DEPARTMENT OF THE ARMY TECHNICAL MANUAL

# DS, GS, AND DEPOT MAINTENANCE MANUAL
# TELETYPEWRITER SETS
# AN/GGC-3 (NSN 5815-00-503-3309)
# AN/GGC-3A (NSN 5815-00-581-9751)
# AN/GGC-53 (NSN 5815-01-012-8772)
# AN/GGC-53A (NSN 5815-00-017-0956)
# AND
# TELETYPEWRITER REPERFORATOR-TRANSMITTERS
# TT-76/GGC (NSN 5815-00-503-2760)
# TT-76A/GGC (NSN 5815-00-553-6061)
# TT-76B/GGC (NSN 5815-00-553-6061)
# TT-76C/GGC (NSN 5815-00-553-6061)
# TT-699/GGC (NSN 5815-01-012-8446)
# TT-699A/GGC (NSN 5815-01-017-9166)
# TT-699B/GGC (NSN 5815-01-017-9166)
# TT-699C/GGC (NSN 5815-01-017-9166)

This copy is a reprint which includes current pages from Changes 1 THROUGH 6.

HEADQUARTERS, DEPARTMENT OF THE ARMY
6 DECEMBER 1965

# WARNING NOTICE

## WARNING

## DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt motor circuits or on the 95- to 250-volt power supply circuits. Serious injury or death may result from contact with these circuits. Turn off the power and discharge all high-voltage capacitators before making any connections or replacing any parts inside the equipment.

**DON'T TAKE CHANCES!**

Change No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 June 1986

**Direct Support, General Support,**
**and Depot Maintenance Manual**
**TELETYPEWRITER SETS**
**AN/GGC-3 (NSN 5815-00-503-3309)**
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TM 11-5815-238-35, 6 December 1966, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the identification number.

| *Remove pages* | *Insert pages* |
|---|---|
| i and ii | i and ii |
| i-1 | 1-1/(1-2 blank) |
| 3-1 and 3-2 | 3-1 and 3-2 |
| 4-48.1 | 4-48.1 |
| 4-143 through 4-148 | 4-143 through 4-148 |
| 4-151 through 4-152.1 | 4-151 through 4-152.1/(4-152.2 blank) |
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2. File this change sheet in the front of the publication for reference purposes.

By Order of the Secretary of the Army.

JOHN A. WICKHAM JR
*General, United States Army*
*Chief of Staff*

Official:

R. L. DILWORTH
*Brigadier General, United States Army*
*The Adjutant General*

DISTRIBUTION:

To be distributed in accordance with DA Form 12-51 literature requirements for AN/GGC-3, -3A, AN/GGC-53, -53A, TT-76,A,B,C/GGC and 12-36 requirements for TT-699,A,B,C.

TECHNICAL MANUAL
No. 11-5815-238-35

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *6 December 1965*

# Direct Support, General Support, and Depot Maintenance Manual

## TELETYPEWRITER SETS AN/GGC-3 (NSN 5815-00-503-3309), AN/GGC-3A (5815-00-581-9751); AN/GGC-53 (5815-01-012-8772); AND AN/GGC-53A (5815-01-017-0956); AND TELETYPEWRITER REPERFORATOR-TRANSMITTERS TT-76/GGC (5815-00-503-2760); TT-76A/GGC, TT-76B/GGC, AND TT-76C/GGC (5815-00-553-6061); TT-699/GGC (5815-01-012-8446); AND TT-699A/GGC, TT-699B/GGC, AND TT-699C/GGC (5815-01-017-9166)

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

**You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5007. A reply will be furnished to you.**



*This manual, together with TM 11-5815-238-12, 6 December 1965, supersedes TM 11-2225, 4 April 1957, including C 1, 6 November 1957; C 2, 19 December 1957, C 3, 8 September 1958; C 4, 2 February 1959; C 7, 8 June 1962, C 8, 18 July 1963, C 9, 4 October 1963; and C 10, 24 February 1964

## LIST OF ILLUSTRATIONS

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# CHAPTER 1

# INTRODUCTION

## 1-1. Scope

*a.* This manual contains information on the functioning, maintenance, and repair of high-level Teletypewriter Set AN/GCC-3 (*) and low-level Teletypewriter Set AN/GGC-53 (*). The major component of Teletypewriter Set AN/GGC-3 (*) is Teletypewriter Reperforator-Transmitter TT-76(*)/GGC. The major component of Teletypewriter Set AN/GGC-53 (*) is Teletypewriter Reperforator-Transmitter TT-699(*)/GGC.

*b.* Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Therefore, Teletypewriter Set AN/GGC-3 (*) refers to Teletypewriter Sets AN/GGC-3 and AN/GGC-3A; Teletypewriter Reperforator-Transmitter TT-76(*)/GGC refers to Teletypewriter Reperforator-Transmitters TT-76/GGC, TT-76A/GGC, TT-76B/GGC, and TT-76/GGC. Teletypewriter Set AN/GGC-53 (*) refers to Teletypewriter Sets AN/GGC-3 and AN/GGC-53A; Teletypewriter Reperforator-Transmitter TT-699 (*)/GGC refers to Teletypewriter Reperforator-Transmitters TT-699/GGC, TT-699A/GGC, TT-699B/GGC and TT-699C/GGC. If reference is not made to a specific model, the information is applicable to all models.

## 1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

## 1-3. Maintenance Forms, Records, and Reports

*a. Reports of Maintenance and Unsatisfactory Equipment.* Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

*b. Report of Packaging and Handling Deficiencies.* Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73B/AFR 400-54/MCO 4430.3H.

*c. Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP)(SF 361) as prescribed in AR 735-11-2/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/ DLAR 4500.15.

## 1-4. Deleted

## 1-5. Reporting Equipment Improvement Recommendations (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, New Jersey ) 07703-5023. We'll send you a reply.

## 1-6. Administrative Storage

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment ,or limited storage are covered in TM 740-90-1.

## 1-7. Destruction of Army Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

# CHAPTER 2

# FUNCTIONING OF EQUIPMENT

## SECTION I. INTRODUCTION

### 2-1. General

This chapter describes the theory of operation of high-level Teletypewriter Reperforator-Transmitter TT-76(*)/GGC and low-level Teletype Reperforator-Transmitter TT-699(*)/GGC. The theory of operation of the TT-76/GGC, TT-76A/GGC, TT-76B/GGC, and TT-76C/GGC is identical, unless otherwise indicated. Similarly, the theory of operation of the TT-699/GGC, TT-699A/GGC, TT-699B/GGC, and TT-699C/GGC is identical unless otherwise indicated. The major electrical components vary considerably between high and low-level units. However, the major mechanical components are the same for high and low-level units. Personnel operating procedures for the keyboard, transmitter distributor, and reperforator of high and low-level units is virtually the same Section I presents the basic principles of teletypewriter communication. Section II gives a general description of the component mechanisms. The detailed theory of the keyboard transmitter is provided in Section III. Section IV presents the theory of the transmitter-distributor. Section V describes the detailed theory of the tape printing and punching mechanism, and Section VI describes the various circuits of the set in detail.

### 2-2. Basic High-Level Teletypewriter System

A basic circuit used for operating two interconnected teletypewriters on a neutral basis is shown in figure 2-1. Impulses sent from either sending contact operate the selector magnets in both teletypewriters. In neutral operation, the selector magnets are operated when signal current flows and released when no current flows, in accordance with a signaling code that determines the character to be transmitted and received. In a basic circuit such as this, each station has a means of sending and receiving. Additional stations, sending units, or receiving units can be added to this basic circuit as required.

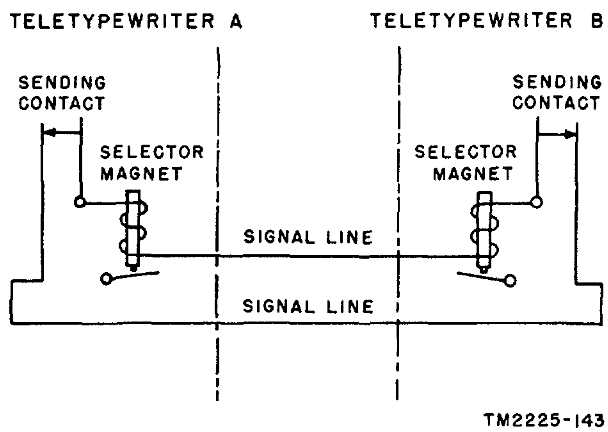



*Figure 2-1. Basic high-level teletypewriter circuit, schematic diagram*

### 2-2.1. Basic Low-Level Teletypewriter System

A basic circuit used for operating two interconnected low-level teletypewriters on a polar basis only is shown in figure 2-1.1 . Negative and positive impulses are initiated at sending teletypewriter A by the opening and closing of the sending contacts. The transmitter module transforms these openings and closings into positive and negative polar 6-volt signals and applies them to the signal line. These polar signals are received by the receiver module of receiving teletypewriter B. After processing by the receiver module, the signal is processed through the selector magnet driver to the selector magnet. Positive impulses cause current to flow through the selector magnet in one direction and negative impulses cause current to flow in the opposite direction. Teletypewriter A is also equipped with receiving components the same as teletypewriter B. Teletypewriter B is also equipped with transmitting components the same as teletypewriter A. Full two-way communication would require four signal lines and transmitters and receivers interconnected.

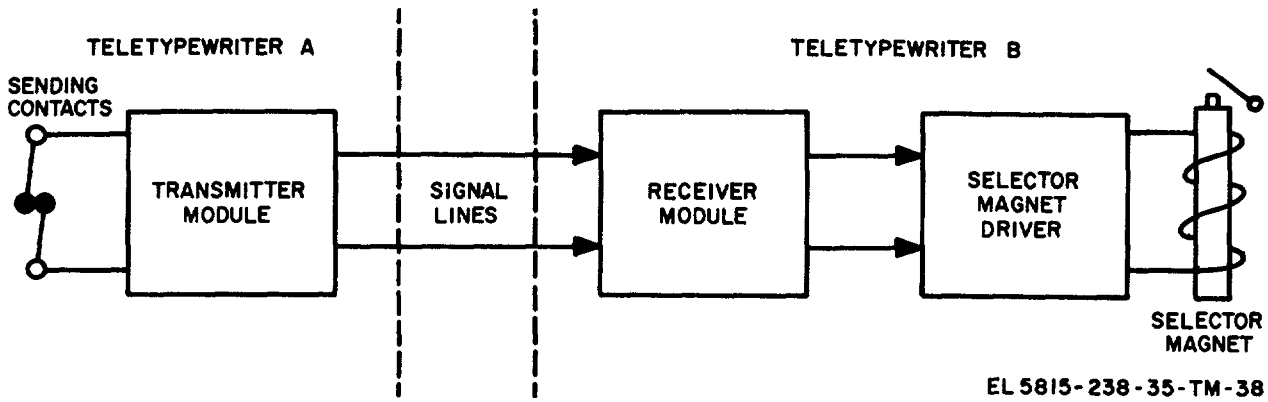



*Figure 2-1.1. Basic low-level teletypewriter circuit, schematic diagram.*

Additional receiving stations may be connected to a sending station on a parallel basis only.

**2-3. Standard Start-Stop, 5-Unit Code**

Signal intelligence is transferred between teletypewriters through the use of a standard start-stop, 5 unit code. The code group for each of the 26 letters of the alphabet and for each of the functional operations requires seven individual impulses. Two of these impulses, the first (start) impulse and the last (stop) impulse, are standard impulses which are used to keep the sending and receiving mechanisms synchronized. The five impulses which may be varied provide 32 code combinations. These code combinations have been assigned to individual letters and functions as shown in figure 2-2.

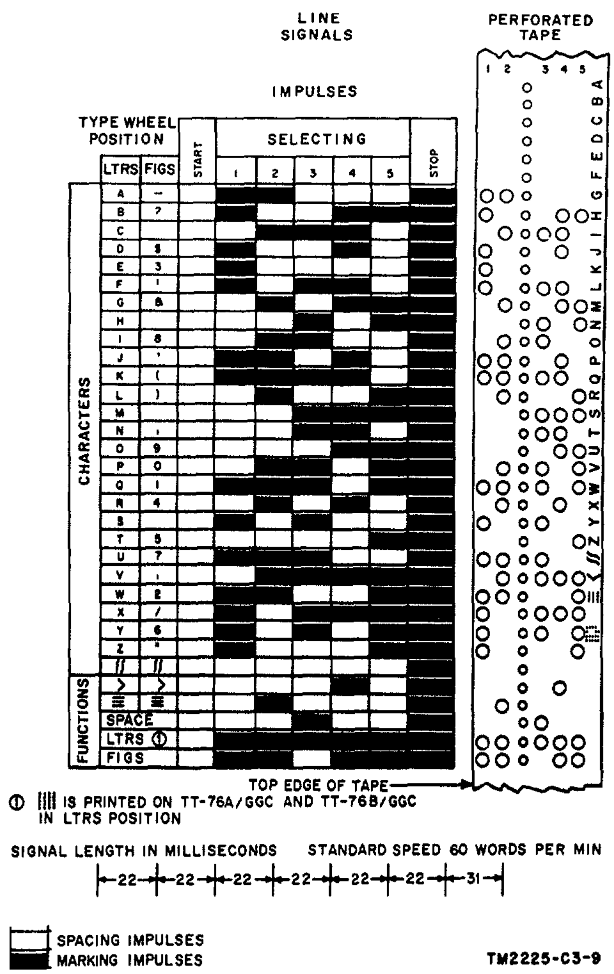



*Figure 2-2. Standard start-stop, 5-unit code chart*

## 2-4. Signaling Code

*a.* In standard teletypewriter operation, the code for different characters always consists of five units or elements of equal length. These equal-length elements are called marking impulses and spacing impulses. Figure 2-3 illustrates the 5-unit code group used for the letter X. Codes for other characters are made by combing five elements in different combinations. Thirty-two different combinations are possible.

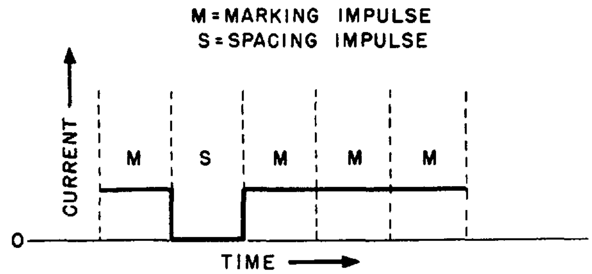



*Figure 2-3. Standard start-stop, 5-unit signal code for the letter X.*

*b.* Standard teletypewriter signals are transmitted by neutral and polar operation. In neutral operation, current flows through the circuit only one direction, marking impulses are current impulses, and spacing impulses are no current impulses. In polar operation, current lows through the circuit in both directions; marking impulses are current impulses in one direction, and spacing impulses are current impulses in the opposite direction, that is, of opposite polarity.

*c.* High-level reperforator TT-76 (*) /GGC is designed to receive both neutral and polar impulses. The key board-transmitter and the transmitter-distributor in these sets are wired to send neutral impulses. Polar signals can be sent only if the transmitters are rewired.

*d.* Low-level reperforator TT-699 (*) /GGC is designed to transmit and receive 6-volt polar impulses only.

## 2-5. Synchronism

Starting and stopping the receiving mechanism in synchronism with the sending mechanism is accomplished by transmitting two additional Impulses with the 5-unit code impulses for each character. The start impulse is a spacing impulse sent immediately preceding the 5-unit code impulses, and the stop impulse is a marking impulse sent immediately following the 5-unit code impulses (fig. 2-4). The start impulse causes the receiving mechanism to start operation when the sending mechanism starts, and the stop impulse causes the receiving mechanism to stop somewhat before the sending mechanism stops. Therefore, even if the receiving mechanism is operating a bit slowly, it still will be brought to a complete stop before the next signal group is sent and will be ready to start in step again. The length of the start impulse is equal to that of one of the 5-unit code impulses, but the length of the stop impulse is 1.42 times as long. This insures that the receiving mechanism will have enough time to complete its functions and come to a complete stop.

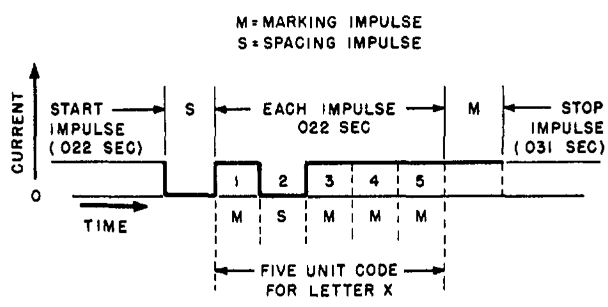



*Figure 2-4. Standard start-stop, 5-unit code signal for the letter X, plus start and stop impulses.*

## SECTION II. FUNCTIONING OF TELETYPEWRITER REPERFORATOR-TRANSMITTER TT-76(*) /GGC AND TT-699(*) /GGC

## 2-6. General

*a.* High-level Teletypewriter Reperforator-Transmitter TT-76(*)/GGC consists of: a keyboard-transmitter, transmitter-distributor, and a reperforator, which are mounted together on a common base. Each unit is electrically capable of independent operation, depending on the type of operation desired.

*b.* Low-level Teletypewriter Reperforator Transmitter TT-76(*)/GGC consists of the same basic components as the high-level unit. However, electronic modules and a 30-vdc power supply are added to process the low-level signal. Transmitter modules are added to the keyboard and transmitter-distributor transmitter circuitry. A receiver module and a selector magnet driver module are added to the reperforator circuitry. Except for the low-level circuit modules used to process the low-level electrical impulses, the low level reperforator-transmitter functions identically with the high-level unit.

*c.* The keyboard-transmitter and transmitter distributor are capable of transmitting standard 5-unit, start-stop code to the signal line. The reperforator is capable of receiving standard start stop, 5-unit code.

**2-7. Set Component Relationship**

*a.* Figure 2-5 shows in simplified form the relationship between the major electrical and mechanical components of two interconnected Teletypewriter Sets AN GGC-3 (*). The sending mechanisms controlled by the keyboard-transmitter and transmitter-distributor operate sending contacts to transmit electrical 5-unit code signals. The selector magnet (at both teletypewriters) responds to these signals to position a group of five code rings in the selector mechanism, which in turn controls the character printed and perforated by the reperforator.

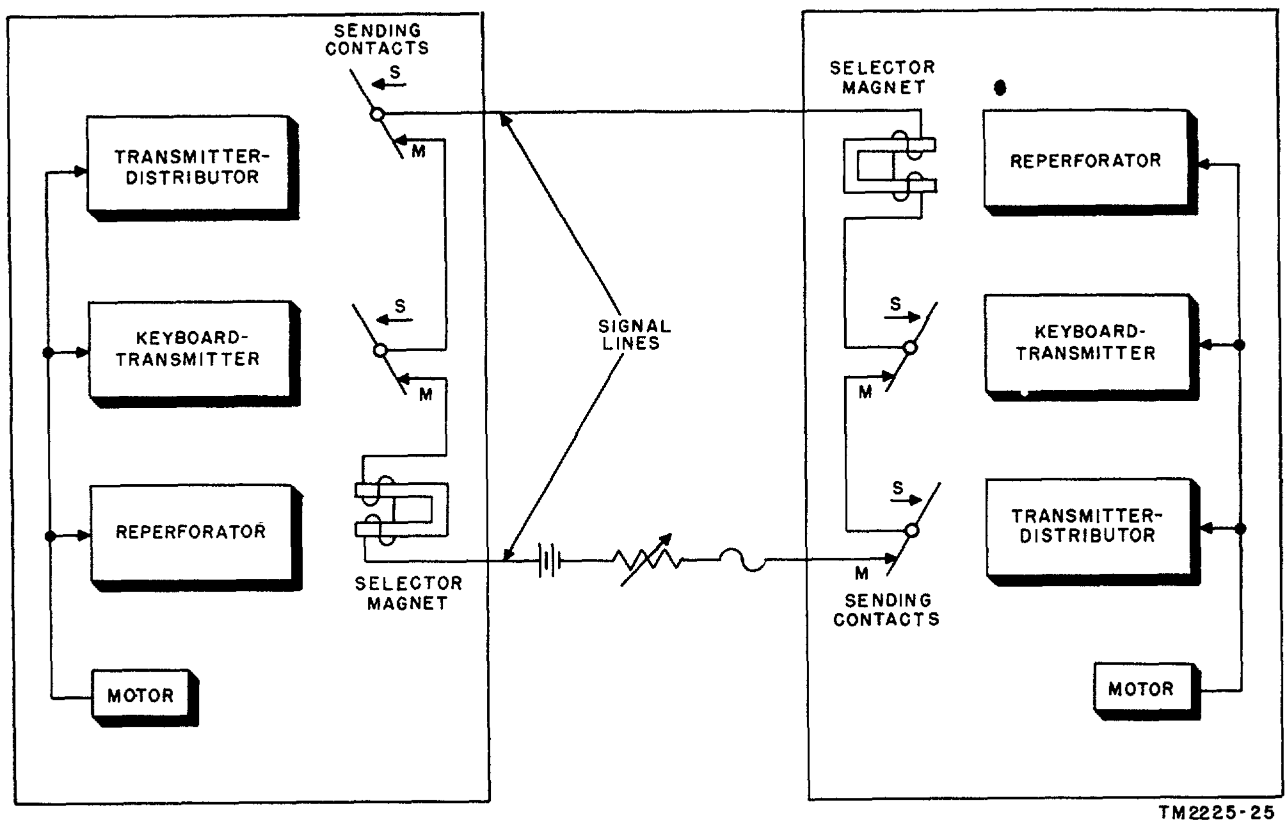



*Figure 2-5. Interconnected Teletypewriter Reperforator-Transmitters (TT-76(*)/GGC).*

*b.* Figure 2-5.1 shows in simplified form the relationship between the major electrical and mechanical components of two interconnected low-level Teletypewriter Sets AN/GGC-53 (*). The sending mechanisms controlled by the keyboard-transmitter and transmitter-distributor operate sending contacts to transmit (via a line transmitter module) electrical 5-unit code signals. The selector magnet at the receiving unit responds (via the receiver and selector magnet driver modules) to these signals to position a group of five code rings in the selector mechanism, which in turn, controls the character printed and perforated by the reperforator.

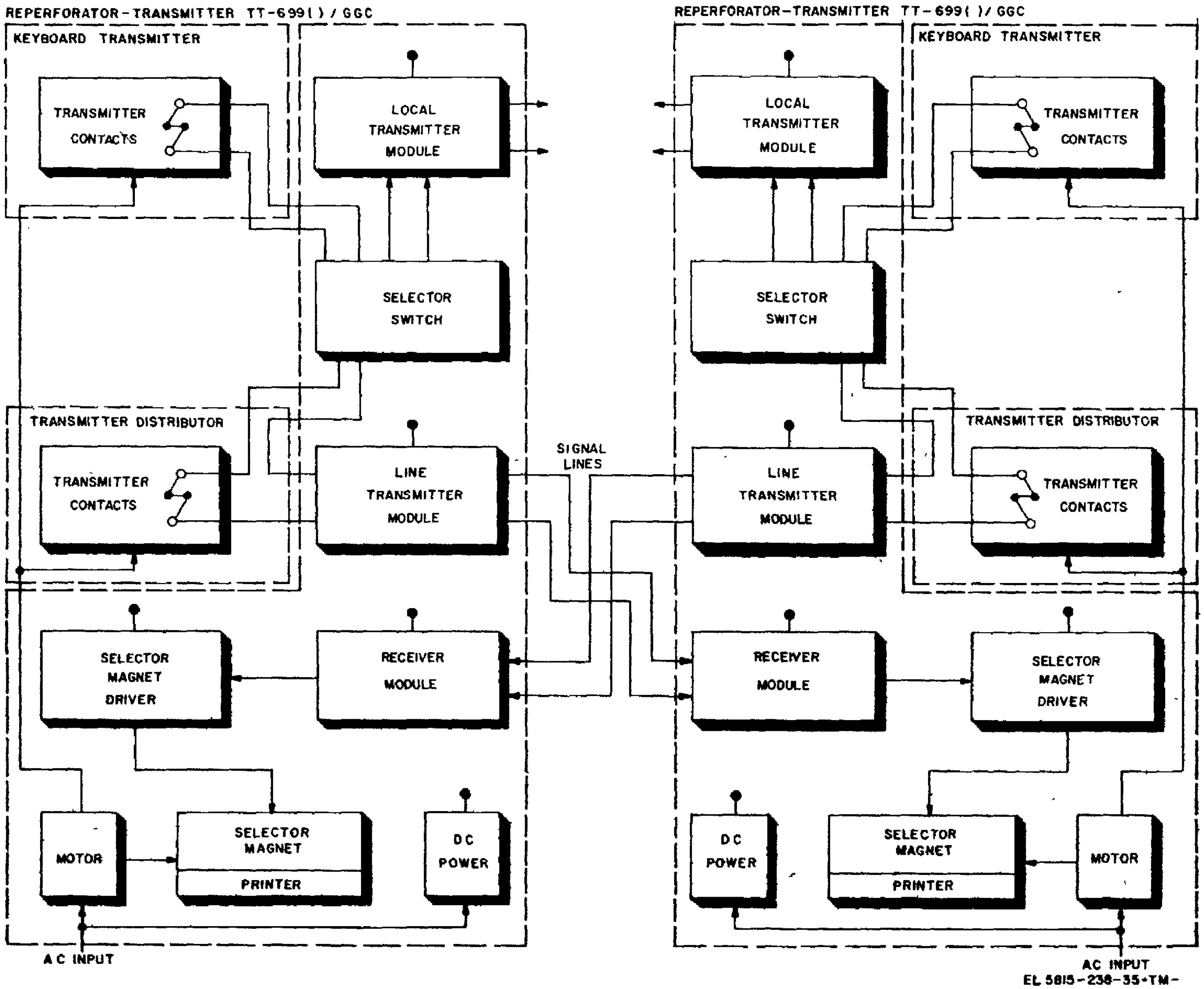



*Figure 2-5.1. Interconnected Teletypewriter Reperforator-Transmitters TT-699(*)/GGC.*

*c.* The mechanisms of each set are driven by a constant speed motor. All mechanisms must operate in synchronism so that the same code signals will be undergoing transformation at both the sending and the receiving ends. The motors of all teletypewriters are set to run at the same speed. However, since there are always small variations in speed between independent motors, the sending and receiving mechanisms in the two communicating teletypewriters will inevitably get out of step. Unless these speed differences are compensated for, they will result in the printing of wrong characters at the distant receiving machine. To guarantee that the receiving mechanism always will be in step (synchronized) with the sending mechanism, both mechanisms are stopped by clutch action after the transmission of each code groups. Starting both mechanisms together at the beginning of each code group prevents the accumulation of small variations in speed.

**2-8. Motor**

The series governed motor operates on 105 -to 125-volt regulated or unregulated ac and is governed to run at 3,600 rpm. The armature and field coils are in series with the contacts of the motor governor assembly and MOTOR switch. The governor contacts are normally closed, but are opened with the motor speed increases about the allowable maximum. This places a resistor (fig. 6-1) in series with the motor armature and field coils and causes the voltage and thus the speed of the motor to decrease. When the proper speed is reached the governor contacts close again. A resistor in combination with a capacitor also acts as a spark suppressor for the governor contacts. A motor filter suppresses radio frequencies generated by the governor contacts and the motor commutator. The suppression of these frequencies lessens Interference with associated electronic equipment.

**2-9. Governor**

*a.* The motor governor assembly is adjustable to permit the motor speed to be maintained at precisely 3,600 rpm. The governor is mounted on the motor shaft and rotates with it. The governor contacts points are connected in series with the field coils and armature of the motor through two slip rings (located on the back of the motor speed governor base), which are contacted by two brushes in the motor housing. The movable electrical contact of the governor (fig. 2-6) is flexible and is held against the stationary electrical contact by a coil spring until the motor speed exceeds 3,600 rpm. When this occurs, the centrifugal force acting on the movable electrical contact is greater than the tensions of the spring. The movable electrical contact then moves away from the stationary electrical contact. The speed at which this movement will occur depends on the tension applied to the spring by the governor adjusting lever, which should be adjusted while the motor is running by manipulating the governor worm shaft.

*b.* The governor worm has two integral threaded portions, one right and one left hand. Complete instructions for adjusting the motor speed are given in TM 11-5815-238-12.

**2-10. Power Shaft and Power Distribution**

Motion is distributed to the mechanisms of the set by the motor through a drive gear set (fig. 2-7). This drive gear set consists of a removable worm gear on the motor shaft and

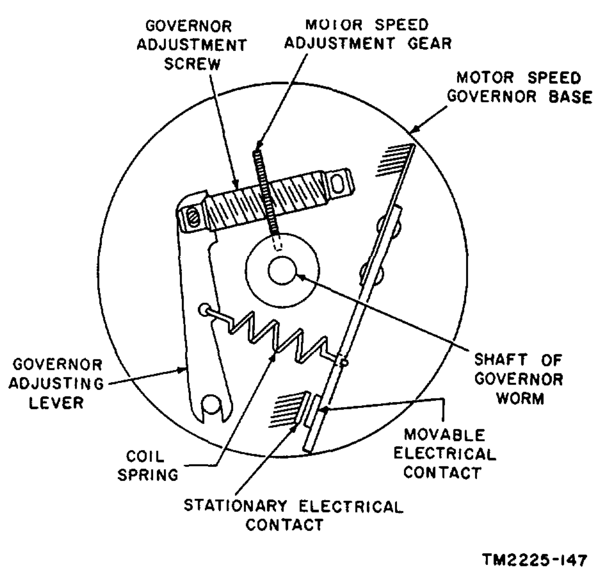



*Figure 2-6. Motor governor, functional view.*

a fiber worm gear fastened to the right end of the power shaft. The reperforator-transmitter is equipped with gears for operating at a standard speed of 368.1 (60 wpm) opm but can be altered for speeds of 404, 460, or 600 opm by changing the gear set. When shipped from the factory, a 600- (100 wpm) opm gear set is supplied as accessory equipment and is located on mounting studs at the right rear of the motor. Alternate 404- (66 wpm) or 460- (75 wpm) opm gear sets are obtainable through normal supply channels. The power shaft rotates constantly when the set is In operation and transfers power to the entire assembly through friction clutches and gears.

## 2-11. Friction Clutches

*a.* Power for the keyboard-transmitter and transmitter-distributor camshafts is received through friction clutches (fig. 2-8) mounted on the ends of the keyboard-transmitter and

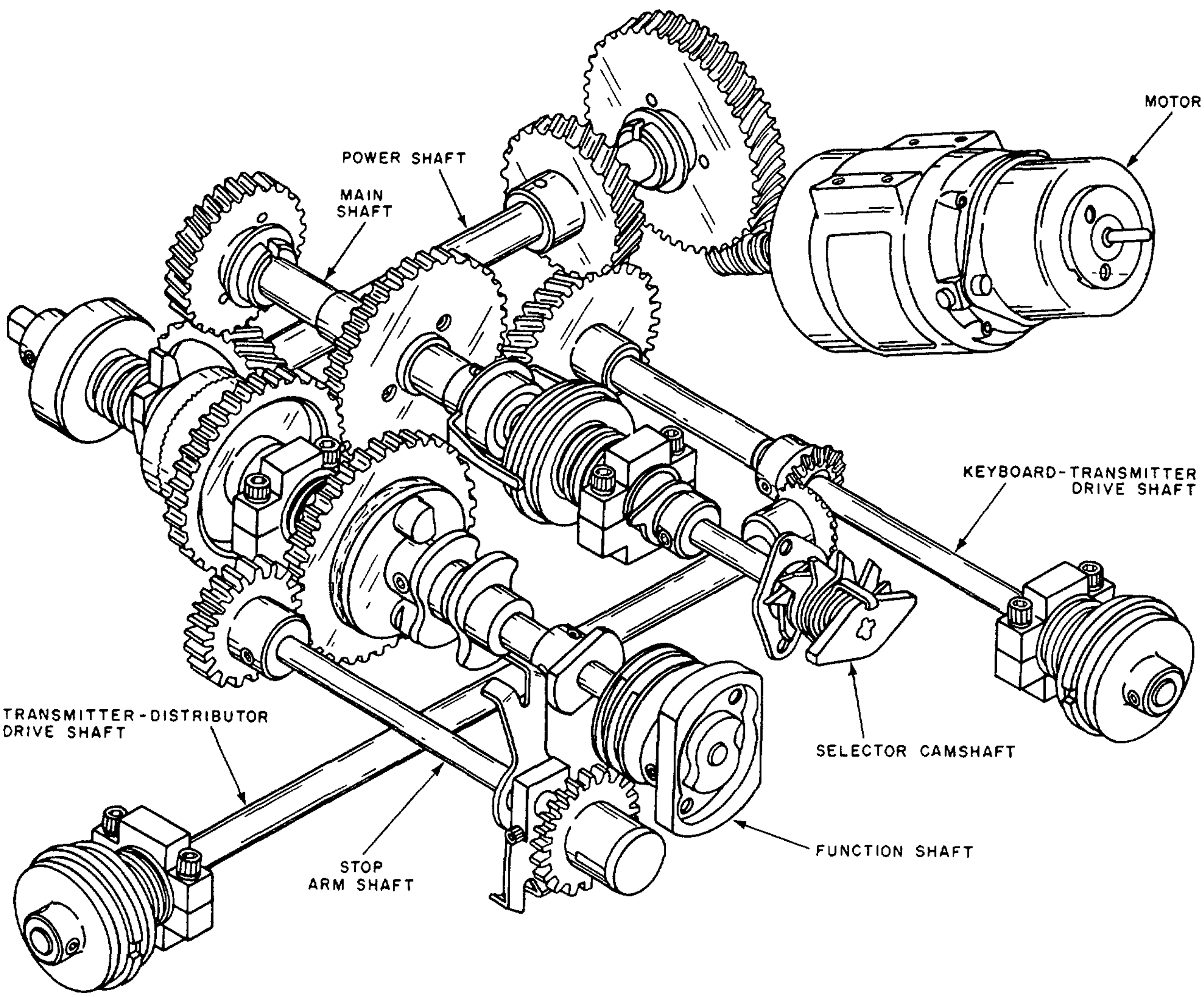





*Figure 2-7. Mechanical power distribution.*

transmitter-distributor drive shafts. These friction clutches make rapid start and stop actions possible. The fork of each driven camshaft engages the notches on the clutch driver plate of the clutch. Two felt plates on the driving shaft are hold against the clutch driver plate by spring pressure. The spring pressure can be increased or decreased by tightening or loosening the clutch collar, increasing or decreasing the torque transmitted through the clutch. The clutch driver disk has projections which engage holes in the felt plates. This causes the clutch driver disk and the felt plate to rotate in unison. Friction between the felt plates and the outer clutch disks is sufficient to rotate the driven shaft under a normal work load. When a greater load is placed on a clutch (when the cam stop lever is blocking the rotation of the transmitter camshaft), the friction is overcome and slipping occurs at the friction surfaces. This allows the driven shaft to stop, but maintains a steady torque on the shaft to permit it to resume rotation immediately when the blocking force is removed.

*b.* The operation and design of the selector camshaft friction clutch is identical to that of the transmitter friction clutches. The design of the function shaft friction clutch Is different from the others, but its operating principle is the same.

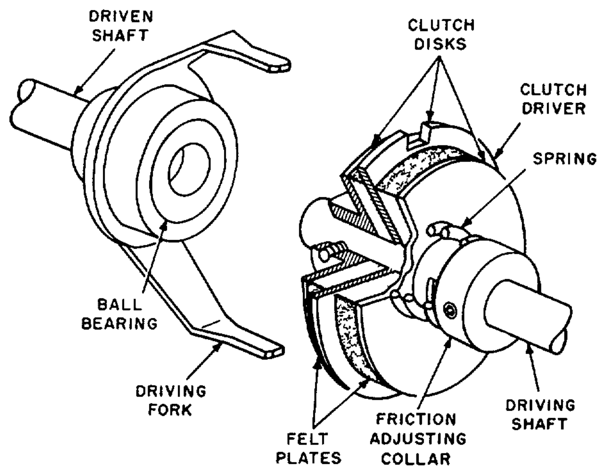



*Figure 2-8 . Typical friction clutch.*

## SECTION III. KEYBOARD TRANSMITTER

### 2-12. General

The keyboard-transmitter converts the mechanical positioning that occurs when a key lever is depressed, into a series of current and no current impulses on high-level units. ON low-level units, the conversions are to positive and negative current impulses. These series of current and no-current impulses or series of opposite polarity current impulses make up the teletypewriter code group for the letter or function represented by the depressed key lever. It consists of key levers (fig. 2-9), code bars, and sensing levers that are used in selecting code groups to be transmitted; a transmitter camshaft, selector levers, and transmitting contacts used to transmit the selected code group, and a universal bar, cam-stop lever, and friction clutch used to start and stop transmission.

### 2-13. Transmitting Mechanism

*a.* The five code bars used to set up the mechanical form of the code are located under the key levers (fig. 2-10). They run the width of the keyboard-transmitter and can be engaged by pressing any key lever. Each code bar is notched in one of two ways at the point where it is engaged by each key lever. The sides of these notches are slanted to the right or to the left. The downward movement of a key lever pushes the code bars either to the right or left. The notches are cut so that the first code bar will move to the right (A, fig. 2-11) for high-level units, or (A, fig. 2-11.1) for low-level units if the first unit of the code for the key pressed is a marking signal. If the second unit of the code is to be a spacing signal, the movement of the second code bar will be to the left (B, fig. 2-11) for high-level units or (B, fig. 2-11.1) for low-level units.

*b.* The universal bar (fig. 2-10) is mounted in front of the code bars and is notched in such a way that depressing any key lever causes that key lever to strike the slanted portion of the notch, camming the universal bar to the right. As it moves to the right it strikes the universal bar adjusting screw on the locking lever latch, pivoting the locking lever latch counterclockwise. As the locking lever latch

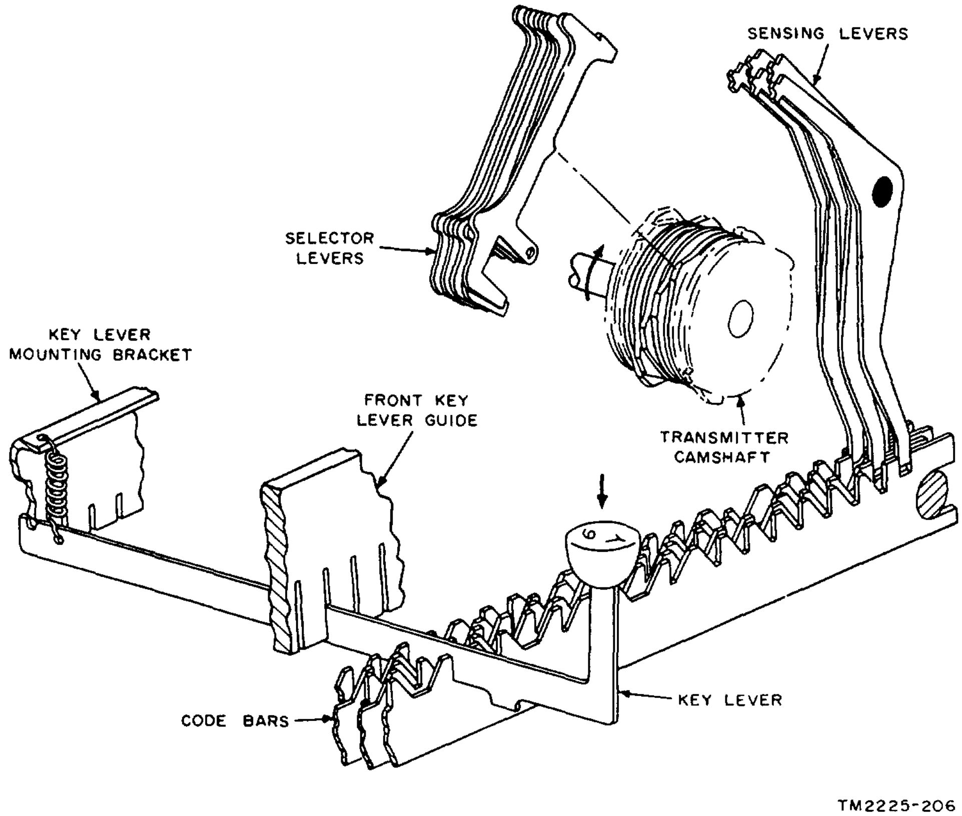



*Figure 2-9. Mechanical form of 5-unit code being set up by operation of a key lever.*

and its assembled repeat blocking lever are pivoted, the repeat blocking lever strikes and is held by the cam-stop lever, forming a slot between the locking lever latch and the repeat blocking lever. The cam-stop lever is pulled into this slot by its spring, permitting the cam-stop lever to pivot far enough to clear the tooth on the transmitter camshaft. Since the transmitter camshaft is no longer blocked, the friction clutch rotates the camshaft to start transmission.

*c*. The positions of the code bars are transformed into electrical signals by the positioning of the transmitter contact. The positioning of the transmitter contact is controlled by the code bars, the five rotating cams on the transmitter camshaft, the five selector levers, (fig. 2-9) Each code bar moves only its associated sensing lever. Any selector lever, however, will actuate the transmitter contacts when the selector lever is moved by its associated cam. The five cams are positioned so that they operate their associated selector levers and transmitter contact In sequence as the transmitter camshaft rotates. To send marking signals, a code bar shifted to the right turns its mating sensing lever counterclockwise so that the end of the sensing lever engages and latches the upper end of the selector lever. When the lobe of the mating cam raises the midpoint of the selector lever its lower end slides on the bearing shoe and closes the transmitter contact. To send spacing signals, a code bar shifted to the left turns its mating sensing lever clockwise, so that the end of the sensing lever does not latch the upper end of the selector lever. When the lobe of the mating cam raises the midpoint of the selector lever, its upper end moves and permits the contact bail spring to open the transmitter contact.

*d.* When a key lever is depressed, the sensing levers (fig. 2-9) are locked in position until the code group is completed. Pressing another key lever right away will not interfere with the settings. This locking is accomplished by the sensing lever locking bail (fig. 2-10), that drops and engages the upper ends of the sensing levers.

*e.* When the keyboard-transmitter is at rest, the key levers (fig. 2-9) are held in the raised position by the key lever springs. The code bars are shifted to the left or to the right as they were positioned by the last key lever depression. The universal bar (fig. 2-10) which is mounted immediately in front of the code bars is held to its left position by the universal code bar return spring. The sensing levers which engage the notches at the right side of the code bars are pivoted clockwise or counterclockwise depending on the position of their associated code bars. The clockwise pivoted sensing levers (B, fig. 2-11) for high-level units or (B, fig. 2-11.1) for low-level units are out of engagement with their associated selector levers while the counterclockwise pivoted sensing levers latch the notch of their associated selector levers. The permanently latched start stop selector lever is held in the marking position by its mating cam on the transmitter camshaft, holding the transmitter marking contacts closed. The sensing lever locking bail (fig. 2-10) is held clear of the sensing levers by its mating cam. The locking lever latch is pivoted in its counterclockwise position, held there by the locking lever latch spring In this position, the locking lever latch holds the cam-stop lever in its counterclockwise position in the path of the tooth on the transmitter camshaft, blocking the rotation of the transmitter camshaft. This causes the keyboard-transmitter friction clutch to slip without transferring motion to the transmitter camshaft. The sequence of operations that occurs when any key lever other than the REPEAT key lever is depressed is summarized in the chart below.

*Keyboard Sending Sequence Chart*

| | | |
|---|---|---|
| 1. | Key lever or space bar pressed. | |
| 2. | Key lever or space bar strikes slanted groove of universal bar camming the universal bar to the right (fig. 2-10). | Key lever or space bar strikes slanted grooves of the five code bars camming them Individually to the right or left according to code (fig. 2-11). |
| 3. | Universal bar strikes adjusting screw pivoting locking lever latch counterclockwise (fig. 2-10). | Code bars turn the five sensing levers Individually counterclockwise or clockwise (fig. 2-11). |
| 4. | Repeat blocking lever on locking lever latch strikes the cam-stop lever and Is pivoted clockwise causing a slot between the repeat blocking lever and locking lever latch Cam-stop lever dropped between locking lever latch and repeat blocking lever (fig. 2-10) permits rotation of the transmitter camshaft. | |
| 5. | Transmitter camshaft released by the cam-stop lever starts revolving (fig. 2-10) as friction clutch operates. | Sensing lever locking bail pivoted counterclockwise by the sensing lever locking bail spring as the locking bail moves off the high point of the locking bail cam locking the five sensing levers (key lever may be released at any time hereafter) (fig. 2-10) |
| 6. | No 6 selector lever (permanently latched) drops off cam to permit the selector lever to pivot counterclockwise moving away from the transmitter contact. | |
| 7. | Contact bail spring turns transmitter contact counterclockwise opening contacts (fig. 2-11). | |
| 8. | Start (no current) impulse sent. | |
| 9. | First 5 unit code Impulse cam raises No 1 selector lever. | |
| 10. | If latched by sensing lever lower end of selector lever No. 1 turns transmitter contact clockwise; if not latched by sensing lever, contact bail spring turns transmitter contact counterclockwise (fig. 2-11). | |

*Keyboard Sending Sequence Chart-Continued*

| | |
|---|---|
| 11. | Mark impulse or space impulse sent, depending on whether transmitter contact turned clockwise or counterclockwise (fig. 2-11). |
| 12. | Second. third, fourth, and fifth code impulses sent by corresponding parts of the transmitter mechanism as for the first code impulse (fig. 2-11). |
| 13. | Cam-stop lever restoring cam raises cam-stop lever (fig. 2-10). |
| 14. | Cam-stop lever latched in up position by repeat blocking lever if universal bar is still shifted or by locking lever latch if universal bar has been released by key lever (fig. 2-10). |
| 15. | Stop-cam lever raises No. 6 selector lever (permanently latched). |
| 16. | Lower end of No. 6 selector lever turns transmitter contact clockwise, closing contacts. |
| 17. | Stop (current) impulse sent. |
| 18. | Tooth on transmitter camshaft strikes cam-stop lever and transmitter camshaft stops revolving (having completed a one-half revolution) (fig. 2-10). |
| 19. | Key lever must be released before above sequence can be repeated for any other or the same key lever to allow locking lever latch to return under cam-stop lever (fig. 2-10). |

High-level unit, see figure 2-10.1 for low-level unit.
High-level unit. Negative impulse sent from transmitter module on low-level units.
High-level unit. Positive impulse sent from transmitter module on low-level units.

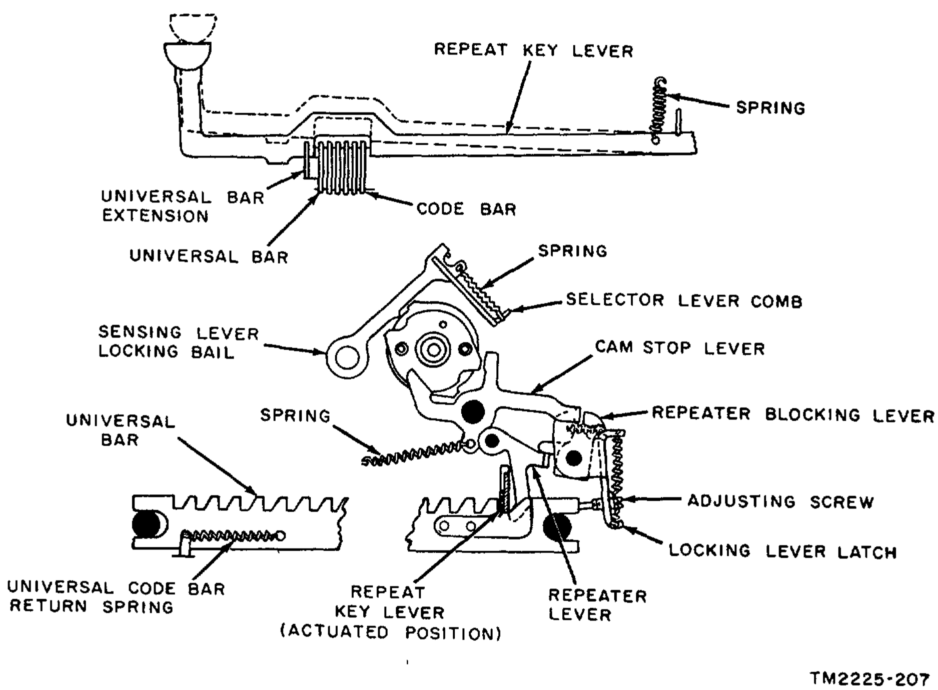



*Figure 2-10. Transmitter camshaft control mechanism.*

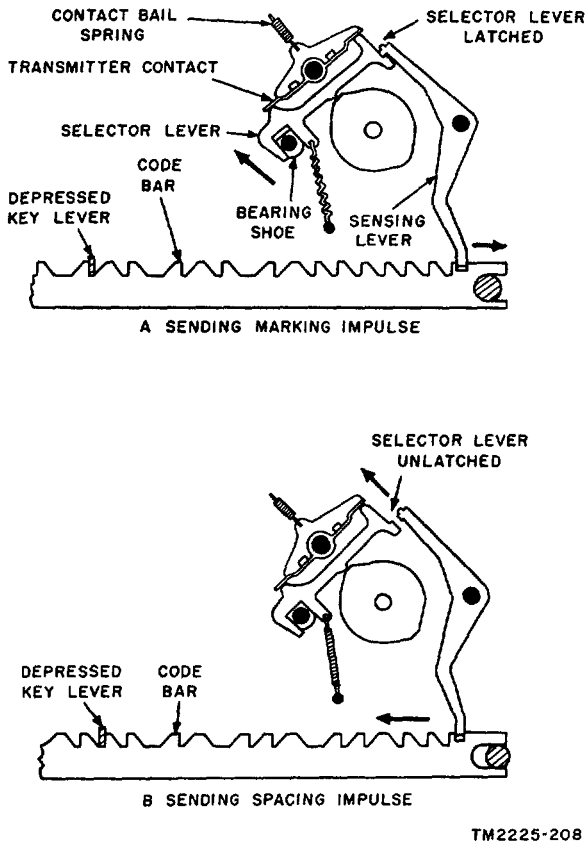



*Figure 2-11. Operation of keyboard-transmitter transforming mechanical settings into electrical Impulses (high-level units).*

(Page 2-11 Deleted including Fig. 2-11.1)

## 2-14. Character Repeat Feature

The character repeat feature of the key-board-transmitter permits the repeated sending of any letter or function as long as the key lever associated with that letter or function and the REPEAT key lever are held down. The transmitting mechanism is in its normal, at rest position as described in paragraph (2-13e) prior to the depression of the REPEAT key lever. In the at rest position, the REPEAT key lever is raised and the repeat lever (fig. 2-12) is pivoted clockwise, out of engagement with the repeat blocking lever In this position, the slanting finger of the repeat lever is in the downward path of the REPEAT key lever. The repeat blocking lever is held counterclockwise by its spring. The sequence of operations that occurs when the REPEAT key lever is depressed is summarized below:

*Repeat Sending Sequence Chart*

| | |
|---|---|
| 1. | REPEAT key lever depressed (fig. 2-10) |
| 2. | Same sequence of operations takes place as in paragraph 2-13 up to the point where cam-stop lever restoring cam raises cam-stop lever REPEAT key is either released or still depressed at this point. Rest of sequence is identical with the chart in paragraph 2-13e if key is released. If REPEAT key lever is still depressed, sequence given below takes place. |
| 3. | Repeat key lever strikes angled finger of the repeat lever, pivoting It counterclockwise. |
| 4. | Repeat lever pivots repeat blocking lever (fig. 2-12), holding it in its clockwise position. |
| 5. | Restoring cam moves clear of cam-stop lever (fig. 2-10). |
| 6. | Cam-stop lever drops again since it is not blocked by the repeat blocking lever (fig. 2-10). |
| 7. | Stop cam raises No. 6 selector lever (permanently latched). |
| 8. | Lower end of No. 6 selector lever turns transmitter contact clockwise, closing contacts. |
| 9. | Stop (current) impulse sent. |
| 10. | Tooth on transmitter camshaft passes cam stop lever (fig. 2-10). |
| 11. | Transmitter camshaft continues to turn and sequence above starts again, since it is not blocked by the cam stop lever. |

## 2-15. Character Counter and End of Line Indicator Mechanism

A mechanical counter and end of line indicator mechanism (figs. 2-13, 2-14 or 2-15) Are provided with the keyboard-transmitter of this set. Both mechanisms are located behind the top, row of keys. The character counter mechanism is operated each tune a key lever is depressed, except the FIGS, LTRS, LINE FEED, and CAR. RET key levers. The purpose of the character counter is to indicate to the operator the number of characters perforated in the paper tape or sent out on the signal line since the last depression of the CAR RET key. When the END OF LINE INDICATOR lamp lights, the operator is warned that the character counter is six spaces from the right margin of a standard line of type. A warning

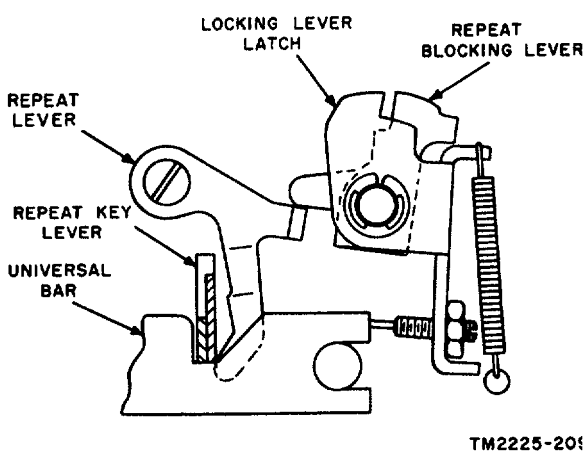



*Figure 2-12. Repeat mechanism.*

bell is also installed audibly warn the operator that the character counter Is six spaces from the right margin.

*a. Operation of Character Counter Mechanism.*

(1) The indicated carriage (fig. 2-13, 2-14 or 2-15) is advanced each time a key lever or the space bar is depressed. The FIGS, LTRS, LINE FEED, and CAR RET key levers do not advance the indicator carriage of the keyboard-transmitter because reception of those function code groups at the receiving page printing machine does not space the type bar carriage to the right.

(2) In the at rest position, the line indicator cam follower (fig. 2-16) is held clockwise in the path of the line indicator cam on the transmitter camshaft. The ratchet pawl which is mounted on the line indicator cam follower is so aligned to permit it to engage the ratchet wheel (fig. 2-13) when the ratchet pawl is moved upward by the line indicator cam follower. The indicator return spring is partially wound, and applies torque that would rotate the line indicator drive shaft toward the rear if its rotation was not blocked by the ratchet wheel detent that has engaged one of the ratchet wheel teeth, preventing rearward rotation of the line indicator drive shaft. The bore of the indicator carnage on the line indicator drive shaft has an internal projection that engages the spiral groove of the line indicator drive shaft, forcing the indicator carnage to the left or right when the line indicator drive shaft is rotated. The sequence of operations that occurs when the character counter mechanism operates is summarized in the chart below:

*Character Counter Mechanism Sequence Chart*

| | |
|---|---|
| 1. | Any key lever or space bar depressed.[a] |
| 2. | Transmitter camshaft starts to rotate. |
| 3. | Restoring cam strikes the line indicator follower and moves it counterclockwise. |
| 4. | Right extension of cam follower raises ratchet pawl. |
| 5. | Ratchet pawl engages a tooth on the ratchet wheel and rotates line Indicator drive shaft one tenth revolution. |
| 6. | Rotation of line Indicator drive shaft moves indicator carriage one space to the right. |
| 7. | Ratchet wheel detent holds line indicator drive shaft in advanced position against the torque of the indicator return spring. |

[a]Except FIGS, LTRS, LINE FEED, and CAR RET key levers

*Note*. The indicator drive shaft return spring used with the TT-76B/GGC is a coiled torsion type spring. It is located inside the drive shaft and is secured on the left by a keyed support stud (figs. 2-14 and 4-7).

(3) The character counter mechanism prevents the movement of the indicator mechanism when the FIGS, LTRS, or LINE FEED key levers are depressed. Prior to depressing any of these key levers, the character counter mechanism Is in the at rest position described in (2) above. The function blocking bar is shifted to the left so that the slanting fingers are in downward path of the FIGS, LTRS, or LINE FEED key levers. The sequence of character counter operations that occurs when any of these key levers is depressed is summarized in the chart below:

*FIGS, LTRS or LINE Feed Sequence Chart*

| | |
|---|---|
| 1. | FIGS, LTRS, or LINE FEED key lever depressed. |
| 2. | Selected key lever strikes angled finger associated with it and moves the function blocking bar partially to the right. |
| 3. | The right projection on the function blocking bar moves the ratchet pawl counterclockwise out of engagement with the ratchet wheel. |
| 4. | Cam follower lifts the ratchet pawl which moves past the ratchet wheel. |
| 5. | Line indicator drive shaft is held stationary by the ratchet wheel detent Indicator carriage Is not advanced. |

*Note*. On the TT-76B/GGC serial numbers 256 and above, Order No. 13931-PC-58 and TT-76C/GGC, a carriage return blocking bar (fig. 2-17) has been added. The function blocking bar has been modified and is fastened to the front key lever guide stud by a spring. This allows the function blocking bar to be moved independently of the carriage return blocking bar when the figures, letters, or line feed key levers are depressed. When the function blocking bar moves, the subsequent action Is the same as described in (3) above.

(4) On the TT-76/GGC, TT-76A/GGC, and TT-76B/GGC, serial numbers 256 and above, Order No. 13931-PC-58, the indicator carriage is returned to the left margin when the CAR. RET. key lever is depressed. The character counter mechanism is in the at rest position as described in (2) and (3) above prior to depressing of the CAR. RET. key lever. The return latch (A, fig. 2-13 or A, fig 2-14) is blocked in its clockwise position by the left projection of the function blocking bar which is shifted to the left In this position CAR. RET. finger on the function blocking bar is in the downward path of the CAR. RET. key lever. The sequence of the character counter operations that occurs when the CAR. RET. key lever is depressed is summarized in the chart below.

*Carriage Return Sequence Chart (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC serial Nos. 255 and below, Order No. 13931-PC-58)*

| | |
|---|---|
| 1. | CAR. RET. key lever depressed (fig. 2-18). |
| 2. | Selected key lever strikes the finger which is more sharply angled than the fingers associated with the other function key levers, shifting the function blocking bar to the far right. |
| 3. | Ratchet pawl and ratchet wheel detent moved out of the path of the ratchet wheel by projections on the function blocking bar. |
| 4. | Function blocking bar latched in extreme right position by the return latch. |
| 5. | Line indicator drive shaft, released by the ratchet wheel detent, rotates toward the back of the keyboard transmitter driven by the indicator return spring. |

*Carriage Return Sequence Chart (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC serial Nos. 225 and below, Order No. 13931-PC-58)-Continued*

| | |
|---|---|
| 6. | Indicator carriage moves to the left striking a projection on the return latch. |
| 7. | Return latch pivots clockwise releasing the function blocking bar. |
| 8. | Function blocking bar returned to normal position by Its spring. |
| 9. | Ratchet pawl and ratchet wheel detent, released by projection on function blocking bar, re-engages the ratchet wheel. |
| 10. | Indicator carriage at zero position. |

(5) On the TT-76B/GGC, serial Nos. 256 and above, Order No. 13931-PC-58, a carriage return blocking bar (fig. 2-17) has been added and a modified function blocking bar has been fastened to the front key lever guide stud by a spring. When the carriage return key lever is depressed, both the function blocking bar and the carriage return blocking bar move to the right. When either the line feed, letters, or figures key levers are depressed only the function blocking bar moves to the right. The sequence of operation when the CAR. RET. key lever is depressed is summarized in the chart below.

*Carriage Return Sequence Chart*

| | |
|---|---|
| 1. | When the carriage return key lever is depressed, it strikes the carriage return finger on carriage return blocking bar (fig. 2-19). |
| 2. | The carriage return blocking bar shifts to the right and a projection on the carriage return blocking bar moves the function blocking bar to the right. |
| 3. | The carriage return blocking arm and the function blocking arm contact the ratchet wheel detent and ratchet feed pawl and moves them counterclockwise out of engagement with the ratchet wheel. |
| 4. | The return latch, under pressure of its spring, rotates counterclockwise and latches the return latch bracket. |
| 5. | The indicator carriage, driven by the line indicator drive shaft return spring, returns to the left. The indicator carriage strikes the return latch and rotates it clockwise, unlatching it from the return latch bracket. |
| 6. | A spring on the function blocking bar returns the function blocking bar and the carriage return blocking bar to the left. The ratchet wheel detent and the feed pawl engage the ratchet wheel |

*b. Operation of End of Line Indicator Mechanism*. The end of line indicator mechanism operates as follows:

(1) If tape is being originated at the local keyboard-transmitter, the END OF LINE INDICATOR lamp will light to warn the operator of the approach of the end of a line. When the lamp is lighted, the operator should depress the CAR. RET. key lever to return the indicator carriage to the zero position. The END OF LINE INDICATOR lamp should light when the indicator carriage is six spaces from the right margin of a standard line of typing (normally the 66th character on machines equipped with standard communication keyboards). The indicator carriage guide roller moves against the switch actuating arm (fig. 2-20) and pivots the arm clockwise slightly. As the switch

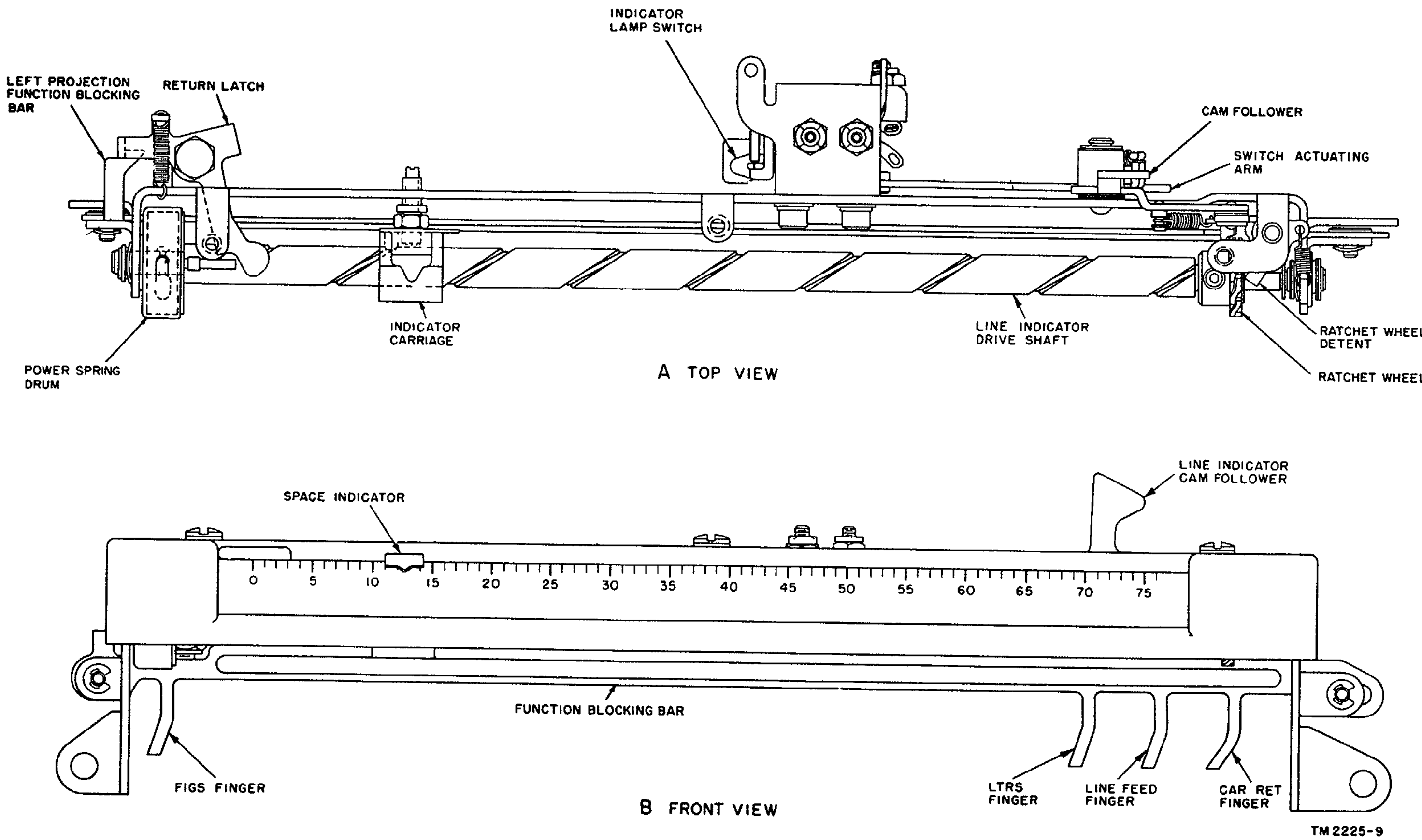





*Figure 2-13. Character counter and end of line indicator mechanism (TT-76/GGC and TT-76A/GGC).*

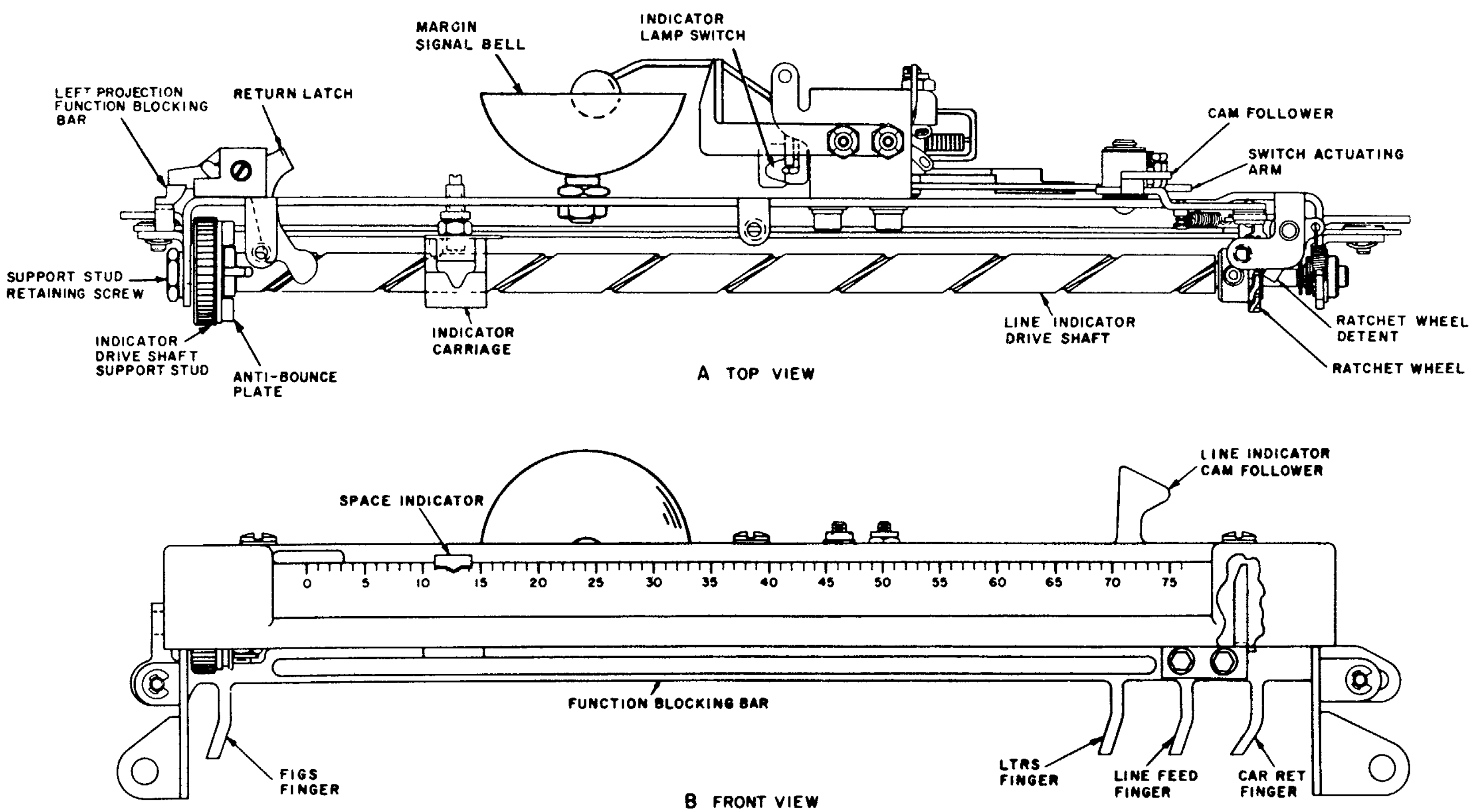



*Figure 2-14. Character counter and end of line indicator mechanism (TT-76B/GGC serial Nos. 255 and below, Order No. 13931-PC-58).*

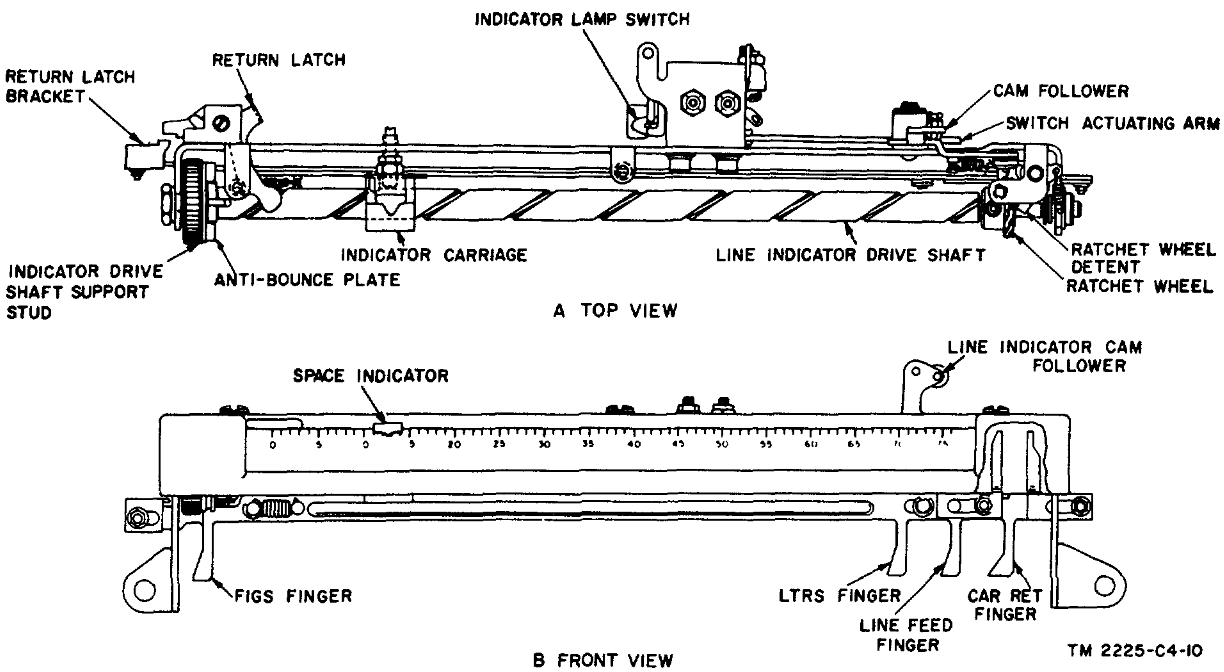



*Figure 2-15. Character counter and end of line indicator mechanism (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and TT-76C/GGC*

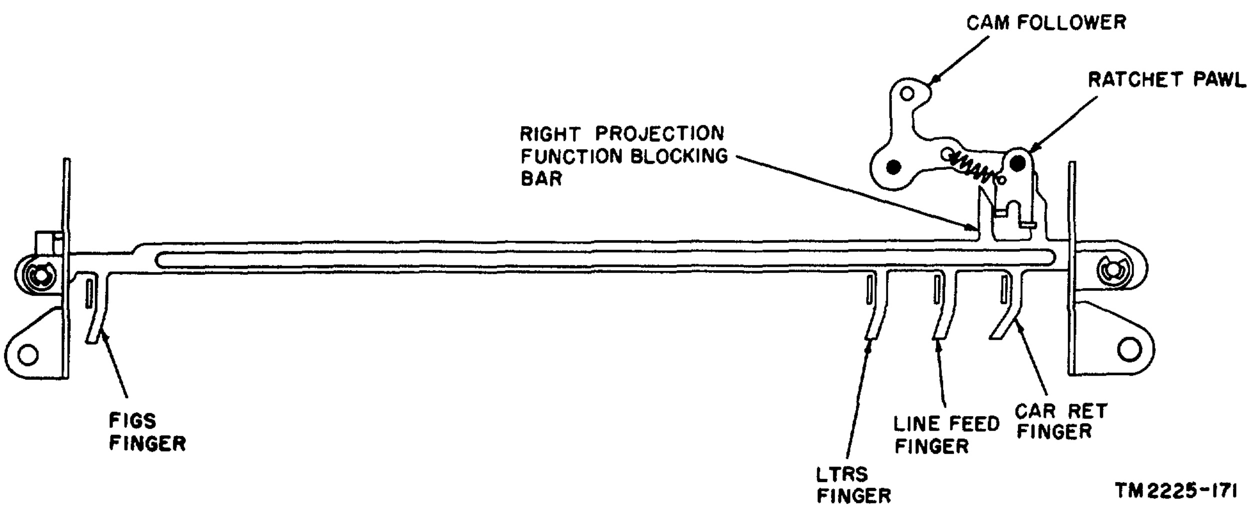



*Figure 2-16. Function blocking bar, front view, unoperated position, (TT-76/GGC, TT-76A/GGC and TT-76B/GGC serial Nos. 255 and below, Order No. 13931-PC-58).*

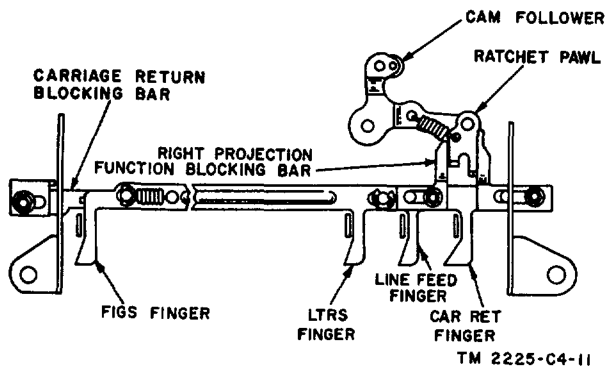



*Figure 2-17. Function blocking bar and carriage return blocking bar, front view, unoperated position (TT-76B/GGC serial Nos. 256 and above, Order No.* 13931-PC-58 and TT-76C/GGC).

actuating arm pivots, the left end moves upward closing the contacts of the indicator lamp switch. This completes the lamp circuit (figs. 2-52 and 2-53) and lights the END OF LINE INDICATOR lamp.

(2) The warning bell (fig. 2-21) is used on all models of the keyboard-transmitter except the TT-76/GGC. It operates in conjunction with the END OF LINE INDICATOR lamp to warn the operator of the approach of the end of the line. The warning bell rings when the operator strikes the key which causes the space indicator to reach the 66th character on the indicator scale. The clapper actuating pawl is operated by the indicator carriage guide roller which also actuates the indicator lamp switch. When the indicator carriage guide roller reaches the 60th space on the indicator scale it contacts the clapper actuating pawl. Between the 61st and 65th spaces the indicator carriage guide roller cams the end of the clapper actuating pawl down against the tension of the actuating pawl spring. This pivots the clapper actuating pawl so that the clapper mounted on the other end of the pawl moves away from the striking surface of the warning bell. When the key lever is struck which causes the indicator carriage to move beyond the 65th space, the indicator carriage guide roller moves beyond the clapper actuating pawl and the clapper actuating pawl is pivoted In the opposite direction by the tension of the clapper arm spring. This causes the clapper to strike the warning bell and alert the operator of the approach of the end of the line.

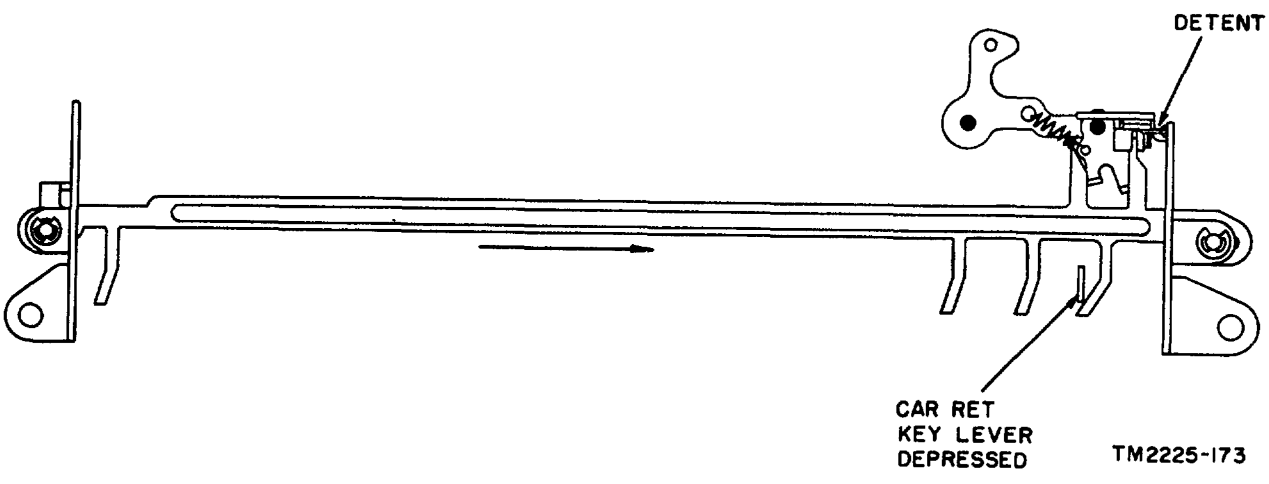



*Figure 2-18. Function blocking bar, CAR. RET. key lever depressed (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC serial Nos. 255 and below, Order No. 13931-PC-58).*

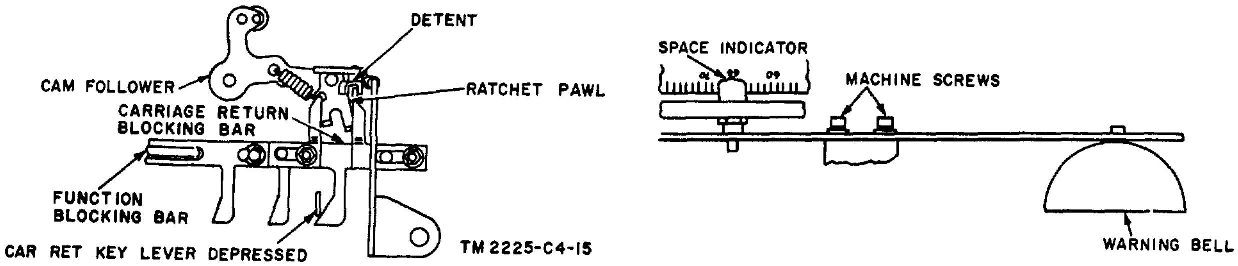



*Figure 2-19. Function blocking bar and carriage return blocking bar CAR. RET. key lever depressed (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and TT-76C/GGC.*

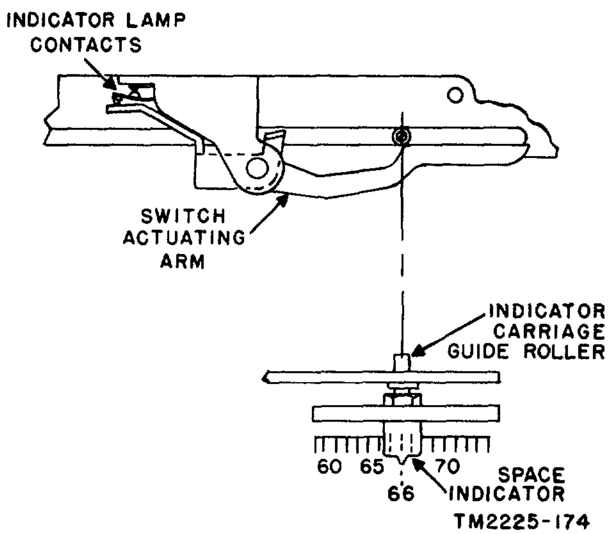



*Figure 2-20. End of line indicator mechanism lamp (TT-76/GGC).*

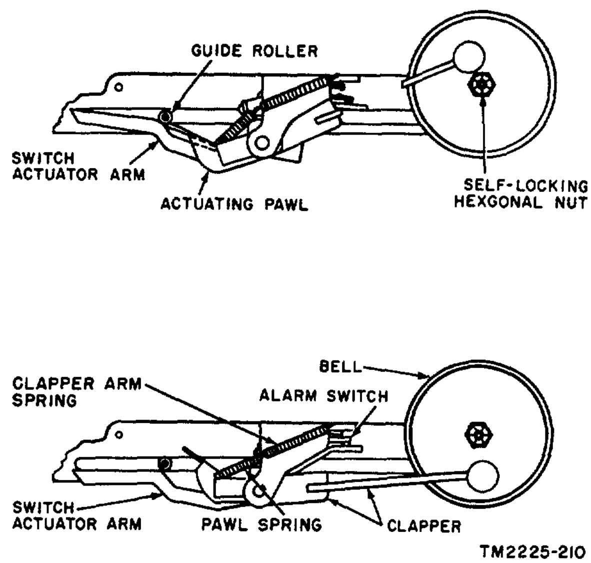



*Figure 2-21. Warning bell and indicator switch Mechanism (TT-76A/GGC all subsequent models).*

**2-16. General**

The transmitter-distributor translates the code perforations in a paper tape into electrical impulses and transmits these impulses as teletypewriter code groups to teletypewriter receiving units. It consists of a control lever mechanism, control mechanism, sensing mechanism, code transmitting mechanism, and tape feed mechanism.

**2-17. Control Lever Mechanism**

The operation of the transmitter-distributor is controlled by the control lever mechanism which operates the start-stop switch in the clutch magnet circuit. Unless the clutch magnet is energized no transmission can take place from the transmitter-distributor. Three control levers are involved, the stop-start lever, the tape-out lever, and the tight-tape lever.

*a. Stop-Start Lever.* The stop-start lever provides the operator with a manual control of the operation of the transmitter-distributor. There are three lever positions; the START position which, when selected, permits the start-stop switch to close, energizing the clutch magnet, the STOP position which, when selected, opens the start-stop switch, and the FEED RETRACT position which holds the start-stop switch open and lowers the feed pins of the tape feed claw. This prevents the tape feed pins from engaging the feed holes in the message tape permitting the tape to be positioned in the unit without raising the tape cover. Just prior to starting the transmitter-distributor when the tape is properly installed and the stop-start lever is held in the STOP position by the start-stop lever detent, the stop-start lever holds the lower switch bail lever against the startstop switch operating lever so that the normally closed start-stop switch is open. When the startstop switch is open, the clutch magnet is deenergized to prevent the transmitter camshaft from rotating (para. 2-18). Below is a chart which summarizes the sequence of events that occurs when the stop-start lever is operated with the message tape properly installed in the unit and the tight-tape lever is in the slack position.

*Stop-Start Lever Sequence Chart*

| | | |
|---|---|---|
| 1. | Stop-start lever is in the STOP position . | Start-stop switch is closed and clutch magnet is not energized. |
| 2. | Stop-start lever is raised to the START position | Projection on the stop-start lever moves away from the lower switch bail lever permitting it to be moved. |
| 3. | Spring in the switch pushes out the start-stop switch operating lever to move the upper switch bail lever and the lower switch bail lever away from the start-stop switch. | |
| 4. | Start-stop switch opens to energize the clutch magnet permitting transmission (para. 2-18). | |
| 5. | Stop-start lever moved to the STOP position. | |
| 6. | Projection on the stop-start lever strikes the lower switch bail lever, pivoting it against the upper switch bail lever. | |
| 7. | Upper switch bail lever moves against the start-stop switch operating lever to open the normally closed switch Interrupting the circuit to the clutch magnet and preventing transmission (para. 2-18). | |
| 8. | Stop start lever moved to the FEED RETRACT position. | |
| 9. | Projection on stop-start lever moves against the stud on the tape feed retracting lever, pivoting its clockwise. | |
| 10. | Tape feed retracting lever pivots the tape feed claw so that the pins at the end of the tape teed claw move downward out of engagement with the message tape. | |

High level units. On low level units the start stop switch is open and the clutch magnet Is not energized.
High level units. On low level units the start stop snitch closes to energize the clutch magnet permitting transmission.

*b. Tape-Out Lever* The tape-out lever is provided to stop transmission from the transmitter-distributor when the end of the message tape passes through the sensing mechanism. This prevents the repeated sending of the LTRS code group which would occur if the unit continued to transmit without tape. It also stops transmission if the tape cover is raised during operation. When a message tape is properly installed in the transmitter-distributor and the units is transmitting, the stop-start lever is In the START position and the lower switch bail lever is pivoted away from the start-stop switch operating lever so that the switch is closed, energizing the clutch magnet to permit transmission. The tape-out lever is pivoted away from the upper switch bail lever, held in that position by the message tape which is installed in the machine. The switch spring holds the start-stop switch operating lever and the upper switch bail lever pivoted away from the start-stop switch body. The following chart summarizes the sequence of events which occurs when the end of the message tape passes through the transmitter-distributor:

*End-of-Tape Lever Operation Sequence Chart*

| | |
|---|---|
| 1. | End of the message tape passes through the sensing mechanism. |
| 2. | Tape-out lever, no longer blocked by the message tape, pilots counterclockwise by spring tension. |
| 3. | Tape-out lever moves upper switch bail lever clockwise. |
| 4. | Lower finger of the upper switch bail lever moves start-stop switch operating lever toward start-stop |
| | switch to open normally closed start-stop switch. |
| 5. | Clutch magnet de-energized to stop transmission (para. 2-18). |

*c. Tight-Tape Lever.* The tight-tape lever is provided to shut off transmission from the transmitter-distributor when the message tape becomes excessively tight, preventing the message tape from being torn or damaged when too much tension is applied to the message tape. This is accomplished by threading the message tape through the hole In the tight-tape lever, to permit the lever to operate the start-stop switch In the clutch magnet circuit when the tight-tape lever is raised by the message tape tension. When the message tape is properly installed In the transmitter-distributor and the unit is operating, the start-stop switch is closed and the switch spring holds the start-stop switch operating lever, the upper switch bail lever, and the lower switch bail lever pivoted away from the switch body. The tight-tape lever is pivoted forward out of engagement with the lower switch bail lever. The chart below summarizes the sequence of events that occurs when the tight-tape lever is operated by message tape tension:

*Tight-Tape Lever Sequence Chart*

| | | |
|---|---|---|
| 1. | Tight-tape lever in the slack position. | Clutch magnet is energized and transmitter-distributor is transmitting. |
| 2. | Message tape starts to tighten, raising the loop end of the tight-tape lever. | |
| 3. | Projection on the tight-tape lever strikes the bottom of the lower snitch bail lever, causing it to pivot. | |
| 4. | Top of the lower switch bail lever strikes the upper switch bail lever, moving the upper switch bail lever against the switch operating lever. | |
| 5. | Switch operating level moves far enough to open the normal} closed switch-stop switch, de-energizing the clutch magnet to stop transmission (par 2-18). | |

**2-18. Control Mechanism**

*a.* The control mechanism regulates the starting and stopping of the transmitter camshaft as directed by the tight-tape lever, start-stop lever and tape-out leper It consists of a clutch magnet (fig. 2-23), clutch magnet armature, camshaft stop lever, and the stop lever cam which is part of the transmitter camshaft assembly

*b.* The control mechanism controls the starting and stopping of the transmitter camshaft When the clutch magnet is de-energized (A, fig 2-23) and the transmitter-distributor is stopped, the armature spring holds the clutch magnet armature pivoted in its clockwise position so that it latches the blocking end of the camshaft stop lever. A projection In the middle of the camshaft stop leper engages a tooth on the stop lever cam, blocking the rotation of the transmitter camshaft. When the clutch magnet is energized (B, fig. 2-23), the magnetic field of force produced in the magnet attracts the rear end of the clutch magnet armature, pivoting the clutch magnet armature counterclockwise to unlatch the blocking end of the camshaft stop lever. The friction clutch then operates to turn

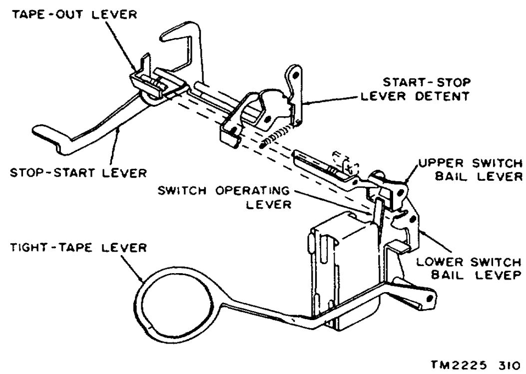



*Figure 2-22. Control lever mechanism.*

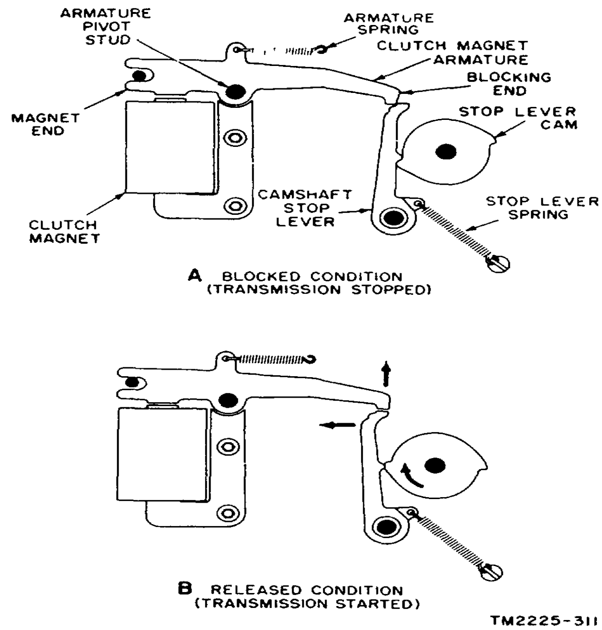



*Figure 2-23. Transmitter camshaft control mechanism.*

the transmitter camshaft, moving the camshaft stop lever out of the path of the tooth on the stop lever cam. As the high point if the stop lever cam passes the projection on the camshaft stop lever, the camshaft stop lever spring pivots the camshaft stop lever back into the path of the second tooth on the stop lever cam and permits the clutch magnet armature to again engage the blocking end of the camshaft stop lever if the magnet is de-energized,

c. The sequence chart in paragraph 2-22 lists the sequence of operations for the transmitter-distributor and shows the relationship of the control mechanism to the other operations.

**2-19. Tape Sensing Mechanism**

The tape sensing mechanism translates the holes punched into a message tape mechanical settings. It consists of five identical code sensing levers (fig. 2-24) and sensing lever springs, a sensing lever restoring ball, and a sensing lever restoring cam which is part of the transmitter camshaft assembly.

*a.* The five code sensing levers are mounted on the code sensing lever stud in such a manner that the pins at the end of the code sensing levers are aligned with the code holes punched in the message tape (fig. 2-2). When the transmitter camshaft is in the at rest position, the sensing lever restoring bail (fig 2-24) is held at its furthest clockwise position by the sensing lever restoring cam, holding the pin end of the code sensing levers down and out of engagement with the message tape.

*b*. As the transmitter camshaft starts to rotate, as described in paragraph 2-18, the sensing lever restoring bail cam follower moves to the low portion of the sensing lever restoring cam, pivoting the sensing lever restoring bail counterclockwise and releasing the code sensing levers. The code sensing lever springs pivot the code sensing levers counterclockwise, raising the pin end upward into engagement with the message tape.

*c*. If the message tape has no hole above the pin of a code sensing lever, the counterclockwise movement of the code sensing lever is blocked and the code sensing lever is positioned for a spacing impulse. If the message tape has a hole above the pin of the code sensing lever, the counterclockwise movement of the code sensing lever continues, positioning the code sensing lever for a marking impulse. In this manner the five code sensing levers are positioned in the marking or spacing position for the code group to be transmitted.

d. The sequence chart in paragraph 2-22 lists the sequence of operations for the transmitter distributor and shows the relation of the tape sensing mechanism to the other operations.

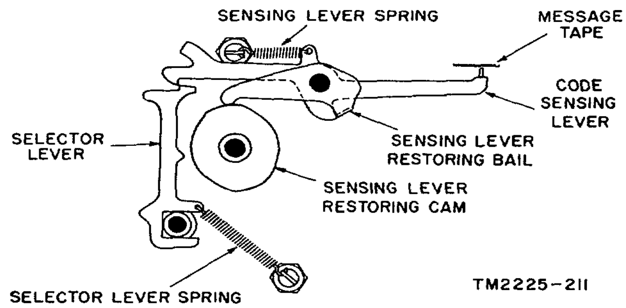



*Figure 2-24. Tape sensing mechanism.*

**2-20. Code Transmitting Mechanism TT76(*)/ GGC**

The code transmitting mechanism converts the mechanical settings of the sensing mechanism into electrical impulses that can be transmitted to the signal line. It consists of five selector levers (fig. 2-25), a transmitter camshaft, a transmitter contact bail, and transmitter stationary contacts Start and stop impulses are transmitted through the inter-operation of the permanently latched start-stop selector lever (fig. 2-26) and its associated start-stop cam.

*a.* If a hole is present in the message tape, the code sensing lever associated with the code impulse is moved to the marking position (par. 2-19). In this position, the latching end of the code sensing lever (A, fig. 2-25) engages the notched end of its associated selector lever, latching the upper end of the selector lever in place. When the lobe of the associated cam moves against the center projection of the selector lever, the bottom of the selector lever is forced to move toward the transmitter contact bail, pivoting the transmitter contact bail clockwise and causing the contact on the transmitter contact bail to touch the stationary contact to send a current impulse.

*b.* If no hole is present in the message tape, the movement of the code sensing lever is blocked (para 2-19), and the code sensing lever is prevented from latching the selector lever (B, fig. 2-25). As the lobe of the associated cam rotates against the center projection of the selector lever, the top of the selector lever is free to move and the selector lever pivots counterclockwise, permitting the transmitter contact bail spring to open the transmitter contacts, causing a no current or spacing impulse.

*c.* The start-stop impulses are transmitted when the permanently latched start-stop selector lever is moved by the start-stop cam on the transmitter camshaft. When the transmitter camshaft is in the latched position, the lobe of the start-stop cam is pressed against the center projection of the start-stop lever, forcing the lower end of the associated selector lever against the transmitter contact bail to hold the transmitter contacts closed When the transmitter camshaft starts to rotate the center projection of the start-stop selector lever moves on the cam lobe and the start-stop selector lever is pivoted counterclockwise by the selector lever spring, permitting the transmitter contact bail spring to pivot the transmitter contact bail and open the transmitter contacts. This causes a no current, start impulse to be transmitted As the transmitter camshaft nears the end of its half revolution, the cam lobe again moves against the center projection of the start-stop selector lever to close the transmitter contacts, sending a marking, stop impulse.

*d.* The cams on the transmitter camshaft are arranged to operate each selector lever in turn, causing the impulse associated with that selector lever to be sent at precisely the correct instant, and to give the start and code impulses a duration of 22 milliseconds and the stop impulse a duration of 31 milliseconds.

*e.* The sequence chart in paragraph 2-22 summarizes the sequence of operations for the transmitter-distributor and shows the relationship of the code transmitting cycle to the other operations.

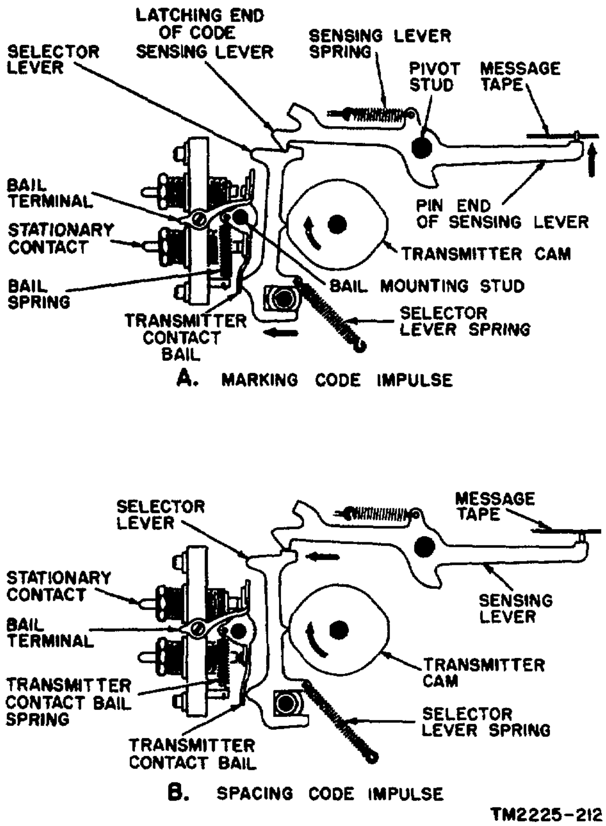



*Figure 2-25. Transmission of marking and spacing code impulse.*
*Figure 2-25 1. Deleted.*

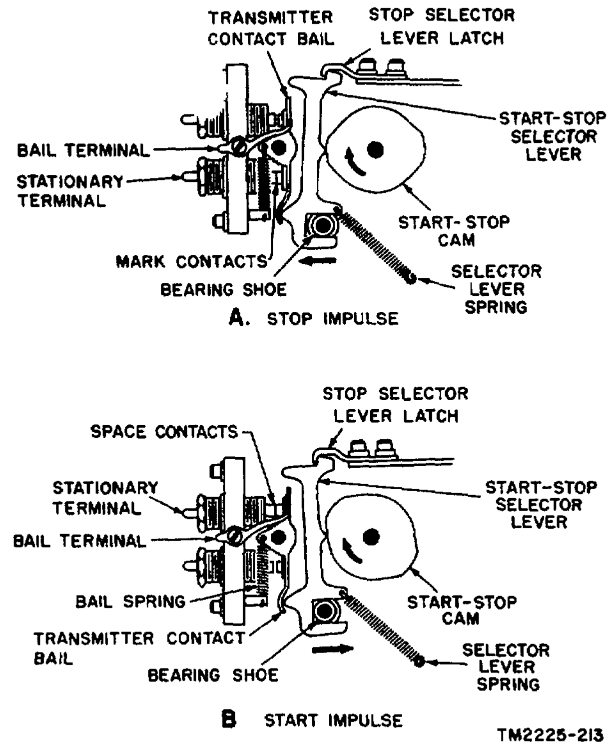



*Figure 2-26. Transmission of start and stop impulses*
*Figure 2-26.1 Deleted*

**2-20.1. Deleted**

## 2-21. Tape Feed Mechanism

The tape feed mechanism feeds the message tape through the transmitter-distributor mechanism, positioning the message tape to permit the sensing mechanism to sense the perforated code group and advance the message tape after each code group is transmitted. It consists of a tape feed lever (fig. 2-27), tape feed lever cam, tape feed claw, tape feed claw spring, tape feed retracting lever cam, tape feed retracting lever, and tape feed retracting lever spring. Tape feed occurs immediately after the transmission of each code group. Tape feeding is done in two distinct movements. A horizontal movement in which the tape feed claw moves from the front toward the back of the transmitter-distributor and a vertical movement in which the tape feed claw raises and lowers to engage and disengage the feed holes in the message tape.

*a*. When the transmitter camshaft is in the at rest position, the tape feed lever is held in the low part of the feed lever cam by the tape feed lever spring. In this position it is pivoted counterclockwise, and the top of the tape feed lever that engages the tape feed claw holds the tape feed claw to the left. This is the position of the tape feed claw immediately after feeding the message tape in the transmitter-distributor. As the transmitter camshaft starts to rotate, the tape feed lever is cammed clockwise by the feed lever cam. The clockwise movement of the tape feed lever permits the tape feed claw spring to pull the tape feed claw to the right where it engages the feed holes in the message tape as described in b below. As the high point of the feed lever cam passes the projection on the tape feed lever, the tape feed lever spring snaps the tape feed lever clockwise against the low portion of the feed lever cam and causes the top end of the tape feed lever to snap to the left, positioning the message tape for the next code group.

*b*. In addition to the horizontal movement described in *a* above, the tape feed claw is also moved vertically by the tape feed retracting lever (B, fig 2-27) and the tape feed retracting lever cam. A pin through the right arm of the tape feed retracting lever horizontally engages the notch in the tape feed claw. This pin causes the tape feed claw to follow the movements of the right end of the tape feed retracting lever. When the transmitter-distributor is in the at rest position, the tape feed retracting lever cam follower is in the low part of the tape feed retracting cam and the right end is raised by action of the tape feed retracting lever spring, holding the tape feed claw in its upper position. At the beginning of the transmission of a code group the tape feed retracting lever cam rotates, and cams the tape feed retracting lever clockwise, dropping the right end of the tape feed retracting lever and with it the tape feed claw. This lowers the pins of the tape feed claw out of engagement with the feed holes in the message tape. Before the tape feed retracting lever cam completes its one-half revolution, the tape feed retracting lever again moves to the low part of the cam; the tape feed retracting spring raises the right end of the tape feed retracting lever and the tape feed claw. The combined action of the tape feed retracting lever cam and the tape feed retracting lever moves the tape feed claw vertically, upward to engage the feed holes in the message tape and downward to disengage the feed holes after feeding.

*c*. The actual motion of the tape feed claw under the control of the tape feed retracting lever, and their respective cams is rectangular. The tape feed retracting lever causes the tape feed claw to engage the message tape before feeding, and disengages from the message tape after feeding. The tape feed lever causes the tape feed claw to move the tape a distance of one space and then moves back into position to re-engage the message tape for the next feeding cycle.

*d*. The chart in paragraph 2-22 summarizes the sequence of operations for the transmitter-distributor, and shows the relationship of the tape feed cycle to the other operations.

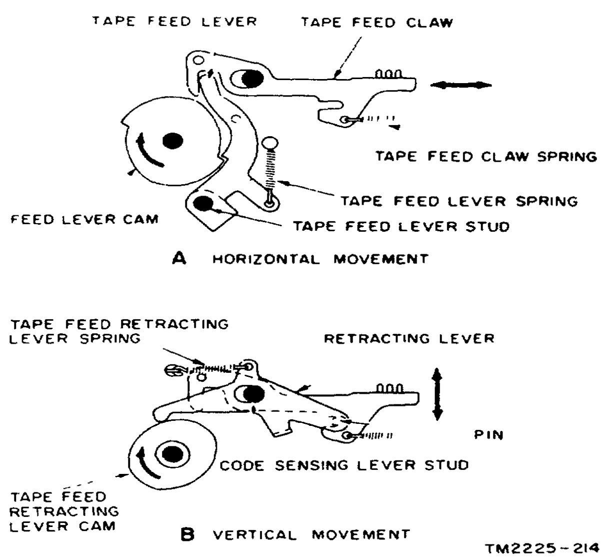



*Figure 2-27. Tape feed mechanism*

## 2-22. Transmitter-Distributor Operation Sequence Chart

The following sequence chart summarizes the various operations which occur in the transmitter-distributor. Assume that a message tape is properly installed in the transmitter-distributor.

*Transmitter-Distributor Operation Sequence Chart*

| | | |
|---|---|---|
| 1. | Start-stop lever moved to the START position | |
| 2. | Clutch magnet energized, energizing the laminated core (B, fig 2-23) | |
| 3. | Clutch magnet armature pivoted counterclockwise by clutch magnet, releasing camshaft stop lever | |
| 4. | Camshaft stop lever pivots counterclockwise, freeing stop lever cam | |
| 5. | Friction clutch operates | Transmitter camshaft starts rotating |

*Transmitter-Distributor Operation Sequence Chart-Continued*

| | | |
|---|---|---|
| 6. | Sensing lever restoring bial moves into low part of sensing lever restoring cam, code sensing levers rise (fig 2-24) | |
| 7. | Code sensing levers strike message tape (fig. 2-24) | If code sensing lever is aligned with hole in message tape (marking), it latches selector lever (A, fig 2-25) If code sensing lever is aligned with no hole in message tape (spacing), it does not latch selector lever (B, fig. 2-25) |
| 8. | Start-stop cam allows selector lever spring to pull start-stop selector lever counterclockwise (B, fig 2-26) | |
| 9. | Start-stop selector lever pivots transmitter contact bail to spacing position. | Start (no current or negative) impulse sent. |
| 10. | Transmitter camshaft causes No. 1 selector lever to pivot at top if latched (marking) (A, fig 2-25) or at the bottom if not latched (spacing) (B, fig. 2-25) | Transmitter contact ball moved to marking or spacing position sending No. 1 marking or spacing impulse (fig. 2-25) |
| 11. | Tape fed claw moves down out of engagement with tape feed holes (B, fig 2-27) | |
| 12. | Second. third, and fourth code impulses sent (fig. 2-25 | Tape feed claw moves forward (A, fig 2-27) |
| 13 | Fifth code impulse sent (fig 2-25) | Feed claw rises to engage with holes (B, fig 2-27) |
| 14 | Stop impulse sent (A, fig 2-26) | Code sensing levers lowered by cam action out of way of message tape. |
| 15 | Tape feed lever moves to low part of cam, allowing tape feed lever spring to pull tape feed lever to the rear, moving the message tape one space (A, fig. 2-27) | |
| 16. | Transmitter-distributor ready to transmit another code group | |

## SECTION V. REPERFORATOR MECHANISM

### 2-23. Selector Magnet

*a Description* The selector magnet (A, fig. 2-28) consists of a permanent bar magnet, an armature, a potentiometer, and two line and two bias windings mounted on a U-shaped silicon-steel core Around each arm of the U-shaped core are wound one line and one bias winding as shown min B of figure 2-28 The armature, pivoted in the center, is mounted over the open end of the core. During operation of the magnet, reception of a marking impulse causes one of the armature to be pulled toward one arm of the U-shaped core. Reception of a spacing impulse causes the opposite end of the armature to move toward the other arm of the core. The selector magnet is constructed so that when current is not present in any of the windings, a balanced magnet field is present (B, fig 2-28). Under this condition, the permanent magnet is the only source of magnetism. Note that the magnetic flux at the lower end of the magnet (north pole) divides equally and returns to the south pole through both arms of the core and both sides of the armature. The magnetic pull of the cores on the armature is therefore equal, when all windings are not energized

*b Operation with Polar Signals* When operating in polar circuits, the bias windings are not used. The line windings are connected min series for low-level signaling, 15-ma operation (B, fig. 2-28) and in parallel for 30-ma operation (no illustrated)

(1) During a marking impulse, current flows through the line windings. Terminal 2 is positive and terminal 6 is negative. The magnetic field set up by the line winding around the left

arm opposes the field of the permanent magnet, and little pull is present on the left side of the armature. The magnetic field set up by the line winding around the right arm of the core is poled to aid the field of the permanent magnet and therefore, the right end of the armature is pulled toward the right arm of the U-shaped core. The left end of the armature that includes the armature blade, moves to the marking position and into the path of the selector levers.

(2) During reception of a polar spacing impulse, current flow in the line windings is reversed, and the opposite of the above occurs. The magnetic pull on the right end of the armature is weakened and the pull on the left is increased, causing the armature to be drawn toward the left arm of the core.

*c. Operation with Neutral Signals*. When operating in neutral circuits, the bias windings must be used. They are wired in series and are energized constantly. The magnetic field set up by the left bias winding is poled to aid the magnetic field of the permanent magnet. The field of the right bias winding opposes the field of the permanent magnet. During reception of a neutral spacing impulse, current is not present in the line windings. The combined magnetic fields of the energized bias windings and the permanent magnet cause the blade end of the armature to be pulled toward the left core, away from the selector levers. Current flows in both line windings during reception of a neutral marking impulse. The current value in a line winding normally is twice the bias current value. The field set up by the energized line winding around the left core opposes the combined magnetic fields of the left bias winding and the permanent magnet. The energized line winding around the right core aids the field of the permanent magnet and opposes the field of the right bias winding. Therefore, a marking impulse in the line windings will cause the right end of the armature to be pulled toward the right core arm, and the left (blade) end is moved into the path of the selector levers (marking position). Neutral operation of this selector magnet is possible in both 20- and 60ma circuits. The line windings are connected in series for 20-ma neutral operation and in parallel for 60-ma neutral operation. Adjustment of the bias current value to obtain the most advantageous machine range is accomplished with a potentiometer that is connected in series in the bias circuit.

## 2-24. Selector Mechanism Operation

The selector mechanism translates received code impulses into a mechanical selection that will result in the printing and punching of the proper character or the selection of some functional operation. Operation of the selector mechanism begins with reception of the start impulse of a code group. The start impulse permits the selected camshaft to begin one-half revolution. When started, the selector mechanism records each of the five code impulses in the form of a mechanical position as each is received. Reception of the stop impulse immediately after the fifth code impulse stops rotation of the selector camshaft.

*a. Starting and Stopping Selector Camshaft (Synchronization)*. To synchronize operation of the reperforator with the incoming electrical Impulses, the selector cams are started from a stopped position at the beginning of each code group and stopped at the end of each code group. The selector camshaft is friction driven by the main shaft. When current is flowing in the line (normal condition when messages are not being transmitted), the se lector camshaft is prevented from turning by . the engagement of the selector magnet armature, selector camshaft lever, and stop plate. The armature when lowered (A, fig. 2-29), blocks the locking lever which, in turn, holds the stop plate (fig. 2-30) and selector camshaft from turning. When the start (no current) impulse for a signal is received, the armature is raised, releasing the selector camshaft locking lever and stop plate. The selector camshaft, driven by the friction clutch, immediately starts to turn, bringing the first selector cam into engagement with its selector lever during the time the next impulse (first of the five code impulses) is being received.

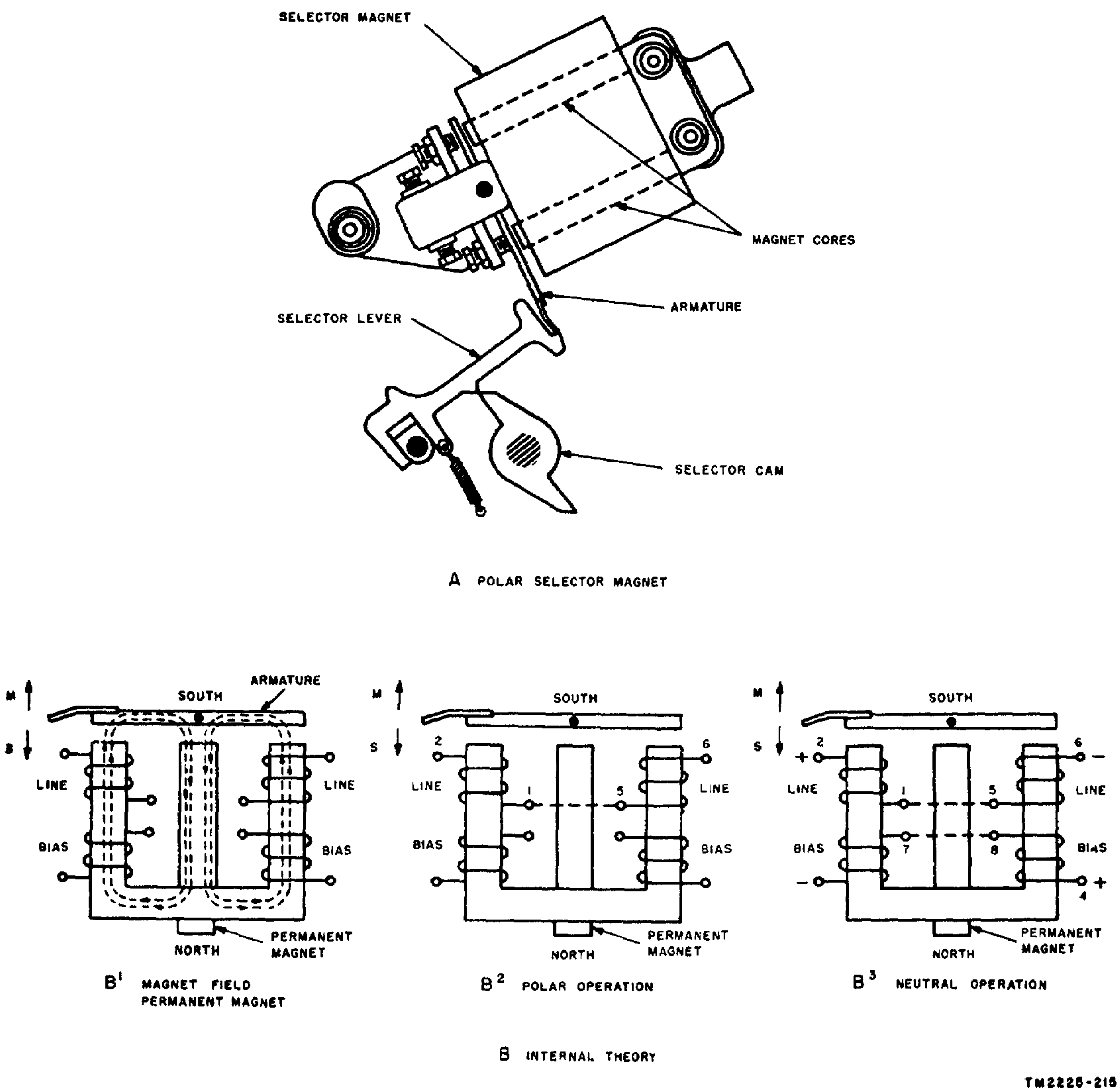



*Figure 2-28. Polar selector magnet operation.*

Thereafter, each of the remaining four selector cams engages its corresponding selector lever in a timed sequence because of the location of the cams around the circumference of the shaft. Rotation speed of the selector camshaft causes each of the five cams to contact its respective selector lever during the time the corresponding code impulse is being received. All five selector levers are operated during one-half revolution of the selector camshaft. The selector camshaft is limited to one-half revolution at a time by the stop impulse. This impulse moves the magnet armature to the marking (lower) position where it blocks the selector camshaft locking lever which, in turn, blocks the stop plate on the selector camshaft as it completes one-half revolution. The selector camshaft is held in this stopped position until reception of the start impulse of the next code group releases the selector camshaft locking lever as described above.

*b. Recording Code Impulses.*

(1) Each of the five code impulses of the code group is recorded in the form of clockwise or counterclockwise movement of the five corresponding selector Y-levers (fig. 2-29) that are mounted on a common Y-lever pivot post stud. This is accomplished through the interaction of the selector magnet, the selector camshaft cams, and the selector levers.

(2) When a marking current impulse is received, the magnet armature moves downward to block the movement of the upper portion of the selector lever associated with that impulse as shown in A, figure 2-29. As the lobe of the associated selector camshaft cam moves against the projection in the center of the selector lever, the selector lever is forced to move in a clockwise direction, moving with it its associated selector Y-lever. The selector Y-lever is held at this clockwise setting by its friction plates on the TT-76/GGC or by its Y-lever detent on all other models of the equipment to record a marking impulse.

(3) When a spacing (no current) impulse is received, the magnet armature is raised, releasing the top of the selector lever associated with that impulse. As the lobe of the associated selector camshaft cam moves against the projection at the center of the selector lever, the tension of the selector lever spring retards the movement of the bottom of the selector lever, forcing the selector lever to rotate counterclockwise, moving with it its associated selector Y-lever. The selector Y-lever is held in this counterclockwise position by its friction plates on the T-76/GGC or by its Y-lever detent on all other models of the equipment to record a spacing impulse.

(4) In the same manner, all five of the Y-levers are positioned to change the incoming electrical impulses to mechanical settings.

*c. Rangefinder Mechanism.*

(1) Although the time length of each code impulse is 22 milliseconds, only about one-fifth of that time is required for the selector cam to position a selector Y-lever. Under ideal conditions, maximum reliability is obtained when the selector Y-lever positioning time occurs during the middle portion of the 22 milliseconds. The rangefinder setting determines which portion of each impulse is used for the positioning of its respective selector Y-lever.

(2) The rangefinder mechanism is provided to allow the operator or mechanic to make an adjustment of the angular position relationship between the selector camshaft cams and the stop plate (fig. 2-30). Increasing the angle between the cams and the stop plate causes the selector cams to position the selector Y-levers later during each code impulse. Decreasing the angle causes the selector Y-levers to be positioned earlier during each code impulse.

(3) The angular position of the stop plate is controlled by the position of the grooved spindle. The angle is increased whenever the spindle is moved inward and is decreased whenever the spindle is moved outward. The position of the grooved spindle is controlled by the rangefinder dial assembly and rangefinding cam. Clockwise rotation of the rangefinder dial assembly causes the rangefinding cam to push the spindle inward, and the selector Y-levers are positioned later during each code impulse. Counter-

clockwise rotation of the rangefinder dial assembly has the opposite effect.

*d. Selector Operation Sequence Chart*. Just prior to the receipt of a code group, the current in the signal line holds the armature of the selector magnet lowered, latching the upper end of the selector camshaft locking lever. The selector camshaft locking lever is held in the path of the stop plate (fig. 2-28) on the selector camshaft, prevention rotation of the selector camshaft and causing the friction clutch to slip without transferring rotation. On the TT-76/GGC the friction plates between the selector Y-levers hold the selector Y-levers as they were positioned by the last received code group. On all other models they are held in position by the Y-lever detents. The sequence chart below describes the sequence of operations that occurs when the code group is received by the reperforator.

*Selector Operation Sequence Chart*

| | |
|---|---|
| 1. | Start impulse received. |
| 2. | Selector magnet armature moves to space position |
| 3. | Armature releases stop lever. |
| 4. | Stop lever releases stop plate. |
| 5. | Selector camshaft starts rotating, driven by the friction clutch. |
| 6. | First code impulse moves armature to mark or space position, depending on whether code impulse is a marking or spacing impulse. |
| 7. | First selector cam lifts first selector lever. |
| 8. | First selector lever pivots on the end of armature if armature is in marking position or on selector lever pivot stud if armature is in spacing position |
| 9 | First selector lever pushes first T-lever clockwise if selector lever is pivoting on the armature end (marking), or counterclockwise if selector lever Is pivoting on the pivot stud (spacing). The TT-76A/GGC and later model equipment Y-lever detents engage Y-levers to hold them in place |
| 10. | Second, third, fourth, and fifth code impulses, in turn, are recorded in the corresponding parts of the selector mechanism, as described for the first code impulse. Each Y-lever is positioned clockwise or counterclockwise as determined by its associated code impulse. |
| 11. | Transfer lever latch tripping cam turns transfer lever latch. |
| 12. | *Note* The actions described in the transfer operation and function shaft operation sequence chart (par 2-25) begin at this point in the overall sequence of equipment operation |
| 12 | Stop impulse is received. |
| 13. | Armature moves to marking position. |
| 14. | Stop plate engages stop lever. |
| 15. | Armature latches stop lever. |
| 16. | Stop lever holds stop plate |
| 17. | Selector camshaft stops at end of one-half revolution. |

## 2-25. Transfer Mechanism

After the five selector Y-levers have been positioned as described in paragraph 2-24, the selector Y-lever settings must be transferred to the code rings (fig. 2-32) and the function shaft must be allowed to rotate (fig. 2-31). This is accomplished by means of five T-levers which are mounted on the T-lever pivot stud of the transfer lever. The T-levers engage the slotted tails of the code rings and pivot the code rings either clockwise or counterclockwise, depending upon whether the associated code impulse is a marking or spacing impulse.

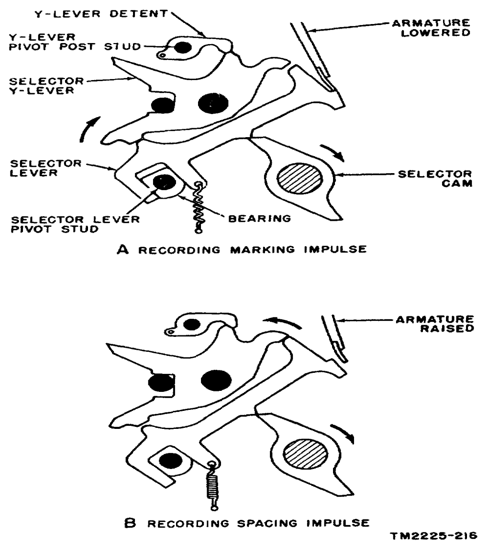



*Figure 2-29. Recording code impulses.*

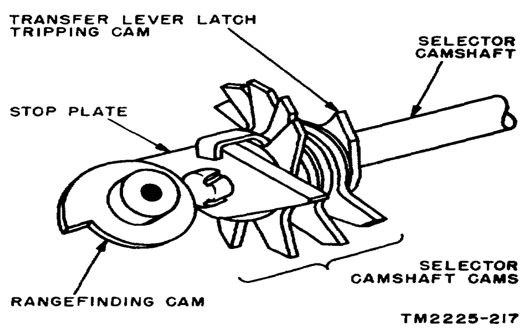



*Figure 2-30. Selector camshaft and stop plate.*

*a.* The transfer operation occurs immediately after the fifth impulse is stored in the selector Y-levers. The transfer lever latch tripping cam (fig. 2-32) on the selector camshaft moves against the transfer lever trip latch, pivoting the transfer lever trip latch counterclockwise against the tension of the spring The lower arm of the transfer lever trip latch moves out of engagement with the transfer lever and permits the transfer lever spring to step the transfer lever clockwise, moving the T-levers into engagement with the selector Y-levers. Each selector Y-lever positioned in a clockwise direction will cause its associated T lever to pivot counterclockwise The T-lever, in pivoting, will cause its associated code ring to pivot clockwise. Thus a selector Y-lever pivoted clockwise will cause its associated code ring to pivot clockwise Likewise, any selector Y-lever pivoted counterclockwise will cause its associated code ring to pivot counterclockwise.

*b*. Each code ring is provided with a unique arrangement of notches cut into the inner and outer edges of the curved portion of the code ring (fig. 2-32). After the transfer lever has positioned the code rings, the rings are arranged with a notch of each ring lined up with the notches of the other four at one point on their circumference. At this point the notches form a groove into which one stop bar moves under pressure of a compression spring (fig. 2-33). This movement places the selected stop bar into the patch of the selector stop arm to control the degree of turn of the selector stop arm for proper character or function selection The previously selected stop bar at the same time is moved to the unselected position by the sloped high portion of one or more of the code rings.

*c*. The 32 stop bars are arranged in one inner and one outer row about a semicircle in the code ring cage (fig. 2-32). The ends of the outer stop bars move inward when selected (fig. 2-33). The ends of the inner stop bars move outward when selected. The selector stop arm (fig. 2-36) has one inner and one outer projection on each end for engaging a selected stop bar. The inner projections of the stop arm halt the arm halfway between the outer projection stop positions. The character or function assigned to each stop bar is shown in figure 2-34.

*d*. Just prior to the stop bar selector operation, the five selector Y-levers, the five T-levers, and the code rings are positioned as they were by the last received code group. The stop bars (fig. 2-32) are all held in the unselected position by one or more code rings, except the code bar selected by the last received code group which remains in the selected position. The transfer lever is held in its counterclockwise position by the transfer lever trip latch. The T-levers that are mounted on the T-lever pivot stud at the top of the transfer lever are held out of engagement with the selector Y-levers. The following sequence chart summarizes the operations that occur when the transfer mechanism operates.

*Stop Bar Selection Sequence Chart*

| | |
|---|---|
| 1. | Transfer lever latch tripping cam turns transfer lever trip latch (fig. 2-31). |
| 2. | Transfer lever trip latch releases transfer lever. |
| | *Note*. The action described in the function shaft clutch control sequence chart begins at this point in the sequence of operations. |
| 3. | Transfer lever moves five T-levers against Y-levers. |
| 4. | Y-levers position T-levers. |
| 5. | T-levers position code rings, forming notch in code rings. |
| 6.<br>7. | Selected stop bar pushed into notch in code rings (fig. 2-33).<br>Previously selected stop bar pushed out by code rings. |

## 2-26. Function Shaft Clutch Control

The function shaft (fig. 2-7) is driven by the main shaft through the operation of the function shaft clutch and is engaged by the movement of the clutch latch arm that is firmly fastened to the end of the transfer lever shaft. The function shaft does not begin its one-half revolution until after the code impulses are stored in the selector Y-levers. It provides the power to operate the printing and punching mechanism, to restore the transfer lever, and to perform the various reperforator functions.

*a.* As the transfer lever (fig. 2-31) is unlatched and turns slightly clockwise, the clutch latch arm at the end of the transfer lever shaft moves out of the path of the arm on the sliding clutch drum. The sliding clutch spring closes the clutch and the function shaft begins its one-half revolution. When the function shaft nears the end of its cycle, the transfer lever cam on the function shaft strikes the transfer lever roller stud and cams the transfer lever counterclockwise beyond its latched position, permitting it to be latched by the transfer lever trip latch. As the transfer lever shaft rotates slightly, it moves the clutch latch arm back into the path of the arm of the sliding drum clutch and the clutch members are cammed-out of engagement to stop the rotation of the function shaft.

*b*. To prevent the code rings from shifting after the code group has been set up in them, a code-ring locking mechanism is provided to hold the code rings in place through almost one-half revolution of the function shaft. This is accomplished by a code-ring locking bail (fig. 2-35) which is operated by cam studs on the type wheel and function lever cam of the function shaft friction clutch through the code-ring locking bail cam follower. While code impulses are being stored in the selector mechanism

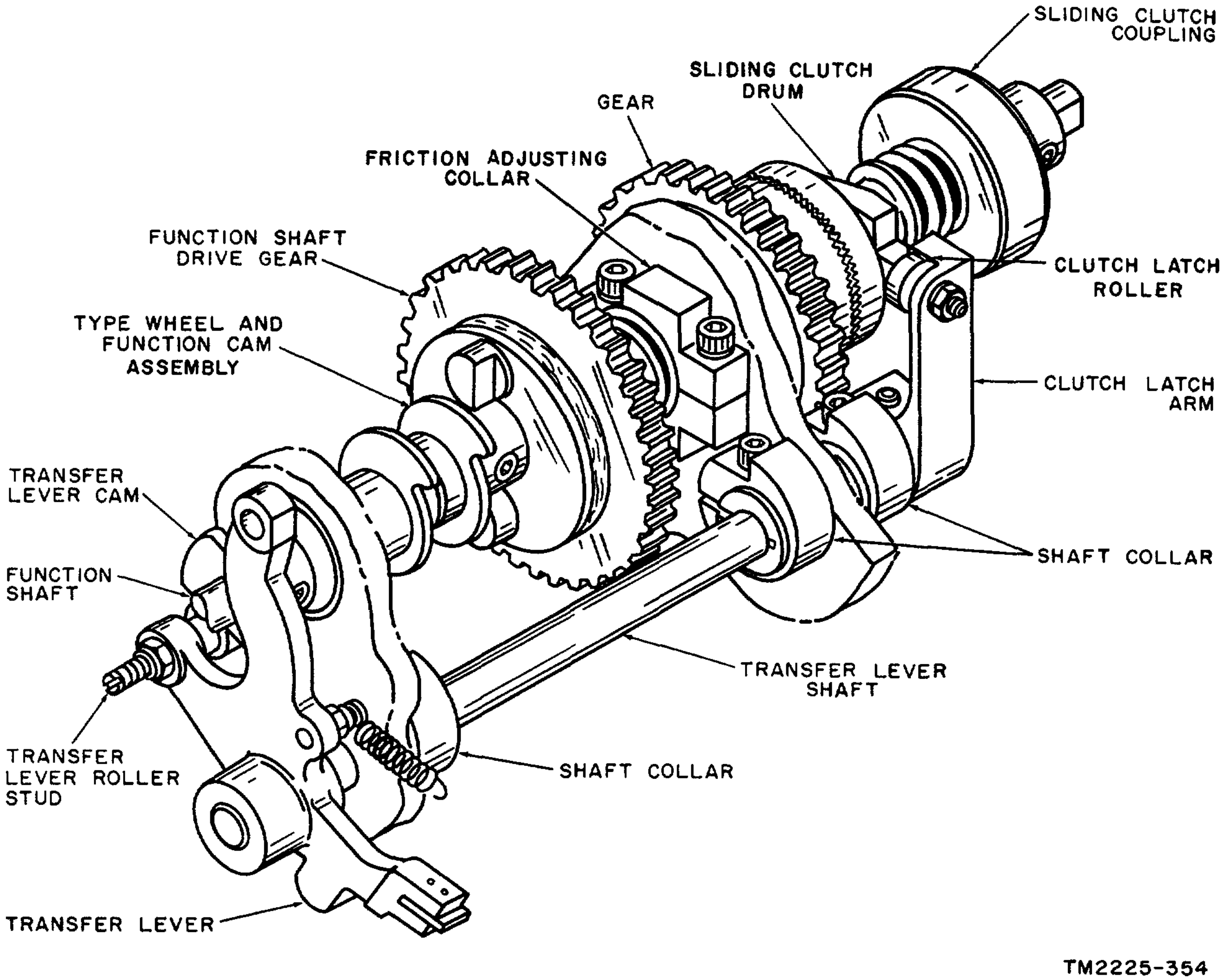



*Figure 2-31. Function shaft, sliding clutch drum engaged.*

the function shaft is motionless and one cam stud is positioned under the code-ring locking bail cam follower, holding the code- ring locking bail out of engagement with the code rings. When the function shaft starts to rotate, the cam stud moves counterclockwise out of the patch of the code-ring locking ball cam follower. The code-ring locking bail cam follower and the code-ring locking bail are mounted on the same shaft and the code-ring locking bail pivots with the code-ring locking bail cam follower to engage the code rings, locking them in place. When the function shaft nears the end of its one-half revolution the opposite cam stud moves the code-ring locking bail cam follower upward, moving with it the code-ring locking bail to release the code rings.

*c*. Just prior to the transfer operation which starts the rotation of the function shaft, the sliding drum clutch is held out of engagement with the mating clutch gear by the clutch latch arm. The clutch gear is rotating, driven by a gear on the main shaft. The transfer lever (fig. 2-32) is held in the latched position by the transfer lever trip latch. The code-ring locking ball (fig. 2-35) Is held out of engagement with the code rings. The following sequence chart summarizes the operations that occur when the transfer lever is released by the transfer lever trip latch.

*Function Shaft Sequence Chart*

| | |
|---|---|
| 1. | Transfer lever trip latch releases transfer lever (fig. 2-31) |
| 2. | Transfer lever, transfer shaft, and clutch latch arm turn |
| 3. | Sliding drum clutch stop arm released by clutch latch arm |
| 4. | Sliding drum clutch engages. |
| 5. | Function shaft starts rotating<br>*Note* The action described in the printing operation sequence chart ends at this point |
| 6. | Code-ring locking ball cam follower moves off the cam stud pivoting code-ring locking ball to lock code rings (fig. 2-35). |
| 7 | Transfer lever restoring cam lifts transfer lever (fig. 2-32). |
| 8. | T-levers move clear of Y-levers, and clutch latch arm returns to latching position. |
| 9. | Transfer lever latches<br>*Note*. The action described In the printing operation sequence chart ends at this point |
| 10. | Cam stud strikes code-ring locking ball cam follower pivoting code-ring locking ball to release code rings (fig. 2-35). |
| 11. | Near the end of one-half revolution of the function shaft, sliding drum clutch stop arm meets clutch latch arm ball bearing. |
| 12. | Sliding drum clutch (fig. 2-31) disengaged by clutch latch arm |
| 13 | Clutch latch arm holds sliding drum clutch stop arm |
| 14. | Function shaft stops at completion of one-half revolution |

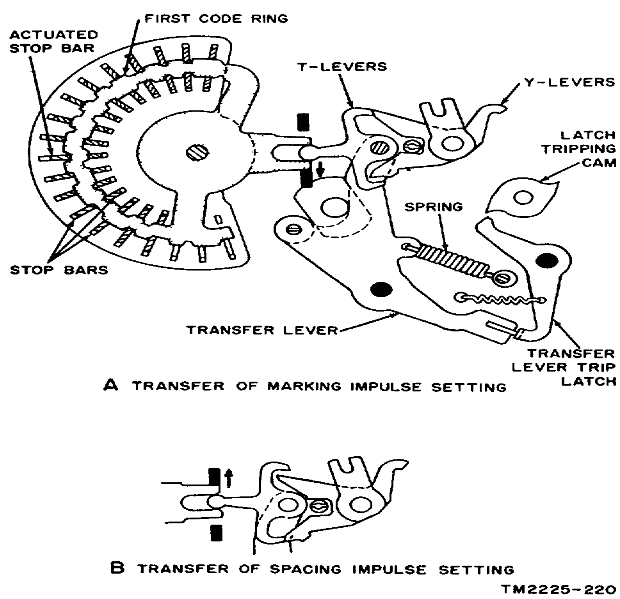



*Figure 2-32. Transfer lever operated.*

**2-27. Stop Arm Shaft Operation**

Driven by the function shaft through a friction clutch and gear arrangement, the stop arm shaft (fig. 2-36) turns the stop arm shaft driven gear and type wheel driven gear. The stop arm and type wheel are aligned so that the desired character will appear on the type wheel in the printing position when the selected stop bar stops rotation of the stop arm. Therefore, the position of the code rings and stop bars determines the character or symbol to be printed and punched. Since the stop arm shaft must be positioned accurately, any tendency of the shaft to travel m a reverse direction must be prevented. An antibounce clutch (fig. 237), mounted on the stop arm shaft between the code ring cage and the selector stop arm, serves this purpose. The central portion of the clutch is fastened to the stop arm shaft. The outer part of the clutch is locked in place by a stud on the code-ring cage. Four rollers in the clutch are spring-loaded in the notches cut into the center portion of the clutch at an angle that permits only clockwise rotation of the stop arm shaft. The rollers roll along the inside surface of the cylindrical housing. Any attempt to make the shaft rotate

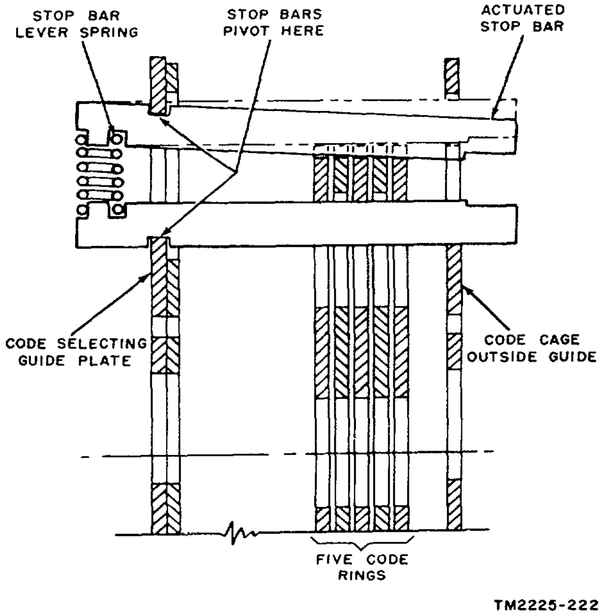



Figure 2-33. Cross section of code ring showing a stop bar selected by code rings.

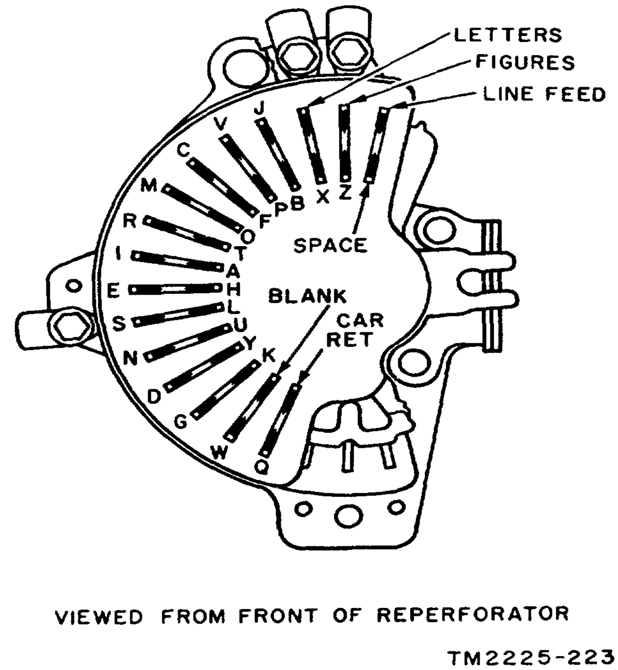



Figure 2-34. Characters and functions selected by stop bars.

counterclockwise immediately causes the rollers to jam between the housing and the moving part of the clutch. Therefore, travel in a reverse direction is prevented.

**2-28. Printing Operation**

The printing operation in reperforators is accomplished by the mechanism shown in figure 2-36. Portions of the selector and transfer mechanisms are included in this illustration to show the relationship between all mechanisms concerned.

*a. Selecting Character or Symbol*. A round type wheel contains the raised letters of the alphabet, symbols, and figures that may be printed by this reperforator. The type wheel is driven by the type wheel hub driven gear on the stop arm shaft. Rotation of the stop arm shaft rotates the type wheel. After a received code group has positioned the code rings, the stop arm rotates until it is stopped by the selected stop bar of the code-ring cage. The type wheel, geared to the stop arm shaft, also rotates and when stopped, the letter on the type wheel corresponding to the stop arm position will appear directly above the print hammer lever. The stop arm can stop the type wheel in any of 32 positions, as the unit includes 32 stop

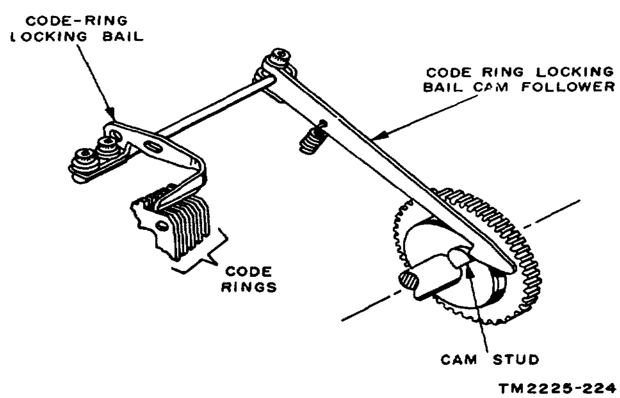



Figure 2-35. Code ring locking mechanism.

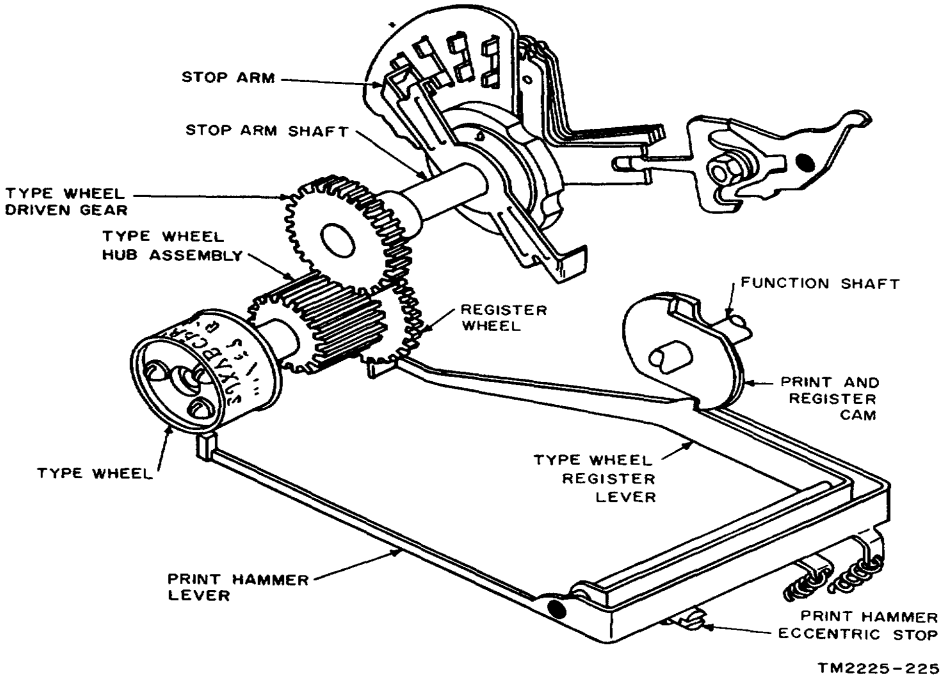



*Figure 2-36. Selecting and printing, functional diagram.*

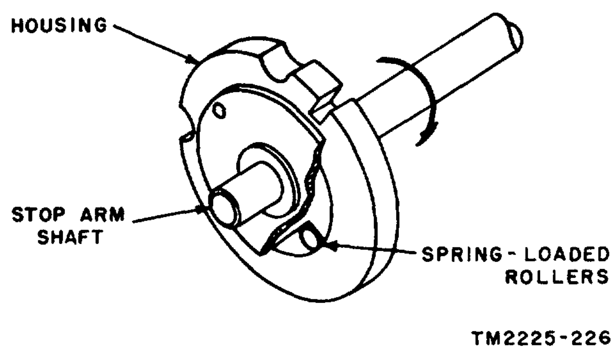



*Figure 2-37. Antibounce clutch for stop arm shaft.*

bars, each in a different position in the code-ring cage. Of the 32 possible type wheel positions, 26 are used for letters of the alphabet, 3 are for symbols, and 3 are blank and do not print. (On later models of the equipment, four positions contain symbols and two positions are blank). When the type wheel moves to the figures-shift position, the type wheel positions are used for printing numerals, punctuation marks, and communication symbols (fig. 2-2). Rotation of the stop arm, therefore, controls rotation of the type wheel which, in turn, brings the desired character to the printing position directly above the print hammer lever. The function shaft and the stop arm shaft begin rotating at the same time. Because of the gear ratio between the two shafts, rotation of the stop arm to the selected stop bar is always completed well min advance of the printing or punching action. This applies in all cases except when a selection is repeated. The stop arm, in this case, remains in the previously chosen position without any stop arm shaft motion. Operated by another mechanism, the print hammer lever moves upward sharply at the proper instant striking the paper tape and inking ribbon against the character on the type wheel.

*b. Printing Character or Symbol*. The printing operation follows the positioning of the stop arm and is controlled by rotation of the print and register cam on the function shaft (fig. 2-36). The type wheel register lever, riding against the print and register cam on the function shaft, is pulled sharply upward by spring action when a high part of the cam passes the contacting surfaces of the type wheel register lever. The blade at the left end of the register lever engages a notch of the register wheel, locking the type wheel in the desired character position. At the same time, the print hammer eccentric stop attached to the register lever moves downward, no longer blocking rotation of the print hammer lever. As a high portion of the print cam rotates past the contacting surfaces of the print hammer lever, the print hammer lever is pivoted sharply upward by a spring. The print hammer lever strikes the paper tape pressing the inking ribbon against the desired character on the locked type wheel. After the character has been printed, the print and register cam moves the type wheel register lever downward, disengaging the register wheel and the type wheel is free to rotate for printing the next character. Printing does not occur when the letters-shift (TT-76/GGC only), figures-shift, or space code group is received. (On all models except the TT-76/GGC, a rectangular symbol (fig. 2-2) is printed on the tape when the letters-shift code group is received. ) The stop bars for these operations halt rotation of the stop arm at a point where the highest portion of the register wheel is stopped directly above the register lever blade. When the print and register cam permits the type wheel register lever to begin moving upward, it strikes against the portion of the register wheel that has no teeth cut into it. This prevents the register lever from moving fully to the upward position, and the print hammer eccentric stop continues to block rotation of the print hammer lever. With the print hammer eccentric stop in this position, the print hammer lever cannot follow the print cam surface and printing is prevented. The printing operation is summarized in the chart below.

*c. Printing Operation Sequence Chart*. Just prior to the printing operation, the incoming code group has been set up in the selector Y-levers and in the code rings, the print hammer lever (fig. 2-36) is in its released position, the type wheel register lever is cammed away from the register wheel by the print and register cam, and the function shaft has just begun its one-half revolution. The following sequence chart summarizes the operations that occur when the printing mechanism operates.

*Printing Operation Sequence Chart*

| | |
|---|---|
| 1. | Printing operation sequence started by transfer operation, function shaft starts to rotate. |
| 2. | Stop arm is released by the previously selected stop bar. Function shaft friction clutch operates, permitting the friction shaft drive gear to rotate the stop arm shaft. |
| 3. | Type wheel driven gear on the stop arm shaft rotates type wheel hub assembly and type wheel |
| 4. | Type wheel reciprocating drive lever begins to push type wheel reciprocatingtransfer lever toward figures letters shift lever (par. 2-33). |
| 5. | Stop arm stopped by selected stop bar. Type wheel stopped In corresponding position Function shaft friction clutch is overcome, stopping the driving gear and stop arm shaft |
| 6. | Type wheel moves forward, carrying the inking ribbon with it. Forward movement of the type wheel is halted by figures-letters shift lever and held under spring tension |
| 7. | Register cam releases type wheel register lever. Spring tension moves type wheel register into engagement if a character is to be printed. |

*Printing Operation Sequence Chart-Continued*

| | |
|---|---|
| 8. | Print cam releases print hammer lever which allows spring to drive print hammer lever toward type wheel. Momentum of print hammer lever causes hammer to snap momentarily against bottom of message tape, driving the tape and inking ribbon against character on type wheel, printing the character on the message tape. |
| 9. | Type wheel register lever is withdrawn from the register wheel by register cam. |
| 10. | Print hammer lever is moved away from the type wheel by print cam. |
| 11. | Low portion on type wheel reciprocating cam allows spring to move type wheel to normal rear position |
| 12 | Function shaft clutch is disengaged. Function shaft stops. |

## 2-29. Tape Punching and Feeding Operations

In addition to printing messages on a paper tape, as described in paragraph 2-28 the reperforator records the code impulses of each received code group in the form of punched code holes in the message tape. The printing appears along one edge of the message tape, and the code impulses are recorded as holes across the message tape. This perforated portion of a message tape is subdivided into six columns; five for the code impulse holes and one for the tape feed hole. The first column along the edge opposite the printing is reserved for recording the first code Impulse. When it is a marking Impulse, a code hole is punched in this column, and when it is a spacing impulse, a hole is not punched. The second column is used to record the second code impulse in a like manner. The third column consists of a continuous row of smaller holes that are used for feeding the message tape through the reperforator. The remaining three columns are used for the third, fourth, and fifth code impulses. Start and stop impulses are not recorded in perforated form because the transmitter distributor mechanism automatically provides these impulses. Operation of the mechanism that perforates the code and feed holes and feeds the tape is described in subparagraph *a* through *c* below.

*a. Code Hole Punching Selection*. This operation begins when the code impulses of a received code group are stored in the code rings as described in paragraph 2-25. The lower end of each of the five code ring mates with one of five punch interference levers (fig. 2-38). These punch interference levers transfer the code ring settings to the punching mechanism.

(1) When a code ring is positioned counterclockwise to record a spacing impulse, the mating punch interference lever is rotated clockwise. The lower arm moves away from the raised portion of its corresponding code hole punch lever and a hole will not be punched when the punching operation occurs.

(2) When a code ring is positioned clockwise to record a marking impulse, the mating punch interference lever rotates counterclockwise. This causes the lower arm of the punch interference lever to move in the blocking position directly above the raised portion of its code hole punch lever. When the punching operation occurs, a hole will be punched in the message tape to record this code impulse.

(3) The five code punch bars and the feed punch are mounted in the code die support and are held In place by a comb (fig. 2-39). Each of the code punch bars is engaged by an associated code hole punch lever. The feed punch bar is smaller In diameter than the code punch bars The feed punch lever is slightly different from the code hole punch levers. It does not have a raised portion like the code

hole punch levers, but is hooked around the shaft on the punch arm assembly. This arrangement causes It to raise the feed punch bar during the punching operation and perforate a feed hole In the message tape for each code group received.

*b. Punching Operation*. This operation occurs after the transfer operation positions the punch interference levers In accordance with the received code impulses. One-half revolution of the print and register cam, mounted on the function shaft (fig. 2-39), provides the power required for the punching operation. The cam starts one-half revolution when the transfer operation occurs. As this cam revolves, it moves the roller end of the punch arm assembly downward and causes the opposite end containing the five code hole punch levers to move upward toward the code punch bars. The code hole push levers that are blocked by the lower arm of the mating punch interference levers push their respective punch bars upward through the paper tape to record marking code impulses. The code hole punch levers that are not blocked by the lower arm of the punch interference levers pivot counterclockwise slightly on their pivot stud and do not perforate the paper tape to record spacing code impulses.

*c. Tape Feeding Operation*. Tape feeding in this reperforator is accomplished by a slight rotation of the tape feed sprocket (fig. 2-40), as it feeds the tape one space for each code group received. The pins in the tape feed sprocket engage the feed holes in the message tape and force the message tape to move when the tape feed sprocket turns. Tape feeding occurs immediately before the message tape is punched.

(1) The initial motion for tape feeding is provided by the punch arm assembly when it begins the punching operation. As the code hole punch lever end of the punch arm assembly moves upward, the feed pawl assembly engages and rotates the ratchet wheel, feeding the tape. The feed pawl assembly must not be permitted to continue turning the ratchet wheel during the punching operation, or the tape will be damaged. To prevent this the machine screw on the code die support is adjusted to cause the feed pawl assembly to rotate free of the ratchet wheel immediately before the tape is punched.

(2) At all times except during tape feeding, the tape feed sprocket is held motionless by the detent wheel, the detent lever, and a spring. The detent wheel is attached firmly to the shaft that contains the feed sprocket and ratchet wheel. The spring causes the detent lever to exert a constant pressure against the detent wheel. This pressure also is used to complete tape feeding. As the feed pawl assembly pushes and immediately releases the ratchet wheel, the pressure of the detent lever against the detent wheel completes the feeding operation.

*d. Tape Puller*. Models other than the TT-76/GGC are provided with a tape puller mechanism which operates in conjunction with the tape feed mechanism. The tape puller mechanism pulls the paper tape from the tape reel, providing slack in the paper tape between the tape feed mechanism and the tape reel. This relieves the tape feed mechanism of the strain of unwinding the paper tape from the tape reel. It consists of a tape puller arm (fig. 2-41) that is driven by the print and register cam, a tape puller spring that pivots with the arm to hold one end of the paper tape against the tape puller studs while the tape puller arm pulls it from the tape reel, and a tape puller bracket for mounting the mechanism.

*e. Summary*. The following chart summarizes the sequence of operations that occurs during the tape punching and feeding operation:

*Feeding and Punching Operation Sequence Chart*

| | |
|---|---|
| 1. | Sequence starts with transfer operation; function shaft starts to revolve (fig. 2-38). |
| 2. | Punch interference levers, actuated by code rings, are positioned m accordance with received code impulses. For spacing impulses, lower arm of punch interference lever moves to space position and swings clear of raised portion of mating code hole punch levers. For marking Impulses, lower arm of punch interference lever moves to blocking position above raised portion of mating code hole punch levers. |
| 3. | Punch arm assembly begins to pivot, operated by print and register cam (fig. 2-39). |
| 4. | Feed pawl assembly engages ratchet wheel on tape feed sprocket shaft (fig. 2-40). |
| 5. | Paper tape is moved forward one character space. Detent lever and detent wheel hold paper tape stationary. |
| 6. | Tape puller arm and spring pivoted clockwise by print and register cam Spring holds paper tape to tape puller stud as tape puller arm depresses paper tape, unreeling it (fig. 2-41). |
| 7. | Continued rotation of punch arm assembly forces code hole punch levers that are blocked by punch interference levers to drive code punch bars through paper tape. Other code punch bars remain in lower position. Feed punch lever drives feed punch through tape on every upward movement of punch arm assembly (fig. 2-38). |
| 8. | Print and register cam returns punch arm assembly to original position, withdrawing punches from paper tape. |
| 9.<br>10 | Tape puller arm and spring pivoted counterclockwise, releasing tape (fig. 2-41).<br>Feed pawl assembly is positioned for the next feeding operation (fig. 2-40). |
| 11. | Function shaft clutch is disengaged. Function shaft stops. |

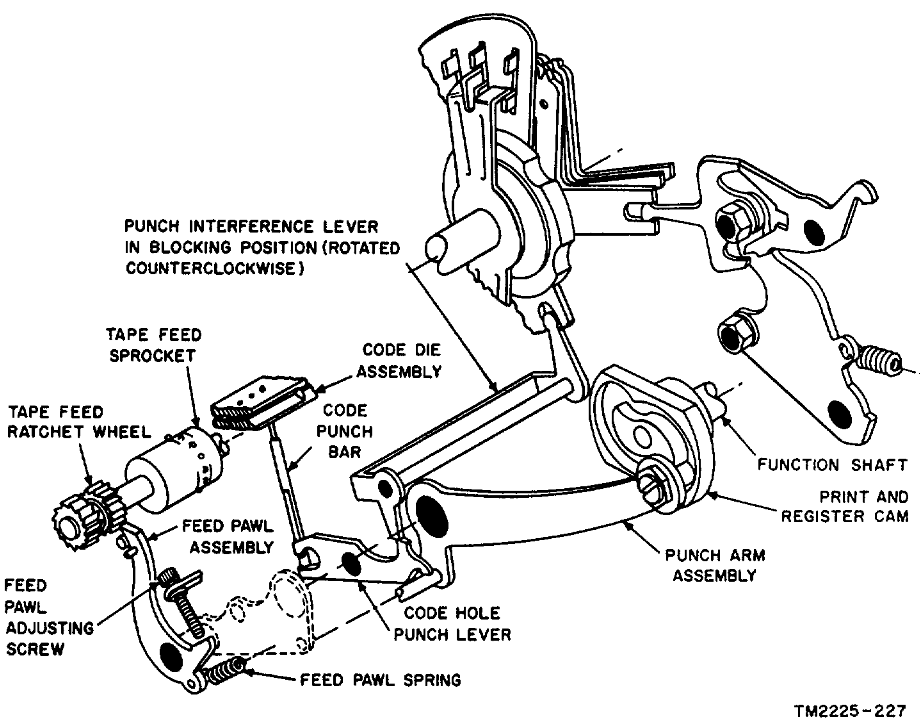



*Figure 2-38. Functional diagram, selecting and punching mechanisms.*

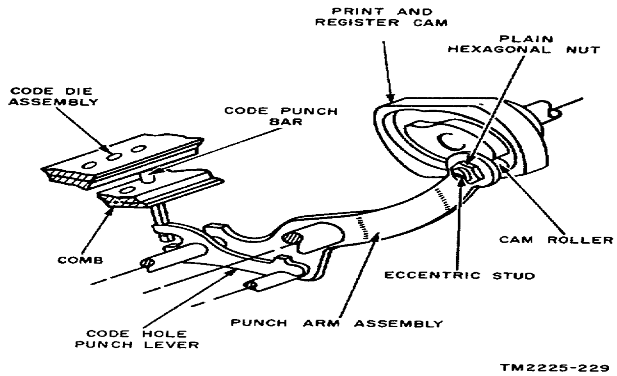



*Figure 2-39. Basic punching mechanism.*

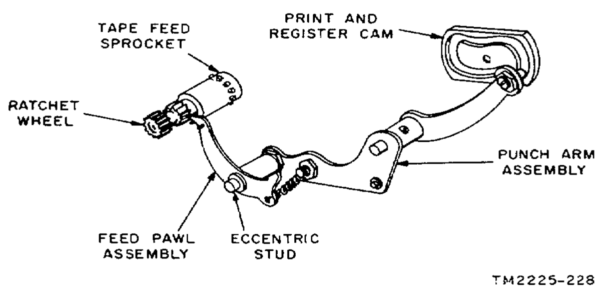



*Figure 2-40. Basic tape feed mechanism.*

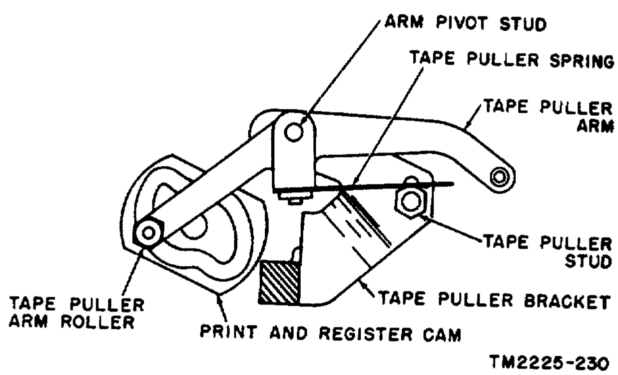



*Figure 2-41. Tape puller mechanism (TT-76A/GGC and subsequent models.*

## 2-30. Manual Tape Feed-Out Operation

A manually operated mechanism is included in the reperforator to permit feeding tape out of the unit while messages are not being received. To accomplish this, the operator merely operates the manual type feed-out lever (fig. 2-42) and releases it when sufficient tape has been fed. Operation of the manual tape feed-out lever positions the selector Y-levers for the blank code group (fig. 2-2) and trips the transfer lever. The printing mechanism prints the blank signal, and the tape feed mechanism feeds the tape. If a code group is received while the manual tape feed-out lever is operated, the motion of the selector camshaft disables the manual tape feed-out mechanism and the incoming message is recorded. Detailed operation of the manual tape feed-out mechanism (fig. 2-42) is described in a and b below. Manual tape feed-out is a local mechanical operation and has no effect on the signal line.

*a. Tape Feed-Out Operation*. Operation of the manual tape feed-out lever to the left turns the feed-out control lever counterclockwise. This action raises the manual tape feed-out link which, in moving upward, raises one end of the feed-out latching lever (fig. 2-42).

The feed-out latching lever, in moving upward, moves against an eccentric stud that acts as a pivot point and causes the lever to pivot slightly. As it pivots, the end moving downward moves the feed-out operating arm downward against the trip latch lever. The trip latch lever rotates the transfer lever trip latch away from the transfer lever and permits the transfer lever spring to operate the transfer lever. An eccentric spindle, attached to the feed-out operating arm, extends over the upper arm of the selector Y-levers. As the feed-out operating arm moves downward, the eccentric spindle pushes downward on the Y-levers and rotates all five to the spacing position (blank code group position). With the release of the transfer lever, the transfer operation (par. 2-41) transfers the blank code group setting of the selector Y-levers to the code rings and punch interference levers. The transfer operation also causes printing of the blank symbol and feeding of the tape. The entire operation is repeated continuously, as long as the operator holds the manual tape feed-out lever in the operated position, unless an incoming code group disables the mechanism.

*b. Effects of Received Code Group*. If a code group is received during operation of the manual tape feed-out mechanism, the feed-out mechanism is disabled immediately by the following actions: Receipt of the start impulse causes the selector camshaft to begin rotating as in normal operation. The manual tape feed-out cam, mounted on the selector camshaft (fig. 2-7), trips the feed-out disabling latch, that was held in the latched position by the latch spring. When the feed-out disabling latch is tripped, the feed-out operating arm is released and the operating arm spring pulls the feed-out operating arm upward. The eccentric stud on the feed-out operating arm moves upward and releases the selector Y-levers. When the feed-out operating arm is in the upper position, the transfer lever trip latch engages the transfer lever again, and operation of the reperforator is controlled by the incoming code groups only. When this occurs, the operator releases the manual tape feed-out lever. The spring of the feed-out latching lever causes the feed-out disabling latch to latch the feed-out operating arm again; this resets the en-

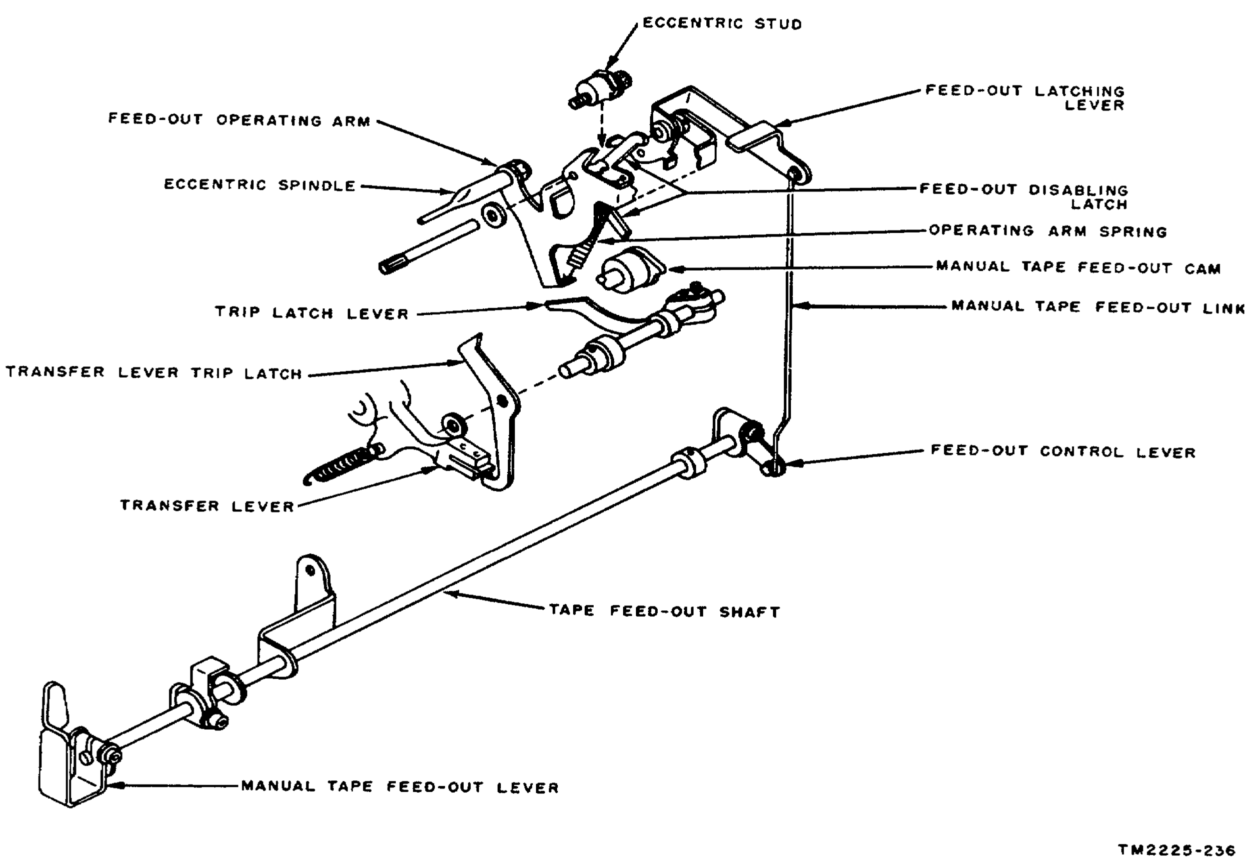



*Figure 2-42. Manual tape feed-out mechanism.*

tire mechanism in the normal unoperated position.

## 2-31. Ribbon Feed and Ribbon Reverse Operations

The ribbon mechanism includes two ribbon spools and sufficient inking ribbon to fill only one spool. As the reperforator operates, the inking ribbon is unwound automatically from one spool and wound on the other. When the ribbon is almost entirely wound on one spool, the ribbon mechanism automatically reverses the direction of the ribbon feed and begins to wind the inking ribbon onto the empty spool. The mechanisms that accomplish the feeding and reversing actions are described in a and b below.

*a. Ribbon Feeding Operation*. Power to operate the ribbon feed and ribbon reverse mechanism is supplied by the ribbon feed cam on the function shaft (fig. 2-7). As the function shaft rotates during the reception of code groups, it causes the ribbon feed cam follower (fig. 2-43) to pivot about the eccentric stud and swing to the left and right. The cam has one high and one low portion as compared to two for most cams in this unit. Reception of every other code group causes the ribbon feed mechanism to feed the inking ribbon. The feed mechanism includes a left hand and right hand ribbon feed lever, a left hand and right hand ribbon feed detent wheel, and a left hand and right hand sensing lever, one of each for each ribbon spool. The two ribbon feed levers are mounted on a U-shaped driving link lever that is coupled to the ribbon feed cam follower. As the ribbon feed cam follower pivots to the left, it moves the driving link lever upward. One ribbon feed lever engages its ribbon feeding detent wheel and rotates the ribbon spool shaft enough to feed the inking ribbon one character space. On the downward stroke of the ribbon feed cam follower, the ribbon feed lever also is moved downward in preparation for the next feed stroke. The other ribbon feed lever moves up and down also but is held away from its mating ribbon feeding detent wheel. A ratchet feed detent and spring prevents the driven ribbon feeding detent wheel from rotating freely.

*b. Ribbon Feed Sequence*. Assume that the function shaft (fig. 2-7) is in that portion of its cycle so that the ribbon feed cam follower (fig. 2-43) driven by the function shaft is moved to the right just prior to the start of the ribbon feed operation, the driving link lever and the ribbon feed levers are in their down position. The driving ribbon feed lever is positioned to engage its ribbon feeding detent wheel. The driven ribbon feeding detent wheel is engaged by its detent to prevent reverse rotation of the detent wheel. The ribbon feed lever and the ratchet feed detent associated with the idling ribbon feeding detent wheel are held out of engagement with the detent wheel by the ribbon reversing arm to prevent any engagement with the ribbon feeding detent wheel. The following chart summarizes the sequence of operations of the ribbon feed mechanism as the function shaft starts to rotate.

*Ribbon Feed Sequence Chart*

| | |
|---|---|
| 1. | Function shaft starts to rotate. |
| 2. | Print and register cam moves the ribbon feed cam follower to the left, moving the driving link lever and ribbon feed lever upward. |
| 3. | Ribbon feed lever engages one of the ribbon feeding detent wheels which drives one of the ribbon spools. |
| 4. | Inking ribbon moves one space, unwinding the inking ribbon from the opposite ribbon spool. |
| 5. | Ratchet feed detent engages the driven ribbon feed detent wheel to prevent reverse movement of the ribbon feeding detent wheel and ribbon spool. |
| 6. | Function shaft stops until it is again actuated by a received code group. |

*Ribbon Feed Sequence Chart-Continued*

| | |
|---|---|
| 7. | Function shaft starts to rotate. |
| 8. | Print and register cam moves ribbon feed cam follower to the right, moving the driving link lever and ribbon feed lever. |
| 9. | Ribbon feed lever disengages ribbon feeding detent wheel. |
| 10. | Print and register came moves feed cam follower to the extreme right position |
| 11. | Function shaft stops, having completed one full revolution. |

*c. Ribbon Reversing Mechanism*. The ribbon feed mechanism automatically reverses the direction of feed when the last turn of the ribbon is unwrapped from one of the ribbon spools (fig. 2-43). As the ribbon spool empties, an opening in the hub of the spool is uncovered and the portion of the sensing lever that is inside the spool moves into the opening under spring tension. This movement pivots the top end of the sensing lever forward into the vertical path of the reversing toggle assembly. On the next downward movement of the cam follower arm the toggle assembly is tripped. This moves the ribbon feed lever and the ratchet feed detent out of engagement with the ribbon feeding detent wheel of the full ribbon spool, and moves the other ribbon feed lever and ratchet feed detent into engagement with the ribbon feeding detent wheel of the empty ribbon spool. As the reperforator continues to operate, the ribbon feed lever engages the ribbon feeding detent wheel associated with the empty ribbon spool and rotates the ribbon spool to wind the inking ribbon onto it. The ribbon reversing action occurs automatically on each side as each ribbon spool, in turn, becomes empty.

**2-32. Stop Bar Selection of Functions**

In addition to recording messages in printed and punched form on tape, the reperforator is capable of performing three mechanical operations called functions-the letters-shift function; the figures-shift function; and the signal bell function.

*a. General*. A stop bar for each function is located in the code-ring cage (fig. 2-34). The signal bell function shares the same stop bar used for selecting the letter "S." The stop bars for these functions are longer than other stop bars, the additional length extending beyond the other bars at the rear of the code-ring cage. Three sensing levers, one for each function, are mounted on the stop arm shaft directly behind the code-ring cage. Springs apply tension to the sensing levers and pull each toward its respective stop bar. Operation of the type wheel and function lever cam and cam

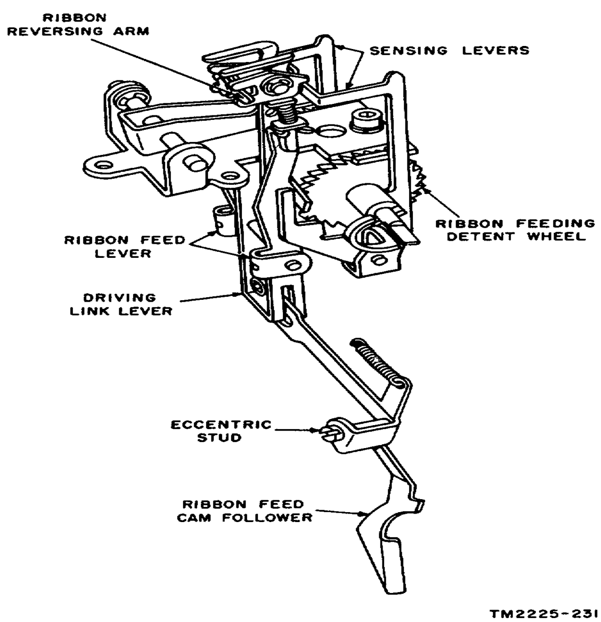



*Figure 2-43. Ribbon feed and reversing mechanism.*

lever assembly holds the sensing levers away from the stop bars while an incoming code group is being set up in the code-ring cage. After the transfer operation, the type wheel and function lever cam and cam lever assembly permit the sensing levers to be pulled toward their stop bars. Each of the function stop bars, when not selected, blocks the path of its respective sensing lever.

*b. Operation*. The function sensing operation begins after the transfer operation positions the code rings. As the type wheel and function lever came on the function shaft begins to rotate, a low portion of the cam permits the cam lever assembly (fig. 2-44) to move toward the function shaft allowing the springs to pull each sensing lever toward its stop bar.

(1) If the code rings have not selected one of the function stop bars, the sensing levers rotate until each sensing lever strikes its stop bar. The sensing levers remain in this blocked position until they are restored by the cam lever assembly and type wheel and function lever cam.

(2) If the code ring selects one of the function stop bars, the three sensing levers move toward their stop bars until the two not selected are halted by their stop bars. The selected stop bar is not in position to block the sensing lever of the desired function, and the sensing lever rotates past the stop bar causing operation of the associated function mechanism. When a function stop bar is in the selected position, the front end moves into the notch formed by the code rings and raises the rear extension of the stop bar out of the path of its sensing lever.

**2-33. Letters Shift and Figures Shift Operations**

The type wheel of the reperforator is moved to the forward position directly above the message tape for printing, and is moved backward after printing to expose the character to view. The forward and backward movement of the type wheel is called type wheel reciprocation. It works in conjunction with the figures shift and letters shift mechanisms
that control the length of the type wheel reciprocating stroke.

*a*. Power to move the type wheel is supplied by the type wheel and function lever cam (B, fig. 2-46) on the function shaft, which begins to rotate after the transfer operation. As the type wheel and function lever cam rotates, its high portion pushes one arm of the type wheel reciprocating cam follower downward. This moves the opposite arm, that is coupled to the type wheel reciprocating spring lever upward, rotating the type wheel reciprocating spring lever clockwise when viewing it from the rear. When the type wheel reciprocating spring rotates, it pivots the type wheel reciprocating transfer lever assembly (A, fig. 2-46) rotating the bell crank levers. This projects the type wheel forward above the paper tape just before the printing operation occurs. The inking ribbon, attached to the type wheel assembly, reciprocates forward with the type wheel.

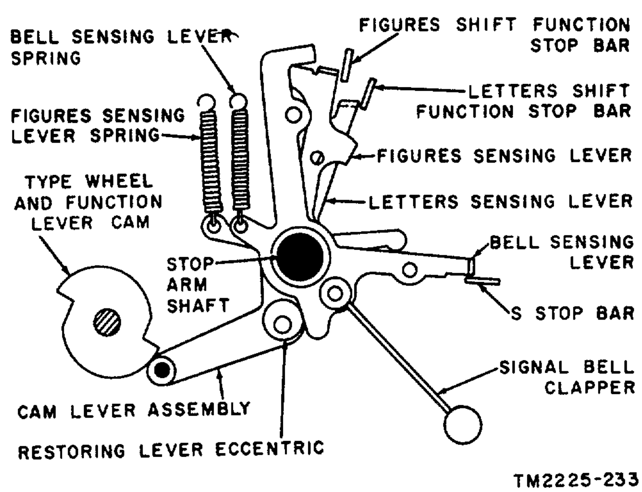



*Figure 2-44. Function sensing levers in normal (blocked) position.*

As the type wheel and function lever cam continues to rotate after printing, the low portion of the cam permits the spring to return the cam lever assembly to its original position. The type wheel, moved by spring tension, returns to its normal position behind the printed portion of the paper tape, permitting the operator to read the last printed character.

*b*. Just prior to the operation of the type wheel reciprocating mechanism, the type wheel (fig 2-45) is in the rearward position withdrawn from the printing so that the last character printed is visible to the operator. The type wheel reciprocating transfer lever assembly is pivoted clockwise. The type wheel reciprocating cam follower is also pivoted clockwise and its roller is in the low portion of its associated cam. The following chart summarizes the sequence of operations that occurs when the function shaft starts to rotate and the type wheel reciprocating mechanism operates.

*Type Wheel Reciprocating Operation Sequence Chart*

| | |
|---|---|
| 1. | Function shaft starts to rotate. |
| 2. | Type wheel and function lever cam on the function shaft moves against the type wheel reciprocating cam follower, pivoting the type wheel reciprocating cam follower counterclockwise (fig. 2-45). |
| 3. | Type wheel reciprocating cam follower pivots type wheel reciprocating spring lever clockwise, moving the lever against the type wheel reciprocating transfer lever assembly |
| 4. | Type wheel reciprocating transfer lever assembly pivots counterclockwise on its stud, pivoting the type wheel upper bell crank lever in a clockwise direction. |
| 5. | Clockwise rotation of the type wheel upper bell crank lever is transferred to the type wheel lower bell crank lever that moves the type wheel outward. |
| 6. | Driven end of the type wheel reciprocating transfer lever strikes the figures-letters shift lever that limits the type wheel reciprocating transfer lever travel. (Travel distance varies depending upon whether the figures letters shift lever is in the letters or figures position). |
| 7 | Type wheel reciprocating spring lever continues its clockwise motion, extending its spring. |
| 8. | Type wheel reciprocating cam follower reaches high point of the type wheel and function lever cam |
| 9. | Print hammer lever strikes paper tape (par. 2-28) printing aligned character. |
| 10 | Type wheel reciprocating cam follower moves to low point of type wheel and function lever cam under tension of the shift cam follower spring, pivoting the type wheel reciprocating cam follower clockwise, to the restored position. |
| 11. | Type wheel reciprocating cam follower pivots the type wheel reciprocating spring lever counterclockwise, moving the lever out of engagement with the type wheel reciprocating transfer lever assembly. |
| 12. | Type wheel bell crank lever spring on the type wheel lower bell crank lever pivots the bell crank assembly counterclockwise, moving the type wheel reciprocating transfer lever assembly and the type wheel to the restored position. |

**2-34. Letters Shift Operation**

The characters and symbols printed by this reperforator are arranged in two raised parallel rows around the type wheel. The letters (outer) row contains the letters of the alphabet and the special symbols shown in the LTRS column (fig. 2-2). The figures (inner) row contains the numerals, punctuation marks, and symbols shown in the FIGS column. When the reperforator is in the letters shift position, the type wheel reciprocates forward just enough to align the letters row of characters above the print hammer lever. When the reperforator is in the figures shift position, the reciprocating stroke is longer and the figures row is aligned with the print hammer lever.

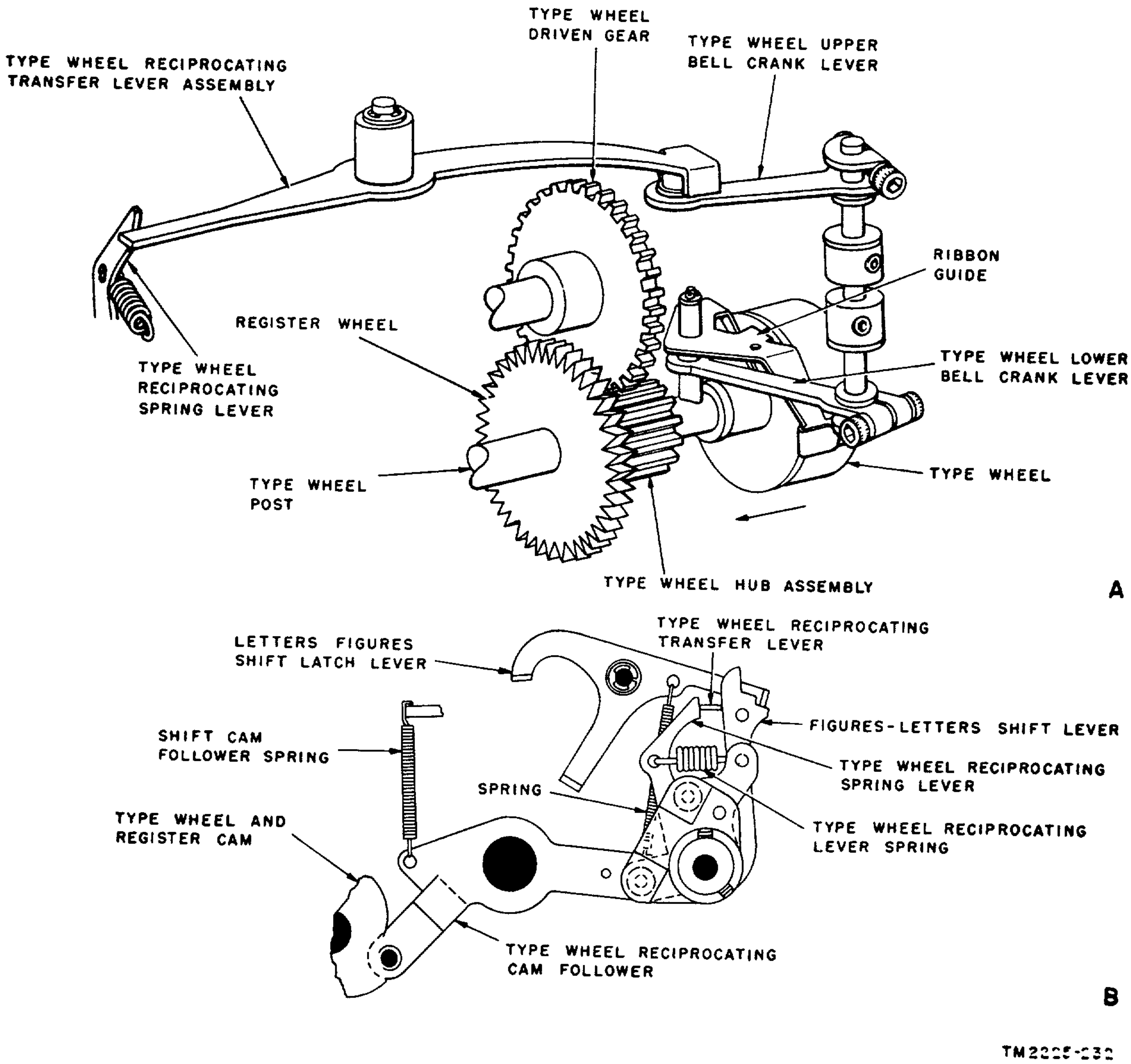



*Figure 2-45. Type wheel reciprocating and shifting mechanism.*

a. When a letters shift code group is received, the code rings are positioned to select the letters shift function stop bar (fig. 2-34). The letters sensing lever, (A, fig. 2-46) no longer blocked by the letters shift function stop bar is rotated by the letters sensing lever spring. The arm opposite the spring engages the figures-letters shift lever and rotates it counterclockwise to the letters shift position. This action permits a spring to pull the letters figures shift latch lever downward, thereby latching the figures-letters shift lever in the letters shift position In this position, the figures-letters shift lever limits the forward motion of the type wheel (fig. 2-45) during reciprocation. The type wheel is moved forward during reciprocation as the type wheel reciprocating spring lever rotates the free end of the type wheel reciprocating transfer lever assembly. When the free end of the type wheel reciprocating transfer lever assembly strikes the figures-letters shift lever (A, fig. 2-46), forward motion of the type wheel is halted and the letters row of characters on the type wheel is positioned above the print hammer lever.

*b.* The letters shift operating sequence starts as the letters code group is set up in the codering cage by the transfer operation (fig. 2-32). Just prior to this the letters shift function stop bar (A, fig. 2-46) is in the path of the letters sensing lever. The letters figure shift latch lever holds the figures-letters shift lever clockwise in its figures position. The cam lever assembly is at the high point of its associated cam and holds the sensing levers in their restored position. Following is a chart that summarizes the sequence of operations that occurs when the reperforator is shifted from figures shift to letters shift position.

*Letters Shift Sequence Chart*

| | |
|---|---|
| 1. | Letters code group received and set up by code rings In the code-ring cage. |
| 2. | Letters shift function stop bar pivoted into aligned notches in code rings, moving rear end of the stop bars out of the path of the letters sensing lever. |
| 3. | Function shaft starts to rotate, high part of type wheel and function lever cam moves out of the path of the cam lever assembly. |
| 4. | Letters sensing lever spring pivots letters sensing lever clockwise into contact with lower extension of the figures-letters shift lever |
| 5. | Figures-letters shift lever pivots counterclockwise. |
| 6. | Shift latch spring pulls letters figures shift latch lever to lower latch surface on the figures-letters shift lever, locking the lever In the letters shift position. |
| 7. | Type wheel reciprocating transfer lever assembly strikes figures-letters shift lever, restricting Its travel distance (a above). |
| 8. | Type wheel and function lever cam on function shaft moves against the cam lever assembly, moving the cam lever assembly and the letters sensing lever to the restored position. |
| 9 | Figures-letters shift lever remains latched in the letters position. |
| 10. | Function shaft stops rotating. |

**2-35. Figures Shift Operation**

Operation of the figures shift mechanism permits a long forward stroke of the type wheel during reciprocation that permits the figures row on the type wheel to print.

*a.* Reception of the figures code group causes selection of the figures shift function stop bar in the code-ring cage (fig. 2-34). Since the figures sensing lever (B, fig. 2-46) is not stopped by its figures shift function stop bar, the figures sensing lever spring rotates the figures sensing lever, causing it to trip the letters-figures shift lever latch. When tripped, the letters-figures shift lever latch moves upward and releases the figures-letters shift lever, which is pulled to the figures shift position by its spring. In this position the figures-letters shift increases the distance the type wheel reciprocating transfer lever assembly

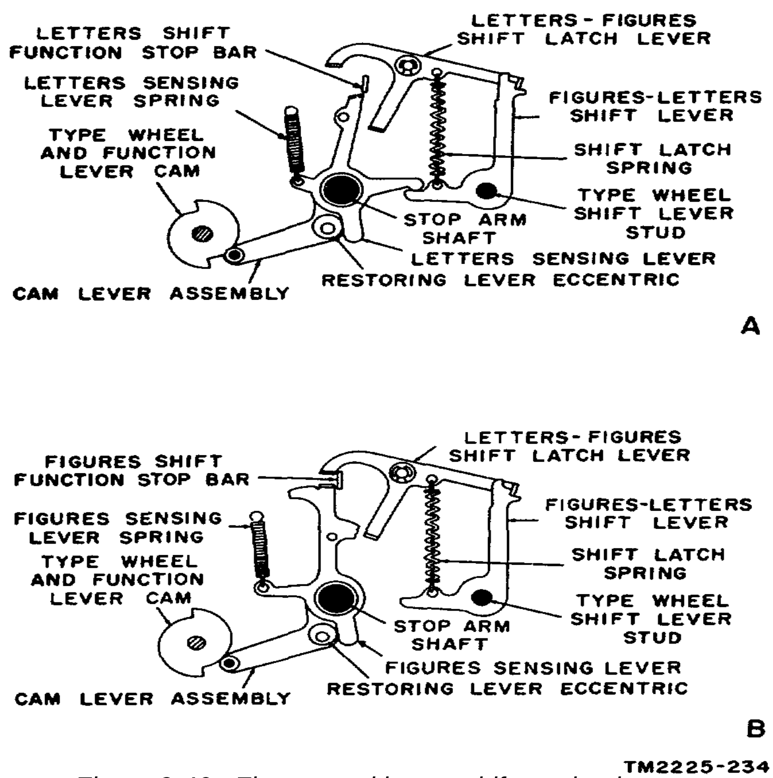



*Figure 2-46. Figures and letters shift mechanism*

(fig. 2-45) can travel during reciprocation, thereby increasing the forward motion of the type wheel. When the figures-letters shift lever is in the figures shift position, the forward motion of the type wheel is not halted until the figures (inner) row of the type wheel is directly over the print hammer lever. As the operation of the reperforator continues, the figures or symbols in this row are printed until a letter shift code group is received.

*b.* The figures shift operation sequence starts as the figures code group is set up in the codering cage by the transfer operation (fig. 2-32). Just prior to this the figures shift function stop bar is in the path of the figures sensing lever. The letters figures shift latch lever (B, fig. 2-46) holds the figures-letters shift lever counterclockwise in the figures position. The cam lever assembly is at the high point of its association cam and holds the sensing levers in their restored position. Following is a chart that summarizes the sequence of operations that occurs when the reperforator is shifted from the letter shift to the figures shift position.

*Figure Shift Sequence Chart*

| | |
|---|---|
| 1. | Figures code group received and set by code rings In the code-ring cage. |
| 2. | Figures shift function stop bar pivoted into the aligned notches m the code rings, moving the rear end of the stop bar out of the part of the figures sensing lever. |
| 3. | Function shaft starts to rotate, high part of type wheel and function lever cam moves out of the path of the cam lever assembly. |
| 4. | Figures sensing lever spring pivots the sensing lever clockwise into contact with lower extension of the letters figures shift latch lever (B, fig. 2-46). |
| 5. | Figures letters shift latch lever pivots counterclockwise, far enough to unlatch the figures-letters shift lever (fig. 2-46). |
| 6. | Shift latch spring pivots the figures-letters shift lever clockwise until latched in the figures shift position by the letters figures shift latch lever. |
| 7. | Type wheel reciprocating transfer lever strikes figures-letters shift lever latched in the figures position, restricting its travel distance (a above). |

*Figure Shift Sequence Chart-Continued*

| | |
|---|---|
| 8. | Type wheel and function lever cam on function shaft moves against the cam lever assembly, moving the cam lever assembly and the figures sensing lever to the restored position |
| 9. | Figures-letters shift lever remains latched in the figures position. |
| 10. | Function shaft stops rotating |

**2-36. Signal Bell Operation**

This reperforator includes a signal bell mechanism that is used by operators for signaling purposes. The signal bell rings each time the S code group is received while the shift mechanism is in the figures-shift position. The code group also is recorded in punched form on the tape, and the bell symbol (fig. 2-2) is printed. Reception of the same code group causes the letter "S" to be printed when the shift mechanism is in the letters shift position.

*a. Operation.* The signal bell mechanism (fig. 2-47) rings the bell whenever the bell sensing lever spring is permitted to rotate the bell sensing lever clockwise (as viewed from the rear) causing the signal bell clapper to strike the signal bell. The bell function stop bar (used for the letter "S" also) normally blocks rotation of the bell sensing lever when other code groups are received. Reception of the S code group causes the code rings to select the bell function stop bar. The stop bar then moves out of the path of the bell sensing lever and permits the bell sensing lever to rotate when the units is in the figures shift position. The sensing lever when pivoted by the sensing lever spring strikes the signal bell clapper against the signal bell. The mechanism is reset when the cam lever assembly moves to the high point of its associated cam, restoring the function sensing levers to the original counterclockwise position.

*b. Signal Bell Suppression in Letters-Shift.* Although the same code group is used both for printing the letter "S" and ring the signal bell, only one is accomplished when this code group is received. The upper extension of the bell sensing lever is blocked by the upper arm of the letters figures shift latch lever (fig. 2-47) when the code group is received while the unit is in the letters shift position. When this occurs, the reperforator prints the letter "S" and punches the code in the paper tape. If the code group is received while the reperforator is in the figures shift position, the upper arm of the letters figures shift latch lever is positioned below the upper extension of the bell sensing lever and does not block rotation of the sensing lever. In this condition, the signal bell rings, the bell code is punched in the paper tape, and the type wheel reciprocates forward far enough to print the bell symbol (figures row) on the type wheel.

*c. Signal Bell Operating Sequence.* The signal bell operating sequence starts when the S code group is received and set up in the codering cage. Just prior to the start of the sequence the cam lever assembly is at the high point of its associated cam, holding the bell sensing lever (fig. 2-47) and its assembled signal bell clapper in the restored position. The figures-letters shift lever is held in the figures (clockwise) position by the letters figures shift latch lever. In the figures position, the left arm of the letters figures shift latch lever is pivoted out of the path of the upper arm of the bell sensing lever. The bell function stop bar remains in the path of the lower arm of the bell sensing lever until the S code group is received in the code-ring cage. The following chart summarizes the sequence of signal bell operations.

*Signal Bell Sequence Chart*

| | |
|---|---|
| 1 | S code group received and set up by the code rings In the code-ring cage |
| 2. | S stop bar pivots into the aligned notches In the code rings, moving the rear end of the bell function stop bar out of the path of the bell sensing lever |
| 3 | Function shaft starts to rotate, high part of type wheel and function lever cam moves out of the path of the cam lever assembly |
| 4 | Cam lever assembly pivots sharply clockwise, releasing the function sensing levers |
| 5 | Bell sensing lever spring pivots the bell sensing lever and its assembled signal bell clapper clockwise, causing the signal bell clapper to strike the signal bell |
| 6 | Type wheel and function lever cam on function shaft moves against the cam lever assembly, moving the cam lever assembly and the bell sensing lever to the restored position |
| 7 | Function shaft stops rotating |

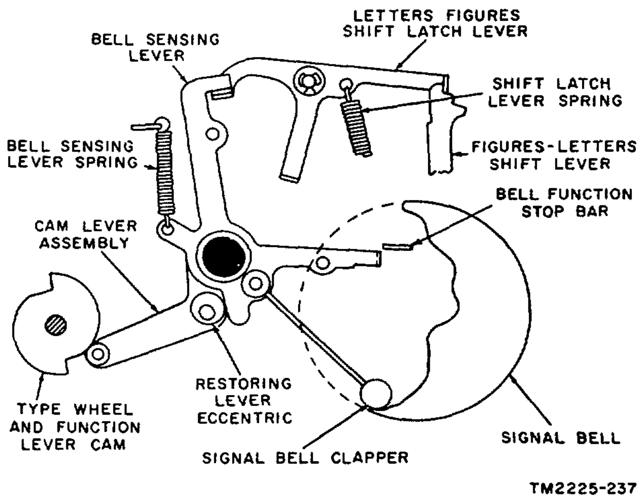



*Figure 2-47. Signal bell mechanism in operated condition.*

**2-37. Tape-Out Alarm**

All models of this equipment are provided with a tape-out alarm mechanism which warns the operator that the supply of paper tape on the tape reel is running low. The design of the tape-out alarm mechanism differs between the machines, but both use an alarm switch which, when operated, closes the electrical circuit to the tape alarm buzzer The operation of the tape-out alarm mechanism used on the TT-76/GGC Is described In (a below; the operation of the tape-out alarm mechanism used on other models is described In *b* below.

*a. Tape-Out Alarm (TT-76/GGC).* The upper end of the alarm lever (fig 2-48) is held against the outer circumference of the paper tape roll by spring action. As the paper tape roll grows smaller the alarm lever, whose lower end is mounted on a stud on the tape reel bracket, pivots counterclockwise. The switch actuating stud that is mounted near the lower end of the alarm lever, and which extends through a hole in the tape reel bracket moves against the switch actuating arm latch as the paper tape roll diameter diminishes, pivoting the switch actuating arm latch clockwise. This movement unlatches the switch actuating lever that is pivoted clockwise by its spring so that the extended arm of the switch actuating lever strikes the operating lever of the alarm switch closing the alarm switch. When the alarm switch closes, it energizes the circuit to the tape alarm buzzer to sound the alarm. This triggering arrangement is provided to cause the switch to snap to the closed position, tape alarm buzzer to sound the alarm. This triggering arrangement is provided to cause the switch to snap to the closed position, preventing arcing that could result If the switch was closed slowly. The tape-out alarm mechanism is reset when the alarm lever is pivoted clockwise to install a new paper tape roll. This moves the switch actuating stud against the switch actuating lever pivoting it counter-clockwise so it can be latched by the switch actuating arm latch. The following tape-out alarm sequence describes the operation of the reset as described above.

*Tape-Out Alarm Sequence Chart (TT-76/GGC)*

| | |
|---|---|
| 1. | Switch actuating arm latch spring pivots the switch actuating arm latch counterclockwise, causing it to latch the switch actuating lever |
| 2. | As the tape roll is expended, the alarm lever pivots counterclockwise, moving the switch actuating stud against the switch actuating arm latch |
| 3. | Switch actuating arm latch pivots clockwise, unlatching the switch actuating lever |
| 4. | Switch actuating lever spring pivots the switch actuating lever counterclockwise |
| 5. | Arm on the switch actuating lever snaps against the alarm switch operating lever to close the alarm switch |
| 6. | Closed alarm switch permits the flow of current to the tape alarm buzzer, sounding the alarm |
| 7. | When a new tape roll is Installed, the alarm lever is pivoted to the right, causing the switch actuating stud to strike the switch actuating lever, pivoting it counterclockwise to open the alarm switch |

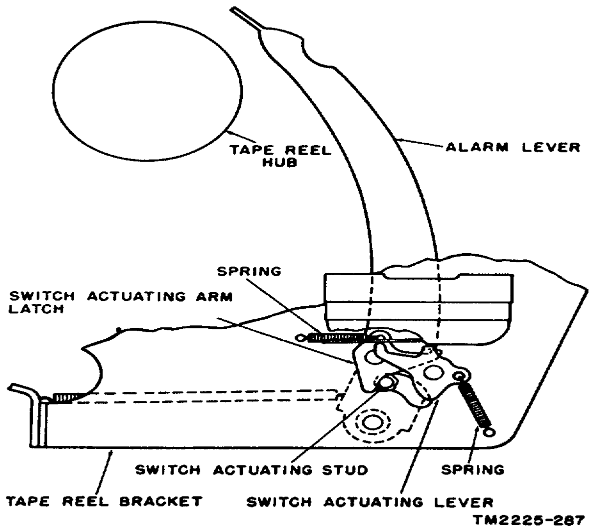



*Figure 2-48. Tape-out alarm mechanism (TT-76/CGGC).*

*b. Tape-Out Alarm (All models except TT-76/GGC)* The free end of the alarm lever (fig. 2-49) is held against the outer circumference of the paper tape roll by spring action. As the paper tape roll diameter diminishes, the tape alarm lever pivots, counterclockwise on its stud on the switch bracket. The switch arm assembly is fastened to the tape alarm lever and pivots with it. As the free end of the alarm lever approaches the core in the center of the paper tape roll, the switch arm assembly whose notch engages the operating lever of the alarm switch, moves the switch operating lever downward to close the alarm switch. When the alarm switch closes, it energizes the electrical circuit to the tape alarm buzzer to sound the alarm. The switch operating lever that is an integral part of the alarm switch, terminates with a spring giving the switch operating lever some flexibility. This permits the switch to snap to the closed position to prevent internal arcing which occurs when the switch is closed slowly. A lever latch mounted on the switch arm assembly engages a stud on the switch bracket when the alarm lever is moved to the extreme clockwise position. The lever latch holds the alarm lever in this position

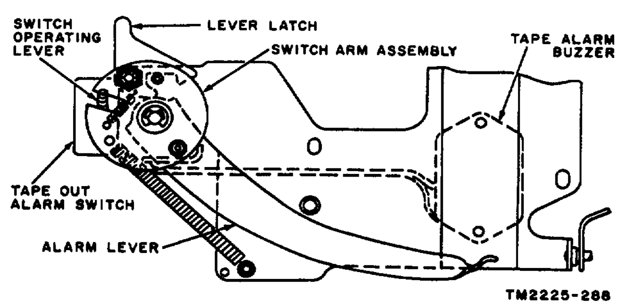



*Figure 2-49. Tape-out alarm mechanism (All models except TT-76/GGC ).*

while the new paper tape roll is being installed. With the alarm lever in this position the switch operating lever is up and the circuit to the tape alarm buzzer is open. When it is manually pivoted counterclockwise, the lever latch releases the alarm lever, permitting spring action to move the free end of the alarm lever against the tape roll.

## SECTION VI. CIRCUIT DESCRIPTIONS TT-76(*)/GGC

### 2-38. General

The circuits in the reperforator-transmitter are divided into two main groups: ac circuits and dc circuits. Figures 2-50 through 2-62 are the schematic diagrams of the reperforator-transmitter circuits. The circuit differences of the various models are illustrated separately Figures 6-1 through 6-6 are the complete schematic and air line diagrams of the reperforator-transmitters.

### 2-39. Ac Circuits

*a. Ac Input Circuit* (figs. 2-50 and 2-51). A power selector switch is provided to permit operation of the transformer on either 115-or 230-volt, 60 cycle ac. If the source of the voltage is 230 volts, the power selector switch is positioned to 230 V and the input voltage is applied to terminals 1 and 3 of the transformer. The autotransformer action of the primary winding steps down the voltage to 115 volts at terminals 1 and 2 of the transformer to operate the motor and copy light circuits. When a 115-volt source is used, the power selector switch is positioned to 115V and the input voltage is applied to terminals 1 and 2 of the transformer. The ac input circuit is traced from the input plug through the POWER ON-OFF switch, fuse, and the primary winding of the transformer. TT-76/GGC has one side of the power input line fused, the TT-76A/GGC has both sides of the power input line fused. All subsequent models have both sides of the power input line fused for 2.0 amperes.

*b. Motor Circuits* (figs. 2-50 and 2-51). The motor circuit is connected in parallel with the 115-volt portion (terminals 1 and 2) of the transformer primary winding. The circuit begins at the 115-volt portion of the transformer primary winding and is traced through the MOTOR switch, filter, field windings, armature, and governor contacts. When the motor has reached the proper speed, centrifugal force overcomes the pull of the governor contact spring and the governor contacts open. This places a 150-ohm resistor (TT-76/GGC and TT-76A/GGC) or a 250-ohm resistor (TT-76B/GGC and later models) in series with the field winding and reduces the current that flows through the windings, decreasing the motor speed. The motor speed decreases until the governor contacts close. The current through the motor and motor speed again increase until the governor contacts reopen. This procedure continues as long as the motor is running. The filter is provided to suppress the rf interference generated by the motor.

*c. Copy Light Circuit* (figs. 2-50 and 2-51). The copy light circuit is connected in parallel to the motor circuit and across the 115-volt portion (terminals 1 and 2) of the transformer primary winding. The circuit can be traced from terminals 1 and 2 of the transformer primary winding through the LIGHT switch and the copy light, when the LIGHT switch is closed.

*d. END OF LINE INDICATOR Lamp and Tape-Out Alarm Circuits* (figs. 2-52 and 2-53). The END OF LINE INDICATOR lamp and tape-out alarm circuit are powered by the 6.3-volt portion of the secondary winding of the transformer.

(1) The 6.3 volt portion of the transformer supplies 6.3 volts ac to the indicator

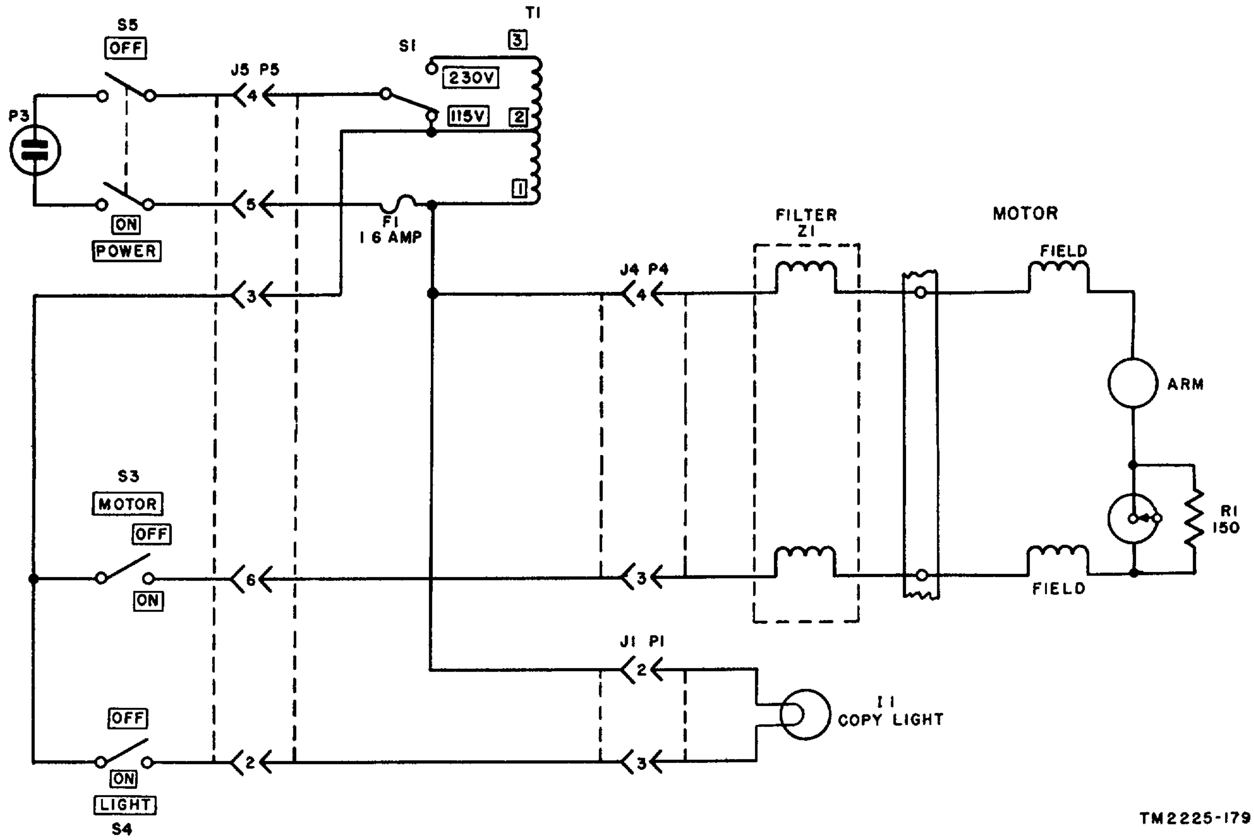
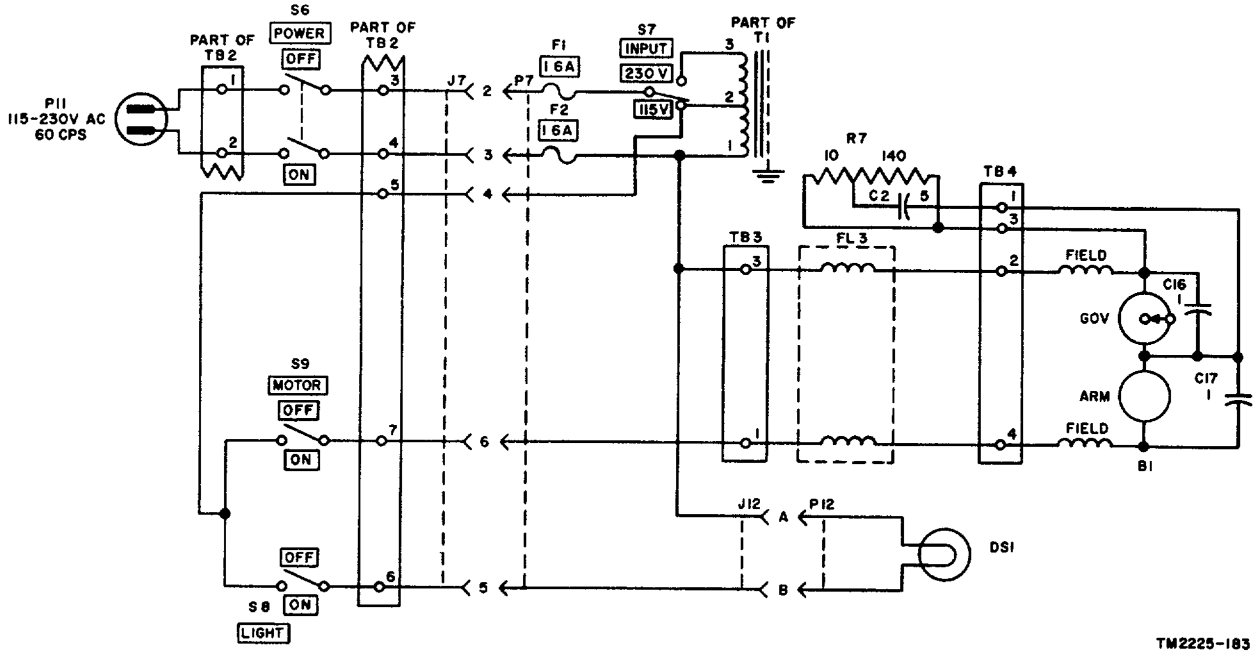



*Figure 2-50. Ac input, motor, and copy light circuits (TT-76/GGc).*

lamp switch and the END OF LINE INDICATOR lamp, located on the left side of the keyboard guard. When transmitting from the key-board-transmitter, the END of LINE INDICATOR lamp lights to indicate that 66 characters have been transmitted since the last carriage return signal. The operator should punch the carriage return and line feed symbols in the message tape.

(2) When the tape roll supply diminishes to a predetermined point, the tape alarm lever resting on the paper tape actuates the contacts of the alarm switch and closes the circuit that connects the tape alarm buzzer across the 6.3 volt portion of the secondary winding of the transformer. This causes the tape alarm buzzer to sound.




*Note.* On the TT-76B/GGC and all subsequent models, fuses F1 and F2 are 2 amperes each. Resistor R7 is 250 ohms and has a 10-ohm tap.

*Figure 2-51. Ac input, motor, and copy light circuits (TT-76A/-GGC and all subsequent models.)*

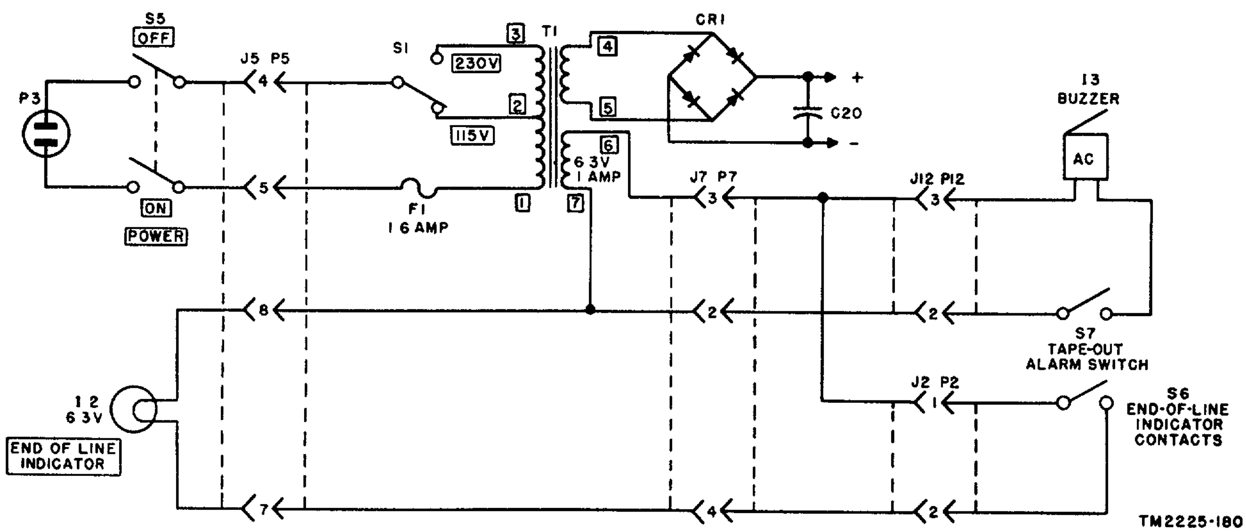
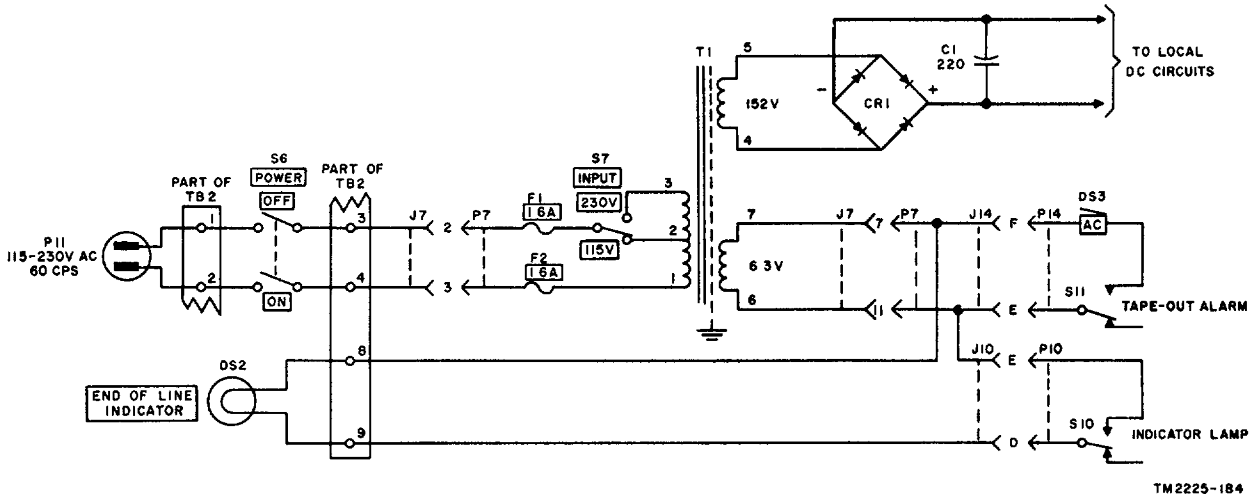



*Figure 2-52. END OF LINE INDICATOR lamp and tape out alarm circuits (TT-76/GGC).*




Note. On the TT-76B/GGC and all subsequent models, fuses F1 and F2 are 2 amperes each.

*Figure 2-53. END OF LINE INDICATOR lamp and tape out alarm Circuits (TT-76A/GGC and all subsequent models).*

nects the tape alarm buzzer across the 6.3 volt portion of the secondary winding of the transformer. This causes the tape alarm buzzer to sound..

## 2-40. Dc Circuits

*a. Position 1, TR SEND, TD SEND, RECEIVE* (figs. 2-54 through 2-56). When the SELECTOR switch is operated to position 1, the transmitter-distributor is connected to the gray plug, the keyboard-transmitter is connected to the black plug, and the reperforator selector magnet line windings are connected to the red plug.

(1) *TR SEND Circuit* (A, figs. 2-54, 2-55 and 2-56). The keyboard-transmitter contacts, BREAK switch, and TR jack are in series with the TR SEND plug and the signal line. When the transmitter camshaft is allowed to rotate (par. 2-13) the keyboard-transmitter contacts are opened and closed in sequence and the selected code impulses are sent to the line. The KEYBOARD switch is across the mark (MK) and common (COM) contacts of the keyboard-transmitter. When the KEYBOARD switch is placed in the LOCK position, the keyboard-transmitter contacts are shorted and transmission from the keyboard-transmitter is blocked.

(2) *TD SEND Circuit* (B, figs. 2-54, 2-55, and 2-56). The transmitter-distributor contacts and the TD jack are in series with the TD SEND plug and the signal line. When the transmitter camshaft is allowed to rotate (par. 2-18) the transmitter-distributor contacts are opened and closed in sequence and the selected code impulses are sent to the line.

(3) *RECEIVE Circuit* (C, figs. 2-54, 2-55 and 2-56). The reperforator selector magnet line windings and the REC jack are in series with the REC plug and the signal line. The incoming code signals operate the selector magnet line windings. The TT-76A/ GGC and subsequent model selector magnets are equipped with a plug and two jacks to facilitate operation of the selector magnet on either 20 or 60 ma line circuits. The plug from the selector magnet is placed in either the 20-MA or 60-MA jack (fig. 6-2) and the SIGNAL/BIAS switch is placed in a like position. The center position of the SIGNAL/BIAS switch, BIAS OFF, is to be used for polar operation

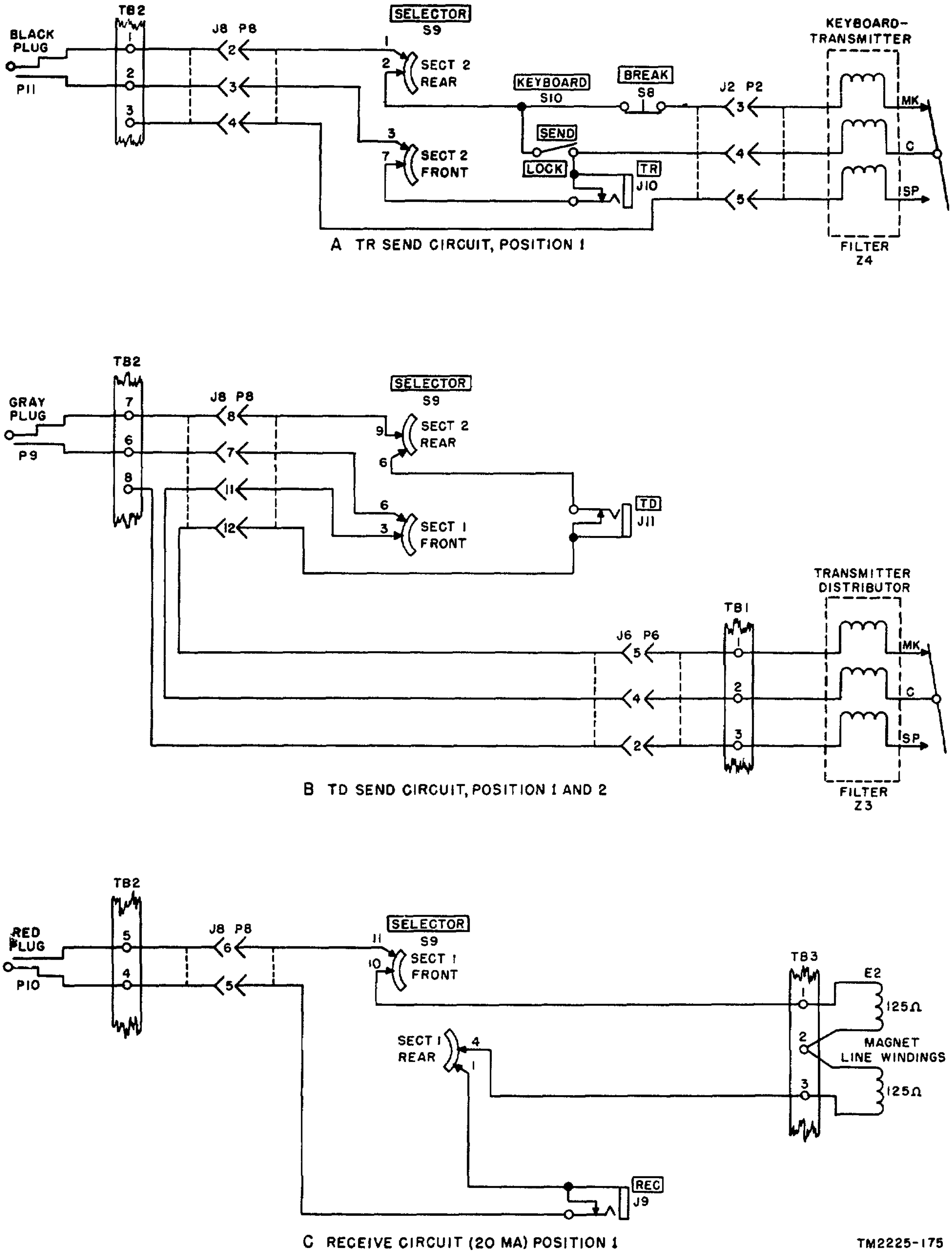



*Figure 2-54. TR SEND, TD SEND, RECEIVE circuits, position 1 (TT-76/GGC).*

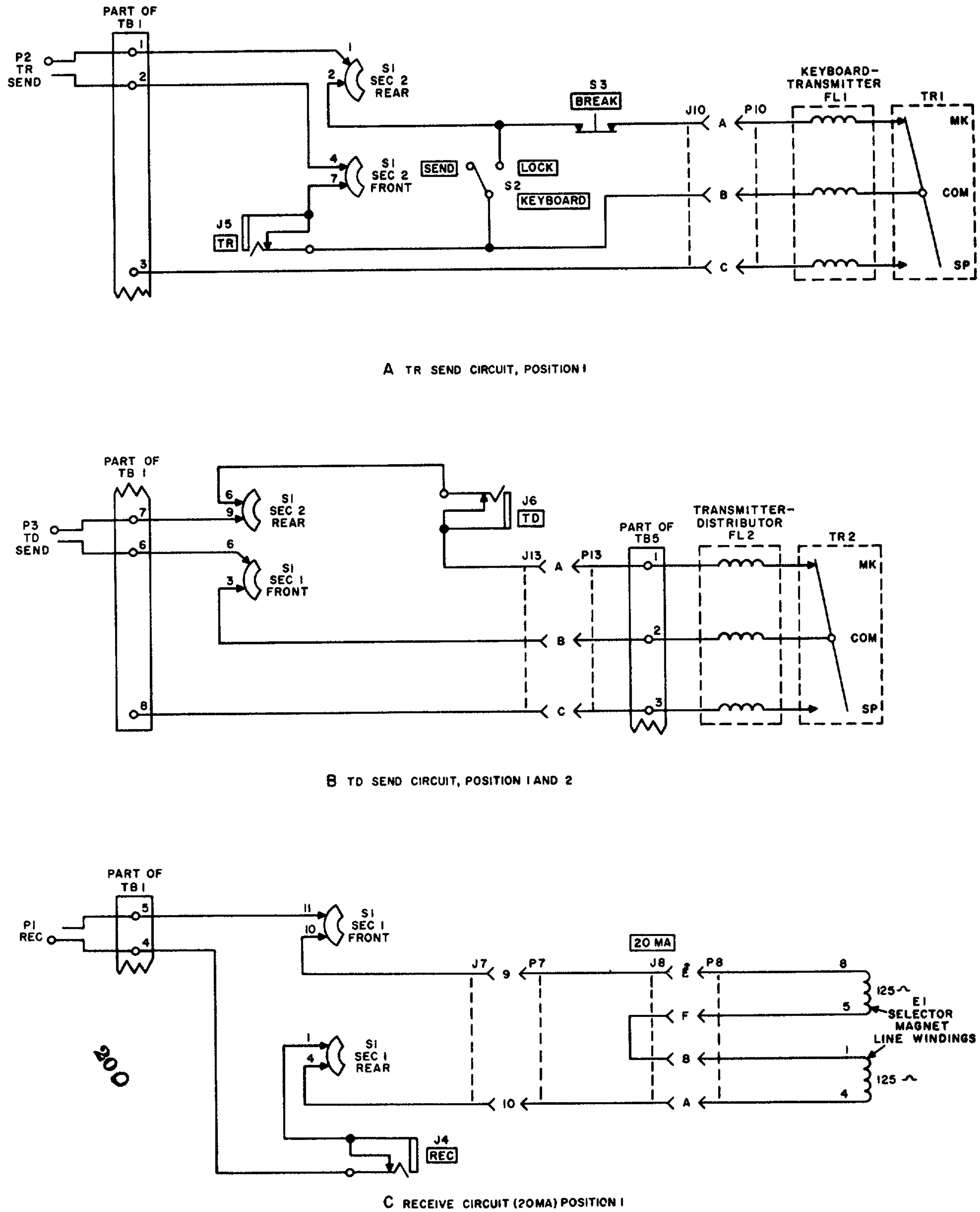



*Figure 2-55. TR SEND, TD SEND, RECEIVE circuits, position 1 (TT-76A/GGC below serial number 670 on Order No. 49651-Phila-56).*

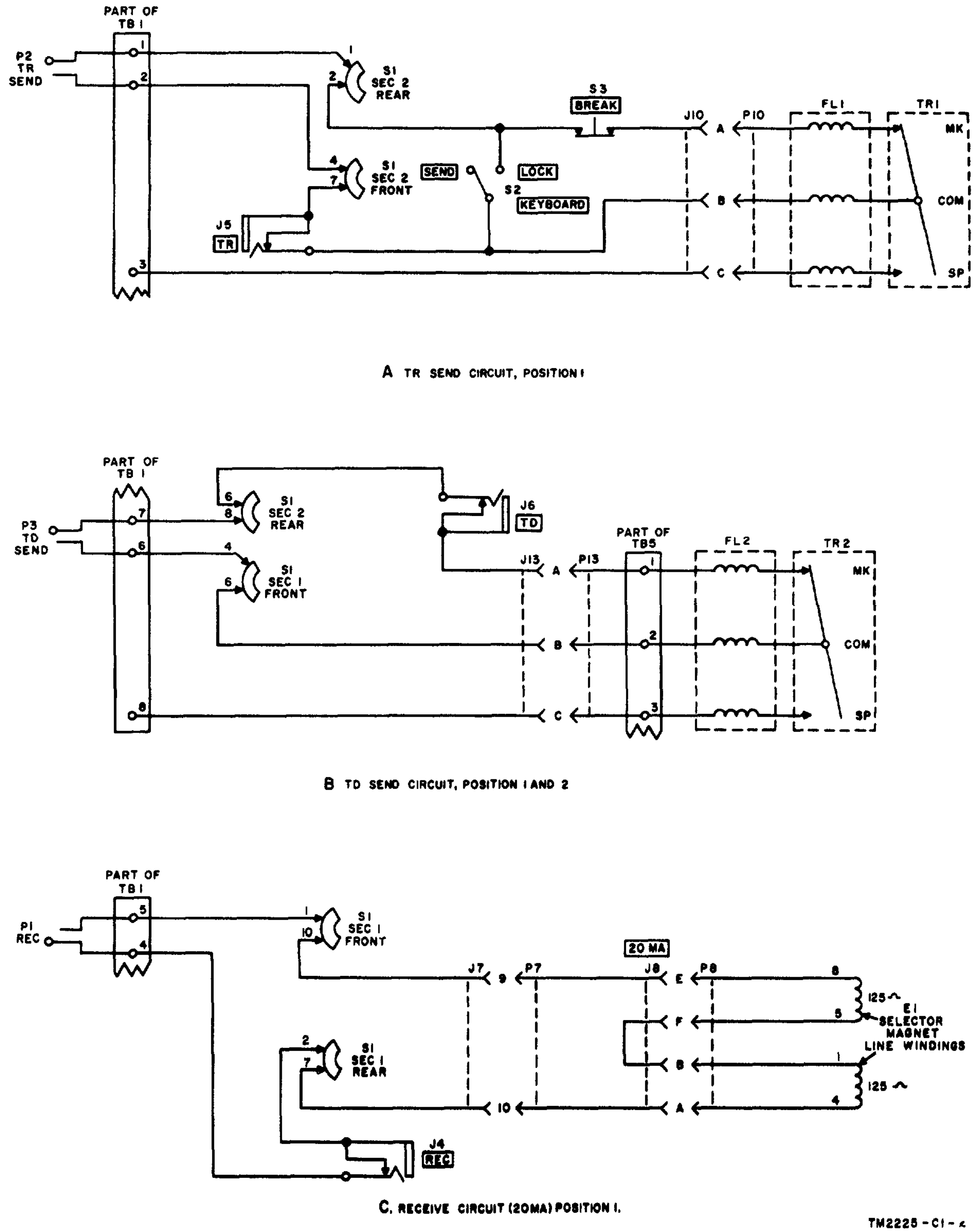



*Figure 2-56. TR SEND, TD SEND, RECEIVE circuits, position 1 (TT-76A/GGC, serial numbers 670 and above, on Order No. 49651-Phila-56 and all subsequent procurements).*

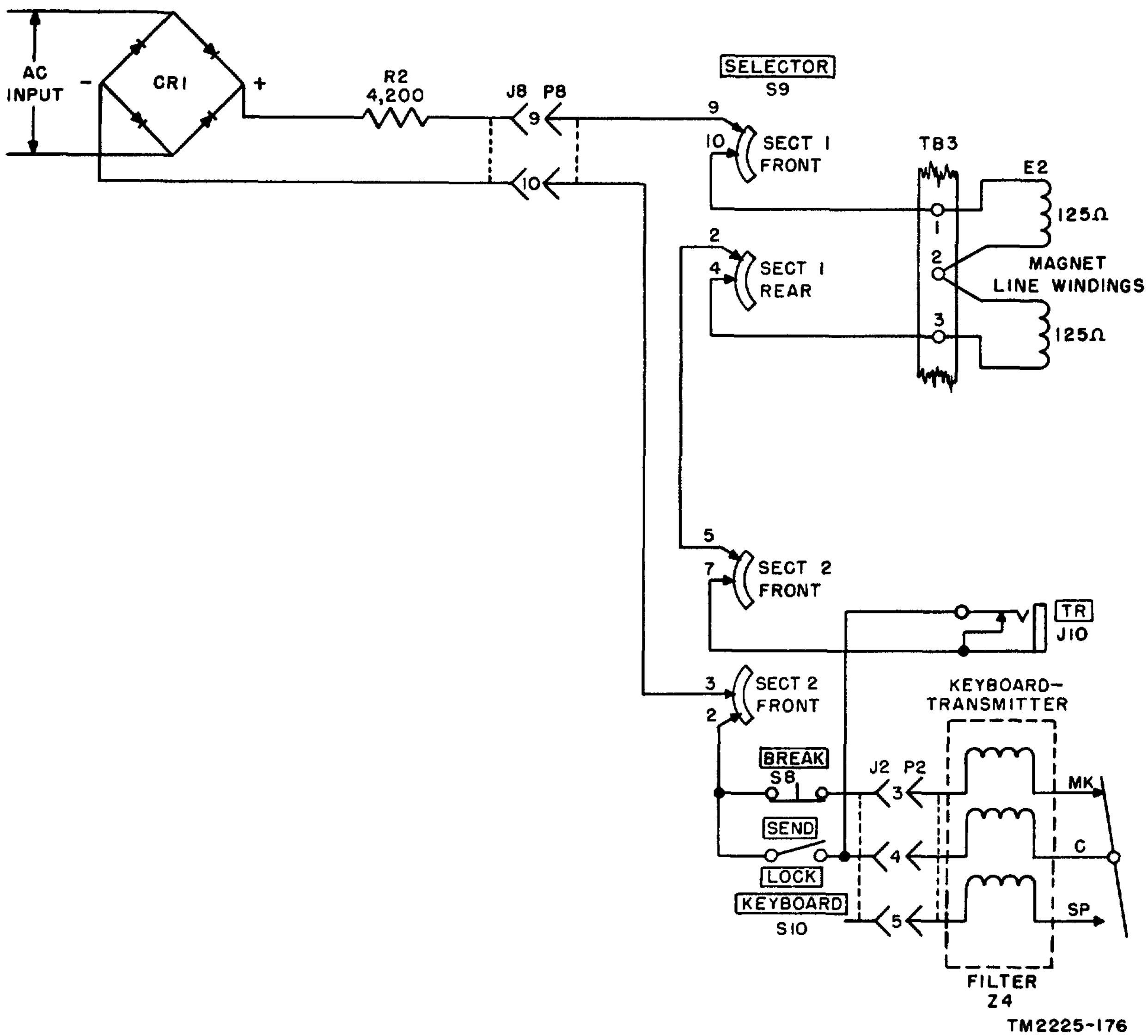


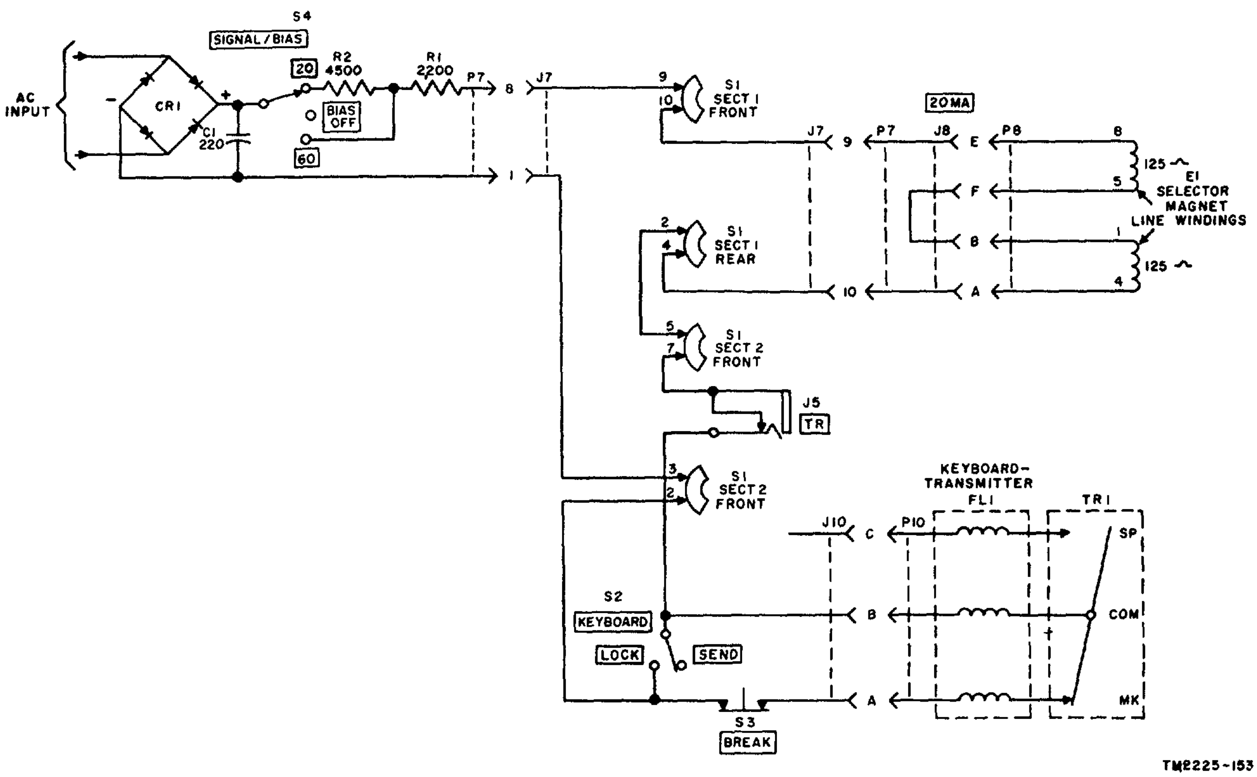

*Figure 2-57. LOCAL PUNCH circuit, position 2 (TT-76/GGC).*

and this switch setting opens the bias circuit of the selector magnet.

*b. Position 2, TD SEND, LOCAL PUNCH Circuit* (figs. 2-57 and 2-58). When the SELECTOR switch is operated to position 2, the transmitter-distributor is connected to the TD SEND plug. The keyboard transmitter contact and the selector magnet line windings are connected in a local series circuit.

(1) *TD SEND circuit* (B, figs. 2-54, 2-55 and 2-56). This circuit is the same as for position 1 of the SELECTOR switch (a(2) above).

(2) *LOCAL PUNCH circuit* (figs. 2-57 and 2-58). The SIGNAL/BIAS switch, selector magnet line windings, TR jack, keyboard-transmitter contacts, and the BREAK switch are connected in series with the output of the rectifier. As the keyboard-transmitter camshaft is allowed to rotate, the keyboard-transmitter contacts are




*Note.* On the TT-76A/GGC bearing Order Number 49651-Phila-56, serial numbers 670 and above, and all subsequent models, contact 9 of S1, Sect. 1, FRONT, is changed to 11. Contact 2 of S1. Sect. 1, REAR, is changed to 5, and contact 4 is changed to 7.

*Figure 2-58. LOCAL PUNCH circuit, position 2 (TT-76A/GGC and all subsequent models).*

opened and closed in sequence and the selected code impulses are sent to the selector magnet line windings which in turn position the magnet armature and put the code punching mechanism into operation. When the KEYBOARD switch is in the LOCK position, the keyboard-transmitter contacts are shorted and transmission from the keyboard-transmitter is blocked. The local punch circuit can be operated on either 20-ma or 60-ma signal current. When a local punch circuit operation of 60 ma is desired, the selector magnet plug must be inserted in the 60-MA jack and the SIGNAL/BIAS switch placed in the 60-MA position. For local punch operation of 20 ma the plug must be in the 20-MA jack and the SIGNAL/BIAS switch in the -20-MA position. Since the keyboard-transmitter is not wired for polar operation, the SIGNAL/BIAS switch must not be positioned in the BIAS OFF position.

*c. LOCAL REPUNCH Circuit* (figs. 2-59 and 2-60). When the SELECTOR switch is operated to position 3, the SIGNAL/BIAS switch, selector magnet line windings, transmitter-distributor contacts, TD plug, TR plug, keyboard-transmitter contacts, and the BREAK switch are connected in series and powered by the output of the rectifier. When either the transmitter-distributor or the keyboard-transmitter contacts are opened and closed in sequence the selected code impulses are sent to

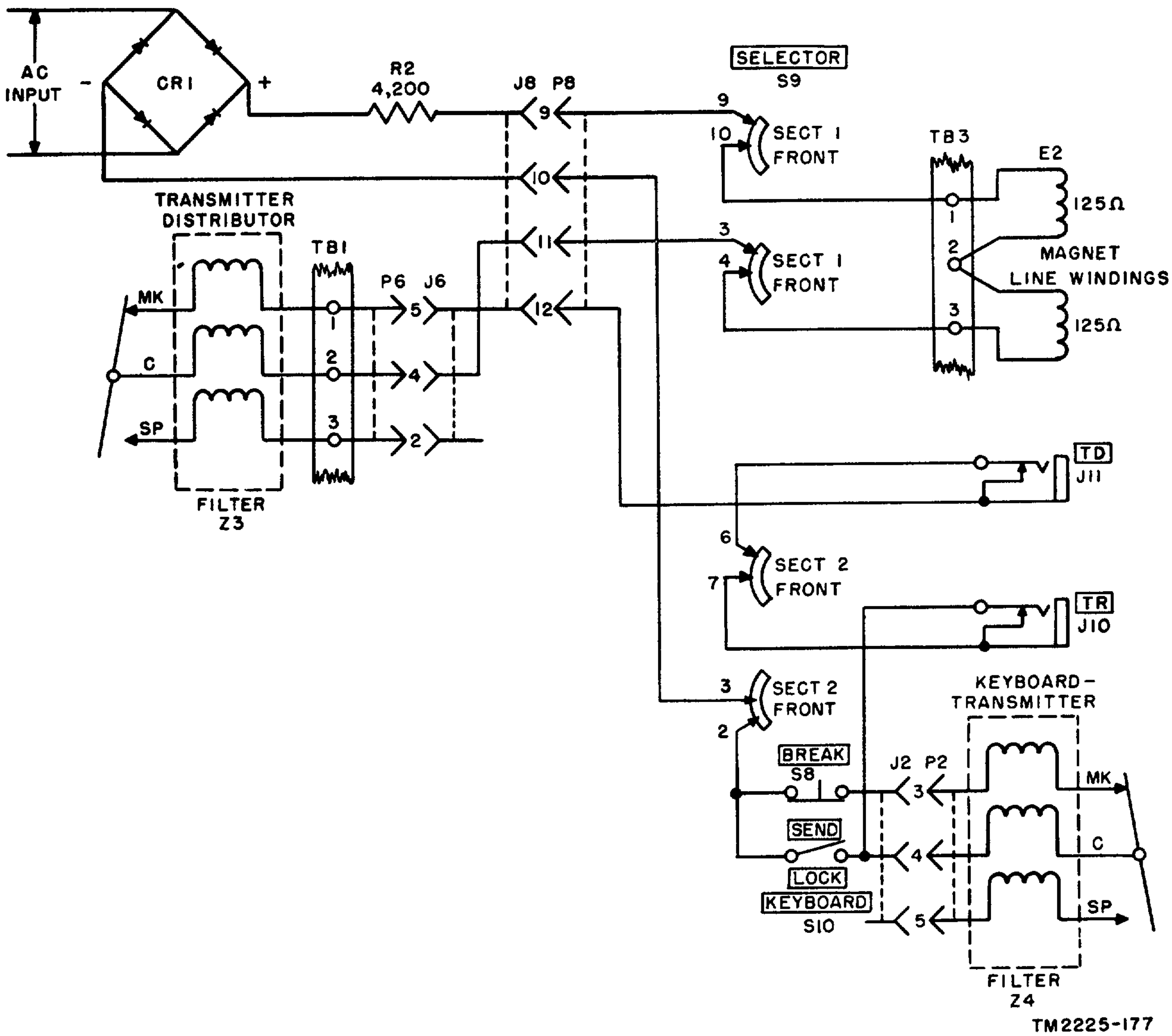
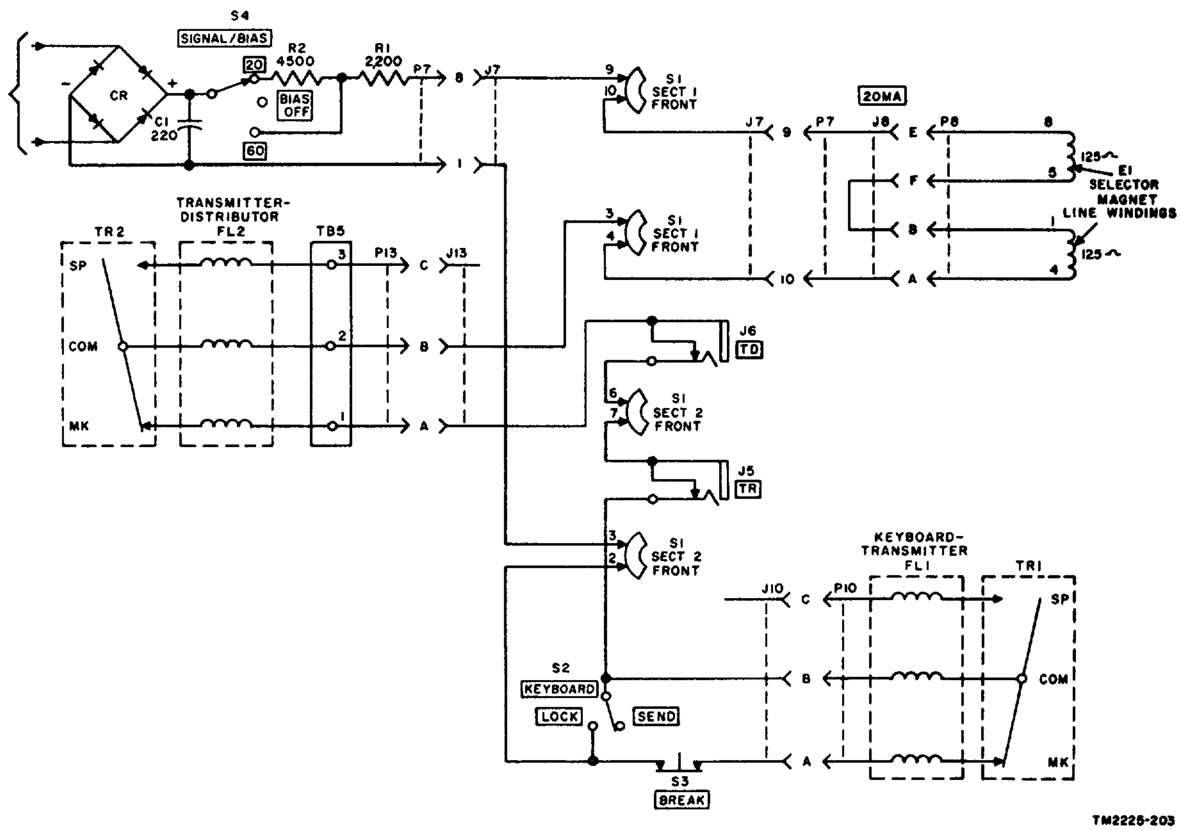



*Figure 2-59. LOCAL REPUNCH circuit, position 3 (TT-76/GGC).*

the selector magnet line windings that in turn position the magnet armature and put the code punching mechanism into operation. When the KEYBOARD switch is in the LOCK position, the keyboard-transmitter contacts are shorted and only the transmitter-distributor operation will actuate the code punching mechanism. The local repunch circuit can be operated on either 20-ma or 60-ma signal current. When operation of local repunch at 60 ma is desired, the selector magnet plug must be inserted in the 60-MA jack and the SIGNAL/BIAS switch placed in the 60-ma position. For local repunch operation of 20 ma the plug must be in the 20-MA jack and the SIGNAL/BIAS switch in the 20-MA position. Since polar transmission is not possible from the keyboard-transmitter or the transmitter-distributor the SIGNAL/BIAS switch must not be positioned in the BIAS OFF position. In position 3 of the SELECTOR switch, the TD SEND, TR SEND, and RECEIVE cords are shorted to keep the




*Note.* On TT-76A/GGC bearing Order Number 49651-Phila-56, serial numbers 670 and above, and all subsequent models, contacts of S1, Sect 1, FRONT, are changed as follows.

Contact 9 is changed to 11
Contact 3 is changed to 6
Contact 4 is changed to 7

*Figure 2-60. LOCAL REPUNCH circuit, position 3 (TT-76A/GGC and all subsequent models)*

signal line isolated from the local circuits of the reperforator.

*d. Selector Magnet Bias Circuit* (figs. 2-61 and 2-62). The magnetic fields set up by the current in the selector magnet bias windings control the movement of the selector magnet armature when neutral signal space impulses are received. The circuit connects the SIGNAL/BIAS switch, BIAS TEST MA, and selector magnet bias windings in series with the rectifier output. The SIGNAL/BIAS switch controls the amount of bias current in the selector magnet bias windings. This circuit is in parallel with the one containing the clutch magnet. The BIAS TEST MA strap provides a convenient means of testing the current in the selector magnet bias circuit. A variable resistor in series between the two windings is adjusted to give the correct amount of bias current for optimum performance.

*e. Transmitter-Distributor Clutch Magnet Circuit* (figs 2-61 and 2-62). The transmitter-distributor clutch magnet must be energized to transmit from the transmitter-distributor. The clutch magnet is controlled by the START-STOP switch. When the START-STOP switch is open (START position) the clutch magnet will energize and transmission is possible. When the START-STOP switch is closed the clutch magnet windings are shorted, the clutch magnet will de-energize, and transmission stops. The clutch magnet circuit is traced from the rectifier through the limiting resistor to the clutch magnet coil. When the START-STOP switch Is In the STOP or FEED RETRACT position, the circuit is closed around the clutch magnet and transmission from the transmitter-distributor is stopped.'

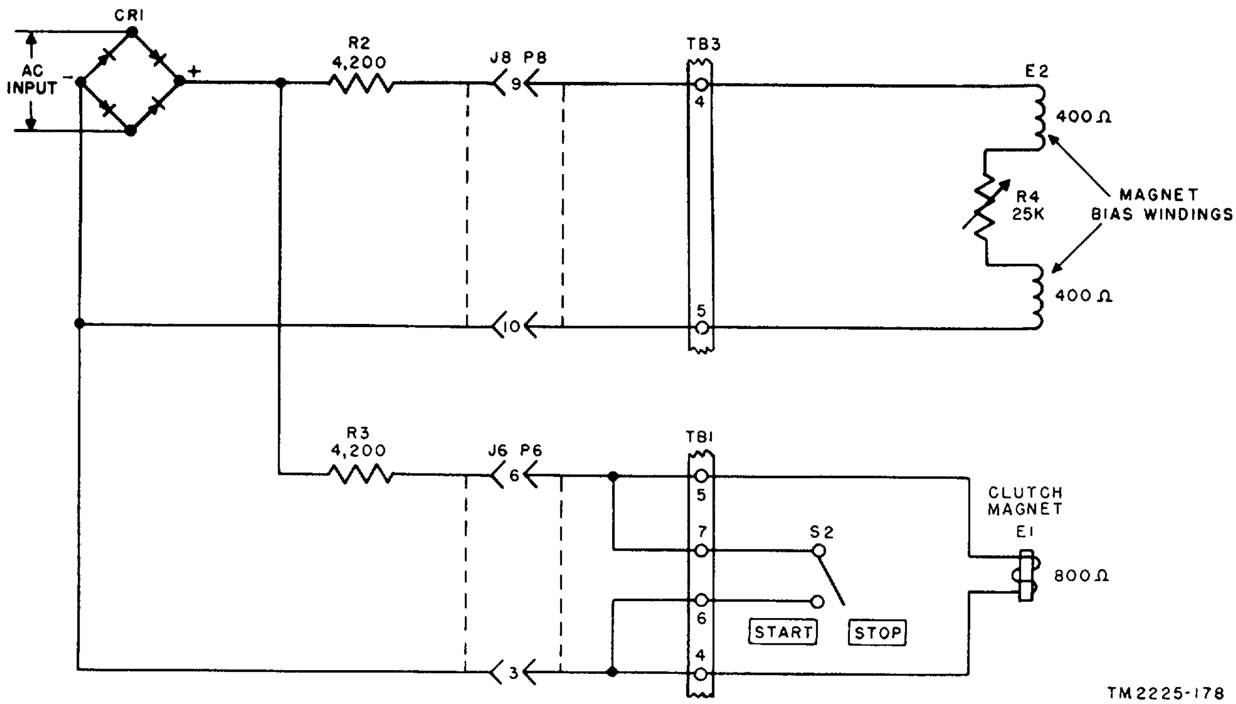



*Figure 2-61. Selector magnet bias and transmitter-distributor clutch magnet circuits (TT-76/GGC).*

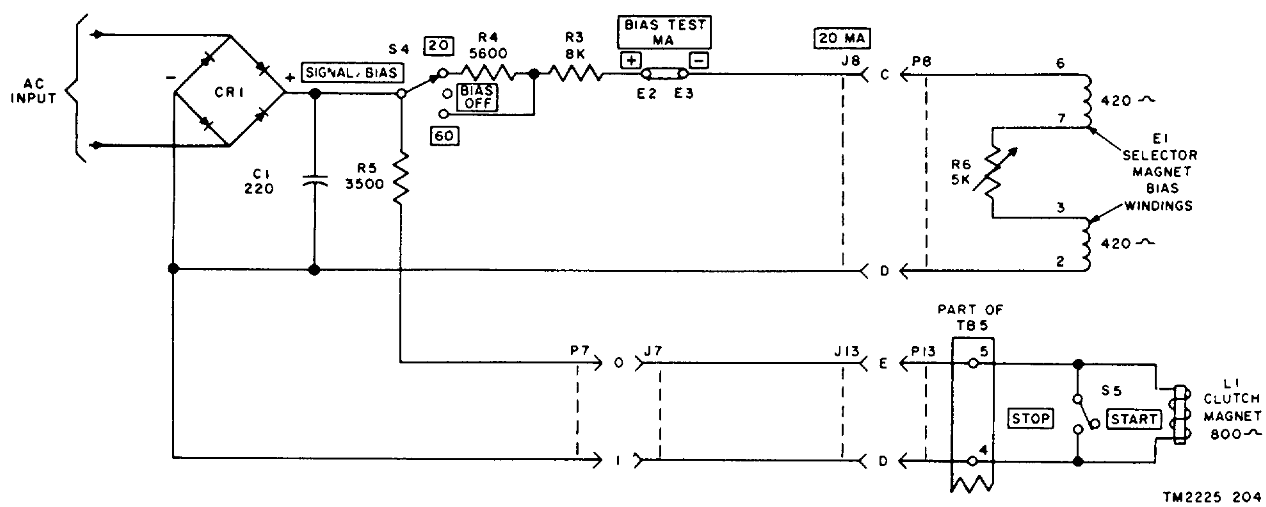



*Figure 2-62. Selector magnet bias and transmitter-distributor clutch magnet circuits (TT-76/GGC and all subsequent models).*

## SECTION VII. CIRCUIT DESCRIPTIONS TT-699(*)/GGC

### 2-41. General

The circuits in the low-level reperforator-transmitter are divided into two main groups: ac circuits and dc circuits. Figures 2-63 through 2-78 are the schematic diagrams of the reperforator-transmitter circuits. The circuit differences of the various models are illustrated separately. Figures 6-7 through 6-10 are the complete schematic and airline diagrams of the reperforator-transmitters.

### 2-42. Ac Circuits

*a. Ac Input Circuit* (fig 2-63 and 2-64). A power selector switch is provided to permit operation of the transformer on either 115 or 230 volt, 60 Hertz ac. If the source of the voltage is 230 volts, the power selector switch is positioned to 230 V and the input voltage is applied to terminals 1 and 3 of the transformer. The autotransformer action of the primary winding steps down the voltage to 115 volts at terminals 1 and 2 of the transformer to operate the motor and copy light circuits. When a 115-volt source is used, the power selector switch is positioned to 115 V and the input voltage is applied to terminals 1 and 2 of the transformer. The ac input circuit is traced from the input of the transformer.

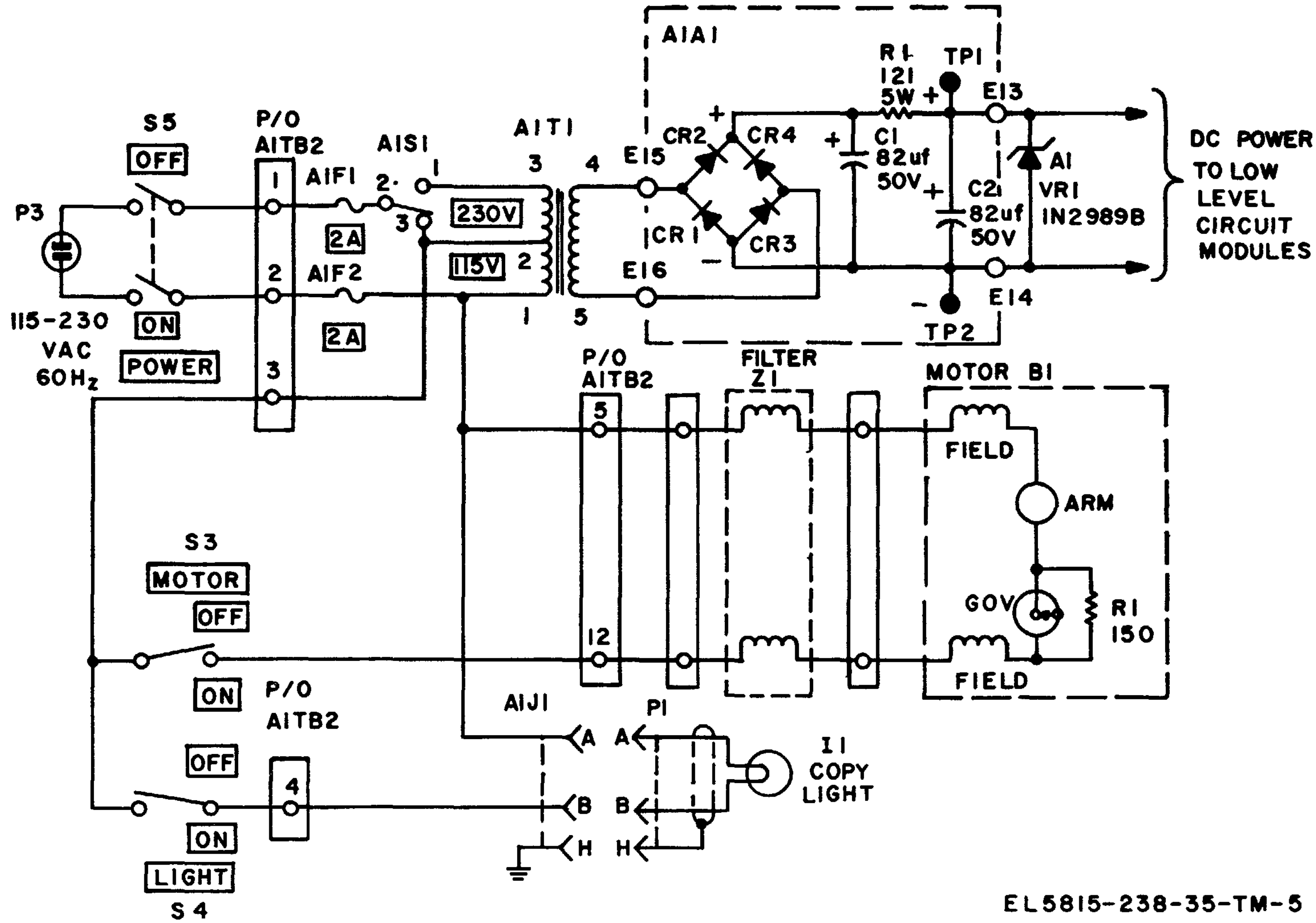



*Figure 2-63. Ac input, motor, copy light and dc power input circuits (TT-699/GGC).*

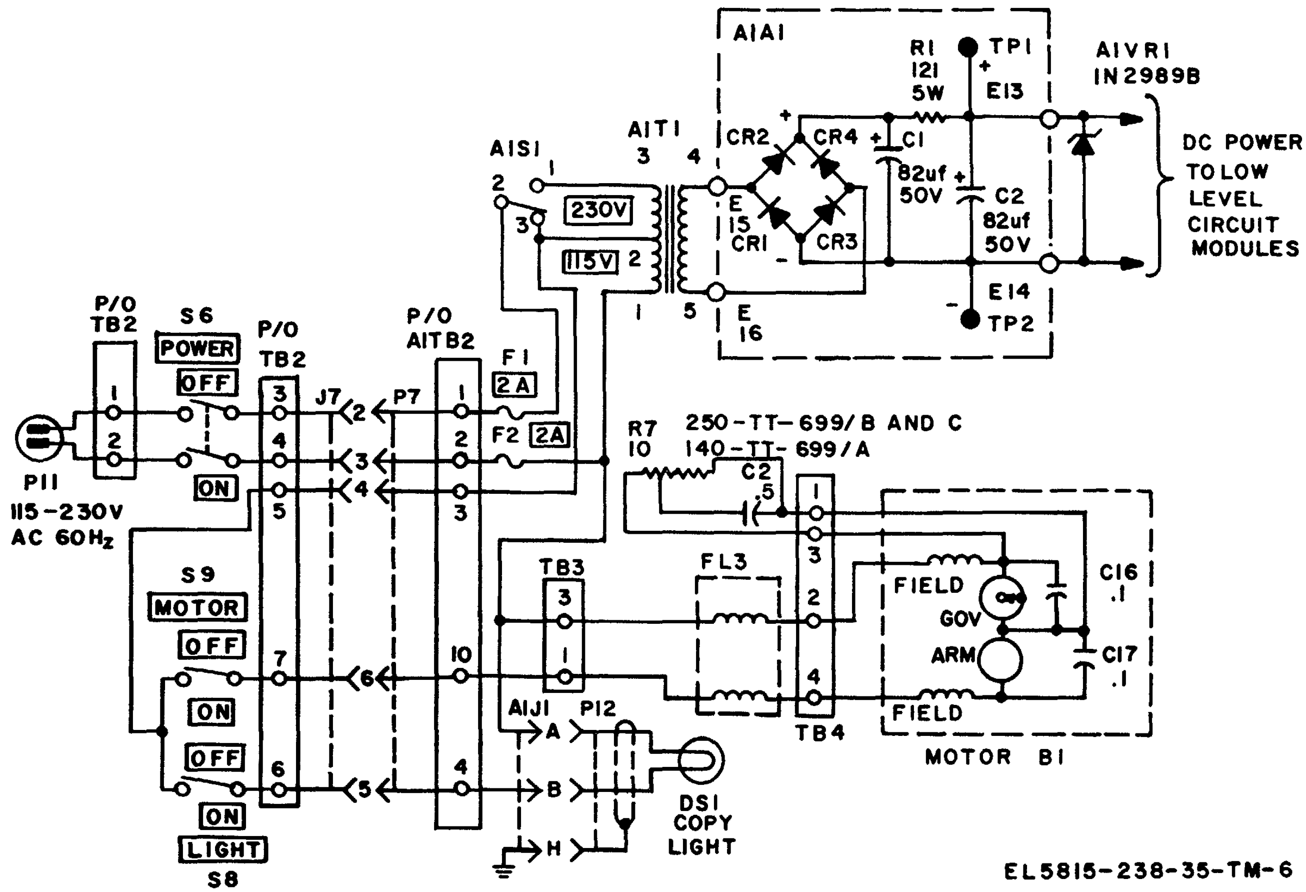



*Figure 2-64. Ac input, motor, copy light and dc power input circuits (TT-699A/GGC and all subsequent models.)*

*b*. *Motor Circuits* (fig 2-63 and 2-64) The motor circuit is connected in parallel with the 115-volt portion (terminals 1 and 2) of the transformer primary winding The circuit begins at the 115-volt portion of the transformer primary winding and is traced through the MOTOR switch, filter, field winding, armature, and governor contacts. When the motor has reached the proper speed, centrifugal force overcomes the pull of the governor contact spring and the governor contacts open This places a 150-ohm resistor (TT-699(*)/GGC and TT-699A/GGC), or a 250-ohm resistor (TT-699B/GGC and later models), in series with the field winding and reduces the current that flows through the windings, decreasing the motor speed The motor speed decreases until the governor contacts close. The current though the motor and motor speed again increases until the governor contacts reopen. This procedure continues as long as the motor is running The filter is provided to suppress the rf interference generated by the motor.

*c* *Copy Light Circuit* (fig 2-63 and 2-64) The copy light circuit is connected m parallel to the motor circuit and across the 115-volt portion (terminals 1 and 2) of the transformer primary winding The circuit can be traced from terminals 1 and 2 of the transformer primary winding, through the LIGHT switch and the copy light, when the LIGHT switch is closed.

*d*. *Dc Power Input Circuits (*fig. 2-63 and 2-64) Ac input power to the dc power supply is supplied via the 35-volt portion (terminals 4 and 5) of the secondary winding of the transformer. The dc power supply in turn supplies 30 DC to the low-level circuit modules.

*e* END OF LINE INDICATOR *Lamp and Tape-Out Alarm Circuits* (fig. 2-65 and 2-66) The END OF LINE INDICATOR lamp and tape-out alarm circuits are powered by the 6 3-volt portion of the secondary winding of the transformer

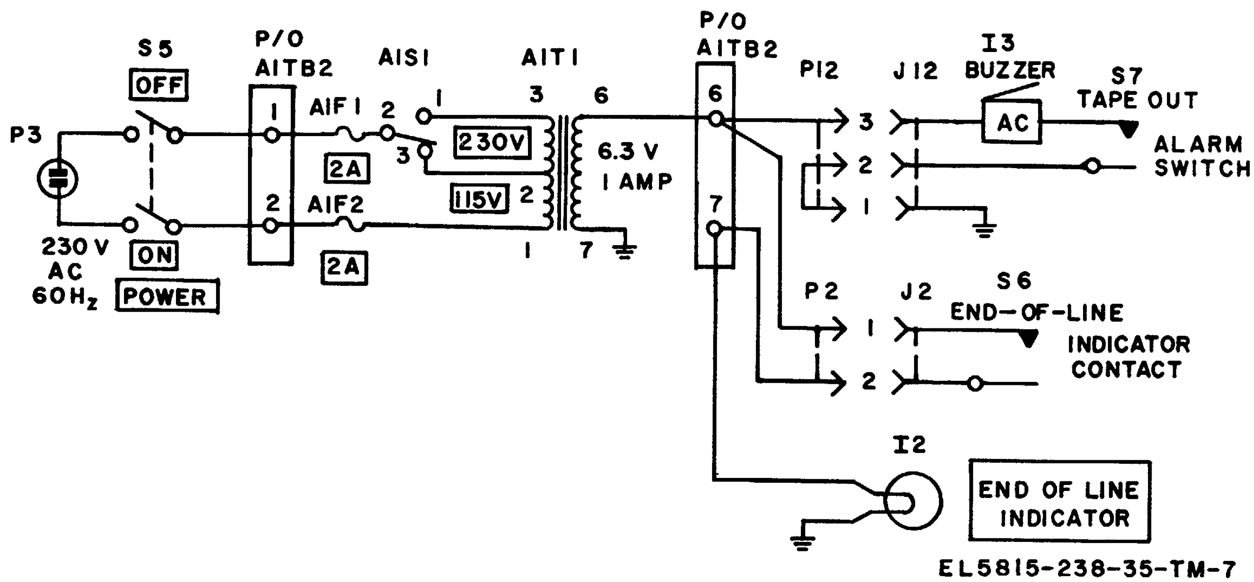



*Figure 2-65. End of line indicator lamp and tape-out alarm circuits (TT-699/GGC).*

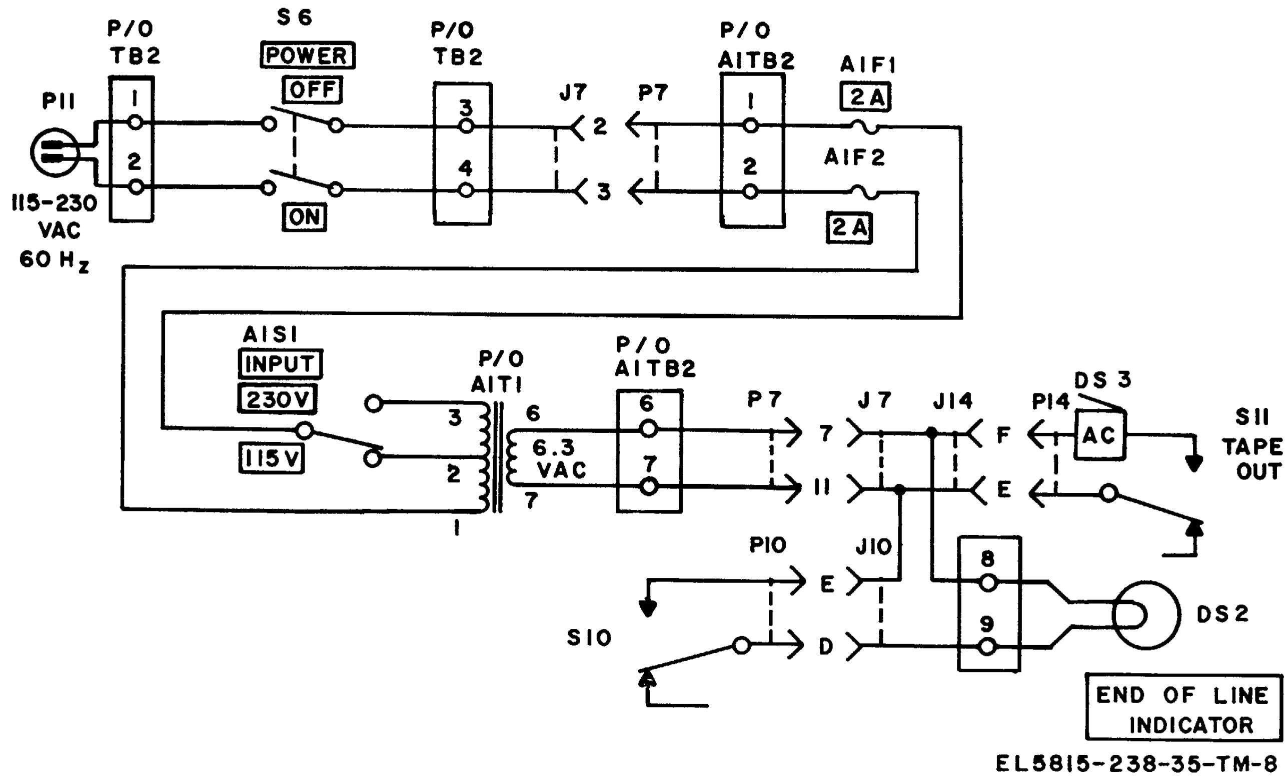



*Figure 2-66. End of line indicator lamp and tape-out alarm circuits (TT-699A/GGC and all subsequent models.)*

(1) The 6 3-volt portion of the transformer supplies 6 3 volts ac to the indicator lamp switch and the END OF LINE INDICATOR lamp, located on the left side of the keyboard guard When transmitting from the keyboard-transmitter, the END OF LINE INDICATOR lamp lights to indicate that 66 characters have been transmitted since the last carriage return signal The operator should punch the carriage return and line feed symbols in the message tape

(2) When the tape roll supply diminishes to a predetermined point, the tape alarm lever resting on the paper tape actuates the contacts of the alarm switch and closes the circuit that connects the tape alarm buzzer across the 6 3-volt portion of the secondary winding of the transformer. This causes the tape alarm buzzer to sound.

**2-43. Dc Signal Circuits.**

a. Position 1, TR SEND, TD SEND, RECEIVE (fig 2-67 and 2-68) When the SELECTOR switch is operated to position 1, the keyboard-transmitter and transmitter-distributor contacts are placed in series with the signalline and input of the line transmitter module Either pair of contacts may initiate signal transmission. The transmitter module output terminals are connected to the send line The receive circuit is completely independent of the send circuit. A received signal is processed via the receiver and selector magnet drive modules to the selector magnet line winding.

*Figure 2-67. TR SEND, TD SEND, RECEIVE circuits, position 1(TT-699/GGC).*

**Located in back of manual**

*Figure 2-68. TR SEND, TD SEND, RECEIVE circuits, position 1 (TT-699AQGGC and all subsequent models).*

**Located in back of manual**

(1) TR SEND circuit (A, fig 2-67 and 2-68). The keyboard-transmitter contacts, the BREAK switch and the closed contacts of the stopped transmitter-distributor are in series with the signalline and input of the line transmitter module When the transmitter camshaft is allowed to rotate (para 2-13) the keyboard-transmitter contacts are opened and closed in sequence and the selected code impulses are sent to the line The KEYBOARD switch is across the contacts of the keyboard-transmitter. The KEYBOARD switch is placed in the LOCK position, the keyboard-transmitter contacts are shorted and transmission from the keyboard-transmitter is blocked.

(2) TD SEND circuit (B, fig. 2-67 and 2-68). The transmitter-distributor contacts, BREAK switch, and closed contacts of the stopped keyboard-transmitter are in series with the signalline and input of the line transmitter module When the transmitter camshaft is allowed to rotate (para 2-18) the transmitter-distributor contacts are opened and closed in sequence and the selected code impulses are sent to the line

(3) RECEIVE circuit (C, fig. 2-67 and 2-68). The receive circuit accepts low-level polar mark and space impulses from the external signal lines connected to terminals 8 and 9 of terminal board A1TB1 The coded impulses are applied to
the receiver module which amplifies the impulses The impulses are sent to the selector magnet module which amplifies the impulses The impulses are sent to the selector magnet module which controls the selector magnet which, in turn, governs the position of mechanical parts within the selector mechanism.

b Position 2, TD SEND LOCAL PUNCH Circuit (fig. 2-67 through 2-70). When the SELECTOR switch is operated to position 2, the transmitter-distributor is connected to the line transmitter module and its output, in turn, to the send line. The keyboard transmitter is connected to the local transmitter module and its output to the input of the receive circuit.

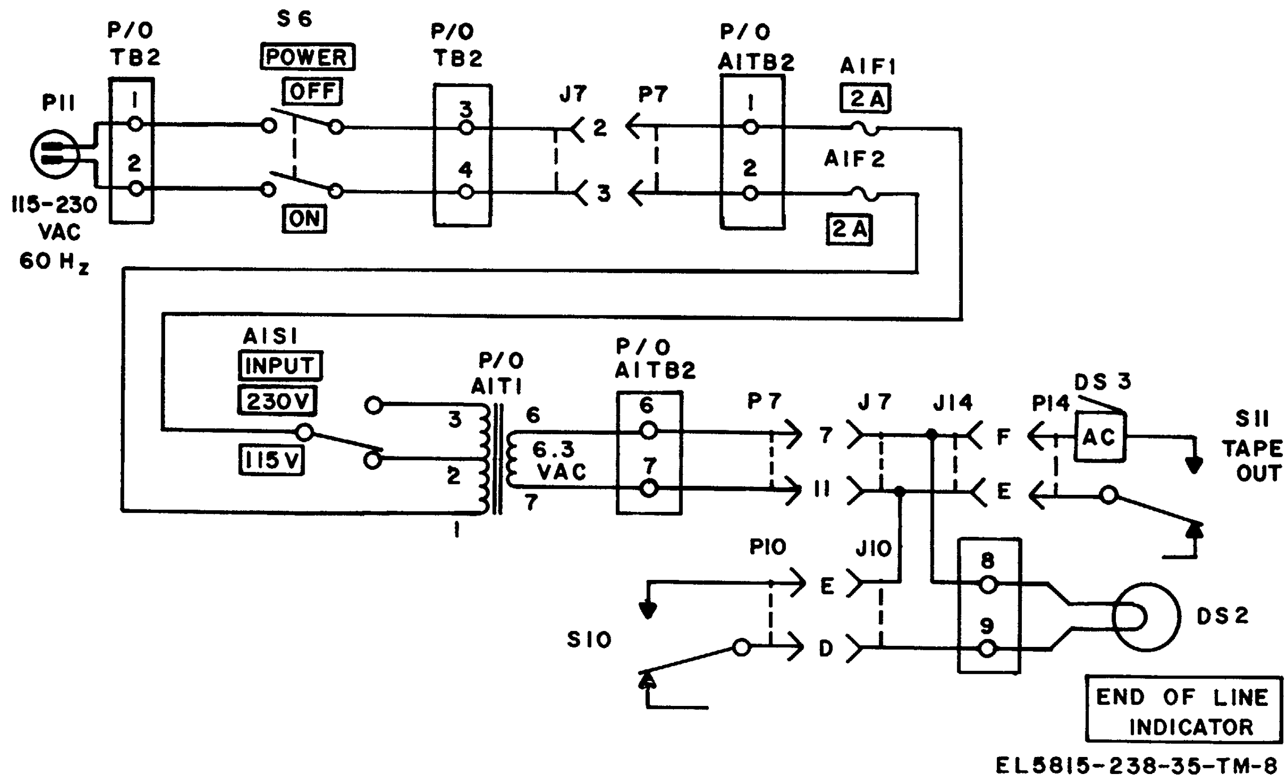



*Figure 2-69. LOCAL PUNCH circuit, position 2 (TT-299/GGC).*

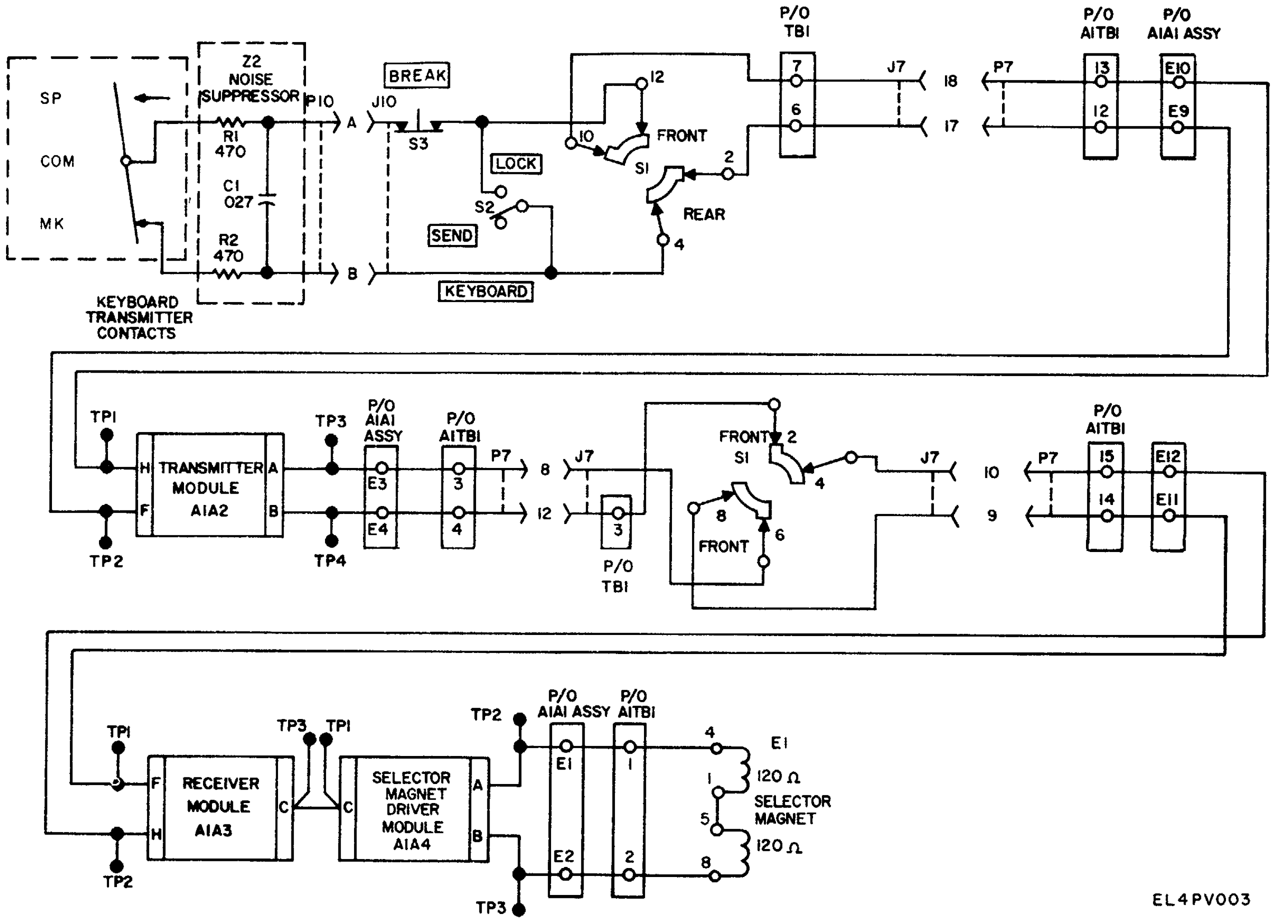



*Figure 2-70. LOCAL PUNCH circuit, position 2 (TT-699A/GGC and all subsequent models).*

(1) *TD SEND circuit* (B, fig 2-67 and 2-68). This circuit is basically the same as for position 1 of the selector switch (a(2) above). The exceptions are as follows:

(a) The keyboard-transmitter contacts are no longer in series with the transmitter-distributor contacts.

(b) The circuit is completed through different contacts of the SELECTOR switch

(2) LOCAL PUNCH *circuit* (figs. 2-69 and 2-70) The keyboard-transmitter contacts and the BREAK switch are in series with the input circuit of the local transmitter module As the keyboard-transmitter camshaft is allowed to rotate, the keyboard-transmitter contacts are opened and closed in sequence and the selected code impulses are processed through the transmitter module and sent to the receive circuit In the receive circuit, the coded impulses are amplified by the receiver module, sent to the selector magnet module and finally to the selector magnet line windings. The line windings position the magnet armature and put the code punching mechanism into operation When the KEYBOARD switch is m the LOCK position, the keyboard-transmitter is blocked.

C LOCAL REPUNCH *Circuit* (fig. 2-71 and 2-72). When the SELECTOR switch Is operated to position 3, the keyboard-transmitter contacts, transmitter-distributor contacts, and the BREAK switch are in series with the input of the local transmitter module. The output of the local transmitter module Is connected to the input of the receive circuit. When either the keyboard-transmitter or the transmitter-distributor contacts are opened and closed in sequence, the selected code impulses are processed through the transmitter module and sent to the receive circuit In the receive circuit the coded impulses are amplified by the receive module, sent to the selector magnet module, and finally to the selector magnet line windings. The line windings position the magnet armature and put the code punching mechanism into operation. When the KEYBOARD switch is in the LOCK position, the keyboard-transmitter contacts are shorted and only the transmitter-distributor operation will actuate the code punching mechanism Position 3 may also be considered a *local test* position in that all portions of the reperforator may be tested except for the line transmitter module The line transmitter module, however, may be tested in this position by exchanging It with the local transmitter module.

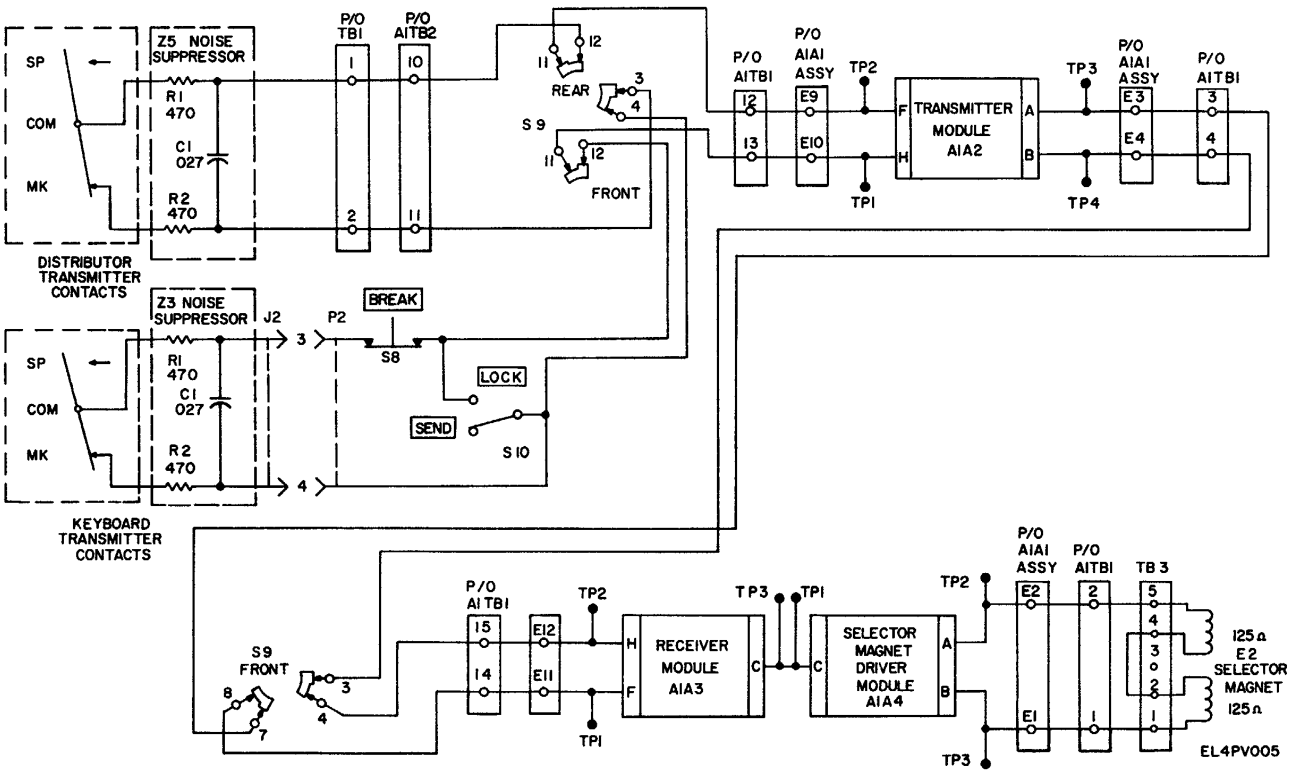



*Figure 2-71. Local REPUNCH circuit, position 3 (TT-699/GGC).*

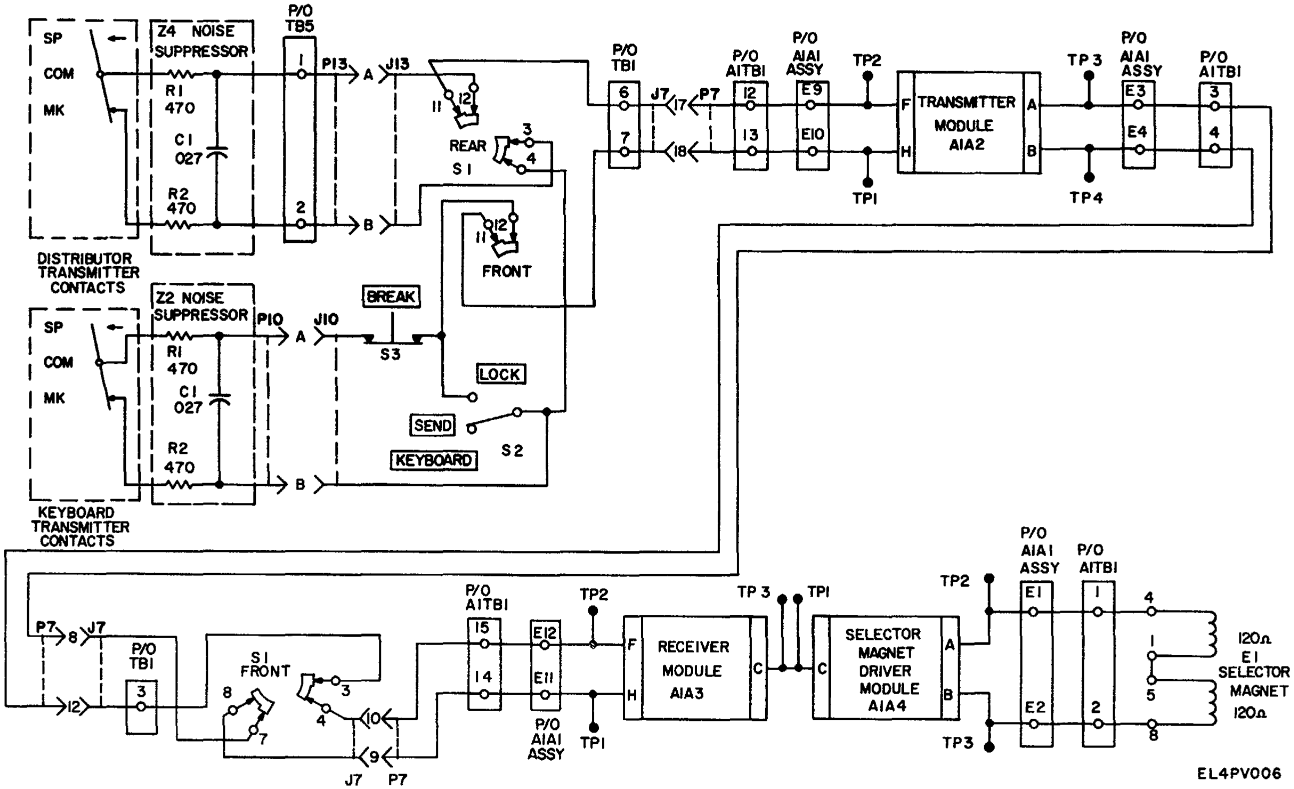



*Figure 2-72. Local REPUNCH circuit, position 3 (TT-699A/GGC and all subsequent models).*

d. *Transmitter-Distributor Clutch Magnet Circuit* (fig 2-73 and 2-74). The transmitter-distributor clutch magnet must be energized to transmit from the transmitter-distributor. The Clutch magnet is controlled by the START-STOP switch. When the START-STOP switch is closed START position), the clutch magnet will energize and transmission is possible. When the START-STOP switch is open, the clutch magnet loses the 30-vdc input, the clutch magnet will de-energize, and transmission stops. When the START-STOP switch is in the STOP or FEED RETRACT position, the 30-vdc input is removed from the clutch magnet.

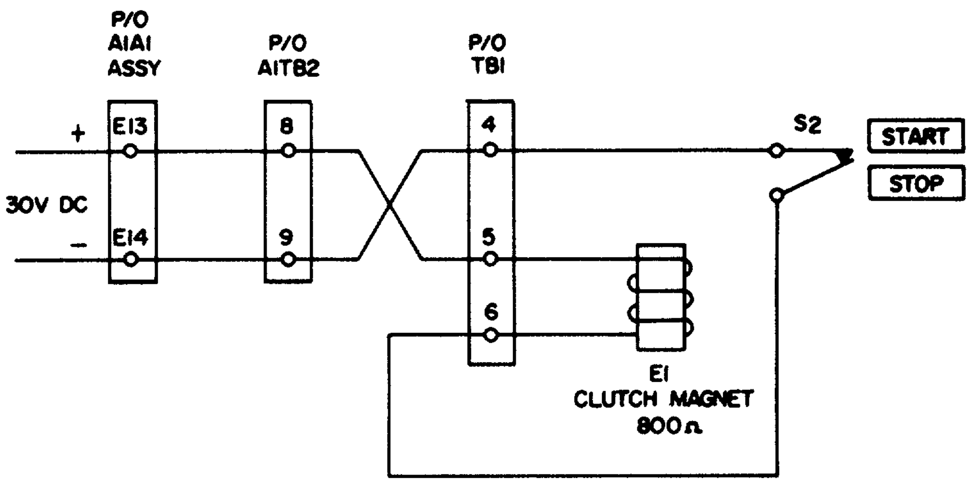



*Figure 2-73. Transmitter-Distributor Clutch Magnet Circuit (TT-699/GGC)*

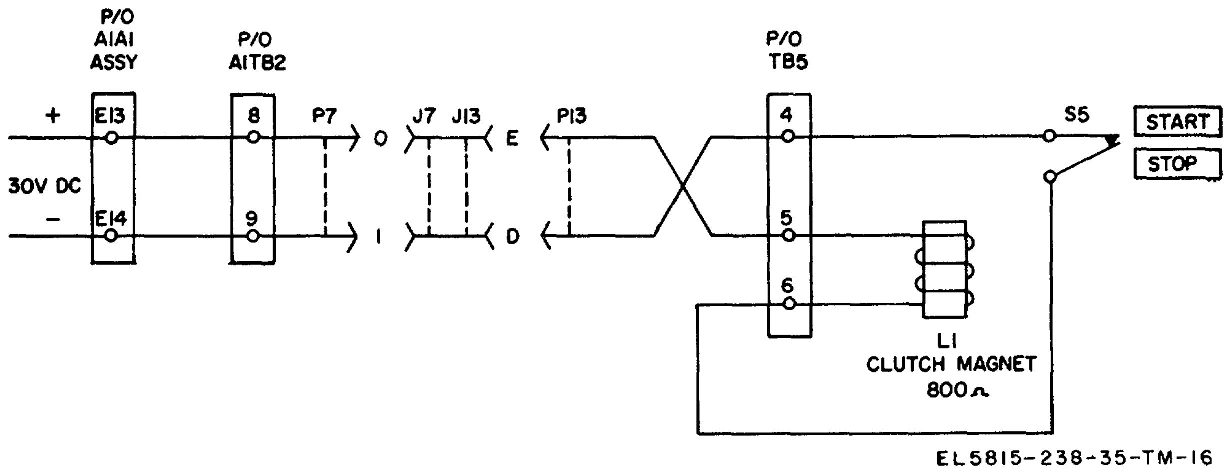



*Figure 2-74. Transmitter-Distributor Clutch Magnet Circuit (TT-699A/GGC and all subsequent models}*

## SECTION VIII. LOW LEVEL CIRCUIT CARD DESCRIPTIONS TT-699(*) / GGC

### 2-44. General

This section furnishes detailed descriptions of low-level circuit card modules The circuit card presentations are expanded to show how they function m the SEND and RECEIVE circuits as a whole The presentations will be made in the sequence of signal progression.

### 2-45 Send Circuit (Transmitter Module)

a. *Send Circuit Schematic Diagram* Refer to figures 6-7 and 6-8 for the overall schematic diagram The send circuit is used to transmit polar mark and space impulses to external signal lines The send circuit's low-level coded impulses are generated by either transmitter-distributor or keyboard-transmitter contacts which are mechanically operated (para 2-13 and 2-20 1). The low-level impulses pass through a noise suppressor, and if the keyboard-transmitter is active, the BREAK switch to the transmitter module The BREAK switch is used for testing purposes to simulate a space condition by opening the line Noise Suppressor Z1 is a resistor-capacitor network which reduces RF interference caused by contact bounce during the opening and closing of the transmitter contacts.

b. *Transmitter Module* (fig. 2-75).

(1) The transmitter module generates a ±6 volt polar output for transmission to the line The purpose of the driver U1 is to provide sufficient signal drive to operate output transistors Q1 and Q2 Resistors R5 and R8, and 6 2-volt zener diodes CR4 and CR5 act as a voltage divider across the 30-volt power source. This fixes the voltage at pin B (reference line) at + 15 volts with reference to the negative return line of the 30-volt power supply. The reference line, which is fixed at 15 volts, is the point from which all signal levels are referenced.

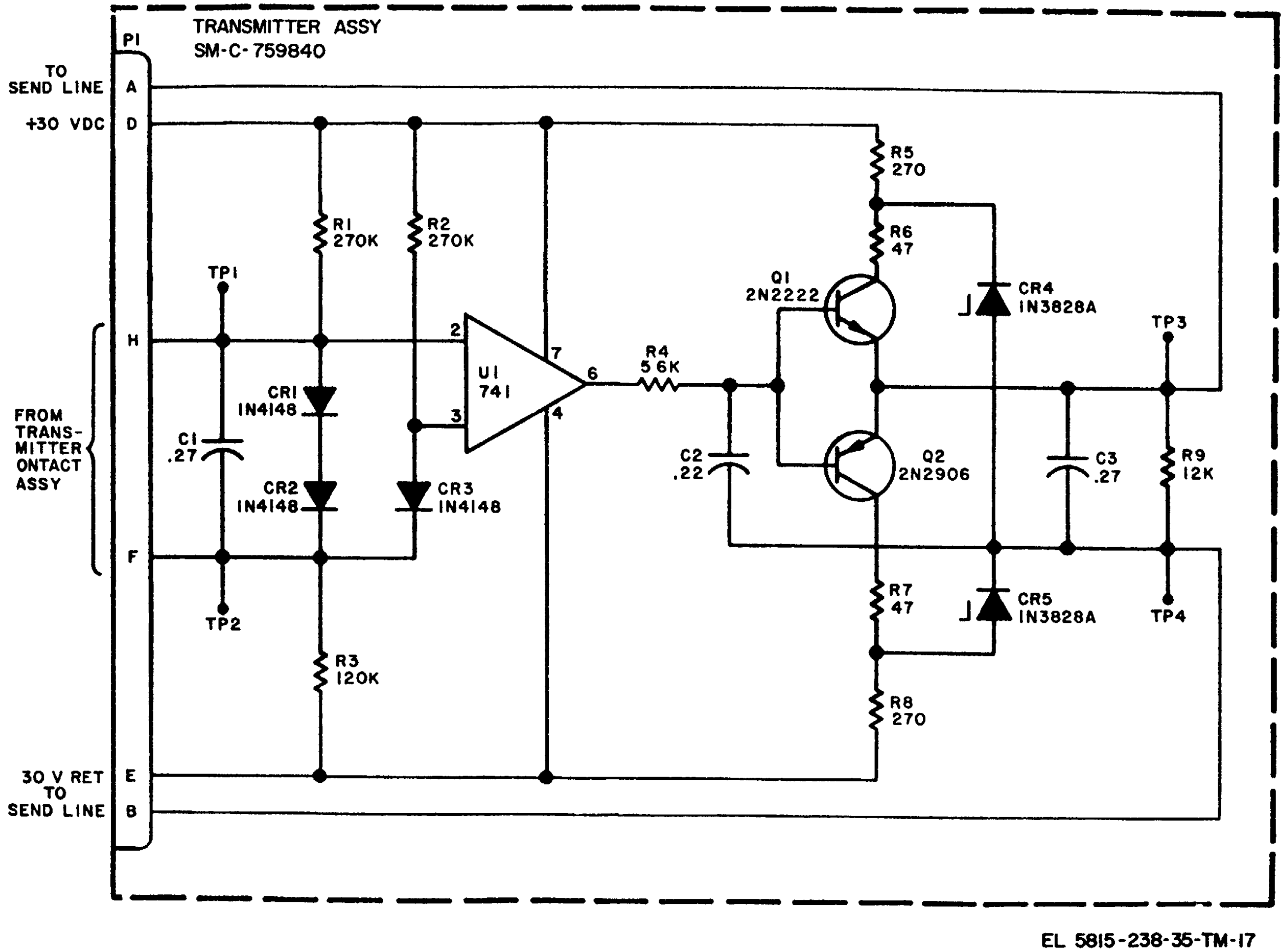



*Figure 2-75. Transmitter module, simplified schematic diagram TT-699(*)/TG.*

(2) The input voltage needed to operate U1 is provided by the voltage dividing network, consisting of resistors R1, R2, R3, and diodes CR1, CR2, and CR3. During a SPACE operation, the contacts of the contact assembly are opened and the action of the voltage divider network causes pin 2 of U1 to be 0 4 volt above pin 3. This condition causes the output of U1 (pin 6) to drop to approximately-12 volts with reference to pin B (TP4). This-12-volt pulse from U1, turns transistor Q2 on Q2 acts as a switch and effectively connects the 6 2-volt zener diode CR5 across output resistor R9, thereby establishing a 6 2-volt potential across R9. In this condition, the current flow through R9 Is from TP3 to TP4, thus putting the signal line 6 2 volts below the signal line.

(3) During a MARK operation, the contacts of the contact assembly are closed, shorting out CR1 and CR2 of the voltage divider. This condition changes the input potential to U1 such that pin 3 is now 0 4 volt above pin 2, causing the output of U1 (pin 6) to increase approximately +12 volts with reference to pin B (TP4). This +12-volt pulse from U1 turns transistor Q1 on, which connects the 6 2 volt potential across R9. In this condition, the current flow through R9 is from TP4 to TP3, thus putting the signal line 6 2 volts above the reference line. The resultant output at R9, caused by the transmitter contacts closing and opening, is a±6 volts for a MARK and SPACE, respectively.

(4) The output impedance of the transmitter is fixed at approximately 80 ohms. The output of the transmitter may be connected to external signal lines or interconnected to the receive circuit for local testing.

**2-46. Receive Circuit (Receiver and Selector Magnet Driver Modules).**

Refer to figures 6-7 and 6-8 for the overall schematic diagram. The receive circuit is used to accept polar mark and space impulses from external signal lines. The coded impulses are applied to the receiver module, which amplifies the impulses. The amplified impulses are sent to the selector magnet driver module which controls the selector magnet which, in turn, governs the position of mechanical parts within the selector mechanisms.

a. *Receiver module* (fig. 2-76). The receive module accepts the ±6-volt MARK/SPAC signals from the receive line. The input impedance of the receiver is approximately 56K ohms, which limits the signal line currents to approximately 100 microamperes for low-level operation

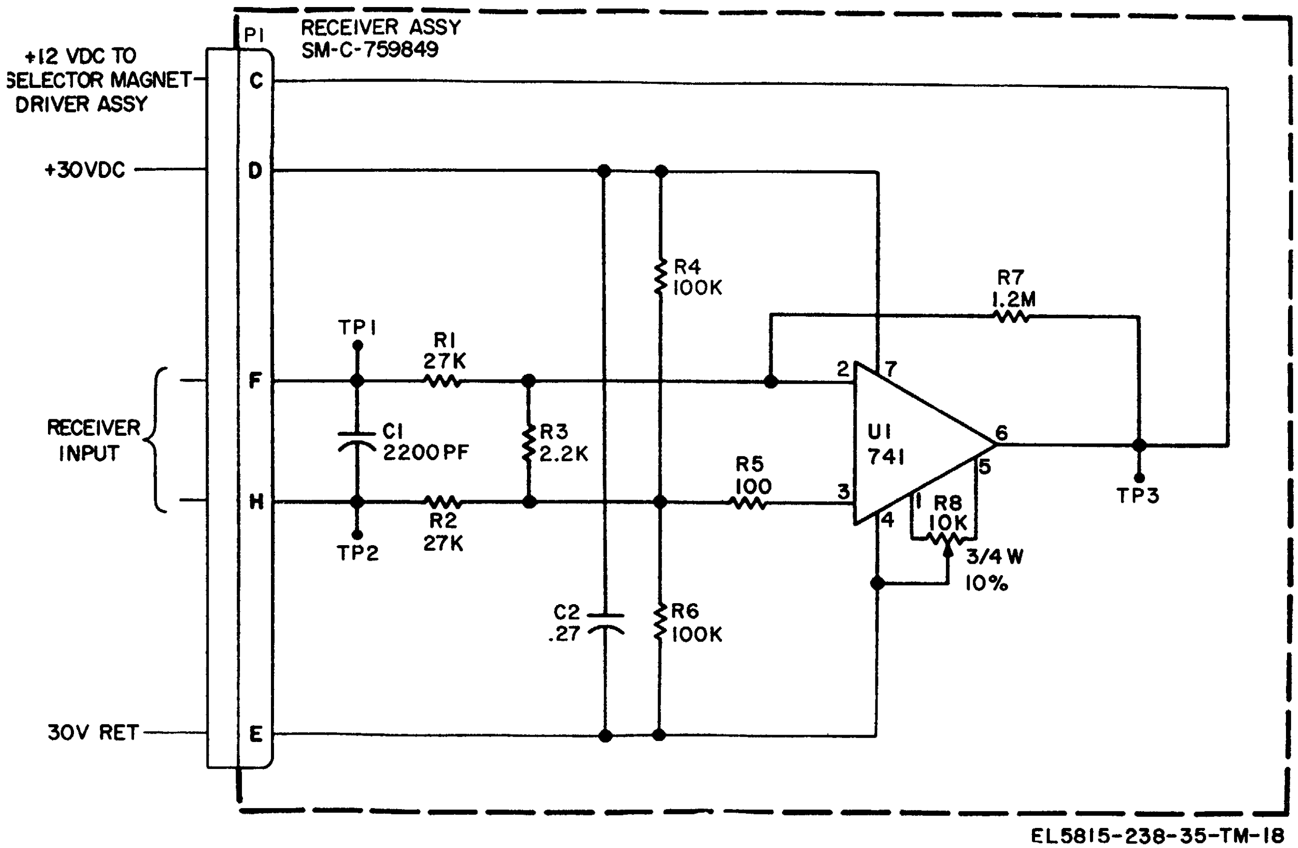



*Figure 2-76. Receiver module, simplified schematic diagram TT-699(*)/TG.*

(1) Resistors R4 and R6 act as a voltage divider between the 30-volt power source which fixes pin 3 of driver U1 at +15 volts (reference point) with respect to the negative power supply return line. With no signal input, potentiometer R8 is adjusted to also fix the output of U1 (pin 6) at + 15 volts above the return line This is done to establish the same receiver signal reference point as in the transmitter output line. Resistor R7 is used as a feedback to fix pin 2 of U1 at a +15 volts with no signal input.

(2) Amplifier U1 provides the necessary signal drive to the selector magnet module. In a SPACE condition, the signal line connected to pin 2 of U 1 is-6 volts with respect to the reference line connected to pin 3. This causes the output at pin 6 (TP3) to increase to approximately +12 volts with respect to the reference line. A MARK input forces pin 2 to +6 volts with respect to pin 3, which causes the output at pin 6 to drop to approximately-12 volts with respect to the reference line.

(3) The 12-volt SPACE/MARK output of the receiver is used to drive the selector magnet driver module.

b. *Selector Magnet Driver Module (fig. 2-77).* Resistors R2, R3, R4, and R5 form a voltage divider network across the 30-volt power source. The common connection between R4 and R5 fixes TP3, the reference line, at + 15 volts with respect to the negative return line, of the 30-volt power supply. A + 12-volt SPACE pulse at TP1 switches transistor Q1 on, allowing current to flow through R2, Q1, selector magnet E1, R5, and R3. The direction of current flow causes TP2 to be positive with respect to TP3 (reference line). A-12-volt MARK input pulse at TP1 switches transistor Q2 on, allowing current to flow through R2, R4, E1, Q2, and R3 The direction of current flow causes TP2 to be negative with respect to TP3 (reference line). In both cases, the current through the selector magnet is approximately 10 millamperes. The selector magnet windings are arranged in series and the full value of the selector magnet driver current passes through each winding.

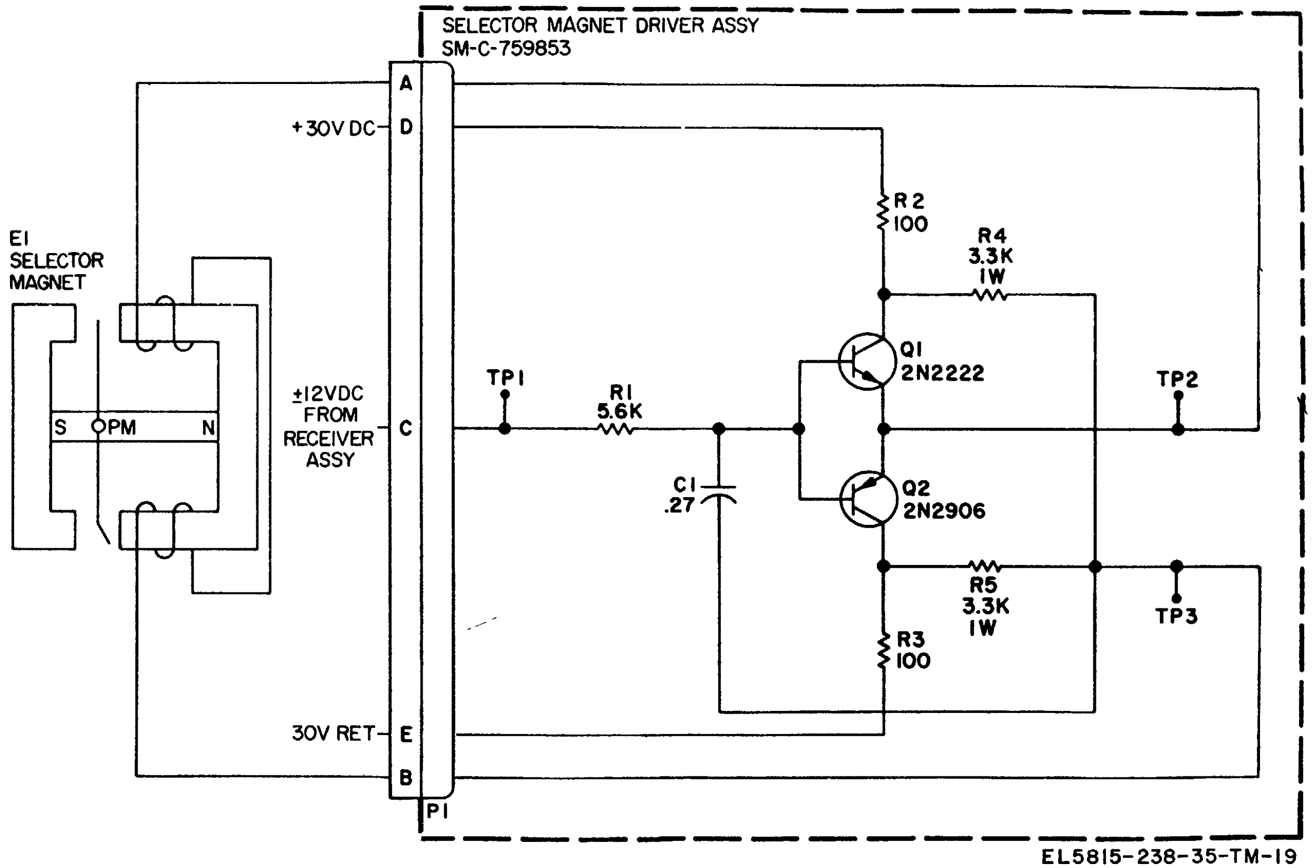



*Figure 2-77. Selector magnet driver module simplified schematic diagram TT-699(*)/GGC.*

## 2-47. Power Supply Circuit 30 VDC (TT-699 (*)/GGC)

Refer to figures 6-7 and 6-8 for the overall schematic diagram. The power supply assembly supplies 30 VDC to the electronic circuits of the transmitter, receiver, and selector magnet driver modules as well as the clutch magnet. When the POWER switch is place m the ON position, 115 VAC is applied to the primary of a step down transformer. Voltage on secondary winding terminals 4 and 5 of T1 is stepped down to approximately 35 VAC, rectified by rectifier bridge, CR1, and filtered by capacitors, C1 and C2. The voltage output from the power supply Is 34 VDC, which is regulated at 30 VDC by resistor, R1 and zener diode, VR1. This 30 VDC level is applied to the modules which are protected by fuses F1 and F2.

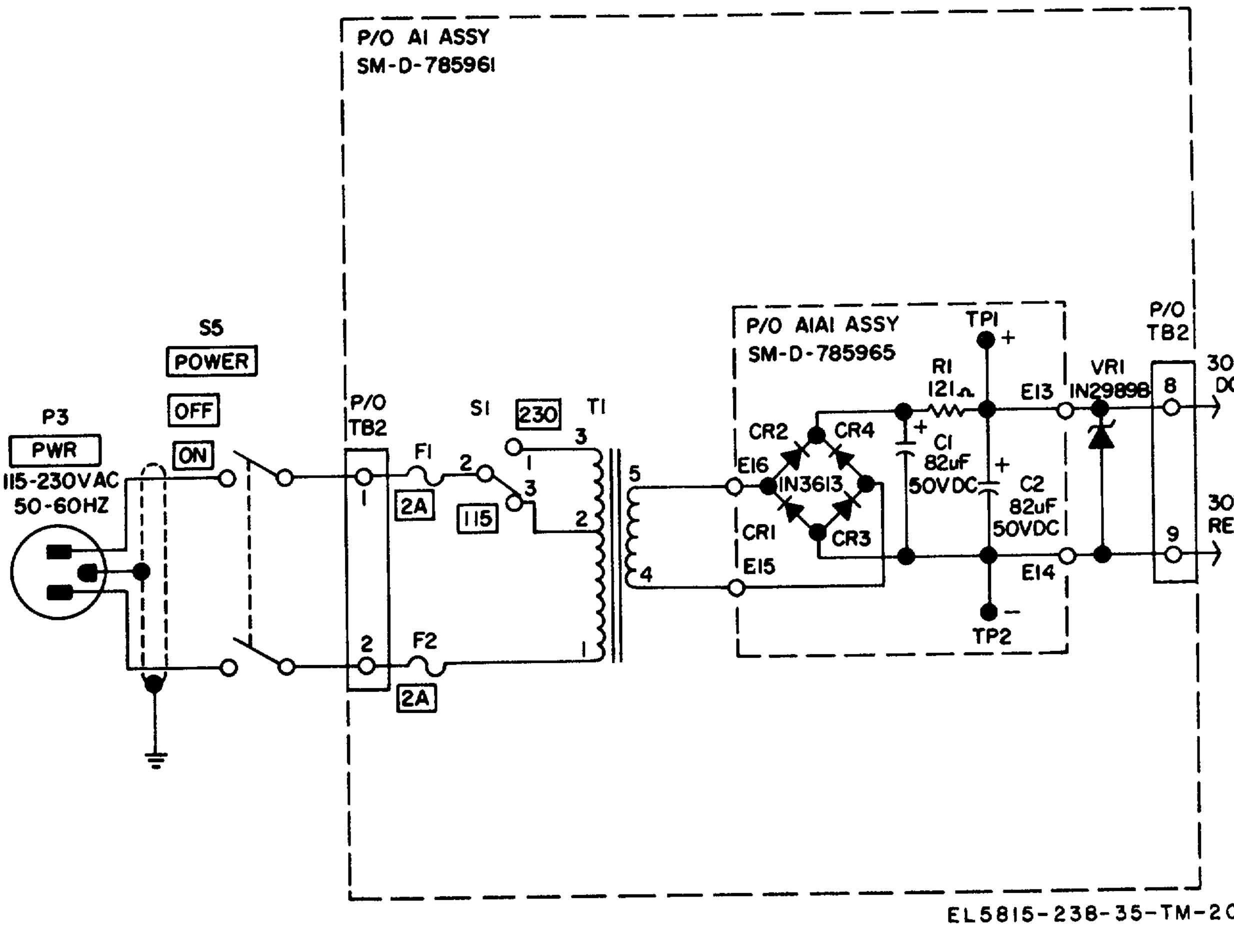



*Figure 2-78. Power supply 30 VDC. schematic diagram TT 6991(*)/TG*

# CHAPTER 3

# FIELD AND DEPOT MAINTENANCE

## SECTION I. TOOLS AND TEST EQUIPMENT

### 3-1. Tools

a. *General*. Tool Equipment TD-50-B should be available to technical personnel responsible for maintenance of the TT-76(*)/GGC. This kit includes most of the tools and test equipment required to perform normal repairs and test. Tool Equipments TE-50-A do not include the special wrenches and gages required for maintenance of this reperforator. Organizations with these tool kits may requisition the added tools in accordance with appropriate supply bulletins.

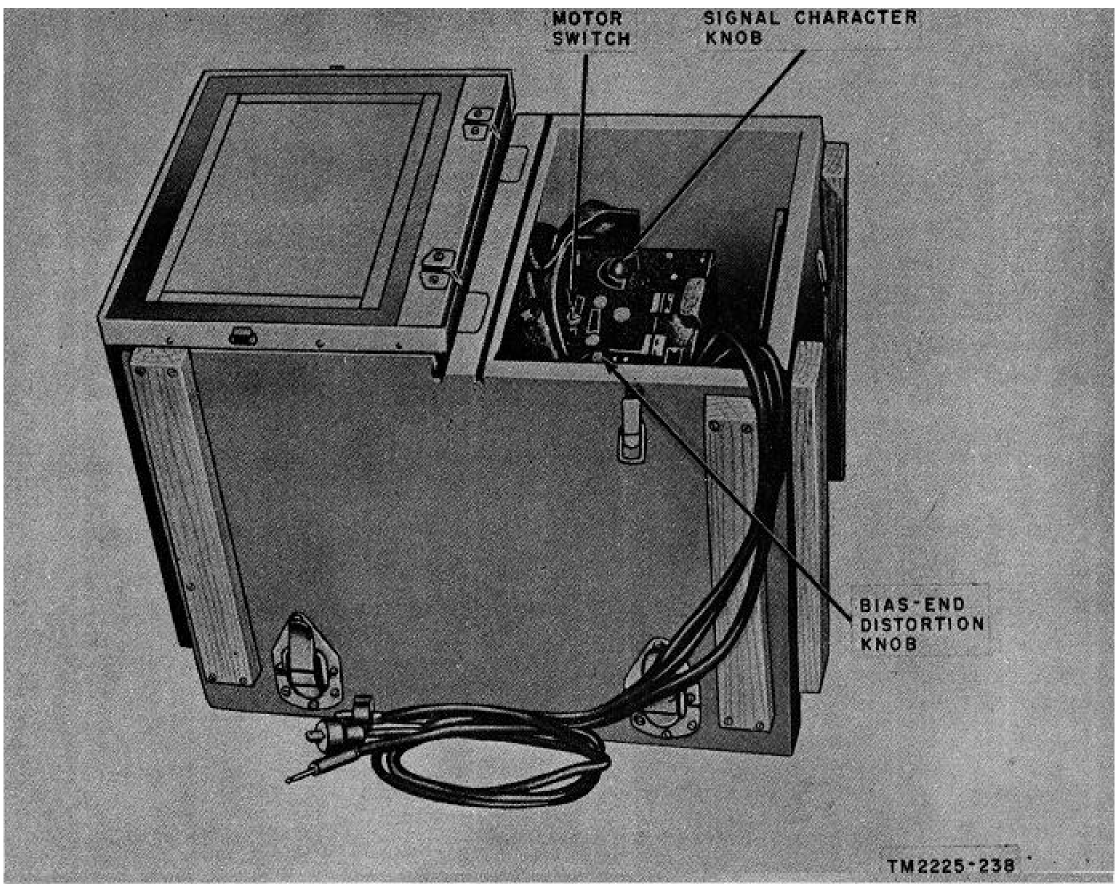



*Figure 3-1. Test Set TS-2/TG.*

*b*. *Additional Tools* The necessity for reworking old parts or making new parts may require metal cutting tools such as drill sets, taps and dies for National Coarse and National Fine thread sizes, a ¼-inch electric hand drill, adjustable tap wrenches and die stocks, a metal handsaw, and ¼-inch chisel. Welding and brazing equipment may be required for occasional emergency repairs. This equipment should be operated only by authorized skilled personnel.

**3-2. Test Equipment and Materials**

a. *Test Equipment*. The test equipment normally used currently to perform maintenance on teletypewriter equipment includes the following test sets:

(1) Multimeter TS-352 B/U.

(2) Test Set TS-2/TG (TT-76(*) /GGC only). Provides normal or distorted test signals.

NOTE

TS-2/TG is to be replaced by Test Set AN/UGM-1 (refer to TM 11-6625-620-12). TS-383/GG is being replaced by Teletypewriter Test Set AN/GGM-1.

(3) Distortion Test Set TS-383/GGC (TT-76(*)/GGC only). Provides normal or distorted test signals and a stroboscopic light for viewing the signals.

NOTE

Test Set TS-2/TG (fig. 3-1) is mounted in a wooden case with carrying handles. It normally is issued to field maintenance units that require a degree of mobility. Distortion Test Set TS-383/GG (fig. 3-2) is not so easily transported and normally is issued to rear echelon repair shops.

(4) Telegraph Test Set AN/GGM-15(V). Provides normal or distorted test signals for testing low-level reperforator-transmitters.

b. Maintenance Materials. In addition to the maintenance materials listed in TM 11-5815-238-12 and paragraph 3-8, the maintenance materials furnished with the TE-50-B (para 3-1) are required for field maintenance.

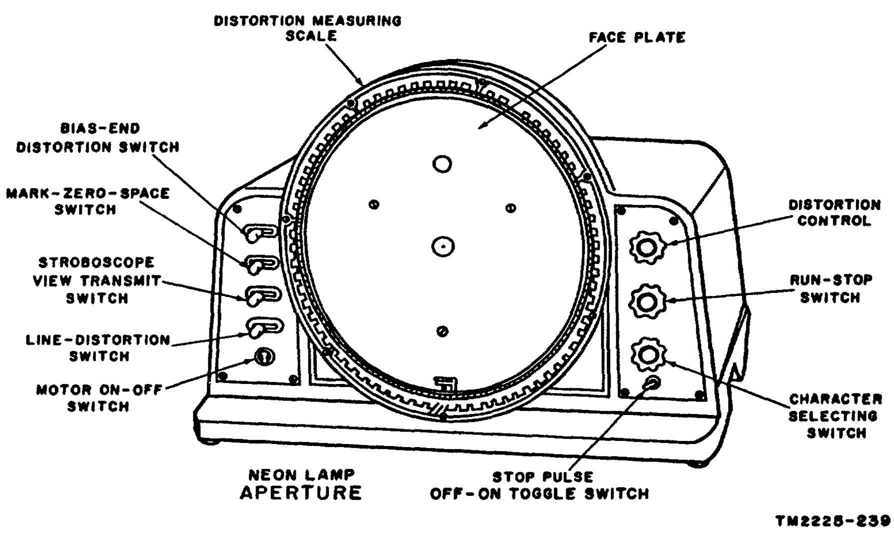



*Figure 3-2. Distortion Test Set TS-383/GG.*

## SECTION II. INSPECTING AND CLEANING

**3-3. Inspection Procedure**

When Teletypewriter Reperforator-Transmitter TT-76(*) GGC arrives at a repair shop for maintenance, the first step is to determine the nature and extent of the repairs required. A pre-repair inspection of this set should include the following checks-

*a*. Examine the general condition of the covers.
*b*. See that the set contains all its components
*c*. Turn the motor over by hand and check for motor bind or visual signs of overheating.
*d*. Check all gears for excessive wear, backlash, or looseness.
*e*. Examine all bearings for wear, bind, or signs of overheating.
*f*. Inspect all mechanical assemblies for signs of damage incurred in transit.
*g*. Examine all castings for signs of cracks or broken portions.
*h*. Check the condition of the wiring and electrical cords.

**3-4. Cleaning Procedures**

Clean the TT-76 (*)/GGC thoroughly at field maintenance shops before any repair work is performed. Remove all dirt, particles of paper tape, and oil or grease as described in *a* through *f* below. Preparation for cleaning includes the removal of some major assemblies.

*a. Covers*. Remove the dust covers and clean the outer surfaces with a cloth slightly moistened with water. To remove oil or grease stains, moisten the cloth with solvent (SD).

*b. Motor.* Disconnect the motor plug. Remove loose dust and dirt from the exterior of the motor with a clean, dry, sash brush. To clean the interior of the motor, disassemble the motor as described in paragraph 4-71 and remove loose dirt and dust with a sash brush. Use a cloth dampened with solvent (SD) to remove oil and gummy deposits. When cleaning the interior, be sure to remove all traces of solvent (SD). Be careful not to damage the wiring.

*c. Select Magnet Assembly.* Disconnect the selector magnet wiring from the terminal board. Remove the complete magnet assembly (pars. 4-46 and 4-47). The magnet coils may be cleaned with a cloth slightly dampened with solvent (SD). Oil should never be present between the magnet armature and pole pieces. To remove oil, insert a piece of Bell Seal Bond paper between the armature and pole pieces and allow the oil to soak into the paper. Repeat this procedure with fresh paper until all oil is removed If the pole pieces are corroded, clean them with No 0000 sandpaper and recoat them with a thin film of lacquer.

*d. Ribbon Mechanism.* Unhook the ribbon mechanism from the ribbon guides on each side of the type wheel and remove the inking ribbon and both ribbon spools. Remove the ribbon feed mechanism (pars 4-51 and 4-52). Brush the loose dirt and dust from the mechanism with a sash brush and remove any oil or grease deposits with a cloth moistened with solvent (SD).

*e. Main Frame Mechanisms.* After the motor, selector mechanism, and the ribbon mechanism are cleaned, the main frame castings and remaining mechanisms may be cleaned with solvent (SD) or Cleaning Compound Do not immerse any of the ball bearings or bronze oil-impregnated sleeve bearings In a cleaning fluid. They are self-lubricating and Immersion would be harmful Parts with a black metallic finish have a protective, corrosion-resistant finish. *These parts should never be dipped in a cleaning fluid longer than is necessary to re-move the dirt. Extended immersion is harmful to the protective finish.* After such cleaning, lightly spray these parts with oil.

*Note.* Do not use gasoline as a cleaning fluid If an emergency requires the use of a substitute for the recommended cleaning fluids, Fuel Oil, Diesel (D-40) may be used until the proper cleaning fluid is obtained Never use carbon tetrachloride.

*f. Base Frame and Associated Parts.* After all other mechanisms (a-c above) are removed and cleaned, all that remains is the base frame, filter box, and tape reel assembly. Remove loose dust, dirt, and tape particles from the base with a sash brush Remove oil and grease de-posits with a cloth moistened with solvent (SD). If the base frame and filter box are extremely dirty, it may be necessary to remove the filter box (pars 4-84 and 4-85) to clean the unit thoroughly Use a cloth slightly dampened with water to clean the rubber-covered cords Brush the dust and dirt from the wiring and electrical components with a clean dry sash brush.

*g. Transmitter-Distributor*. Remove the transmitter-distributor as directed in paragraph 4-27a. Clean the cover with a cloth moistened with water. To remove oil or grease stains, use a cloth moistened with solvent (SD). The remaining mechanisms may be cleaned with solvent (SD). Observe the same cautions in cleaning the bearings and black finished parts as stated in e above.

*h. Keyboard-Transmitter.* Disconnect the keyboard-transmitter plug from its mounting. Remove the keyboard-transmitter (par. 4-5a). Remove loose dust and dirt from the keys, key levers, code bars, and transmitting mechanisms with a clean, dry brush. Use a cloth moistened with solvent (SD) to remove oil and gummy deposits.

**3-5. Rustproofing and Painting**

*a.* If the finish on the dust cover or the immersionproof case becomes badly scratched or scarred, prevent rust and corrosion by touching up bared surfaces. Use No. 00 or No. 000 sandpaper to clean the surfaces down to the bare metal. Obtain a bright, smooth finish. Do not use steel wool; minute particles of steel wool can enter the electrical parts and cause harmful internal shorting and grounding of circuits.

*b.* When a touchup job is necessary, apply paint with a small brush. When numerous scars and scratches warrant complete repainting, remove the TT-76(*)/GGC from service. Place protective masking over all areas where paint is not required or may cause damage. Then spray paint over the entire surface. Remove slight rust from corroded metal by cleaning with solvent (SD). In severe cases, it may be necessary to use solvent (SD) to soften the rust and then sandpaper to complete the preparation for painting. The paint to be used will be authorized in accordance with existing regulations. Restore the moistureproofing and fungiproofing.

**3-6. Lubrication, Assembly, and Operational Test**

When the components are thoroughly cleaned (par. 3-5) all parts that are susceptible to wear should be examined carefully for traces of excessive wear. Worn parts should be replaced and adjusted according to instructions in paragraphs 4-4 through 4-95. Particular attention should be given to gear teeth, sleeve bearings and shafts, ball bearings, and surfaces of cams and associated levers.

*a. Lubrication.* After replacement of worn parts, lubricate each mechanical assembly as described in paragraph 3-12. If evidence of overheating or wear is discovered at points that are normally self-lubricating (oil-impregnated parts), restore lubrication to these parts by immersion for 20 minutes in Oil, Lubricating, Signal Corps stock No. 6G1325, heated to 140° F.

*b. Assembly.* As each of the disassembled mechanisms is lubricated, replace it on the TT-76 (*)/GGC. Renew the coating of anti-seize compound on any steel screws that are to be screwed into aluminum or magnesium castings. This coating is necessary because steel screws, unless coated with this compound, have a tendency to seize in the casting and make future removal of the screws very difficult. The recommended antiseize compound is available through regular supply channels as a Corps of Engineers item, stock No. CE-52-2724.500.080.

*c. Operational Test.* After the reperforator, keyboard-transmitter, and transmitter-distributor are cleaned, lubricated, and assembled, an operational test must be made of the complete unit. Prepare the reperforator-transmitter for testing and test as described in TM 11-5815-238-12. If the reperforator-transmitter operates improperly, locate the fault by using the troubleshooting chart (par. 3-20). If the reperforator-transmitter operates properly, it should receive a prolonged test run before installation into the communication system. Under normal conditions, equipment should be test run for at least 1 hour to minimize the possibility of failure after installation into the system.

**3-7. General**

Lubrication is the most important single item in a preventive maintenance program. Carefully follow lubrication instructions, using the lubricants indicated in the quantities recommended and at the correct time interval.

**3-8. Recommended Lubricants**

The recommended lubricants are:

*a*. Oil (OAI), FSN 9150-223-4129 (1-qt can).
*b*. Grease (GH), FSN 9150-223-4003 (1-lb can).

**3-9. Recommended Lubrication Schedule**

The following chart shows the recommended intervals for checking the lubrication of reperforator-transmitters. When checking, lubricate only those points that require lubrication. DO NOT OVERLUBRICATE.

| | Operating periods (No of days) | | | |
|---|---|---|---|---|
| Reperforator-transmitter operating speeds (wpm) | Up to 8 hours per day | 8 to 12 hours per day | 12 to 16 hours per day | 16 to 24 hours per day |
| 60 | 30 | 20 | 15 | 10 |
| 66 | 27 | 18 | 13 | 9 |
| 75 | 24 | 18 | 12 | 8 |
| 100 | 18 | 12 | 9 | 6 |

*Note* The above intervals between lubrication checks apply to reperforator-transmitters in which felt washers are used *only as part-of friction clutch assemblies* Equipments that include felt lubricating washers at additional lubrication points require less frequent lubrication *at those particular lubrication points.* Add lubricant only as necessary and avoid over saturation Refer to paragraph 4-96 for additional felt lubrication washer data.

**3-10. Preparation for Lubrication**

To completely lubricate the reperforator-transmitter, take it out of service and disassemble it as outlined in a below. After lubrication, reassemble the reperforator-transmitter in the reverse order and make the checks and adjustments listed in TM 11-5815-238-12.

*a. Disassembly.* To disassemble the reperforator-transmitter for lubrication, proceed as follows:

(1) Remove the power cord from the wall outlet and remove the dust cover.
(2) Remove the transmitter-distributor (par. 4-27a).
(3) Remove both ribbon spools and the inking ribbon on the TT-76/GGC as follows:
 (a) Raise the spool clip.
 (b) Push backward on the ribbon sensing lever.
 (c) Pull forward on the tab at the top of the ribbon retainer.
 (d) Remove the ribbon spools and the ribbon.
(4) Remove both ribbon and the inking ribbon on the TT-76A/GGC and later models as follows:
 (a) Move the ribbon spool locks at the ends of the ribbon spool shaft to outward (unlocked) position.
 (b) Pull forward on the tab at the top of the ribbon retainer.
 (c) Remove the ribbon spools and inking ribbon from the ribbon spool shaft.
(5) Tear the paper tape where it enters the tape chute. Depress the tape retainer lever and remove the paper tape from the punch and die assembly.
(6) Remove the keyboard-transmitter (par. 4-5*a*).
(7) Remove the three screws that mount the indicator cover to the keyboard-transmitter and remove the indicator cover.

(8) Remove the motor governor target and cover (par. 4-71a).

*b. Old Lubricants*. Remove all old grease and oil with a clean, dry, lint-free cloth. Wrap the cloth around the end of a screw driver or an orange stick to remove old lubricants from hard-to-reach places.

**3-11. General Lubrication Instructions**

*a. Method of Applying Grease.* Use a grease gun to apply grease to gears. Hold the nozzle of the grease gun against the gear teeth at an angle of about 45° Operate the handle until enough grease is ejected and, at the same time, turn the gear to from a continuous ribbon of grease.

b. *Method of Applying Oil*. To apply only one or two drops of oil dip a piece of No. 22 wire one-half inch into the oil and immediately touch it to the lubrication point to be oiled. This method prevents overlubrication. Where more oil is required, use the oiler supplied with Tool Equipment TE-50-B.

*c. Preventing Corrosion.* Apply only enough oil (except as otherwise indicated) to wet the rubbing surfaces. After the teletypewriter is completely lubricated, wipe off excess oil and any visible dirt.

**3-12. Detailed Lubrication Instructions**

The points to be lubricated, the type of lubricant to be used, and the quantity applied are listed in the charts below. The item numbers are arranged according to the method of application, so that the reperforator-transmitter can be treated by one lubricant or by one method at a time in a systematic way. Item numbers shown in figures 3-3 through 3-17 for the parts to be lubricated correspond with item numbers listed in the charts.

*a. Ball Bearings.* All ball bearings in the reperforator-transmitter are sealed and do not require lubrication.

*b. Gears.* Wipe all old grease from gears with a clean, dry, lint-free cloth. Apply fresh grease as follows:

| Fig. No. | Item No. | Name of Part | Method and quantity |
|---|---|---|---|
| 3-3 | 8 | Worm gear set | Work grease around gears, cover gear teeth liberally |
| 3-4 | 2 | Function shaft drive gear | Apply grease sparingly around gear teeth |
| 3-4 | 3 | Stop arm shaft driven gear | Apply grease sparingly around gear teeth. |
| 3-4 | 7 | Function camshaft gear | Work grease around gears, cover gear teeth liberally |
| 3-4 | 10 | Main shaft driven gear | |
| 3-4 | 11 | Main shaft drive gear | |
| 3-4 | 12 | Keyboard drive shaft driven gear | Apply grease sparingly around gear teeth. |
| 3-4 | 13 | Keyboard drive shaft drive gear | |
| 3-4 | 14 | Function shaft drive gear | |
| 3-5 | 26 | Type wheel hub assembly | Apply grease sparingly only around those teeth engaged by register lever. |
| 3-6 | 4 | Transmitter-distributor drive shaft | Apply grease sparingly around gear teeth. drive gear set. |

*c. Cams.* Remove all of the old lubricants and any dust or residue that might be present. Wipe off with a cloth moistened with solvent (SD). Use a clean cloth to dry the surface thoroughly; apply grease as indicated in the following chart:

| Fig. No. | Item No. | Name of Part | Method and quantity |
|---|---|---|---|
| 3-3 | 5 | Manual tape feed-out disabling cam | Apply a thin film on the working surface of the cam. |
| 3-4 | 8 | Ball bearing | Apply a thin film on the outer circumference. |
| 3-4 | 9 | Clutch latch arm | Apply a thin film on surface contacted by stop arm |
| 3-5 | 2 | Print and register cam | Apply grease to coat all surfaces of cam groove and the bearing of the roller. |
| 3-5 | 4 | Transfer level restoring cam | Apply a film on the working surface of the cam. |
| 3-5 | 10 | Selector camshaft and stop plate | Apply a thin film on working surfaces. |

| Fig. No. | Item No. | Name of Part | Method and quantity |
|---|---|---|---|
| 3-6 | 5 | Type wheel register lever cam............................. | Apply sparingly to cam groove. |
| 3-6 | 6 | Print hammer cam ............................................. | Apply sparingly to cam groove. |
| 3-6 | 12 | Reciprocating and restoring cams....................... | Apply a thin film to all surfaces. |
| 3-6 | 15 | Cam stud plate ................................................. | Apply a thin film on studs. |
| 3-7 | 8 | Transmitter-distributor camshaft .......................... ..................................................................... | Apply a thin coat on all cam lobes and stop lever cam teeth. |
| 3-9 | 4 | Keyboard-transmitter camshaft........................... ..................................................................... | Apply a thin coat on all cam lobes and locking lever teeth. |

*d. Friction Clutches.* Apply oil as shown in the chart below. Do not release the spring tension on friction clutches for periodic lubrication unless it is necessary to provide a thorough cleaning. If a thorough cleaning Is necessary, release the tension on the TT-76/GGC friction clutches by loosening the set screws that hold the spring positioning collars. On the TT-76A/GGC and later models of the equipment, loosen the clamping machine screws In the adjusting collar enough to permit the collar to be rotated, releasing the spring tension Rotate the friction clutch and apply oil After all the clutches are oiled, set them to give approximately the required spring tension on each friction clutch and run the reperforator-transmitter without printing or punching for about 5 minutes, then operate on repeat space for about 5 minutes. When lubrication Is completed, set the spring-tension of the friction clutches as described in paragraphs 4-106 or 4-107, 4-140, 4-187 or 4-188, and 4-221 or 4-222

| Fig. No. | Item No. | Name of Part | Method and quantity |
|---|---|---|---|
| 3-3 | 6 | Selector camshaft friction clutch | 10 to 15 drops of oil along periphery of felt friction plates; apply sparingly to spring and collar. |
| 3-3 | 11 | Keyboard-transmitter drive shaft friction clutch | 10 to 15 drops of oil along peripheryof felt friction plates; apply sparingly to spring and collar. |
| 3-6 | 16 | Function shaft function clutch | 10 to 15 drops of oil along periphery of felt friction plates; apply sparingly to spring and collar. |
| 3-10 | 14 | Transmitter-distributor friction clutch. | 10 to 15 drops of oil along periphery of felt friction plates; apply sparingly to spring and collar. |

*e. Moving Parts*. Apply oil at the following places:

| Fig. No. | Item No. | Name of Part | Method and quantity |
|---|---|---|---|
| 3-3 | 1 | Ribbon roller ..................................................... | 1 drop at each end of rollers. |
| 3-3 | 2 | Ribbon sensing lever........................................... | 2 drops at each stud of sensing lever. [a] |
| 3-3 | 3 | Spool clip............................................................ | Apply sparingly at pivots. |
| 3-3 | 4 | Manual tape feed-out trip latch............................ | 1 drop at pivot and latching surface. |
| 3-3 | 7 | Manual tape feed-out link..................................... | 1 drop at pivot points. |
| 3-3 | 9 | Transfer trip latch shaft........................................ | Apply sparingly at both ends of shaft. [a] |
| 3-3 | 10 | Transfer lever latch and trip latch | 2 drops at each end of sleeve between the two latches. |
| 3-3 | 12 | Grooved spindle in end of selector camshaft........ ..................................................................... | Several drops between spindle and camshaft. |
| 3-3 | 13 | Type wheel post................................................. ..................................................................... ..................................................................... | Apply 2 drops at each end of post. Slide type wheel In and out several times for even lubrication. |
| 3-4 | 1 | Manual tape feed-out latching lever shaft............ | 1 drop at each lever pivot point of shaft |
| 3-4 | 4 | Code-ring locking bail cam follower..................... | Apply sparingly to latching surface. |
| 3-4 | 5 | Code-ring locking ball shaft................................ ..................................................................... ..................................................................... | Apply sparingly to all working surfaces and to pivot point of figures and levers latch.[a] |
| 3-4 | 6 | Stop arm shaft.................................................... ..................................................................... | Apply sparingly between levers and flat washers. [a] |

[a] On reperforators with felt lubricating washers, lubricate the associated felt washer to the point of saturation only

| Fig. No. | Item No. | Name of part | Method and quantity |
|---|---|---|---|
| 3-5 | 1 | Ribbon feed cam follower eccentric stud | Apply sparingly at both ends of stud. [a] |
| 3-5 | 3 | Transfer lever roller stud | 1 drop between roller stud and lever. |
| 3-5 | 5 | T-levers and separating washers | Apply sparingly to all rubbing and beating surfaces. [a] |
| 3-5 | 6 | Armature mounting shaft | Apply sparingly to bearing points. |
| 3-5 | 7 | Y-levels and separating flashers | Apply sparingly to all rubbing and bearing surfaces. [a] |
| 3-5 | 8 | Selector levers and separating flashers | Apply sparingly between levers and washers. [a] |
| 3-5 | 9 | Selector lever stop comb | Apply sparingly to all rubbing surfaces. |
| 3-5 | 11 | Switch actuating arm latch | Apply sparingly to both ends of latch. |
| 3-5 | 12 | Switch actuating lever pivot | Apply sparingly to both ends of pivot. |
| 3-5 | 13 | Tape-out alarm lever hub | Apply sparingly to both ends of hub. |
| 3-5 | 14 | Transfer lever trip latch | Apply sparingly to latching surfaces. |
| 3-5 | 15 | Rangefinder cam | Apply thin film on cam surfaces. |
| 3-5 | 16 | Tape feed-out shaft | 2 drops at all pliot points. |
| 3-5 | 17 | Print and register levers shaft | Apply sparingly to all working surfaces of the levers. [a] |
| 3-5 | 18 | Punch lever stop pin | Apply sparingly to entire length of pin. |
| 3-5 | 19 | Punch arm pivot post | Apply 5 drops of oil in oil hole of punch arm assembly. [a] |
| 3-5 | 20 | Punch lever pivot stud | Several drops between levers and washers. |
| 3-5 | 21 | Feed pawl pivot | 1 drop at each end of pivot. [a] |
| 3-5 | 22 | Back space pivot stud | Apply sparingly at pivot points. |
| 3-5 | 23 | Code hole punch levers | Thin film on working surfaces. |
| 3-5 | 24 | Interference level shaft | Thin film on working surfaces. |
| 3-5 | 25 | Code punch bars | Thin film on contact surfaces. |
| 3-5 | 28 | Stop arm | 1 drop each side of collar on shaft. [a] |
| 3-6 | 1 | Sliding clutch coupling | Several drops into clutch coupling. |
| 3-6 | 2 | Slidlng drum clutch | 2 drops in oil hole in drum clutch. [a] |
| 3-6 | 3 | Tiansfer lever shaft beatings | 1 drop between collars and bearings and on transfer lever shaft.[a] |
| 3-6 | 7 | Ribbon feed cam | Apply thin film on cam. |
| 3-6 | 8 | Ribbon feed lever pawl | Apply thin film on all workinig surfaces of ribbon feed pawl. [a] |
| 3-6 | 9 | Driving link lever toggle assembly | Apply thin film on all working surfaces of toggle assembly. |
| 3-6 | 10 | Ribbon spool shaft | 2 drops at each ratchet of spool shaft. [a] |
| 3-6 | 11 | Ribbon retainers | Apply sparingly to ribbon retainer shaft pivot points. |
| 3-6 | 13 | Reciprocating and restoring cam followers | Apply sparingly to roller, pivots, and all rubbing surfaces. |
| 3-6 | 14 | Cam lever assembly | Several drops between sensing levers and spacers on hub. |
| 3-6 | 17 | Felt washer (on function camshaft gear) | Saturate. |
| 3-7 | 1 | Clutch magnet armature | 1 or 2 drops at pivot and working end. |
| 3-7 | 2 | Sensing lever comb | 1 or 2 drops in each comb slot. |
| 3-7 | 3 | Felt washer (on sensing lever springs) | Saturate. |
| 3-7 | 4 | Tape feed retracting lever | 1 or 2 drops at pivot and wolking end. |
| 3-7 | 5 | Code sensing levers | Apply sparingly at working surfaces and at pivot. |
| 3-7 | 6 | Stop-start lever | 1 or 2 drops at pivot and working points. [a] |
| 3-7 | 7 | Tape feed lever | 1 or 2 drops at pivot and working points. [a] |
| 3-7 | 9 | Selector levers, bearing shoes, and flat washers | Apply sparingly to all rubbing and bearing surface. [A] |
| 3-7 | 10 | Transmitter contact bail pivot stud | 2 or 3 drops between arm and stud. [a] |

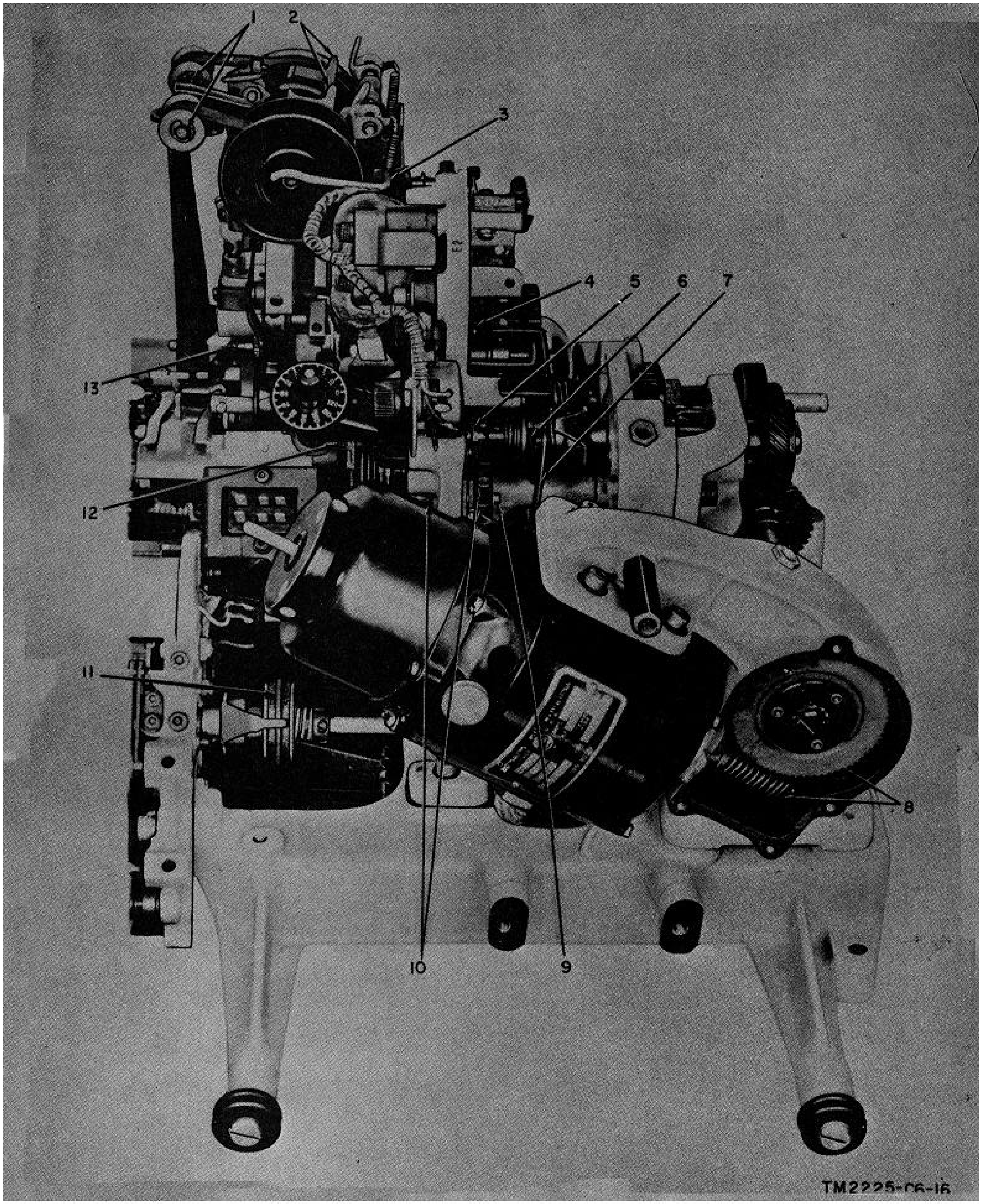
[a] On reperforators with felt lubricating washers, lubricate the associated felt washer to the point of saturation only

| Fig. No. | Item No. | Name of part | Method and quantity |
|---|---|---|---|
| | | **NOTE** The following parts apply to the TT-699(*)/GGC transmitter-distributor contact assembly. | |
| 3-7.1 | 1 | Deleted. | |
| | 2 | Deleted. | |
| | 3 | Deleted. | |
| 3-8 | 1 | Felt washer (on stop-start detent lever stud). | Saturate. |
| 3-9 | 1 | Selector levers, bearing shoes, and flat washers. | Apply sparingly at all rubbing and bearing surfaces. [a] |
| 3-9 | 2 | Transmitter contact ball pivot stud | 2 or 3 drops between arms and pivot stud. |
| 3-9 | 3 | Sensing lever locking ball | 1 or 2 drops on ball surfaces and between lever and comb. |
| 3-9 | 5 | Cam-stop lever | 1 or 2 drops at pivot; apply sparingly to latching surface. [a] |
| 3-9 | 6 | Sensing levers | Apply sparingly at working surfaces at each end at pivot. [a] |
| 3-9 | 7 | Locking lever latch | 2 or 3 drops at pivot points; thin film at latching surface. [a] |
| | | **NOTE** The following parts apply to the TT-699(*)/GGC keyboard-transmitter contact assembly. | |
| 3-9 1 | 1 | Deleted. | |
| | 2 | Deleted. | |
| | 3 | Deleted. | |
| 3-10 | 1 | Type wheel reciprocating drive levers | 2 drops on drive pin and between levers and flat washers. [a] |
| 3-10 | 2 | Type wheel reciprocating eccentric stud | 2 drops at upper end of stud. |
| 3-10 | 3 | Code rings | Thin film all along inner and outer working surfaces of each code ring One drop between code rings and washers. |
| 3-10 | 4 | Stop bars in code-rng cage | 2 drops at each end of all 32 stop bars. |
| 3-10 | 5 | Upper bell crank lever | Apply sparingly to coupling of arm and type wheel reciprocating transfer lever. |
| 3-10 | 6 | Upper bell crank lever stud | Apply sparingly to upper bell crank lever stud. |
| 3-10 | 7 | Reciprocating lever shaft | 2 drops at upper and lower bell crank shaft collars. [a] |
| 3-10 | 8 | Lower bell crank lever | Apply sparingly to lower bell crank lever end. |
| 3-10 | 9 | Tape feed sprocket | 2 drops in each hole on both sides of sprocket shaft. [a] |
| 3-10 | 10 | Tape retainer assembly | 1 drop at each end of tape retainer assembly. |
| 3-10 | 11 | Detentlever | 1 drop at each end of detent lever roller. |
| 3-10 | 12 | Detent lever eccentric stud | 1 drop at each end of stud. [a] |
| 3-10 | 13 | Punch interference levers | 1 drop between interference levers and washers. [a] |
| 3-11 | 1 | Tape-out lever | 1 or 2 drops at pivot and working points. [a] |
| 3-11 | 2 | Tape feed claw | 1 or 2 drops at pivot and working points. |
| 3-11 | 3 | Start-stop lever detet | 1 or 2 drops at pivot and working points. |
| 3-11 | 4 | Lower switch ball lever | 1 or 2 drops at pivot and working points[a] |
| 3-11 | 5 | Tight-tape lever | 1 or 2 drops at pivot and working points. [a] |
| 3-11 | 6 | Upper switch ball lever | 1 or 2 drops at pivot and working points. |
| 3-12 | 1 | Tape cover latch | 1 or 2 drops at pivot and working points. |
| 3-12 | 2 | Tape cover hinge | 1 or 2 drops at pivot. |
| 3-13 | 1 | Indicator return spring (TT-76/GGC and TT-76A/GGC). | Light coat on sprinng surface. |
| 3-13 | 2 | Return latch | 1 or 2 points at pivot and working surface. [a] |
| 3-13 | 3 | Keylevers | 1 drop at each of the 33 key lever pivots. |

[a] On reperforators with felt lubricating washers, lubricate the associated felt washer to the point of saturation only.

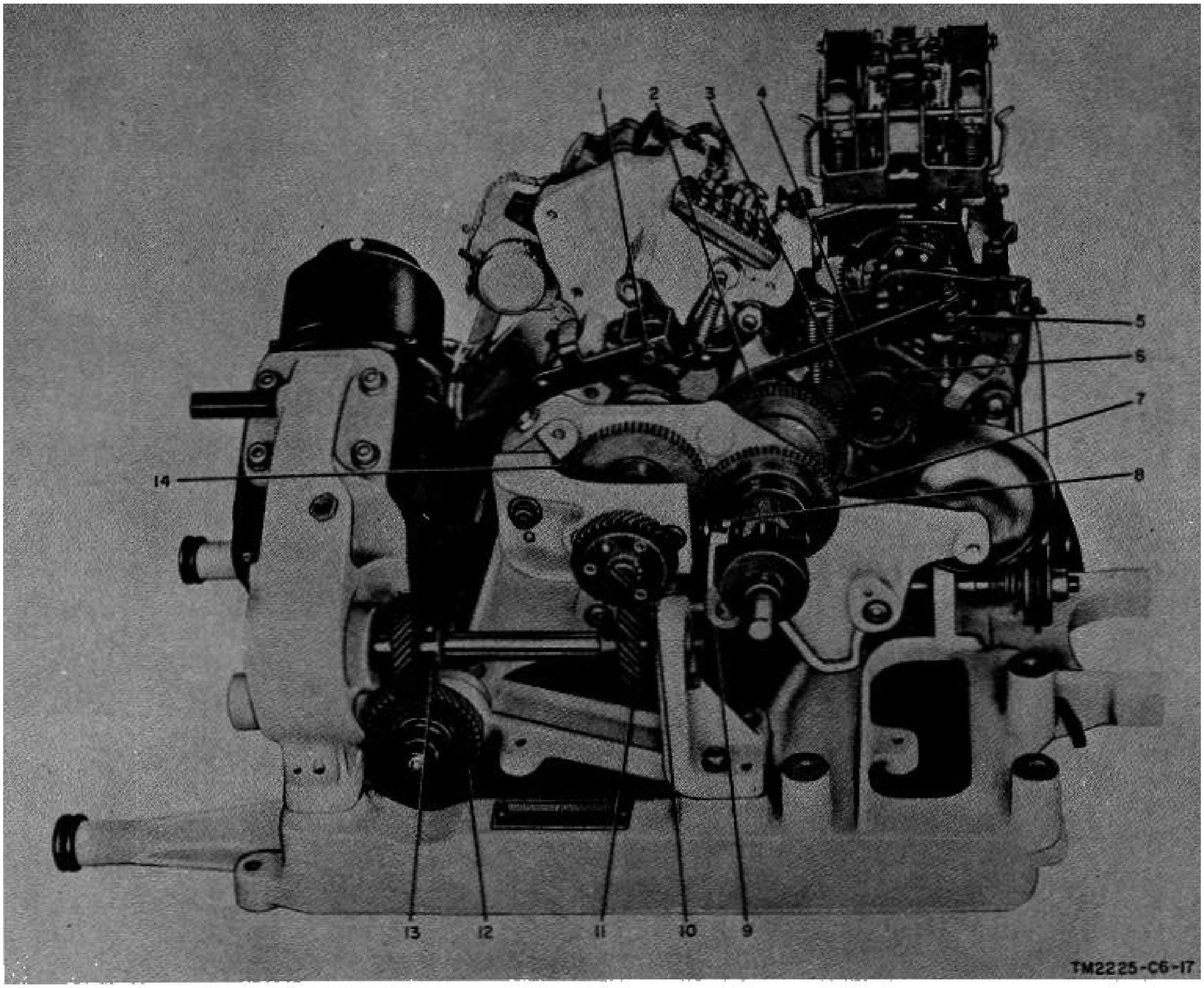
| Fig. No. | Item No. | Name of part | Method and quantity |
|---|---|---|---|
| 3-13 | 4 | Indicator carriage .................................... | 1 or 2 drops on roller. [a] |
| 3 13 | 5 | Line indicator drive shaft ............................ | 1 or 2 drops at pivot, light coat on entire working surface. |
| 3-13 | 6 | Cam follower............................................. | 1 or 2 drops at pivot and working surfaces. [a] |
| 3-13 | 7 | Ratchet pawl.............................................. | 1 or 2 drops at pivot point and working surfaces. |
| 3-13 | 8 | Ratchet wheel ........................................... | Light coat on entire working surface. |
| 3-13 | 9 | Ratchet wheel detent.................................. | 1 or 2 drops at pivot and working surface. [a] |
| 3-13 | 10 | Function blocking bar.................................. | 1 or 2 drops at each pivot and working surface. |
| 3-13 | 11 | Front key lever guide.................................. | 1 drop in each slot. |
| 3-13 | 12 | Space bar arm assembly pivots.................. | 1 drop at each of the three pivots. |
| 3-13 | 13 | Middle key lever guide................................. | 1 drop in each of the 33 key lever guide slots. |
| 3-13 | 14 | Code bar guide studs.................................. | 2 or 3 drops in each groove. |
| 3-14 | 1 | Line indicator drive shaft anti-bounce plate.. (TT-76B/GGC). | 2 or 3 drops between antibounce plate and adjacent spacer. [a] |
| 3-14 | 2 | Indicator drive shaft spring (TT-76B/GGC)... ......................................................... | 3 or 4 drops into keyed slot at the left end of the indicator drive shaft. |
| 3-15 | 1 | Motor governor adjustment gear................. | Apply sparingly on gear teeth. |
| 3-15 | 2 | Governor worm .......................................... | 1 or 2 drops in governor hub opening. |
| 3-15 | 3 | Governor adjustment lever................... | 1 drop each end. |
| 3-15 | 4 | Governor adjustment screw........................ | Apply sparingly to entire thread. |
| 3-16 | 1 | Tape puller arm roller ................................. | 1 or 2 drops on roller. |
| 3-16 | 2 | Tape puller arm pivot stud.......................... | 1 drop at each working point of stud. [a] |
| 3-17 | 1 | Alarm lever................................................. | 1 or 2 drops at pivot point. |
| 3-17 | 2 | Lever latch ................................................. | 1 drop at pivot point. |

[a] On reperforators with felt lubricating washers lubricate the associated felt washer to the point of saturation only.



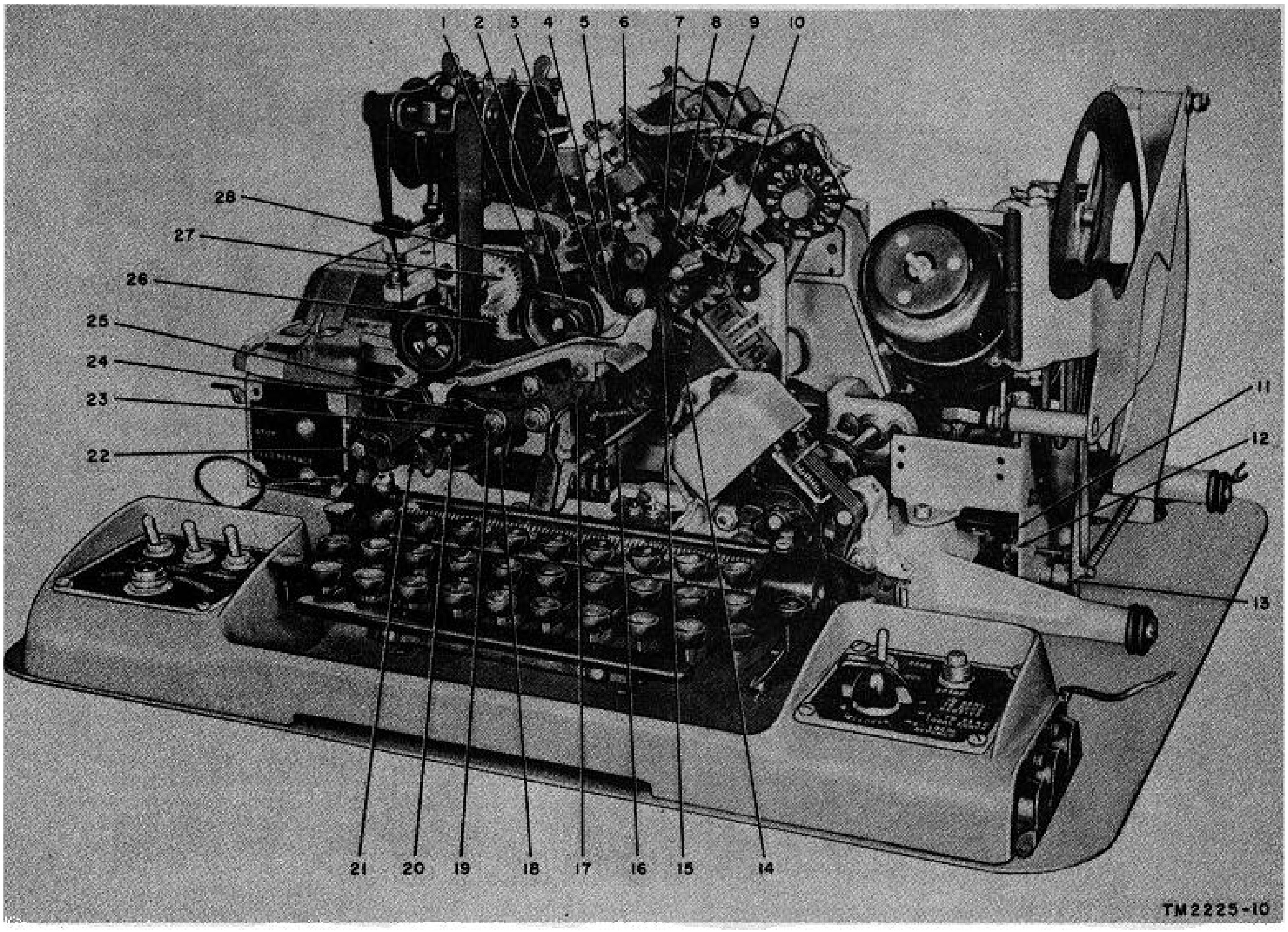

1 Ribbon roller
2 Ribbon sensing levers
3 Spool clip
4 Manual tape feed-out trip latch
5 Manual tape feed-out disabling cam
6 Selector camshaft friction clutch
7 Manual tape feed-out link
8 Worm gear set
9 Transfer trip latch shaft
10 Transfer lever latch and trip latch
11 Keyboard-transmitter drive shaft friction clutch
12 Grooved spindle
13 Type wheel post

*Figure 3-3. Right side of reperforator, showing lubrication points.*



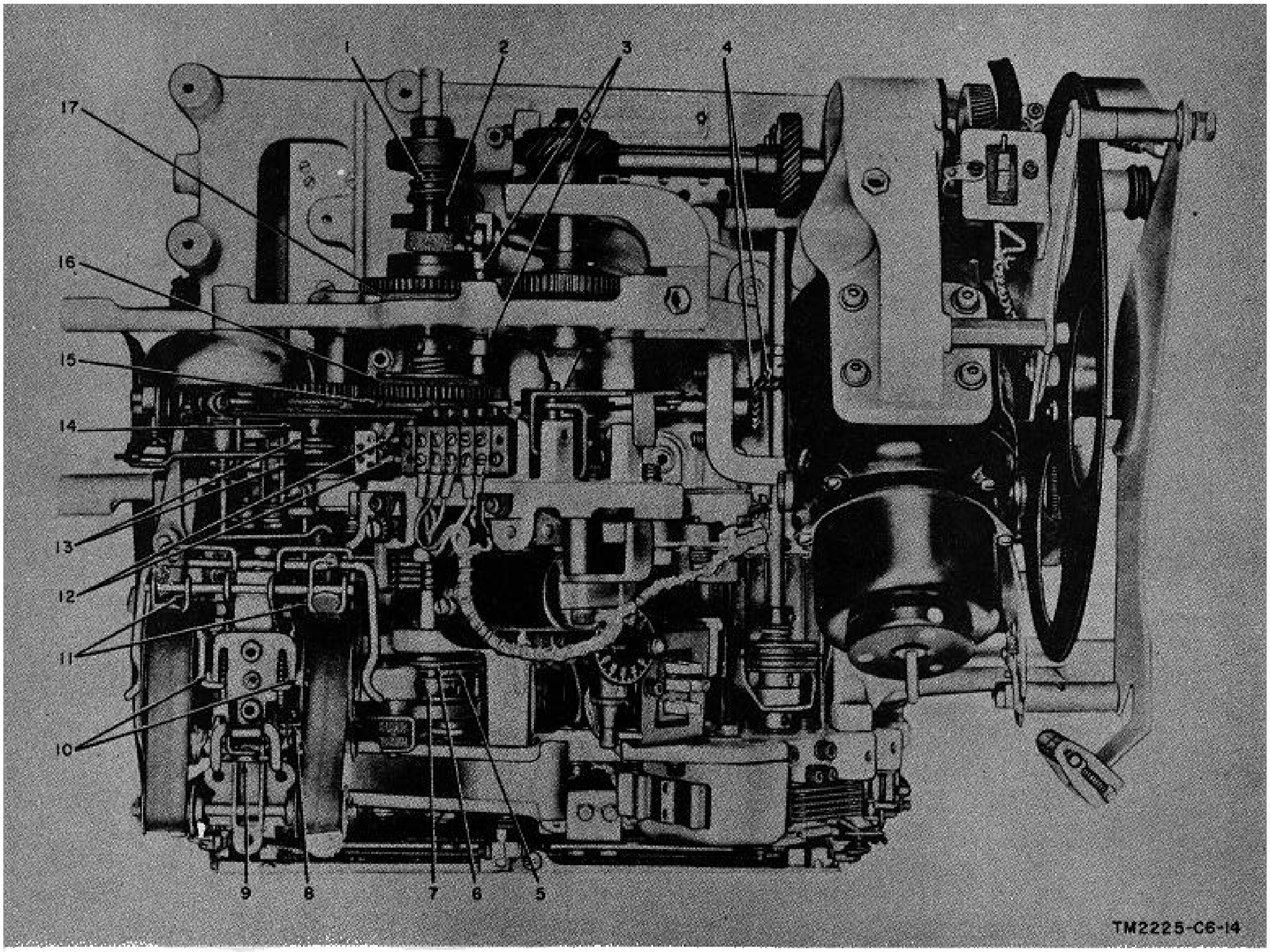

1 Manual tape feed-out latching lever shaft
2 Function shaft drive gear
3 Stop arm shaft driven gear
4 Code-ring locking bail cam follower
5 Code-ring locking bail shaft
6 Stop arm shaft
7 Function camshaft gear
8 Ball bearing
9 Clutch latch arm
10 Main shaft driven gear
11 Main shaft drive gear
12 Keyboard drive shaft driven gear
13 Keyboard drive shaft drive gear
14 Function shaft drive gear

*Figure 3-4. Rear view of reperforator, showing lubricating points.*




1 Ribbon feed cam follower eccentric stud
2 Print and register cam
3 Transfer lever roller stud
4 Transfer lever restoring cam
5 T-levers and separating washers
6 Armature mounting shaft
7 Y-levers and separating washers
8 Selector levers and separating washers
9 Selector lever stop comb
10 Selector camshaft and stop plate
11 Switch actuating arm latch
12 Switch actuating lever
13 Tape-out alarm lever hub
14 Transfer lever trip latch
15 Rangefinder cam
16 Tape feed-out shaft
17 Print and register levers shaft
18 Punch lever stop pin
19 Punch arm pivot post
20 Punch lever pivot stud
21 Feed pawl pivot
22 Back space pivot stud
23 Code hole punch levers
24 Interference lever shaft
25 Code punch bars
26 Type wheel hub assembly
27 Type wheel driven gear
28 Stop arm

*Figure 3-5. Front view of reperforator, showing lubrication points.*




1 Sliding clutch coupling
2 Sliding drum clutch (on function camshaft)
3 Transfer lever shaft bearings
4 Transmitter-distributor drive shaft drive gear set
5 Typewheel register lever cam
6 Print hammer cam
7 Ribbon feed cam
8 Ribbon feed lever pawl and shaft
9 Driving link lever toggle assembly
10 Ribbon spool shaft
11 Ribbon retainer levers
12 Reciprocating and restoring cams
13 Reciprocating and restoring cam followers
14 Cam lever assembly
15 Cam stud plate
16 Function shaft friction clutch
17 Felt washer (on function camshaft gear)

*Figure 3-6. Top view of reperforator, showing lubrication points.*

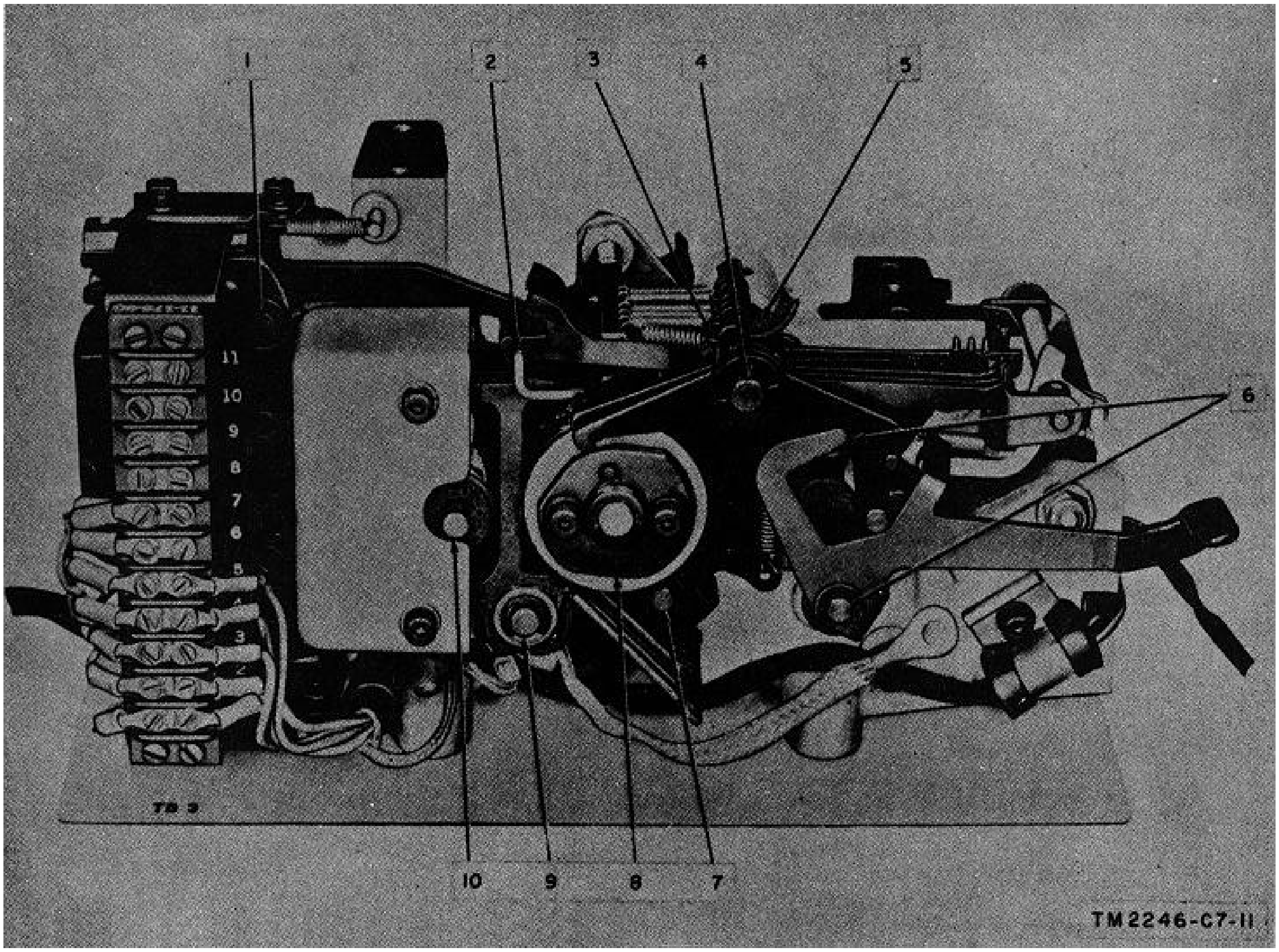



*Figure 3-7. Right side of transmitter-distributor, showing lubrication points.*

(**Page 3-16 deleted including figure 3-7.1)**

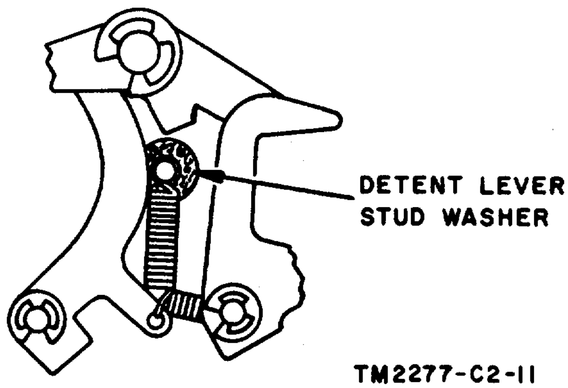



*Figure 3-8. Partial right side view of transmitter-distributor.*

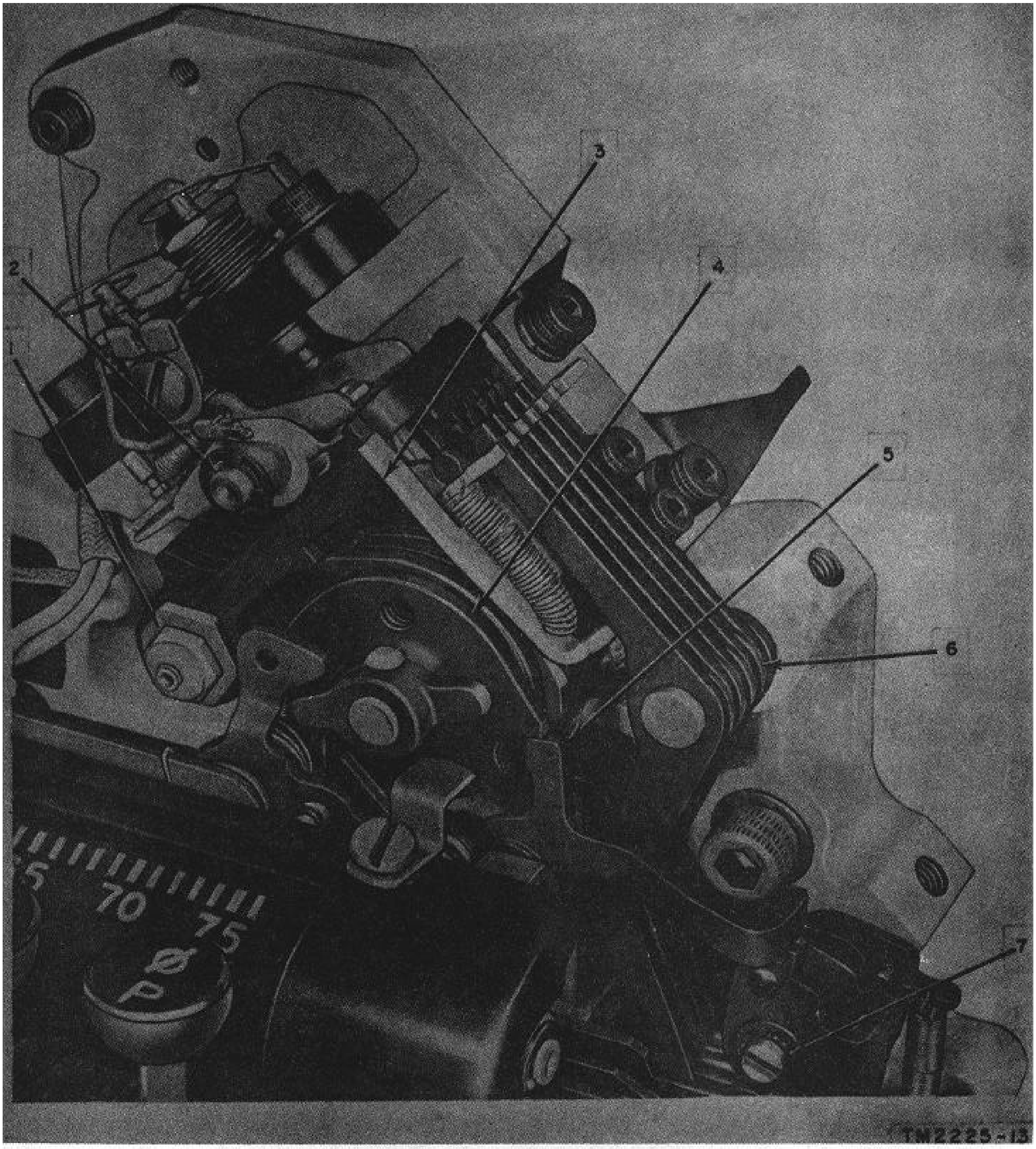
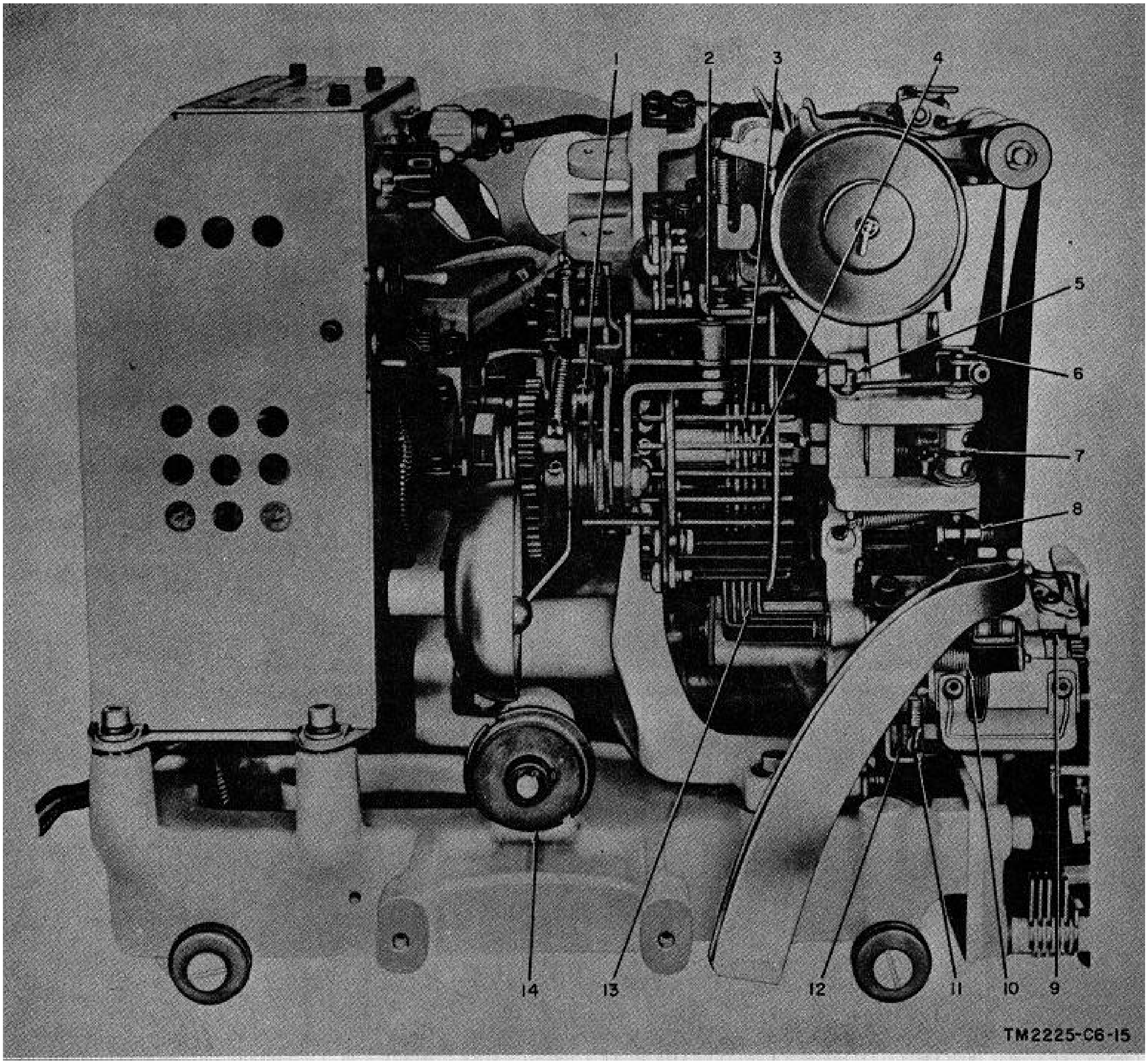


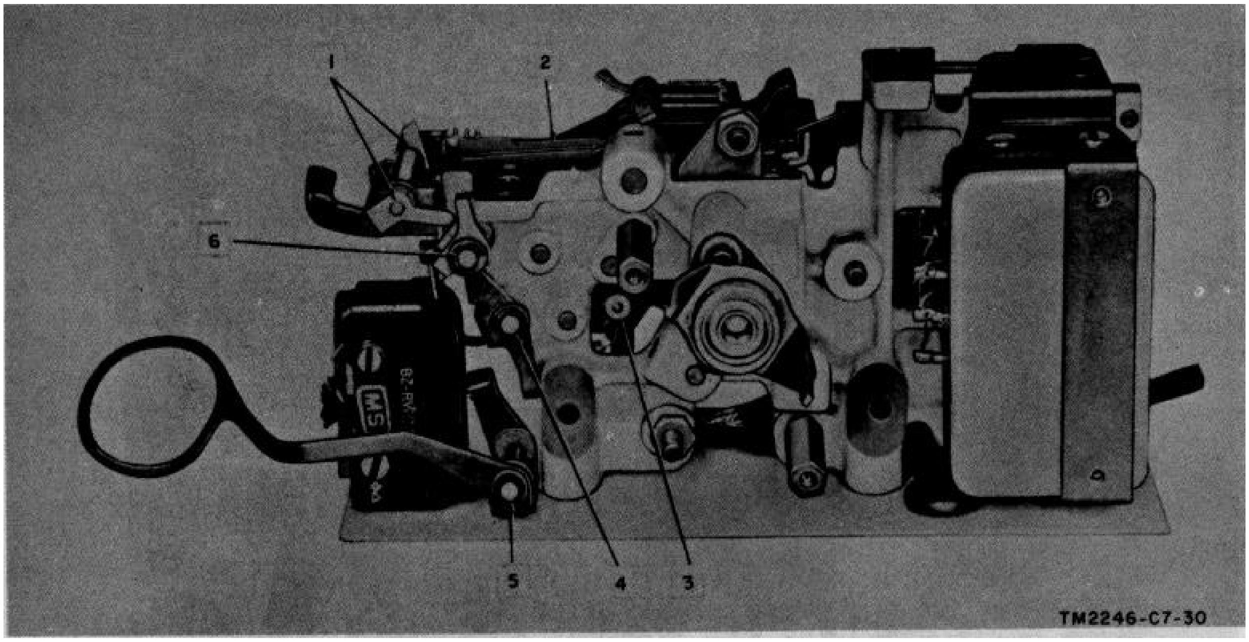

*Figure 3-9. Keyboard-transmitter mechanism, showing lubrication points.*




1 Type wheel reciprocating drive levers
2 Type wheel reciprocating transfer lever eccentric stud
3 Code rings
4 Stop bars in code-ring cage
5 Upper bell crank lever
6 Upper bell crank lever stud
7 Reciprocating lever shaft
8 Lower bell crank lever
9 Tape feed sprocket
10 Tape retainer assembly
11 Detent lever
12 Detent lever eccentric stud
13 Punch interference levers
14 Transmitter-distributor friction clutch

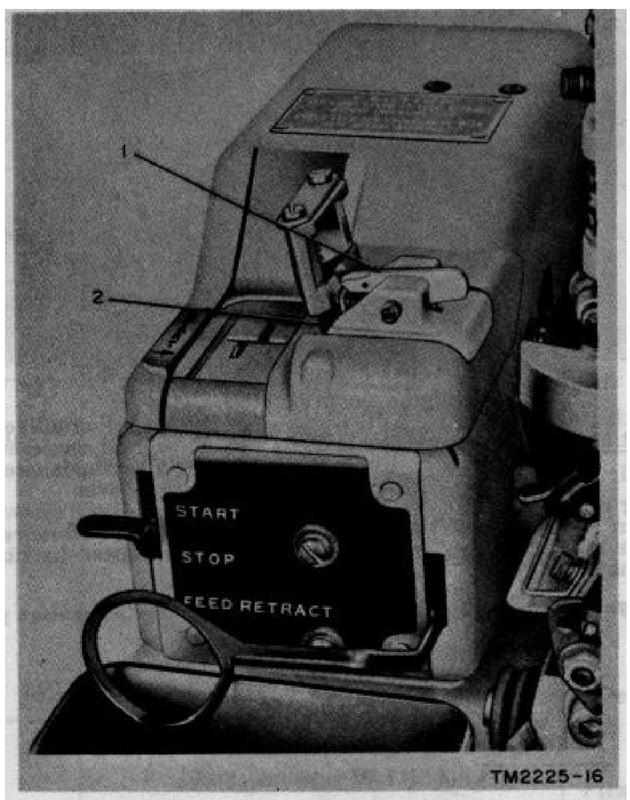


*Figure 3-10. Left side of reperforator, showing lubrication points.*



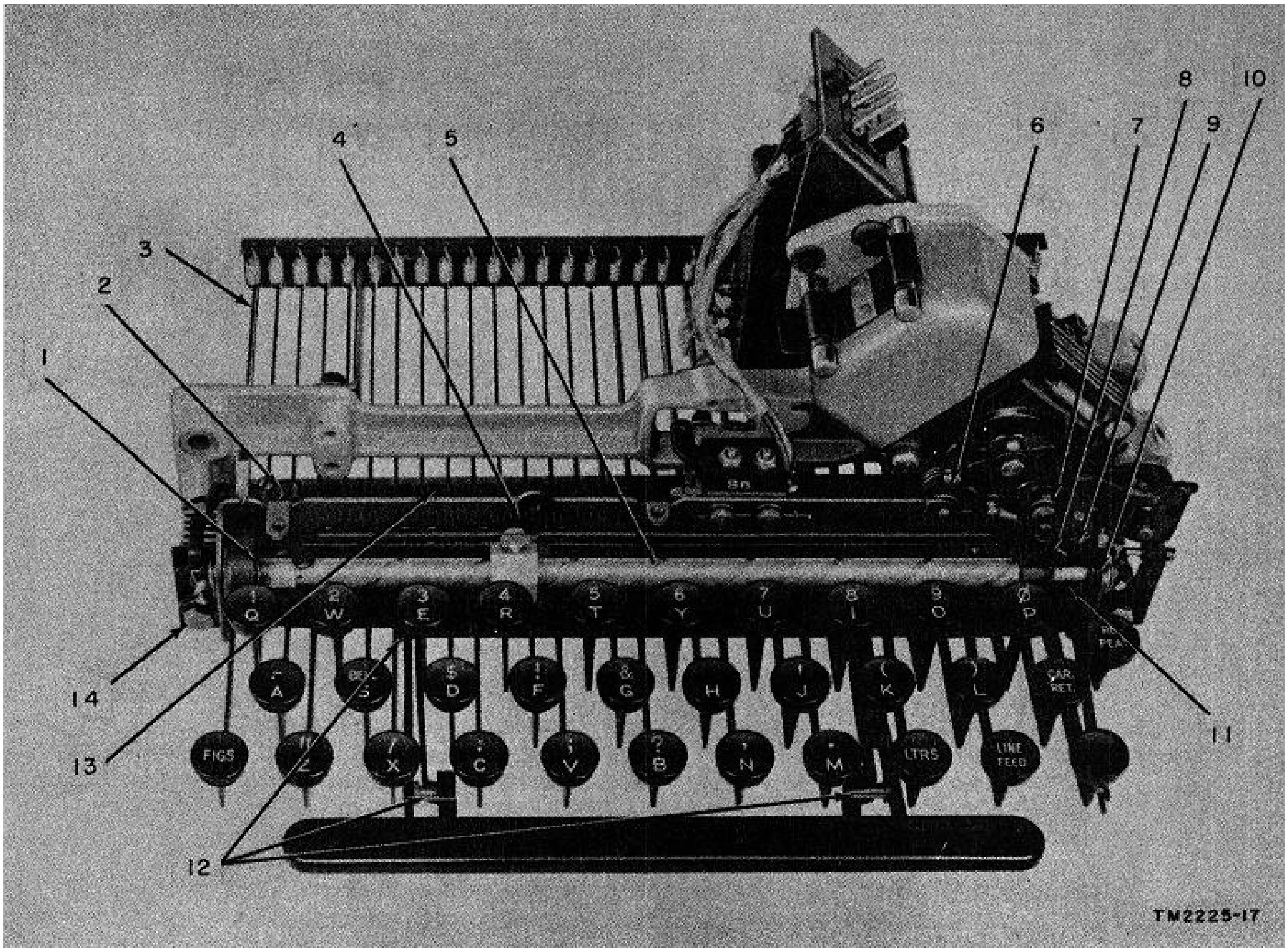

1 Tape-out lever
2 Tape feed claw
3 Start-stop lever detent
4 Lower switch bail lever
5 Tight-tape lever
6 Upper switch bail lever

*Figure 3-11. Left side of transmitter-distributor, showing lubrication points.*



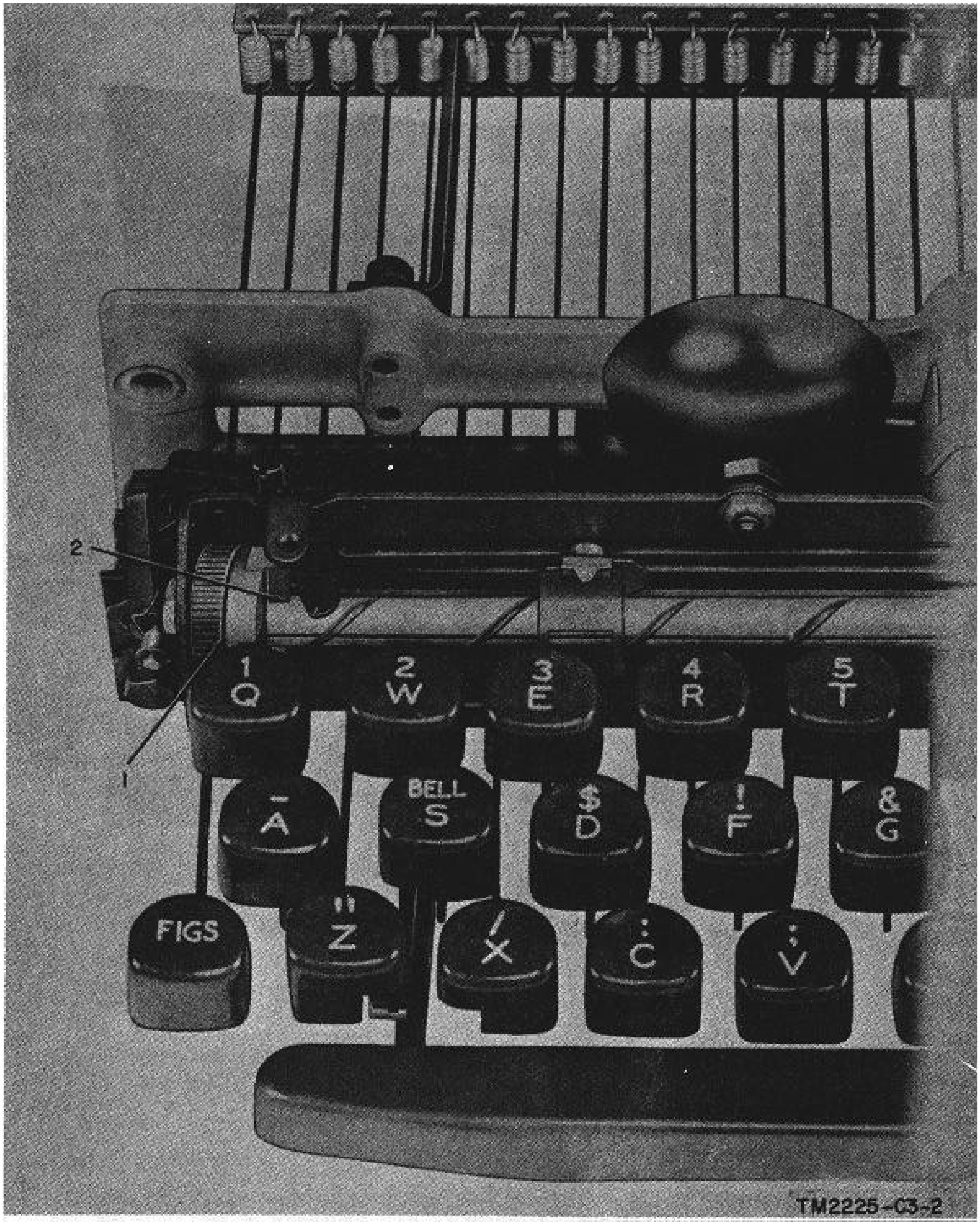

1. Tape cover latch
2. Tape cover hinge

*Figure 3-12. Transmitter-distributor, tape cover lubrication points.*



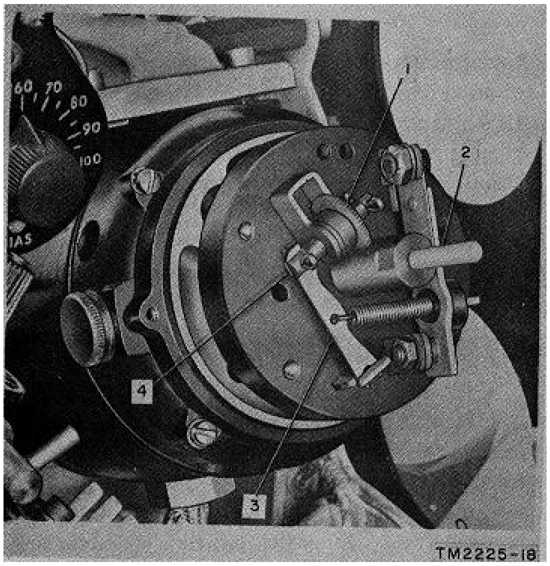

1 Indicator return spring (TT-76/GGC and TT-76A/GGC)
2 Return latch
3 Key levers
4 Indicator carriage
5 Line indicator drive shaft
6 Cam follower
7 Ratcher pawl
8 Ratchet wheel
9 Ratchet wheel detent
10 Function blocking bar
11 Front key lever guide
12 Space bar arm assembly pivots
13 Middle key lever guide
14 Code bar guide studs

*Figure 3-13. Front view of keyboard-transmitter, showing lubrication points.*



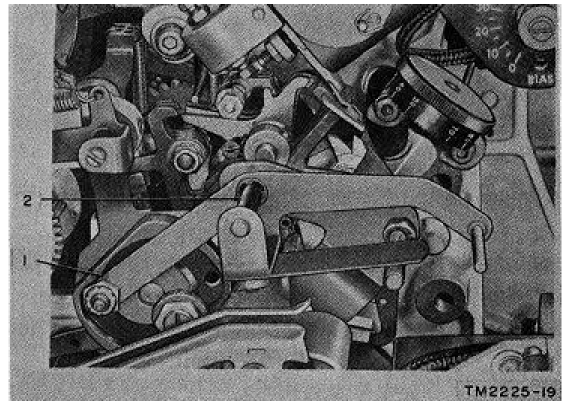

1 Line indicator drive shaft antibounce plate
2 Indicator drive shaft (key slot)

*Figure 3-14. Left side of keyboard-transmitter, showing additional lubrication points (TT-76B/GGC and subsequent models).*



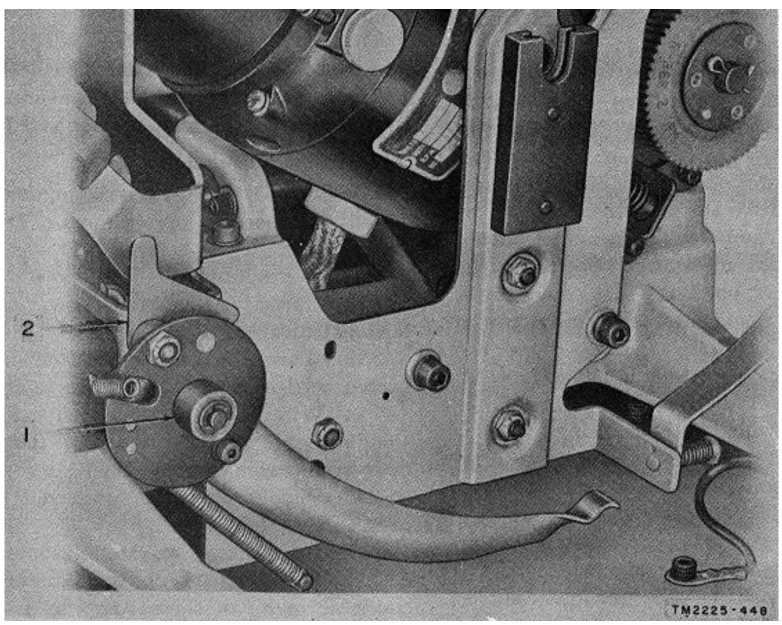

1 Motor governor adjustment gear
2 Governor worm
3 Governor adjustment lever
4 Governor adjustment screw

*Figure 3-15. Motor governor, showing lubrication points.*




1 Tape puller arm roller
2 Tape puller arm pivot stud

*Figure 3-16. Tape puller, showing lubrication points (TT-76A/GGC and all subsequent models)*




1 Alarm lever 2 Lever latch

*Figure 3-17. Tape-alarm lever, showing lubrication points (TT-76A/GGC and all subsequent models).*

## SECTION IV. TROUBLESHOOTING

### 3-13. General

This section includes information that will help in locating and correcting faults in Tele-typewriter Reperforator-Transmitter TT-76(*)/GGC and TT-699(*)/GGC. Although the instructions do not cover every possible trouble, the recommended troubleshooting procedures present a systematic approach which normally will result in the location of any trouble. The troubleshooting chart (par 3-20) lists the symptoms, causes, and corrective actions for most common troubles.

*a. Knowledge Requirements.* The troubleshooter must have a thorough understanding of how the reperforator, keyboard-transmitter, and transmitter-distributor circuits and mechanisms operate. The symptoms of many operating failures often indicate the location of the fault to personnel who thoroughly understand the operation of the mechanisms. Faulty operation can be caused by wear, damage, or maladjustment of any of the large number of parts. The troubleshooter must be able to determine quickly which part is affected, whether the trouble is electrical or mechanical, and the exact cause.

*b. Sectionalizing Trouble.* Sectionalizing trouble in this reperforator-transmitter means determining whether the trouble is caused by a fault in the mechanical assemblies, or a fault in the circuits of the components. To determine whether a trouble is electrical or mechanical, disconnect all power from the reperforator-transmitter and check the selector magnet armature movement manually. The armature should not bind and should move freely between the marking and spacing positions. Plug the power cord into a power outlet, place the POWER switch and the MOTOR switch to ON. Place the SELECTOR switch in position 3 LOCAL REPUNCH. Under these conditions, the motor should be electrically held in the marking position, and the selector, printing, and punching mechanisms should remain stationary (run closed).

(1) *Electrical trouble.* Under the above conditions, if the armature is not held electrically to the marking position, the trouble may be assumed to be electrical. As the motor rotates, the reperforator-transmitter runs open (mechanisms operate continuously). Manually operate the armature to the marking position. If this action causes the reperforator mechanisms to stop operating, the trouble is definitely electrical. However, if the mechanisms continue operating with the armature held in the marking position, the reperforator may have both electrical and mechanical faults. Many of the common electrical troubles and the corrective action for each are included in the troubleshooting chart (para, 3-20).

(2) *Mechanical trouble.* If the armature is electrically held to the marking position under the test conditions described above, and the reperforator-transmitter runs open, the trouble may be assumed to be mechanical. Not all mechanical troubles may be sectionalized by this method. Examples of this type are failure of the tape feed mechanism and the ribbon mechanism. Normally, this type of trouble is obviously mechanical and the above tests are not necessary. Refer to the troubleshooting chart for the normal symptoms and corrective actions for this type of trouble.

(3) *Localizing trouble.* After the trouble has been tentatively identified as electrical or mechanical, the next step is to localize the trouble (trace it to a particular part in the circuitry or mechanisms). Localizing electrical and mechanical troubles is described in paragraphs 3-17 and 3-18.

### 3-14. Visual Inspection

*a.* Failure of equipment to operate properly usually is caused by one or more of the following visible faults:

(1) Improperly connected power cord.
(2) Burned-out fuse in power supply and terminal unit.
(3) Worn, broken, burned-out, or disconnected cord or plug.
(4) Wires broken by excessive vibration.
(5) Loose ground connection (particularly in dc system using simplex line).
(6) Visibly worn or damaged mechanical part.

*b*. When failure or troublesome operation occurs and the cause is not immediately apparent, check as many of these items as is practicable before starting a detailed examination. If possible, obtain information from the operator of the equipment regarding the performance at the time trouble occurred.

*c.* Visually inspect as much of the line system as possible for obvious trouble.

### 3-15. Sectionalizing Trouble

When the cause of trouble cannot be found by simple visual inspection (para 3-14), follow the procedure outlined in the equipment performance checklist (para. 3-19). In this list it is assumed that the teletypewriter is connected to a signal line or to the local test circuit (para. 3-16), that a good fuse is inserted properly in the fuse holder, and that the teletypewriter is loaded properly with paper tape. Perform the steps in the order they are listed. If the trouble cannot be found by means of the equipment performance checklist, field maintenance is required.

### 3-16. Local Test Arrangement

When a trouble exists and cannot readily be located in associated teletypewriters, or in some part of the line circuit between stations by visual inspection, place the SELECTOR switch in the LOCAL REPUNCH position. This connects the teletypewriter transmitter contacts in series with the selector magnet and a local dc supply. The reperforator of the local machine now can be operated with signals received directly from the keyboard-transmitter or transmitter-distributor. Perform the steps outlined in the equipment performance checklist (para 3-19). If the trouble no longer is evident, look for it in the line circuit or at the distant teletypewriter.

### 3-17. Localizing Electrical Troubles TT-76(*)/GGC

Many electrical troubles may be located visually. Examples of this type of trouble are burned-out resistors, a wire broken loose from a connection point, and visible arcing in the circuit. Others require the methodical testing of each circuit as a whole, and the testing of individual components in each circuit. Normally, certain routine preliminary tests are made before detailed testing of any individual circuits. Be sure that the power cord plug is pressed firmly into the power outlet and that the SELECTOR switch is positioned for the type of operation required. If the motor fails to operate, or the copy light fails to light, check the fuse in the power supply and terminal unit. Check the power at the power outlet also, because the power circuit may have failed. If the motor operates properly and trouble is encountered in all three positions of the SELECTOR switch, place the SELECTOR switch in position 3 and check the LOCAL REPUNCH circuit (figs. 2-59 and 2-60) as described in b(l) and (2) below. If trouble is encountered only in position 1 or 2, check the circuits associated with that particular switch position as described in a or b below.

*a. Ohmmeter Method.* The ohmmeter is used to determine whether an open is present in a circuit and to locate the exact component that contains the open. Multimeter TS-297/U, or any similar test set may be used for this test. Arrange the test set to measure resistance (ohms), because this test is actually a resistance test of a circuit or component of a circuit in the following steps.

**Caution: Disconnect all power from the reperforator-transmitter before making any continuity tests. Failure to do so will damage the meter.**

(1) To check the continuity of an entire circuit, arrange the meter in series in the circuit by placing the test leads at appropriate points. Isolate the circuit under test to cause the testing current to flow through the desired circuit only. Isolation is important because adjacent circuits in parallel with a circuit under test can result in a false reading of apparent continuity in a circuit which actually is open.

(2) When it has been established definitely that a circuit contains an open (shown as infinite resistance on the meter), the open may be traced to a specific portion of the circuit by placing the meter in series with half the circuit or some other convenient subdivision. If the meter shows continuity in this portion, check the remaining portions to localize the trouble to a particular portion of the circuit. With one meter lead placed at one side of the portion containing the open, trace the open to a specific circuit component, or connection point by moving the other lead from point to point through the circuit until the meter reading shows a loss of continuity (infinite resistance).

b. *Voltage Drop Method*. The voltage drop method of determining the location of a short or open in an electrical circuit requires that the normal power supply to the circuit under test be operative. Before attempting to check a circuit by this method, the maintenance man should make a detailed analysis of the circuit. The circuit should be drawn out in simplified form and the voltage at each point in the circuit computed by means of Ohm's law. When meter readings are taken on the actual working circuit, any variations in voltage between the actual and the computed values will give an indication of the type of trouble (a short or open) present in the circuit. To get a voltage drop across a resistor or coil, voltage, current, and resistance must be present in the circuit. When current flows through a resistor or coil in a dc circuit, a voltage equal to the current multiplied by the dc resistance of the component is expended (dropped). If the circuit is open, no current will flow and no voltage drops will be found across any of the resistive elements in the circuit under test. If there is a short across a resistive element in a do circuit, current will flow because a complete electrical path exists through the circuit. No voltage drop, however, will be found across the shorted element, and the voltage drops across the other resistors will be higher than computed during the initial circuit analysis. To check the LOCAL REPUNCH circuit for a short or open, follow the procedure given in (1) and (2) below:

(1) *Open circuit.* Set the voltmeter to read 400 volts dc. With the power connected to the TT-76 (*) /GGC and the POWER switch in the ON position, place the meter leads across the output terminals of the selenium rectifier. The meter should indicate approximately 120 volts dc. Leave one meter lead on the negative (-) terminal of the rectifier and move the other lead point-to-point around the circuit until the voltage reading is lost. The open will be found between the last point a reading was present and the first point a reading was not present. To verify the results, place the meter lead on the positive (+) terminal of the rectifier and check the circuit point-to-point in the opposite direction.

(2) *Short circuit.* Set the voltmeter to read 400 volts dc. With the power connected to the TT-76(*) /GGC and the POWER switch in the ON position, place the meter leads across the output terminals of the selenium rectifier. The meter should indicate approximately 120 volts dc. Leave one meter lead on the negative (-) terminal of the rectifier and proceed to check the circuit point-to-point. A short is indicated when a coil or resistor fails to produce a voltage drop. To verify the results, place the meter lead on the positive (+) terminal of the rectifier

and check the circuit point-to-point in the opposite direction.

*c. Capacitor Test.* Capacitors may cause circuit troubles by developing internal shorts, opens, or leaks. To test a capacitor, short the capacitor leads or terminals first, to remove any existing charge. Arrange the meter to read ohms (using the highest scale) and touch the capacitor terminals with the meter leads.

**Caution. Be absolutely sure to remove any existing charge from a capacitor before testing. Failure to do so may result in severe electrical shock.**

(1) A good capacitor causes the needle to move up the scale rapidly and slowly return to the infinity mark (maximum resistance)

(2) Open capacitor will not cause the meter to move from the maximum resistance mark

(3) A capacitor with an internal short will cause a meter reading of constant value between zero and infinity, depending on the resistance of the short.

**3-17.1. Localizing Electrical Troubles TT-699(*)/GGC**

Reperforator-transmitter TT-699(*)/GGC is equipped with low-level conversion circuits. These circuits are contained in printed circuit board modules. Most electrical troubles are found In the electronic modules or at various electrical contacts in the unit. Troubleshooting is facilitated by various test points. When the trouble occurs in the teletypewriter and the cause is not immediately apparent, obtain as much information as possible from the teletypewriter operator regarding the equipment performance at the time the trouble occurred. Make a visual inspection of the unit to determine if the trouble is caused by loose line or power connections, improperly set switches, erratic motor speed, or improper rangefinder adjustment. To systematically localize the trouble, arrange the reperforator-transmitter to operate in a local test configuration by placing the SELECTOR switch to LOCAL REPUNCH After the trouble has been localized, the checks and tests of individual circuit boards and components outlined in paragraphs *a* through *d* below may be made.

*a. Power Source*. Check to be sure that the voltage for the motor circuit is 105 to 125 volts ac, single phase, 50-60 Hz.

*b. Power Supply Checks.*

(1) Check for 30 +3 vdc across terminals 8(+) and 9(-) of TB-2 on the terminal box assembly.

(2) Make a thorough physical inspection of all electrical components.

(3) Insure all power is turned off. Make resistance checks of the electrical components.

*c. Continuity Testing.* Continuity testing with a multimeter is used to locate a suspected open circuit to or from a module board. In making continuity tests, be sure that parallel current paths are disconnected to make the tests. Check the continuity through the circuit suspected to be faulty by connecting the test leads so that current can go only through the suspected current. Be sure that no other part of the circuit is shunting the circuit being tested If necessary, disconnect certain leads or module board. Check all likely circuits in this manner. If, after checking all possible causes, the fault cannot be located, check the module boards as instructed below.

*d. Module Board Testing.* The easiest method of determining whether a module is the cause of a malfunction is to substitute a good module for a suspected module If substitution is not possible, the following checks can be made to determine the operability of the modules:

(1) *Transmitter module.* With the transmitter contacts operating properly, the transmitter module should supply a ±6-volt pulse output (+6 volts for a mark and -6 volts for a space). The mark and space pulses should have pulse widths of equal time duration. The output of the local transmitter module may be checked by placing an oscilloscope across terminals 3 and 4 of TB-1. Operation of the transmitter contacts may be started for test purposes by running a test tape through the transmitter-distributor, or alternately typing R and Y on the keyboard transmitter.

(2) *Receiver module.* The receiver module receiver ±6-volt mark and space signals. The signals are amplified to 12-volt mark and space signals Check this module as follows:

(*a*) Remove the input from the receiver module by placing the SELECTOR switch to position 1 and disconnecting any input signal lines from terminals 8 and 9 of TB-1.

(*b*) Apply power to the module.

(*c*) Obtain a dc voltmeter and connect it to TP2 and TP3 of the module.

(*d*) Adjust R8 for zero volt.

(*e*) Connect a 6-volt mark or space signal to the input. Check the output between TP3 (output) and TP2 (reference) for a 12 ±2-volt mark or space signal. Compare the mark and space amplitudes to see if they are within 1 volt of each other If necessary, adjust R8 for equal amplitudes.

*(f)* Return the SELECTOR switch to position 3.

*e. Selector Magnet Module.* The selector magnet module receives the ±12-volt mark and space signals from the receiver module and provides an unloaded output (selector magnet disconnected) of±12-volt mark and space signals.

(1) Apply power to the module.

(2) Apply a mark or space input signal to the module.

(3) Selector magnet disconnected. Connect an oscilloscope to TP2 and TP3. The output should be 12 ±2 volts mark and space signals.

(4) Selector magnet connected. Apply either a continuous mark or space to the input. Connect a dc voltmeter between TP2 and TP3. The voltmeter should read a low voltage + or - (depending on the input) under 4 volts.

**NOTE**

The receiver module inverts the polarity of the mark and space signals. Hence the input to the selector magnet driver appears to operate on incorrect polarity mark and space signals.

**CAUTION**

Before testing a capacitor, always place a momentary short circuit across the capacitor terminals to remove any charge present in the capacitor. Be extremely careful when discharging the capacitor, severe electrical shock may be received from a charged capacitor.

*f. Testing Electrolytic Capacitors.* Electrolytic capacitors may cause trouble by being shorted or by leaking. To test, discharge the capacitor with an insulated shorting jumper, then, disconnect one lead and connect the capacitor to an ohm-meter. Use the highest reading scale.

(1) A good capacitor will be indicated by the ohmmeter pointer first moving up the scale rapidly, then returning slowly to the infinity mark.

(2) A capacitor in an open circuit will give a reading of infinite ohms. A shorted capacitor will give a reading of constant value between zero and infinity, depending on the resistance of the short.

**3-18. Localizing Mechanical Troubles**

Most mechanical troubles may be located by a careful examination of the faulty mechanism as it operates while turning the motor manually.

*a.* If the trouble has definitely been established as mechanical, and the code rings are not positioned in accordance with the code group received, the fault is in the selector or transfer mechanism. The impulse recording tram of parts for each code impulse must be examined carefully while turning the motor over manually. If each code impulse is properly recorded in the selector Y-levers check the transfer operation and associated code-ring mechanisms.

*b.* If the pringing mechanism prints the correct character but the punching mechanism does not, the trouble may be located by a careful examination of the punching mechanism while turning the motor shaft over manually.

*c.* If the correct code holes are punched in the paper tape but an incorrect character is printed, the fault is in the character selection and printing mechanism. Examine the operation of this mechanism while rotating the motor manually.

*d*. The symptoms, causes, and corrective actions for additional common mechanical troubles are listed in the troubleshooting chart.

## 3-19. Equipment Performance Checklist

| | Item No | Item | Action or condition | Normal indications | Corrective measures |
|---|---|---|---|---|---|
| PREPARATORY | 1 | Power selector switch | Set to match ac power | None. | None. |
| | 2 | Ground | Check connections. Be sure all power connections are in OFF position while checking. | None. | Establish good connection. |
| | 3 | Power | Power cord plugged in | None. | None. |
| | 4 | POWER switch | In OFF position | None. | None. |
| | 5 | Line connections | Signal cords plugged into provided line facilities for type of service desired | None. | Connect as required. |
| | 6 | Paper tape | Check for adequate supply, be sure that paper tape is positioned correctly through Its guides, under type wheel, and through punch and die assembly | None. | Replenish or adjust paper tape. |
| | 7 | Inking ribbon | In proper position around spools and rollers, and passed through guide slots. | None. | Adjust inking ribbon |
| | 8 | POWER switch | Operate to ON | None. | None. |
| | 9 | LIGHT switch | Operate to ON | Copy light should light | Check lamp and switch |
| EQUIPMENT PERFORMANCE | 10 | MOTOR switch | Operate to ON | Motor starts | Check fuse, check power source connection. Check brushes. |
| | 11 | KEYBOARD switch | Operate to SEND | Transmission possible from keyboard transmitter. | Check switch. |
| | 12 | Motor speed. | Adjust according to instructions in TM 11-5815-238-12. | | |
| | 13 | BIAS potentiometer. | Adjust according to instructions In TM 11-5815-238-12. | | |
| | 14 | Rangefinder. | Adjust according to instructions in TM 11-5815-238-12. | | |
| | 15 | Tape feed (reperforator). | Depress space bar and hold REPEAT key depressed. | Paper tape should feed properly | Check paper tape reel guides. |
| | 16 | END OF LINE IN INDICATOR lamp. | Depress R and Y alternately. | Lamp should light on operation of 66th character | Check lamp and contacts (pars 4-118 or 4-119). |
| | 17 | CAR. RET key. | Depress key | When depressed, END OF LINE IN INDICATOR lamp should extinguish, indicator mechanism should return to zero position. | Check function blocking bar, ratchet pawl, and return spring housing (pars 4-116 and 4-118 or 4-119). For the TT-76B/GGC serial numbers 256 and above and subsequent models. refer to paragraphs 4-113, 4-117 and 4-119. |

| | Item No | Item | Action or condition | Normal indications | Corrective measures |
|---|---|---|---|---|---|
| EQUIPMENT PERFORMANCE | 18 | REPEAT key | Depress and hold any key and the REPEAT key | Selected character should repeat as long as both keys are held depressed | Check REPEAT key lever, repeat lever, and repeater blocking lever (para. 4-103) |
| | 19 | BREAK key | Depress key | Opens signal line | Check key |
| | 20 | Type wheel | Receive test message | Should be projected and restored for each operation and should shift to figures position properly | Check bell crank assemblies and operation of the type wheel drive lever (pars 4-125 and 4-164) |
| | 21 | Inking ribbon feed mechanism | Receive test message | Inking ribbon should feed as every other character is typed | Check inking ribbon in guides and ribbon feed pawl action (pars 4-166-4-171) |
| | 22 | Code and feed punches | Receive test message | Check operation by sending continuous R's and Y's on keyboard-transmitters | Check punch arm, code punch lever and code hole punches (pars 4-150, 4-151, and 4-153) |
| | 23 | Manual tape feed out lever | Move lever to left | Paper tape should feedout, BLANK symbol will print on paper tape | Check transfer lever trip latch, and manual tape feed-out linkage (pars 4-189-4-192) |
| | 24 | Signal bell mechanism | Depress S key with unit in figures shift position | Signal bell should ring | Check signal bell sensing lever, clapper, and bell (pars 4-132, 4-133 and 4-127) |
| | 25 | Back space lever | Operate lever | Paper tape should back space one space for each operation | Check back-space pawl and spring (pars 4-158 and 4-159) |
| | 26 | KEYBOARD switch | Operate to LOCK | No transmission possible from keyboard transmitter | Check switch. |
| | 27 | Transmitter distributor | Test paper tape in position STOP-START lever at START | Transmitter distributor should transmit from tape. | Check tight tape and tape out linkage and power supply (pars 4 219, 4-221, and 4-222) |
| | 28 | Tight tape lever (on transmitter distributor) | Raise lever | Transmitter-distributor should stop | Check tight tape and tape out linkage (pars 4-209 and 4-219) |
| | 29 | Tape out lever | End of message tape passes over tape-out lever | Transmitter distributor should stop | Check tape-out lever tape out linkage and switch (pars 4-209 and 4-219) |
| | 30 | Transmitter module[a] | Transmitter contact assembly operating properly | The transmitter module should supply +6 volts for a space The mark and space pulses should have pulse widths of equal duration Check with oscilloscope across TP3 and TP4 on the transmitter module | Replace with a good transmitter module. |

[a] Applicable to TT-699 (*)/GGC only

| | Item No | Item | Action or condition | Normal indications | Corrective measures |
|---|---|---|---|---|---|
| EQUIPMENT PERFORMANCE | 31 | Receiver module [a] | Receive test message | With ± 6-volt mark and space inputs. outputs across TP3 and TP2 should be ±12 volts | Remove input signal use voltmeter and measure between TP3 and pin E of connector XA1 for +15V at TP3 Measure between TP3 and pin D for 15V at TP3 Adjust R8 on the receive card if necessary to equalize these two voltages. |
| | 32 | Selector magnet module [a] | Receive test message | With ±12 volt mark and space inputs from the receiver module, output should be ± polar signals under 4 volts | Replace with a good selector magnet module |
| | 33 | DC power supply a assembly | Power switch ON | 30 ±1 DC across terminals TP1 (+) and TP2 (-) | Check step-down power transformer and power supply components |
| | 34 | MOTOR switch<br>LIGHT switch | Turn to OFF<br>Turn to OFF | Motor should stop<br>Light should be extinguished | Check action of switch<br>Check switch |
| | 35 | POWER switch | Turn to OFF | Supply of power to power supply and terminal unit Is cut off | Check switch |
| | 36 | | | | |

[a] Applicable to TT-699(*)/GGC only

### 3-20. Troubleshooting Charts

The most common reperforator, transmitter-distributor, and keyboard-transmitter troubles, probable causes, and corrective actions are listed in *a* through *c* below. Both electrical and mechanical troubles are listed, but they are not separated into groups because some faulty conditions may be caused by either type of trouble. Several probable causes are listed for most troubles, but they rarely occur at the same time The troubleshooter must determine by a thorough check of each item which one causes the particular trouble under investigation.

*a. Reperforator Troubleshooting Chart.*

| Symptom | Probable cause | What to do |
|---|---|---|
| Motor fails to start | Power input fuse blown | Replace fuse |
| | Failure of power source | Correct defect or use another power source |
| | Governor spring loose or broken | Repair or replace spring (para 4-74b). |
| | Governor electrical contacts dirty or pitted | Clean, burnish or replace electrical contacts (para 4-74b). |
| | Electrical contact brushes not sealed properly or badly worn | Adjust or replace electrical contact brush (para 4-72 and 4-74b) |
| | Open field or armature winding | Replace motor (para 4-70) |
| | Bind in the shafts or bearings | Locate and correct trouble. In mechanism (para 3-18) |
| | Dirty commutator on motor | Clean commutator (para 4-73) |
| Motor runs but speed is erratic | Governor electrical contacts dirty or pitted | Clean, burnish or replace electrical contacts (para 4-74) |
| | Governor spring broken | Replace spring (para 4-74) |

Applicable to TT-76(*)/ GGC only

| Symptom | Probable cause | What to do |
|---|---|---|
| | Dirty commutator on motor | Clean commutator (para 4-73) |
| Reperforator operates properly but causes clicks and noises in local radio equipment | Table not grounded properly | Ground table |
| | Filter assemblies in motor circuit open | Check filter circuits (para 2-39) |
| Reperforator runs open (mechanism does not stop operating) when line current should be steady marking | Grounding strap from base to cover not connected | Connect grounding straps |
| | Transfer lever trip latch spring broken or missing | Replace transfer lever trip latch spring (para 4-69) |
| | Low line current | Check signal circuit power source and adjustment of lime current control resistor (not part of reperforator) |
| | *Space* instead of *mark* impulses received (polar operation) | Reverse signal line connection |
| | Receive circuit open or shorted | Check receive circuit for continuity or short and repair fault (para 3-17) |
| | Selector magnet armature not holding stop lever | Readjust selector magnet bracket and stop lever (para 4-6, 4-17 and 4-20) |
| | Selector camshaft locking lever spring broken | Replace spring (para 4-63) |
| | Selector camshaft stop plate or locking lever worn or broken | Replace stop plate or lever (para 4-63 or 4-77) |
| | Bias potentiometer not adjusted properly (neutral operation)[a] | Readjust bias potentiometer (para 5-3b and c) |
| | Defective receiver or selector magnet driver module (TT-699(*)/GGC) | Check modules (para 3-17.1d) and replace if necessary |
| Motor operates but reperforator runs closed (does not respond to in coming code signals) | Motor worm gear not rotated by motor | Check for broken or missing motor shaft pin (para 4-71) |
| | Main shaft not rotated by worm gear | Check for broken or missing gear pin on power shaft (para 4-79) |
| | Selector friction clutch failing | Set clutch collar for proper spring tension Tighten clutch fork set screws (para 4-187 or 4-188) |
| | Maladjusted selector camshaft lever eccentric | Adjust eccentric (para 4-182 and 4-183) |
| | Maladjusted selector magnet bracket | Adjust bracket (para 4-124) |
| | Open component in bias circuit[a] | Check bias potentiometer, bias windings of magnet, fixed resistor (para 2-40d) |
| Reperforator prints but range (rangefinder measurement) Is narrow | Line current too high or too low[a] | Readjust line current |
| | Bias potentiometer Improperly set[a] | Readjust bias potentiometer (para 5-3b and c) |
| | Motor speed improper at transmitting teletypewriter | Request transmitting station to make motor speed check |
| | Selector mechanism improperly adjusted | Make complete readjustment of selector mechanism (para 4-143 and para 4-174, 4-189) |
| | Selector magnet drive current too high or too low (TT-699(*)/GGC) | Check for correct output voltage from selector magnet drive module and replace If necessary (para 3-17.1d) |
| Reperforator prints errors or scrambles letters and functions | Rangefinder or bias potentiometer improperly set | Readjust bias potentiometer and rangefinder (para 5-3b and c) |
| | Transfer lever trip latch spring broken or missing | Replace spring (para 4-69) |
| | Excessive crossfire or noise pickup on line | Check line and associated equipment |
| | Selector camshaft friction clutch slipping | Readjust clutch and tighten setscrews or replace worn felt washers (para 4-187 or 4-188 and para 4-77). |

[a] Applicable to TT-76(*)/ GGC only

| Symptom | Probable cause | What to do |
|---|---|---|
| | Dirty, binding, or sticking selector mechanism | Clean and adjust selector mechanism (para 4-143 thru 4-153 and para 4-174 thru 4-189) |
| | Worn or broken Y-or T-levers | Replace defective parts (para 4-62 or 4-63 and para 4-69) |
| | Selector lever spring broken | Replace spring (para 4-63) |
| | Selector magnet or mounting loose | Readjust and tighten mounting screws (para 4-174) |
| Reperforator continued to print the same character or perform the same function although no additional signals are being received | Transfer lever trip latch spring or transfer lever spring broken | Replace broken spring (para 4-69) |
| Certain characters (or functions) will not print | Stop bar sticking | Celan stop bar guide plates and code rings (TM 11-5815-238-12) |
| | Stop bar lever spring broken | Replace spring (para 4-68) |
| Type wheel will not stay in figures shift position | Letters figures shift latch lever spring broken or missing | Replace spring (para 4-65) |
| Type wheel cannot be prevented from returning to figures shift position or is erratic. | Letters stop bar broken | Replace stop bar (par 4-68) |
| | Figures stop bar broken | Replace stop bar (para 4-68) |
| | Figures sensing lever spring broken | Replace spring (para 4-65) |
| Signal bell does not operate. | Clapper bent | Straighten clapper as required to sound bell (para 4-135) |
| | Broken or loose bell sensing lever spring | Replace or attach spring (para 4-65) |
| | Maladjusted bell stop bar adjustable fulcrum in code-ring cage | Adjust fulcrum (para 4-133) |
| Reperforator prints part of characters only. | Type wheel not properly adjusted on type wheel post | Readjust post setting (para 4-163) |
| | Ribbon feed not operating properly | Check ribbon feed |
| | Type wheel hub assembly not aligned with type wheel | Check alignment (pars 4-163) |
| Printing too light. | Print hammer lever not adjusted properly | Adjust print hammer eccentric stop (para 4-161) |
| | Worn ribbon | Replace ribbon |
| Ribbon does not teed or ribbon feed does not reverse. | Ribbon spools not seated correctly | Check seating of spools |
| | Ribbon reversing arm contact plunger spring missing or broken | Replace spring (para 4-53 or 4-54) |
| | Ribbon sensing-lever bent dirty, or broken | Clean and adjust or replace parts as required (para 4-53 or 4-54) |
| Reperforator operates correctly but emits grinding or whining noise | Fouled bearings in motor main shaft. or function shaft. | Replace bearings If necessary (para 4-79 or 4-80, 4-78 and para 4-75 or 4-76) |
| | Motor shaft or main shaft bent | Replace bent shaft (para 4-79 or 4-80 and para 4-78) |
| Tape perforations in properly spaced. | Feed sprocket detent lever not adjusted | Adjust detent leper (para 4-157) |
| Tape breaks | Tape puller mechanism improperly timed. | Adjust tape puller (para 4-135 and 4 136) |
| | Tape reel binding | Remove obstacle binding tape reel |
| Manual tape feed-out does not operate | Loose lever or linkage | Adjust manual tape feed out mechanism (para 4-190 and 4-191) |
| Tape does not feed properly | Feed pawl pivot out of adjustment | Adjust pivot (para 4-156) |

[a]Applicable to TT-76(*)/GGC only.

*b. Transmitter-Distributor Troubleshooting Chart*.

| Symptom | Probable cause | What to do |
|---|---|---|
| Transmitter-distributor camshaft does not rotate | Clutch magnet not energized | Check tape-out linkage adjustment and switch Check clutch magnet circuit (para 4-209 or 2-40c) |
| | Clutch magnet armature does not clear stop lever | Check armature eccentric stud adjustment and magnet cores adjustment (para 4-206 and 4-207). |
| | Friction clutch dry or out of adjust ment | Check friction clutch adjustment and lubricate (para 4-221 or 4-222 and para 13-12d) |
| | Stop-start lever not in START position | Operate lever to correct position |
| | Gray plug disconnected | Connect gray plug. |
| Camshaft rotates but transmitter distributor cannot transmit code signals to the line | Signal circuit shorted | Check circuit connections and the transmitter-distributor signal circuit (para 4-13a(2)). |
| | Line current not furnished by associated equipment | Check current supply |
| | Transmitter contacts dirty or out of adjustment a | Clean contacts and adjust (para 4-208) |
| | Transmitter contact assembly out of adjustment (TT-699(*)/GGC) | |
| | Transmitter contact ball spring weak or broken | Replace spring (para 4-36) |
| Transmitter-distributor transmits garbled copy | Friction clutch dry or out of adjust ment | Check friction clutch adjustment and lubricate (para 4-221 or 4-222 and para 13-12d) |
| | Transmitter contacts dirty or out of adjustment. [a] | Clean contacts and adjust (para 4-208) |
| | Transmitter contact assembly out of adjustment (TT-699(*)/GGC) | Adjust transmitter contact assembly (para 4-208 1) |
| | Transmitter contact bail spring Weak. | Replace spring (para 436). |
| | Transmitter-distributor top cover out of alignment. | Adjust top cover alignment (para 4-220) |
| | Bind In the sensing levers or selectors levers. | Free bind and readjust if necessary (para 4-214). |
| Transmitter-distributor transmits only the blank combination. | Transmitter contacts dirty or out of adjustment. [a] | Clean or adjust contacts (para 4-208) |
| | Transmitter contact assembly out of adjustment (TT-699(*)/GGC) | Adjust transmitter contact assembly (para 4-208.1) |
| | Defective transmitter module ----- | Check transmitter module (para 3-17.1d). |
| | Selector lever comb out of adjustment | Adjust comb (para 4-205). |
| | Code sensing lever spring weak---- | Replace springs (para 4-33). |
| | Code sensing levers binding -------- | Readjust comb to eliminate bind (para 4-205). |
| Transmitter-distributor camshaft rotates continuously. | START-STOP switch open _---------- | Replace switch (para 4-32) |
| | Tape-out linkage out of adjustment | Adjust tape out linkage (para 4-209). |
| | Camshaft stop lever binding -------- | Free bind, readjust selector lever comb if necessary (para 4-205). |
| | Clutch magnet armature spring weak or broken | Replace spring (para 4-37). |
| | Stop lever spring weak or broken | Replace spring (para 4-34). |

[a] Applicable to TT-76(*)/GGC.

| Symptom | Probable cause | What to do |
|---|---|---|
| Tape does not feed properly | Feed tape claw bent, broken or binding. | Repair or replace if necessary (para 4-33). |
| | Tape feed lever spring, or feed claw spring weak. | Replace springs (para 4-33) |
| | Tape feed lever bent out of engagement with the tape feed claw | Straighten tape feed lever and engage It with the tape feed claw (para 4-33 and 4-34) |
| Transmitter-distributor operates properly but causes clicks and noises in local radio equipment when sending. | Electrical noise suppressor shorted open or not grounded properly | Check suppressor; replace if necessary (para 4-37) |
| Cannot send from transmitter-distributor | Short in send circuit -------------- | Check for shorted bare wire beneath transmitter-distributor contact cover. Perform insulation resistance test (para 7-6b(1), (3), (4)) |

*c*. *Keyboard-Transmitter Troubleshooting Chart*.

| Symptom | Probable cause | What to do |
|---|---|---|
| Cannot send from keyboard-transmitter | Black plug disconnected----------- | Connect plug. |
| | Transmitter stationary contacts out of adjustment [a] | Adjust contacts (para 4-100) |
| | Transmitter contact assembly out of adjustment (TT-699(*)/GGC) | Adjust transmitter contact assembly (para 4-208.1) |
| | Defective transmitter module TT-699(*)/GGC | Check transmitter module (para 3-17.1d) |
| | Keyboard-transmitter plug and jack disconnected. | Connect plug and jack (para 4-5) |
| | Transmitter universal bar adjusting screw improperly adjusted. | Readjust universal bar adjusting screw (para 4-103) |
| | Keyboard-transmitter friction clutch dry or out of adjustment | Lubricate and readjust If necessary (para 3-12d and para 4-106 or 4-107) |
| | Cam-stop spring broken or missing | Replace spring (para 4-24 or 4-25) |
| Keyboard-transmitter camshaft rotates continuously | Universal code bar return spring missing or broken. | Replace spring (para 4-19 or 4-20) |
| | Universal bar adjusting screw out of adjustment. | Adjust universal bar adjusting screw (para 4-103) |
| Keyboard-transmitter transmits garbled copy. | Friction clutch dry or out of adjustment | Lubricate and adjust if necessary (para 13-12d and para 4-106 or 4-107) |
| | Transmitter contacts dirty or out of adjustment | Clean contacts and adjust If necessary (para 4-100) |
| | Transmitter contact assembly out of adjustment (TT-699(*)/GGC) | Adjust transmitter contact assembly (para 4-208.1). |
| | Contact ball spring weak ---------- | Replace spring (para 4-16) |
| | Binding sensing levers or selector levers | Free bind |
| | Sensing lever locking ball spring broken or missing | Replace spring (para 4-17) |
| Indicator carnage does not advance to the right. | Ratchet pawl spring broken or missing | Replace spring (para 4-12 or 4-13) |
| | Cam follower spring broken -------- | Replace spring (para 4-12 or 4-13) |
| | Ratchet wheel detent spring broken or missing | Replace spring (para 4-12 or 4-13) |
| Indicator carriage does not return to zero when CAR. RET. key lever is depressed | CAR. RET finger bent or broken | Straighten finger or replace function blocking bar (para 4-12 or 4-13) |

[a] Applies to TT-76(*)/GGC

| | | |
|---|---|---|
| | Carriage return blocking arm improperly adjusted (TT-76B/GGC. serial Nos 256 and above. Order No 13931-PC-58) | Adjust the carriage return blocking arm (para 4-13) |
| | Return latch bracket improperly adjusted (TT-76B/GGC, serial Nos 256 and above. Order No 13931-PC-58) | Adjust the return latch bracket (para 4-117) |
| | Indicator return spring broken | Replace spring (para 4-10 or 4-11) |
| END OF LINE INDICATOR lamp does not light | Indicator drive shaft requires lubrication | Lubricate shaft (para 3-12e) |
| END OF LINE INDICATOR lamp | Replace lamp burned out __ | (para 4-90 or 4-91) |
| | Indicator, lamp switch contacts out of adjustment | Adjust switch contacts (para 4-118 or 4-119) |
| | Short or open in lamp circuit | Locate short or open and correct fault (para 2-39d) |
| End of line signal bell does not ring (TT-76A/GGC) | Indicator carnage roller missing | Replace roller (para 4-100) |
| | Bell clapper bent | Straight clapper (para 4-119) |
| Keyboard-transmitter operates properly but causes clicks and noises In local radio equipment when sending | Filter assembly shorted, open or not properly grounded | Check filter, replace if necessary (para 4-24 and 4-25) |

[a] Applies to TT-76(*)GGC

## SECTION V. SPRING DATA

### 3-21. General

*a*. This section contains data on the coil springs used in Reperforator-Transmitter TT-76(*)/GGC. This information is useful when inspecting or overhauling the equipment to determine which springs must be replaced. It is also useful as a check list when reassembling, adjusting, or troubleshooting, and as a means of identifying springs.

*b.* The charts in paragraphs 3-22 through 3-25 give the dimensional and strength characteristics required of each spring used in the reperforator Each type of spring is illustrated in figures 3-18 through 3-30. The free length is measured between the inside surfaces of the end hooks. If a spring fails to pass its strength check, it should be replaced

## 3-22. Cross-End Spring Data

| Reference No | Name | A Free length (in.) | B Extended length (in.) | Required tension Wire thickness | C Wire thickness (in) | D No of coils | E Diameter (OD) (In) |
|---|---|---|---|---|---|---|---|
| 50678 | Copy retaining arm | 11/16 | 7/8 | 32±4 | .025±.0005 | 17 | .172 |
| 50912 | Reel support latch | ½ | 21/32 | 17 1/2± 1 ½ | .018±.005 | 12 ¾ | .156 |
| 50941 | Key lever | ½ | 5/8 | 20± 2 | .020±.003 | 8 ¾ | .187 |
| 50944 | Repeat blocking lever | 3/8 | 9/16 | 2 1/2± ½ | .010±.0003 | 21 | .125 |
| 52167 | Type wheel reciprocating lever | 23/22 | 13/16 | 33 ± 3 | .033±.0005 | 8 ¼ | .250 |
| 52169 | Letters sensing lever | 13/16 | 1 | 33 to 36 | .022±.0003 | 26 ¼ | .141 |
| 52171 | Figures sensing lever | 7/8 | 1 3/16 | 26 to 30 | .020±.0003 | 32 ¼ | .141 |
| 52172 | Shift cam follower | 1 5/32 | 1 5/16 | 38 to 42 | .026±.0003 | 33 | .162 |
| 52173 | Bell sensing lever | 13/16 | 1 | 24 to 28 | .020±.0003 | 28 | .141 |
| 52602 | Ribbon feed cam follower | 13/16 | 1 | 33 ½ ± 1 ½ | .025±.0003 | 19 | .197 |
| 53123 | Tape cover latch | 7/16 | ½ | 9 to 11 | .018±.0003 | | .156 |
| 53149 | Start-stop lever detent | 25/32 | 7/8 | 20±1 | .020±.0003 | 27 1/4±1 | .156 |
| 53152 | Code sensing lever | 33/64 | 45/64 | 12±1 | .012±.0003 | 29 1/4±1 | .085 |
| 53153 | Tape feed claw | ½ | 21/32 | 2 3/4±3 ¼ | .011±.0003 | 22 1/4±1 | .123 |
| 53974 | Space bar | ½ | 5/8 | 86±9 | .031±.0005 | 5 ¾ | .218 |
| 55009 | Y-lever detent | 7/32 | .342 | 80±5 grams | .008±.0003 | 9 ¾±1 | .083 |

## 3-23. Parallel-End Spring Data

| Reference No | Name | A Free length (in.) | B Extended length (in.) | Required tension Wire thickness | C Wire thickness (in) | D No of coils | E Diameter (OD) (In) |
|---|---|---|---|---|---|---|---|
| 50334 | Governor adjusting | 15/16 | 1 | 32±3 | .023±.0005 | 23 1/2±1 | .156 |
| 50904 | Transfer lever trip latch | 11/16 | 13/16 | 2 1/2±3/4 | .012±.0003 | 33 ¾ | .156 |
| 51136 | Universal code bar return | 11/16 | 1 | 15 to 20 | .009±.0003 | 46 | .150 |
| 51544 | Locking lever latch | 7/8 | 1 1/8 | grams | .015±.0003 | 57 | .125 |
| 51548 | Contact bail | 7/16 | 9/16 | 1 1/2±1/4 | .012±.0003 | 14±1 | .125 |
| 51574 | Sensing lever locking bail | 5/8 | 27/32 | 11±1 | .012±.0003 | 31 | .156 |
| 51575 | Cam-stop lever | 13/16 | 1 3/16 | 2 1/2±1/4 | .016±.0003 | 43 | .156 |
| 52161 | Type wheel bell crank lever | 3/64 | 1 3/8 | 3±1/2 | .025±.0003 | 45±2 | .187 |
| 52163 | Print hammer lever | 7/8 | 1 | 4 3/4±1/4 | .020±.0003 | 16 | .250 |
| 52166 | Detent lever | 7/16 | ½ | 18 to 22 | .012±.0003 | 10 ½ | .156 |
| 52168 | Figures letters lever | 1 ¼ | 1 7/16 | 25±2 | .011±.0003 | 74 | .125 |
| 52192 | Back space pawl | 9/32 | 11/32 | 3 1/2±1/4 | .016±.0003 | 5 | .125 |
| 52193 | Back space lever | 15/32 | 9/16 | 5 ½±1 | .010±.0003 | 11 ¼ | .156 |
| 52212 | Lever latch | 5/8 | ¾ | 10±1 | .018±.0003 | 27 | .156 |
| 52266 | Switch operating lever | 5/8 | 13/16 | 30±4 | .025±.0003 | 15 | .187 |
| 52576 | Alarm lever | 3 13/16 | 4 3/16 | 12±1 | .012±.0003 | 140 | .197 |
| 52603 | Ribbon retainer lever | 5/8 | 1 | 20±2 | .009±.0003 | 27 | .165 |
| 52604 | Ratchet feed detent | 11/16 | 7/8 | 2 1/4 to 2 ¾ | .018±.0003 | 48 ¾ | .125 |
| 53139 | Tape feed out operating arm | 23/32 | 1 1/8 | 1 3/8±1/8 | .018±.0003 | 19±1 | .216 |
| 53140 | Latching lever | 23/32 | 1 | 10±1/4 | .022±.0003 | | .216 |
| 53148 | Latch spring | 9/16 | 5/8 | 8±1/4 | .014±.0003 | | .187 |
| 53154 | Tape feed retracting lever | 15/32 | ¾ | 12 to 14 | .012±.0003 | | .156 |
| 53155 | Clutch magnet armature | 19/32 | 25/32 | 12±1 | .015±.0003 | 12 | .125 |
| 53304 | Clapper arm spring | 27/32 | 1 ¼ | 5±1 | .008±.0003 | 32 ¼ | .187 |
| 53311 | Pawl spring | 3/8 | 17/32 | .9 to 1.1 | .012±.0003 | 34±1 | .120 |
| 53312 | Indicator return latch | 19/32 | ¾ | 3 ¾ to 3 ¾ | .010±.0003 | 20±1 | .141 |
| 53313 | Detent spring | 11/32 | ½ | 2 3/4±1/4 | .018±.0003 | | .125 |
| 53569 | Code-ring locking bail cam | 15/16 | 1 11/32 | 11±1 | .022±.0003 | 12 ¾ | .191 |
| 54948 | Copy retaining arm | 7/16 | 5/8 | 2 lb±4 | | 31±1 | .172 |

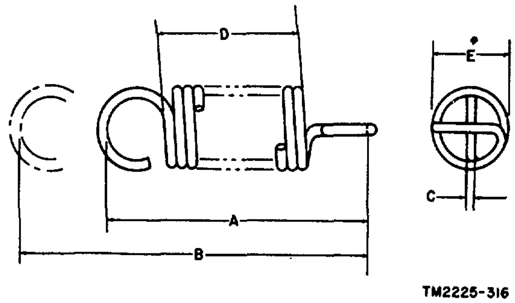



Figure 3-18. Cross-end spring.

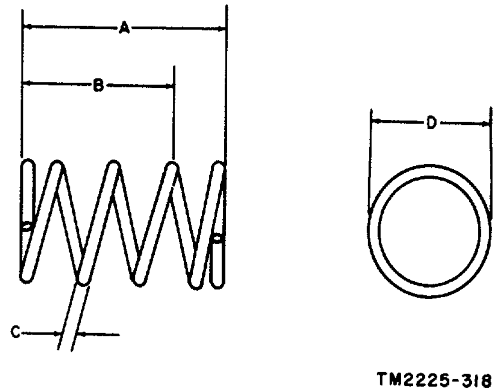



Figure 3-21. Extension spring

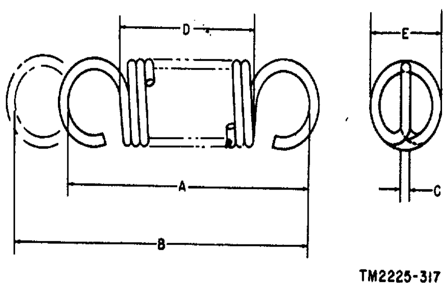



Figure 3-19. Parallel-end spring.

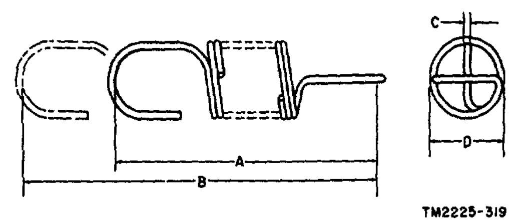



Figure 3-22. Selector lever spring.

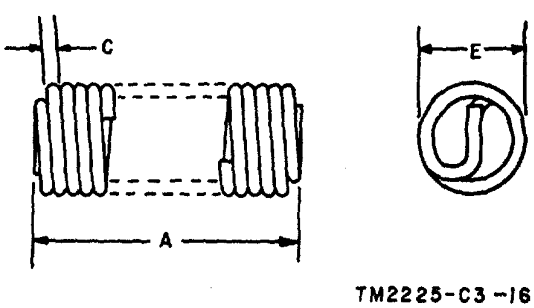



Figure 3-20. Indicator drive shaft torsion spring (TT-76B/GGC only).

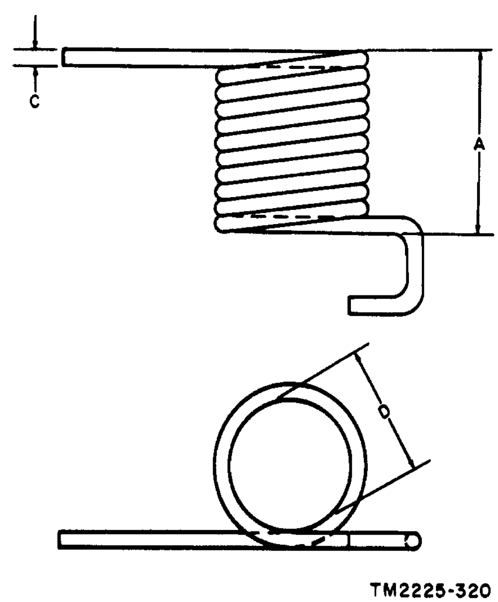



Figure 3-23. Tape retainer spring.

## 3-24. Extension Spring Data

| Reference No | Name | A Free length (in.) | B Extended length (in.) | Required tension Wire thickness | C Wire thickness (in) | D No of coils | E Diameter (OD) (In) |
|---|---|---|---|---|---|---|---|
| 50847 | Friction clutch | 1/2 ± 1/32 | 9/32 | 10 lbs ± 8 | .053±0005 | 4 | .453 ID |
| 50848 | Sliding clutch | 3/4±1/16 | 7/16 | 28 ± 3 | .041±0005 | 5 ½ | .578 ID |
| 50910 | Friction plate | 17/32 | 5/16 | 32 ± 2 | .028±0005 | 6 ½ | .250 ID |
| 50914 | Friction clutch | 13/32 | 9/32 | 6 lbs ± 10 | .049±001 | 4 ½ | .390 ID |
| 51593 | Contact plunger | 5/8±3/64 | 5/16 | 7 ± 1 | .012±0003 | 11 | .125 ID |
| 51855 | Governor adjusting pressure | 5/8±1/32 | .047 | -------------------- | .014±0003 | 6 | .240 OD |
| 52813 | Tape cover | 7/16±1/32 | 9/32 | 28 ± 3 | .018± 0003 | 13 ½ | .125 OD |
| 52940 | Stop bar lever | 37/64±1/64 | .375 | 8 ± 1/2 | .016±0003 | 11 ½ | .183 OD |
| 53256 | Holding clip detent | 17/32±1/32 | 3/8 | 10 ± 1 lb. | .028±0005 | 11 ½ ± 1 | .141 OD |
| 54932 | Friction clutch | 13/32±3/64 | 9/32 | 6 lbs ± 10 | .067±.0001 | 3 ½ | .6875 ID |
| 56091 | Selector magnet cover | 5/16±3/64 | .100 | ------------------- | .012±0003 | 5 | 125 ID |
| 56249 | Friction clutch | 1/2±3/64 | 9/32 | 10 lbs 8 ± 8 | .076±001 | 3 ½ | 891 ID |
| 57203 | Tape cover latch | 1/2 | .281 | 20 ± 2 | .013±0003 | 18 | 086 OD |
| 57391 | Release plunger | 1 | 1/4 | 1 ¼ ± 1/4 | .010 | 12 ½ | .203 ID |

## 3-25. Special Spring Data

| Fig. No. | Reference No | Name | A Free length (in.) | B Extended length (in.) | Required tension Wire thickness | C Wire thickness (in) | D No of coils | E Diameter (OD) (In) |
|---|---|---|---|---|---|---|---|---|
| 3-20 | 60021 | Indicator drive shaft | 7 1/4<br>+.000<br>- 1/2 | ----------- | --------------------- | .0146± .0003 | 461± 20 | .140± 005 OD |
| 3-22 | 50902 | Selector lever | 1<br>3/8 | 1 1/4 | 8±1 | .012± .0003 | 55 max | .085 OD |
| 3-23 | 52422 | Tape retainer | | ------------ | --------------------- | .033± .0005 | 10 | .265 ID |
| 3-24 | 52551 | Copy holder clip | ½ ± 1/32<br>9/16 | ------------ | --------------------- | .0459± .0005 | 10 | .172 ID |
| 3-25 | 52579 | Jack guard door | | ------------ | --------------------- | .016± .0003 | ---------- | .109 OD |
| 3-26 | 53156 | Tape out lever | 1 1/16 ± 1/16<br>1/8±1/32 | ------------ | -------------------- | .0168± .0003 | 52 | .188 OD |
| 3-27 | 53289 | Cam follower | 5/32 | ------------ | 5± ½ | .0220± .0005 | 3 | 7/16 ID |
| 3-28 | 53586 | Blocking bar | | ------------ | --------------------- | .016 | 9 1/8 | .140 ID |
| 3-29 | 53888 | Cover, R H | ¼ | ------------ | --------------------- | .0625± .0005 | 1 | ---------- |
| 3-30 | 53889 | Cover, L H | ¼ | ------------ | -------------------- | .0625± .0005 | 1 | ---------- |
| 3-31 | 55674 | Transfer lever | 1 3/32<br>5/32 | 1 1/4 | 3 ¾ lbs ± 4 | .035± .0005 | 14 | 9/32 OD |
| 3-32 | 56324 | Tape cover | | ------------ | --------------------- | .024± .0003 | 6 | 5/32 ID |
| 3-33 | 56396 | Tape guide lever | ---------- | ------------ | 35 grams ± 10 grams | .012± .0005 | 3 | .258 ID |

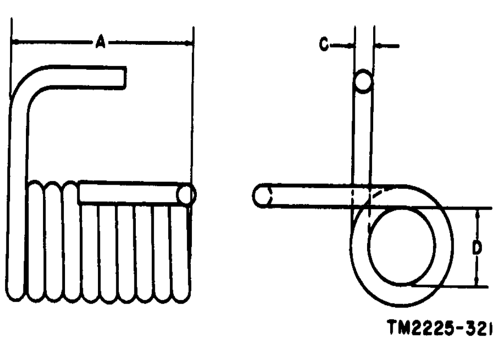



*Figure 3-24. Copy holder clip spring.*

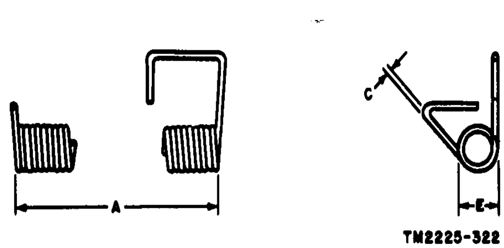



*Figure 3-25. Jack guard door spring.*

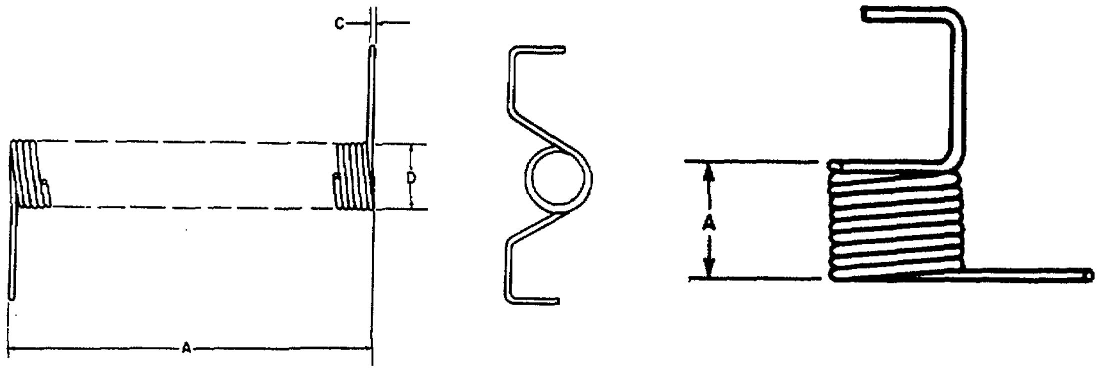



*Figure 3-26. Tape-out lever spring.*

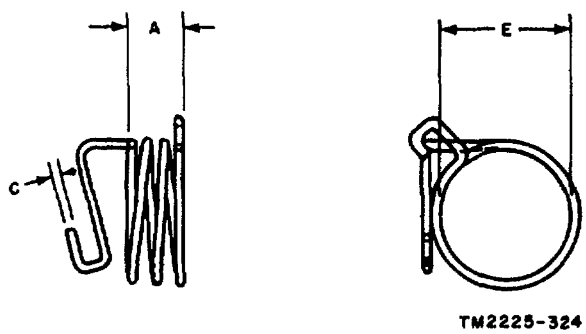



*Figure 3-27. Cam follower spring.*

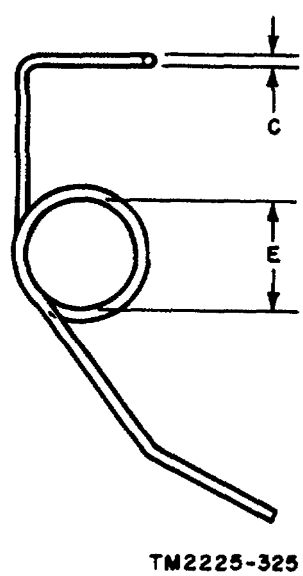



*Figure 3-28. Blocking bar spring.*

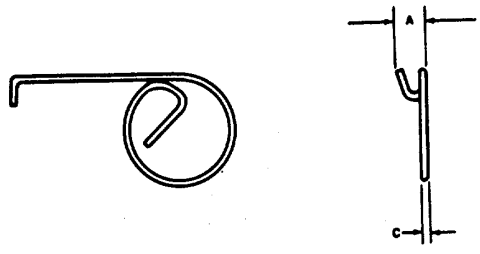



Figure 3-29. Cover Spring, Right Hand.

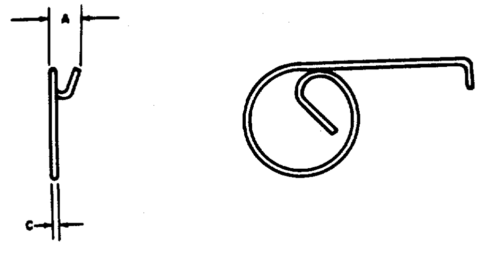



Figure 3-30. Cover Spring, Left Hand.

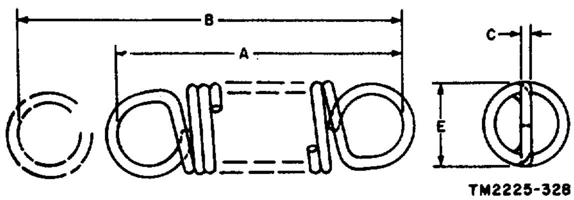



Figure 3-31. Transfer Lever Spring.

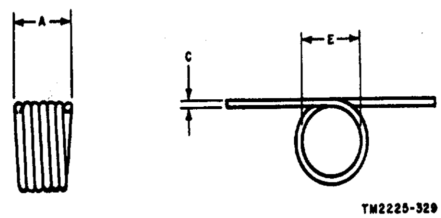



Figure 3-32. Tape Cover Spring.

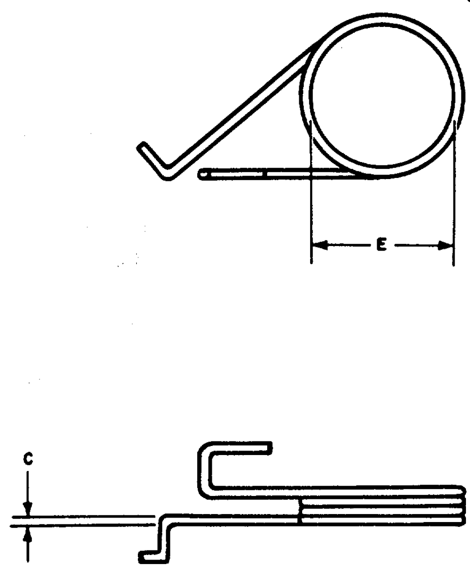



Figure 3-33. Tape Guide Lever Spring.

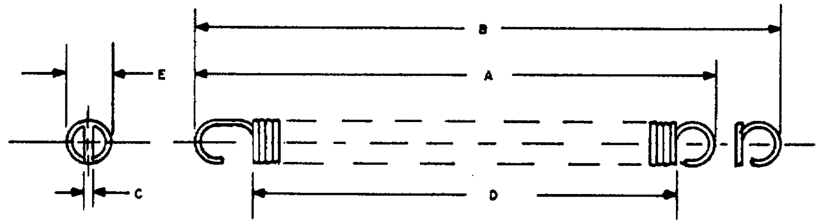



Figure 3-34. Tape Reel Latch Spring.

# CHAPTER 4
# REPAIR AND ADJUSTMENT

## SECTION I. REMOVAL AND REPLACEMENT OF REPERFORATOR-TRANSMITTER COMPONENTS

### 4-1. General

*a.* This section describes replacement procedures required to overhaul completely a defective or inoperative Teletypewriter Reperforator-Transmitter TT-76 (*)/GGC. Procedure includes replacement of all parts of the TT-76 (*)/GGC except those parts for which the procedure is obviously simple.

*b.* Except in extreme emergency, all repairs should be made by personnel thoroughly trained in teletypewriter maintenance. It is as important to know what not to do as well as what to do. Equipment operating with minor faults may fall completely as the result of efforts by inexperienced personnel to correct apparently simple defects.

*c.* Follow the inspection, cleaning, and lubricating instructions in paragraphs 3-3 through 3-12. When repairs are made, the reperforator-transmitter should be completely readjusted in accordance with paragraphs 4-97 through 4-222.

### 4-2. General Disassembly Procedure

*a. Preparation for Disassembly*. Follow the procedures given in (1) through (3) below before disassembling the reperforator-transmitter.

(1) Arrange a clean place on a bench or table to work. Make certain that dust or dirt will not fall or be blown into the mechanism while it is disassembled.

(2) Obtain several small, clean cardboard, wood, or metal containers to store removed parts.

(3) Arrange the necessary tools and materials so that they will be readily accessible during the progress of the repair work.

*b. Disassembly Procedure.*

(1) Disconnect the power and signal line connections.

(2) Remove the dust cover.

(3) Remove the inking ribbon and paper tape roll.

(4) Proceed to disassemble the various parts and assemblies; use the correct tool for each specific operation. Do not disassemble the reperforator-transmitter or its assemblies beyond the point necessary to thoroughly inspect and clean the mechanism, and to repair and replace defective parts.

(5) When small parts are disassembled, place them in a container and tag them to identify their point of disassembly. Vary the sequence of disassembly to meet any particular situation.

(6) While the equipment is disassembled for checking and repair, replace any parts that are likely to cause trouble before the next scheduled overhaul of the TT-76(*)/GGC.

### 4-3. General Reassembly Procedures

All parts, subassemblies, and units should be reassembled in accordance with the following provisions:

*a.* Replace all worn or broken parts that may cause malfunctioning of the reperforator-transmitter and adjust them in accordance with a.

the directions in paragraphs 4-97 through 4-222.

*b.* Assemble replaced parts and associated parts. Tighten all screws, nuts, and bolts carefully, but not excessively. Many of the threaded holes are tapped into aluminum or magnesium alloy castings. These threads may be stripped by the use of too much force. To prevent binding when installing steel screws in aluminum or magnesium alloy castings, it is important that they be treated with antiseize compound, stock No. CE-52-2724.500.080 before installation.

*c.* Be careful to replace the correct springs in the friction clutches. Although the springs are similar in appearance, they are not identical. Improper assembly could cause faulty operation and premature failure of the clutches. (Refer to the spring data charts, pars. 3-21 through 3-25.)

*d.* When parts are secured on shafts by setscrews, remove the setscrews and align the tapped holes with the flats on shafts.

*e*. Support parts into which taper pins are being driven with wooden or other soft supports to prevent bending or distortion.

*f.* If the locking edges of lockwashers are rounded, install new lockwashers.

*g.* Replace screws or nuts that have damaged heads or threads.

*h.* Some bent and distorted parts may be restored to shape and re-used provided no cracks result from the straightening process.

**4-4. Removal and Replacement of Reperforator-Transmitter Chassis**

*a. Removal.*

(1) On the TT-76/GGC, remove the four machine screws (1, fig. 4-73) and lockwashers (2) that hold the reperforator frame to the mounting table or to the alternate wooden mounting base and metal base plate.

(2) On the TT-76A/GGC, and later models of the equipment, disconnect the power cable plug from the receptacle connector on the mounting base at the rear of the transmitter-distributor. Disconnect the transmitter-distributor plug from the receptacle connector on the mounting base at the rear of the transmitter-distributor. Disconnect the tape reel plug and the keyboard-transmitter plug from the receptacle connector at the right of the keyboard-transmitter. Remove the four machine screws (1, fig. 4-74) and lockwashers (2) that hold the reperforator frame to the mounting base.

*Note.* On TT-76A/GGC, serial numbers 525 and above on Order No. 49651-Phila-56 and subsequent procurements, remove the bearing cap (fig. 4-63) that secures the power shaft to the reperforator frame.

(3) Carefully lift the reperforator-transmitter clear of the mounting base. Do not hold onto the cable, tubing, levers, or other parts that might be easily damaged when lifting the reperforator-transmitter chassis from its base.

*b. Replacement*. Replace the reperforator transmitter on the mounting base by reversing the procedures outlined in a above.

**4-5. Removal and Replacement of Keyboard-Transmitter**

*a. Removal.*

(1) On the TT-76/GGC, remove the two machine screws (1, fig. 4-71) and lockwashers (2) that hold the keyboard guard to the mounting base.

(2) On the TT-76A/GGC and later models, tilt the keyboard guard away from the reperforator.

(3) Remove the keyboard transmitter plug.

(4) Remove the two machine screws (1, fig. 4-16) and lockwashers (2), and flat washers (3) that hold the keyboard casting to the reperforator frame.

(5) Pull the keyboard-transmitter to the front and lift it away from the reperforator.

*b. Replacement.*

(1) Position the keyboard-transmitter on the reperforator frame. Engage the keyboard-transmitter friction clutch yoke (2, fig. 4-10) with the friction

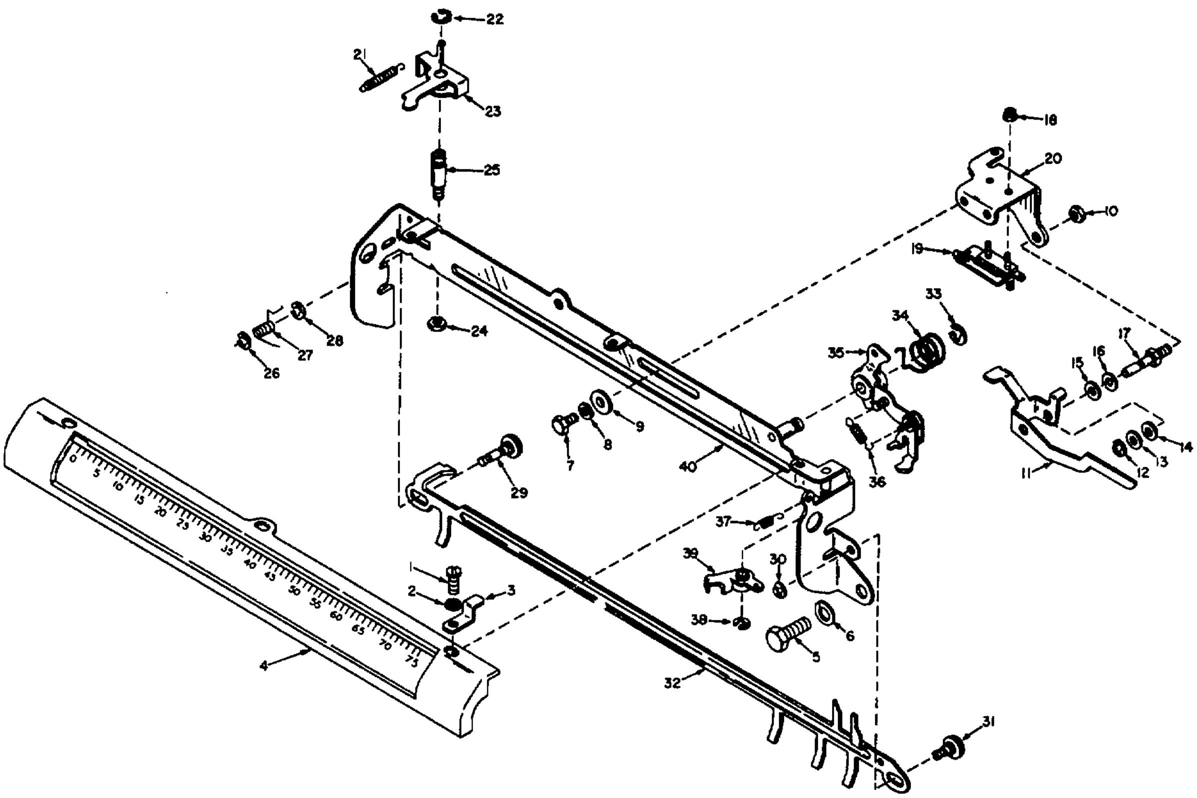
clutch driver plate on the keyboard- transmitter drive shaft.

(2) Secure the keyboard-transmitter to the reperforator frame with the two machine screws and lockwashers.

(3) Connect the keyboard transmitter plug.

(4) On the TT-76/GGC, secure the keyboard guard with the two machine screws (1, fig. 4-71) and lockwashers (2).

(5) On the TT-76A/GGC and later models, tilt the keyboard guard to its locked position.



TM2225-242

1 Machine screw, 10393
2 Lockwasher, 10429
3 Follower stop, 53896
4 Indicator cover, 53251
5 Machine screw, 10397
6 Lockwasher, 10431
7 Machine screw, 10303
8 Lockwasher, 10429
9 Flat washer, 10450
10 Self-locking hexagonal nut, 10500
11 Switch actuating arm, 53228
12 Retainer ring, 10960
13 Flat washer, 10463
14 Flat washer, 10463
15 Flat washer, 10463
16 Flat washer, 10463
17 Switch actuating arm stud, 53224
18 Self-locking hexagonal nut, 10535
19 Indicator lamp switch, 53348A
20 Indicator lamp switch bracket, 53219
21 Return latch spring, 53312
22 Retainer ring, 10949
23 Return latch, 53232
24 Self-locking hexagonal nut, 10500
25 Return latch stud, 53233
26 Retainer ring, 10969
27 Blocking bar spring, 53586
28 Retainer ring, 10969
29 Blocking bar retaining stud, 53587
30 Retainer ring, 10977
31 Blocking bar retaining stud, 53249
32 Function blocking bar, 53229
33 Retainer ring, 10949
34 Cam follower spring, 53289
35 Cam follower, 57193A
36 Ratchet pawl spring, 53283
37 Detent spring, 53313
38 Retainer ring, 10969
39 Detent, 53240A
40 Indicator frame, 53215A

*Figure 4-1. Indicator frame assembly, exploded view (TT-76/GGC).*

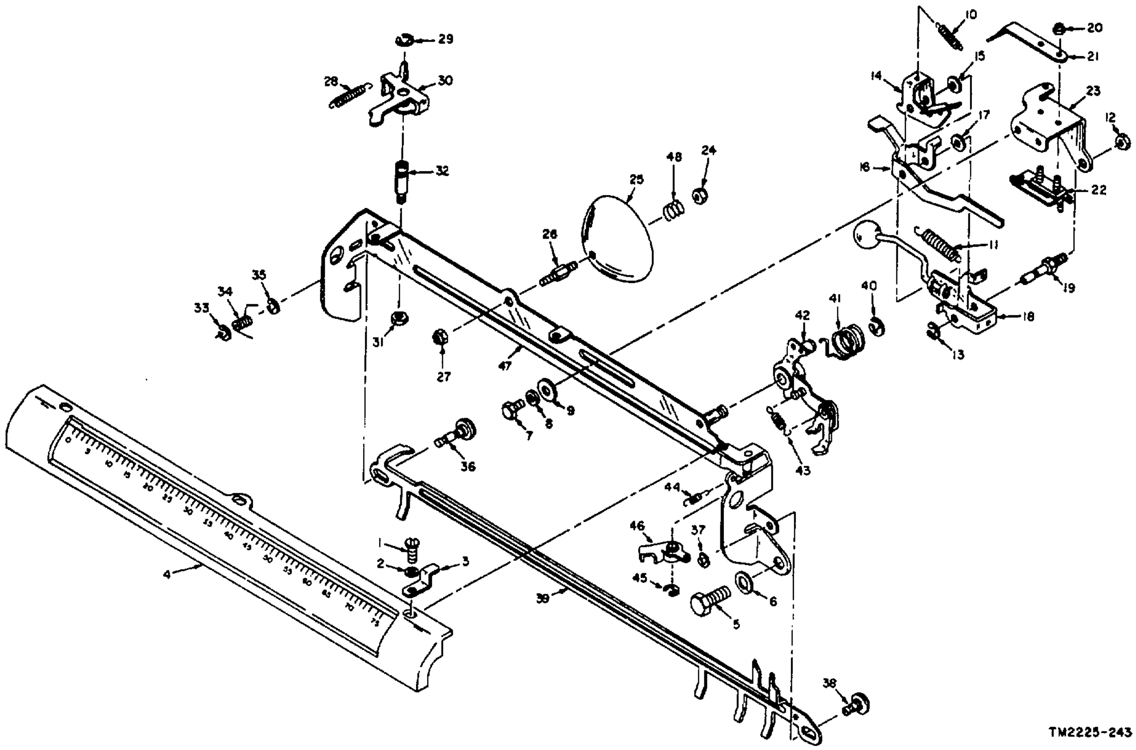
**4-6. Removal and Replacement of Indicator Assembly (TT-76/GGC)**

(fig. 4-1).

*a. Removal.*

(1) Unsolder and disconnect the two wires that connect the cable to the indicator lamp switch (19).

(2) Remove the three machine screws (1) and lockwashers (2) that hold the indicator cover (4) to the indicator




1 Machine screw, 10393
2 Lockwasher, 10429
3 Follower stop, 53896
4 Indicator cover, 53251
5 Machine screw, 10397
6 Lockwasher, 10431
7 Machine screw, 10303
8 Lockwasher, 10429
9 Flat washer, 10450
10 Pawl spring, 53311
11 Clapper arm spring, 53304
12 Self-locking hexagonal nut, 10500
13 Retainer ring, 10960
14 Clapper actuating pawl, 53223
15 Flat washer, 50319
16 Switch actuating arm, 53228
17 Flat washer, 50319
18 Clapper arm, 53243A
19 Switch actuating arm stud, 53224
20 Self-locking hexagonal nut, 10535
21 Clapper stop, 53184
22 Indicator lamp switch, 53348A
23 Indicator lamp switch bracket, 53219
24 Self-locking hexagonal nut, 10500
25 Indicator bell, 51403
26 Stud, 57264
27 Self-locking hexagonal nut, 10500
28 Return latch spring, 53312
29 Retainer ring, 10949
30 Return latch, 53232
31 Self-locking hexagonal nut, 10500
32 Return latch stud, 53233
33 Retainer ring, 10969
34 Blocking bar spring, 53586
35 Retainer ring, 10969
36 Blocking bar retaining stud, 53587
37 Retainer ring, 10977
38 Blocking bar retaining stud, 53249
39 Function blocking bar, 53229
40 Retainer ring, 10949
41 Cam follower spring, 59289
42 Cam follower, 57193A
43 Ratchet pawl spring, 53313
44 Detent spring, 53313
45 Retainer ring, 10969
46 Detent, 53240A
47 Indicator frame, 53215A
48 Spring, 57263

*Note.* **A flat washer 10458 is located between items 2 and 3.**

*Figure 4-2. Indicator frame assembly, exploded view (TT-76A/GGC below serial number 302 on order No.* 49651-Phila-56).

frame (40); remove the follower stop (3) and the indicator cover (4).

(3) Remove the two machine screws (5) and lockwashers (6) that hold the lower portion of the indicator frame (40) to the code bar guide studs.

(4) Remove the indicator assembly by carefully lifting it and moving it slightly to the right to clear the key levers.

*b. Replacement.*

(1) Replace the indicator assembly by reversing the procedures outlined in *a* above; make certain that the fingers on the function blocking bar (32) line up to the right and extend beneath their respective key levers. Replace the follower stop (3) on the right-handed side of the indicator cover and fasten in place with the machine screw (1) and lockwasher (2).

(2) Adjust the indicator assembly as described in paragraphs 4-108 and 4-120.

**4-7. Removal and Replacement of Indicator Assembly (TT-76A/GGC)**
(fig. 4-2 or 4-3)

*a. Removal.*

(1) Unsolder and disconnect the two wires which connect the cable to the indicator lamp switches (22).

(2) Remove the three machine screws (1) and lockwashers (2) that hold the follower stop (3) and the indicator cover (4) to the indicator frame (47); remove the follower stop (3) and the indicator cover (4).

(3) Remove the two machine screws (5) and lockwashers (6) that hold the lower portion of the indicator frame (47) to the Code bar guide studs.

(4) Remove the indicator assembly by carefully lifting it and moving it slightly to the right to clear the key levers.

*b. Replacement.*

(1) Replace the indicator assembly by reversing the procedures outlined in a above; make certain that the fingers on the function blocking bar (39) line up to the right and extend beneath their respective key levers. Replace the follower stop (3) on the right-handed side of the indicator cover and fasten in place with the machine screw (1) and lockwasher (2).

(2) Adjust the indicator assembly as described in paragraphs 4-108 and 4-120.

**4-8. Removal and Replacement of Indicator Frame Assembly (TT-76B/GGC Serial Nos. 255 and Below, Order No. 13931-PC-58)**
(fig. 4-4)

*a. Removal.*

(1) Unsolder and disconnect the two wires which connect the cable to the indicator lamp switches (23).

(2) Remove the three machine screws (1), lockwashers (2), and flat washers (3) that hold the follower stop (4) and the indicator cover (5) to the indicator frame (52); remove the follower stop (4) and the indicator cover (5).

(3) Remove the two machine screws (6) and lockwashers (7) that hold the lower portion of the indicator frame (52) to the code bar guide studs.

(4) Remove the indicator assembly by carefully lifting it and moving it slightly to the right to clear the key levers.

*b. Replacement.*

(1) Replace the indicator assembly by reversing the procedures outlined in a above; make certain that the fingers on the function blocking bar (44) line up to the right and extend beneath their respective key levers Replace the follower stop (4) on the right hand side of the indicator cover and fasten in place with the machine

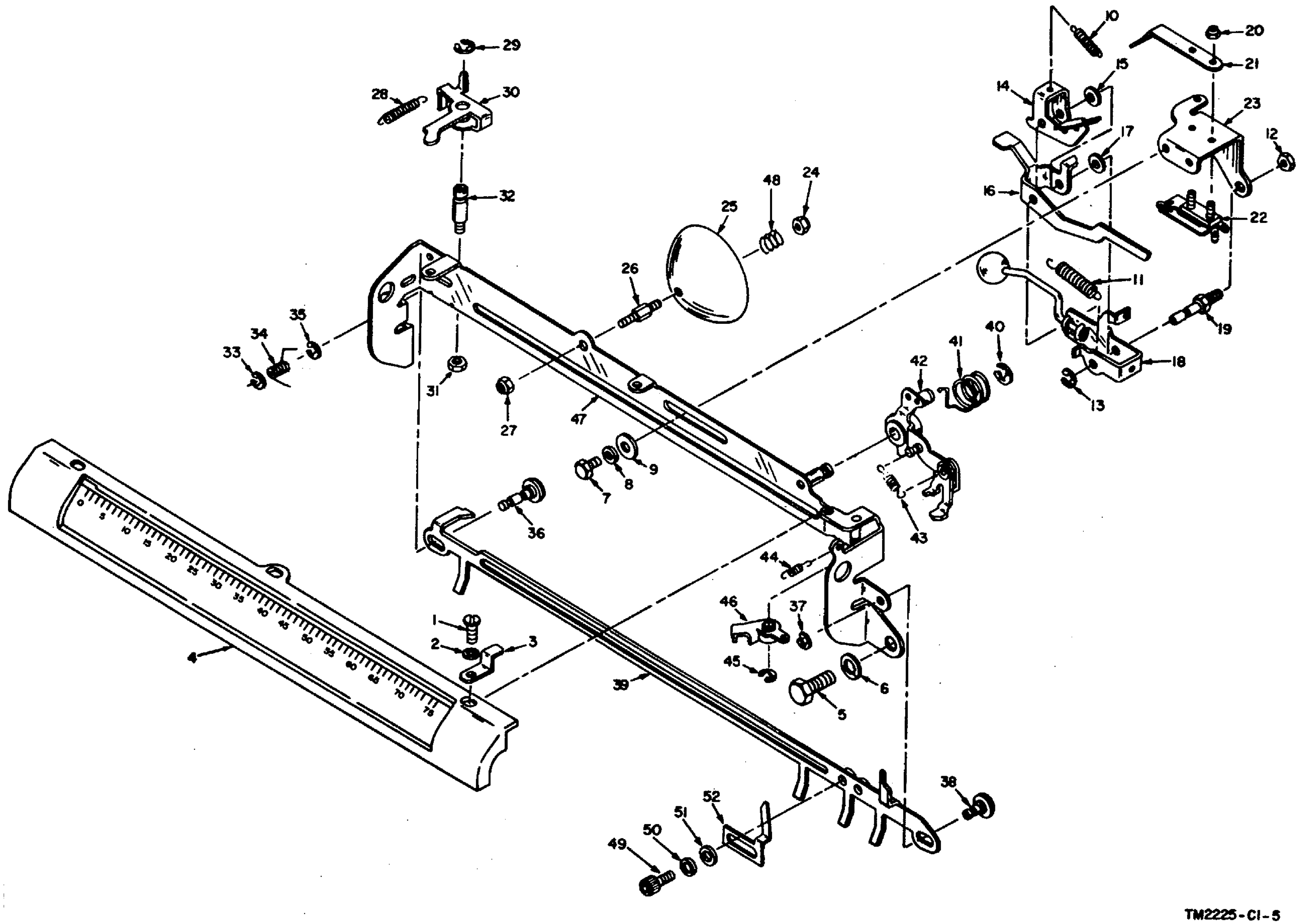



*Figure 4-3. Indicator frame assembly, exploded view (TT-76A/GGC, serial numbers 502 and above, on Order No. 49651-Phila-56 and subsequent procurements).*

screws (1), lockwashers (2), and flat washers (3).

(2) Adjust the indicator assembly as de- scribed in paragraphs 4-109 and 4-120.

**4-9. Removal and Replacement of Indicator Frame Assembly (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and all Subsequent Procurements)**

(fig. 4-5)

*a. Removal*

(1) Unsolder and disconnect the two wires which connect the cable to the indicator lamp switches (23).

(2) Remove the three machine screws (1), lockwashers (2), and flat washers (3) that hold the follower stop (4) and the indicator cover (5) to the indica- tor frame (45); remove the follower stop (4) and the indicator cover (5).

(3) Remove the two machine screws (6) and lockwashers (7) that hold the lower portion of the indicator frame (45) to the code bar guide studs (43, fig. 4-13).

(4) Remove the indicator assembly by carefully lifting it and moving it slightly to the right to clear the key levers.

*b. Replacement.*

(1) Replace the indicator assembly by reversing the procedures outlined in a above. Replace the follower stop (4) on the right-hand side of the indica- tor cover and fasten in place with the machine screws (1), lockwashers (2), and flat washers (3).

(2) Adjust the indicator assembly as described in paragraphs 4-109 and 4-120.

**4-10. Disassembly and Reassembly of Line Indicator Drive Shaft Assembly TT-76/GGC and TT-76A /GGC)**

(fig 4-6)

*a. Disassembly.*

(1) Remove the keyboard - transmitter

---

1 Machine screw, 10393
2 Lockwashers, 10429
3 Follower stop, 53896
4 Indicator cover, 53251
5 Machine screw, 10397
6 Lockwasher, 10431
7 Machine screw, 10303
8 Lockwasher, 10429
9 Flat washer, 10450
10 Pawl spring, 53311
11 Clapper arm spring, 53304
12 Self-locking hexagonal nut, 10500
13 Retainer ring, 10960
14 Clapper actuating pawl, 53223
15 Flat washer, 50319
16 Switch actuating arm, 53228
17 Flat washer, 50319
18 Clapper arm, 53243A
19 Switch actuating arm stud, 53224
20 Self-locking hexagonal nut, 10535
21 Clapper stop, 53184
22 Indicator lamp switch, 53348A
23 Indicator lamp switch bracket, 53219
24 Self-locking hexagonal nut, 10500
25 Indicator bell, 51403
26 Stud, 57264
27 Self-locking hexagonal nut, 10500
28 Return latch spring, 53312
29 Retainer ring, 10949
30 Return latch, 53232
31 Self-locking hexagonal nut, 10500
32 Return latch stud, 53233
33 Retainer ring, 10969
34 Blocking bar spring, 53586
35 Retainer ring, 10969
36 Blocking bar retaining stud, 53587
37 Retainer ring, 10977
38 Blocking bar retaining stud, 53249
39 Function blocking bar, 59408
40 Retainer ring, 10949
41 Cam follower spring, 53289
42 Cam follower, 57193A
43 Ratchet pawl spring, 53283
44 Detent spring, 53313
45 Retainer ring, 10969
46 Detent, 53240A
47 Indicator frame, 53215A
48 Spring, 57263
49 Machine screw, 10059
50 Lockwasher, 10432
51 Washer, 10490
52 Function blocking arm, 55976

*Note.* A flat washer 10458 is located between items 2 and 3.

*Figure 4-3. -Continued.*

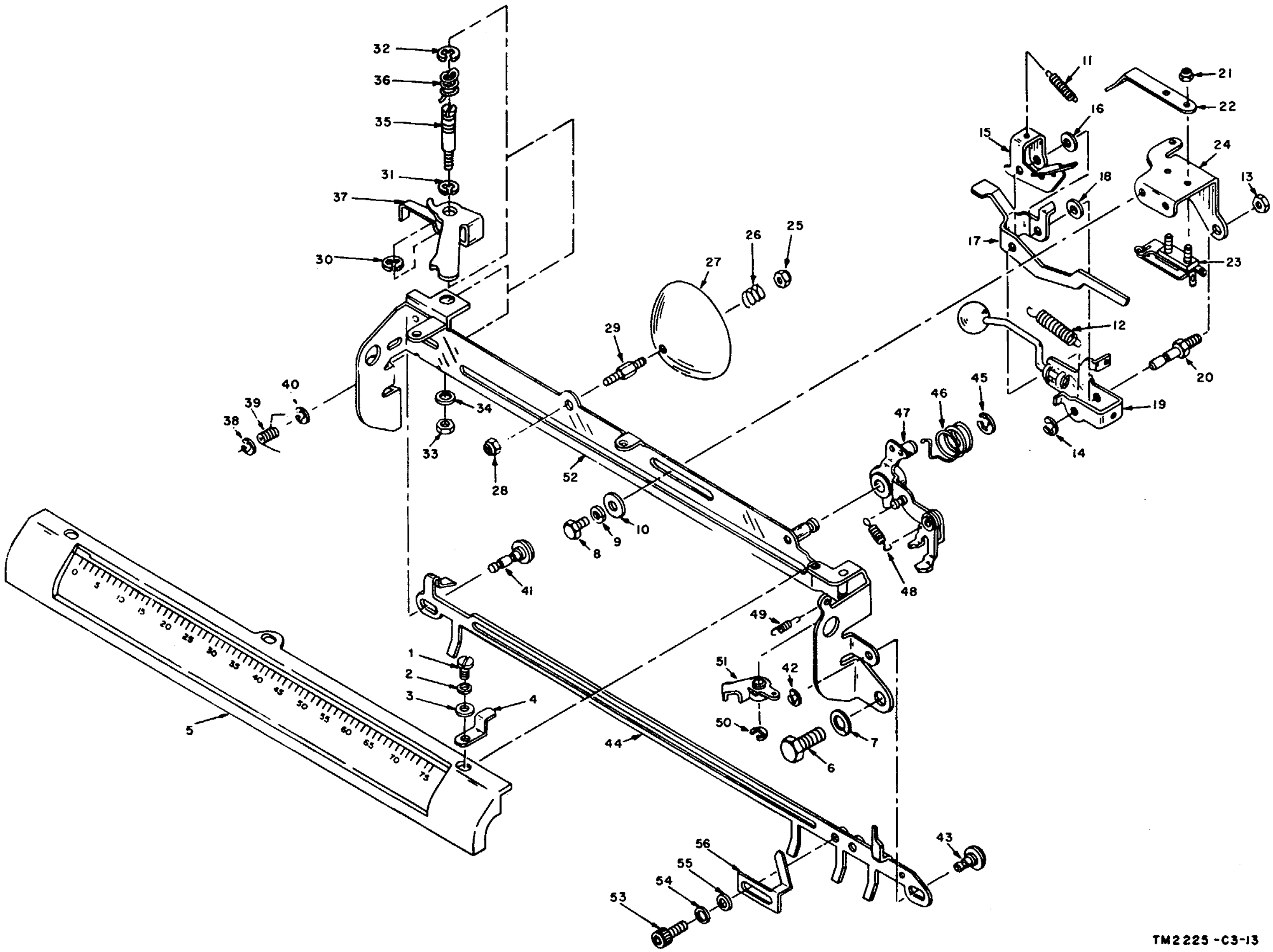



*Figure 4-4. Indicator frame assembly, exploded view (TT-76B/GGC serial numbers 255 and below, Order No. 13931-PC-58).*

from the reperforator frame as described in paragraphs 4-5a.

(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-6a or 4-7a.

(3) Remove the retainer ring (1) and the flat washer (2) from the end of the line indicator drive shaft (18).

(4) Remove the retainer ring (3) from the line indicator drive shaft (18). Remove the retainer ring (4) from the bearing (5); remove the bearing from the indicator frame assembly.

(5) Remove the retainer ring (6) from the bushing in the indicator return spring assembly (11); slide the line indicator drive shaft (18) to the right and remove the line indicator drive shaft assembly from the indicator frame assembly.

(6) Remove the guide roller (7) from the drive pin (15).

(7) On the TT-76/GGC, remove the indicator return spring assembly (11) from the line indicator drive shaft (18).

(8) On the TT-76A/GGC, remove the drive shaft sleeve (8) and the indicator return spring assembly (11) from the rivet (9); remove the drive shaft sleeve (8) and indicator return spring from the line indicator drive shaft (18).

(9) Drive the rivet (9) from the line indicator drive shaft (18) and remove the spring retainer (10).

(10) Remove the two setscrews (12) from the ratchet wheel (13); remove the ratchet wheel (13) from the line indicator drive shaft (18).

(11) Remove the indicator carriage (14) from the indicator drive shaft (18).

(12) Remove the drive pin (15), the plain hexagonal nut (16), and the space indicator (17) from the indicator carriage (14).

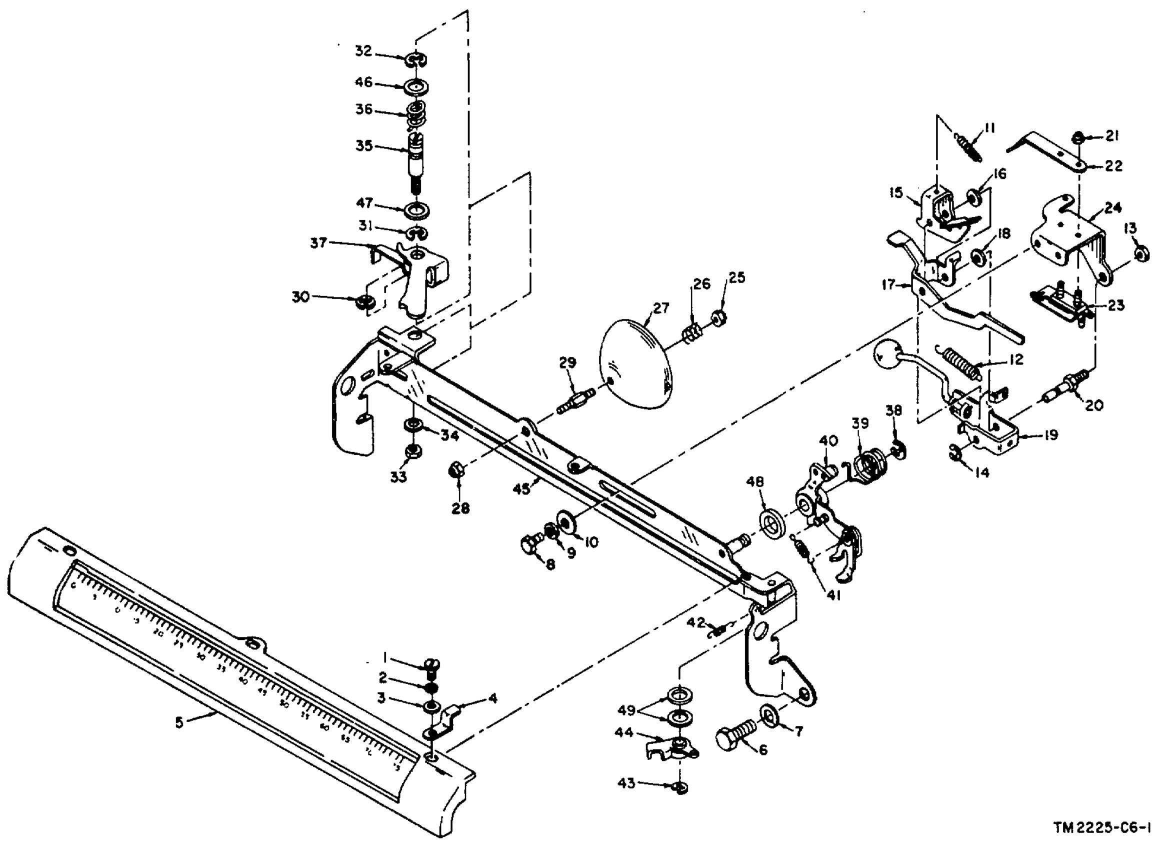
*b. Reassembly.*

(1) On the TT-76/GGC, reassemble by re-

---

1 Machine screw, 10393
2 Lockwasher, 10429
3 Flat washer, 10458
4 Follower stop, 53896
5 Indicator cover, 53251
6 Machine screw, 10397
7 Lockwasher, 10431
8 Machine screw, 10303
9 Lockwasher, 10429
10 Flat washer, 10450
11 Pawl spring, 53311
12 Clapper arm spring, 53304
13 Self-locking hexagonal nut, 10500
14 Retainer ring, 10960
15 Clapper actuating pawl, 53223
16 Flat washer, 50319
17 Switch actuating arm, 53228
18 Flat washer, 50319
19 Clapper arm, 53243A
20 Switch actuating arm stud, 53224
21 Self-locking hexagonal nut, 10535
22 Clapper stop, 53184
23 Indicator lamp switch, 43348A
24 Indicator lamp switch bracket, 57302
25 Self-locking hexagonal nut, 10500
26 Spring, 57263
27 Indicator bell, 51403
28 Self-locking hexagonal nut, 10500
29 Stud, 57264
30, 31, and 32 Retainer ring, 10960
33 Self-locking hexagonal nut, 10500
34 Lockwasher, 10429
35 Return latch stud, 60058
36 Return latch spring, 55974
37 Return latch, 55972
38 Retainer ring, 10969
39 Blocking bar spring, 53586
40 Retainer ring, 10969
41 Blocking bar retaining stud, 53587
42 Retainer ring, 10977
43 Blocking bar retaining stud, 53249
44 Function blocking bar, 60243A
45 Retainer ring, 10949
46 Cam follower spring, 53289
47 Cam follower, 57195A
48 Ratchet pawl spring, 53283
49 Detent spring, 53313
50 Retainer ring, 10969
51 Detent, 53240A
52 Indicator frame, 60237A
53 Machine screw, 10059
54 Lockwasher, 10432
55 Washer, 10490
56 Function blocking arm, 55976

*Figure 4-4. -Continued.*




| | | | |
|---|---|---|---|
| 1 | Machine screw, 10335 | 25 | Self-locking hexagonal nut, 10500 |
| 2 | Lockwasher, 10432 | 26 | Spring, 57263 |
| 3 | Flat washer, 10490 | 27 | Indicator bell, 54103 |
| 4 | Follower stop, 53896 | 28 | Self-locking hexagonal nut, 10500 |
| 5 | Indicator cover, 53251 | 29 | Stud, 57264 |
| 6 | Machine screw, 10089 | 30, 31, and 32 | Retainer ring, 10960 |
| 7 | Lockwasher, 10431 | 33 | Self-locking hexagonal nut, 10500 |
| 8 | Machine screw, 10303 | 34 | Lockwasher, 10429 |
| 9 | Lockwasher, 10429 | 35 | Return latch stud, 60058 |
| 10 | Flat washer, 10450 | 36 | Return latch spring, 55974 |
| 11 | Pawl spring, 53311 | 37 | Return latch, 55972 |
| 12 | Clapper arm spring, 53304 | 38 | Retainer ring, 10949 |
| 13 | Self-locking hexagonal nut, 10500 | 39 | Cam follower spring, 53289 |
| 14 | Retainer ring, 10960 | 40 | Cam follower, 57193 |
| 15 | Clapper actuating pawl, 53223 | 41 | Ratchet pawl spring, 53313 |
| 16 | Flat washer, 50319 | 42 | Detent spring, 60553 |
| 17 | Switch actuating arm, 53228 | 43 | Retainer ring, 10969 |
| 18 | Flat washer, 50319 | 44 | Detent, 53240A |
| 19 | Clapper arm, 53243A | 45 | Indicator frame, 60600A |
| 20 | Switch actuating arm stud, 53224 | 46 | Felt washer, 61477 |
| 21 | Self-locking hexagonal nut, 10535 | 47 | Felt washer, 61477 |
| 22 | Clapper stop, 53183 | 48 | Felt washer, 61482 |
| 23 | Indicator lamp switch, 53348A | 49 | Felt washer, 61477 |
| 24 | Indicator lamp switch bracket, 57302 | | |

*Figure 4-5. Indicator frame assembly, exploded view (TT-76B/GGC, Serial No. 256 and above on Order No. 13931-PC-58 and all subsequent procurements).*

versing the procedures outlined in a(12) through (9) and a(7) through (3) above.

(2) On the TT-76A/GGC, reverse (12), (11), (10), and (9) in a above.

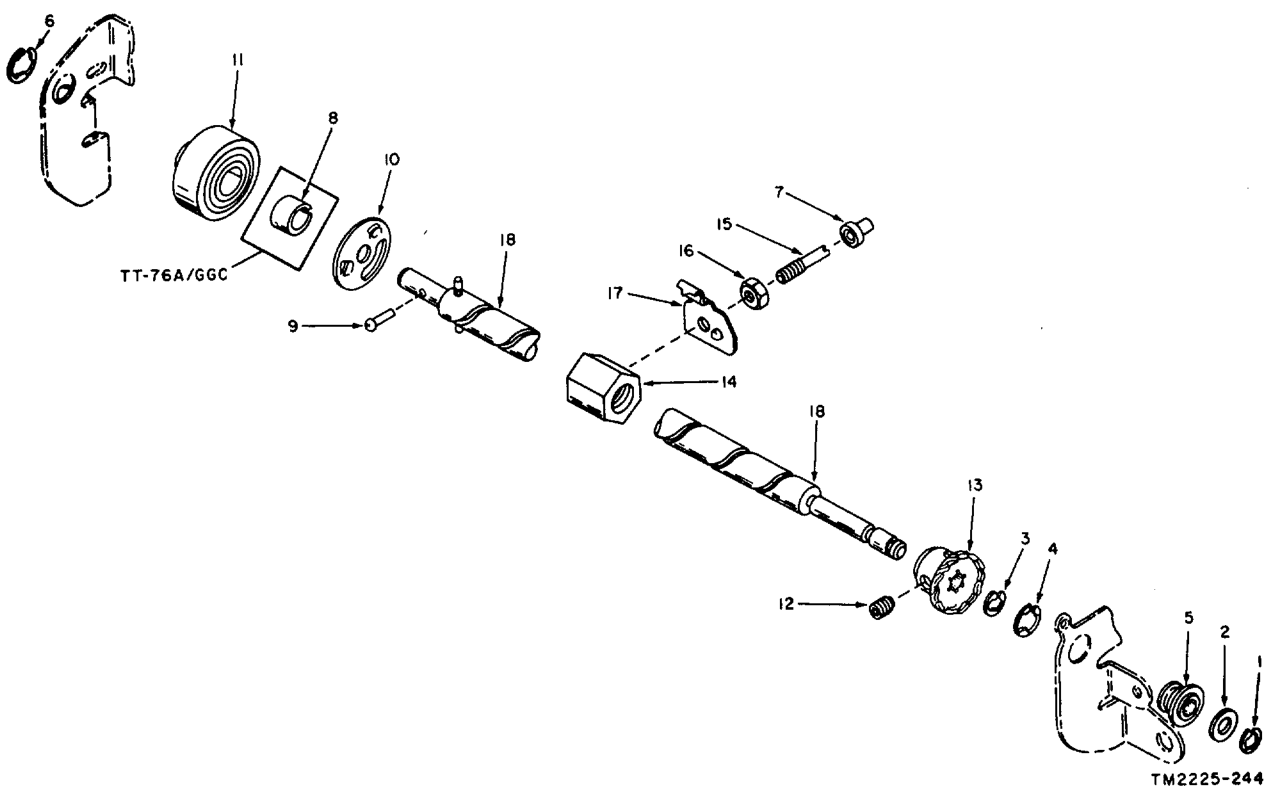
(3) Position the end of the indicator return spring on the rivet (9); position one full coil of the indicator return spring around the line indicator drive shaft (18). Slide the drive shaft sleeve (8) over the one coil and rivet head.

(4) Complete the reassembly of the TT-76A/GGC by reversing (6) through (3) in *a* above.

(5) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-6 or 4-7*b*.

(6) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5.

(7) Adjust the line indicator drive shaft assembly as described in paragraphs 4-108 through 4-120.




1 Retainer ring, 10949
2 Flat washer, 50831
3 Retainer ring, 10949
4 Retainer ring, 10998
5 Bearing, 53226
6 Retainer ring, 10998
7 Guide roller, 53246
8 Drive shaft sleeve 56574 (TT-76A/GGC only)
9 Rivet, 11316
10 Spring retainer, 53252
11 Indicator return spring assembly, 56597A
12 Setscrew, 10201
13 Ratchet wheel, 53230A
14 Indicator carriage, 57191
15 Drive pin, 53247
16 Plain hexagonal nut, 10513
17 Space indicator, 53248
18 Line indicator drive shaft, 53220A

*Figure 4-6. Line indicator drive shaft assembly, exploded view (TT-76/GGC and TT-76A/GGC).*

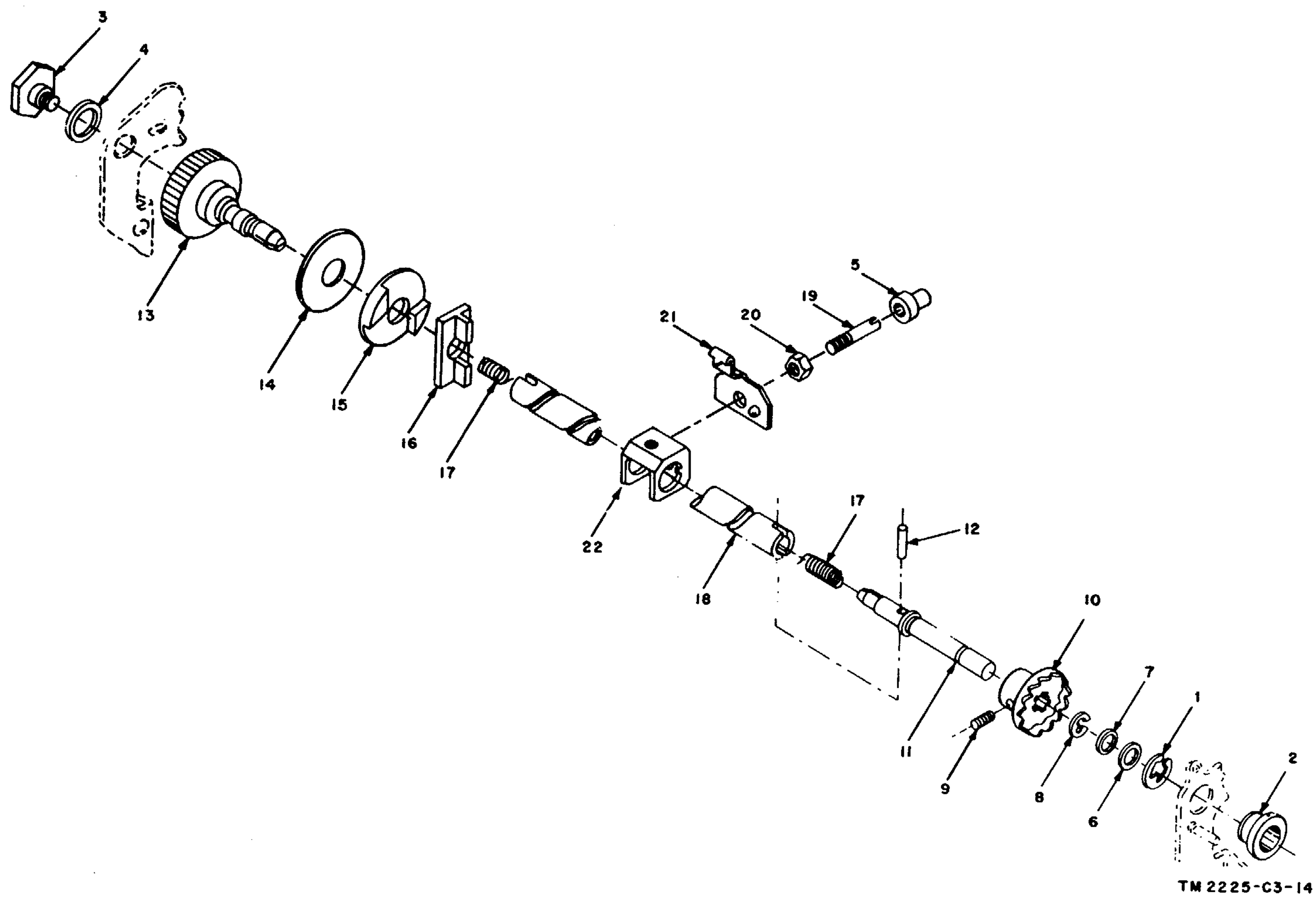



*Figure 4-7. Line indicator drive shaft assembly, exploded view (TT-76B/GGC and TT-76C/GGC).*

**4-11. Disassembly and Reassembly of Line Indicator Drive Shaft Assembly (TT-76B/GGC and TT-76C/GGC**
(fig. 4-7)

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame (par. 4-5*a*).

(2) Remove the indicator assembly from the keyboard-transmitter (par. 4-8*a*).

(3) Loosen the support stud retaining screw (3) and let the drive shaft torsion spring (17) unwind itself. Remove the screw (3) and spring washer (4).

(4) Remove the spring retainer (1) and retainer ring (8) from the right hand drive shaft support stud (11). Slide off the bearing (2) and the spacers (6 and 7) through the indicator frame hole (52, fig. 4-4).

(5) Slide the right hand drive shaft support stud (11, fig. 4-7) as far as possible to the right Slide the line indicator drive shaft (18) to the right and remove the line indicator drive shaft assembly from the indicator frame assembly (Since the guide roller (5) is not secured to the drive pin (19), remove the guide roller).

(6) Remove the right hand drive shaft support stud (11) with the ratchet wheel (10) from the line indicator drive shaft assembly. Remove the drive shaft torsion spring (17) Loosen the set screw (9) and remove the ratchet wheel (10)

(7) Remove the indicator drive shaft support stud (13) from the shaft assembly. Remove the indicator drive shaft stop (16), antibounce plate (15), and spacer (14) from the drive shaft support stud (13).

(8) Remove the indicator carriage (22) from the line indicator drive shaft (18). Loosen the hexagonal nut (20) and remove the drive pin (19) and space indicator (21) from the indicator carriage (22).

*b. Reassembly.*

(1) Install the indicator drive shaft assembly to the indicator frame (52, fig. 4-4) by reversing the procedures described in *a*(3) through (8) above.

(2) Replace the indicator assembly to the keyboard-transmitter (par. 4-8b).

(3) Replace the keyboard-transmitter on the reperforator frame (par. 4-5b).

(4) Adjust the line indicator drive shaft assembly (pars 4-109 - 4-120).

**4-12. Disassembly and Reassembly of Indicator Frame Assembly (TT-76/GGC)**
(fig. 4-1)

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.

(2) Remove the indicator frame assembly from the keyboard-transmitter as described in paragraph 4-6a.

(3) Remove the two machine screws (7), lockwashers (8), and flat washers (9) that attach the indicator lamp switch bracket (20) to the indicator frame (40).

(4) Remove the self-locking hexagonal nut (10) from the switch actuating

---

1 Retainer ring, 10998
2 Bearing, 60022
3 Support stud retaining screw, 60020
4 Spring washer, 10493
5 Guide roller, 53246
6 Spacer, 50831
7 Spacer, 55948
8 Retainer ring, 10949
9 Set screw, 10201
10 Ratchet wheel, 53230A
11 Right hand drive shaft support stud, 60017
12 Pin, 10988
13 Drive shaft support stud, 60016
14 Spacer, 55035
15 Antibounce plate, 60019
16 Drive shaft stop, 60018
17 Drive shaft torsion spring, 60021
18 Line indicator drive shaft, 60067A
19 Drive pin, 53247
20 Plain hexagonal nut 10513
21 Space indicator, 53248
22 Indicator carriage, 60026

*Figure 4-7. -Continued*

arm stud (17) and remove the assembled switch actuating arm and switch actuating arm stud from the indicator lamp switch bracket (20).

(5) Remove the retainer ring (12) and two flat washers (13 and 14); remove the switch actuating arm (11). Remove the two flat washers (15 and 16) from the switch actuating arm stud (17).

(6) Remove the two self-locking hexagonal nuts (18) from the studs on the indicator lamp switch (19); remove the indicator lamp switch (19) from the switch bracket (20).

(7) Remove the return latch spring (21) from the return latch (23).

(8) Remove the retainer ring (22) and the return latch (23) from the return latch stud (25).

(9) Remove the self-locking hexagonal nut (24) from the return latch stud (25); remove the return latch stud (25) from the indicator frame (40).

(10) Remove the retainer ring (26), the blocking bar spring (27), and the retainer ring (28) from the blocking bar retaining stud (29); remove the blocking bar retaining stud (29). Remove the retainer ring (30) from the blocking bar retaining stud (31); remove the blocking bar retaining stud (31) and the function blocking bar (32) from the indicator frame (40).

(11) Remove the retainer ring (33) and cam follower spring (34) from the cam follower (35); remove the cam follower from the indicator frame (40) Remove the ratchet pawl spring (36) from the cam follower (35).

(12) Unhook the detent spring (37) from the detent (39) and the indicator frame (40).

(13) Remove the retainer ring (38) from the stud on the indicator frame (40); remove the detent (39) from the indicator frame (40).

*b. Reassembly.*

(1) Reassemble the indicator frame assembly by reversing the procedures outlined in a(13) through (3) above.

(2) Replace the indicator frame assembly on the keyboard-transmitter as described in paragraph 4-6b.

(3) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

(4) Adjust the indicator frame assembly as described in paragraphs 4-108 through 4-120.

**4-13. Disassembly and Reassembly of the Indicator Frame Assembly (TT-76A/GGC)**
(fig. 4-2)

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.

(2) Remove the indicator assembly from the keyboard-transmitter as describe in paragraph 4-7a.

(3) Remove the two machine screws (7), lockwashers (8), and flat washers (9) that attach the indicator lamp switch bracket (23) to the indicator frame (47)

(4) Remove the pawl spring (10) from the clapper actuating pawl (14) and the clapper arm (18).

(5) Remove the clapper arm spring (11) from the clapper arm (18) and the indicator lamp switch bracket (23).

(6) Remove the self-locking hexagonal nut (12) from the switch actuating arm stud (19) and remove the assembled clapper actuating pawl (14), switch actuating arm (16), clapper arm (18), and switch actuating arm stud (19), from the indicator lamp switch bracket (23).

(7) Remove the retainer ring (13), clapper actuating pawl (14), flat washer (15), switch actuating arm (16), flat washer (17), and clapper arm (18)

from the switch actuating arm stud (19).

(8) Remove the two self-locking hexagonal nuts (20) from the studs on the indicator lamp switch (22); remove the clapper stop (21) and the indicator lamp switch (22) from the indicator lamp switch bracket (23).

(9) Remove the self-locking hexagonal nut (24), spring (48), indicator bell (25), and self-locking hexagonal nut (27) from the stud (26); remove the stud (26) from the indicator frame (47).

(10) Remove the return latch spring (28) from the return latch (30).

(11) Remove the retainer ring (29) and the return latch (30) from the return latch stud (32).

(12) Remove the self-locking hexagonal nut (31) from the return latch stud (32); remove the return latch stud (32) from the indicator frame (47).

(13) Remove the retainer ring (33), the blocking bar spring (34), and the retainer ring (35) from the blocking bar retaining stud (36); remove the blocking bar retaining stud (36). Remove the retainer ring (37) from the blocking bar retaining stud (38); remove the blocking bar retaining stud (38) and the function blocking bar (39) from the indicator frame (47).

(14) Remove the retainer rind (40) and the cam follower spring (41) from the cam follower (42); remove the cam follower (42) from the indicator frame (47). Remove the ratchet pawl spring (43) from the cam follower (42).

(15) Unhook the detent spring (44) from the detent (46) and the indicator frame (47).

(16) Remove the retainer ring (45) from the stud on the indicator frame (47); remove the detent (46) from the indicator frame (47).

*b. Reassembly.*

(1) Reassemble the indicator frame assembly by reversing the procedures outlined in a(16) through (3) above.

(2) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-7b.

(3) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

(4) Adjust the indicator frame assembly as described in paragraphs 4-108 through 4-120.

## 4-14. Disassembly and Reassembly of Indicator Frame Assembly (TT-76B/GGC Serial Nos. 255 and Below, Order No. 13931-PC-58)

(fig. 4-4)

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame (par. 4-5a).

(2) Remove the indicator assembly from the keyboard-transmitter (par. 4-8a).

(3) Remove the two machine screws (8), lockwashers (9), and flat washers (10) that attach the indicator lamp switch bracket (24) to the indicator frame (52).

(4) Remove the pawl spring (11) from the clapper actuating pawl (15) and the clapper arm (19).

(5) Remove the clapper arm spring (12) from the clapper arm (19) and the indicator lamp switch bracket (24).

(6) Remove the self-locking hexagonal nut (13) from the switch actuating arm stud (20) and remove the assembled clapper actuating pawl (15), switch actuating arm (17), clapper arm (19), and switch actuating arm stud (20) from the indicator lamp switch bracket (24).

(7) Remove the retainer ring (14), clapper actuating pawl (15), flat washer (16), switch actuating arm (17), flat washer (18), and clapper arm (19) from the switch actuating arm stud (20).

(8) Remove the two self-locking hexagonal nuts (21) from the studs on the indicator lamp switch (23); remove the clapper stop (22) and the indicator lamp switch (23) from the indicator lamp switch bracket (24).

(9) Remove the self-locking hexagonal nut (25), ratchet pawl spring (48), indicator bell (27), and self-locking hexagonal nut (28) from the stud (29); remove the stud from the indicator frame (52).

(10) Remove the retainer rings (32), (31), and (30) from the return latch stud (35). Unhook the upper end of the return latch spring (36) from the slot in the stud (35); unhook the lower end of the return latch spring (36) from the notch In the return latch (37).

(11) Remove the self-locking hexagonal nut (33) and lockwasher (34). Remove the return latch stud (35) by pulling it upward through the return latch (37) and the bracket on the indicator frame (52) Remove the return latch (36) and return latch (37).

(12) Remove the retainer ring (38), the blocking bar spring (39), and retainer ring (40) from the blocking bar retaining stud (41); remove the blocking bar retaining stud (41). Remove the retainer ring (42) from the blocking bar retaining stud (43), remove the stud and the function blocking bar (44) from the indicator frame (52).

(13) Remove the machine screw (53), lockwasher (54), washer (55), and the function blocking arm (56) from the function blocking bar (44).

(14) Remove the retainer ring (45) and the cam follower spring (46) from the cam follower (47); remove the cam follower from the indicator frame (52). Remove the ratchet pawl spring (48) from the cam follower (47).

(15) Unhook the detent spring (49) from the detent (51) and indicator frame (52).

(16) Remove the retainer ring (50) from the stud on the indicator frame (52); remove the detent (51) from the indicator frame (52).

*b. Reassembly.*

(1) Reassemble the indicator frame assembly by reversing the procedures described in a(3) through (16) above.

(2) Install the indicator assembly on the keyboard-transmitter (par 4-8b).

(3) Install the keyboard-transmitter on the reperforator frame (par. 4-5b).

(4) Adjust the indicator frame assembly (pars. 4-109 - 4-120).

## 4-15. Disassembly and Reassembly of Indicator Frame Assembly (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and TT-76C/GGC)

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator (par. 4-5a).

(2) Remove the indicator assembly from the keyboard-transmitter (par 4-9a).

(3) Remove the two machine screws (8) (fig. 4-5), lockwashers (9), and flat washers (10) that attach the indicator lamp switch bracket (24) to the indicator frame (45)

(4) Remove the pawl spring (11) from the clapper actuating pawl (15) and the clapper arm (19)

(5) Remove the clapper arm spring (12) from the clapper arm (19) and the indicator lamp switch bracket (24).

(6) Remove the self-locking hexagonal nut (13) from the switch actuating arm stud (20) and remove the assembled clapper actuating pawl (15), switch actuating aim (17), clapper arm (19), and switch actuating arm stud (20) from the indicator lamp switch bracket (24)

(7) Remove the retainer ring (14), clapper actuating pawl (15) flat washer (16), switch actuating arm (17), flat washer (18), and clapper arm (19

from the switch actuating arm stud (20).

(8) Remove the two self-locking hexagonal nuts (21) from the studs on the indicator lamp switch (23); remove the clapper stop (22) and the indicator lamp switch (23) from the indicator lamp switch bracket (24).

(9) Remove the self-locking hexagonal nut (25), spring (26), indicator bell (27), and self-locking hexagonal nut (28) from the stud (29), remove the stud from the Indicator frame (45)

(10) Remove the retainer rings (32), (31), and (30), and felt washer (46), when supplied, from the return latch stud (35) Unhook the upper end of the return latch spring (36) from the slot In the stud (35), unhook the lower end of the return latch spring (36) from the notch in the return latch (37)

(11) Remove the self-locking hexagonal nut (33) and lockwasher (31) Remove the return latch stud (35) by pulling it upward through the return latch (37) and the bracket on the indicator frame (45) Remove the return latch spring (36), felt washed (47), when supplied, and the return latch (37).

(12) Remove the retainer ring (38) and the cam follower spring (39) from the cam follower (40), and felt washer (48), when supplied remove the cam follower from the indicator frame (45) Remove the ratchet pawl spring (41) from the cam follower (10)

(13) Unhook the detent spring (42) from the detent (44) and indicator frame (45)

(14) Remove the retainer ring (43) from the stud on the indicator frame (45), remove the detent (44) and two felt washers (49), when supplied, from the Indicator frame (49)

*b. Reassembly*

(1) Reassemble the indicator frame assembly by reversing the procedures described in a(S) through (14) above.

(2) Replace the keyboard-transmitter (par 4-9b).

(3) Install the keyboard-transmitter on the reperforator frame (4-5b).

(4) Adjust the Indicator frame assembly (pars. 4-109 - 4-120).

## 4-16. Disassembly and Reassembly of Keyboard-Transmitter Contacts TT76(*)/GGC
(fig. 4-8)

*a. Disassembly*

(1) Remove the two machine screws (1) and lockwashers (2) that attach the contact cover (3) to the keyboard frame; remove the contact cover (3) and the two lockwashers (4)

(2) Remove the machine screw (5), the three lockwashers (6) and the two electrical terminal lugs from the side of the contact mounting (15)

(3) Unsolder the two spiraled electrical wires (7) from the tops of the transmitter contacts (11) and transmitter contact terminals (10); remove the spiraled electrical wires (7).

(4) Remove the two machine screws (8) and lockwashers (9) that attach the two transmitter contact terminals (10) to the contact mounting (15); remove the two transmitter contact terminals (10)

(5) Remove the two transmitter contracts (11) from the contact mounting (15)

(6) Remove the contact bail spring (12) from the sprig post on the contact mounting (15) and the transmitter contact ball (17)

(7) Remove the two machine screws (13) and lockwashers (14) from the contact mounting (15), remove the contact mounting (15)

(8) Remove the retainer ring (16) from the post (19). remove the transmitter contact ball (17)

(9) Remove the self-locking hexagonal nut

(18) from the post (19); remove the post (19).

*b. Reassembly.*

(1) Position the post (19) in the keyboard frame and secure with the self-locking hexagonal nut (18).

(2) Position the transmitter contact ball (17) on the post (19) and secure with a retainer ring (16).

(3) Replace the contact mounting (15) on the keyboard frame and secure with the two machine screws (13) and lockwashers (14).

(4) Replace the contact bail spring (12) between the spring post of the transmitter contact and the contact mounting spring post. Install the transmitter contacts (11) in the contact mounting (15).

(5) Insert the transmitter contact terminals (10) in the threads of stationary contacts (11), 1/2 to 1 1/2 threads above the contact mounting (15); secure the contacts in place with the machine screws (8) and lockwashers (9) but do not tighten the screws. Solder the two spiraled electrical wires (7) between the transmitter contacts (11) and the transmitter contact terminals (10).

(6) Replace the machine screw (5) and three lockwashers (6) that hold the two electrical terminal lugs to the side of the contact mounting (15).

(7) Adjust the transmitter contacts (11) as described in paragraph 4-203.

**CAUTION**

When positioning the transmitter contact cover (3) over the contact mounting (15), certain precautions are to be made to prevent a short to ground in the SEND circuit by ensuring that the bare wire on the contact bail, or the metal contact to which the wire is connected, does not touch the cover. To eliminate this problem, bend the bare wire on the contact bail, or the metal contact to which the wire is connected away from the cover. In addition, insulate the inside of the contact cover by cleaning and applying electrical tape: NSN 5970-00-788-4901, cut to appropriate dimensions, to the inside of the cover.

Perform insulation resistance test (para 7-6b(1), (3), and (4)) to ensure that no short to ground exists.

On the TT-699(*)/GGC, where no line cord plugs are available, make the insulation resistance test from terminal 10, on terminal board TB1 (located on the terminal box assembly), to ground; also from terminal 11 on TB1 to ground.

(8) Replace the two lockwashers (4) and contact cover (3) and secure with the two machine screws (1) and lockwashers (2).

**4-16.1. Deleted.**

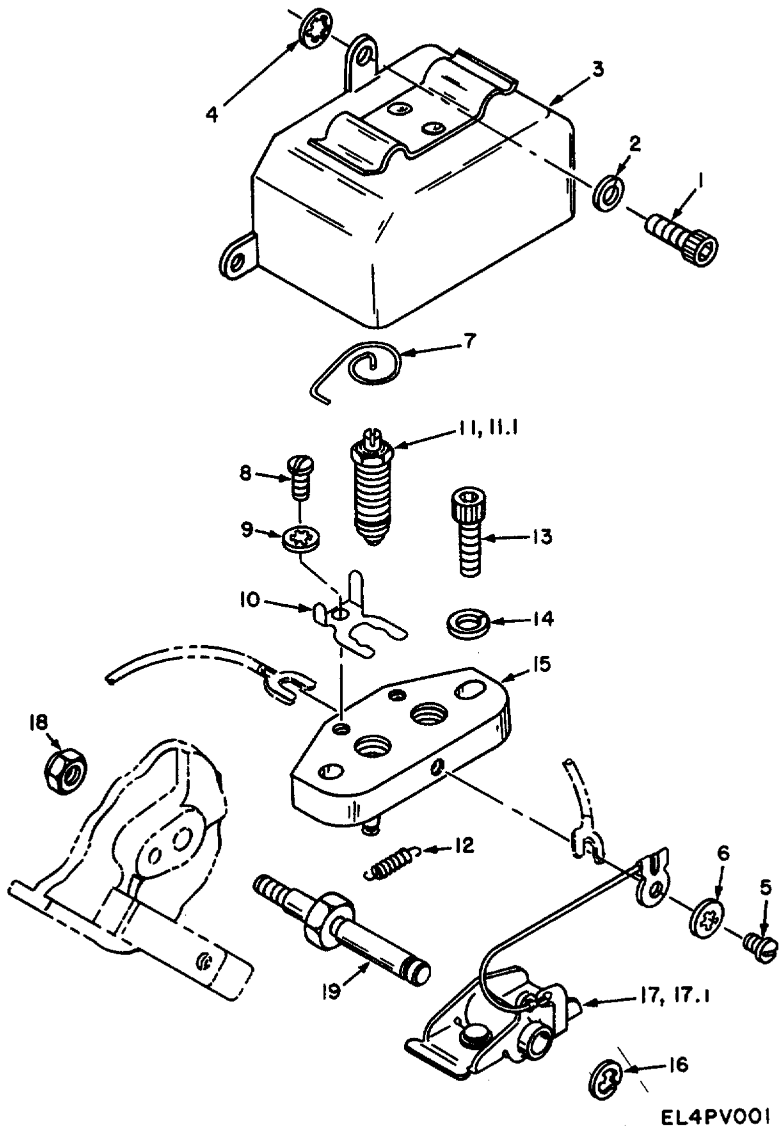
**4-17. Disassembly and Reassembly of Keyboard-Transmitter Sensing and Selector Levers**

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.

(2) Remove the indicator assembly as directed in paragraph 4-6a for the TT-76/GGC or paragraph 4-7a for the TT-76A/GGC or paragraph 4-8a or 4-9a for the TT-76B/GGC.

(3) Remove the setscrew (1, fig. 4-9) that holds the sensing lever pivot stud (2)




1. Machine screw, 10055
2. Lockwasher, 10403
3. Contact cover, 51579A
4. Lockwasher, 10403
5. Machine screw, 10301
6. Lockwasher, 10403
7. Electrical wire, 51610
8. Machine screw, 10301
9. Lockwasher, 10403
10 Transmitter contact terminal, 51597
11 Transmitter contact, 51588A (high-level, see note below)
11.1 Transmitter contact, SM–B–930674 (low-level)
12 Contact bail spring, 51548
13 Machine screw, 10009
14 Lockwasher, 10430
15 Contact mounting, 51595A
16 Retainer ring, 10949
17 Transmitter contact bail, 51582A (high-level)
17.1 Transmitter contact bail, SN–B–930672 (low-level)
18 Self-locking hexagonal nut, 10501
19 Post, 51581

**NOTE**

Transmitter contact assembly (TRI) includes 7, 8, 9, 10, 11, and 15 for item 11.

**NOTE**

On low-level units only, contact bail (17.1), NSN 5999–00–411–3141, must be used. Contact (11.1), NSN 5999–00–444–2223, must also be used only on low level units.

*Figure 4-8. Keyboard transmitter contacts, exploded view.*

*Figure 4-8.1 and legend deleted.*

in the keyboard frame; remove the sensing lever pivot stud, catching the flat washers (3, 4, 6, 8, 10, 12, and 14), sensing levers (5, 7, 9, 11, and 13) and the felt washer (51), when supplied, as they are released by the stud.

(4) Remove the six selector lever springs (15) from the selector levers (21, 24, 27, 30, 33, and 36) and from the selector lever spring bracket (43). Remove the sensing lever locking bail spring (16) from the sensing lever locking bail (19) and from the selector lever spring bracket (43). Unhook the cam-stop lever spring (3, fig. 4-16).

(5) Remove the self-locking hexagonal nut (17) that holds the sensing lever locking bail bearing (18) and the sensing lever locking bail (19) to the selector lever pivot post (40); remove the sensing lever locking bail bearing (18)and the sensing lever locking bail(19).

(6) Remove the spacing collar (20), and the six selector levers (21, 24, 27, 30, 33, and 36), the six bearing shoes (22, 25, 28, 31, 34, and 37), and the six flat washers (23, 26, 29, 32, 35, and 38) from the selector lever pivot post (40), alternating selector lever, bearing shoe, and flat washer until all are removed. Remove the felt washer (52), when supplied from the selector lever pivot post.

(7) Remove the self-locking hexagonal nut (39) that holds the selector lever pivot post (40) to the keyboard frame; remove the selector lever pivot post (40).

(8) Remove the two machine screws (41) and lockwashers (42) that hold the selector lever spring bracket (43) to the keyboard frame; remove the selector lever spring bracket (43).

(9) Remove the two machine screws (44) and lockwashers (45) that hold the selector levers comb (50) and the adjusting plate (46), (all models except TT-76/GGC), on the keyboard frame; remove the selector levers comb (50).

(10) Remove the two machine screws (47) and lockwashers (48) that hold the stop selector lever latch (49) to the selector levers comb (50); remove the stop selector lever latch (49).

*b. Reassembly.*

(1) Reassemble the keyboard-transmitter sensing and selector levers by reversing the procedures outlined in a(10) through (3) above.

(2) Adjust the keyboard-transmitter sensing and selector levers as described in paragraphs 4-98 through 4-101.

(3) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 46b for the TT-76/GGC or 4-7b for the TT-76A/GGC or paragraph 4-8b or 4-96b for the TT-76B/GGC and later models.

(4) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

**4-18. Disassembly and Reassembly of Keyboard-Transmitter Camshaft**

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.

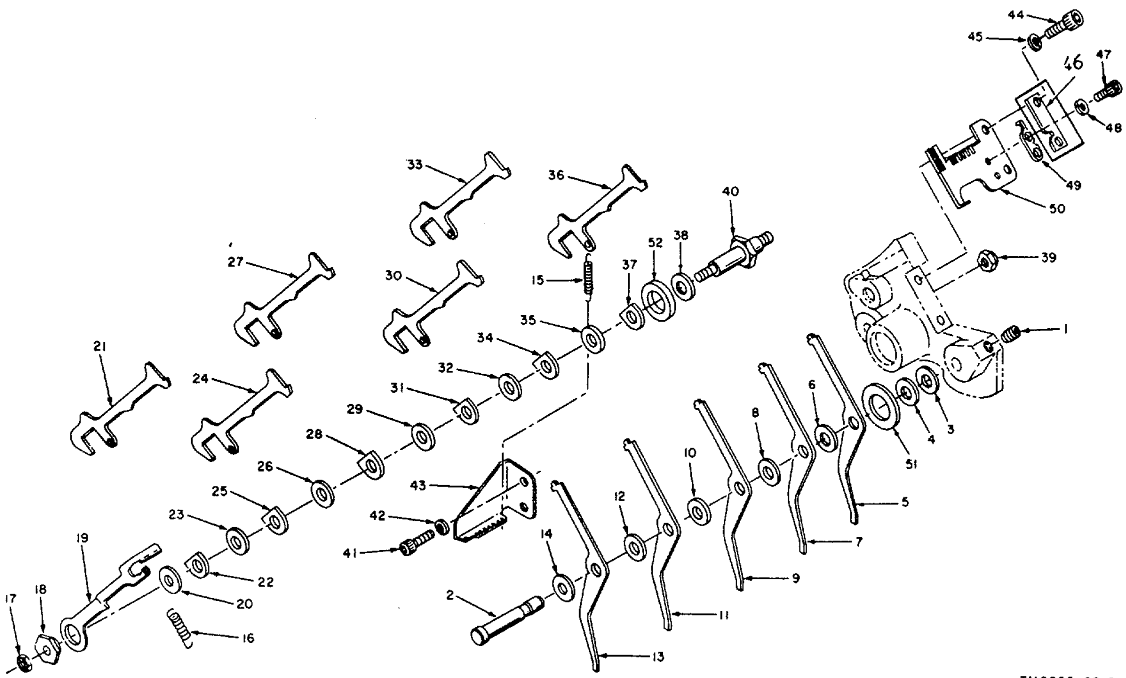
(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraphs 4-6a for the TT-76/ GGC, 4-7a for the TT-76A/GGC, and 4-8a or 4-9a for the TT-76B/GGC and subsequent procurements.

(3) On the TT-76/GGC, remove the cam-stop lever (5, fig. 4-16) from the cam-stop lever stud (28) as described in paragraph 4-24a(9).

(4) On the TT-76A/GGC and later models, remove the cam-stop lever (5, fig. 4-17) from the cam-stop lever stud (23) as described in paragraph 4-75a(9).

(5) Remove the two setscrews (1, fig.4-10) that hold the dutch yoke (2) to the keyboard-transmitter camshaft (3); remove the clutch yoke (2) and camshaft (3).

(6) Remove the two machine screws (4), lockwashers (5), and flat washers (6) that hold the spacer (7), ball bearing (8), collar (9), and ball bearing (10) in the keyboard frame; remove the




| | | | |
|---|---|---|---|
| 1 | Setscrew, 10209 | 27 | Selector lever |
| 2 | Sensing lever pivot stud, 51562 | 28 | Bearing shoe |
| 3 | Flat washer, 53526 | 29 | Flat washer, 50147 |
| 4 | Flat washer, 50147 | 30 | Selector lever, |
| 5 | Sensing lever, 51573A (see note below) | 31 | Bearing shoe |
| 6 | Flat washer, 50147 | 32 | Flat washer, 50147 |
| 7 | Sensing lever, | 33 | Selector lever, |
| 8 | Flat washer, 50147 | 34 | Bearing shoe |
| 9 | Sensing lever, | 35 | Flat washer, 50147 |
| 10 | Flat washer, 50147 | 36 | Selector lever, |
| 11 | Sensing lever, | 37 | Bearing shoe |
| 12 | Flat washer, 50147 | 38 | Flat washer, 50147 |
| 13 | Sensing lever, | 39 | Self-locking hexagonal nut, 10501 |
| 14 | Flat washer, 50147 | 40 | Selector lever pivot post, 51561 |
| 15 | Selector lever spring, 50902 | 41 | Machine screw, 10003 |
| 16 | Sensing level lacking bail spring, 51574 | 42 | Lockwasher, 10429 |
| 17 | Self-locking hexagonal nut, 10500 | 43 | Selector lever spring bracket, 54672 |
| 18 | Sensing lever locking bail bearing, 51557 | 44 | Machine screw, 10003 |
| 19 | Sensing lever locking bail, 51567 | 45 | Lockwasher, 10430 |
| 20 | Spacing collar, 51555 | 46 | Adjusting plate, 55869 (TT-76A/GGC and later models only). |
| 21 | Selector lever, 51598A (see note below) | 47 | Machine screw, 10002 |
| 22 | Bearing shoe, 50019A (includes items 25, 28, 31, 34, and 37) | 48 | Lockwasher, 10429 |
| 23 | Flat washer, 50147 | 49 | Stop selector lever latch, 55870 |
| 24 | Selector lever, | 50 | Selector levers comb, 51558 |
| 25 | Bearing shoe | 51 | Felt washer, 61466 |
| 26 | Flat washer, 50147 | 52 | Felt washer, 61467 |

Note: Includes items 7,9,11,13).
Note: Includes items 24,27,30,33,36).

*Figure 4-9. Keyboard-transmitter sensing and selecting levers, exploded view.*

spacer (7), ball bearing (8), collar (9), and ball bearing (10) from the keyboard frame.

*b. Reassembly*.

(1) Reassemble the keyboard-transmitter camshaft by reversing the procedures outlined in a(6) and (5) above.

(2) Adjust the keyboard-transmitter cam-shaft as described in paragraph 4-106 or 4-107.

(3) Replace the cam-stop lever as described in paragraph 4-25b for the TT-76A/GGC and later models or 424b for the TT-76/GGC.

(4) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-7b for the TT-76/GGC, paragraph 4-8b or 4-9b for the TT-76B/GGC and later models, or 4-6b for 77-76/GGC.

(5) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

**4-19. Disassembly and Reassembly of Key Levers and Code Bars (TT-76/GGC)**

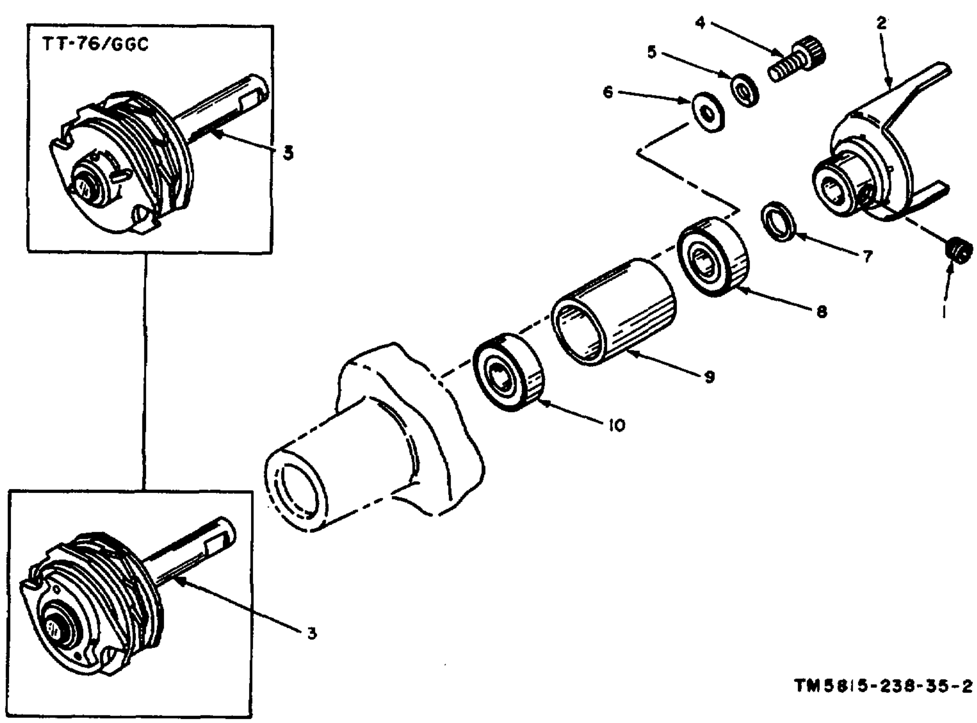
*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.

(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-6a.

(3) Remove the two retainer rings (1 and 2, fig. 4-11) that hold the space bar bail shaft (3) to the key lever guide (13); remove the space bar bail shaft (3) and the space bar assembly (4).

(4) Remove the 31 key lever springs (5) and the two space bar springs (6).




1 Setscrew, 10209
2 Clutch yoke, 50484A
3 Keyboard-transmitter camshaft, 51545 (TT-76/GGC), 57285A (TT-76A/GGC and later models)
4 Machine screw, 10003
5 Lockwasher, 10429
6 Flat washer, 10450
7 Spacer, 51552
8 Ball bearing, 10753
9 Collar, 51599
10 Ball bearing, 10753

*Figure 4-10. Keyboard-transmitter camshaft, exploded view.*

(5) Remove the space bar lever (7) and the repeat key lever (8).
(6) Remove the long key levers (9), medium key levers (10), and short key levers (11). Remove the keytops (27 and 28) from the key levers only if either is damaged.
(7) Remove the universal code bar return spring (12) and the key lever guide (13).
(8) Remove the four machine screws (14) and lockwashers (15) that hold the key lever mounting bracket (16) to the keyboard frame and the machine screw (9, fig. 416) and lockwasher (10) securing the keyboard filter (11) to the key lever mounting bracket (16, fig. 4-11); remove the key lever mounting bracket (16, fig. 4-11); remove the key lever mounting bracket (16).
(9) Remove the two machine screws (17) and the lockwashers (18) that hold the code bar guide studs (19) to the key-board frame; remove the code bar guide studs (19).
(10) Remove the universal bar (20), the code bars (21-25), and the middle key lever guide (26).

*b. Reassembly.*
(1) Reverse the procedures outlined in a (10) through (7) above.
(2) Install the assembled short key levers (11) and keytops (27 and 28) from left to right in the order given in the chart below. Similarly install the assembled medium key levers (10) and long key levers (9) and keytops (27) from left to right as indicated in the chart below. The chart also gives the reference symbol for each of the keytops.

*Keytop Chart*

Short key levers

| Keytop reference symbols | Markings | |
|---|---|---|
| 50777 | Q | 1 |
| 50778 | W | 2 |
| 50779 | E | 3 |
| 50780 | R | 4 |
| 50781 | T | 5 |
| 50782 | Y | 6 |
| 50783 | U | 7 |
| 50784 | I | 8 |
| 50785 | O | 9 |
| 50786 | P | 0 |
| 52912 | REPEAT | |

Medium key levers

| | | |
|---|---|---|
| 50787 | A- | |
| 50788 | S | BELL |
| 50789 | D | $ |
| 50791 | G | & |
| 53609 | H | |
| 50793 | J | ‘ |
| 50794 | K | ( |
| 50795 | L | ) |
| 50796 | CAR.RET. | |

Long key levers

| | | |
|---|---|---|
| 50797 | FIGS | |
| 50798 | Z | “ |
| 50799 | X | / |
| 50800 | C | : |
| 50801 | V | ; |
| 50802 | B | ? |
| 50803 | N | , |
| 50804 | M | |
| 50805 | LTRS | |
| 50806 | LINE FEED | |
| 50807 | | |

(3) Reverse the procedures outlined in a (5) through (3) above.
(4) Adjust the universal bar as described in paragraph 4-103.
(5) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-6b.
(6) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

**4-20. Disassembly and Reassembly of the Key Levers and Code Bars (TT-76A/GGC)**

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.
(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-7a.
(3) Remove the two retainer rings (1 and 2, fig. 4-12) that hold the space bar bail shaft (3) to the key lever guide (19); remove the space bar bail shaft (3) and the space bar bail assembly (4).
(4) Remove the two machine screws (5) and lockwashers (6) that hold the space bar (7) to the space bar bail assembly (4); remove the space bar.
(5) Remove the three machine screws (8) and lockwashers (9) that hold the key lever locking bar (10) to the key lever mounting bracket (22); remove the key lever locking bar.
(6) Remove the 31 key lever springs (11) and the two space bar springs (12).
(7) Remove the space bar lever (13) and the repeat key lever (14).
(8) Remove the long key levers (15), medium key levers (16), and short key levers (17). Remove the keytops (33) from the key levers only if either is damaged.
(9) Remove the universal code bar return spring (18) and the key lever guide (19).

(10) Remove the four machine screws (20) and lockwashers (21) that hold the key lever mounting bracket (22) to the keyboard frame and the machine screw (9, fig. 4-17) and lockwasher (10) that hold the keyboard filter (11) to the key lever mounting bracket (22, fig. 4-12); remove the key lever mounting bracket (22).
(11) Remove the two machine screws (23) and lockwashers (24) that hold the code bar guide studs (25) to the key-board frame; remove the code bar guide studs (25).
(12) Remove the universal bar (26), the code bars (27-31), and the middle key lever guide (32).

*b. Reassembly.*

(1) Reverse the procedures outlined in a (12) through (9) above.
(2) Install the assembled short key levers (17) and keytops from left to right in the order given in the chart below. Similarly, install the assembled medium key levers (16) and long key levers (15) and keytops (33) from left to right as indicated in the chart below. The chart also gives the reference symbols for each of the keytops.

*Keytop Chart*

| Short key levers | | | Medium key levers | | | Long key levers | | |
|---|---|---|---|---|---|---|---|---|
| Keytop reference symbols | Markings | | 54044A | A | - | 57326A | FIGS | |
| | | | 54045A | S | BELL | 57327A | Z | “ |
| | | | 54046A | D | $ | 57328A | X | / |
| 54033A | Q | 1 | 54047A | F | ! | 57329A | C | : |
| 54034A | W | 2 | 54048A | G | & | | | |
| 54035A | E | 3 | 57283A | H | | | | |
| 54036A | R | 4 | 54050A | J | ‘ | | | |
| 54037A | T | 5 | 54051A | K | ( | | | |
| 54038A | Y | 6 | 54052A | L | ) | | | |
| 54039A | U | 7 | 54053A | CAR RET. | | | | |
| 54040A | I | 8 | | | | | | |
| 54041A | O | 9 | | | | | | |
| 54042A | P | 0 | | | | | | |
| 57323A | REPEAT | | | | | | | |

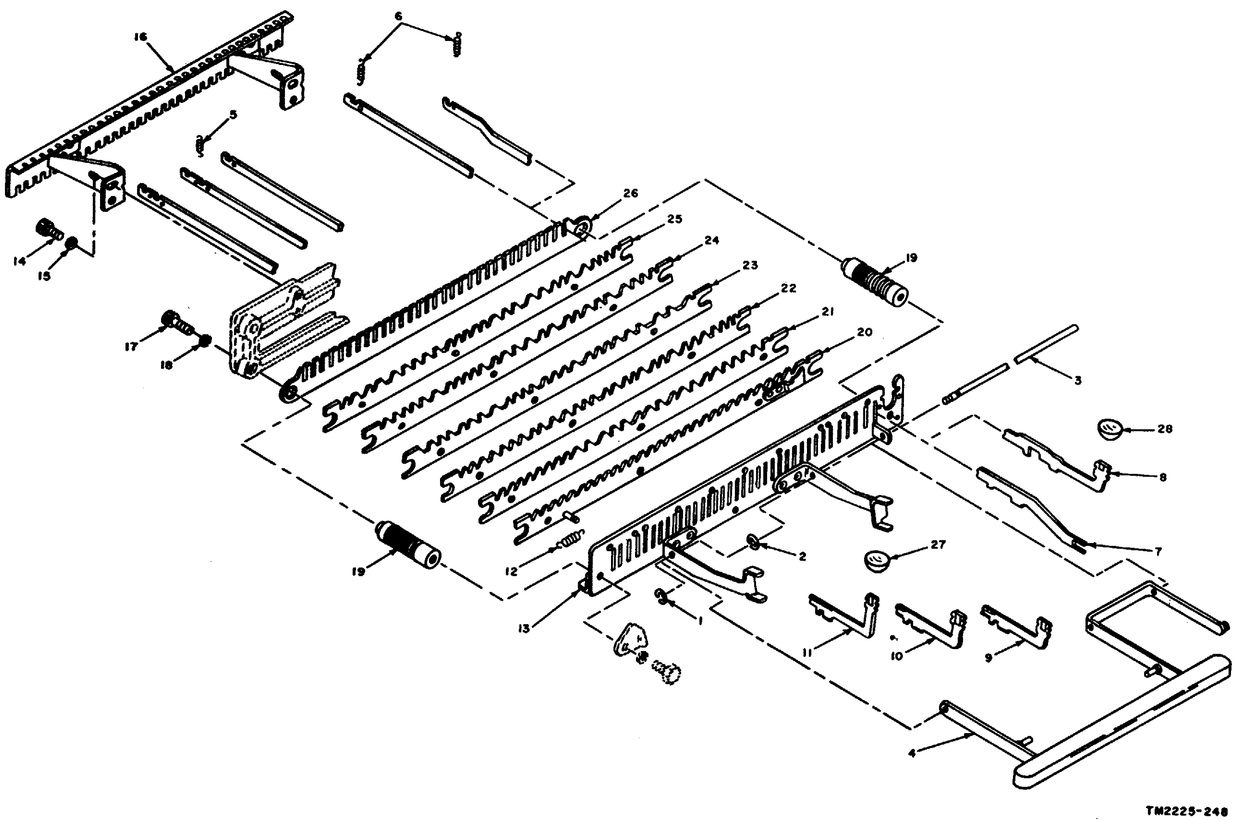



*Figure 4-11. Key levers and code bars, code view (TT-76/GGC).*

Keytop Chart-Continued

| Long key levers | | |
|---|---|---|
| 57330A | V | ; |
| 57331A | B | ? |
| 57332A | N | , |
| 57333A | M | . |
| 57334A | LTRS | |
| 57335A | LINE FEED | |
| 57336A | | |

(3) Reverse the procedures outlined in (7) through (3) in a above.
(4) Adjust the universal bar as described in paragraph 4-103 .
(5) Replace the indicator assembly on the keyboard-transmitter as described in in paragraph 4-7b.
(6) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

**4-21. Disassembly and Reassembly of Key Levers and Code Bars (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and Subsequent Procurements)**

*a. Disassembly.*

(1) Remove the keyboard transmitter from the reperforator frame as described in paragraph 4-5a.
(2) Remove the indicator assembly from the keyboard transmitter as described in paragraph 4-9a.
(3) Remove the two machine screws (1, fig. 4-13) and lockwashers (2) that hold the space bar (3) to the space bar arm assembly (7); remove the space bar.
(4) Remove the two retainer rings (4) and (5) that hold the space bar arm shaft (6) to the front key lever guide (40); remove the space bar arm shaft and space bar assembly.
(5) Remove the three machine screws (8) and lockwashers (9) that hold the key lever locking bar (10) to the key lever mounting bracket (21); remove the key lever locking bar.
(6) Remove the 31 key lever springs (11) and the two space bar springs (12).
(7) Remove the assembled keytops (13) and short key levers (14), keytops and medium key levers (15), and key-tops and long key levers (16). Do not remove the keytops from the key levers.
(8) Remove the space bar lever (17) and the repeat key lever (18).
(9) Remove the four machine screws (19) and lockwashers (20) that hold the key lever mounting bracket (21) to the keyboard casting; remove the key lever mounting bracket.
(10) Remove the function blocking bar spring (22) from the function blocking bar (28).
(11) Remove the self-locking hexagonal nut (23), and flat washer (56) that holds the function blocking arm (24) to the function blocking bar (28); remove the function blocking arm.

1 Retainer ring, 10969
2 Retainer ring 10969
3 Space bar bail 'shaft 52904
4 Space bar assembly, 52906A
5 Key lever spring, 50941
6 Space bar spring 53974
7 Space bar lever, 55916
8 Repeat key lever, 56913
9 Long key lever, 52584
10 Medium key lever, 52583
11 Short key lever, 52582
12 Universal code bar return spring, 51136
13 Key lever guide, 52905A
14 Machine screw, 10015
15 Lockwasher, 10431
16 Key lever mounting bracket, 52918A
17 Machine screw, 10017
18 Lockwasher, 10431
19 Code bar guide stud, 51560
20 Universal bar 51134A
21 Code bar, 53295
22 Code bar, 53296
23 Code bar, 53297
24 Code bar, 53298
25 Code bar, 53299
26 Middle kev lever guide. 52915
27 Keytop see para 4-196b (2)
28 Keytop, 52912

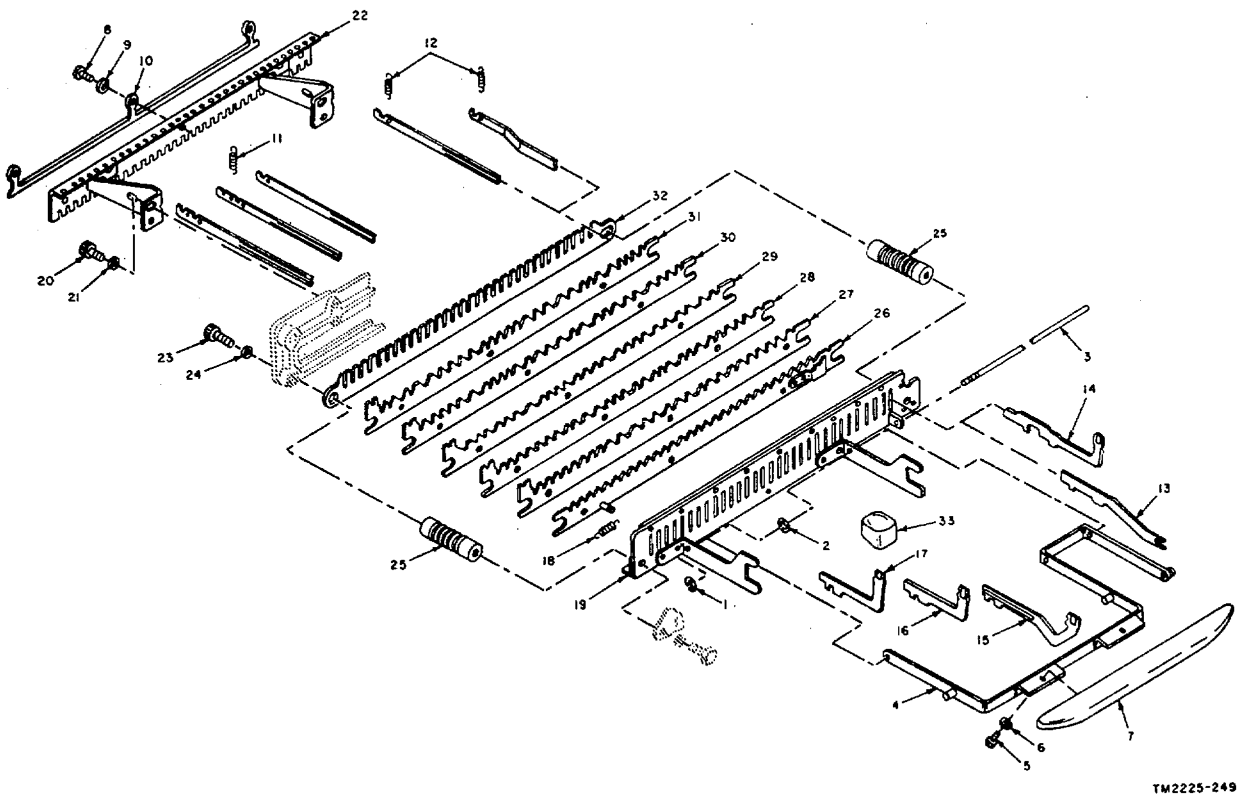
*Figure 4-11. Key levers and code bar, exploded view (TT-76/GGC)-Continued.*

(12) Remove the two retainer rings (25), the lubricating pads (26), and remaining two retainer rings (27) that hold the function blocking bar on the studs on the key lever guide (40); remove the function blocking bar (28).

(13) Remove the self-locking hexagonal nut (29) and flat washer (30) that hold the carriage return blocking arm (31) to the carriage return blocking bar (36); remove the carriage return blocking arm (31).

(14) Remove the self-locking hexagonal nut (32) and flat washer (33) that hold the return latch bracket (34) to the carriage return blocking bar (36); remove the return latch bracket (34).

(15) Remove the two retainer rings (35) that hold the carriage return blocking bar (36) to the studs on the front key




1 Retainer ring, 10969
2 Retainer ring, 10969
3 Space bar bail shaft, 55862
4 Space bar bail assembly, 57281A
5 Machine screw, 10001
6 Lockwasher, 10429
7 Space bar, 53944A
8 Machine screw, 10304
9 Lockwasher, 10429
10 Key lever locking bar, 53210
11 Key lever spring, 50941
12 Space bar spring, 53974
13 Space bar lever, 55916
14 Repeat key lever, 57324
15 Long key lever, 57325
16 Medium key lever, 55918
17 Short key lever, 55917
18 Universal code bar return spring, 51136
19 Key lever guide, 57278A
20 Machine screw, 10015
21 Lockwasher, 10431
22 Key lever mounting bracket, 57279A
23 Machine screw, 10017
24 Lockwasher, 10431
25 Code bar guide stud, 51560
26 Universal bar, 51134A
27 Code bar, 53295
28 Code bar, 53296
29 Code bar, 53297
30 Code bar, 53298
31 Code bar, 53299
32 Middle key lever guide, 52915
33 Keytop, see para 4-20b(2)

*Figure 4-12. Key levers and code bars, exploded view (TT-76A/GGC).*

lever guide (40); remove the carriage return blocking bar (36).

(16) Remove the universal code bar return spring (37). Remove the front key lever guide (40).

(17) Remove the two machine screws (41) and lockwashers (42) that hold the code bar guide studs (43) to the key-board frame; remove both code bar guide studs (43).

(18) Remove the middle key lever guide (44), the code bars (45-49), and the universal bar (50).

*b. Reassembly.*

(1) Position the universal bar (50, fig.4-13), the five code bars arranged in their proper sequence (code bar No. 1, (49) next to the universal bar, followed by the remaining code bars (48) through (45)) and the middle key lever guide (44) on the code bar guide studs (43).

(2) Position the assembled code bar guide studs and code bars on the key-board frame; secure them with two machine screws (41) and lockwashers (42).

(3) Position the front key lever guide (40) in front of the universal bar (50) and install the universal code bar return spring (37).

(4) Position the carriage return blocking bar (36) on the studs on the front key lever guide (40); secure it with two retainer rings (35).

(5) Position the return latch bracket (34) on the carriage return blocking bar (36); secure it with a flat washer (33) and self-locking hexagonal nut (32).

(6) Position the carriage return blocking arm (31) on the carriage return blocking bar (36); secure it with a flat washer (30) and a self-locking hexagonal nut (29).

(7) Position the function blocking bar bar (28) on the studs on the front key lever guide (40); secure it with two retainer rings (27), two lubricating pads (26), and the remaining two retainer rings (25).

(8) Position the function blocking arm (24) on the function blocking bar (28); secure it with a flat washer (56) and self-locking hexagonal nut (23).

(9) Connect one end of the function blocking bar spring (22) to the function blocking bar (28) and the other end to the stud on the front key lever guide (40).

(10) Position the key lever mounting bracket (21) on the keyboard casting; secure it with four machine screws (19) and lockwashers (20).

(11) Install the repeat key lever (18) and the space bar lever (17).

(12) Install the assembled long key levers (16) and keytops (13) from left to right in the order given in the chart paragraph 4-20b(2). Similarly install the assembled medium key levers (15) and short key levers (14) and key-tops from left to right as indicated in the chart. The chart also gives the part number for each of the keytops.

(13) Install the 31 key lever springs (11) and the two space bar springs (12).

(14) Position the key lever locking bar (10) on the key lever mounting bracket (21); secure it with three machine screws (8) and lockwashers (9).

(15) Position the space bar arm assembly (7) on the front key lever guide (40); install the space bar arm shaft (6) through the holes in the space bar arm assembly and the arms of the front key lever guide. Secure it with two retainer rings (4) and (5).

(16) Position the space bar (3) on the space bar arm assembly (7); secure it with two machine screws (1) and lockwashers (2).

(17) Install the indicator assembly as described in paragraph 4-9b.

(18) Install the keyboard transmitter on the reperforator frame as described in paragraph 4-5b.

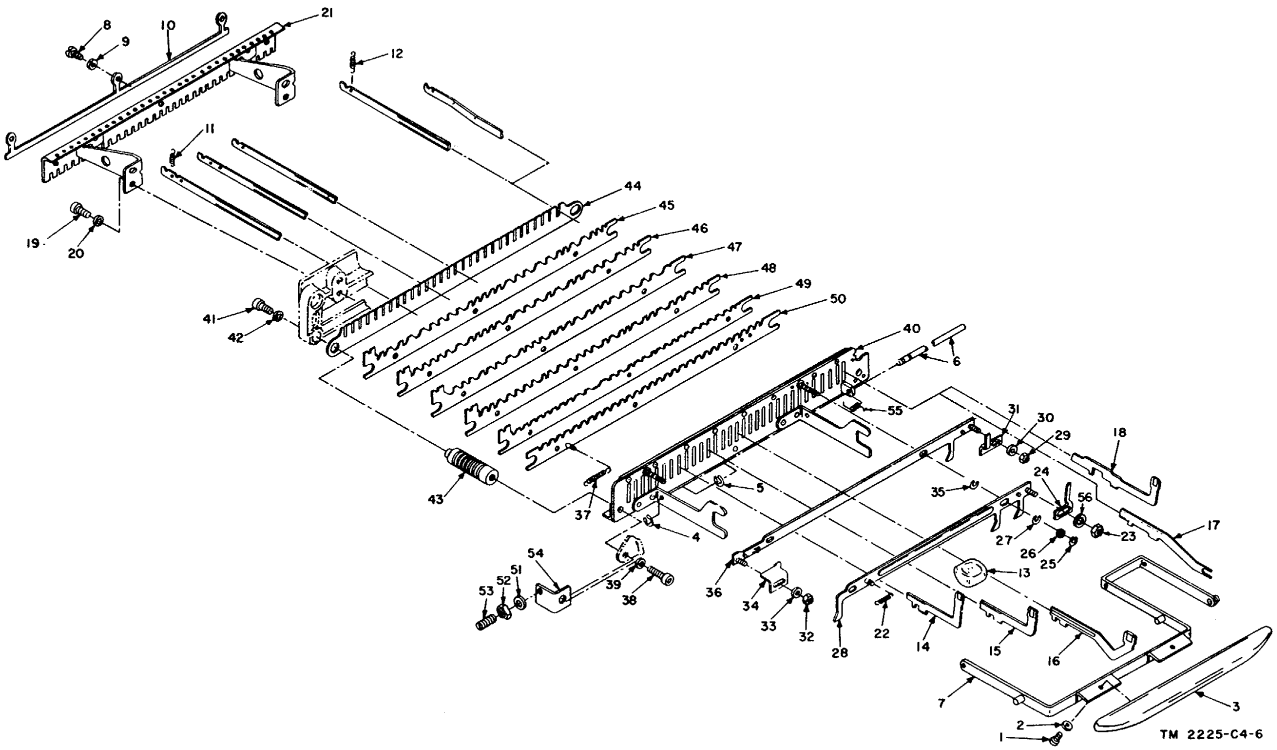



*Figure 4-13. Key levers and code bars, exploded view, (TT-76B/GGC, serial Nos. 256; and above, Order No. 13931-PC-58 and subsequent procurements).*

(19) Adjust the mechanisms as described in paragraphs 4-103, 4-113, 4-115, and 4-117.

**4-22. Disassembly and Reassembly of Keyboard-Transmitter Cam Locking Latch Mechanism (fig. 4-14)**

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.

(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-6a. (TT-76/GGC) or 4-7a (TT-76A/GGC).

(3) Remove the sensing levers as described in paragraph 4-17a(3).

(4) Remove the cam-stop lever as described in paragraph 4-24a(9) for the TT-76/GGC or 4-25a(9) for the TT-76/GGC.

(5) Remove the locking lever latch spring (1) from the locking lever latch (10) and the spring post in the keyboard frame.

(6) Remove the repeat blocking lever spring (3) from the repeat blocking lever (6) and the locking lever latch (10).

(7) Remove the retainer ring (4) that holds the repeat blocking lever (6) and the locking lever latch (10) to the locking lever latch stud (5); remove the locking lever latch (10) and the repeat blocking lever (6) from the locking lever latch stud (5). Remove the set-screw (2) that holds the locking lever latch stud (5) in the keyboard frame; remove the locking lever latch stud (5).

(8) Remove the lockwasher (7), the plain hexagonal nut (8), and the universal bar adjusting screw (9) from the locking lever latch (10).

(9) Remove the repeat lever pivot stud (11), the repeat lever (12), and the flat washer (13) from the keyboard frame.

*b. Reassembly.*

(1) Reassemble the cam locking lever latch mechanism by reversing the procedures outlined in a(9) through (5) above.

(2) Replace the cam-stop lever as described in paragraph 4-24b for the TT-76/GGC or 4-25b for the TT-76A/GGC.

(3) Replace the sensing levers as described in paragraph 4-17b.

(4) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-6b for the TT-76/GGC or 4-7b for the TT-76A/GGC.

1 Machine screw, 10001
2 Lockwasher, 10429
3 Space bar, 53944A
4 Retainer ring, 10969
5 Retainer ring, 10969
6 Space bar arm shaft, 55862
7 Space bar bail arm assembly, 57281A
8 Machine screw, 10304
9 Lockwasher, 10429
10 Key lever locking bar, 53210
11 Key lever spring, 50941
12 Space bar spring. 53974
13 Keytop, para .4-0b(2)
14 Short key lever, 55917-
15 Medium key lever
16 Long key lever, 5732
17 Space bar lever, 5591
18 Repeat key lever, 57324
19 Machine screw, 10015
20 Lockwasher, 10431
21 Key lever mounting bracket, 57279A
22 Function blocking bar spring, 50919
23 Self-locking hexagonal nut, 10551
24 Function blocking arm, 55976
25 Retainer ring, 10969
26 Lubricating pad, 55986
27 Retainer ring, 10969
28 Function blocking bar 55822A
29 Self-locking hexagonal nut, 10551
30 Flat washer, 10457
31 Carriage return blocking arm, 55977
32 Self-locking hexagonal nut, 10551
33 Flat washer, 10457
34 Return latch bracket, 55975
35 Retainer ring, 10969
36 Carriage return blocking bar, 55823A
37 Universal code bar return spring, 51136
38 Machine screw, 10024
39 Lockwasher, 10431
40 Front key lever guide, 55860
41 Machine screw, 10017
42 Lockwasher, 10431
43 Code bar guide stud, 51560
44 Middle key lever guide, 52915
45 Code bar, 53299
46 Code bar, 53298
47 Code bar, 53297
48 Code bar, 43296
49 Code bar, 53295
50 Universal bar, 51134A
51 Lockwasher, 10429
52 Hexagonal nut, 10573
53 Universal bar adjusting screw, 54637
54 Universal bar bracket, 54642
55 Spring, 56688
56 Flat washer, 10457

*Figure 4-13. -Continued*

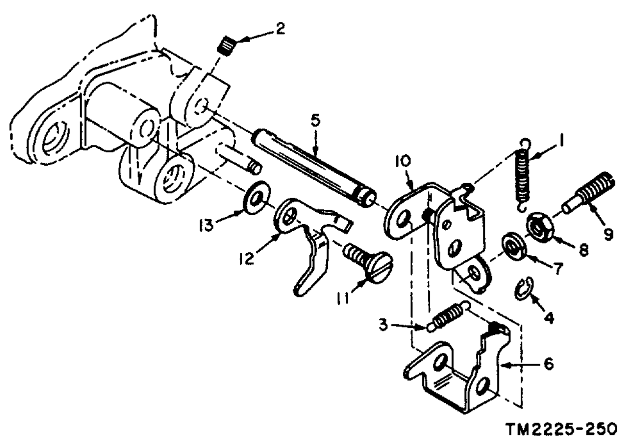
(5) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

(6) Adjust the cam locking lever mechanism as described in paragraph 4-103.

## 4-23. Disassembly and Reassembly of Keyboard-Transmitter Camlocking Latch Mechanism (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and Subsequent Procurements)

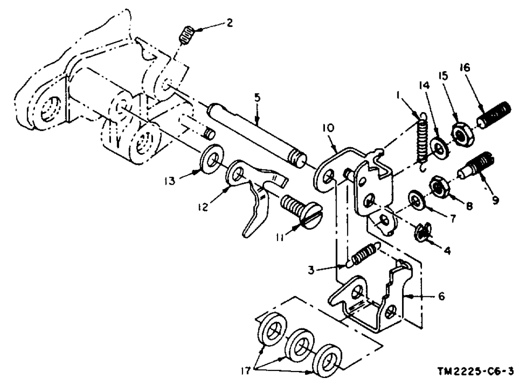
*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.
(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-9a.
(3) Remove the sensing levers as described in paragraph 4-17a(3).
(4) Remove the retainer ring (4, fig. 4-17) that holds the cam-stop lever (5) to the cam-stop lever stud (23); remove the cam-stop lever (5).
(5) Remove the locking lever latch spring (1, fig. 4-15) from the locking lever latch (10) and the spring post in the keyboard frame.
(6) Remove the repeat blocking lever spring (3) from the repeat blocking lever (6) and the locking lever latch (10).




1 Locking lever latch spring, 51544
2 Setscrew, 10209
3 Repeat blocking lever spring, 50944
4 Retainer ring, 10949
5 Locking lever latch stud, 51564
6 Repeat blocking lever, 51569
7 Lockwasher, 10409 (TT-76A/GGC only)
8 Plain hexagonal nut, 10507
9 Universal bar adjusting screw, 50658
10 Locking lever latch, 51570A
11 Repeat lever pivot stud, 51568
12 Repeat lever, 52914
13 Flat washer, 50414

Figure 4-14. Cam locking lever latch mechanism, exploded view (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC, serial Nos. 255 and below, Order No. 13931-PC-58).




1 Locking lever latch spring, 59478
2 Set screw, 10209
3 Repeat blocking lever spring, 50944
4 Retainer ring, 10949
5 Locking lever latch stud, 51564
6 Repeat blocking lever, 59477
7 Lockwasher, 10409
8 Plain hexagonal nut, 10507
9 Universal bar adjusting screw, 50658
10 Locking lever latch, 51570A
11 Repeat lever pivot stud, 51568
12 Repeat lever, 52914
13 Flat washer, 50414
14 Flat washer, 10409
15 Plain hexagonal nut, 10507
16 Repeat blocking lever adjusting screw, 10233
17 Felt washer, 61468

Figure 4-15. Cam locking lever latch mechanism, exploded view (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and all subsequent procurements).

(7) Remove the retainer ring (4) that holds the repeat blocking lever (6) and the locking lever latch (10) to the locking lever latch stud (5): remove the locking lever latch (10), the repeat blocking lever (6) and the three felt washers (17), when supplied, as they fall free of the locking lever latch stud (5). Remove the setscrew (2) that holds the locking lever latch stud (5) in the keyboard frame and remove the locking lever latch stud (5).

(8) Remove the plain hexagonal nut (8), the lockwasher (7), and the universal bar adjusting screw (9) from the locking lever latch (10).

(9) Remove the self-locking hexagonal nut (15), the washer (14), and the repeat blocking lever latch adjusting screw (16).

(10) Remove the repeat lever pivot stud (11), the repeat lever (12), and the flat washer (13) from the keyboard frame.

*b. Reassembly.*

(1) Reassemble the cam locking lever latch mechanism by reversing the procedures outlined in a(10) through (4) above.

(2) Replace the sensing levers as described in paragraph 4-17b.

(3) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-9b.

(4) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

(5) Adjust the cam locking lever mechanism as described in paragraph 4-103 .

**4-24. Disassembly and Reassembly of Keyboard Transmitter Frame Assembly (TT-76/ GGC and TT-699/ GGC)**

*a. Dissasembly.*

(1) Remove the keyboard-transmitter from the perforator frame as described in paragraph 4-5a.

(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-6a.

(3) Remove the keyboard-transmitter contacts from the keyboard frame as described in paragraph 4-16a.

(4) Remove the sensing and selector levers from the keyboard frame as described in paragraph 4-17a.

(5) Remove the keyboard-transmitter camshaft as described in paragraph 4-18a.

(6) Remove the key levers and code bars from the keyboard frame as described in paragraph 4-19a.

(7) Remove the camshaft locking mechanism as described in paragraph 4-22a.

(8) Remove the cam-stop lever spring (3, fig. 4-16) from the cam-stop lever (5).

(9) Remove the retainer ring (4) that hold the cam-stop lever (5) to the cam-stop lever stud (28); remove the cam-stop lever (5).

(10) Unsolder and disconnect the five electrical wires connected to the keyboard filter (11).

(11) Remove the machine screw (6) and two lockwashers (7 and 8) that hold the keyboard filter (11) to the connector mounting bracket (26) and the keyboard frame (29).

(12) Remove the machine screw (9) and lock-washer (10) that hold the keyboard filter (11) to the key lever mounting bracket (16 fig. 4-11); remove the keyboard filter (11, or 30, fig. 4-16).

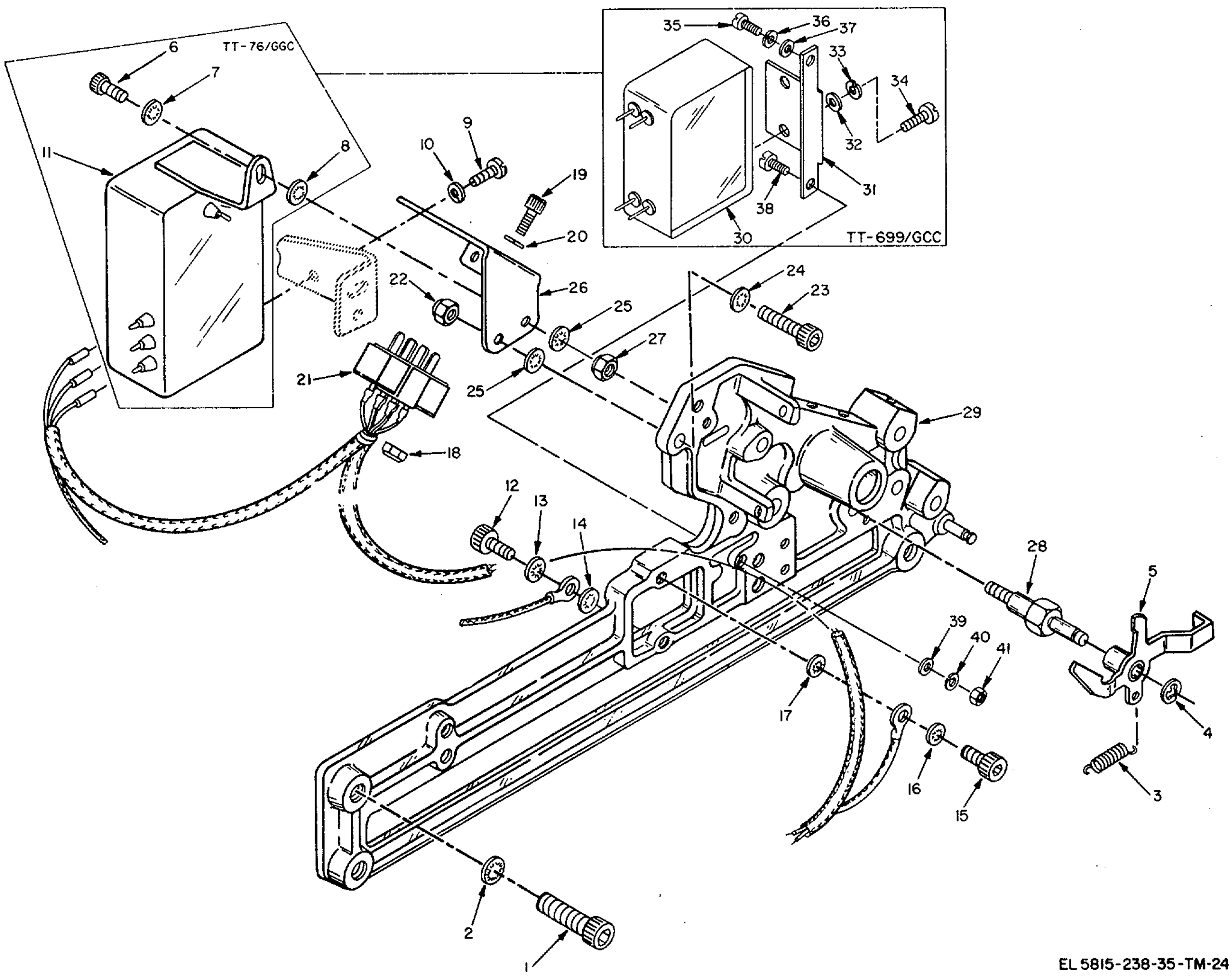
(13) Remove the machine screw (12) and two lockwashers (13 and 14) that hold the cable grounding lug to the inside of the keyboard frame (29).

(14) Remove the machine screw (15) and two lockwashers (16 and 17) that hold the cable grounding lug to the outside ot the keyboard frame (29).

(15) Remove the self-locking hexagonal nut (18), machine screw (19), and lockwasher (20) that hold the plug connector (21) to the connector mounting bracket (26); remove the plug connector (21).

(16) Remove the self-locking hexagonal nut (22), the machine screw (23), and lockwasher (24) that hold the connector mounting bracket (26) to the keyboard frame (29); remove the connector mounting bracket (26) and two lockwashers (25).

(17) Remove the self-locking hexagonal nut (27) that holds the cam-stop lever stud (28) to the keyboard frame (29); remove the cam-stop lever stud (28).




1 Machine screw, 10030
2 Lockwasher, 10405
3 Cam-stop lever spring, 51575
4 Retainer ring, 10949
5 Cam-stop lever, 51549A
6 Machine screw, 10004
7 Lockwasher, 10403
8 Lockwasher, 10403
9 Machine screw, 10301
10 Lockwasher, 10430
11 Keyboard filter, 52305A
12 Machine screw, 10004
13 Lockwasher, 10403
14 Lockwasher, 10403
15 Machine screw, 10004
16 Lockwasher, 10403
17 Lockwasher, 10403
18 Self-locking hexagonal nut, 10500
19 Machine screw, 10003
20 Lockwasher, 10429
21 Plug connector, 20400
22 Self-locking hexagonal nut, 10500
23 Machine screw, 10005
24 Lockwasher, 10403
25 Lockwasher, 10403
26 Connector mounting bracket, 52954
27 Self-locking hexagonal nut, 10501
28 Cam-stop lever stud, 51563
29 Keyboard frame 51441A
30 Noise suppressor SM-D-759881
31 Pan head screw 6-40 x 1/2
32 Lockwasher No. 6 MS35338-136
33 Flat washer No. 6 MS15795-805
34 Pan head screw 6-32 x 5/8
35 Flat washer No. 6 MS15795-805
36 Lockwasher No. 6 MS35338-136
37 Hex nut, No. 6-32, MS35649-264

*Figure 4-16. Keyboard-transmitter frame assembly, exploded view (TT-76/GGC and TT-699/GGC).*

*b. Reassembly.*

(1) Reassemble the keyboard-transmitter frame assembly by reversing the procedures outlined in a(17) through (8) above. Solder the electrical leads to the keyboard filter (11) as indicated in figure 6-4.
(2) Replace the camshaft locking mechanism as described in paragraph 4-22b.
(3) Replace the key levers and code bars on the keyboard frame as described in paragraph 4-19b.
(4) Replace the keyboard-transmitter camshaft as described in paragraph 4-18b.
(5) Replace the sensing and selector levers on the keyboard frame as described in paragraph 4-17b.
(6) Replace the keyboard-transmitter contacts on the keyboard frame in paragraph 4-16b.
(7) Replace the indicator assembly on keyboard-transmitter as described in paragraph 4-6b.
(8) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

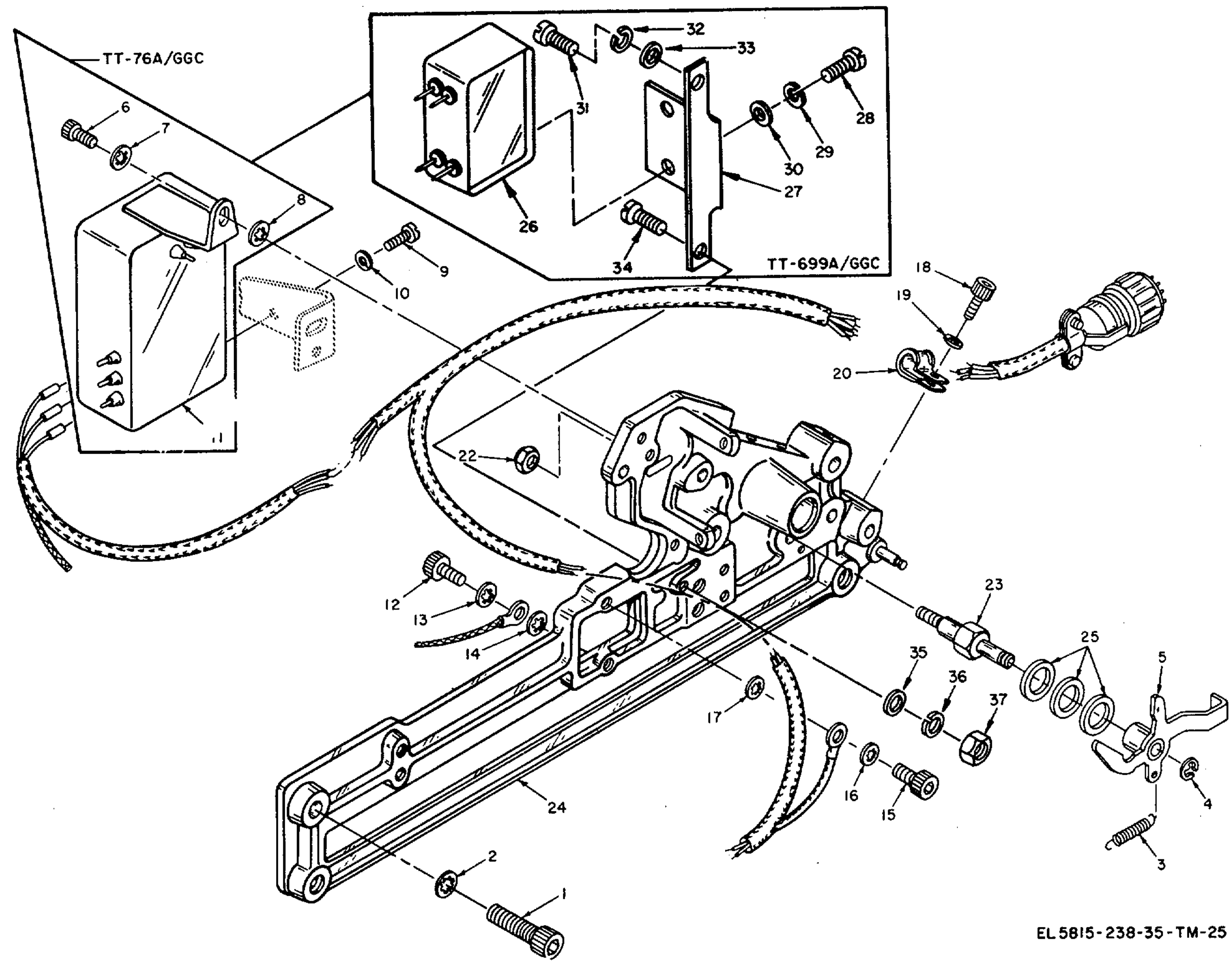
**4-25. Disassembly and Reassembly of Keyboard-Transmitter Frame Assembly (TT-76A/GGC and TT-76B/GGC Serial No. 225 and Below, Order No. 13931-PC-58, TT-966A/GGC and Later Models)**

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.
(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-7a (TT-76A/GGC), or 4-8a (TT-76B/GGC).
(3) Remove the keyboard transmitter contacts from the keyboard frame as described in paragraph 4-16a.
(4) Remove the sensing and selector levers from the keyboard frame as described in paragraph 4-17a.
(5) Remove the keyboard-transmitter camshaft as described in paragraph 4-18a.
(6) Remove the key levers and code bars from the keyboard frame as described in paragraph 4-20a.
(7) Remove the camshaft locking mechanism as described in paragraph 4-22a.
(8) Remove the cam-stop lever spring (3, fig.4-17) from the cam stop lever (5).
(9) Remove the retainer ring (4) that holds the cam-stop lever (5) to the cam-stop lever stud (23); remove the cam-stop lever (5). Remove the three felt washers (25), when supplied, from the cam stop lever stud.
(10) Unsolder and disconnect the five wire leads from the keyboard filter (11).
(11) Remove the machine screw (6), two lockwashers (7 and 8), the machine screw (9), and lockwasher (10) that hold the keyboard filter (11) to the key lever mounting bracket (22, fig. 4-12); remove the keyboard filter (11, fig. 4-17).
(12) Remove the machine screw (12) and two lockwashers (13 and 14) that hold the cable grounding lug to the inside of the keyboard frame (24).
(13) Remove the machine screw (15) and lockwashers (16 and 17) that hold the cable grounding lug to the front of the keyboard frame (24).
(14) Remove the machine screw (18) and lockwasher (19) that hold the cable clamp (20) to the keyboard frame (24); remove the clamp (20) and electrical cable (21).
(15) Remove the self-locking hexagonal nut (22) that holds the cam-stop lever stud (23) in the keyboard frame (24); remove the cam-stop lever stud (23).

*b. Reassembly.*

(1) Reassemble the keyboard-transmitter frame assembly by reversing the procedures outlined in a (15) through (8) above use figure 6-5 for keyboard filter connections.
(2) Replace the camshaft locking mechanism as described in paragraph 4-22b.
(3) Replace the key levers and code bars on the keyboard frame as described in paragraph 4-20b.
(4) Replace the keyboard-transmitter cam-shaft as described in paragraph 4-18b.
(5) Replace the sensing and selector levers on the keyboard frame as described in paragraph 4-17b.
(6) Replace the keyboard-transmitter contacts as described in paragraph 4-16b.
(7) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-7b (TT-76A/GGC), or 4-8a (TT-76B/GGC).




| | |
|---|---|
| 1 Machine screw, 10027 | 16 Lockwasher, 10403 |
| 2 Lockwasher, 10405 | 17 Lockwasher, 10403 |
| 3 Cam-stop lever spring, 51575 | 18 Machine screw, 10004 |
| 4 Retainer ring, 10949 | 19 Lockwasher, 10429 |
| 5 Cam-stop lever, 51549A | 20 Cable clamp 20893 |
| 6 Machine screw, 10004 | 21 Electric cable, 57294A |
| 7 Lockwasher, 10403 | 22 Self-locking hexagonal nut, 10501 |
| 8 Lockwasher, 10403 | 23 Cam-stop lever stud, 51563 |
| 9 Machine screw, 10301 | 24 Keyboard frame, 57295A |
| 10 Lockwasher, 10430 | 25 Felt washer, 61469 |
| 11 Keyboard filter, 54576A | 26 Noise suppressor SM-D-759881 |
| 12 Machine screw, 10064 | 27 Noise suppressor bracket SM-C-785977 |
| 13 Lockwasher, 10403 | 28 Pan head screw 6-32 x 3/8 MS51957-28 |
| 14 Lockwasher, 10403 | 29 Lockwasher No. 6 MS35338-136 |
| 15 Machine screw, 10004 | 30 Flat washer No. 6 MS15795-805 |

*Figure 4-17. Keyboard-transmitter frame assembly, exploded view (TT-76A/GGC and later models, TT-699A/GGC and later models).*

(8) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

**4-26. Disassembly and Reassembly of Keyboard-Transmitter Frame Assembly (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and Subsequent Procurements)**

*a. Disassembly.*

(1) Remove the keyboard-transmitter from the reperforator frame as described in paragraph 4-5a.
(2) Remove the indicator assembly from the keyboard-transmitter as described in paragraph 4-9a.
(3) Remove the keyboard transmitter contacts from the keyboard frame as described in paragraph 4-16a.
(4) Remove the sensing and selector levers from the keyboard frame as described in paragraph 4-17a.
(5) Remove the keyboard-transmitter camshaft as described in, paragraph 4-18a.
(6) Remove the key levers and code bars from the keyboard frame as described in paragraph 4-21a.
(7) Remove the camshaft locking mechanism as described in paragraph 4-23a.
(8) Follow the procedure described in paragraph 4-25a(8) through (15).

*b. Reassembly.*

(1) Reassemble the keyboard-transmitter frame assembly by reversing the procedures outlined in paragraph 4-25a, (15) through (8). Use figure 6-5 for keyboard filter connections.
(2) Replace the camshaft locking mechanism as described in paragraph 4-23b.
(3) Replace the key levers and code bars on the keyboard frame as described in paragraph 4-21b.
(4) Replace the keyboard-transmitter camshaft as described in paragraph 4-18b.
(5) Replace the sensing and selector levers on the keyboard frame as described in paragraph 4-17b.
(6) Replace the keyboard-transmitter contacts as described in. Paragraph 4-16b.
(7) Replace the indicator assembly on the keyboard-transmitter as described in paragraph 4-9b.
(8) Replace the keyboard-transmitter on the reperforator frame as described in paragraph 4-5b.

**4-27. Removal and Replacement of Transmitter-Distributor**

*a. Removal.*

(1) On the TT-76/GGC, remove the transmitter-distributor plug from the receptacle connector in the power supply and terminal unit.
(2) On the TT-76A/GGC and later models of the equipment remove the transmitter-distributor from the receptacle connector in the reperforator-transmitter base.
(3) Snap off the outside cover (1, fig.4-18) of the transmitter-distributor.
(4) Remove the two machine screws (1, fig. 4-28) and lockwashers (2) that hold the transmitter-distributor frame to the reperforator frame; remove the transmitter-distributor, carefully disengaging the friction clutch fork (8, fig. 4-25) on the transmitter-distributor camshaft (9) from the clutch driver plate on the transmitted-distributor drive shaft.

*b. Replacement.*

(1) Position the transmitter-distributor on the reperforator frame, carefully engaging the friction clutch fork (8, fig. 4-25) on the transmitter-distributor camshaft with the clutch driver plate on the transmitter-distributor drive shaft. Secure with the two machines screws (1, fig. 4-28) and lockwashers (2).
(2) Install the outside cover (1, fig. 4-18) on the transmitter-distributor.

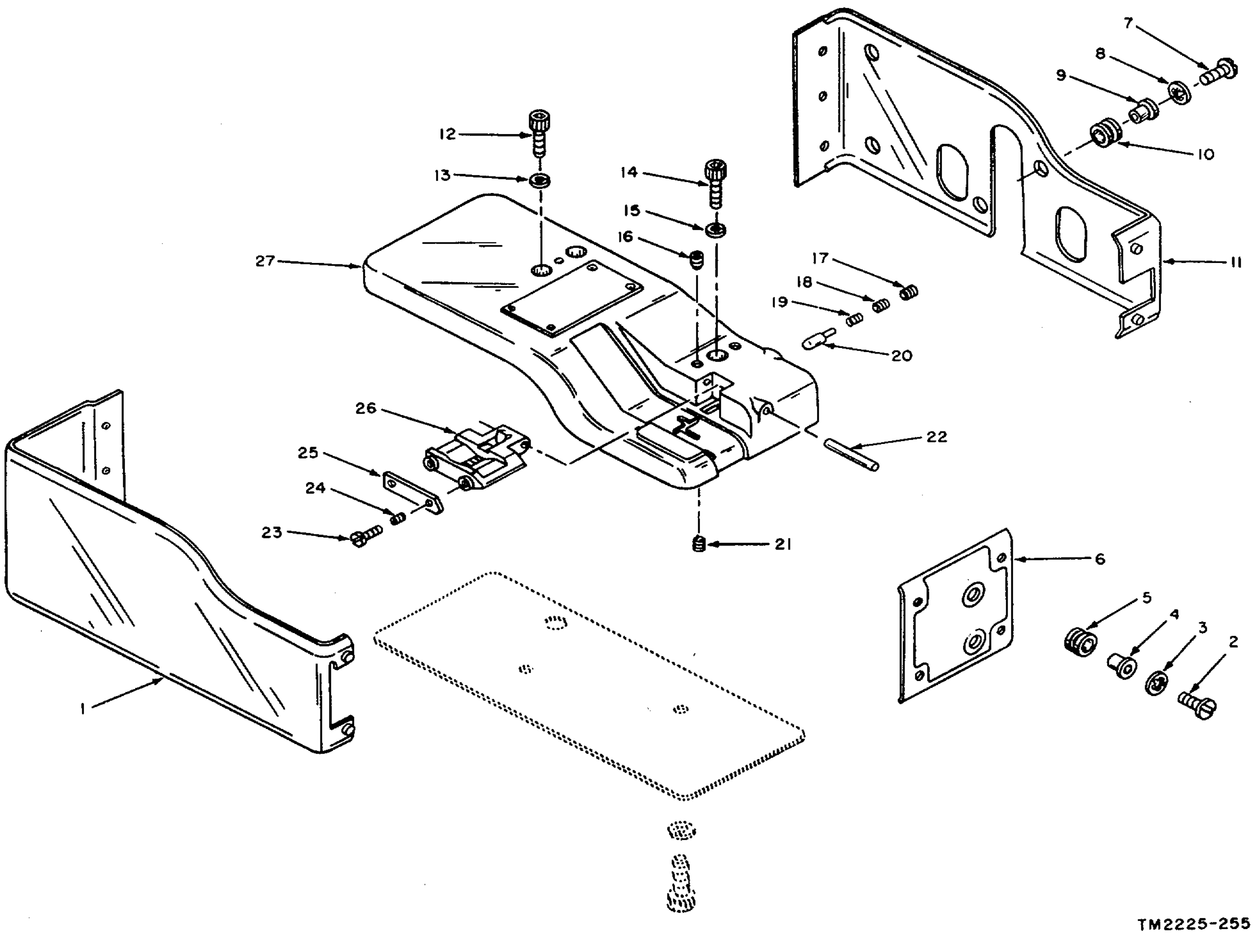
(3) On the TT-76A/GGC and later models of the equipment connect the transmitter-distributor plug to the receptacle connector in the reperforator-transmitter base.

(4) On the TT-76/GGC, connect the transmitter-distributor plug to the receptacle connector on the power supply and terminal unit.

**4-28. Disassembly and Reassembly of Transmitter-Distributor Covers (TT-76/GGC)** (fig. 4-18)

*a. Disassembly.*

(1) Remove the transmitter-distributor as described in paragraph 4-27a.
(2) Remove the two machine screws (2), lockwashers (3), bushings (4), and




| | | | | | |
|---|---|---|---|---|---|
| 1 | Outside cover, 52817A | 10 | Grommet, 20725 | 19 | Tape cover spring, 52813 |
| 2 | Machine screw, 10357 | 11 | Inside cover, 52818A | 20 | Plunger, 52859 |
| 3 | Lockwasher, 10403 | 12 | Machine screw, 10003 | 21 | Setscrew, 10209 |
| 4 | Bushing, 52860 | 13 | Lockwasher, 10429 | 22 | Pin, 52864 |
| 5 | Grommet, 20725 | 14 | Machine screw, 10006 | 23 | Machine screw, 52884 |
| 6 | Front plate, 52853 | 15 | Lockwasher, 10429 | 24 | Setscrew, 10221 |
| 7 | Machine screw, 10357 | 16 | Setscrew, 10224 | 25 | Tape guide, 52809 |
| 8 | Lockwasher, 10403 | 17 | Setscrew, 10209 | 26 | Tape cover, 52820 |
| 9 | Bushing, 52860 | 18 | Setscrew, 10209 | 27 | Top cover, 53588A |

*Figure 4-18. Transmitter-distributor covers, exploded view (TT-76/GGC).*

grommets (5) that hold the front plate (6) to the transmitter-distributor frame; remove the front plate (6).

(3) Remove the four machine screws (7), lockwashers (8), bushings (9), and grommets (10) that hold the inside cover (11) to the transmitter-distributor frame; remove the inside cover (11).

(4) Remove the two machine screws (12), lockwashers (13), machine screw (14), and lockwasher (15) that hold the top cover (27) to the transmitter-distributor frame; remove the assembled tape cover (26) and top cover (27).

(5) Remove the two setscrews (17 and 18) that hold the tape cover spring (19) and plunger (20) in the top cover; remove the tape cover spring (19) and plunger (20).

(6) Remove the setscrew (21) that holds the pin (22) in the top cover (27). Remove the pin (22); remove the tape cover (26) from the top cover (27).

(7) Remove the machine screw (23) and setscrew (24) that hold the tape guide (25) to the tape cover (26); remove the tape guide (25).

*b. Reassembly.*

(1) Reassemble the transmitter-distributor covers by reversing the procedures outlined in a(7) through (2) above. When replacing the top cover (27), depress the tape cover (26) so that the top cover (27) and tape cover (26) are engaged by the tape cover latch (12, fig. 4-20).

(2) Adjust the tape cover as described in paragraphs 4-210 and 4-220.

(3) Replace the transmitter-distributor as described in paragraph 4-27b.

**4-29. Disassembly and Reassembly of Transmitter-Distributor Covers (TT-76A/GGC and Later Models)** (fig. 4-19)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator-transmitter as described in paragraph 4-27a.

(2) Remove the two machine screws (2), lockwashers (3), bushings (4), and grommets (5) that hold the front plate (6) to the transmitter-distributor frame; remove the front plate (6).

(3) Remove the four machine screws (7), lockwashers (8), bushings (9), and grommets (10) that hold the inside cover (11) to the transmitter-distributor frame; remove the inside cover (11).

(4) Remove the setscrew (12) that holds the tape cover latch stud (13) to the tape cover bracket (30); remove the tape cover latch stud (13), tape cover latch (14), and tape cover latch spring (15).

(5) Remove the pin (16) that holds the tape cover (21) to the tape cover bracket (30); remove the tape cover spring (17) and the assembled tape cover (21) and tape guide (20).

(6) Remove the two machine screws (18) and setscrews (19) that hold the tape guide (20) to the tape cover (21); remove the tape guide (20).

(7) Remove the two machine screws (22), lockwashers (23), machine screw (24), and lockwasher (25) that hold the top cover (33) to the transmitter-distributor frame; remove the top cover (33). Remove the setscrew (26) and two setscrews (27) from the top cover (33).

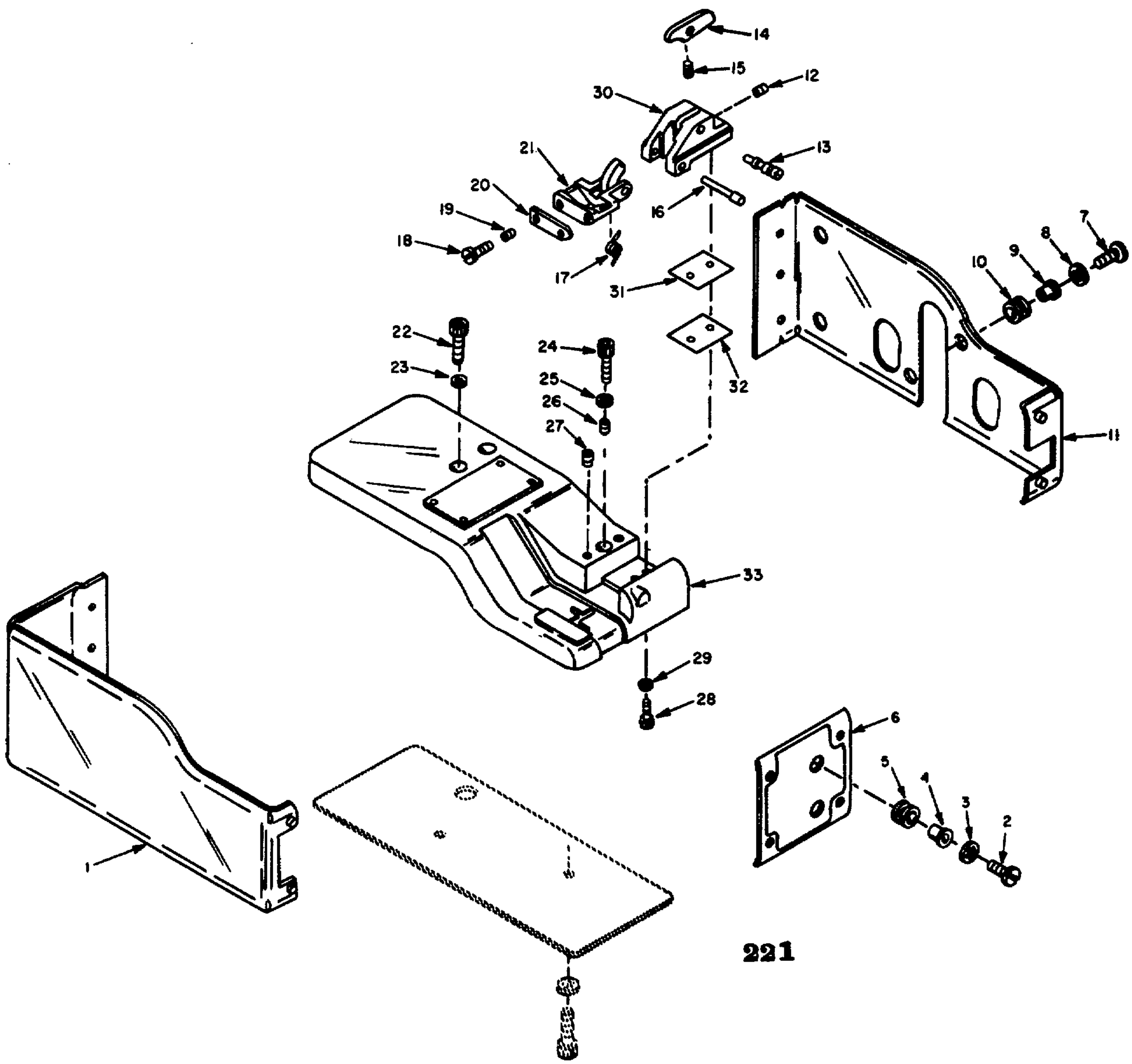
(8) Remove the two machine screws (28) and lockwashers (29) that hold the tape cover bracket (30) to the top cover (33); remove the tape cover bracket (30) and shims (31 and 32).

*b. Reassembly.*

(1) Reassemble the transmitter-distributor covers by reversing the procedures described in a(8) through (2) above.

(2) Adjust the tape cover and top cover as described in paragraphs 4-211 through 4-213 and 4-218.

(3) Replace the transmitter-distributor as described in paragraph 4-27b.




TM2725-256

| | |
|---|---|
| 1 | Outside cover, 53796A |
| 2 | Machine screw, 10357 |
| 3 | Lockwasher, 10403 |
| 4 | Bushing, 52860 |
| 5 | Grommet, 20725 |
| 6 | Front plate, 52853 |
| 7 | Machine screw, 10357 |
| 8 | Lockwasher, 10403 |
| 9 | Bushing, 52860 |
| 10 | Grommet, 20725 |
| 11 | Inside cover, 53795 |
| 12 | Setscrew, 10203 |
| 13 | Tape cover latch stud, 53952 |
| 14 | Tape cover latch, 57204 |
| 15 | Tape cover latch spring, 57203 |
| 16 | Pin, 57214 |
| 17 | Tape cover spring, 56324 |
| 18 | Machine screw, 52884 |
| 19 | Setscrew, 10221 |
| 20 | Tape guide, 52809 |
| 21 | Tape cover, 64045A |
| 22 | Machine screw, 10003 |
| 23 | Lockwasher, 10429 |
| 24 | Machine screw, 10006 |
| 25 | Lockwasher, 10429 |
| 26 | Setscrew, 10209 (TT-76/GGC only) |
| 27 | Setscrew, 10224 |
| 28 | Machine screw, 10004 |
| 29 | Lockwasher, 10421 |
| 30 | Tape cover bracket, 57211 |
| 31 | .002-inch shim, 57201 |
| 32 | .005-inch shim, 57202 |
| 33 | Top cover, 57215A |

Note. A flat washer, 10459, is located between items 33 and 29 on the TT-76A/GGC and later models.

*Figure 4-19. Transmitter-distributor covers, exploded view (TT-76A/GGC and later models).*

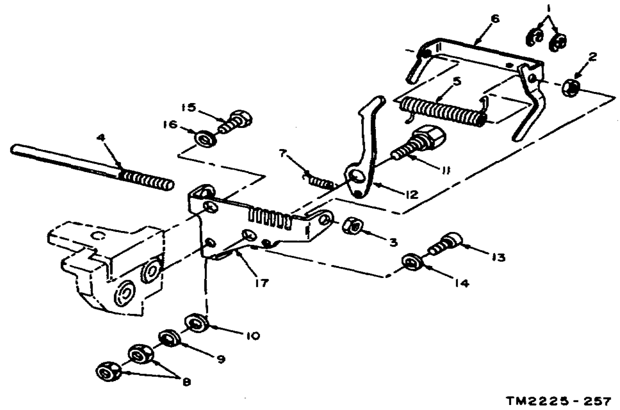
**4-30. Disassembly and Reassembly of Tape-Out Sensing Mechanism (TT-76/GGC)**
(fig. 4-20)

*a. Disassembly.*

(1) Snap off the outside cover and remove the front plate and top cover from the transmitter-distributor as described in paragraph 4-28a(2) and (4).

(2) Remove the two retainer rings (1) that hold the tape-out lever (6) in place on, the tape-out lever pivot shaft (4).

(3) Remove the two plain hexagonal nuts (2 and 3) from the tape-out lever pivot shaft (4).




1 Retainer ring, 10969
2 Plain hexagonal nut, 10504
3 Plain hexagonal nut, 10504
4 Tape-out lever pivot shaft, 52718
5 Tape-out lever spring, 53156
6 Tape-out lever, 52824
7 Tape cover latch spring, 53123
8 Plain hexagonal nut, 10513
9 Lockwasher, 10429
10 Flat washer, 10450
11 Tape cover latch, eccentric, 52847
12 Tape cover latch, 52846
13 Machine screw, 10003
14 Lockwasher, 10429
15 Machine screw, 10398
16 Lockwasher, 10429
17 Code sensing lever guide, 52861

*Figure 4-20. Tape-out sensing mechanism, exploded view (TT-76/GGC).*

(4) Slide the tape-out lever pivot shaft from the code sensing lever guide (17) remove the tape-out lever spring (5) and the tape-out lever (6).

(5) Remove the tape cover latch spring (7) from the tape cover latch (12) and from the code sensing lever guide (17).

(6) Remove the two plain hexagonal nuts (8) lockwashers (9), and flat washer (10) that hold the tape cover latch eccentric (11) to the code sensing lever guide (17). Remove the tape cover latch eccentric (11) and the tape cover latch (12) from the code sensing lever guide (17).

(7) Remove the machine screw (13), lock-washer (14), machine screw (15), and lockwasher (16) that hold the code sensing lever guide (17) to the transmitter-distributor frame; remove the code sensing lever guide (17).

*b. Reassembly.*

(1) Reassemble the tape-out sensing mechanism by reversing the procedures outlined in a(7) through (2) above.

(2) Adjust the transmitter-distributor as described in paragraphs 4-209, 4-210, 4-216, 4-217, and 4-220.

(3) Replace the transmitter-distributor covers as described in paragraph 4-28b and snap on the outside cover.

**4-31. Disassembly and Reassembly of Tape-Out Sensing Mechanism (TT-76A/GGC and Later Models) (fig. 4-21)**

*a. Disassembly.*

(1) Snap off the outside cover and remove the front plate and top cover from the transmitter-distributor as described in paragraph 4-29a(2) and (8).

(2) Remove the two plain hexagonal nuts (1 and 2) from the tape-out lever pivot shaft (5).

(3) Remove the two retainer rings (3 and 4) that hold the tape-out lever (7) in place on the tape-out lever pivot shaft

(5); slide the tape-out lever pivot shaft from the code sensing lever guide (12); remove the tape-out lever spring (6), felt washer (13), when supplied, and tape-out lever (7).

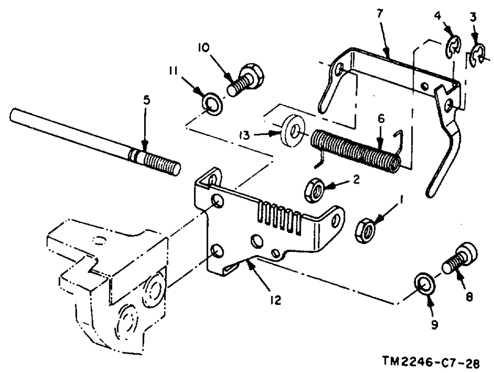
(4) Remove the machine screw (8), lock- washer (9), machine screw (10), and lockwasher (11) that hold the code sensing lever guide (12) to the frame of the transmitter-distributor; remove the code sensing lever guide (12).

*b. Reassembly.*

(1) Reassemble the tape-out sensing mechanism by reversing the procedures outlined in a(4) through (2) above.

(2) Adjust the transmitter-distributor as described in paragraphs 4-209, 4-211, 4-212, 4-213, and 4-218.

(3) Replace the transmitter-distributor covers as described in paragraph 4-29b.




1 Plain hexagonal nut, 10504
2 Plain hexagonal nut, 10504
3 Retainer ring, 10969
4 Retainer ring, 10969
5 Tape-out lever pivot shaft, 52718
6 Tape-out lever spring, 53156
7 Tape-out lever, 52824
8 Machine screw, 10003
9 Lockwasher, 10429
10 Machine screw, 10398
11 Lockwasher, 10429
12 Code sensing lever guide, 52861
13 Felt washer, 61474

*Figure 4-21. Tape-out sensing mechanism, exploded view (TT-76A/GGC and later models).*

## 4-32. Disassembly and Reassembly of Transmitter-Distributor Operating Levers (fig. 4-22)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.

(2) Remove the covers from the transmitter-distributor as described in. paragraph 4-28a for the TT-76/GGC or 4-29a for the TT-76A/GGC and later models.

(3) Remove the retainer ring (1) that holds the tight-tape lever (2) to the pivot post on the transmitter-distributor frame; remove the tight-tape lever catching the two felt washers (23), when supplied, as they fall from the tight-tape lever.

(4) Remove the retainer ring (3) that holds the upper switch bail lever (4) to the pivot post on the transmitter- distributor frame; remove the upper switch bail lever.

(5) Remove the self-locking hexagonal nut (5), machine screws (6) and (7), and flat washer (8) that hold the start-stop switch (11) to the transmitter-distributor frame, remove the start-stop switch.

(6) Remove the machine screw (9) and lockwasher (10) that hold the electrical clamp (13) to the frame.

(7) Unsolder the ends of the two wires in the wiring harness (12) from the solder lugs on the start-stop switch (11) tag the wires and remove the start-stop switch.

(8) Disconnect the terminal lugs of the wires at the other end of the wiring harness from the terminal board; remove the wiring harness and the electrical clamp.

(9) Remove the retainer ring (14) that holds the start-stop lever (15) to the pivot stud on the frame; remove the start-stop lever (15). Catch the two felt washers (24), when supplied, as they fall from the start-stop lever.

(10) Remove the retainer rings (16 and 17) and felt washer (25), when supplied, from the pin (18); remove the pin from the lower switch bail lever (19) and from the transmitter-distributor frame. Remove the lower switch bail lever (19).

(11) Remove the start-stop detent lever spring (20) from the start-stop detent lever (22) and from the spring post on the transmitter-distributor frame.

(12) Remove the retainer ring (21), the felt washer (26), when supplied, and the start-stop detent lever (22) from the pivot post.

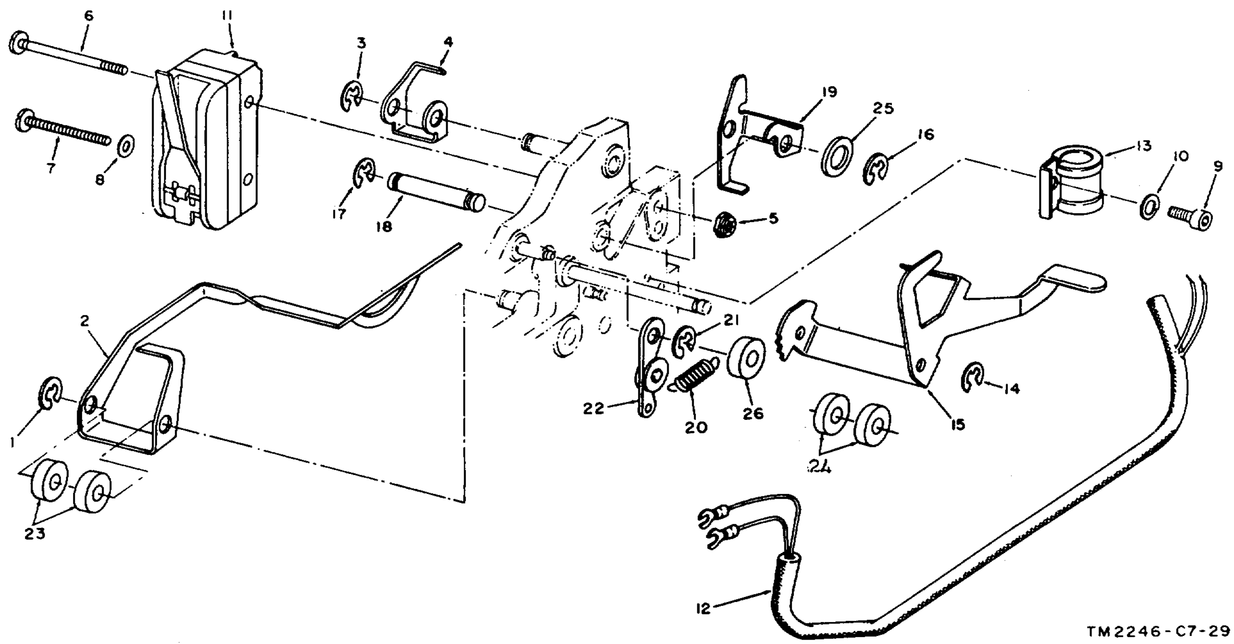
*b. Reassembly.*

(1) Reassemble the transmitter-distributor operating levers by reversing the procedures outlined in a(12) through (3).

(2) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT-76A/GGC and later models, or 4-28b for the TT-76/GGC.

(3) Replace the transmitter-distributor as described in paragraph 4-27b.

Note. A flat washer, 10450, is located between item 5 and the casting on all models except the TT-76/GGC.




1 Retainer ring, 10949
2 Tight-tape lever, 52810
3 Retainer ring, 10940
4 Upper switch bail lever, 52811
5 Self-locking hexagonal nut, 10500
6 Machine screw, 10385
7 Machine screw, 10359
8 Flat washer, 10459
9 Machine screw, 10003
10 Lockwasher, 10429
11 Start-stop switch, 20108
12 Wiring harness, 53339
13 Electrical clamp, 20507
14 Retainer ring, 10949
15 Start-stop lever, 52863
16 Retainer ring, 10949
17 Retainer ring, 10949
18 Pin, 52872
19 Lower switch bail lever, 52812
20 Start-stop detent lever spring, 53149
21 Retainer ring, 10949
22 Start-stop detent lever, 50404
23 Felt washer, 61474
24 Felt washer, 61474
25 Felt washer, 61477
26 Felt washer, 61474

*Note.* A flat washer, 10450, is located between item 5 and the casting on all models except the TT-76/GGC.

*Figure 4-22. Transmitter-distributor operating levers (exploded view).*

**4-33. Disassembly and Reassembly of Transmitter-Distributor Code Sensing Levers** (fig. 4-23)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.

(2) Remove the transmitter-distributor covers as described in paragraph 4-28a for the TT-76/GGC or paragraph 4-29a for the TT-76A/GGC and later models.

(3) Remove the felt washer (22), when supplied, and the five code sensing lever springs (1) from the code sensing levers (16, 17, 18, 20, and 21) and from the code sensing lever spring post (5).

(4) Remove the tape feed retracting lever spring (2) from the tape feed retracting lever (14) and from the code sensing lever spring post (5).

(5) Remove the plain hexagonal nuts (3 and 4) from the code sensing lever spring post (5); remove the code sensing lever spring post (5) from the selector lever comb.

(6) Remove the tape feed claw spring (6) from the tape feed claw (19) and from the selector lever comb.

(7) Remove the setscrew (7) that holds the code sensing lever stud (13) in the frame.

(8) Remove the retainer rings (8, 9, 10, 11, and 12) from the code sensing lever stud (13); slide the code sensing lever stud out of the code sensing levers and the frame.

(9) Remove the tape feed retracting lever (14), sensing lever restoring bail (15), code sensing levers (16, 17, 18, 20, and 21) and the tape feed claw (19) from the selector lever comb. Tag each code sensing lever so that it may be properly reinstalled.

*b. Reassembly.*

(1) Reassemble the transmitter-distributor selector levers by reversing the procedures outlined in a(9) through (3) above.

(2) Adjust the transmitter-distributor as described in paragraphs 4-205 and 4-214.

(3) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT-76A/GGC and later models, or paragraph 4-28b for the TT-76/GGC.

(4) Replace the transmitter-distributor as described in paragraph 4-27b.

**4-34. Disassembly and Reassembly of Transmitter-Distributor Selector Levers** (fig. 4-24)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.

(2) Remove the covers from the transmitter-distributor as described in paragraph 4-28a for the TT-76/GGC or paragraph 4-29a for the TT-76A/ GGC and later models.

(3) Remove the six selector lever springs (1) from the spring post (38) and from the selector levers (4, 7, 10, 13, 16 and 19) and the camshaft stop lever (22).

(4) Remove the retainer ring (2) that holds the selector levers to the selector lever stud (25). Remove the flat washers (3, 6, 9, 15, 18, and 21), the selector levers, and bearing shoes (5, 8, 11, 14, 17, and 20) alternately. Remove the spacer collar (12) in sequence. Remove the felt washer (39), when supplied, from the spacer collar. Remove the camshaft stop lever (22) and the sleeve bearing (23).

(5) Remove the setscrew (24) that holds the selector lever stud (25) in the frame; remove the selector lever stud (25).

(6) Remove the tape feed lever spring (26) from the tape feed lever (28)

and from the spring post on the transmitter distributor frame.

(7) Remove the retainer ring (27) holding the tape feed lever (28) to the tape feed lever stud (30); remove the tape feed lever (28). Catch the two felt washers (40), when supplied, as they fall from the tape feed lever.

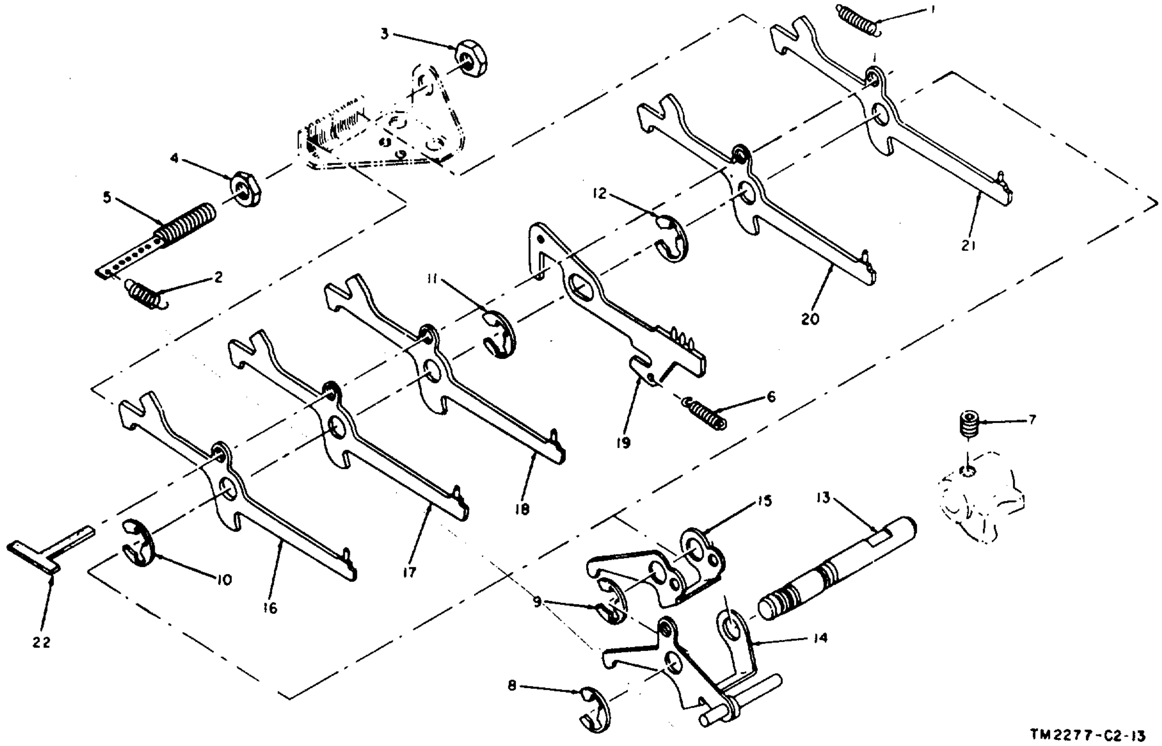
(8) Remove the two machine screws (31) and lockwashers (32) from the selector lever comb (36); remove the selector lever comb (36) from the transmitter-distributor frame.

(9) Remove the two machine screws (33), the lockwashers (34), and the stop selector lever latch (35) from the selector lever comb (36).

(10) Remove the plain hexagonal nut (37) from the spring post (38); remove the spring post (38) from the transmitter-distributor frame.

*b. Reassembly.*

(1) Reassemble the transmitter-distributor selector levers by reversing the procedures outlined in a(10) through (3) above.




- **1** Code sensing lever spring, 53152
- **2** Tape feed retracting lever spring, 53154
- **3** Plain hexagonal nut, 10509
- **4** Plain hexagonal nut, 10509
- **5** Code sensing lever spring post, 50325
- **6** Tape feed claw spring, 53153
- **7** Setscrew, 10209
- **8** Retainer ring, 10957
- **9** Retainer ring, 10957
- **10** Retainer ring, 10957
- **11** Retainer ring, 10957
- **12** Retainer ring, 10957
- **13** Code sensing lever stud, 52835
- **14** Tape feed retracting lever, 52829A
- **15** Sensing lever restoring bail, 52858
- **16** Code sensing lever, 52844
- **17** Code sensing lever, 52844
- **18** Code sensing lever, 52844
- **19** Tape feed claw, 52836
- **20** Code sensing lever, 52844
- **21** Code sensing lever, 52844
- **22** Felt washer, 61460

*Figure 4-23. Transmitter-distributor code sensing levers, exploded view.*

(2) Adjust the transmitter-distributor as described in paragraphs 4-205 and 4-214.

(3) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT-76A/GGC and later models, or paragraph 4-28b for the TT-76/GGC.

(4) Replace the transmitter-distributor as described in paragraph 4-27b.

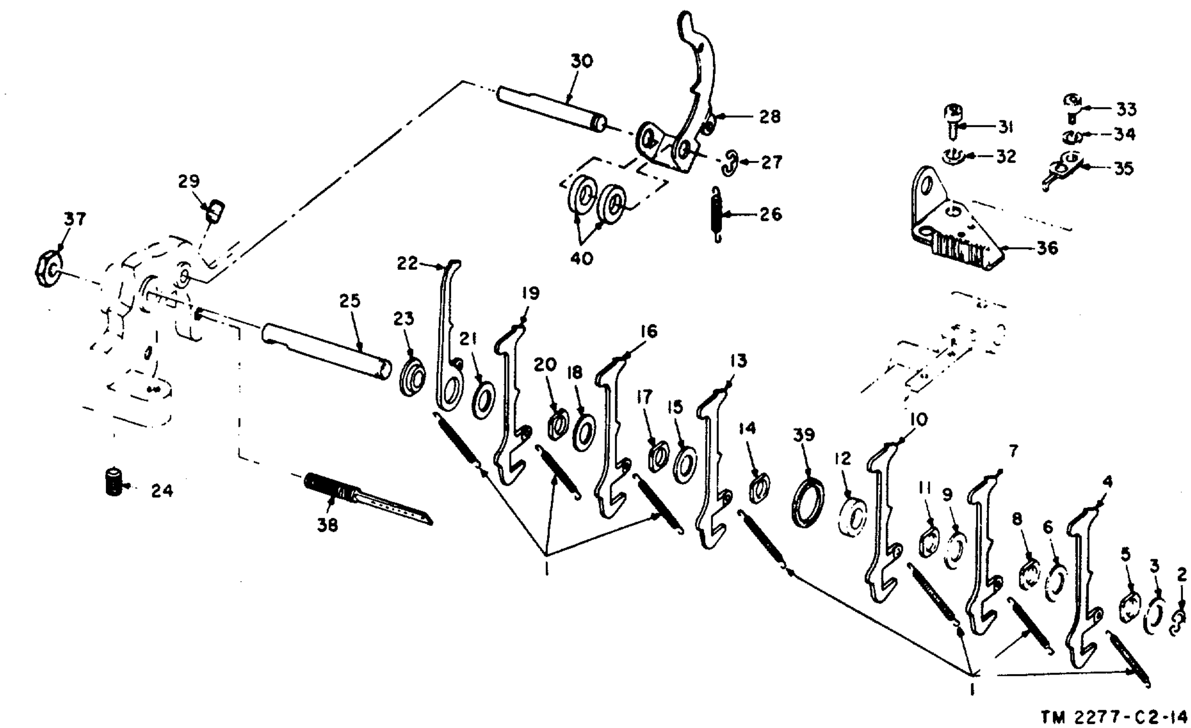
## 4-35. Disassembly and Reassembly of Transmitter-Distributor Camshaft

(fig. 4-25)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.

(2) Remove the transmitter-distributor covers as described in paragraph 4-28a for the TT-76/GGC or paragraph 4-29a for the TT-76A/GGC and later models.




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Selector lever spring, 50902 | 9 | Flat washer, 50147 | 22 | Camshaft stop lever, 53613 | 31 | Machine screw, 10003 |
| 2 | Retainer ring, 10949 | 10 | Selector lever | 23 | Sleeve bearing, 52834 | 32 | Lockwasher, 10429 |
| 3 | Flat washer, 50147 | 11 | Bearing shoe | 24 | Setscrew, 10210 | 33 | Machine screw, 10002 |
| 4 | Selector lever, 51598A (includes items 7, 10, 13, 16 and 19) | 12 | Spacer collar, 52833 | 25 | Selector lever stud, 52840 | 34 | Lockwasher, 10429 |
| 5 | Bearing shoe, 50019A (includes items 8, 11, 14, 17, and 20) | 13 | Selector lever | 26 | Tape feed lever spring, 53151 | 35 | Stop selector lever latch, 55870 |
| 6 | Flat washer, 50147 | 14 | Bearing shoe | 27 | Retainer ring, 10949 | 36 | Selector lever comb, 52841 |
| 7 | Selector lever | 15 | Flat washer, 50147 | 28 | Tape feed lever, 52845 | 37 | Plain hexagonal nut, 10509 |
| 8 | Bearing shoe | 16 | Selector lever | 29 | Setscrew, 10210 | 38 | Spring post, 50325 |
| | | 17 | Bearing shoe | 30 | Tape feed lever stud, 52842 | 39 | Felt washer, 61479 |
| | | 18 | Flat washer, 50147 | | | 40 | Felt washer, 61474 |
| | | 19 | Selector lever | | | | |
| | | 20 | Bearing shoe | | | | |
| | | 21 | Flat washer, 50147 | | | | |

*Figure 4-24. Transmitter-distributor selector levers, exploded view.*

(3) Remove the selector levers as described in paragraph 4-34a.
(4) Remove the two machine screws (1) and lockwashers (2) that hold the tape feed retracting lever cam (3), flat washer (4), sensing lever restoring cam (5), and flat washer (6) to the transmitter-distributor camshaft (9); remove the cams (3 and 5) and flat washers (4 and 6).
(5) Remove the two setscrews (7) that hold the fraction clutch fork (8) to the transmitter-distributor camshaft (9); remove the friction clutch fork (8).
(6) Slide the transmitter-distributor camshaft (9) from the ball bearings (15 and 17) in the transmitter-distributor frame; catch the flat washers (10 and 11) as they fall from the transmitter distributor camshaft (9).
(7) Remove the two machine screws (12), lockwashers (13), and fiat washers (14) that hold the ball bearing (15) in the transmitter-distributor frame; remove the ball bearing (17) from the transmitter-distributor frame.

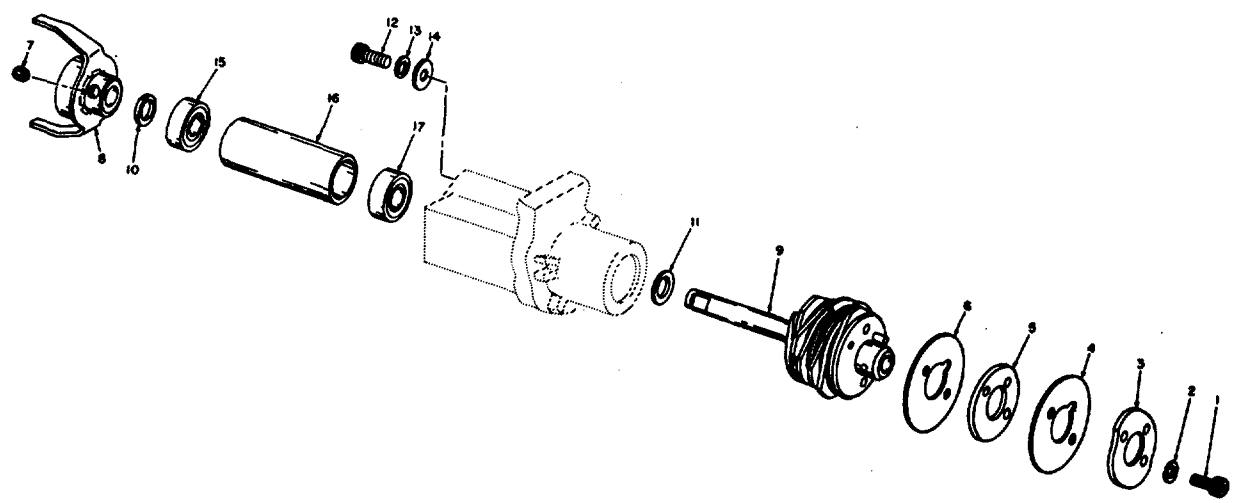
*b. Reassembly.*

(1) Reassemble the transmitter-distributor camshaft by reversing the procedures outlined in a(7) through (4) above.
(2) Replace the selector levers as de- scribed in paragraph 4-34b.
(3) Adjust the transmitter-distributor as described in paragraphs 4-221 and 4-222.
(4) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT-76A/GGC and later models or paragraph 4-28b for the TT-76/GGC.
(5) Replace the transmitter-distributor as described in paragraph 4-27b.

**4-36. Disassembly and Reassembly of Transmitter-Distributor Contacts TT-76(*)/GGC** (fig. 4-26)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.
(2) Remove the transmitter-distributor covers as described in paragraph 4-28a.




| | | | | | |
|---|---|---|---|---|---|
| 1 | Machine screw, 10004 | 7 | Setscrew, 10209 | 13 | Lockwasher, 10429 |
| 2 | Lockwasher, 10429 | 8 | Friction clutch fork, 50484A | 14 | Flat washer, 10450 |
| 3 | Tape feed retracting cam, 52867 | 9 | Transmitter-distributor camshaft, 52871 | 15 | Ball bearing, 10753 |
| 4 | Flat washer, 56175 | 10 | Flat washer, 51552 | 16 | Spacing coller, 52852 |
| 5 | Sensing lever restoring cam, 52868 | 11 | Flat washer, 52210 | 17 | Ball bearing, 10753 |
| 6 | Flat washer, 56175 | 12 | Machine screw, 10003 | | |

*Figure 4-25. Transmitter-distributor camshaft, exploded view.*

28a for the TT-76/GGC or paragraph 4-29a for the TT-76A/GGC and later models.

(3) Remove the two machine screws (1) and four lockwashers (2) that hold the transmitter contact cover (3) to the transmitter-distributor frame; remove the transmitter contact cover (3).

(4) Remove the two machine screws (4) and lockwashers (5) that hold the contact mounting (15) to the transmitter-distributor frame.

(5) Unhook the transmitter contact bail spring (6) from the spring post on the contact mounting (15) and from the hole in the transmitter and contact bail (9).

(6) Remove the machine screw (7), lockwasher (8), and two electrical terminal lugs from the side of the contact mounting (15).

(7) Remove the two machine screws (10) and lockwasher (11) that hold the transmitter contact terminal (12) to the contact mounting (15).

(8) Unsolder and disconnect the two spiraled electrical wires (14) from the top of the stationary contacts (13); remove the spiraled electrical wires (14) and the stationary contacts (13) from the contact mounting (15).

(9) Remove the felt washer (19), when supplied, and the retainer ring (16) that holds the transmitter contact bail (9) to the post in the transmitter-distributor frame; remove the transmitter contact bail (9).

(10) Remove the setscrew (17) that holds the post (18) in the transmitter-distributor frame; remove the post (18).

*b. Reassembly*.

(1) Position the post (18) in the transmitter distributor frame; secure with a setscrew (17).

(2) Position the transmitter contact bail (9) on the post (18) in the transmitter-distributor frame; secure with a retainer ring (16). Install the felt washer (19), when supplied, on the post.

(3) Install the two stationary contacts (13) in the contact mounting (15).

(4) Solder the electrical wires (14) in the slots in the top of the stationary contacts (13).

(5) Insert the transmitter contact terminals (12) in the threads of the stationary contacts (13), 1/2 to 1-1/2 threads above the contact mounting (15); hold the contacts in place with lockwashers (11) and machine screws (10) but do not tighten the screws.

(6) Position the two electrical terminal lugs on the side of the contact mounting (15); secure with the lockwasher (8) and machine screw (7).

(7) Hook one end of the transmitter contact bail spring (6) in the hole in the transmitter contact bail (9) and the other end on the spring post on the contact mounting (15).

(8) Position the contact mounting (15) on the transmitter-distributor frame so that the contacts are in correct alignment; secure with two lockwashers (5) and machine screws (4).

**CAUTION**

When positioning the transmitter contact cover (3) over the contact mounting (15), certain precautions are to be made to prevent a short to ground in the SEND circuit by ensuring that the bare wire on the contact bail, or the metal contact to which the wire is connected, does not touch the cover. To eliminate this problem, bend the bare wire on the contact bail, or the metal contact to which the wire is connected away from the cover. In addition, insulate the inside of the contact cover by cleaning and applying electrical tape: NSN 5970-00788-4901, cut to appropriate dimensions, to the inside of the cover.

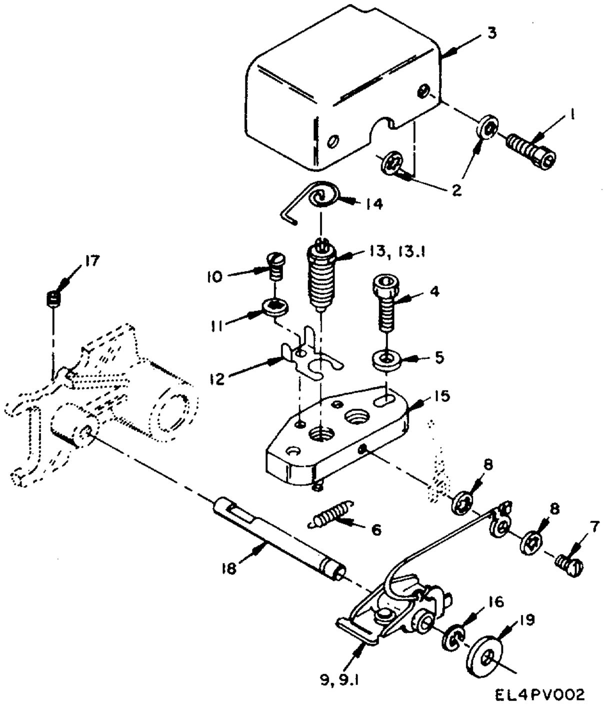
Perform insulation resistance test (para 7-6b(1), (3), and (4)) to ensure that no short to ground exists.
On the TT-699(*/GGC, where no line cord plugs are available, make the insulation resistance test from terminal 10, on terminal board TB1 (located on the terminal box assembly), to ground; also from terminal 11 on TB1 to ground.

(9) Position the transmitter contact cover (3) over the contact mounting (15); secure with two lockwashers (2) and machine screws (1).

(10) Adjust the transmitter-distributor contacts as described in paragraphs 4-203 and 4-208.

(11) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT76A/GGC and later models, or paragraph 4-28b for the TT-76/GGC.

(12) Replace the transmitter-distributor as described in paragraph 4-27b.




1 Machine screw, 10003
2 Lockwasher, 10403
3 Transmitter contact cover, 53674
4 Machine screw, 10009
5 Lockwasher, 10403
6 Transmitter contact bail spring, 51548
7 Machine screw, 10301
8 Lockwasher, 10403
9 Transmitter contact bail, 51582A (high-level)
9.1 Transmitter contact bail, SM-B-930672 (low-level)
10 Machine screw, 10301
11 Lockwasher, 10403
12 Transmitter contact terminal, 51597
13 Stationary contact, 51588A (high-level)
13.1 Transmitter contact, SM-B-930674 (low-level)
14 Electrical wire, 51610
15 Contact mounting, 51595A
16 Retainer ring, 10949
17 Setscrew, 10209
18 Post, 52839
19 Flat washer, 61476

**NOTE**

On low-level units only, contact bail (9.1), NSN 5999-00-411-3141, must be used. Contact (13.1) NSN 5999-00-444-2223, must also be used only on low-level units.

*Figure 4-26. Transmitter-distributor contacts, exploded view.*

**4-36.1. Deleted**

**4-37. Disassembly and Reassembly of Transmitter-Distributor Clutch Magnet and Wiring**
(fig. 4-27)

*a. Disassembly*.

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.

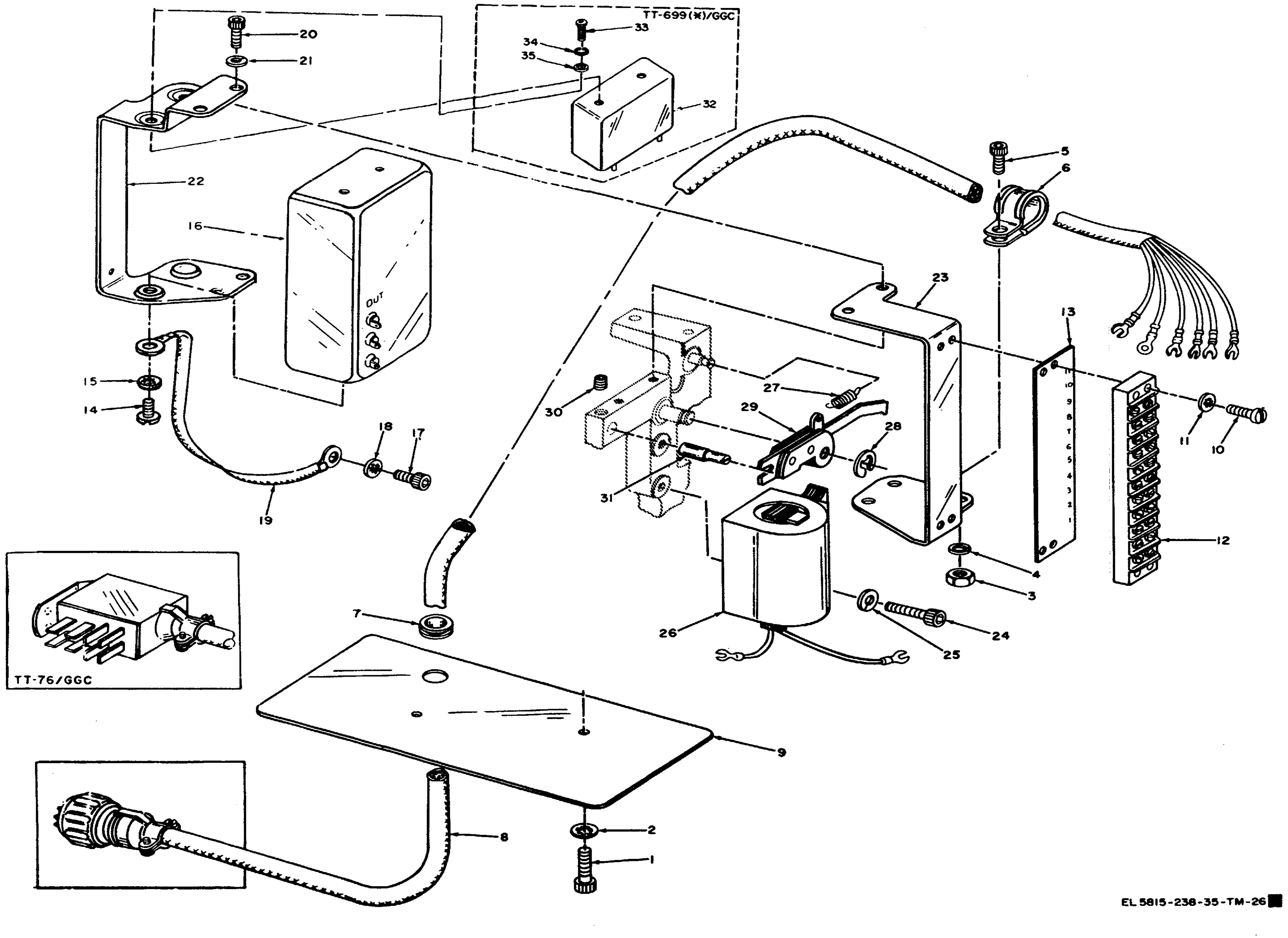
(2) Remove the transmitter-distributor covers as described in paragraph 4-28a for the TT76/GGC or paragraph 4-29a for the TT-76A/ GGC and later models.

(3) Remove the two machine screws (1) and lockwashers (2) that hold the bottom plate (9) to the transmitter-distributor frame.

(4) Remove the plain hexagonal nut (3), lockwasher (4), and machine screw (5) that hold the cable clamp (6) to the terminal board mounting bracket (23); remove the cable clamp (6).

(5) Disconnect all wires from the electrical cable (8) at the terminal board (12); tag the wires. Pull the cable through the grommet (7) and bottom plate (9); remove the grommet (7) from the bottom plate (9).

(6) Remove the four machine screws (10) and lockwashers (11) that hold the terminal board (12) and insulating strip (13) to the terminal board mounting bracket (23); remove the terminal board (12) and insulating strip (13).




Key to fig 4-27

1 Machine screw, 10015
2 Lockwasher, 10431
3 Plain hexagonal nut, 10512
4 Lockwasher, 10429
5 Machine screw, 10003
6 Cable clamp, 20513
7 Grommet, 20726
8 Cable, 52783A (TT-76/GGC); 57218A (TT-76A/GGC)
9 Bottom plate, 52131 (TT-76/GGC; 57205 (TT/76A/GGC)
10 Machine screw, 10358
11 Lockwasher, 10408
12 Terminal board, 52135A
13 Insulating strip, 20380
14 Machine screw, 10301
15 Lockwasher, 10403
16 Electrical noise suppressor, 54577
17 Machine screw, 10055
18 Lockwasher, 10403
19 Grounding lead, 53789A
20 Machine screw, 10004
21 Lockwasher, 10429
22 Filter box mounting bracket, 52869
23 Terminal board mounting bracket, 52866
24 Machine screw, 10010
25 Lockwasher, 10430
26 Clutch magnet, 53605A
27 Clutch magnet armature spring, 53155
28 Retainer ring, 10949
29 Clutch magnet armature, 52828A
30 Setscrew, 10203
31 Eccentric stud, 52838
32 Noise suppressor SM-D-759881
33 Pan head screw 6-32 x 3/8, MS51957-28
34 Lockwasher, No. 6, MS35338-136
35 Flat washer No. 6, MS15795-805

*Note.* A plain washer, 10454, is located between items 25 and 26 on the TT-76A/GGC and later models.

*FO Figure 4-27. Transmitter distributor clutch magnet and wiring, exploded view.*

(7) Remove the four (or two) machine screws 1(14) and lockwashers (15) that attach the electrical noise suppressor (16) to the filter box mounting bracket (22) remove the electrical noise suppressor (16) or (32).

(8) Remove the machine screw (17) and lockwasher (18) that hold the grounding lead (19) to the transmitter-distributor frame; remove the grounding lead (19).

(9) Remove the four machine screws (20) and lockwashers (21) that hold the filter box mounting bracket (22) and the terminal board mounting bracket (23) to the transmitter-distributor frame; remove the filter box mounting bracket (22) and the terminal board mounting bracket (23).

(10) Remove the two machine screws (24) and lockwashers (25) that hold the clutch magnet (26) to the reperforator frame, remove the clutch magnet (26)

(11) Remove the clutch magnet armature spring (27) from the clutch magnet armature (29) and from the spring post on the transmitter- distributor frame.

(12) Remove the retainer ring (28) that holds the clutch magnet armature(29) to the pivot stud on the transmitter-distributor frame; remove the clutch magnet armature (29).

(13) Remove the setscrew (30) that holds the eccentric stud (31) in the transmitter-distributor frame; remove the eccentric stud (31).

*b. Reassembly.*

(1) Reassemble the transmitter-distributor clutch magnet and wiring by reversing the procedures outlined in a(13) through (3) above.

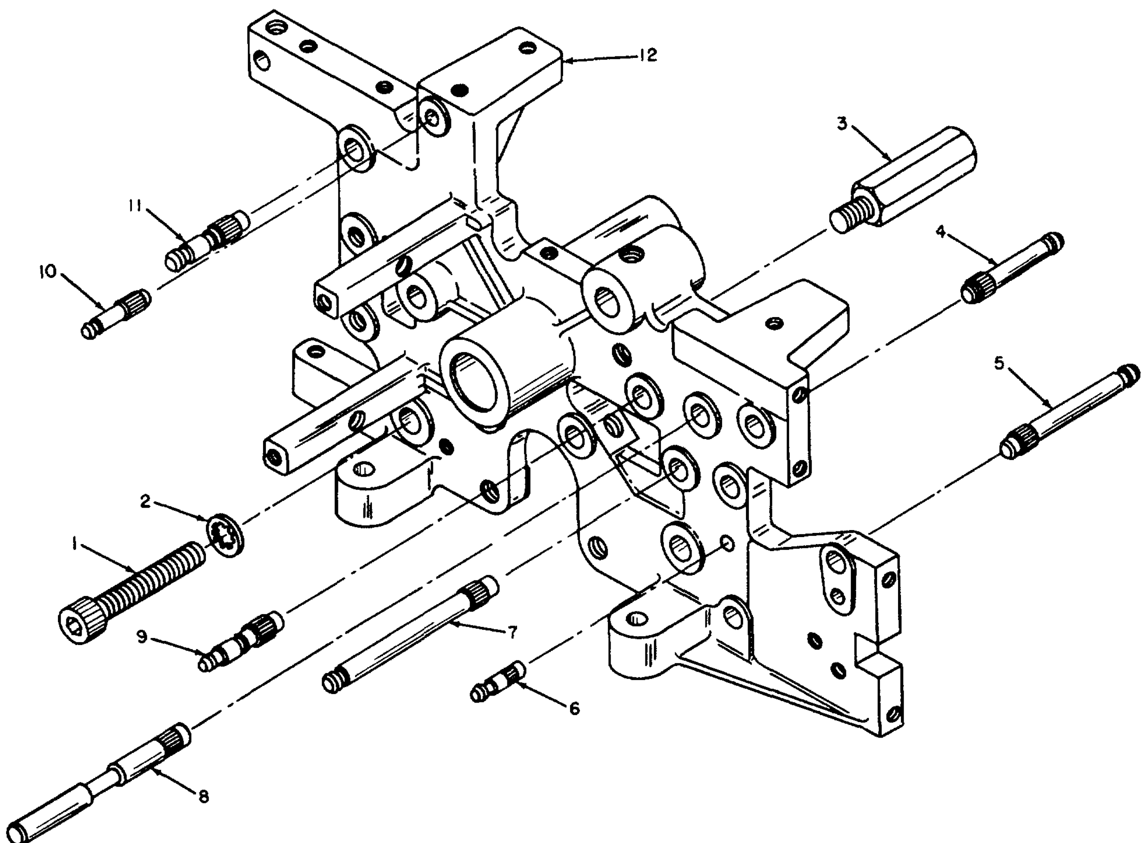
(2) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT-76A/GGC and later models, or paragraph 4-28b for the TT-76/GGC.

(3) Replace the transmitter-distributor as described in paragraph 4-27b.

**4-38. Disassembly and Reassembly of Transmitter-Distributor Frame** (fig. 4-28)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator as described in paragraph 4-27a.




1 Machine screw, 10030
2 Lockwasher, 10405
3 Post, 52851
4 Upper switch ball post. 52873
5 Tight tape stud, 52857
6 Spring post 51123 or 51133 (TT-76B/GGC)
7 Start-stop lever stud, 52854
8 Stop post, 52856
9 Detent lever stud, 52855
10 Spring post, 50455
11 Armature pivot stud, 52837
12 Transmitter-distributor frame, 57199A



*Figure 4-28. Transmitter-distributor frame, exploded view*

(2) Remove the transmitter-distributor covers as described in paragraph 4-28a for the TT-76/GGC or paragraph 4-29a for the TT-76A/GGC and later models.

(3) Remove the tape-out sensing mechanism as described in paragraph 4-30a for the TT-76/GGC or paragraph 4-31a for the TT-76A/GGC and later models.

(4) Remove the. transmitter-distributor operating levers as described in paragraph 4-32a.

(5) Remove the transmitter-distributor code sensing levers as described in paragraph 4-33a.

(6) Remove the transmitter-distributor selector levers as described in paragraph 4-34a.

(7) Remove the transmitter-distributor camshaft as described in paragraph 4-35a.

(8) Remove the transmitter-distributor contacts as described in paragraph 4-36a.

(9) Remove the two cover mounting posts (3) from the transmitter-distributor frame (12)

(10) Remove any loose or damaged spring post or pivot post from the transmitter-distributor frame (12). Support the frame near the post to be removed to prevent distortion of the frame.

*b. Reassembly.*

(1) Replace any spring post or pivot post that has been removed by pressing it into the transmitter-distributor frame (12) at a right angle to the plane of the frame.

(2) Install- the two cover mounting posts

(3) in the transmitter-distributor frame (12).

(3) Replace the transmitter-distributor contacts as described in paragraph 4-36b.

(4) Replace the transmitter-distributor camshaft as described in paragraph 4-35b.

(5) Replace the transmitter-distributor selector levers as described in paragraph 4-34b.

(6) Replace the transmitter-distributor code sensing levers as described in paragraph 4-33b.

(7) Replace the transmitter-distributor operating levers as described in paragraph 4-32b.

(8) Replace the tape-out sensing mechanism as described in paragraph 4-31b for the TT-76A/GGC and later models, or paragraph 4-30b for the TT-76/GGC.

(9) Adjust the transmitter-distributor as described in paragraph 4-203 through 4-222.

(10) Replace the transmitter-distributor covers as described in paragraph 4-29b for the TT-76A/GGC and later models, or paragraph 4-28b for the TT-76/GGC.

(11) Replace the transmitter-distributor on the reperforator frame as described in paragraph 4-27b.

**4-39. Removal and Replacement of Power Supply and Terminal Unit (TT-76/GGC)**

*a. Removal.*

(1) Remove all plugs from the power supply and terminal unit. Unsnap the cable clamp (3, fig. 4-29) and remove the cables from the cable clamp.

(2) Remove the two machine screws (1, fig. 4-28) that hold the terminal board cover (2) to the power supply and terminal unit chassis (70, fig. 4-29); remove the terminal board cover (2, fig. 4-28) and the two lockwashers (3).

(3) Disconnect the terminal leads from the three signal cords (9, 10, and 11) at the terminal board (26). Remove the machine screw (4), lockwasher (5), machine screw (6), and lock- Washer (7) that hold the cable clamp (8) to the power supply and terminal cover (22).

(4) Remove the three machine screws (12), lockwashers (13), spacer (14), machine screw (15), lockwasher (16), and spacer (17) that mount the power supply and terminal unit; remove the power supply and terminal unit and the four lockwashers (18)

*b. Replacement* Replace the power supply and terminal unit by reversing the procedures outlined in a above

**4-40. Removal and Replacement of Power Supply and Terminal Unit (TT-76A/ GGC and Later Models)**

*a. Removal*

(1) Disconnect the plug connector on the selector magnet cable (18, fig 4-37) from the receptacle connector on the power supply and terminal unit

(2) Disconnect the plug connector on the power cable assembly (18, fig 4-31) from the receptacle connector at the rear of the transmitter- distributor.

(3) Remove the four machine screws (1) and lockwashers (2) that hold the power supply unit to the reperforator frame, remove the power supply and terminal unit by lifting it upward.

b. Replacement Replace the power supply and terminal unit by reversing the procedures outlined m a above.

**4-40.1 Removal and Replacement of Terminal Box Assembly (TT-699(*)/ GGC) (fig 4-32 1)**

*a. Removal*

(1) Remove the two machine screws (27, fig 4-29.1), lockwashers (53) and flat washers (54) that hold the CAUTION cover (9) to terminal board TB-2 (12).

(2) Tag, or identify, and remove all leads connected to terminal boards TB-1 (13) and TB-2 (12).

(3) Disconnect the plug from receptacle connector J-1 (8).

(4) Remove the four machine screws and lock washers that hold the terminal box assembly to the reperforator frame, remove the terminal box assembly by lifting it upwards.

*b. Replacement* Replace the terminal box assembly by reversing the procedures outlined in a above.

**4-40.2. Disassembly and Reassembly of Terminal Box Assembly (TT499(*)/ GGC).**

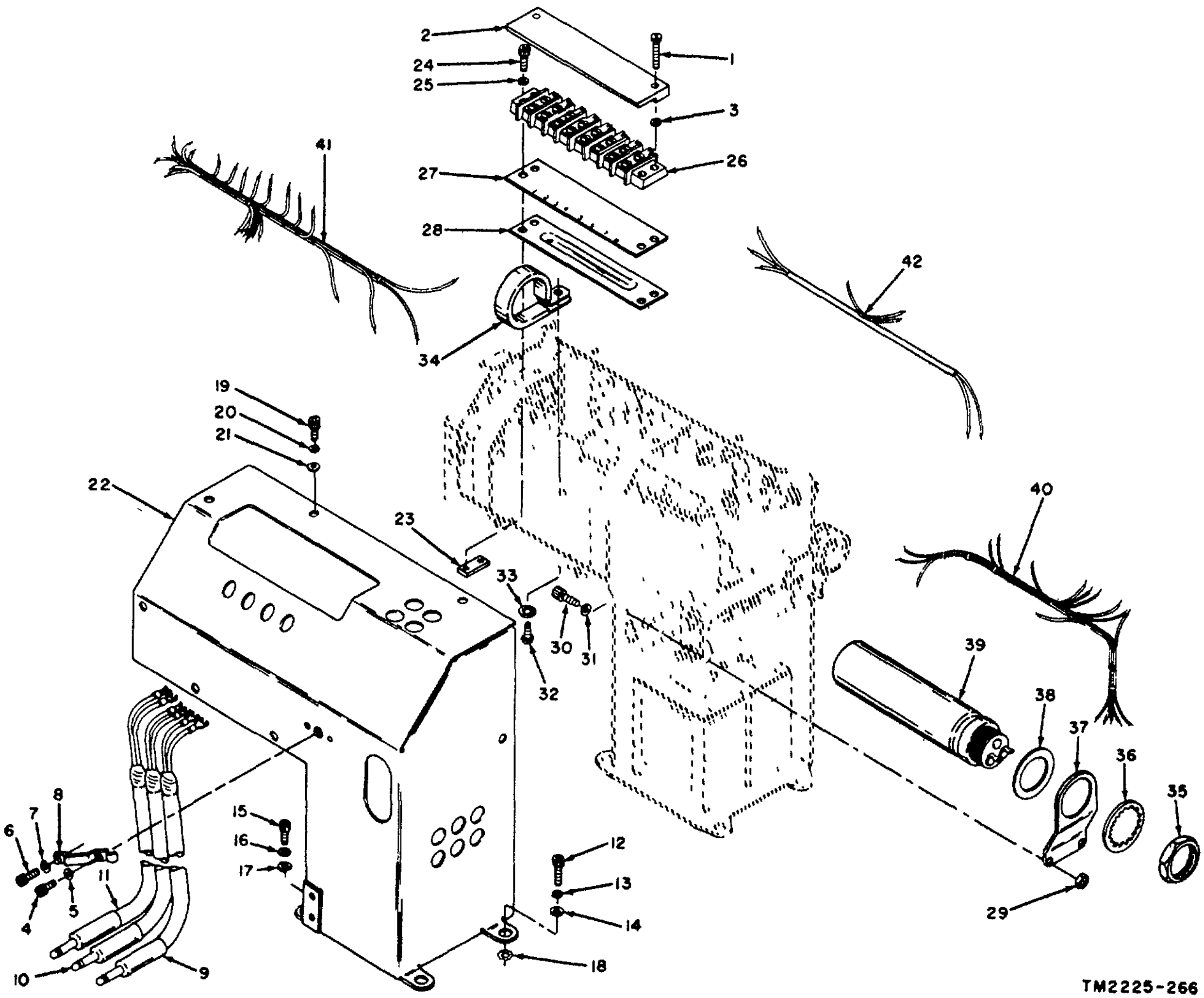
*a. Disassembly.*

(1) Remove the terminal box assembly from the reperforator transmitter as described in 4-40 1.

(2) Remove the three machine screws (40, fig 4-29 1), lockwashers (44), and flat washers (47) that hold the terminal box assembly cover to the terminal box assembly chassis (5).

(3) Remove the four circuit card assemblies (1), (2), and (3).

(4) Unsolder and disconnect the wire lead from terminal boards TB-1 (13) and TB-2 (12).




1 Machine screw, 10359
2 Terminal board cover, 53258
3 Lockwasher, 10429
4 Machine screw, 10003
5 Lockwasher, 10429
6 Machine screw, 10004
7 Lockwasher, 10429
8 Cable clamp, 52564
9 Signal cord (P9), 52661A
10 Signal cord (P10), 52(63A
11 Signal cord (P11), 52662A
12 Machine screw, 10018
13 Lockwasher, 10431
14 Spacer, 10473
15 Machine screw, 10018
16 Lockwasher, 10431
17 Spacer, 54091
18 Lockwasher, 10406
19 Machine screw, 10003
20 Lockwasher, 10429
21 Flat washer, 10458
22 Power supply and terminal cover, 53637
23 Nut plate, 54884
24 Machine screw, 10006
25 Lockwasher, 10429
26 Terminal board (TB2), 20361
27 Terminal marker strip, 20374
28 Brace, 52638
29 Self-locking hexagonal nut, 10500
30 Machine screw, 10003
31 Lockwasher, 10429
32 Self-tapping screw, 10369
33 Lockwasher, 10405
34 Clamp, 20792
35 Plain hexagonal nut
36 Lockwasher
37 Bracket, 52570
38 Fiber washer
39 Capacitor (C20), 20780 (includes items 35, 36, and 38)
40 Ac power cable, 53294
41 Dc power cable, 53293
42 Cable, 53301

*Figure 4-29. Power supply and terminal unit TT-76/GGC*

(5) Remove the machine screws (41), lockwashers (47), flat washers (44), and terminal board mounting plates that hold the terminal boards to the terminal box assembly chassis, remove the terminal boards.

(6) Unsolder and disconnect the wire leads from connector receptacle J1 (8), remove the plain hexagonal nut that secures J1 to the terminal box assembly chassis, remove J1.

(7) Unsolder and disconnect the wire leads from fuse holders XF1 (17) and XF2 (15), remove the plain hexagonal nuts that secure the fuse holders to the terminal box assembly chassis, remove the two fuse holders from the terminal box assembly chassis

(8) Unsolder and disconnect the wire leads from the power selector switch (19). Remove the hexagonal nut that holds the power selector switch to the terminal box assembly chassis, remove the lockwasher, the switch guard assembly (38), and the power selector switch (19).

(9) Tag, or identify, and unsolder all leads connected to transformer (11); remove the four machine screws (28), plain hexagonal nuts (36), lockwashers, and flat washers that hold the transformer (11) to the terminal box assembly chassis, remove the transformer (11).

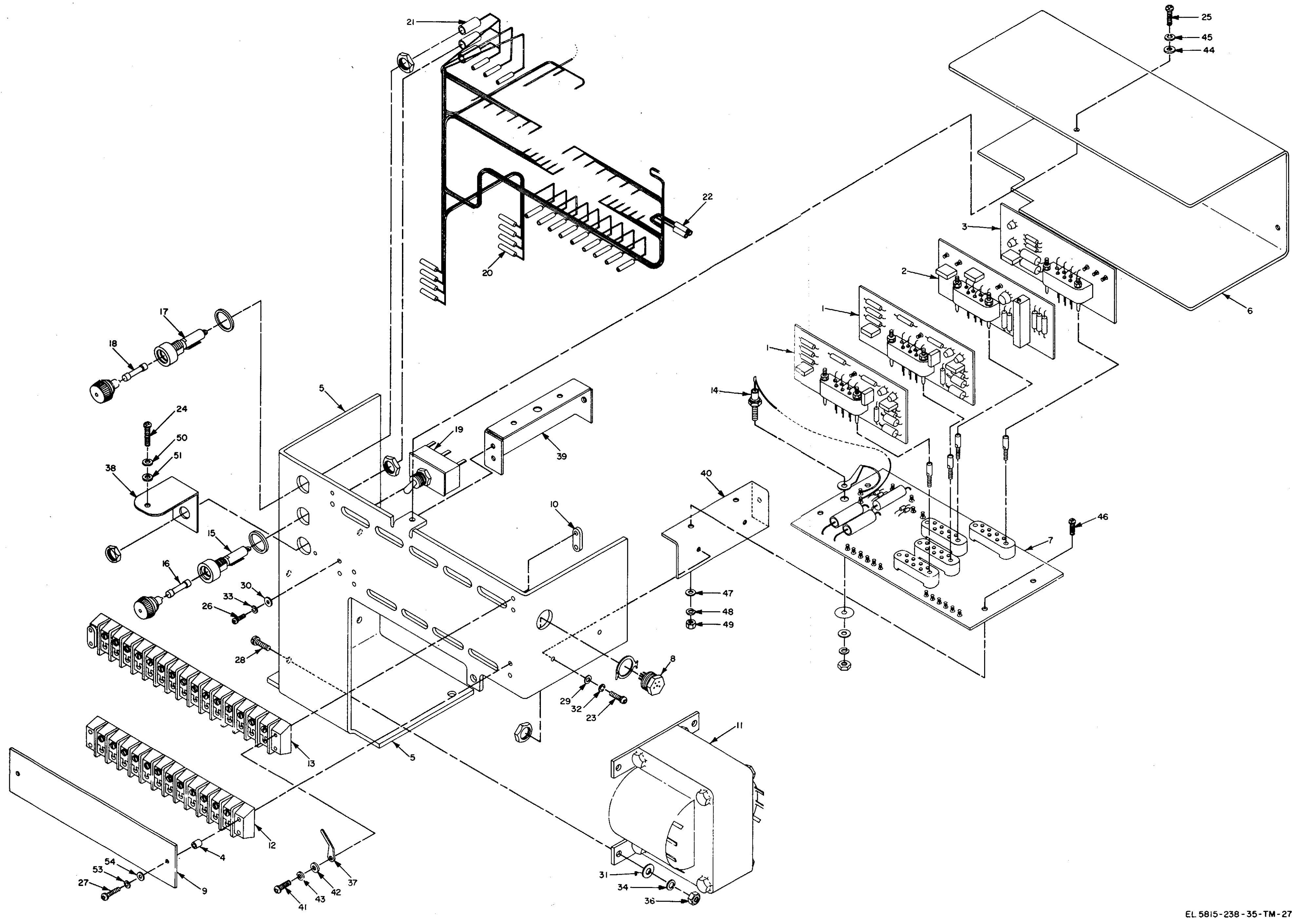
(10) Remove the four machine screws (46), lockwashers (48), flat washers (47), and hexagonal nuts (49) that hold the circuit card assembly (7) to the terminal box assembly chassis, remove the circuit card assembly (7).

(11) Remove the four machine screws (26) and (23), lockwashers (32) and (33), and flat washers (29) and (30) that hold the two support brackets (39) and (40) to the terminal box assembly chassis.

*b Reassembly.*

(1) Reassemble the terminal box assembly by reversing the procedures outlined m a (2) through (11) above.

(2) Replace the terminal box assembly as outlined m paragraph 4-401b.




1 Transmitter circuit card assembly, SM-C-759840
2 Receiver circuit card assembly, SM-C-759849
3 Selector magnet driver circuit card assembly, SM-C-759853
4 Round spacer, SM-B-785948-4
5 Welded assembly, SM-D-785962
6 Cover, SM-D-785963
7 Terminal box circuit card assembly, SM-D-785965
8 Electrical connector receptacle, SM-C-785983
9 Terminal board cover, SM-B-785984
10 Terminal board mounting plate, SM-B-785996
11 Transformer, SM-D-786101
12 Terminal board, 40TB12
13 Terminal board, 40TB15
14 Semiconductor device, JAN1N2989B
15 Fuseholder, FHN26G1
16 Fuse (F2), FO 2A2250V2A
17 Fuseholder, FHN26G1
18 Fuse (F1), FO 2A2250V2A
19 Toggle switch, MS25098-23
20 Insulated sleeving, 0.125 dia. x 0.37 lg blk., class I
21 Insulated sleeving, 0.125 dia. x 0.75 lg blk., class I
22 Insulated sleeving, 0.250 dia. x 0.37 lg blk., class I
23 Pan head screw, 4-40 x 3/8, MS51957-15
24 Pan head screw, 4-40 x 5/8, MS51957-18
25 Pan head screw, 6-32 x 3/8, MS51957-28
26 Pan head screw, 6-32 x 3/4, MS51957-32
27 Pan head screw, 6-32 x 1, MS51957-34
28 Pan head screw, 10-32 x ½, MS51958-63
29 Flat washer, No. 4, MS15795-803
30 Flat washer, No. 6, MS15795-805
31 Flat washer, No. 10, MS15795-808
32 Lockwasher, No. 4, MS35338-135
33 Lockwasher, No. 6, MS35338-136
34 Lockwasher, No. 10, MS35338-138
35 Deleted
36 Hex nut, No. 10-32, MS35650-304
37 Terminal lug, MS77066-2
38 Switch guard assembly, SM-C-785989
39 Support bracket, SM-C-785997
40 Support bracket, SM-C-785998
41 Pan head screw, 6-32 x ¾, MS51957-32
42 Flat washer, No. 6, MS15795-805
43 Lockwasher, No. 6, MS35338-136
44 Flat washer, No. 6, MS15795-805
45 Lockwasher, No. 6, MS35338-136
46 Pan head screw, 4-40 x 3/8, MS51957-15
47 Flat washer, No. 4, MS15795-803
48 Lockwasher, No. 4, MS35338-135
49 Hex nut, No. 4-40, MS35649-244
50 Lockwasher, No. 4, MS35338-135
51 Flat washer, No. 4, MS15795-803
52 Deleted
53 Lockwasher, No. 6, MS35338-136
54 Flat washer, No. 6, MS15795-805

## 4-41. Disassembly and Reassembly of Power Supply and Terminal Unit (TT-76/ GGC)

*a. Disassembly.*

(1) Remove the power supply and terminal unit from the reperforator-transmitter as described in paragraph 4-39a.

(2) Remove the six machine screws (19), fig. 4-29), lockwashers (20), and flat washers (21) that hold the power supply and terminal cover (22) to the power supply and terminal unit chassis (70, fig. 4-30). Unsolder and disconnect the wire leads from the 'terminal board (26, fig. 4-29).

(3) Remove the two nut plates (23), machine screws (24), and lockwashers (25) that hold the terminal board (26) to the power supply and terminal unit chassis; remove the terminal board (26), terminal marker strip (27), and brace (28).

(4) Unsolder and disconnect the wire leads from the capacitor (39). Remove the two selflocking hexagonal nuts (29), machine screws (30), and lockwashers (31) that hold the bracket (37) to the power supply and terminal unit chassis. Remove the self-tapping screw (32) and lockwasher (33) that hold the clamp (34) to the power supply and terminal unit chassis; remove the clamp (34) from the capacitor (39).

(5) Remove the plain hexagonal nut (35) and lockwasher (36) that hold the bracket (37) to the capacitor (39); remove the bracket (37) and fiber washer (38) from the capacitor (39).

(6) Remove the plain hexagonal nut (1, fig. 4-30) and lockwasher (2) that hold the cable clamp (3) to the mounting stud (8); remove the cable clamp (3).

(7) Unsolder and disconnect the wire leads from the resistor (9). Remove the plain hexagonal nut (4), lockwasher (5), plain hexagonal nut (6), and lockwasher (7) that hold the mounting stud (8) to the mounting plate (12) and to the power supply and terminal unit chassis (70), remove the mounting stud (8) catching the resistor (9) as it falls free.

(8) Unsolder and disconnect the wire leads from the resistor (13). Remove the plain hexagonal nut (10), lockwasher (11), and mounting plate (12) that hold the resistor (13) to the mounting stud (16); remove the resistor (13). Remove the plain hexagonal nut (14), lockwasher (15), and mounting stud (16) from the power supply and terminal unit chassis (70).

(9) Remove the self-locking hexagonal nut (17) that holds the grounding lug (18) to the power supply and terminal unit chassis (70); remove the grounding lug (18) and machine screw (19).

(10) Remove the plain hexagonal nut (20) lockwasher (21), and flat washer (22) that hold the fuse holder (25) to the power supply and terminal unit chassis (70); remove the assembled fuse holder (25), fuse holder cap (23), and fuse (24). Remove the fuse holder cap (23) and fuse (24) from the fuse holder (25).

(11) Unsolder and disconnect the wire leads from the receptacle connector (29). Remove the two self-locking hexagonal nuts (26), machine screws (27), and lockwashers (28) that hold the power supply and terminal unit chassis (70); remove the receptacle connector (29).

(12) Unsolder and disconnect the wire leads from the receptacle connector (33). Remove the two self-locking hexagonal nuts (30), machine screws (31), and lockwashers (32) that hold the receptacle connector (33) to the power supply and terminal unit chassis (70); remove the receptacle connector (33).

(13) Remove the nut plate (34), machine screw (35), lockwasher (36), and flat washer (37) that hold the switch lock (38) to the power supply and terminal unit chassis (70); remove the switch lock (38) and spacer (39).

(14) Unsolder and disconnect the wire leads from the plug connector (43). Remove the two self-locking hexagonal nuts (40), machine screws (41), and lockwashers (42) that hold the plug connector (43) to the power supply and terminal unit chassis (70); remove the plug connector (43).

(15) Unsolder and disconnect the wire leads from the receptacle connector (47). Remove the two self-locking hexagonal nuts (44), machine screws (45), and lockwashers (46) that hold the receptacle connector (47) to the power supply and terminal unit chassis (70); remove the receptacle connector (47).

(16) Remove the self-locking hexagonal nut (48) that holds the grounding lug (49) on the machine screw (50), remove the grounding lug (49), machine screw (50), and lockwasher (51).

(17) Unsolder and disconnect the wire leads from the receptacle connector (55). Remove the two self-locking hexagonal nuts (52), machine screws (53), and lockwashers (54) that hold the receptacle connector (55) to the power supply and terminal unit chassis (70); remove the receptacle connector (55).

(18) Unsolder and disconnect the wire leads from the receptacle connector (59). Remove the two self-locking hexagonal nuts (56), machine screws (57), and lockwashers (58) that hold the receptacle connector (59) to the power supply and terminal unit chassis (70); remove the receptacle connector (59).

(19) Unsolder and disconnect the wire leads from the power selector switch (62). Remove the plain hexagonal nut (60) that holds the power selector switch (62) to the power supply and terminal unit chassis (70); remove the lockwasher (61) and the power selector switch (62).

(20) Unsolder and disconnect the wire leads from the transformer (65). Remove the four plain hexagonal nuts (63) and lockwashers (64) that hold the transformer (65) to the power supply and terminal unit chassis (70); remove the transformer (65).

(21) Unsolder and disconnect the wire leads from the rectifier (69). Remove the four self-locking hexagonal nuts (66), machine screws (67), and lockwashers (68) that hold the rectifier (69) to the power supply and terminal unit chassis (70); remove the rectifier (69).

(22) Remove the cables (40, 41, and 42, fig. 4-29) from the power supply and terminal unit chassis.

*b. Reassembly.* (figs. 4-29 and 6-4).

(1) Reassemble the power supply and terminal unit by reversing the procedures outlined in a(22) through (2) above.

(2) Replace the power supply and terminal unit as directed in paragraph 4- 39b.

**4-42. Disassembly and Reassembly of Power Supply and Terminal Unit (TT-76A/GGC and Later Models)**

*a. Disassembly.*

(1) Remove the power supply and terminal unit from the reperforator-transmitter as described in paragraph 4-40a.

(2) Remove the seven machine screws (3, fig. 4-31) and lockwashers (4) that hold the power supply and terminal cover (5) to the power supply and terminal unit chassis (68, fig. 4-32); remove the power supply and terminal cover (5, fig. 4-31).

(3) Unsolder and disconnect the electrical leads from the capacitor (16). Remove the two machine screws (6) and lockwashers (7) that hold the bracket (14) to the power supply and terminal unit chassis.

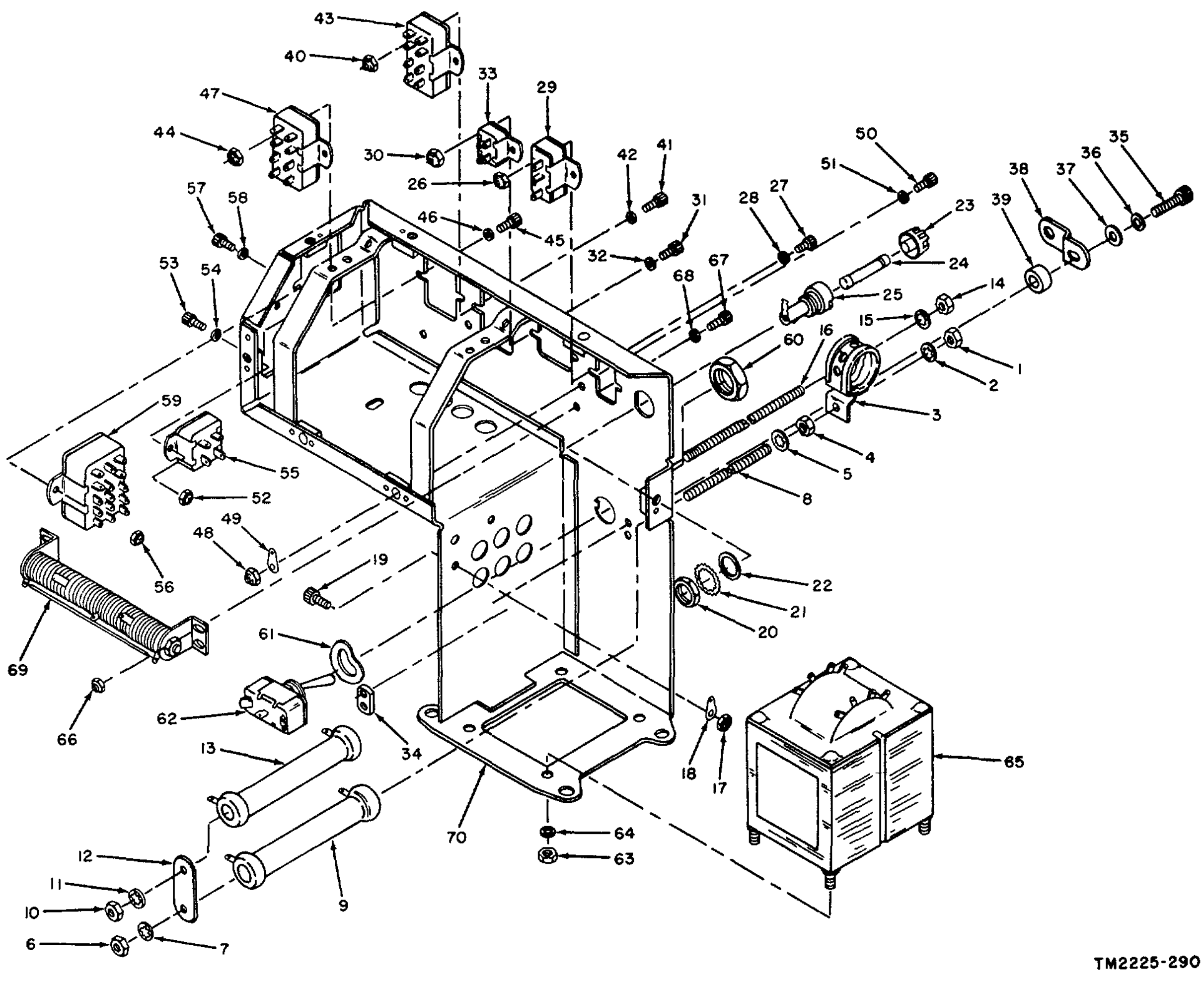



*Figure 4-30. Power supply and terminal unit, disassembly completed, TT-76/GCC.*

(4) Remove the plain hexagonal nut (8), lockwasher (9), and machine screw (10) that hold the clamp on the chassis to the capacitor (16); remove the two O-rings (11) and the assembled capacitor (16) and bracket (14).

(5) Remove the plain hexagonal nut (12) and lockwasher (13) that hold the bracket (14) to the capacitor (16); remove the bracket (14) and fiber washer (15).

(6) Unsolder and disconnect the wire leads from the four resistors (2, 4, 10, and 12, fig. 4-32).

(7) Unscrew the machine screw (6) from the nut plate (8); remove the centering washer (1), resistor (2), flat washer (3), resistor (4), and centering washer (5) from the machine screw (6). Remove the machine screw (6) and lockwasher (7) from the power supply and terminal unit chassis (68).

(8) Remove the machine screw (14) from the nut plate (8); remove the centering washer (9), resistor (10), flat washer (11), resistor (12), and centering washer (13) from the machine screw (14). Remove the machine screw (14) and lockwasher (15) from the power supply and terminal unit chassis (68).

(9) Unsolder and disconnect the wire leads from the switch (18). Remove the plain hexagonal nut (16) that holds the switch (18) to the power supply and terminal unit chassis (68); remove the lockwasher (17) and switch (18).

(10) Unsolder and disconnect the wire leads from the resistor (23). Remove the plain hexagonal nut (19), lockwasher (20), flat washer (21), centering washer (22), resistor (23), centering.

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1 Plain hexagonal nut, 10515
2 Lockwasher, 10404
3 Cable clamp, 20506
4 Plain hexagonal nut, 10516
5 Lockwasher, 10404
6 Plain hexagonal nut, 10516
7 Lockwasher, 10404
8 Mounting stud, 53464
9 Resistor (R2), 20011
10 Plain hexagonal nut, 10516
11 Lockwasher, 10404
12 Mounting plate, 52572
13 Resistor (R3), 20011
14 Plain hexagonal nut, 10516
15 Lockwasher, 10404
16 Mounting stud, 53464
17 Self-locking hexagonal nut, 10500
18 Grounding lug, 20193
19 Machine screw, 10003
20 Plain hexagonal nut
21 Lockwasher
22 Flat washer
23 Fuse holder cap
24 Fuse (F1), 10455
25 Fuse holder. 20;;8 (includes items 20, 21, 22, and 23)
26 Self-locking hexagonal nut, 10500
27 Machine screw, 10003
28 Lockwasher, 10429
29 Receptacle connector (J1), 20258
30 Self-locking hexagonal nut, 10500
31 Machine screw, 10003
32 Lockwasher, 10429
33 Receptacle connector (J4), 20256
34 Nut plate, 52073
35 Machine screw, 10010
36 Lockwasher. 104A0
37 Flat washer, 10463
38 Switch lock, 52671
39 Spacer, 52157
40 Self-locking hexagonal nut, 10505
41 Machine screw, 10003
42 Lockwasher, 10429
43 Plug connector (J5), 20259
44 Self-locking hexagonal nut, 10500
45 Machine screw, 10003
46 Lockwasher, 10429
47 Receptacle connector (J6), 20260
48 Self-locking hexagonal nut, 10500
49 Grounding lug, 20193
50 Machine screw, 10003
51 Lockwasher, 10429
52 Self-locking nut, 10500
53 Machine screw, 10003
54 Lockwasher, 10429
55 Receptacle connector (J7), 20257
56 Self-locking nut, 10500
57 Machine screw, 10003
58 Lockwasher, 10429
59 Receptacle connector (J8), 20261
60 Plain hexagonal nut, 10500
61 Lockwasher, 10466
62 Power selector switch (S1), 20117
63 Plain hexagonal nut, 10516
64 Lockwasher, 10430
65 Transformer, 52878
66 Self-locking hexagonal nut, 10500
67 Machine screw, 10003
68 Lockwasher, 10429
69 Rectifier (CR1), 20782
70 Power supply and terminal unit chassis, ,53628



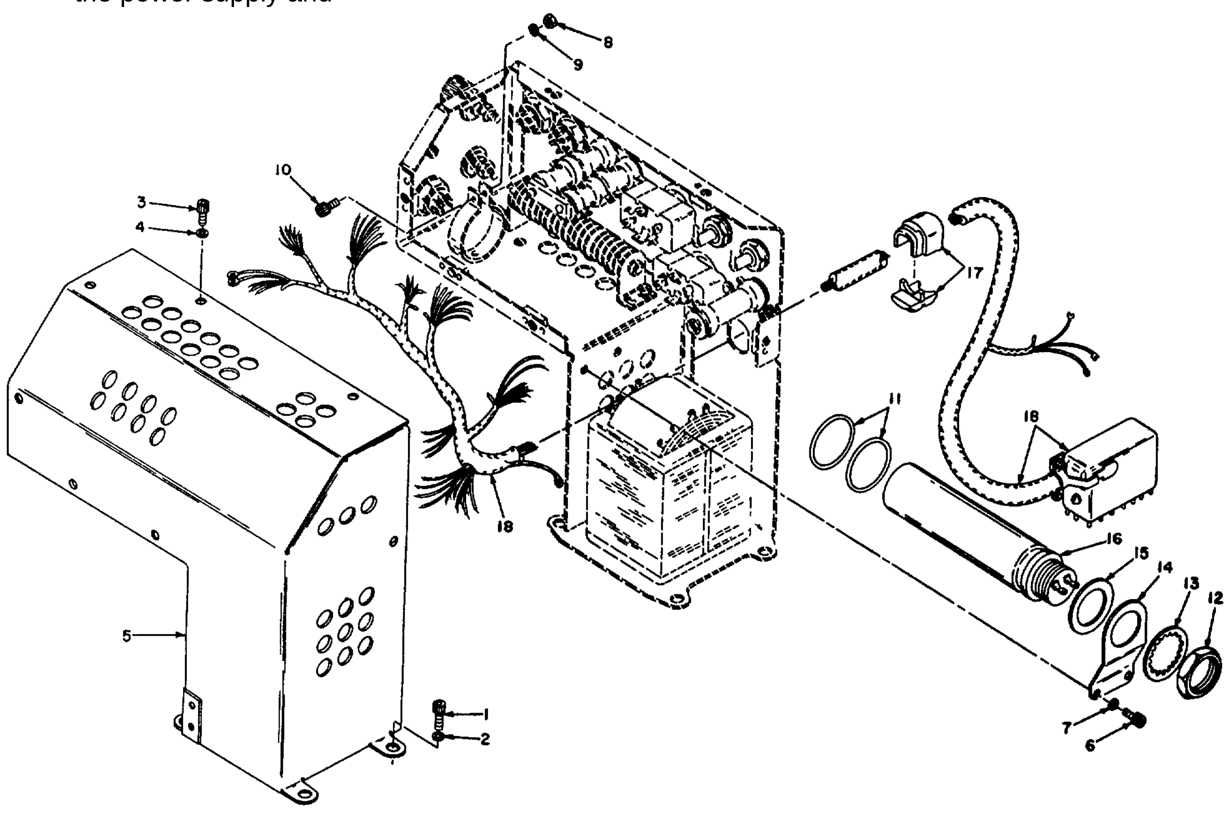
*Figure 30.-Continued*

washer (24), and flat washer (25) from the machine screw (26); remove the machine screw (26) and lock- washer (27) from the power supply and terminal unit chassis (68).

(11) Remove the machine screw (28), lockwasher (29), and flat washer (30) that hold the switch locking bracket (31) to the power supply and terminal unit chassis (68); remove the switch locking bracket (31).

(12) Unsolder and disconnect the wire leads from the switch (34). Remove the plain hexagonal nut (32) that holds the switch (34) to the power supply and terminal unit chassis (68); remove the lockwasher (33) and the switch (34).

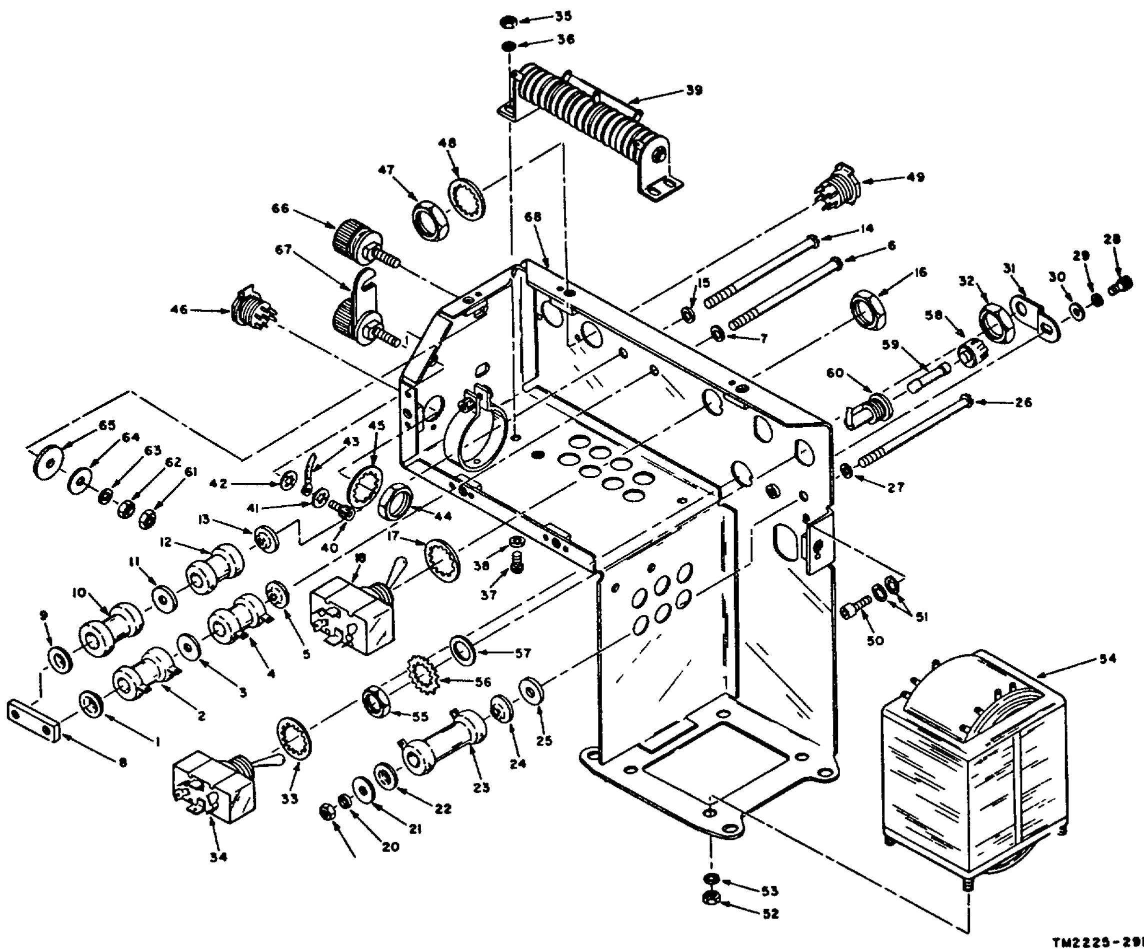
(13) Unsolder and disconnect the wire leads from the rectifier (39). Remove the four plain hexagonal nuts (35), lockwashers (36), machine screws (37), and lockwashers (38) that hold the rectifier (39) to the power supply and




TM2225-267

1 Machine screw, 10018-01
2 Lockwasher, 10406
3 Machine screw, 10003
4 Lockwasher, 10429
5 Power supply and terminal cover, 59370
6 Machine screw, 10001
7 Lockwasher, 10429
8 Plain hexagonal nut, 10505
9 Lockwasher, 10430
10 Machine screw, 10009
11 O-ring, 11077
12 Plain hexagonal nut
13 Lockwasher
14 Bracket, 52570
16 Fiber washer
16 Capacitor (C1), 20220
17 Strain relief, 20886
18 Power cable assembly, (P7), 57300A

*Figure 4-31. Power supply and terminal unit, partial disassembly, TT-76A/GCC and later models.*




1 Centering washer, 57311
2 Resistor (R5), VF8HM352J
3 Flat washer, 54561
4 Resistor (R2), 20048
5 Centering washer, 57311
6 Machine screw, 10164
7 Lockwasher, 10430
8 Nut plate, 57309
9 Centering washer, 57311
10 Resistor (R3), 20039
11 Flat washer, 54561
12 Resistor (R4), 20040
13 Centering washer, 57311
14 Machine screw, 10164
15 Lockwasher, 10430
16 Plain hexagonal nut
17 Lockwasher
18 Switch (S4), 20131 (includes items 16 and 17)
19 Plain hexagonal nut, 10516
20 Lockwasher, 10430
21 Flat washer, 54561
22 Centering washer, 57311
23 Resistor (R1), 20047
24 Centering washer, 57311
25 Flat washer, 54561
26 Machine screw, 10164
27 Lockwasher, 10430
28 Machine screw, 10001
29 Lockwasher, 10429
30 Flat washer, 10477
31 Switch locking bracket, 52671
32 Plain hexagonal nut
33 Lockwasher
34 Switch (S7), 20117 (includes items 32 and 33)
35 Plain hexagonal nut, 50174
36 Lockwasher, 10421
37 Machine screw, 10393
38 Lockwasher, 10421
39 Rectifier (CR1), 57312A
40 Machine screw, 10001
41 Lockwasher, 10403
42 Lockwasher, 10403
43 Grounding lead, 22011
44 Plain hexagonal nut
45 Lockwasher, 10478
46 Receptacle connector (J12), 20277 (includes item 44)
47 Plain hexagonal nut
48 Lockwasher
49 Receptacle connector (J10), 20262 (includes items 47 and 48)
50 Machine screw, 10001
51 Lockwasher, 10403
52 Plain hexagonal nut, 10516
53 Lockwasher, 10404
54 Transformer (T1), 57301
55 Plain hexagonal nut
56 Lockwasher
57 Rubber washer
58 Fuse holder cap
59 Fuse (F1), 20455 (TT-76A/GGC), 20474 (TT-76B/GGC)
60 Fuse holder, 20460 (includes items 55 56. 57. and 58)
61 Plain hexagonal nut, 10515
62 Plain hexagonal nut, 10515
63 Flat washer, 10463
64 Flat washer, 50515
65 Flat washer, 50909
66 Binding post (E2), 20877
67 Shunt assembly (E3), 56197A
68 Power supply and terminal unit chassis, 57305A

*Figure 4-32. Power supply and terminal unit, disassembly completed, TT-76A/GGC, and later models.*

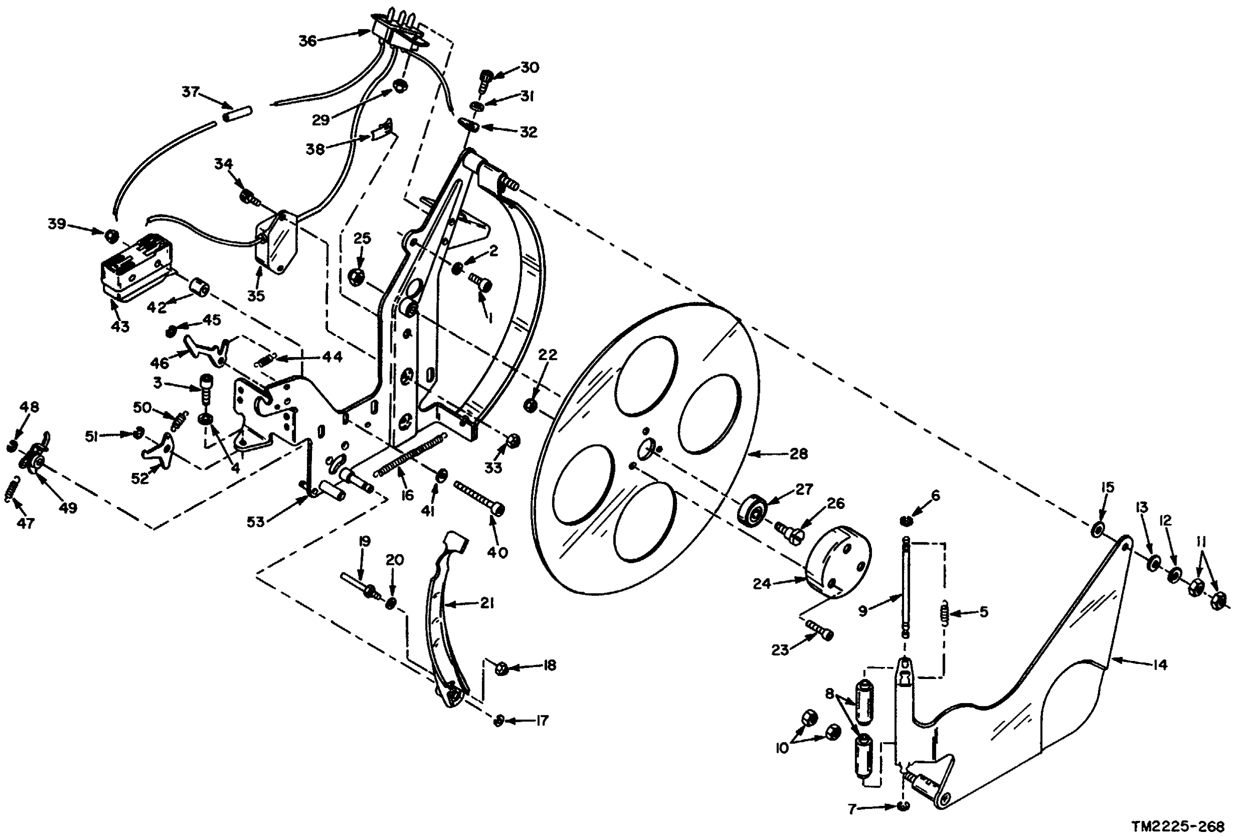



Figure 4-33. Tape reel, exploded view (TT-76/GGC).

terminal unit chassis (68); remove the rectifier (39).

(14) Unsolder and disconnect the grounding lead (43) from the receptacle connector (46). Remove the machine screw (40) and lockwashers (41 and 42) that hold the grounding lead (43) to the power supply and terminal unit chassis (68); remove the grounding lead (43).

(15) Unsolder and disconnect the wire leads from the receptacle connector (46). Remove the plain hexagonal nut (44) and lockwasher (45) that hold the receptacle connector (46) to the power supply and terminal unit chassis (68); remove the receptacle connector (46).

(16) Unsolder and disconnect the wire leads from the two receptacle connectors (49). Remove the two plain hexagonal nuts (47) and lockwashers (48) that hold the receptacle connectors (49) to the power supply and terminal unit chassis (68); remove the two receptacle connectors (49).

(17) Remove the machine screw (50) and two lockwashers (51) that hold the grounding lug on the power cable assembly (18, fig. 4-31) to the power supply and terminal unit chassis (68, fig. 4-32).

(18) Unsolder and disconnect the wire leads from the transformer (54). Remove the four plain hexagonal nuts (52) and lockwashers (53) that hold the transformer (54) to the power supply and terminal unit chassis (68); lift the transformer (54) out of the power supply and terminal unit chassis (68).

(19) Unsolder and disconnect the wire leads from the two fuse holders (60). Remove the two plain hexagonal nuts (55), lockwashers (56), and rubber washers (57) that hold the two fuse holders (60) to the power supply and terminal unit chassis (68); remove the fuse holder caps (58), fuses (59), and fuse holders (60).

(20) Remove the two plain hexagonal nuts (61) that hold the terminal lugs to the studs on the binding post (66) and shunt assembly (67). Remove the two plain hexagonal nuts (62), flat washers (63, 64, and 65) that hold

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| | | | |
|---|---|---|---|
| 1 | Machine screw. 10024-01 | 28 | Tap reel. 52296 |
| 2 | Lockwasher, 10431 | 29 | Self-locking hexagonal nut, 10500 |
| 3 | Machine screw. 10024-01 | 30 | Machine screw, 10003 |
| 4 | Lockwasher. 10405 | 31 | Lockwasher, 10458 |
| 5 | Spring, 52212 | 32 | Terminal lug. 20807 |
| 6 | Retainer ring, 10969 | 33 | Self-locking hexagonal nut, 10500 |
| 7 | Retainer ring. 10969 | 34 | Machine screw, 10003 |
| 8 | Guide roller, 50162 | 35 | Tape alarm buzzer. 20783 |
| 9 | Tape guide roller shaft. 5.2159 | 36 | Plug connector, 20265 |
| 10 | Plain hexagonal nut, 10609 | 37 | Tubing, 20837 |
| 11 | Plain hexagonal nut, 10509 | 38 | Clamp, 20511 |
| 12 | Lockwasher, 10431 | 39 | Self-locking hexagonal nut, 10500 |
| 13 | Flat washer, 53783 | 40 | Machine screw, 10033 |
| 14 | Outer reel support arm, 52540A | 41 | Flat washer, 10450 |
| 15 | Flat washer, 53783 | 42 | Spacer, 52272 |
| 16 | Alarm lever spring, 52576 | 43 | Tape-out alarm switch, 20108 |
| 17 | Retainer ring, 10949 | 44 | Reel support latch spring, 50912 |
| 18 | Self-locking hexagonal nut. 10500 | 45 | Retainer ring, 10949 |
| 19 | Switch actuating stud, 52278 | 46 | Reel support latch, 52938 |
| 20 | Flat washer, 10450 | 47 | Switch operating lever spring, 52266 |
| 21 | Tape-out alarm lever, 52542A | 48 | Retainer ring, 10949 |
| 22 | Self-locking hexagonal nut, 10500 | 49 | Switch operating lever, 52279A |
| 23 | Machine screw, 100086 | 50 | Lever latch spring, 52212 |
| 24 | Tape reel hub, 52128 | 51 | Retainer ring, 10949 |
| 25 | Self-locking hexagonal nut, 10525 | 52 | Lever latch, 52281 |
| 26 | Screw, 52541 | 53 | Tape reel bracket, 52140A |
| 27 | Ball bearing, 10762 | | |

AGO 10080 A

*Figure 4-33.-Continued*

the binding post (66) and shunt assembly (67) to the power supply and terminal unit chassis (68); remove the binding post (66) and shunt assembly (67).

(21) Remove the strain relief (17, fig. 4-31) and power cable assembly (18) from the power supply and terminal unit chassis (68, fig. 4-32).

*b*. *Reassembly* (figs. 4-31 and 6-5).

(1) Reassemble the power supply and terminal unit by reversing the procedures outlined in *a*(21) through (2) above.

(2) Replace the power supply and terminal unit as described in paragraph 4-40*b*.

**4-43. Disassembly and Reassembly of Tape Reel (TT-76/GGC)**
(fig. 4-3)

*a*. *Disassembly.*

(1) Disconnect the receptacle connector from the plug connector (36) attached to the tape reel bracket (53).

(2) Remove the machine screw (1) and lockwasher (2) that hold the tape reel bracket (53) to the stud on the motor support. Remove the three machine screws (3) and lockwashers (4) that hold the tape reel bracket (53) to the reperforator frame; remove the tape reel assembly.

(3) Unhook the two springs (5) from the tape guide roller shaft (9) and from the spring posts on the outer reel support arm (14).

(4) Remove the retainer rings (6 and 7) that hold the tape guide roller shaft (9) to the outer reel support arm (14); remove the tape guide roller shaft (9) and the two guide rollers (8).

(5) Unlatch the reel support latch (46), lift the outer reel support arm (14) clear of the latch, and remove the two plain hexagonal nuts (10) from the stud on the outer reel support arm (14).

(6) Remove the two plain hexagonal nuts (11), lockwashers (12), and flat washers (13) that hold the outer reel support arm (14) to the stud on the tape reel bracket (53); remove the outer reel support arm (14) and flat washer (15).

(7) Unhook the alarm lever spring (16) from the tape reel bracket (53) and from the tape-out alarm lever (21).

(8) Remove the retainer ring (17) that holds the tape-out alarm lever (21) to the stud on the tape reel bracket (53); remove the assembled tape-out alarm lever (21) and switch actuating stud (19).

(9) Remove the self-locking hexagonal nut (18) that holds the switch actuating stud (19) to the tape-out alarm lever (21); remove the switch actuating stud (19) and the flat washer (20).

(10) Remove the three self-locking hexagonal nuts (22) and machine screws (23) that hold the tape reel hub (24) to the tape reel (28); remove the tape reel hub (24).

(11) Remove the self-locking hexagonal nut (25) and the screw (26) that hold the ball bearing (27) and the tape reel (28) to the tape reel bracket (53); remove the ball bearing (27) and the tape reel (28).

(12) Unsolder and disconnect the wire leads to the tape-out alarm switch (43). Remove the wire from the clamp (38).

(13) Remove the two self-locking hexagonal nuts (29), machine screws (30), and lockwashers (31) that hold the plug connector (36) to the tape reel bracket (53); remove the terminal lug (32).

(14) Remove the two self-locking hexagonal nuts (33) and machine screws (34) that hold the tape alarm buzzer (35) to the tape reel assembly (53); remove the tape alarm buzzer (35), plug connector (36), and connecting wire. Remove the tubing (37) from the connecting wire if necessary.

(15) Remove the clamp (38) from the tape reel bracket (53).

(16) Remove the two self-locking hexagonal nuts (39), machine screws (40), and flat washers (41) that hold the tape-out alarm switch (43) to the tape reel bracket (53); remove the tape-out alarm switch (43) and spacer (42).

(17) Unhook the reel support latch spring (44) from the reel support latch (46) and from the spring post on the tape reel bracket (53).

(18) Remove the retainer ring (45) that holds the reel support latch (46) to the stud on the tape reel bracket (53); remove the reel support latch (46).

(19) Unhook the switch operating lever spring (47) from the switch operating lever (49) and from the spring post on the tape reel bracket (53).

(20) Remove the retainer ring (48) that holds the switch operating lever (49) to the stud on the tape reel bracket (53); remove the switch operating lever (49).

(21) Unhook the lever latch spring (50) from the lever latch (52) and from the spring post on the tape reel bracket (53).

(22) Remove the retainer ring (51) that holds the lever latch (52) to the stud on the tape reel bracket (53); remove the lever latch (52).

*b. Reassembly.*

(1) Reassemble the tape reel by reversing the procedures outlined in *a* above.

(2) Adjust the tape reel as described in paragraphs 4-199 and 4-200.

**4-44. Disassembly and Reassembly of Tape Reel (TT-76A/GGC and Later Models) (fig. 4-34)**

*a. Disassembly.*

(1) Disconnect the plug connector (61) of the tape-out alarm cable assembly (62) from the receptacle connector at the right of the keyboard-transmitter.

(2) Remove the tape reel assembly as follows:

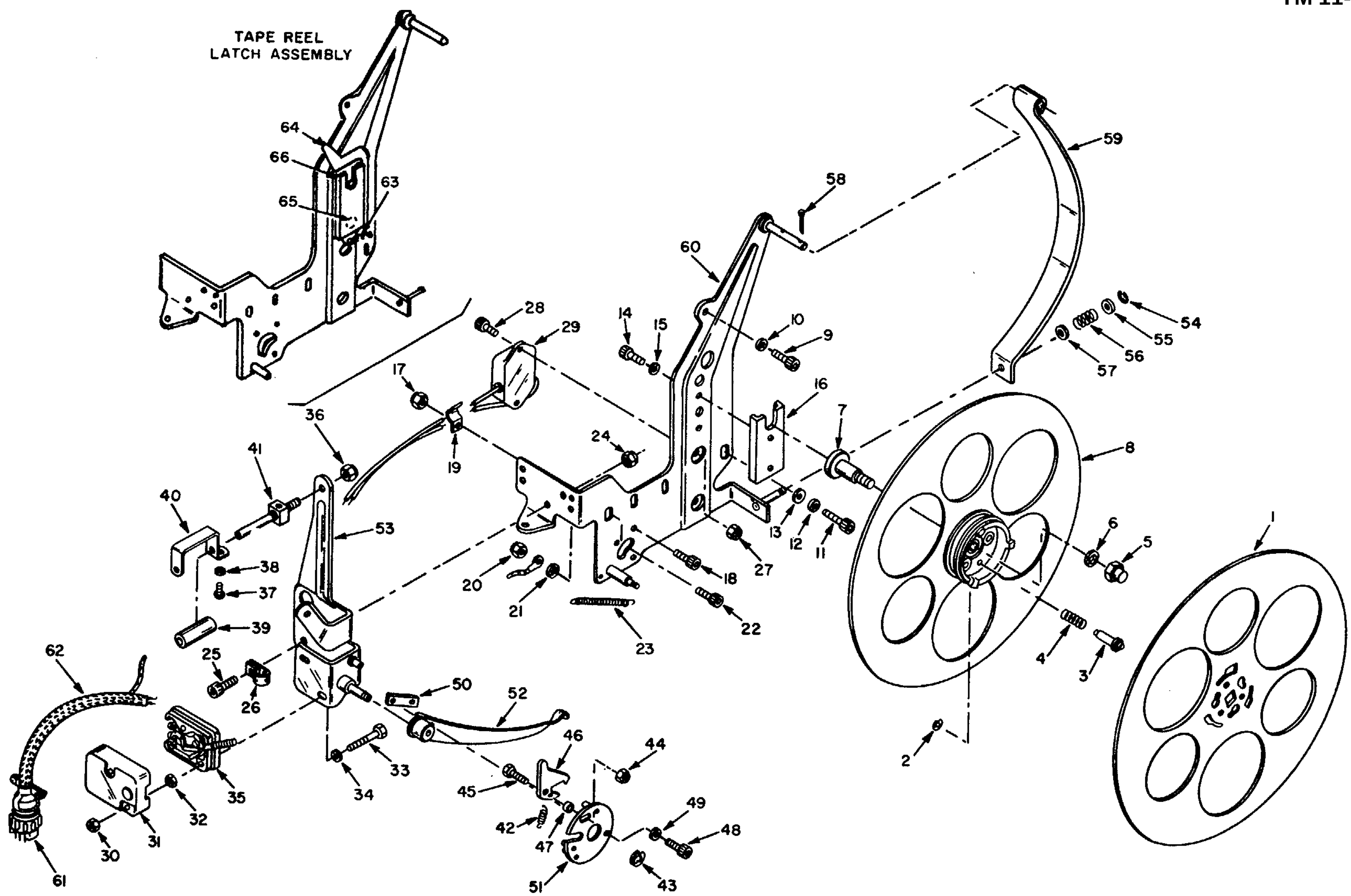
(*a*) On equipments not equipped with a tape reel latch, lift the assembled tape roll retaining plate (1) and the tape reel (8) from the pivot stud bracket (16).

(*b*) On equipments equipped with a tape reel latch (64), operate and hold the tape reel latch; lift the assembled tape roll retaining plate (1) and the tape reel (8) from the pivot stud bracket (66); release the tape reel latch.

(3) Unlock the tape roll retaining plate (1) from the hub on the tape reel (8); remove the tape roll retaining plate.

(4) Remove the retainer ring (2) that holds the release plunger (3) to the tape reel hub; remove the release plunger (3) and spring (4); remove the guide nut (5), lockwasher (6), and pivot stud (7) from the tape reel (8).

(5) Remove the two machine screws (9), lockwashers (10), two machine screws (11), lockwashers (12), and flat washers (13) that hold the tape reel bracket (60) to the reperforator frame; remove the tape reel bracket.

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AGO 10080A

*Figure 4-34. Tape reel, exploded view (TT-76A/GGC and later models).*

1 Tape roll retaining plate, 57315
2 Retainer ring, 10969
3 Release plunger, 57389
4 Spring, 57391
5 Guide nut, 57314
6 Lockwasher, 10431
7 Pivot stud, 57390
8 Tape reel, 57350A
9 Machine screw, 10024-01
10 Lockwasher, 10405
11 Machine screw, 10024-01
12 Lockwasher, 10431
13 Flat washer, 10473
14 Machine screw, 10008
15 Lockwasher, 10430
16 Pivot stud bracket, 57377
17 Self-locking hexagonal nut, 10501
18 Machine screw, 10025
19 Clamp, 20521
20 Self-locking hexagonal nut, 10500
21 Lockwasher, 10403
22 Machine screw, 10055
23 Alarm lever spring, 57394
24 Self-locking hexagonal nut, 10501
25 Machine screw, 10025
26 Clamp, 20521
27 Self-locking hexagonal nut, 10500
28 Machine screw, 10004
29 Tape alarm buzzer, 20783
30 Self-locking hexagonal nut, 10500
31 Alarm switch cover, 55372A
32 Self-locking hexagonal nut, 10513
33 Machine screw, 10091
34 Lockwasher, 10429
35 Tape-out alarm switch, 56821A
36 Self-locking hexagonal nut, 10525
37 Machine screw, 10357
38 Lockwasher, 10429
39 Guide roller, 50162
40 Retainer, 57379
41 Tape guide roller stud, 57378
42 Lever latch spring, 53312
43 Retainer ring, 10949
44 Self-locking hexagonal nut, 10500
45 Machine screw, 10090
46 Lever latch, 57380
47 Spacer, 57395
48 Machine screw, 10003
49 Lockwasher, 10429
50 Nut plate, 52561
51 Switch alarm, 57374A
52 Alarm lever, 57397A
53 Switch bracket, 57371A
54 Retainer ring, 10960
55 Flat washer, 50319
56 Tape retainer spring, 57391
57 Flat washer, 50319
58 Cotter pin, 10802
59 Tape retainer, 57392
60 Tape reel bracket, 57367A
61 Plug connector, 23148
62 Tape-out alarm cable assembly, 57393A
63 Latch spring
64 Latch
65 Latch sleeve
66 Pivot stud bracket

*Figure 4-34.-Continued.*

(6) Remove the pivot stud bracket as follows:

(*a*) On equipments not equipped with a tape reel latch, remove the two machine screws (14) and lockwashers (15) that hold the pivot stud bracket (16) to the tape reel bracket (60); remove the pivot bracket.

(*b*) On equipments equipped with a tapereel latch, remove the latch spring (63), the two machine screws (14) and lockwashers (15) that hold the pivot stud bracket (66) to the tape reel bracket (60); remove the pivot stud bracket (66) along with the tape reel latch (64) and the latch sleeve (65).

(7) Remove the self-locking hexagonal nut (17) and machine screw (18) that hold the cable clamp (19) to the tape reel bracket (60); remove the cable clamp (19).

(8) Remove the self-locking hexagonal nut (20), lockwasher (21), and machine screw (22) that hold the grounding lug on the tape out alarm cable assembly (62) to the tape reel bracket (60).

(9) Disconnect the wire leads from the tape-out alarm switch (3b).

(10) Unhook the alarm lever spring (23) from the alarm lever (52) and from the spring post on the tape reel bracket (60).

(11) Remove the two self-locking hexagonal nuts (24) and machine screws (25) that hold the switch bracket (53) to the tape reel bracket (60); remove the assembled switch bracket and the cable clamp (26).

(12) Remove the two self-locking hexagonal nuts (27) and machine screws (28) that hold the tape alarm buzzer (29) to the tape reel bracket (60); remove the tape alarm buzzer (29) and the tape-out alarm cable assembly (62).

(13) Remove the two self-locking hexagonal nuts (30) that retain the alarm switch cover (31); remove the alarm switch cover (31).

(14) Remove the two self-locking hexagonal nuts (32), machine screws (33), and lockwashers (34) that hold the tape-out alarm switch (35) to the switch bracket (53); remove the tape-out alarm switch (35).

(15) Remove the two self-locking hexagonal nuts (36) that hold the two tape guide roller studs (41) to the switch bracket (53); remove the two guide roller assemblies.

(16) Remove the two machine screws (37) and lockwashers (38) that hold the two retainers (40) to the tape

two tape guide roller studs (41); remove the guide roller (39) and retainer (40) from each of the tape guide roller studs (41).

(17) Unhook the lever latch spring (42) from the switch arm (51) and from the lever latch (46).

(18) Remove the retainer ring (43) that holds the switch arm (51) to the stud on the switch bracket (53); remove the assembled switch arm (51), lever latch (46), and alarm lever (52).

(19) Remove the self-locking hexagonal nut (44) and machine screw (45) that hold the lever latch (46) to the switch arm (51); remove the lever latch (46) and spacer (47).

(20) Remove the machine screws (48), lock-washers (49), and nut plate (50) that hold theswitch arm (51) to the alarm lever (52); remove the switch arm (51).

(21) Remove the retainer ring (54), flat washer (55), tape retainer spring (56), and flat washer (57) that hold the tape retainer (59) to the stud on the tape reel bracket (60). Remove the two cotter pins (58) from the stud at the top of the tape reel bracket (60); remove the tape retainer (59).

(22) Disconnect the plug connector (61) from the tape-out alarm cable assembly (62).

*b. Reassembly*.

(1) Reassemble the tape reel by reversing the procedures outlined in a above.

(2) Adjust the tape reel as described in paragraphs 4-201 and 4-202.

**4-45. Disassembly and Reassembly of Tape Puller Mechanism (TT-76A/GGC and Later Models)** (fig. 4-35)

*a. Disassembly.*

(1) Remove the two machine screws (1), flat washers (2), and lockwashers (3) that hold the tape puller bracket (17) to the reperforator frame; remove the tape puller assembly.

(2) Remove the tape puller arm roller (4) from the tape roller puller stud (8).

(3) Remove the retainer ring (5) and slide the assembled tape puller arm (13), tape puller spring (12), and tape puller roller stud (8) off the arm pivot stud (15). Remove the flat washer (6) from the arm pivot stud (15).

(4) Remove the self-locking hexagonal nut (7) that holds the tape puller roller stud (8) to the tape puller arm (13); remove the tape puller roller stud (8).

(5) Remove the two machine screws (9), the nut plate (10), and two lockwashers (11) that hold the tape puller spring (12) to the tape puller arm (13); remove the tape puller spring (12).

(6) Remove the two self-locking hexagonal nuts (14) that hold the arm pivot studs (15) to the tape puller bracket (17); remove the arm pivot studs (15) and flat washers (16).

*b. Reassembly*.

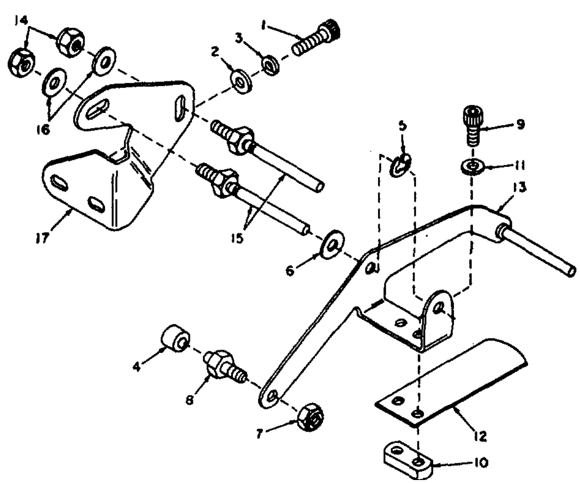
(1) Reassemble the tape puller mechanism by reversing the procedures outlined in *a* above.

(2) Adjust the tape puller mechanism as described in paragraphs 4-193 and

**4-46. Disassembly and Reassembly of Selector Magnet (TT-76-GGC)**

*a. Disassembly.*

(1) Remove the two machine screws (10, fig. 4-68) and lockwashers (12) securing the terminal board cover (11) to the terminal board (14); remove the terminal board cover (11). Unsolder and disconnect the six electrical wire terminals leading from the selector magnet (15, fig.-436) to the terminal board mounted on the reperforator frame directly behind the selector magnet.




| | |
|---|---|
| 1 | Machine screw, 10008 |
| 2 | Flat washer, 10454 |
| 3 | Lockwasher, 10430 |
| 4 | Tape puller arm roller, 50843 |
| 5 | Retainer ring, 10949 |
| 6 | Flat washer, 50827 |
| 7 | Self-locking hexagonal nut, 10501 |
| 8 | Tape puller roller stud, 56539 |
| 9 | Machine screw, 10003 |
| 10 | Nut plate, 54884 |
| 11 | Lockwasher, 10429 |
| 12 | Tape puller spring, 56540 |
| 13 | Tape puller arm, 56536A |
| 14 | Self-locking hexagonal nut, 10501 |
| 15 | Arm pivot stud, 56538 |
| 16 | Flat washer, 50827 |
| 17 | Tape puller bracket, 56541 |

*Note.* Later models of the equipment include a felt washer, 61478, between items (6) and (15).

*Figure 4-35. Tape puller mechanism, exploded view (TT-76A/GGC and later models).*

(2) Remove the two machine screws (1), lock-washers (2), and flat washers (3) that attach the selector magnet bracket (35) to the reperforator frame; remove the selector magnet assembly from the reperforator.

(3) Unsolder the two electrical leads of the cable on the selector magnet (15) from the two terminal lugs on the potentiometer (11); tag the leads. Remove the two pieces of tubing (4) from the electrical leads at the potentiometer (11) (TT-76/GGC).

(4) Remove the two machine screws (5) and lockwashers (6) that hold the potentiometer mounting bracket (12) to the selector magnet bracket (35); remove the assembled potentiometer (11) and bracket (12) (TT-76/GGC).

(5) Remove the knob (7) and plain hexagonal nut (8) that hold the potentiometer (11) to the potentiometer mounting bracket (12); remove the potentiometer (11), lockwasher (9), and flat washer (10) (TT-76/GGC).

(6) Remove the two machine screws (13) and lockwashers (14) that hold the magnet bracket (16) and selector magnet (15) to the selector magnet bracket (35); remove the selector magnet (15) and magnet bracket (16).

(7) Remove the setscrew (17) that holds the armature mounting shaft (20) in the selector magnet bracket (35).

(8) Remove the two retainer rings (18 and 19) from the armature mounting shaft (20); slide the armature mounting shaft (20) from the armature (21) and from the selector magnet bracket (35). Remove the armature (21) from the selector magnet bracket (35).

(9) Remove the setscrew (22) that holds the bar magnet (23) in the selector magnet bracket (35); remove the bar magnet (23).

(10) Remove the machine screw (24) and lockwasher (25) that hold the armature stop bracket (26) on the selector magnet bracket (35); remove the assembled armature stop bracket (26), machine screws (27), and plain hexagonal nuts (28).

(11) Remove the two machine screw (27) and plain hexagonal nuts (28) from the armature stop bracket (26).

(12) Remove the two armature leaf spring stop screws (29 and 31) and plain hexagonal nuts (30 and 32) from the selector magnet bracket (35).

(13) Remove the setscrews (33 and 34) from the selector magnet bracket (35).

*b. Reassembly.*

(1) Install the four setscrews (34 and 33) in the selector magnet bracket (35) with the leading ends flush with the surface of the mounting bracket.

(2) Install the plain hexagonal nuts (32 and 30) on the armature leaf spring stop screws (31 and 29) about halfway up the threads; install the machine screws (31 and 29) in the selector magnet bracket (35).

(3) Install the plain hexagonal nuts (28) on the machine screws (27); install the machine screws in the armature stop bracket (26) with the ends of the machine screws approximately flush with the face of the armature stop bracket (26).

(4) Position the bar magnet (23) on the selector magnet bracket (35) with the north pole protruding from the magnet bracket. See paragraph 4-175 for adjustment and positioning of the bar magnet. The north pole of the bar magnet is designated by a red dot. Secure the bar magnet (23) with a setscrew (22).

(5) Reassemble the selector magnet by reversing the procedures outlined in *a* (12) through (2) above.

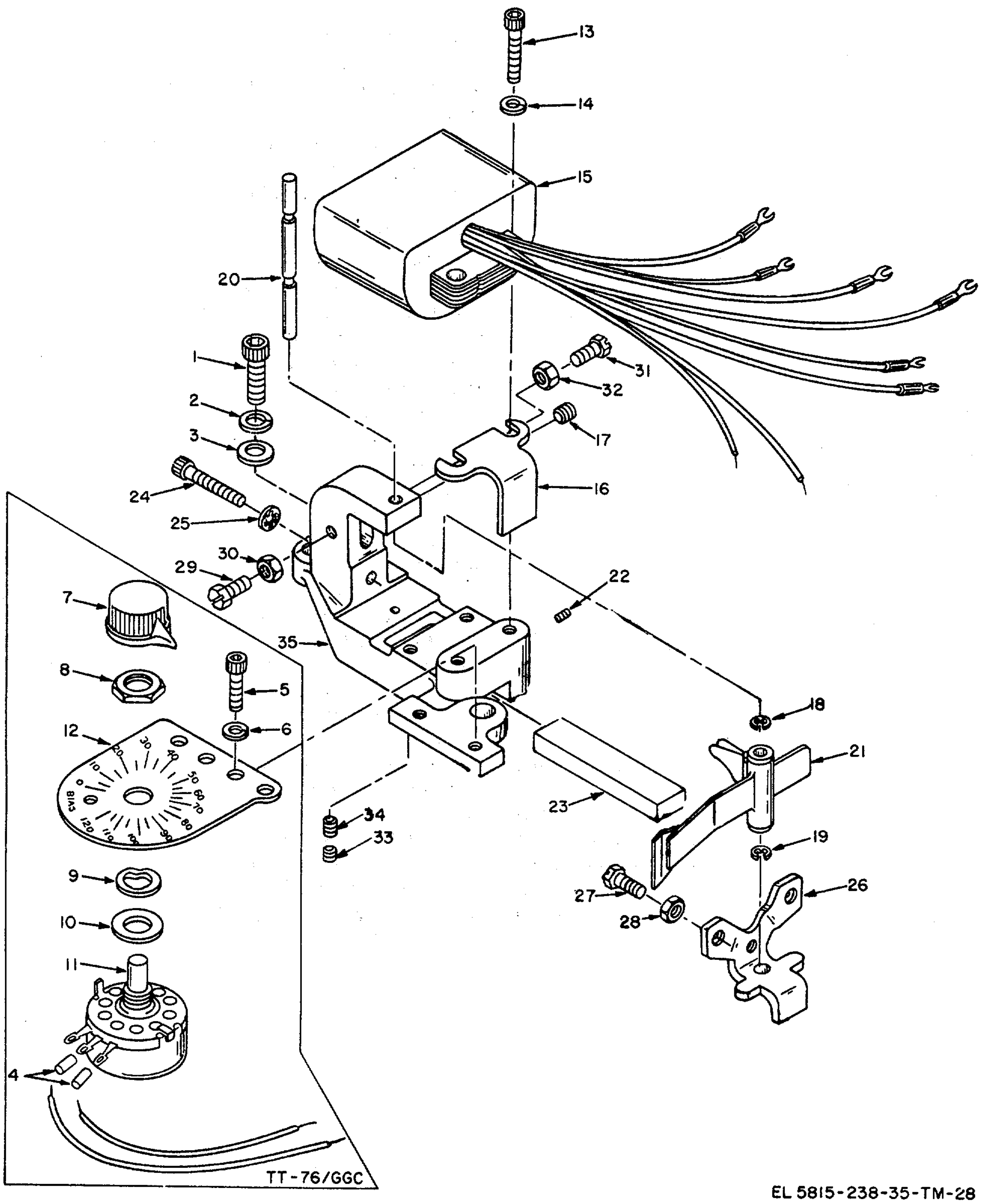



*Figure 4-36. Selector magnet, exploded view (TT-76/GGC and TT-699/GGC).*

Key to fig 4-36

| | | | |
|---|---|---|---|
| 1 | Machine screw, 10018 | 19 | Retainer ring, 10969 |
| 2 | Lockwasher, 10420 | 20 | Armature mounting shaft, 52288 |
| 3 | Flat washer, 10464 | 21 | Armature, 53103A |
| 4 | Tubing, 20732-01 | 22 | Setscrew, 10220 |
| 5 | Machine screw, 10032 | 23 | Bar magnet, 52289 |
| 6 | Lockwasher, 10430 | 24 | Machine screw, 10010 |
| 7 | Knob. 20815 | 25 | Lockwasher, 10404 |
| 8 | Plain hexagonal nut, 10529 | 26 | Armature stop bracket, 52529 |
| 9 | Lockwasher, 10465 | 27 | Machine screw, 53183 |
| 10 | Flat washer, 10468 | 28 | Plain hexagonal nut, 10507 |
| 11 | Potentiometer, 20019 | 29 | Armature leaf spring stop screw, 53183 |
| 12 | Potentiometer mounting bracket, 53327 | 30 | Plain hexagonal nut, 10507 |
| 13 | Machine screw, 10011 | 31 | Armature leaf spring stop screw, 53183 |
| 14 | Lockwasher, 10430 | 32 | Plain hexagonal nut, 10507 |
| 15 | Selector magnet, 52740A | 33 | Setscrew, 10221 |
| 16 | Bracket, 52296 | 34 | Setscrew, 10235 |
| 17 | Setscrew, 10225 | 35 | Selector magnet bracket, 52528 |
| 18 | Retainer ring, 10969 | | |

(6) Adjust the selector magnet as described in paragraphs 4-178 and 4-180.

(7) Install the selector magnet bracket (35) on the frame of the reperforator with two flat washers (3), lockwashers (2), and machine screws (1). Connect and solder the terminal leads from the selector magnet (15). Install the terminal board cover (11, fig. 4-68) on the terminal board (14); secure with two machine screws (10) and lockwashers (12).

(8) Adjust the selector magnet as described in paragraphs 4-174, 4-176, 4-182, 4-184, and 4-186.

**4-47. Disassembly and Reassembly of Selector Magnet (TT-76A/ GGC, TT-699A/ GGC and Later, Models)** (fig. 4-37)

a. *Disassembly.*

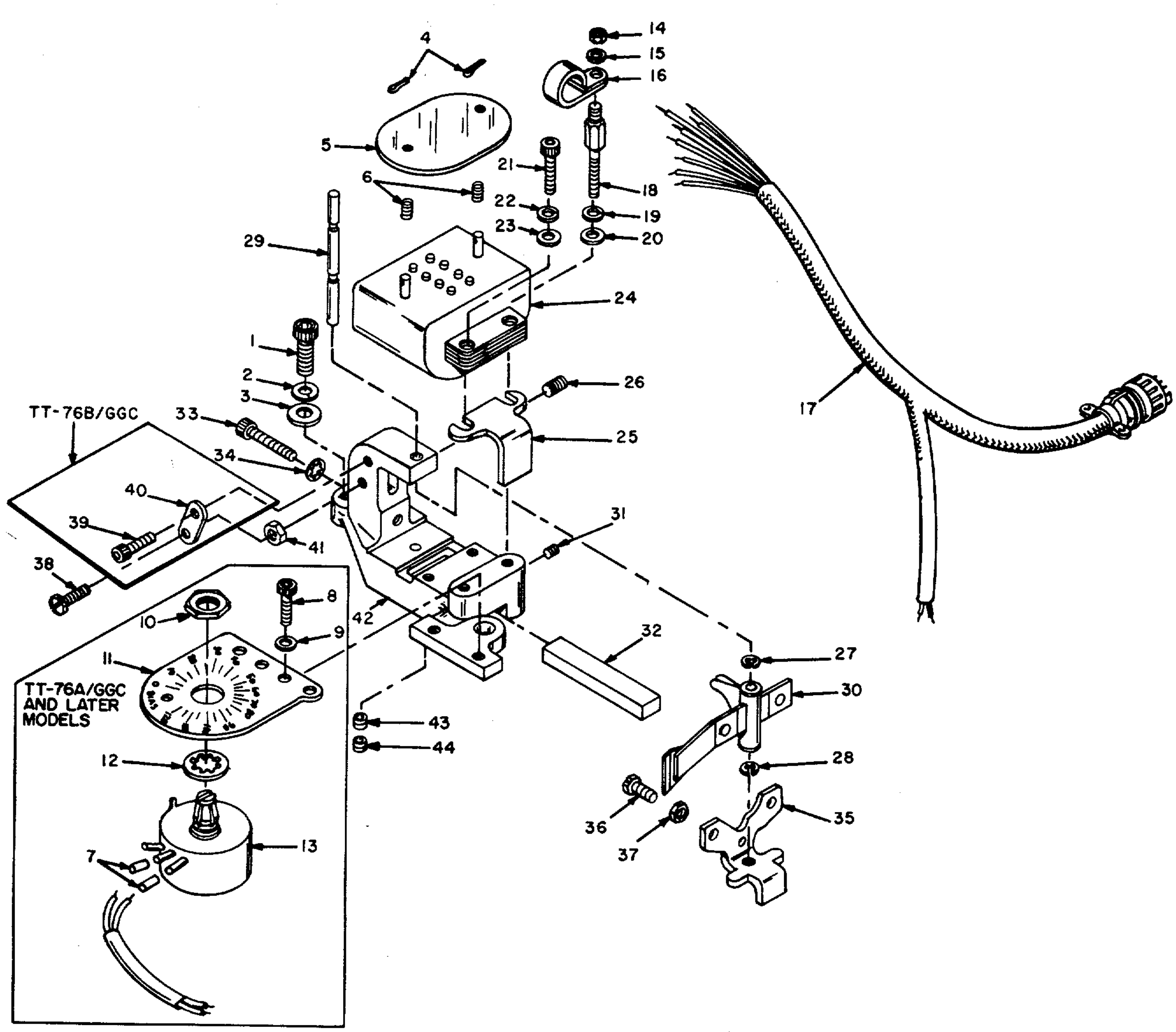
(1) Unplug the selector magnet cable (17) and remove the two machine screws (1), lock-washers (2), and flat washers (3) that attach the selector magnet bracket (42) to the reperforator frame; remove the selector magnet assembly from the reperforator.

(2) Remove the two cotter pins (4) that hold the cover (5) on the two studs of the selector magnet (24); remove the cover ((5) and the two cover springs (6).

(3) Unsolder the two electrical leads of the selector magnet cable (17) from the two terminal lugs on the potentiometer (13); tag the leads. Remove the two pieces of tubing (7) from the electrical leads at the potentiometer (13) (TT. 76A/GGC, TT-76B/GGC, and TT-76C/GGC).

(4) Remove the two machine screws (8) and lockwashers (9) that hold the potentiometer mounting bracket (11) to the selector magnet bracket (42); remove the assembled potentiometer (13) and mounting bracket (11) (TT-76A/GGC, TT-76B/GGC, and TT-76C/GGC).

(5) Remove the plain hexagonal nut (10) that holds the potentiometer (13) to the potentiometer mounting bracket (11); remove the potentiometer (13) and lockwasher (12) (TT-76A/GGC, and TT. 76C/GGC).

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1 Machine screw, 10018
2 Lockwasher, 10420
3 Flat washer, 10464
4 Cotter pin, 10806
5 Cover, 56089
6 Cover spring, 56091
7 Tubing, 20732
8 Machine screw, 10032
9 Lockwasher, 10430
10 Plain hexagonal nut, 10529
11 Potentiometer mounting bracket, 53327
12 Lockwasher, 10419
13 Potentiometer, 20025
14 Plain hexagonal nut, 10507
15 Lockwasher, 10430
16 Cable clamp, 20513
17 Selector magnet cable, 53545A
18 Selector magnet cable stud, 56127
19 Lockwasher, 10430
20 Flat washer, 50315
21 Machine screw, 10011
22 Lockwasher, 10430
23 Flat washer, 50315
24 Selector magnet, 56126A
25 Magnet bracket, 52292
26 Setscrew, 10225
27 Retainer ring, 10969
28 Retainer ring, 10969
29 Armature mounting shaft, 52288
30 Armature, 54092A
31 Setscrew, 10220
32 Bar magnet, 52289
33 Machine screw, 10010
34 Lockwasher, 10404
35 Armature stop bracket, 52529
36 Machine screw, 53183
37 Plain hexagonal nut, 10507
38 Armature leaf spring stop screw, 53183
39 Machine screw, 10058
40 Locking tab, 59896
41 Plain hexagonal nut, 10507, (TT-76A/GGC only)
42 Selector magnet bracket, 52528
43 Setscrew, 10235
44 Setscrew, 10221

*Figure 4-37. Selector magnet, exploded view (TT-76.A/GGC, TT-699A/GGC and later models).*

(6) Remove the plain hexagonal nut (14) and lockwasher (15) that hold the cable clamp (16) to the selector magnet cable stud (18); remove the cable clamp (16).

(7) Unsolder the eight electrical wire leads of the selector magnet cable (17) from the eight terminal posts of the selector magnet (24); tag the leads. Remove the selector magnet cable (17) from the cable clamp (16).

(8) Remove the selector magnet cable stud (18), lockwasher (19), flat washer (20), machine screw (21), lockwasher (22), and flat washer (23) that hold the magnet bracket (25) and selector magnet (24) to the selector magnet bracket (42); remove the selector magnet (24) and magnet bracket (25).

(9) Remove the setscrew (26) that holds the armature mounting shaft (29) in the selector magnet bracket (42).

(10) Remove the two retainer rings (27 and 28) from the armature mounting shaft (29); slide the armature mounting shaft (29) from the armature (30) and from the selector magnet bracket (42); remove the armature (30) from the selector magnet bracket (42).

(11) Remove the setscrew (31) that holds the bar magnet (32) in the selector magnet bracket (42); remove the bar magnet (32).

(12) Remove the machine screw (33) and lockwasher (34) that hold the armature stop bracket (35) on the selector magnet bracket (42); remove the assembled armature stop bracket (35), machine screws (36), and plain hexagonal nuts (37).

(13) Remove the two machine screws (36) and plain hexagonal nuts (37) from the armature stop bracket (35).

(14) Remove the two armature leaf spring stop screws (38) and plain hexagonal nuts (41) from the selector magnet bracket (42).

(15) On the TT-76B/GGC and later models, remove the two machine screws (39) and the locking tabs (40) from the selector magnet bracket (42).

(16) Remove the four setscrews (43 and 44) from the selector magnet bracket (42).

*b. Reassembly.*

(1) Install the four setscrews (44 and 43) in the selector magnet bracket (42) with the leading ends flush with the surface of the mounting bracket.

(2) Install the plain hexagonal nuts (41) on the armature leaf spring stop screws (38) about halfway up the threads; install the screws (38) in the selector magnet bracket (42).

(3) On the TT-76B/GGC and later models, pull the two locking tabs (40) on their respective machine screws (39) and install the two machine screws on the selector magnet bracket (42). Be sure that the larger holes of the locking tabs (40) aline with the holes for the armature leaf spring stop screws (38). Turn the two armature leaf spring stop screws (38) about halfway up the thread, into the selector magnet bracket.

(4) Install the plain hexagonal nuts (37) on the machine screws (36); install the machine screws in the armature stop bracket (35) with the ends of the machine screws approximately flush with the face of the armature stop bracket (35).

(5) Position the bar magnet (32) on the selector magnet bracket (42). (See para. 4-175 for adjustment and positioning of the bar magnet). The north pole of the bar magnet is designated by a red dot. Secure the bar magnet (32) with a set screw (31).

(6) Reassemble the selector magnet by reversing the procedures outlined in a(2) through (12) above.

(7) Adjust the selector magnet attractive force and armature clearance (para. 4-179 and 4-181).

(8) Install the selector magnet bracket (42) on the frame of the reperforator with the two flat washers (3), lockwasher (2), and machine screws (1). Plug the selector magnet cable (17) into the socket.

(9) Adjust the selector magnet (para. 4-174, 4-177, and 4-183 through 4-18**8**).

## 4-48. Disassembly and Reassembly of Rangefinder (TT-76/GGC)

(fig. 4-38)

*a. Disassembly.*

(1) Remove the selector magnet assembly from the reperforator frame as de-scribed in paragraph 4-46a(1) and (2).

(2) Remove the two machine screws (1) and lockwashers (2) that hold the rangefinder and comb bracket (17) to the frame of the reperforator; remove the rangefinder mechanism and shims (3 and 4).

(3) Remove the rangefinder dial lock (5)

(or the alternate knurled nut (6) and lockwasher (7).), and the flat washer (8) from the rangefinder dial clamp (13).

(4) Remove the two setscrews (9) that hold the rangefinder cam (10) to the shaft on the rangefinder dial (12); remove the rangefinder cam (10).

(5) Remove the retainer ring (11) that holds the rangefinder dial (12) to the rangefinder and comb bracket (17); remove the rangefinder dial (12) and rangefinder dial clamp (13).

(6) Remove the two machine screws (14) and lockwashers (15) that hold the selector lever stop comb (16) to the rangefinder and comb bracket (17); remove the selector lever stop comb (16).

*b. Reassembly.*

(1) Reassemble the rangefinder by reversing the procedures described in *a* (6) through (2) above.

| | | | | | |
|---|---|---|---|---|---|
| 1 | Machine screw, 10029 | 7 | Lockwasher, 562179 | 13 | Rangefinder dial clamp, 52323 |
| 2 | Lockwasher, 10431 | 8 | Flat washer, 515666 | 14 | Machine screw, 10046 |
| 3 | 002 in. shim, 52578 | 9 | Setscrew, 10201 | 15 | Lockwasher, 10429 |
| 4 | 005 in. shim, 52577 | 10 | Rangeflnder cam, 50317 | 16 | Selector lever stop comb, 50511 |
| 5 | Rangefinder dial lock, 50895A | 11 | Retainer ring, 10949 | 17 | Rangefinder and comb bracket, 52326 |
| 6 | Knurled nut, 58819 | 12 | Rangefinder dial, 52881A | | |

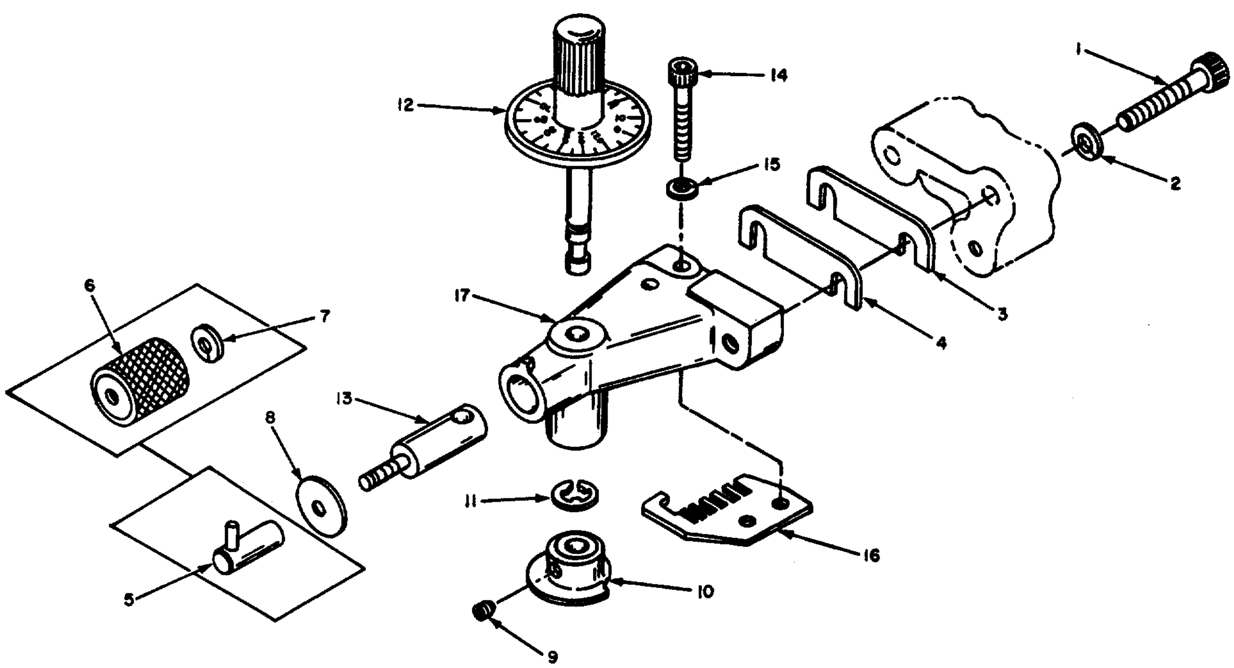


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*Figure 4-38. Rangefinder, exploded view (TT-76/GGC)*

(2) Adjust the rangefinder mechanism as described in paragraph 4-143.

(3) Replace the selector magnet assembly as described in paragraph 4-46 (7).

(4) Adjust the selector magnet assembly as described in paragraph 4-174, 4-175, 4-176, 4-178, and 4-180.

**4-49. Disassembly and Reassembly of Rangefinder (TT-76A/GGC and Later Models)**
(fig. 4-38)

*a. Disassembly.*

(1) Remove the machine screw (1), lock- washer (2), machine screw (3), and lockwasher (4) that hold the rangefinder and comb bracket (17) to the nut plate (5); remove the rangefinder assembly and shims (6 and 7).

(2) Remove the two machine screws (8) and lockwashers (9) that hold the selector lever stop comb (10) to the rangefinder and comb bracket (17); remove the selector lever stop comb (10).

(3) Remove the two setscrews (11) that hold the rangefinder cam (12) on the shaft of the rangefinder dial assembly (14); remove the rangefinder cam (12).

(4) Remove the retainer ring (13) that holds the rangefinder dial assembly (14) to the rangefinder and comb bracket (17); remove the rangefinder dial assembly (14).

(5) Remove the setscrew (15) that holds the rangefinder dial detent (16) to the rangefinder and comb bracket (17); remove the rangefinder dial detent (16).

*b. Reassembly.*

(1) Reassemble the rangefinder by reversing the procedures outlined in a above.

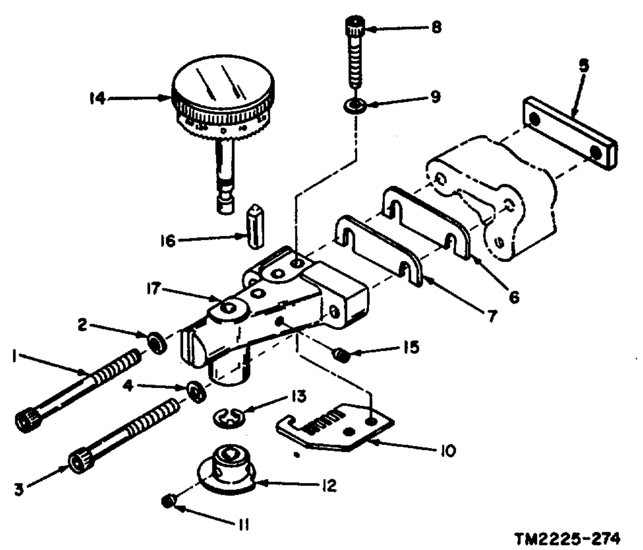
(2) Adjust the rangefinder as described in paragraphs 4-129 and 4-130.

**4-50. Disassembly and Reassembly of Manual Tape Feed-Out Mechanism (fig. 4-40)**

*a. Disassembly.*

(1) Remove the machine screw (1), nut plate (2), and flat washer (3) that hold the tape feed-out lever (4) to the tape feed-out shaft (22); remove the tape feed-out lever (4).

(2) Remove the machine screw (5), nut plate (6), and flat washer (7) that hold the limit stop lever (8) to the tape feed-out shaft (22); remove the limit stop lever (8) and flat washer (9).




1 Machine screw, 10060
2 Lockwasher
3 Machine screw, 10067
4 Lockwasher, 10431
5 Nut plate, 57165
6 .002 in. shim, 52578
7 .005 in. shim, 52577
8 Machine screw, 10046
9 Lockwasher, 10429
10 Selector lever stop comb, 50511
11 Setscrew, 10203
12 Rangefinder cam, 5031:
13 Retainer ring, 10949
14 Rangefinder dial assembly, 57161A
15 Setscrew, 10208
16 Rangefinder dial detent, 53306A
17 Rangefinder and comb bracket, 57163

*Note.* A flat washer, 10459, is located between items 9 and 17 on the TT-76A/GGC and later models.

*Figure 4-39. Reperforator rangefinder, exploded view (TT-76A/GGC and later models).*

(3) Remove the two machine screws (10) and lockwashers (11) that hold the front support bracket (12) to the tape feed-out shaft (22); remove the front support bracket (12).

(4) Remove the retainer ring (13) that holds one end of the manual tape feed-out link (15) to the link lever (19). Remove the retainer ring (14) that holds the other end of the manual

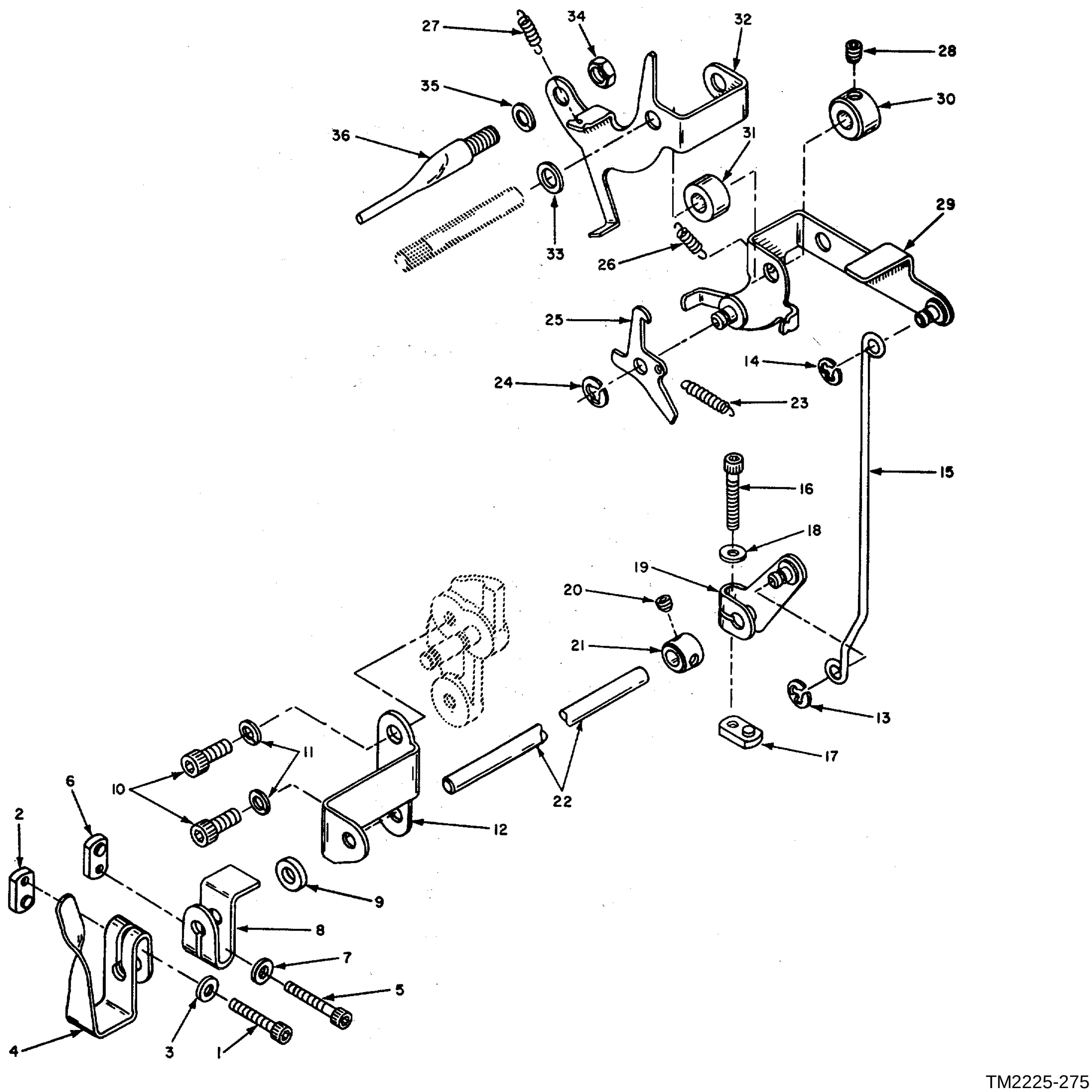



*Figure 4-40. Manual tape feed-out mechanism, exploded view.*

tape feed-out link (15) to the latching lever (29). Remove the manual tape feed-out link (15).

(5) Remove the machine screws (16), nut plate (17), and flat washer (18) that hold the link lever (19) to the tape feed-out shaft (22); remove the link lever (19).

(6) Remove the two setscrews (20) that hold the collar (21) to the tape feed-out shaft (22); remove the collar (21). Remove the tape feed-out shaft (22) from the reperforator frame.

(7) Remove the latching lever stop spring (23) from. the disabling latch (25) and from the latching lever (29).

(8) Remove the retainer ring (24) that holds the disabling latch (25) to the stud on the latching lever (29); remove the disabling latch (25).

(9) Remove the latching lever spring (26) from the latching lever (29) and from the spring post on the reperforator frame.

(10) Remove the tape feed-out operating arm spring (27) from the tape feed-out operating arm (32) and from the spring post on the reperforator frame.

(11) Remove the two setscrews (28) that hold the collar (30) to the mounting post on the reperforator frame. Remove the latching lever (29), collar (30), spacer (31), tape feed-out operating arm (32), and flat washer (33) from the mounting post on the reperforator frame.

(12) Remove the plain hexagonal nut (34) that holds the eccentric spindle (36) to the tape feed-out operating arm (32); remove the eccentric spindle (36) and lockwasher (35).

*b. Reassembly.*

(1) Reassemble the manual tape feed-out mechanism by reversing the procedures outlined in a above.

(2) Adjust the manual tape feed-out mechanism as described in paragraph 4-190.

**4-51. Removal and Replacement of Ribbon Supply Group (TT-76/GGC)**
(fig. 4-41)

*a. Removal.*

(1) Remove the ribbon spools (1) from the ribbon spool shaft (37).

(2) Remove the machine screw (2) and lockwasher (3) that hold the ribbon feed brace (8) to the reperforator frame.

(3) Remove the two machine screws (4) and lockwashers (5) that hold the ribbon feed mounting bracket (38) to

1 Machine screw, 10006
2 Nut plate, 50174
3 Flat washer, 10459
4 Tape feed-out lever, 52646
5 Machine screw, 10006
6 Nut plate, 50174
7 Flat washer, 10459
8 Limit stop lever, 52211 (TT-76/GGC) 56593 (TT-76A/GGC and later models)
9 Flat washer, 50827
10 Machine screw, 10035.
11 Lockwasher, 10405
12 Front support bracket, 52686
13 Retainer ring, 10960
14 Retainer ring, 10960
15 Manual tape feed-out link, 52145
16 Machine screw, 10006
17 Nut plate, 50174
18 Flat washer, 10459
19 Link lever, 52142A
20 Setscrew, 10201
21 Collar, 50391
22 Tape feed-out shaft, 52144
23 Latching lever stop spring, 53141
24 Retainer ring, 10949
25 Disabling latch, 52155
26 Latching lever spring, 53140
27 Tape feed-out operating arm spring, 53139
28 Setscrew, 10208
29 Latching lever, 52152 (TT-76/GGC); 56738A (TT-76A/GGC and later models)
30 Collar, 50149
31 Spacer, 52517
32 Tape feed-out operating arm, 52149
33 Flat washer, 50544
34 Plain hexagonal nut, 10509
35 Lockwasher; 10431
36 Eccentric spindle, 52151



*Figure 4-40.-Continued*

the front support frame. Disengage the ribbon feed cam follower (13) from the print and register cam on the function shaft and remove the ribbon supply group from the reperforator.

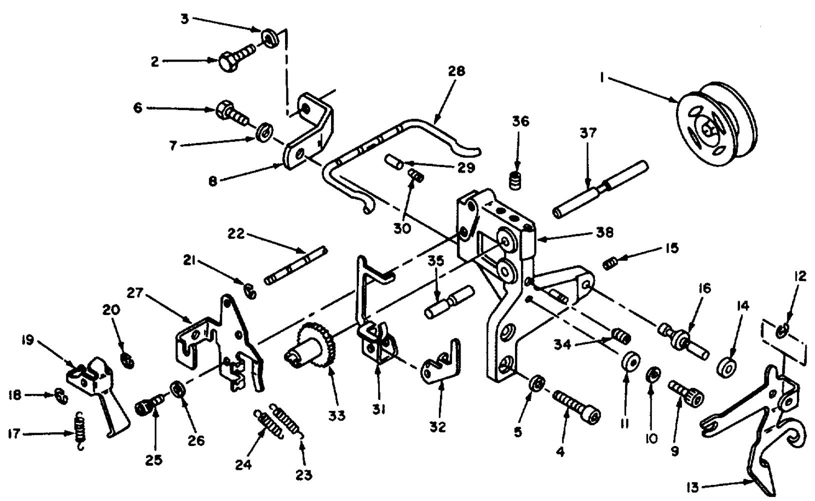
*b. Replacement.*

(1) Position the ribbon supply group on the reperforator; be careful to engage the ribbon feed cam follower (13) with the print and register cam on the function shaft, Secure the ribbon feed mounting bracket (38) to the front support frame with two machine screws (4) and lockwashers (5).

(2) Position the ribbon feed brace (8) on the reperforator frame; secure with a machine screw (2) and lockwasher (3).

(3) Install the ribbon spool (1) on the reperforator ribbon spool shaft (37).

(4) Adjust the ribbon supply group as described in paragraphs 4-166 and 4-168.

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1 Ribbon spool
2 Machine screw, 10397
3 Lockwasher, 10431
4 Machine screw, 10028
5 Lockwasher, 10430
6 Machine screw, 10397
7 Lockwasher, 10431
8 Ribbon feed brace, 52581
9 Machine screw, 10008
10 Lockwasher, 10430
11 Spacer, 53334
12 Retainer ring, 10949
13 Ribbon feed cam follower, 52586
14 Spacer, 50827
15 Setscrew, 10210
16 Eccentric stud, 52585
17 Ribbon retainer lever spring, 52603
18 Retainer ring, 10969
19 Ribbon retainer lever, 52708
20 Retainer ring, 10969
21 Retainer ring, 10969
22 Ribbon retainer shaft, 53178
23 Ratchet feed detent spring, 52604
24 Sensing lever spring, 52603
25 Machine screw, 10001
26 Lockwasher, 10429
27 Left holding clip bracket, 52599 and right holding clip bracket, 52594
28 Ribbon spool holding clip, 52615
29 Holding clip detent, 53179
30 Holding clip detent spring, 53256
31 Left sensing lever, 52597 and right sensing lever, 52596
32 Left ratchet feed detent, 52610A and right ratchet feed detent, 52611A
33 Left ribbon feed detent wheel, 52591A and right ribbon feed detent wheel, 52590A
34 Setscrew, 10210
35 Sensing lever shaft, 52595
36 Setscrew, 102.10
37 Ribbon spool shaft, 52589
38 Ribbon feed mounting bracket, 52512

*Figure 4-41. Ribbon feed mechanism, exploded view (TT-76/GGC).*

**4-52. Removal and Replacement of Ribbon Supply Group (TT-76A/GGC and Later Models)**
(fig. 4-42)

a. Removal.

(1) Remove the ribbon spools (1) from the ribbon spool shaft (35).

(2) Remove the machine screw (2) and lockwasher (3) that hold the ribbon feed brace (8) to the reperforator frame.

(3) Remove the two machine screws (4) and lockwashers (5) that hold the ribbon feed mounting bracket (36) to the front support frame. Disengage the ribbon feed cam follower (12) from the print and register cam on the function shaft and remove the ribbon supply group from the reperforator.

1 Ribbon spool
2 Machine screw, 10397
3 Lockwasher, 10431
4 Machine screw, 10028
5 Lockwasher, 10430
6 Machine screw, 10397
7 Lockwasher, 10431
8 Ribbon feed brace, 52581
9 Stud, 57063
10 Lockwasher, 10430
11 Retainer ring, 10949
12 Ribbon feed cam follower, 56234
13 Spacer, 50827
14 Setscrew, 10210
15 Eccentric stud, 52585
16 Ribbon feed cam follower spring, 52602
17 Ribbon retainer lever spring, 52603
18 Setscrew, 10201
19 Ribbon retainer lever, 57062
20 Collar, 67061
21 Left sensing lever retracting lever, 57059 and right sensing lever retracting lever 57060
22 Retainer ring, 10969
23 Ribbon retainer shaft, 53178
24 Ratchet feed detent spring, 52604
25 Sensing lever spring, 52603
26 Machine screw, 10001
27 Lockwasher, 10429
28 Left holding lip bracket, 56226 and right holding clip bracket, 56228
29 Left sensing lever, 52597 and right sensing lever, 52596
30 Left rachet feed detent, 52610A and right ratchet feed detent, 52611A
31 Left ribbon feed detent wheel, 52591A and right ribbon feed detent wheel 52590A
32 Setscrew, 10210
33 Sensing lever shaft, 52595
34 Setscrew, 10210
35 Ribbon spool shaft, 56231A
36 Ribbon feed mounting bracket, 52512A
37 Felt washer, 61474
38 Felt washer, 61476
39 Felt washer, 61478
40 Felt washer, 61478
41 Felt washer, 61476

*Figure 4-42. Ribbon feed mechanism, exploded view (TT-76A/GGC and later models).*

*b. Replacement.*

(1) Position the ribbon supply group on the reperforator; be careful to engage the ribbon feed cam follower (12) with the print and register cam on the function shaft. Secure the ribbon feed mounting bracket (36) to the front support frame with two machine screws (4) and lockwashers (5).

(2) Position the ribbon feed brace (8) on the reperforator frame. Secure the ribbon feed brace with a machine screw (2) and lockwasher (3).

(3) Install the ribbon spools on the ribbonspool shaft (35).

(4) Adjust the ribbon supply group as described in paragraphs 4-167,4-168,4-169,4-170, and 4-171.

## 4-53. Disassembly and Reassembly of Ribbon Supply Group (TT-76/GGC)

*a. Disassembly.*

(1) Remove the ribbon supply group from the reperforator as described in paragraph 4-51a.

(2) Remove the machine screw (6, fig. 4-41) and lockwasher (7) that hold the ribbon feed brace (8) to the ribbon feed mounting bracket (38); remove the ribbon feed brace (8).

(3) Remove the machine screw (9), lockwasher (10), and spacer (11) from the ribbon feed mounting bracket (38).

(4) Remove the retainer ring (12) that holds the ribbon feed cam follower (13) to the eccentric stud (16); remove the ribbon feed cam follower (13) and spacer (14).

(5) Remove the setscrew (15) that holds the eccentric stud (16) to the ribbon feed mounting bracket (38); remove the eccentric stud (16).

(6) Remove the two ribbon retainer lever springs (17) from the two ribbon retainer levers (19) and the ribbon spool holding clip (28).

(7) Remove the retainer rings (18) that hold the ribbon-retainer levers (19) to the ribbon retainer shaft (22); remove the ribbon retainer levers (19).

(8) Remove the retainer rings (20 and 21) that hold the ribbon retainer shaft (22) to the left and right holding clip brackets (27); remove the ribbon retainer shaft (22).

(9) Remove the two ratchet feed detent springs (23) from the left and right holding clip brackets (27) and the left and right ratchet detents (32). Remove the two sensing lever springs (24) from the left and right holding clip brackets (27) and the left and right sensing levers (31).

(10) Remove the four machine screws (25) and lockwashers (26) that hold the left and right holding clip brackets (27) to the ribbon feed mounting brackets (38); remove the left and right holding clip brackets (27).

(11) Remove the ribbon spool holding clip (28) from the left and right holding clip brackets (27); catch the holding clip detent (29) and holding clip detent spring (30) as they are released from the ribbon feed mounting bracket (38).

(12) Remove the left and right sensing levers (31) and the left and right ratchet feed detents (32) from the sensing lever shaft (35). Remove the left and right ribbon feed detent wheels (33) from the ribbon spool shaft (37).

(13) Remove the setscrew (34) that holds the sensing lever shaft (35) in the ribbon feed mounting bracket (38); remove the sensing lever shaft (35).

(14) Remove the setscrew (36) that holds the ribbon spool shaft (37) in the ribbon feed mounting bracket (38); remove the ribbon spool shaft.

(15) Remove the two machine screws (1, fig. 4-43) and lockwashers (2) that hold the roller bracket (19) to the

ribbon feed mounting bracket (38, fig. 4-41); remove the upper ribbon feed and reversing mechanism from the ribbon feed mounting bracket (38).

(16) Remove the two retainer rings (3, fig. 4-43) that hold the two ribbon rollers (4) to the ribbon roller shaft (6); remove the ribbon rollers (4).

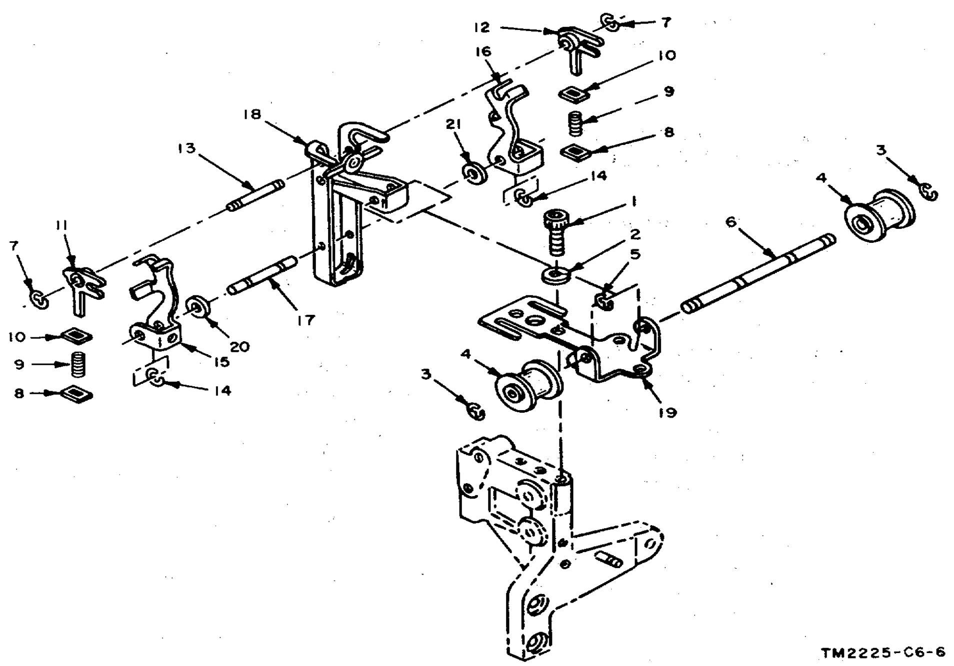
(17) Remove the two retainer rings (5) that hold the ribbon roller shaft (6) to the roller bracket (19); remove the ribbon roller shaft (6).

(18) Remove the two retainer rings (7) that hold the left and right ribbon reversing arms (11 and 12) to the reversing arm shaft (13); remove the left and right ribbon reversing arms (11 and 12).

(19) Remove the two spring washers (8), contact plunger springs (9), and two spring washers (10) from; the left and right ribbon reversing arms (11 and 12).

(20) Remove the reversing arm shaft (13) from the driving link lever (18).

(21) Remove the two retainer rings (14) that hold the left and right ribbon feed levers (15 and 16) to the ribbon feed pawl shaft (17); remove the left and right ribbon feed levers (15 and

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| | | | | | |
|---|---|---|---|---|---|
| 1 | Machine screw, 10008 | 8 | Spring washer, 53427 | 15 | Left ribbon feed lever, 52605 |
| 2 | Lockwasher, 10430 | 9 | Contact plunger spring, 51593 | 16 | Right ribbon feed lever, 52607 |
| 3 | Retainer ring, 10949 | 10 | Spring washer, 53427 | 17 | Ribbon feed pawl shaft, 52609 |
| 4 | Ribbon roller, 52608 | 11 | Left ribbon reversing arm, 52705A | 18 | Driving link lever, 52622A |
| 5 | Retainer ring, 10949 | 12 | Right ribbon reversing arm, 62704A | 19 | Roller bracket, 52598 |
| 6 | Ribbon roller shaft, 52601 | 13 | Reversing arm shaft, 52703 | 20 | Felt washer, 61478 |
| 7 | Retainer ring, 10969 | 14 | Retainer ring, 10969 | 21 | Felt washer, 61478 |

*Figure 4-43. Upper ribbon feed and reversing mechanism, exploded view.*

16) and the ribbon feed pawl shaft (17).

(22) Remove the driving link lever (18) from the roller bracket (19).

b. Reassembly.

(1) Reassemble the ribbon supply group by reversing the procedure outlined in a (22) through (2) above.

(2) Replace the ribbon supply group on the reperforator as described in paragraph 4-51b.

**4-54. Disassembly and Reassembly of Supply Group (TT-76A/GGC and Later Models)**

*a. Disassembly*.

(1) Remove the ribbon supply group from the reperforator as described in paragraph 4-52a.

(2) Remove the machine screw (6, fig. 4-42) and lockwasher (7) that hold the ribbon feed brace (8) to the ribbon feed mounting bracket (36); remove the ribbon feed brace (8).

(3) Remove the stud (9) and lockwasher (10) from the ribbon feed mounting bracket (36).

(4) Remove the ribbon feed cam follower spring (16) from the ribbon feed cam follower (12) and from the spring post on the ribbon feed mounting bracket (36).

(5) Remove the retainer ring (11) that holds the ribbon feed cam follower (12) to the eccentric stud (15); remove the ribbon feed cam follower (12) and spacer (13). Remove the two felt washers (37) when supplied.

(6) Remove the setscrew (14) that holds the eccentric stud (15) to the ribbon feed mounting bracket (36); remove the eccentric stud (15).

(7) Remove the two ribbon retainer lever springs (17) from the left and right ribbon retainer levers (19) and from the left and right holding clip brackets (28).

(8) Remove the setscrews (18) from the two collars (20); remove the two ribbon retainer levers (19) and collars (20) from the ribbon retainer shaft (23).

(9) Remove the left and right sensing lever retracting levers (21) from the left and right sensing levers (29) and from the ribbon retainer shaft (23).

(10) Remove the two retainer rings (22) that hold the ribbon retainer shaft (23) to the left and right holding clip brackets (28); remove the ribbon retainer shaft (23).

(11) Remove the two ratchet feed detent springs (24) from the left and right holding clip brackets (28) and from the left and right ratchet feed detents (30). Remove the two sensing lever springs (25) from the left and right holding clip brackets (28) and from the sensing levers (29).

(12) Remove the four machine screws (26) and lockwashers (27) that hold the left and right holding clip brackets (28) to the ribbon feed mounting bracket (36); remove the left and right holding clip brackets (28).

(13) Remove the left and right sensing the sensin lever shaft (33) in the ratchet feed detent (30) from the sensing lever shaft (33). Remove the left and right ribbon feed detent wheels (31) from the ribbon spool shaft (35). Remove the felt washer (38), when supplied.

(14) Remove the setscrew (32) that holds the sensing lever shaft (33) in the ribbon feed mounting bracket (36). Remove the felt washers (39) and (40), when supplied. Remove the sensing lever shaft.

(15) Remove the setscrew (34) that holds the ribbon spool shaft (35) in the ribbon feed mounting bracket (36); remove the ribbon spool shaft (35). Remove the felt washer (41), when supplied, from the ribbon spool shaft.

(16) Remove the two machine screws (1, fig. 4-43) and lockwashers (2) that hold the roller bracket (19) to the rib-

bon feed mounting bracket (36, fig. 4-42); remove the upper ribbon feed and reversing mechanism from the ribbon feed mounting bracket (36).

(17) Remove the two retainer rings (3, fig. 4-43) that hold the two ribbon rollers (4) to the ribbon roller shaft (6); remove the ribbon rollers (4).

(18) Remove the two retainer rings (5) that hold the ribbon roller shaft (6) to the roller bracket (19); remove the ribbon roller shaft (6).

(19) Remove the two retainer rings (7) that hold the left and right ribbon reversing arms (11 and 12) to the reversing arm shaft (13); remove the left and right ribbon reversing arms (11 and 12).

(20) Remove the two spring washers (8), contact plunger springs (9), and two spring washers (10) from the left and right ribbon reversing arms (11 and 12).

(21) Remove the reversing arm shaft (13) from the driving link lever (18).

(22) Remove the two retainer rings (14) that hold the left and right ribbon feed levers (15 and 16) to the ribbon feed pawl shaft (17); remove the left and right ribbon feed levers (15 and 16), felt washer (20 and 21), when supplied, and the ribbon feed pawl shaft (17).

(23) Remove the driving link lever (18) from the roller bracket (19).

*b. Reassembly.*

(1) Reassemble the ribbon supply groups by reversing the procedures outlined in a (23) through (2) above.

(2) Replace the ribbon supply group on the reperforator as described in paragraph 4-52*b*.

**4-55. Removal and Replacement of Front Support Assembly (TT-76/GGC)**

*a. Removal*.

(1) Remove the power supply and terminal unit from the reperforator frame as described in paragraph 4-40a.

(2) Remove the ribbon supply group from the reperforator frame as described in paragraph 4-51a.

(3) Remove the two setscrews (1, fig. 4-57) that hold the print and register cam (2) to the function shaft (33).

(4) Remove the two setscrews (3, fig. 4-54) that hold the type wheel driven gear (4) to the stop arm shaft (8).

(5) Remove the two machine screws (1 and 3, fig. 4-44) and lockwashers (2 and 4) that hold the chad tube (8) to the front support frame (67); remove the chad tube (8).

(6) Remove the three machine screws (13) and lockwashers (14) that hold the front support frame (67) to the reperforator frame.

(7) Loosen the four machine screws (1, fig. 4-73) that hold the reperforator frame to the base casting. Lift the front of the reperforator frame about 1/4 inch so that the front support assembly can drop far enough to allow the punch interference levers to clear the code rings; remove the front support assembly.

*b. Replacement*.

(1) Replace the front support assembly by reversing the procedures outlined in a (7) through (3) above. Be sure that each of the punch interference levers engages a code ring in the code ring cage.

(2) Replace the ribbon supply group as described in paragraph 4-53*b*.

(3) Replace the power supply and terminal unit as described in paragraph 4-51*b*.

**4-56. Removal and Replacement of Front Support Assembly (TT-76A/GGC and Later Models)**

*a. Removal*.

(1) Remove the power supply and terminal unit from the reperforator frame as described in paragraph 4-41*a*.

(2) Remove the tape puller mechanism as described in paragraph 4-45*a*.

(3) Remove the ribbon supply group from the reperforator frame as described in paragraph 4-52*a*.

(4) Remove the machine screw (1, fig. 4-44), lockwasher (2), machine screw (5) and lockwasher (6) that hold the chad tube (7) to the front support frame (68); remove the chad tube (7).

(5) Remove the two machine screws (9) and lockwashers (10) that hold the bearing block (11) to the front support frame (68).

(6) Remove the three machine screws (13) and lockwashers (14) that hold the front support frame (68) to the reperforator frame.

(7) Loosen the four machine screws (1, fig. 4-74) that hold the reperforator frame to the base casting. Lift the front of the base reperforator frame about 1/4 inch so that the front support assembly can drop far enough to allow the punch interference levers to clear the code rings; remove the front support assembly.

*b. Replacement*.

(1) Replace the front support frame assembly by reversing the procedures outlined in *a* (7) through (4) above. Be sure that each of the punch interference levers engage a code ring in the code ring cage.

(2) Replace the ribbon supply group as described in paragraph 4-52*b*.

(3) Replace the tape puller mechanism as described in paragraph 4-45*b*.

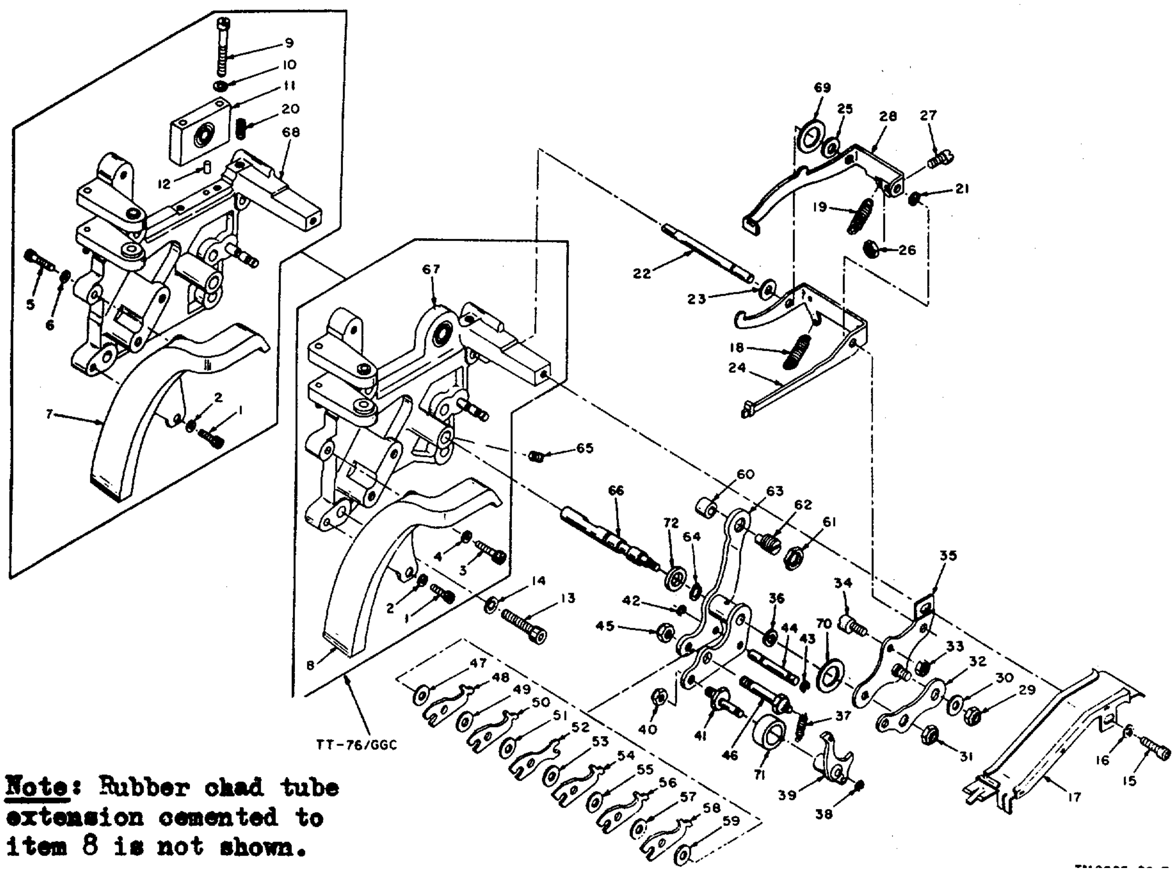


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*Figure 4-44. Front support assembly, exploded view.*

### 4-57. Disassembly and Reassembly of Tape Feed Mechanism

*a. Disassembly.*

(1) Remove the front support assembly from the reperforator as described in paragraph 4-55*a* or 4-56*a*.

(2) Remove the back space pawl spring (1, fig. 4-45) from the back space lever (8) and from the back space pawl (4).

(3) Remove the self-locking hexagonal nut (2) that holds the back space pawl (4) to the back space lever (8); remove the pawl eccentric screw (3) and back space pawl (4).

(4) Remove the back space lever spring (5) from the back space lever (8) and from the terminal lug (8, fig. 4-46) on the code die support (30).

(5) Remove the back space pivot stud (6, fig. 4-45) that holds the back space lever (8) to the front support frame; remove the collar (7) and the back space lever (8).

(6) Remove the detent lever spring (9) from the retainer mounting bracket (24) and from the detent lever (11).

(7) Remove the retainer ring (10) that holds the detent lever (11) to the eccentric stud (13); remove the detent lever (11). Catch the two felt washers (27), when supplied, as the fall from the detent lever.

(8) Remove the self-locking hexagonal nut (12) that holds the eccentric stud (13) to the code die support, remove the eccentric stud (13).

(9) Remove the retainer ring (14) that holds the tape retainer assembly (15) to the stud on the retainer mounting bracket (24); remove the tape retainer assembly (15) and the tape retainer spring (16).

1 Machine screw, 10025
2 Lockwasher, 10430
3 Machine screw, 10010
4 Lockwasher, 10430
5 Machine screw, 10010
6 Lockwasher,10430
7 Chad tube, 55760A
8 Chad tube, 53515
9 Machine screw, 10063
10 Lockwasher, 10430
11 Bearing block, 55131
12 Dowel
13 Machine screw, 10035-01
14 Lockwasher, 10405
15 Machine screw, 10009
16 Lockwasher, 10430
17 Tape chute, 52489A
18 Print hammer lever spring, 56168
19 Register lever spring, 52163
20 Setscrew, 10211
21 Retainer ring, 10949
22 Print and register levers shaft, 52486
23 Flat washer, 52651
24 Print hammer lever, 52436A
25 Flat washer, 52651
26 Self-locking hexagonal nut, 10501
27 Print hammer eccentric stop, 52485
28 Type wheel register lever, 52432
29 Self-locking hexagonal nut, 10525
30 Flat washer, 10464
31 Self-locking hexagonal nut, 10525
32 Adjusting plate, 52493
33 Self-locking hexagonal nut, 10501 (TT-76/GGC)
34 Print hammer eccentric stop, 52485 (TT-76/GGC)
35 Support plate, 52321A
36 Flat washer, 52651
37 Feed pawl spring, 52164
38 Retainer ring, 10960
39 Feed pawl assembly, 52331A
40 Self-locking hexagonal nut, 10501
41 Feed pawl pivot, 52329
42 Retainer ring, 10960
43 Retainer ring, 10960
44 Code and feed hole punch lever stop pin, 52327
45 Self-locking hexagonal nut, 10525
46 Pivot stud, 52409
47 Flat washer, 52446
48 Code hole punch lever, 52346
49 Flat washer, 52446
50 Code hole punch lever, 52346
51 Flat washer, 52446
52 Feed punch lever, 52347
53 Flat washer, 22446
54 Code hole punch lever, 52346
55 Flat washer, 52446
56 Code hole punch lever, 52346
57 Flat washer, 52446
58 Code hole punch lever, 52346
59 Flat washer, 52446
60 Cam roller, 52354
61 Plain hexagonal nut, 10526
62 Eccentric stud, 52365
63 Punch arm assembly, 52337A
64 Retainer ring, 10971
65 Setscrew, 10211
66 Punch arm pivot post, 52345
67 Front support frame, 5243RA
68 Front support frame, 57101A
69 Felt washer, 61670
70 Felt washer, 61670
71 Felt washer, 61472
72 Felt washer, 61483

*Figure 4-44. - Continued*

(10) Remove the two machine screws (17) and lockwashers (18) that hold the tear wire (19) on the TT-76A/GGC and later models, the tape guide (20), and retainer mounting bracket (21) to the code die support; remove the tear wire (19) on TT-76A/GGC and later models, the tape guide (20), and the retainer mounting bracket (21).

(11) Remove the two setscrews (22) that hold the detent wheel (25) to the ratchet shaft (24). Remove the two setscrews (23) that hold the tape feed sprocket (26) to the ratchet shaft (24). Remove the ratchet shaft (24) catching the detent wheel (25) felt washer (28), when supplied, and tape feed sprocket (26) as they fall from the shaft of the ratchet shaft (24).

1 Back space pawl spring, 52192
2 Self-locking hexagonal nut, 1.0501
3 Pawl eccentric screw, 52643
4 Back space pawl, 52709
6 Back space lever spring, 5F193
6 Back space pivot stud, 526/4
7 Collar, 52645
8 Back space lever, 52654
9 Detent lever spring, 5216
10 Retainer ring, 10949
11 Detent lever, 52445A
12 Self-locking hexagonal nut, 10501
13 Eccentric stud, 52342
14 Retainer ring, 10969
15 Tape retainer assembly, 562126A
16 Tape retainer spring, 52422
17 Machine screw, 10003 (TT-76/GGC) or 10004 (TT-76A/GGC and later models)
18 Lockwasher, 10429 (TT-76/GGC)
19 Tape tear wire, 56164 (TT-76A/GGC and later models)
20 Tape guide, 52519
21 Retainer mounting bracket, 56298A
22 Setscrew, 10201
23 Setscrew, 10201
24 Ratchet shaft, 52442A
25 Detent wheel, 52384
26 Tape feed sprocket, 52377
27 Felt washer, 64481
28 Felt washer, 61475

*Figure 4-45. Tape feed mechanism, exploded view.*

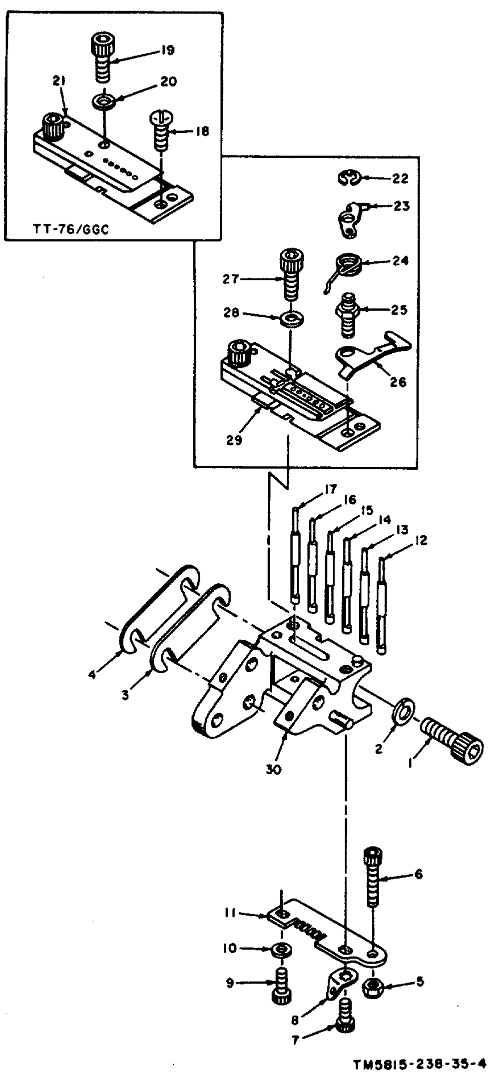
*b. Reassembly.*

(1) Reassemble the tape feed mechanism by reversing the procedures outlined in *a*(11) through (2) above.
(2) Adjust the tape feed mechanism as described in paragraphs 4-154, 4-156, and 4-158.
(3) Replace the front support assembly as described in paragraph 4-55*b* or 4-56*b*.

## 4-58. Disassembly and Reassembly of Punch and Die Support Assembly
(fig. 4-46)

*a. Disassembly.*

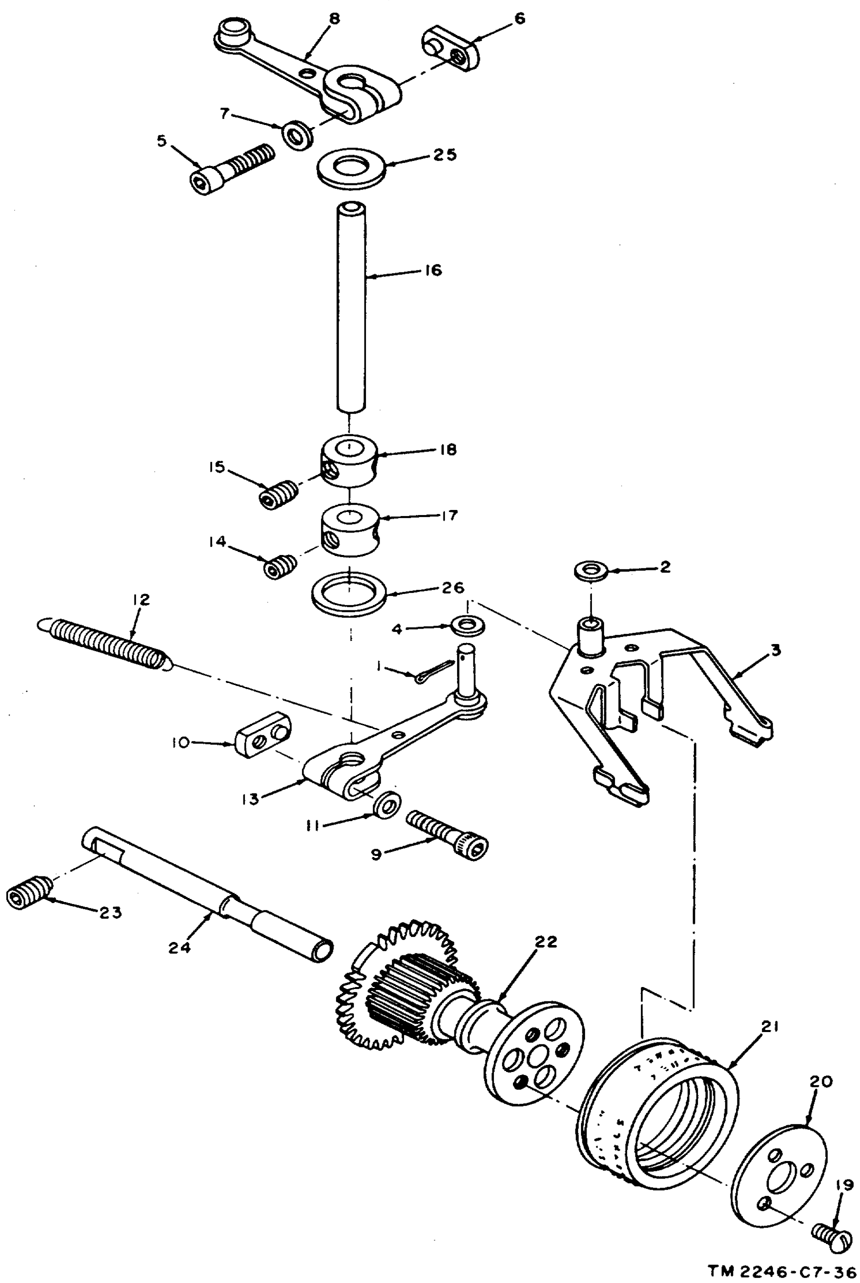
(1) Remove the front support assembly from the reperforator as described in paragraph 4-55*a* for the TT-76/GGC or paragraph 4-56*a* for the TT-76A/GGC and later models.
(2) Remove the tape feed mechanism as described in paragraph 4-57*a*.
(3) Remove the machine screw (1) and lockwasher (2) that hold the code die support (30) to the front support frame; remove the punch and die support assembly and shims (3 and 4).
(4) Remove the self-locking hexagonal nut (5) and machine screw (6) from the comb (11).
(5) Remove the machine screw (7), terminal lug (8), machine screw feed




| | |
|---|---|
| 1 | Machine screw, 10017-01 |
| 2 | Lockwasher, 10431 |
| 3 | .005 in. shim, 52578 |
| 4 | .002 in. shim, 52577 |
| 5 | Self-locking hexagonal nut, 10500 |
| 6 | Machine screw, 10006 |
| 7 | Machine screw, 10003 |
| 8 | Terminal lug, 20795 |
| 9 | Machine screw, 10003 |
| 10 | Lockwasher, 10429 |
| 11 | Comb, 52356 |
| 12 | Code punch bar, 52369 (see note below) |
| 13 | Code punch bar, 52369 (see note below) |
| 14 | Code punch bar, 52369 (see note below) |
| 15 | Feed hole punch bar, 52889 (see note below) |
| 16 | Code punch bar, 52369 (see note below) |
| 17 | Code punch bar, 52369 (see note below) |
| 18 | Machine screw, 10358 |
| 19 | Machine screw, 10009 |
| 20 | Lockwasher, 10430 (Not used with TT-76B/GGC and later models.) |
| 21 | Code die assembly, 52521-A |
| 22 | Retainer ring, 10969 |
| 23 | Tape guide lever, 56163 |
| 24 | Tape guide lever spring, 56396 |
| 25 | Tape guide lever pivot, 56161 |
| 26 | Indicator plate, 56397 |
| 27 | Machine screw, 10009 |
| 28 | Lockwasher, 10430 (Not used with TT-76B/GGC and later models.) |
| 29 | Code die assembly, 56256A |
| 30 | Code die support, 52372 |

*Note.* The die set is maintained as an integral assembly. In the event replacement is required, Assembly 52520A used for TT-76/GGC. Assembly 53543A is used for all other models.

*Figure 4-46. Punch and die support assembly, exploded view.*




1 Cotter pin, 10806
2 Flat washer, 50320
3 Ribbon guide, 52416A
4 Flat washer, 50320
5 Machine screw, 10006
6 Nut plate, 50174
7 Flat washer, 10459
8 Type wheel upper bell crank lever, 52482A
9 Machine screw, 10006
10 Nut plate, 50174
11 Flat washer, 10459
12 Type wheel bell crank lever spring, 52161
13 Type wheel lower bell crank lever, 52480A
14 Setscrew, 10201
15 Setscrew, 10201
16 Reciprocating lever shaft, 52414
17 Shaft collar, 50391
18 Shaft collar, 50391
19 Machine screw, 10305
20 Type wheel clamp plate mounting disk, 52407
21 Type wheel 55132
22 Type wheel hub assembly, 52380 (TT-76/GGC), 55134A (TT-76A/GGC and later models)
23 Setscrew, 10210
24 Type wheel post, 52418
25 Felt washer, 61490
26 Felt washer, 61479

*Figure 4-47. Type wheel group, exploded view.*

(9) and lockwasher (10) that hold the comb (11) to the bottom of the code die support (30); remove the comb (11) and the six code punch bars (12, 13, 14, 15, 16, and 17).

(6) On the TT-76/GGC, remove the machine screws (18 and 19) and the lockwasher (20) that hold the code die assembly to the code die support (30); remove the code die assembly (21).

(7) On the TT-76A/GGC and later models, remove the retainer ring (22) that holds the tape guide lever (23) to the tape guide lever pivot (25). Unhook the tape guide lever spring (24) from the tape guide lever (23) and from the indicator plate (26); remove the tape guide lever (23) and tape guide lever spring (24) from the tape guide lever pivot (25). Remove the tape guide lever pivot (25), indicator plate (26), machine screw (27) and lock-washer (28) that hold the code dies assembly (29) to the code die support (30).

*b. Reassembly.*

(1) Reassemble the punch and die support assembly by reversing the procedures outlined in *a*(7) through (3) above.

(2) Adjust the punch and die support assembly as described in paragraphs 4-153 and 4-155.

(3) Replace the tape feed mechanism as described in paragraph 4-57*b*.

(4) Replace the front support assembly as described in paragraph 4-56*b* for the TT-76A/GGC and later models, or paragraph 4-55b for the TT-76/GGC.

**4-59. Disassembly and Reassembly of Type Wheel Group**
(fig. 4-47)

*a. Disassembly.*

(1) Remove the cotter pin (1) that holds the ribbon guide (3) to the stud on the type wheel lower bell crank lever (13); remove the flat washer (2), ribbon guide (3), and flat washer (4).

(2) Remove the machine screw (5), nut plate (6), and flat washer (7) that hold the type wheel upper bell crank lever (8) to the reciprocating lever shaft (16); remove the type wheel upper bell crank lever (8). Remove the felt washer (25), when supplied.

(3) Remove the type wheel bell crank lever spring (12) from the type wheel lower bell crank lever (13) and from the spring post on the front support frame.

(4) Remove the machine screw (9), nut plate (10), and flat washer (11) that hold the type wheel lower bell crank lever (13) to the reciprocating lever shaft (16); remove the type wheel lower bell crank lever (13).

(5) Remove the two setscrews (14) that hold the shaft collar (17) to the reciprocating lever shaft (16). Remove the two setscrews (15) that hold the shaft collar (18) to the reciprocating lever shaft (16); remove the reciprocating lever shaft (16), catching the shaft collars and felt washer (26), when supplied as they fall from the shaft.

(6) Remove the assembled type wheel hub assembly (22) and type wheel (21) from the type wheel post (24). Remove the three machine screws (19) that hold the type wheel clamp plate mounting disk (20) to the type wheel hub assembly (22); remove the type wheel clamp late mounting disk (20) and the type wheel (21).

(7) Remove the setscrew (23) that holds the type wheel post (24) to the front support frame; remove the type wheel post (24).

*b. Reassembly.*

(1) Reassemble the type wheel group by reversing the procedures outlined in *a* above.

(2) Adjust the type wheel group as directed in paragraphs 4-160, 4-162, 4-163, 4-164, and 4-172.

## 4-60. Disassembly and Reassembly of Punch Interference Levers

(fig. 4-48)

*a. Disassembly.*

(1) Remove the front support assembly from the reperforator as described in paragraph 4-55*a* for the TT-76/GGC or paragraph 4-56*a* for the TT-76A/GGC and later models.

(2) Remove the machine screw (1), flat washer (2), and lockwasher (3) that hold the interference lever shaft support plate (4) to the front support frame; remove the interference lever shaft support plate (4) and the assembled punch interference levers from the front support assembly.

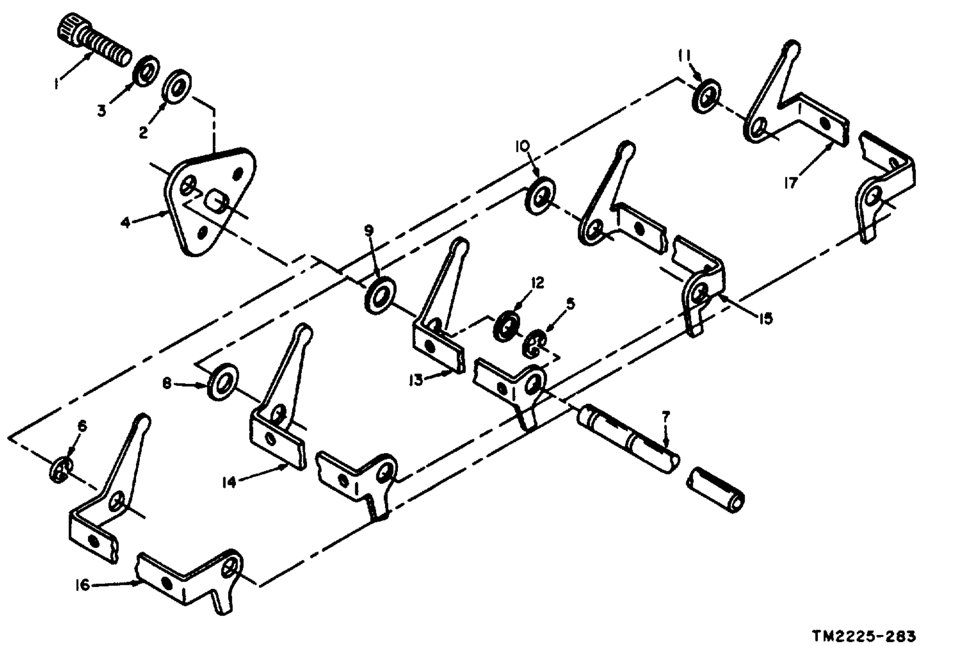
(3) Remove the two retainer rings (5 and 6) that hold the punch interference levers (13, 14, 15, 16, and 17) to the interference lever shaft (7); remove the punch interference lever shaft (7) to release the five flat washers (8, 9, 10, 11, and 12) and the five punch interference levers (13, 14, 15, 16, and 17).

*b. Reassembly.*

(1) Reassemble the punch interference levers by reversing the procedures outlined in *a*(2) and (3) above.

(2) Replace the front support assembly as described in paragraph 4-55*b* for the TT-76/GGC or paragraph 4-56*a* for the TT-76A/GGC and later models.

(3) Adjust the punch interference levers as directed in paragraph 4-151.




1 Machine screw, 10009
2 Flat washer, 10463
3 Lockwasher, 10430
4 Interference lever shaft support plate, 52334
5 Retainer ring, 10949
6 Retainer ring, 10949
7 Interference lever shaft, 52452
8 Flat washer, 52430
9 Flat washer, 52430
10 Flat washer, 52430
11 Flat washer, 52430
12 Flat washer, 50831
13 Punch interference lever, No. 1, 52424
14 Punch interference lever, No. 3, 52427
15 Punch interference lever, No. 2, 52426
16 Punch interference lever, No. 5, 52429
17 Punch interference lever, No. 4, 52428

*Note.* Later models of equipment include a felt washer, 61476, between items (4) and (9).

*Figure 4-48. Punch interference levers, exploded view.*

## 4-61. Disassembly and Reassembly of Front Support Frame

(fig. 4-44)

*a. Disassembly.*

(1) Remove the front support assembly from the reperforator as described in paragraph 4-55*a* for the TT-76/GGC or paragraph 4-56*a* for the TT-76A/GGC and later models.

(2) Remove the tape feed mechanism from the front support assembly as described in paragraph 4-57*a*.

(3) Remove the punch and die support assembly from the front support assembly as described in paragraph 4-58*a*.

(4) Remove the type wheel group from the front support assembly as described in paragraph 4-59*a*.

(5) Remove the punch interference levers from the front support assembly as described in paragraph 4-60*a*.

(6) Remove the machine screw (15) and lockwasher (16) that hold the tape chute (17) to the front support frame (67, TT-76/GGC or 68, TT-76A/GGC and later models); remove the tape chute (17).

(7) Remove the print hammer lever spring (18) from the print hammer lever (24) and from the register and print lever spring post on the front support frame (67, TT-76/GGC or 68, TT-6A/GGC and later models). Remove the register lever spring (19) from the type wheel register lever (28) and from the spring post on the front support frame.

(8) Remove the setscrew (20) that holds the print and register levers shaft (22) in the front support frame (67, TT-76/GGC or 68, TT-76A/GGC and later models); remove the assembled print hammer lever (24), type wheel register lever (28), and print and register levers shaft (22) from the front support frame (67, TT-76/GGC or 68, TT-76A/GGC and later models).

(9) Remove the retainer ring (21) that holds the print hammer lever (24) and type wheel register lever (28), to the print and register levers shaft (22); remove the print and register levers shaft (22), releasing the flat washer (23), print hammer lever (24), flat washer (25), and type wheel register lever (28). Remove the felt washer (69), when supplied.

(10) Remove the self-locking hexagonal nut (26) that holds the print hammer eccentric stop (27) to the type wheel register lever (28); remove the print hammer eccentric stop (27).

(11) Remove the self-locking hexagonal nut (29), flat washer (30), and self-locking hexagonal nut (31) that hold the adjusting plate (32) to the support plate (35); remove the adjusting plate (32), support plate (35), felt washer (70), when supplied, flat washer (36), and punch arm assembly (63) from the punch arm pivot post (66).

(12) Remove the feed pawl spring (37) from the pivot stud (46) and from the feed pawl assembly (39).

(13) Remove the retainer ring (38) that holds the feed pawl assembly (39) to the feed pawl pivot (41); remove the feed pawl assembly (39). Remove the felt washer (71), when supplied.

(14) Remove the self-locking hexagonal nut (40) that holds the feed pawl pivot (41) to the punch arm assembly (63); remove the feed pawl pivot (41).

(15) Remove the two retainer rings (42 and 43) that hold the code and feed hole punch lever stop pin (44) to the punch arm assembly (63); remove the code feed hole punch lever stop pin (44).

(16) Remove the self-locking hexagonal nut (45) that holds the pivot stud (46) to the punch arm assembly (63), remove the pivot stud (46), catching the seven flat washers (47, 49, 51, 53, 55, 57, and 59); code hole punch levers (48, 50, 54, 56, and 58) and the punch lever (52) as they fall from the pivot stud (46).

(17) Remove the cam roller (60) from the eccentric stud (62) on the punch arm assembly (63). Remove the plain hexagonal nut (61) and eccentric stud (62) from the punch arm assembly (63).

(18) Remove the retainer ring (64) and felt washer (72), when supplied, from the punch arm pivot post (66). Remove the setscrew (65) that holds the punch arm pivot post (66) to the front support (67, TT-76/GGC or 68, TT-76A/GGC and later models); remove the punch arm pivot post (66).

(19) Remove any loose or damaged spring post or dowel from the front support frame (67, TT-76/GGC or 68, TT-76A/GGC and later models).

*b. Reassembly.*

(1) Reassemble the front support frame assembly by reversing the procedures outlined in *a*(19) through (2) above.

(2) Adjust the front support frame assembly as described in paragraphs 4-150 through 4-164.

(3) Replace the front support assembly as described in paragraph 4-55*b* for the TT-76/GGC or paragraph 4-56*b* for the TT-76A/GGC and later models.

## 4-62. Disassembly and Reassembly of Selector Y-Levers and Selector Levers (TT-76/GGC)

*a. Disassembly*

(1) Remove the two setscrews (1, fig. 4-49) that hold the Y-lever retaining collar (2) to the Y-lever pivot post stud (19); remove the Y-lever retaining collar (2), friction plate spring (3), six friction plates (4, 6, 8, 10, 12, and 14), five selector Y-levers (5, 7, 9, 11, and 13), and the Y-lever pivot post collar (15).

(2) Remove the setscrew (16) that holds the Y-lever stop (17) in the reperforator frame; remove the Y-lever stop (17).

(3) Remove the setscrew (18) that holds the Y-lever pivot post stud (19) to the reperforator frame; remove the Y-lever pivot post stud (19).

(4) Remove the friction plate guide stud (20) from the reperforator frame.

(5) Remove the six selector lever springs (21) from the selector levers (29, 32, 35, 38, and 41), and selector camshaft locking lever (26) and from the selector lever spring post (23).

(6) Unhook the transfer lever trip latch spring (36, fig. 4-55) from the selector lever spring post (23, fig. 4-49). Loosen the plain hexagonal nut (22) that locks the selector lever spring post (23) in the reperforator frame; remove the selector lever spring post (23) and plain hexagonal nut (22). Remove the plain hexagonal nut (22) from the spring post (23).

(7) Remove the self-locking hexagonal nut (24), the selector camshaft locking lever eccentric (25), and the selector camshaft locking lever (26) from the selector lever pivot stud (44).

(8) Remove the flat washers (27, 30, 33, 36, and 39), bearings (28, 31, 34, 37, and 40), selector levers (29, 32, 35, 38, and 41), and selector lever pivot post collar (42) from the selector lever pivot stud (44).

(9) Remove the setscrew (43) that holds the selector lever pivot stud (44) in the reperforator frame; remove the selector lever pivot stud (44).

*b. Reassembly*.

*Note*. If any of the selector Y-levers, selector levers, or bearings are damaged and must be replaced, replace a complete set. These items are machined as matched sets. The unit will not function properly when operating with unmatched sets.

(1) Reassemble the selector Y-levers and selector levers by reversing the procedures described in *a* above.

(2) Adjust the selector and selector Y-levers as described, in paragraphs 4-145 and 4-149.

**4-63. Disassembly and Reassembly of Selector Y-Levers and Selector Levers (TT-76A/GGC and Later Models)** (fig. 4-50)

*a. Disassembly.*

(1) Remove the five Y-lever detent springs (1, 2, 3, 4, and 5) from the Y-lever detent spring bracket (21) and from the Y-lever detents (8, 11, 13, 15, and 17).

(2) Remove the plain hexagonal nut (6) and lockwasher (7) that hold the Y-lever detent eccentric sleeve (19) to the Y-lever detent pivot (20); slide the assembled eccentric sleeve (19) and Y-lever detents from the Y-lever detent pivot (20).

(3) Remove the Y-lever 'detents (8, 11, 13, 15, and 17), spacer (9), and detent spacers (10, 12, 14, 16, and 18) alternately from the Y-lever detent eccentric sleeve (19).

(4) Remove the Y-lever detent pivot (20) from the reperforator frame; remove the Y-lever detent spring bracket (21).

(5) Remove the two setscrews (22 and 23) from the Y-lever retaining collar (24); remove the Y-lever retaining collar (24) and felt washer (70), when supplied. Remove the flat washers (25, 27, 29, 31, land 33), selector Y-levers (26, 28, 30, 32, and 34), and the Y-lever pivot post collar (35) from the Y-lever pivot post stud (37). Remove the felt washer (71), when supplied.

(6) Remove the setscrew (36) that holds the Y-lever pivot post stud (37) in the reperforator frame; remove the Y-lever pivot post stud (37).

(7) Remove the setscrew (38) that holds the Y-lever eccentric stop (39) in the reperforator frame; remove the Y-lever eccentric stop (39). Remove the retainer ring (40) from the Y-lever eccentric stop (39).

(8) Remove the six selector lever springs (41, 42, 43, 44, 45, and 46) from the selector lever spring post (69) and from the selector camshaft locking lever (49) and the five selector levers (51, 54, 57, 60, and 63). Unhook the transfer lever trip latch spring (36, fig. 4-55) from the selector lever spring post (69, fig. 4-50).

(9) Remove the self-locking hexagonal nut (47), the selector camshaft locking lever eccentric (48), and the selector camshaft locking lever (49), and felt washer (72), when supplied, from the selector lever pivot stud (67).

(10) Remove the flat washers (50, 53, 56, 59, and 62), selector levers (51, 54, 57, 60, and 63), and the bearings (52, 55, 58, 61, and 64) alternately. Remove the selector lever pivot stud collar (65) from the selector lever pivot stud (67).

(11) Remove the setscrew (66) that holds the selector lever pivot stud (67) in the reperforator frame; remove the selector lever pivot stud (67).

(12) Loosen the plain hexagonal nut (68) ,that locks the selector lever spring post (69) in the frame. Remove the selector lever spring post (69) from the frame of the reperforator; remove the plain hexagonal nut (69) from the selector lever spring post (69).

*b. Reassembly.*

*Note.* If any of the selector Y-levers, selector levers, or bearings are damaged and must be replaced, replace a complete set. These items are machined as matched sets. The unit will not function properly when operating with unmatched sets.

(1) Reassemble the selector Y-levers and *selector* levers by reversing the procedures in *a* above.

(2) Adjust the selector levers and selector Y-levers as described in paragraphs 4-146, 4-147, 4-148, and 4-149.

**4-64. Disassembly and Reassembly of Selector Y-Levers and Selector Levers (Equipment Furnished with Y-Lever Stabilizer Assembly)** (fig. 4-51)

*a. Disassembly.*

(1) Disassemble the selector Y-levers and selector levers as described in paragraph 4-63*a*(1) through (4).

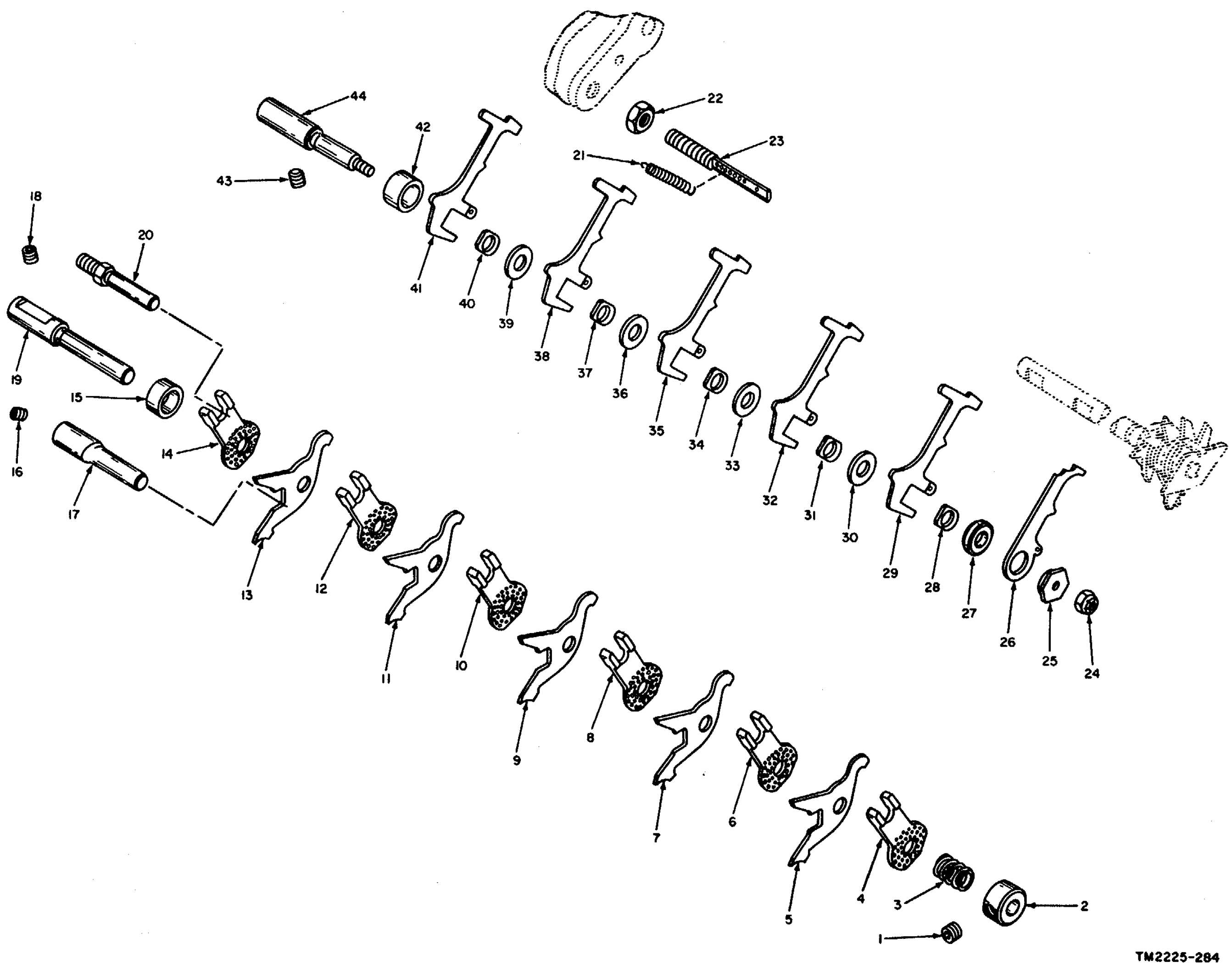



*Figure 4-49. Selector Y-levers and selector levers, exploded view (TT-76/GGC).*

(2) Remove the machine screw (22), flat washer (23), and clamp nut (24) that hold the Y-lever stud bracket (25) to the Y-lever pivot stud (44) and the Y-lever eccentric stop (46). Remove the two machine screws (26), lock-washers (27), and flat washers (28), that held the Y-lever eccentric tie (29); remove the spacer (30).

(3) Remove the flatwashers (31, 33, 35, 37, and 39), together with the selector Y-levers (32, 34, 36, 38, and 40), from the Y-lever pivot post stud (44). Also, remove the flat washer (41) and the Y-lever pivot post collar (42).

(4) Remove the setscrew (43) that holds the Y-lever pivot post stud in the reperforator frame and remove the Y-lever pivot post stud.

(5) Remove the setscrew (45) that holds the Y-lever eccentric stop (46) in the reperforator frame and remove the Y-lever eccentric stop. Remove the retainer ring (47) from the Y-lever eccentric stop.

(6) Remove the six selector lever springs (48 through 53) from the selector lever spring post (77) and from the selector camshaft locking lever (56) and the five selector levers (59, 62, 65, 68, and 71). Unhook the transfer lever trip latch spring (37, fig. 4-55) from the selector lever spring past.

(7) Remove the self-locking hexagonal nut (54), the selector camshaft locking lever eccentric (55), and the selector camshaft locking lever (56) from the selector lever pivot stud (75).

(8) Remove the felt washer (57), flat washers (58, 61, 64, 67, and 70), selector levers (59, 62, 65, 68, and 71), and the bearings (60, 63, 66, 69, and 72) alternately. Remove the selector lever pivot stud collar (73) from the selector lever stud (75).

(9) Remove the setscrew (74) that holds the selector pivot stud (75) in the reperforator frame; remove the selector lever pivot stud.

(10) Loosen the plain hexagonal nut (76) that securesthe selector lever spring post (77) to the frame of the reperforator; remove the hexagonal nut from the selector lever spring post.

*b. Reassembly.*

*Note.* When any of the selector Y-levers, selector levers, or bearings are damaged, replace them with a complete matched set. The unit will not function properly when operating with unmatched sets.

(1) Reassemble the selector Y-levers and selector levers by reversing the procedure given in*a* above.

(2) Adjust the selector levers and selector Y-levers as instructed in paragraphs 4-141 and 4-146 through 4-149.

---

1 Setscrew, 10029
2 Y-lever retaining collar, 50149
3 Friction plate spring, 50910
4 Friction plate, 50018
5 Selector Y-lever. 51067A (includes 7,9, 11 and 13)
6 Friction plate, 50018
7 Selector Y-lever,
8 Friction plate, 50018
9 Selector Y-lever,
10 Friction plate, 50018
11 Selector Y-lever,
12 Friction plate, 50018
13 Selector Y-lever,
14 Friction plate, 50018
15 Y-lever pivot post collar, 51414
16 Setscrew, 10210
17 Y-lever stop, 50152
18 Setscrew, 10211
19 Y-lever pivot post, stud, 53269
20 Friction plate guide stud. 50151
21 Selector lever spring, 50902
22 Plain hexagonal nut, 10509
23 Selector lever spring post, 50325
24 Self-locking hexagonal nut, 10500
25 Selector camshaft locking lever eccentric, 50146
26 Selector camshaft locking, 50014
27 Flat washer 50053
28 Bearing, 50019A (includes 31, 34, 37, and 40)
29 Selector lever, 51598A (includes 32,35, 38 and 41)
30 Flat washer, 50147
31 Bearing
32 Selector lever,
33 Flat washer, 50147
34 Bearing
35 Selector lever,
36 Flat washer, 50147
37 Bearing
38 Selector lever,
39 Flat washer, 50147
40 Bearing
41 Selector lever,
42 Selector lever pivot post collar, 51416
43 Setscrew, 10211
44 Selector lever pivot stud, 53268

*Figure 4-49.-Continued*

## 4-65. Disassembly and Reassembly of Type Wheel Reciprocating Mechanism

(fig. 4-52)

*a. Disassembly.*

(1) Remove the code-ring locking bail cam follower spring (1), from the code-ring locking bail cam follower (5) and from the function plate (45).

(2) Remove the machine screw (2), nut plate (3), and flat washer (4) that hold the code-ring locking bail cam follower (5) to the code-ring locking bail shaft (11); remove the code-ring locking bail cam follower (5). Remove the two felt washers (46), when supplied.

(3) Remove the machine screw (6), flat washer (7), and lockwasher (8) that hold the code-ring locking bail (9) to the code-ring locking bail shaft (11); remove the code-ring locking bail (9).

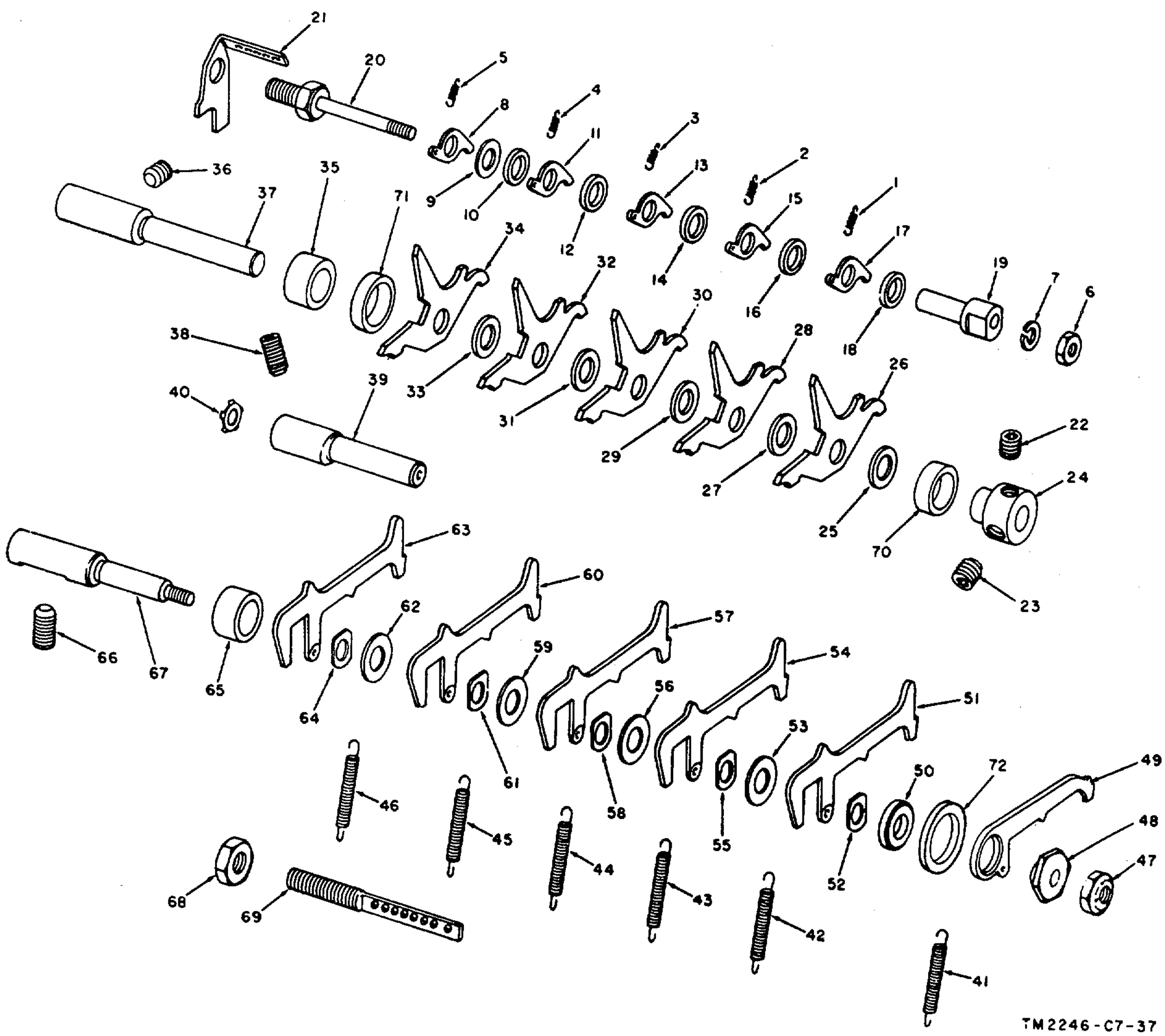



*Figure 4-50. Y-levers and selector levers, exploded view (TT-76A/GGC and TT-76B/GGC).*

(4) Remove the four retainer rings (10) that hold the code-ring locking bail shaft (11) to the function plate (45) and to the letters figures shift latch lever (12). Disconnect the spring (32) from the letters figures shift latch lever (12). Remove the code-ring locking bail shaft (11) and the letters figures shift latch lever (12).

(5) Remove the retainer ring (13) that holds the type wheel reciprocating transfer lever (14) to the eccentric stud (17); remove the type wheel reciprocating transfer lever (14).

(6) Remove the self-locking hexagonal nut (15) and flat washer (16) that hold the eccentric stud (17) to the function plate (45); remove the eccentric stud (17).

(7) Remove the type wheel reciprocating lever spring (18) from the spring pin (28) and from the type wheel reciprocating spring lever (25).

(8) Remove the two setscrews (19) that hold the shaft collar (20) to the type wheel shift lever stud (36); remove the shaft collar (20) and the retainer plate (21).

(9) Remove the drive pins (22) and spring pin (28) from the type wheel reciprocating drive levers (23 and 29). Remove the type wheel reciprocating drive lever (23), flat washer (24), type wheel reciprocating spring lever (25), sleeve bearing (26), flat washer (27), type wheel reciprocating drive lever (29), and two flat washers (30 and 31). Remove the felt washer (47), when supplied.

---

1 Y-lever detent spring, 61000
2 Y-lever detent spring, 61000
3 Y-lever detent spring, 61000
4 Y-lever detent spring, 61000
5 Y-lever detent spring, 61000
6 Plain hexagonal nut, 10504
7 Lockwasher, 10434
8 Y-lever detent, 55004
9 Spacer, 55076
10 Detent spacer, 55001
11 Y-lever detent, 55004
12 Detent spacer, 55001
13 Y-lever detent, 55004
14 Detent spacer, 55001
15 Y-lever detent, 55004
16 Detent spacer, 55001
17 Y-lever detent, 55004
18 Detent spacer, 55001
19 Y-lever detent eccentric sleeve, 55007
20 Y-lever detent pivot, 55008
21 Y-lever detent spring bracket, 55002
22 Setscrew, 10209
23 Setscrew, 10209
24 Y-lever retaining collar, 55006
25 Flat washer, 50148
26 Selector Y-lever, 53540A (includes items 28, 30, 32, and 34)
27 Flat washer, 50148
28 Selector Y-lever
29 Flat washer, 50148
30 Selector Y-lever
31 Flat washer, 50148
32 Selector Y-lever
33 Flat washer, 50148
34 Selector Y-lever
35 Y-lever pivot post collar, 51416
36 Setscrew, 10210
37 Y-lever pivot post stud, 53269
38 Setscrew, 10211
39 Y-lever eccentric stop, 61001
40 Retainer ring, 10928
41 Selector lever spring, 50902
42 Selector lever spring, 50902
43 Selector lever spring, 50902
44 Selector lever spring, 50902
45 Selector lever spring, 50902
46 Selector lever spring, 50902
47 Self-locking hexagonal nut, 10500
48 Selector camshaft locking lever eccentric, 55024
49 Selector camshaft locking lever, 50014
50 Flat washer, 50147
51 Selector lever, 51598A, includes items 54, 57, 60, and 63
52 Bearing, 50019A, includes items 55, 58, 61, and 64
53 Flat washer, 50147
54 Selector lever
55 Bearing
56 Flat washer, 50147
57 Selector lever
58 Bearing
59 Flat washer, 50147
60 Selector lever
61 Bearing
62 Flat washer, 50147
63 Selector lever
64 Bearing
65 Selector lever pivot stud collar, 51416
66 Setscrew, 10211
67 Selector lever pivot stud, 53268
68 Plain hexagonal nut, 10509
69 Selector lever spring post, 50325
70 Felt washer, 61478
71 Felt washer, 61469
72 Felt washer, 61479

*Figure 4-50.- Continued.*

(10) Remove the spring (32) from the figures-letters shift lever (33); remove the figures-letters shift lever (33) and flat washer (34) from the type wheel shift lever stud (36).

(11) Remove the self-locking hexagonal nut (35) that holds the type wheel shift lever stud (36) to the function plate (45); remove the type wheel shift lever stud (36).

(12) Remove the bell sensing lever spring (37), shift cam follower spring (38), letters sensing levers spring (39), and figures sensing levers spring (40) from the function plate (45) and from the function sensing levers.

(13) Remove the two machine screws (41 and 43) and lockwashers (42 and 44) that hold the function plate (45) to the reperforator frame; remove the function plate (45).

*b. Reassembly.*

(1) Reassemble the type wheel reciprocating mechanism by reversing the procedures described in *a* above.

(2) Adjust the type wheel reciprocating mechanism as described in paragraph 4-125.

**4-66. Disassembly and Reassembly of Function Sensing Mechanism**
(fig. 4-53)

*a. Disassembly.*

(1) Remove the type wheel reciprocating mechanism as described in paragraph 4-50a.

(2) Remove the two setscrews (1) that hold the stop arm shaft driven gear (2) to the stop arm shaft; remove the stop arm shaft driven gear (2), the two felt washers (20), when supplied, and thrust bearing (3).

(3) Remove the type wheel reciprocating cam follower (4), sensing lever spacer (5), and the assembled bell

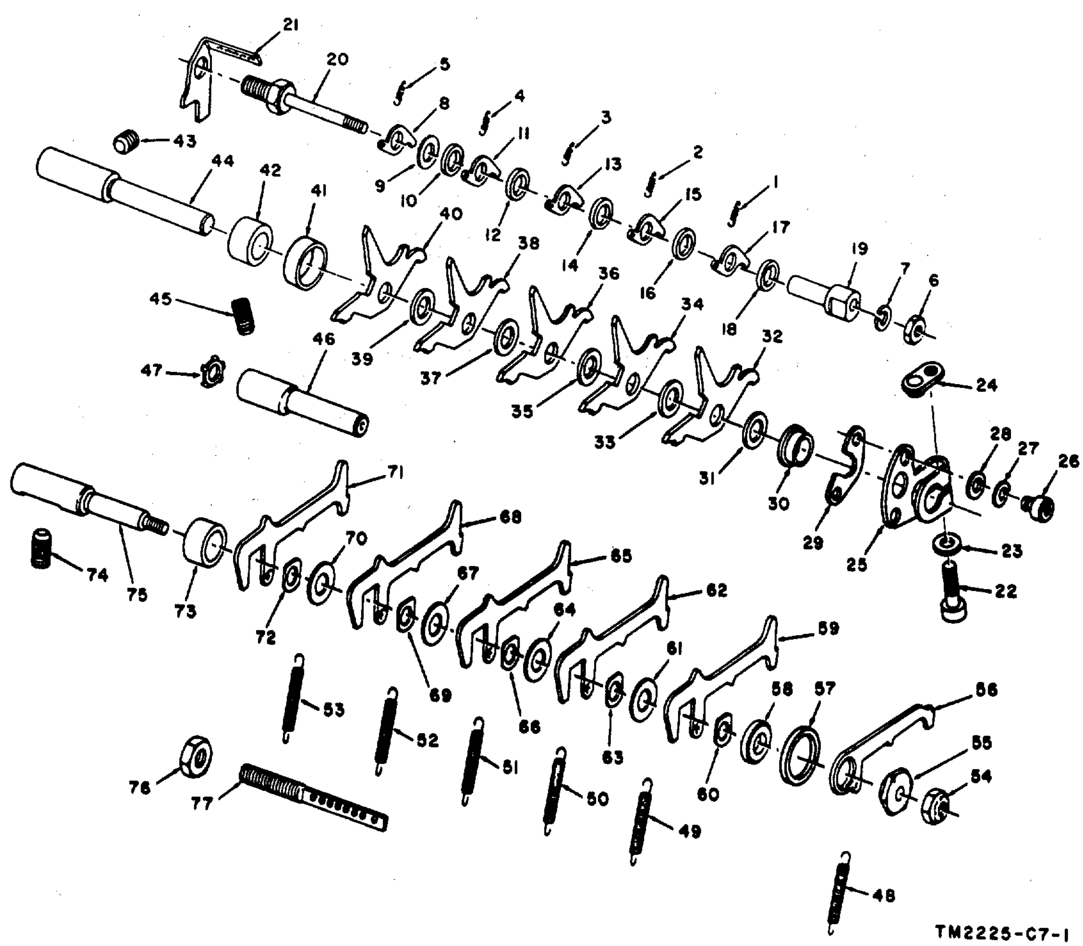



*Figure 4-51. Y-levers and selector levers, exploded view (TT-76C/GGC and equipment furnished with Y-lever stabilizer assembly).*

sensing lever (8) and signal bell clapper (7) from the cam lever assembly 18).

(4) Remove the setscrew (6) that holds the signal bell clapper (7) to the bell sensing lever (8); remove the signal bell clapper (7).

(5) Remove the sensing lever spacer (9), figures sensing lever (10), sensing lever space (11), letters sensing lever space (13) from the cam lever assembly (18).

(6) Remove the plain hexagonal nut (14), lockwasher (15), and flat washer (16) that hold the restoring lever eccentric (17) to the stud on the cam lever assembly (18); remove the restoring lever eccentric (17).

---

1 Y-lever detent spring, 61000
2 Y-lever detent spring, 61000
3 Y-lever detent spring, 61000
4 Y-lever detent spring, 61000
5 Y-lever detent spring, 61000
6 Plain hexagonal nut, 10504
7 Lockwasher, 10434
8 Y-lever detent, 55004
9 Spacer, 55076
10 Detent spacer, 55001
11 Y-lever detent, 55004
12 Detent spacer, 55001
13 Y-lever detent, 55004
14 Detent spacer, 50001
15 Y-lever detent, 55004
16 Detent spacer, 56001
17 Y-lever detent, 55004
18 Detent spacer, 55001
19 V-lever detent eccentric sleeve, 55007
20 Y-lever detent pivot, 55008
21 Y-lever detent spring bracket, 55002
22 Machine screw, 10006
23 Flat washer, 10459
24 Clamp nut, 50174
25 Y-lever stud bracket, 60677
26 Machine screw, 10002
27 Lockwasher, 10429
28 Flat washer, 560319
29 Y-lever eccentric tie, 60678
30 Spacer, 60679
31 Flat washer, 50148
32 Selector Y-lever, 53540A (includes items 34,36,38 and 40)
33 Flat washer, 50148
84 Selector Y-lever
35 Flat washer, 50148
36 Selector Y-lever
37 Flatwasher, 50148
88 Selector Y-lever
89 Flat washer, 50148
40 Selector Y-lever
41 Felt washer, 61469
42 Y-lever pivot post collar, 51416
48 Setscrew, 10210
44 Y-lever pivot post stud, 53269
45 Setscrew, 10211
46 Y-lever eccentric stop, 61001
47 Retainer ring, 10929
48 Selector lever spring, 50902
49 Selector lever spring, 50902
50 Selector lever spring, 50902
51 Selector lever spring, 50902
52 Selector lever spring, 56902
53 Selector lever spring, 50902
54 Self-locking hexagonal nut, 10500
55 Selector camshaft locking lever eccentric, 55024
56 Selector camshaft locking lever, 50014
57 Felt washer, 61479
58 Flat washer, 50147
69 Selector lever, 51598A (includes items 62, 65, 68, and (71)
60 Bearing, 50019 (includes items 63, 66, 69, and 72)
61 Flat washer, 50147
62 Selector lever
63 Bearing
64 Flat washer, 50147
65 Selector lever
66 Bearing
67 Flat washer, 50147
68 Selector lever
69 Bearing
70 Flat washer, 50147
71 Selector lever
72 Bearing
78 Selector lever pivot stud collar, 51416
74 Setscrew, 10211
75 Selector lever pivot stud, 53268
76 Plain hexagonal nut, 10509
77 Selector lever spring post, 50325

*Figure 4-51.-Continued.*

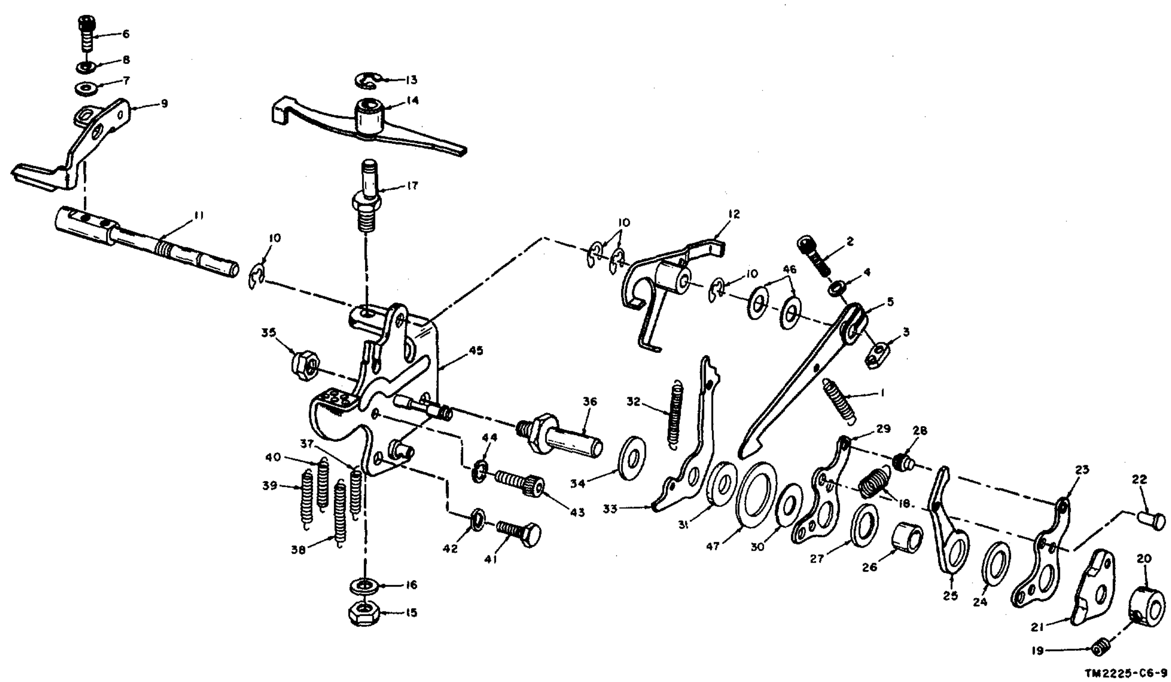
(7) Remove the cam lever assembly (18) and laminated spacer (19) from the projection of the rear of the code-ring cage.

*b. Reassembly.*

(1) Reassemble the function sensing lever mechanism by reversing the procedures described in *a*(7) through (2) above.

(2) Replace the type wheel reciprocating mechanism as described in paragraph 4-50*b*.

(3) Adjust the function sensing mechanism as described in paragraphs 4-122 and 4-124.




1 Code-ring locking bail cam follower spring, 53569
2 Machine screw, 10006
3 Nut plate, 50174
4 Flat washer, 10459
5 Code-ring locking bail cam follower, 52657
6 Machine screw, 10004
7 Flat washer, 10458
8 Lockwasher, 10429
9 Code-ring locking bail, 52653
10 Retainer ring, 10949
11 Code-ring locking bail shaft, 52291
12 Letters-figures shift latch lever, 52411
13 Retainer ring, 10949
14 Type wheel reciprocating transfer lever, 52478A
15 Self-locking hexagonal nut, 10525
16 Flat washer, 52430
17 Eccentric stud, 52399
18 Type wheel reciprocating-lever spring, 52167
19 Setscrew, 10209
20 Shaft collar, 50209
21 Retainer plate, 53652
22 Drive pin, 52404
23 Type wheel reciprocating drive lever, 52362
24 Flat washer, 52402
25 Type wheel reciprocating spring lever, 52405
26 Sleeve bearing, 52401
27 Flat washer, 52402
28 Spring pin, 52403
29 Type wheel reciprocating drive lever, 52362
30 Flat washer, 53261
31 Flat washer, 52413
32 Spring, 52168
33 Figures-letters shift lever, 52406
34 Flat washer, 53261
35 Self-locking hexagonal nut, 10526
36 Type wheel shift lever stud, 52417
37 Bell sensing lever spring, 52173
38 Shift cam follower spring, 52172
39 Letters sensing lever spring, 52169
40 Figures sensing lever spring, 52171
41 Machine screw, 10076
42 Lockwasher, 10430
43 Machine screw, 10025
44 Lockwasher, 10430
45 Function plate, 52419A
46 Felt washer, 61477
47 Felt washer, 61471

*Figure 4-52. Type wheel reciprocating mechanism, exploded view.*

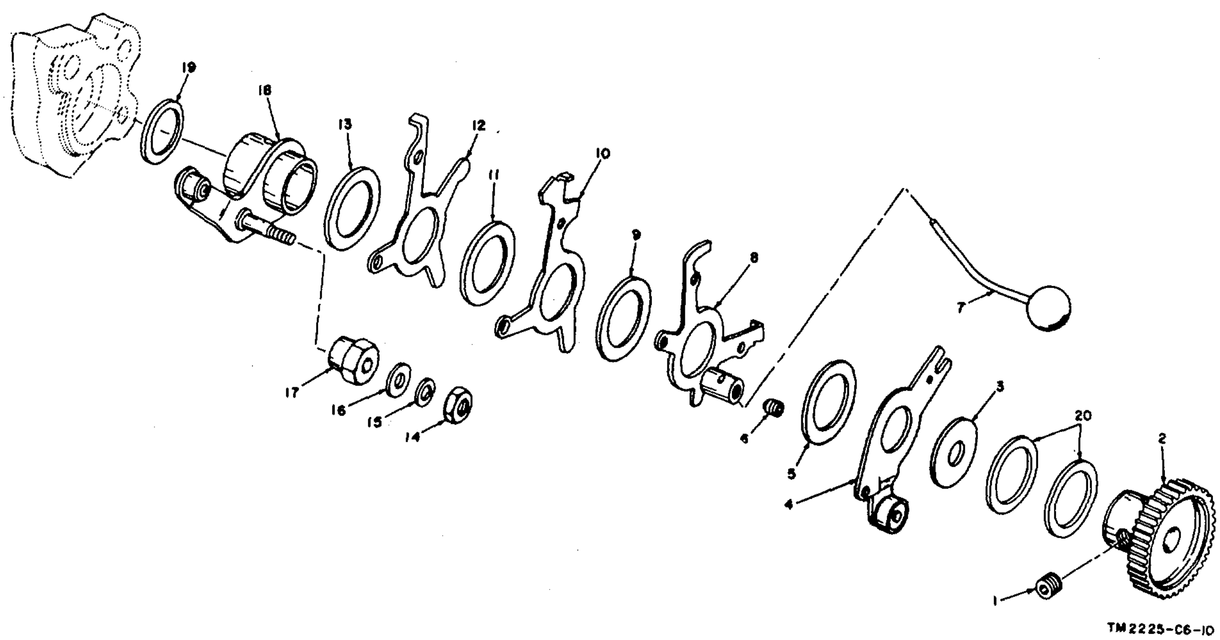
## 4-67. Removal and Replacement of Code-Ring Cage
(fig. 4-54)

*a. Removal.*

(1) Remove the power supply and terminal unit from the reperforator as described in paragraph 4-39*a* for the TT-76/GGC or paragraph 4-40*a* for the TT-76A/GGC and later models.
(2) On the TT-76A/GGC and later models, remove the tape puller mechanism as described in paragraph 4-45*a*.
(3) Remove the ribbon supply group from the reperforator as described in paragraph 4-51*a* for the TT-76/GGC or paragraph 4-52*a* for the TT-76A/GGC and later models.
(4) Remove the front support assembly as described in paragraph 4-55*a* for the TT-76/GGC or paragraph 4-56*a* for the TT-76A/GGC and later models.
(5) Remove the stop arm shaft driven gear as described in paragraph 4-66*a*(2).
(6) Remove the assembled type wheel driven gear (4), stop arm (7) and stop arm shaft (8).
(7) Remove the two machine screws (1) and lockwashers (2) that hold the code-ring cage to the reperforator frame; remove the code-ring cage.

*b. Replacement.*

(1) Position the code-ring cage on the reperforator frame, carefully engaging the tails of the T-levers in the



1 Setscrew, 10209
2 Stop arm shaft driven gear, 52344 (TT-76/GGC); 56257 (TT-76A/GGC and later models)
3 Thrust bearing, 50374
4 Type wheel reciprocating cam follower, 52477A
5 Sensing lever spacer, 52648
6 Setscrew, 10203
7 Signal bell clapper, 52682
8 Bell sensing lever, 52368A
9 Sensing lever spacer, 52649
10 Figures sensing lever, 52483
11 Sensing lever spacer, 52649
12 Letters sensing lever, 52484
13 Sensing lever spacer, 52649
14 Plain hexagonal nut, 10512
15 Lockwasher, 10429
16 Flat washer, 50414
17 Restoring lever eccentric, 52664
18 Cam lever assembly, 52459A
19 Laminated spacer, 52679
20 Felt washer, 61471

*Figure 4-53. Function sensing mechanism, exploded view.*

slotted tails of the code-rings; secure with two machine screws (1) and lockwashers (2).

(2) Replace the assembled type wheel driven gear (4), stop arm (7), and stop arm shaft (8).

(3) Replace the stop arm shaft driven gear as described in paragraph 4-66*b*.

(4) Replace the front support assembly as described in paragraph 4-56*b* for the TT-76A/GGC and later models, or paragraph 4-55*b* for the TT-76/GGC.

(5) Replace the ribbon supply group as described in paragraph 4-52*b* for the TT-76A/GGC and later models, or paragraph *4-51b* for the TT-76/GGC. Make sure the mounting machine screws engage the bearing bracket (5).

(6) On the TT-76A/GGC and later models, replace the tape puller mechanism as described in paragraph 4-45*b*.

(7) Replace the power supply and terminal unit as described in paragraph 4-40*b* for the TT-76A/GGC and later

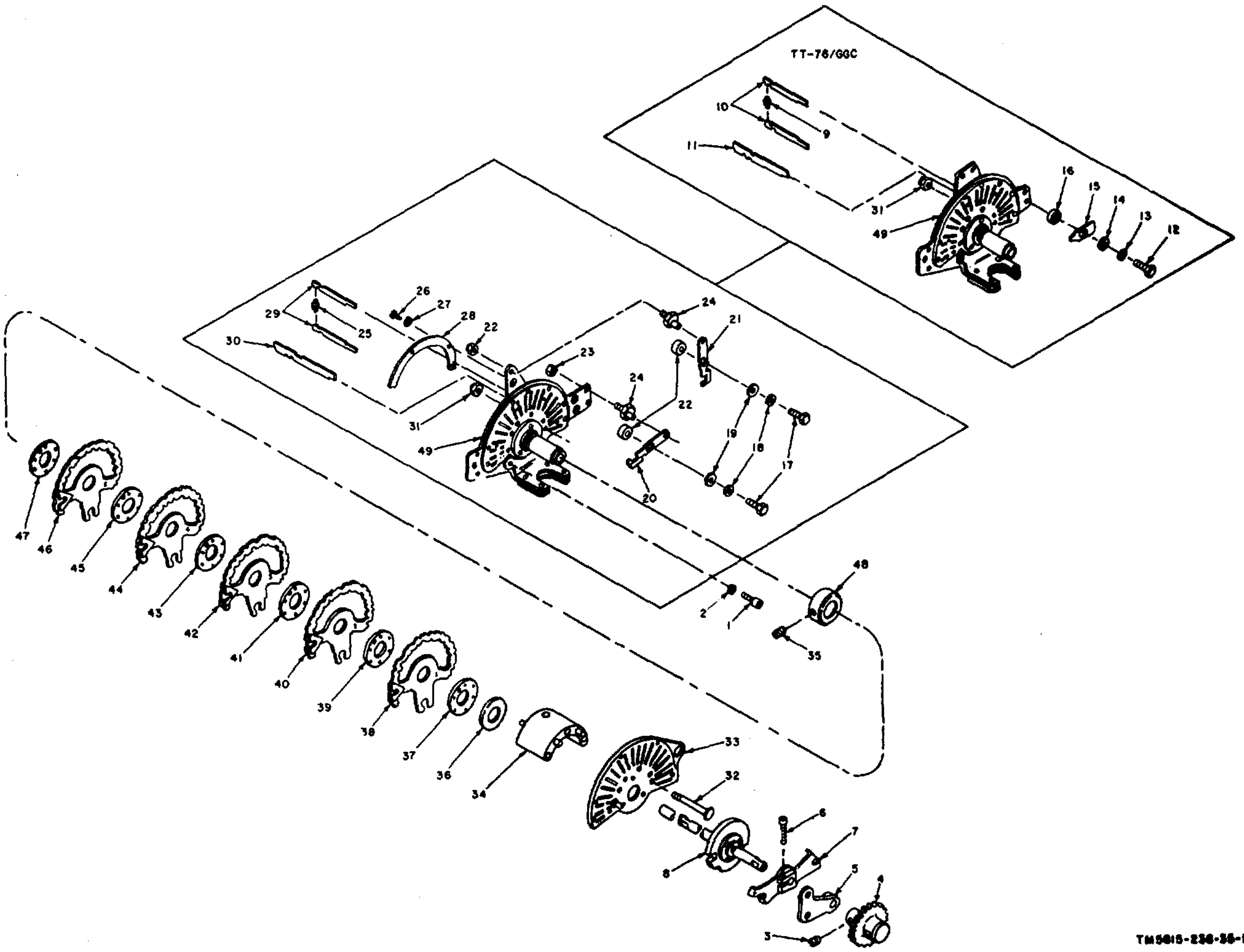



*Figure 4-54. Code-ring cage, exploded view.*

models, or paragraph 4-39*b* for the TT-76/GGC.

### 4-68. Disassembly and Reassembly of Code-Ring Cage
(fig. 4-54)

*a. Disassembly.*

(1) Remove the code-ring cage from the reperforator as described in paragraph 4-67*a*.

(2) Remove the two setscrews (3) that hold the type wheel driven gear (4) to the stop arm shaft (8); remove the type wheel driven gear (4) and the bearing bracket (5).

(3) Remove the machine screw (6) that holds the stop arm (7) to the stop arm shaft (8); remove the stop arm (7).

(4) On the TT-76/GGC, remove the 16 stop bar lever springs (9) from the 29 stop bars (10) and from the three function stop bars (11). Remove the stop bars (10) and the function stop bars (11) from the code-ring cage. Remove the three machine screws (12), lockwashers (13), and flat washers (14) that hold the three adjustable fulcrums (15) to the code selecting guide plate (49); remove the three adjustable fulcrums (15) and flat washers (16).

(5) On the TT-76A/GGC and later models, remove the three machine screws (17), lockwashers (18), and flat washers (19) that hold the two adjustable fulcrums (20) and the adjustable fulcrum (21) to the code selecting guide plate (49) and to the eccentrics (24); remove the adjustable fulcrums (20 and 21) and the three flat washers (22). Remove the three self-locking hexagonal nuts (23) that hold the eccentrics (24) to the code selecting guide plate (49); remove the three eccentrics (24). Remove the 16 stop bar lever springs (25) from the 29 stop bars (29) and from the function stop bars (30). Remove the three machine screws (26) and lockwashers (27) that hold the retainer plate (28) to the code selecting guide plate (49); remove the retainer plate (28). Remove the stop bars (29) and the function stop bars (30) from the code-ring cage.

1 Machine screw, 10024
2 Lockwasher, 10429
3 Setscrew, 10209
4 Type wheel driven gear 52431A
5 Bearing bracket, 53568A
6 Machine screw, 10009
7 Stop arm, 53802A
8 Stop arm shaft, 52134A
9 Stop bar lever spring, 52940
10 Stop bar, 50502
11 Function stop bar, 52333
12 Machine screw, 10398
13 Lockwasher, 10429
14 Flat washer, 10458,
15 Adjustable fulcrum, 52177
16 Flat washer, 53602
17 Machine screw, 10087
18 Lockwasher, 10429
19 Flat washer, 10458
20 Adjustable fulcrum, 56178
21 Adjustable fulcrum, 56176
22 Flat washer, 53602
23 Self-locking hexagonal nut, 10500
24 Eccentric, 55738
25 Stop bar lever spring, 52940
26 Machine screw, 10317
27 Lockwasher, 10433
28 Retainer plate, 56177
29 Stop bar, 50502
30 Function stop bar, 57277
31 Self-locking hexagonal nut, 10500
32 Cage tie bolt, 53972
33 Code cage outside guide, 52444
34 Code cage spacer, 53445
35 Setscrew, 10209
36 Code-ring spacer, 53453
37 Ball retainer, 53647A
38 Code-ring, 53641A
39 Ball retainer, 53647A
40 Code-ring, 53642A
41 Ball retainer, 53647A
42 Code-ring, 53643A
43 Ball retainer, 53647A
44 Code ring, 53644A
45 Ball retainer, 53647A
46 Code-ring, 53645A
47 Ball retainer, 53647A
48 Code-ring collar, 51397
49 Code selecting guide plate, 53808A or 57271A

*Note.* Later models of equipment include a felt washer, 61485, between items (7) and (8).

*Figure 4-54.-Continued*

(6) Remove the three self-locking hexagonal nuts (31) and cage tie bolts (32) that hold the code cage outside guide (33) to the code selecting guide plate (49); remove the assembled code cage outside guide (33) and code cage spacer (34) from the shaft on the code selecting guide plate (49).

(7) Remove the two setscrews (35) that hold the code-ring collar (48) to the code selecting guide plate (49); remove the code ring spacer (36), six ball retainers (37, 39, 41, 43, 45, and 47), five code rings (38, 40, 42, 44, and 46), and the code-ring collar (48).

*b. Reassembly.*

(1) Reassemble the code-ring cage by reversing the procedures described in *a*(7) through (2) above.

(2) Replace the code-ring cage as described in paragraph 4-67*b*.

(3) Adjust the code-ring cage, as described in paragraphs 4-121, 4-123, 4-133, 4-139, 4-140, and 4-165.

## 4-69. Disassembly and Reassembly of Transfer Lever Shaft

(fig. 55)

*a. Disassembly.*

(1) Remove the ribbon supply group as described in paragraph 4-51*a* for the TT-76/GGC or paragraph 4-52*a* for the TT-76A/GGC and later models.

(2) Remove the front support assembly is described in paragraph 4-55*a* for the TT-76/GGC or paragraph 4-56*a* for the TT-76A/GGC and later models.

(3) Move all the code rings either clockwise or counterclockwise. Remove the self-locking hexagonal nut (1) that holds the flat washers (2, 4, 6, 8, and 10) and T-levers (3, 5, 7, 9, and 11) to the T-lever pivot stud (30); remove the flat washers (2, 4, 6, 8, and 10), the T-levers (3, 5, 7, 9, and 11) and shim (41). Remove the felt washer (42), when supplied, from the T-lever stud.

(4) Remove the function clutch latch screw (12) that holds the clutch latch arm (17) to the transfer lever shaft (31); remove the clutch latch arm (17).

(5) Remove the machine screw (13), plain hexagonal nut (14), and lockwasher (15) that hold the ball bearing (16) to the clutch latch arm (17); remove the ball bearing (16).

(6) Remove the machine screw (18) that holds the shaft collar (19) to the transfer lever shaft (31); remove the shaft collar (19) and felt washer (43), when supplied.

(7) Remove the transfer lever spring (20) from the transfer lever spring post (27) and from the spring post on the reperforator frame.

(8) Remove the machine screws (21 and 23) from the shaft collars (22 and 24). Remove the transfer lever shaft assembly by pulling it out from the front of the perforator, catching the shaft collars (22 and 24) and felt washer (44), when supplied, as they fall from the transfer lever shaft (31).

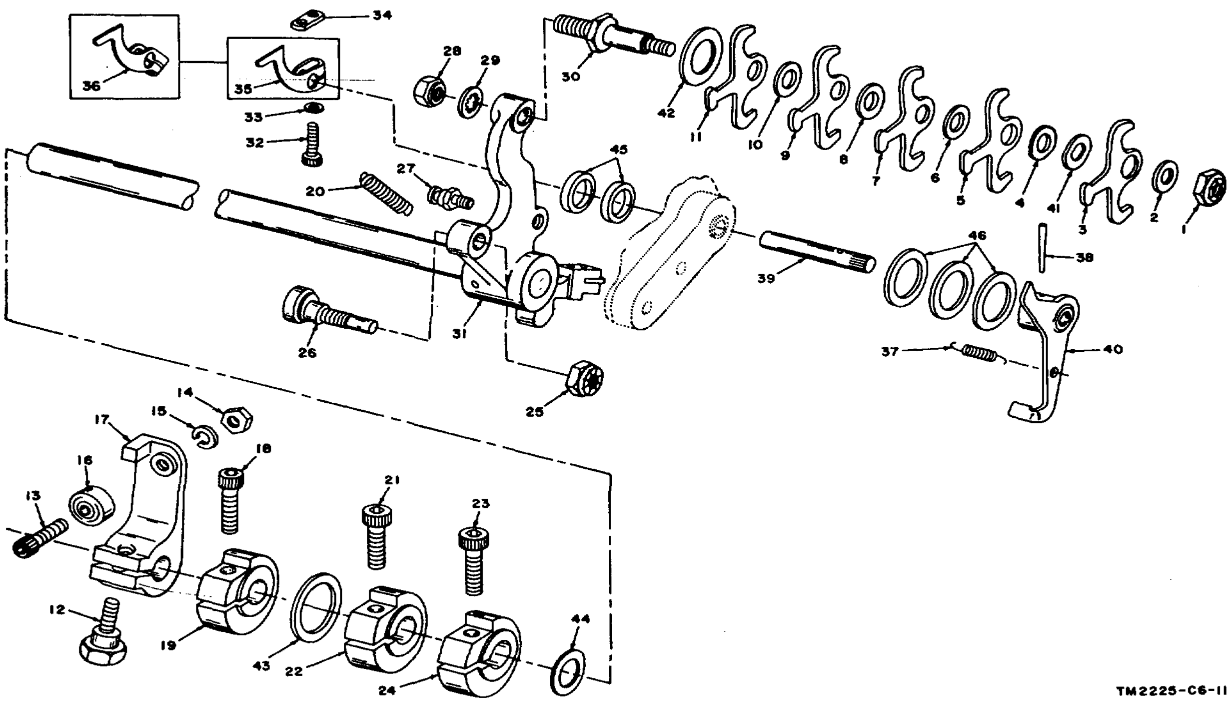
(9) Remove the self-locking hexagonal nut (25) that holds the transfer lever roller stud (26) to the transfer lever; remove the transfer lever roller stud (26).

(10) Remove the transfer lever spring post (27), from the transfer lever.

(11) Remove the plain hexagonal nut (28) and lockwasher (29) that hold the T-lever pivot stud (30) to the transfer lever; remove the T-lever pivot stud (30).

(12) Remove the machine screw (32), flat washer (33), and nut plate (34) that hold the trip latch lever (35) to the trip latch lever pivot stud (38); remove the trip latch lever (35 or 36) and two felt washers (45), when supplied.

(13) Remove the transfer lever trip latch spring (37) from the transfer lever trip latch (40). Remove the assembled trip latch lever shaft (39) and trip latch lever (40) from the reperforator frame. Remove the three felt washers (46), when supplied, from the trip latch lever shaft. Remove the taper pin (38) and remove




| | |
|---|---|
| 1 Self-locking hexagonal nut, 10500 | 24 Shaft collar, 53973 |
| 2 Flat washer, 50414 | 25 Self-locking hexagonal nut, 10501 |
| 3 T-lever, 51066A (includes items 5, 7, 9, and 11 | 26 Transfer lever roller, stud, 56185 |
| 4 Flat washer, 50148 | 27 Transfer lever spring post, 50647 |
| 5 T-lever | 28 Plain hexagonal nut, 50651 |
| 6 Flat washer, 50148 | 29 Lockwasher, 10404 |
| 7 T-lever | 30 T-lever pivot stud, 50650 |
| 8 Flat washer, 50148 | 31 Transfer lever shaft, 54745A |
| 9 T-lever | 32 Machine screw, 10006 |
| 10 Flat washer, 50148 | 33 Flat washer, 10459 |
| 11 T-lever | 34 Nut plate, 50174 |
| 12 Function clutch latch screw, 52176 | 35 Trip latch lever, 52147 (TT-76/GGC only) |
| 13 Machine screw, 10000 | 36 Trip latch lever, 56736 |
| 14 Plain hexagonal nut, 10504 | 37 Transfer lever trip latch spring, 50904 |
| 15 Lockwasher, 10434 | 38 Taper pin, 10857 |
| 16 Ball bearing, 10754 | 39 Trip latch lever shaft, 52148 |
| 17 Clutch latch arm, 50535 | 40 Transfer lever trip latch, 50020A |
| 18 Machine screw, 10010 | 41 Shim (.002-in.), 57072, or shim (.003-in.), 57073 |
| 19 Shaft collar, 53973 | 42 Felt washer, 61480 |
| 20 Transfer lever spring, 55674 | 43 Felt washer, 61488 |
| 21 Machine screw, 10010 | 44 Felt washer, 61492 |
| 22 Shaft collar, 53973 | 45 Felt washer, 61478 |
| 23 Machine screw, 10010 | 46 Felt washer, 61479 |

*Figure 4-55. Transfer lever shaft, exploded view.*

the trip latch lever shaft (39) from the transfer lever trip latch (40).

*b. Reassembly.*

*Note.* If any of the T-levers are damaged and need to be replaced, replace all five of the T-levers. These levers are supplied in matched sets, and will not function properly when operated in unmatched sets.

(1) Reassemble the transfer lever shaft by reversing the procedures in *a*(13) through (3) above.

(2) Adjust the transfer lever and T-levers as described in paragraphs 4-126, 4-128, 4-130 and 4-136 or 4-127, 4-129, and 4-136.

(3) Replace the front support assembly as described in paragraph 4-56*b* for the TT-76A/GGC and later models, or paragraph 4-55*b* for the TT-76/GGC.

(4) Replace the ribbon supply group as described in paragraph 4-52*b* for the TT-76A/GGC and later models or paragraph 4-51*b* for the TT-76/GGC.

## 4-70. Removal and Replacement of Motor

*a. Removal.*

(1) Remove the reperforator-transmitter from the base as described in paragraph 4-4*a*.

(2) Remove the cover from the motor suppression filter unit as described in paragraph 4-84*a* (2) for TT-76/GGC or paragraph 4-85*a*(2) for TT-76A/GGC and later models.

(3) Disconnect the motor cable from the terminal board on the motor suppression filter unit.

(4) Remove the four machine screws (1, fig. 4-68) and lockwashers (2) that hold the gear case cover (6) to the motor support; remove the worm gear bracket (9), gear case cover (6), and gasket (3).

(5) Remove the four machine screws (1, fig. 4-56) and lockwashers (2) that hold the motor to the motor support; remove the assembled motor and the shims (3 and 4).

*b. Replacement.*

(1) Position the shims (3 and 4, fig. 4-56) on the motor so that the holes in the shims line up with the mounting holes on the motor. Position the motor on the motor support; secure with the four machine screws (1) and lockwashers (2).

(2) Position the gasket (3, fig. 4-68) gear case cover (6), and worm gear bracket (9) on the motor support; secure with four machine screws (1) and lockwashers (2).

(3) Connect the terminals on the motor cable to the terminal board on the motor suppression filter unit.

(4) Replace the cover on the motor suppression filter unit as described in paragraph 4-85*b* for the TT-76A/GGC and later models, on paragraph 4-84*b* for the TT-76/GGC.

(5) Replace the reperforator-transmitter on the base as described in paragraph 4-4*b*.

## 4-71. Disassembly and Reassembly of Series-Governed Motor

(fig. 4-56)

*a. Disassembly.*

(1) Remove the motor from the reperforator-transmitter as described in paragraph 4-70*a*.

(2) Remove the machine screw (5) and lockwasher (6) that hold the worm gear (7) to the armature shaft; remove the worm gear.

(3) If replacement of item 9, 12, or 13 is necessary, remove the four motor cable terminals (82) from their wire leads.

(4) Remove the cap (8); slide the shielding (9) off the leads. Remove the ground lug (10) from the shielding only when necessary; unsolder and remove the eyelet (11) from the shielding only when necessary.

(5) Remove the nipple (12) and lockwasher (13) from the motor.

(6) Remove the pin (14) from the armature shaft. Remove the two grease

seals (15 and 16) from the armature shaft.

(7) Remove the setscrew (17) that holds the motor governor target (18) to the shaft of the motor speed governor base (43); remove the motor governor target.

(8) Remove the two machine screws (19) and lockwashers (20) that hold the motor governor cover (21) to the motor (47); remove the motor governor cover.

(9) Remove the two setscrews (22); that hold the motor speed governor base (43) to the armature shaft; remove the assembled motor governor.

(10) Remove the govern worm spring (23) and the governor worm (24) from the motor governor.

(11) Remove the electrical contact brush (25) from the motor governor.

(12) Remove the two electrical contact brushes (26).

(13) Remove the motor brush shields (44), motor brush caps (45) and motor brushes (46).

(14) Remove the four machine screws (48) that hold the end plate (49) to the end bell (57); remove the end plate.

(15) On the Bodine 1/23-hp motor only, remove the oil and dust seal (50) and felt mounting plate (51) from the armature shaft.

(16) On the Howard 1/20- and 1/23-hp motors, remove the spring washer (52) from the armature shaft.

(17) Remove shim washer (53). On the Howard 1/23-hp motor only. Remove the washer (54) from the armature shaft.

(18) Remove the four machine screws (55) and lockwashers (56) that hold the endbell (57) to the motor (47). Remove the endbell.

(19) Remove the armature (62 or 63) from the motor (47). On the Howard 1/20-hp motor only, also remove the baffle plate (64). On the Howard 1/23-hp motor only, remove the spring washer (59) from the armature shaft.

(20) Remove the shim washer (60) and ball bearings (58 and 61) from the armature shaft.

(21) On the Bodine 1/23-hp motor only. Remove the setscrew (65) from the fan (66); remove the fan from the armature shaft.

*b. Removal and Replacement of Motor Capacitors.*

(1) Disassemble the series-governed motor as described in *a*(1) and (7) through (12) above.

(2) Remove the four machine screws (67) that hold the end plate (68) to the end bell (75); remove the end plate.

(3) On the Bodine 1/23-hp motor only, remove the oil and dust seal (69) and felt mounting plate (70).

(4) On both the Bodine and Howard 1/23 motors, remove the four machine screw (71) and lockwashers (72) that hold the endbell (75) to the motor. On the Howard 1/20-hp motor, remove the two machine screws (73) and lockwashers (74) that hold the endbell (75) to the motor. Remove the endbell carefully from the motor housing and field (80).

(5) On the Bodine 1/23-hp motor only, unsolder and disconnect the leads of the two capacitors (81) from the brush holder bushings in the endbell. Remove the two machine screws (76) and lockwashers (78) that hold the capacitor leads, motor field leads, and motor brush holder leads to their respective governor brush holders. Remove the capacitor from the endbell.

(6) On the Howard 1/20- and 1/23-hp motors, remove the two spring clips (79) from their seats on the brush holder bushings in the endbell. Remove the two hexagonal nuts (77) and lockwashers (78) that hold the capacitor leads, motor field leads, and motor brush holder leads to their respective governor brush holders. Remove the capacitors (81) from the endbell.

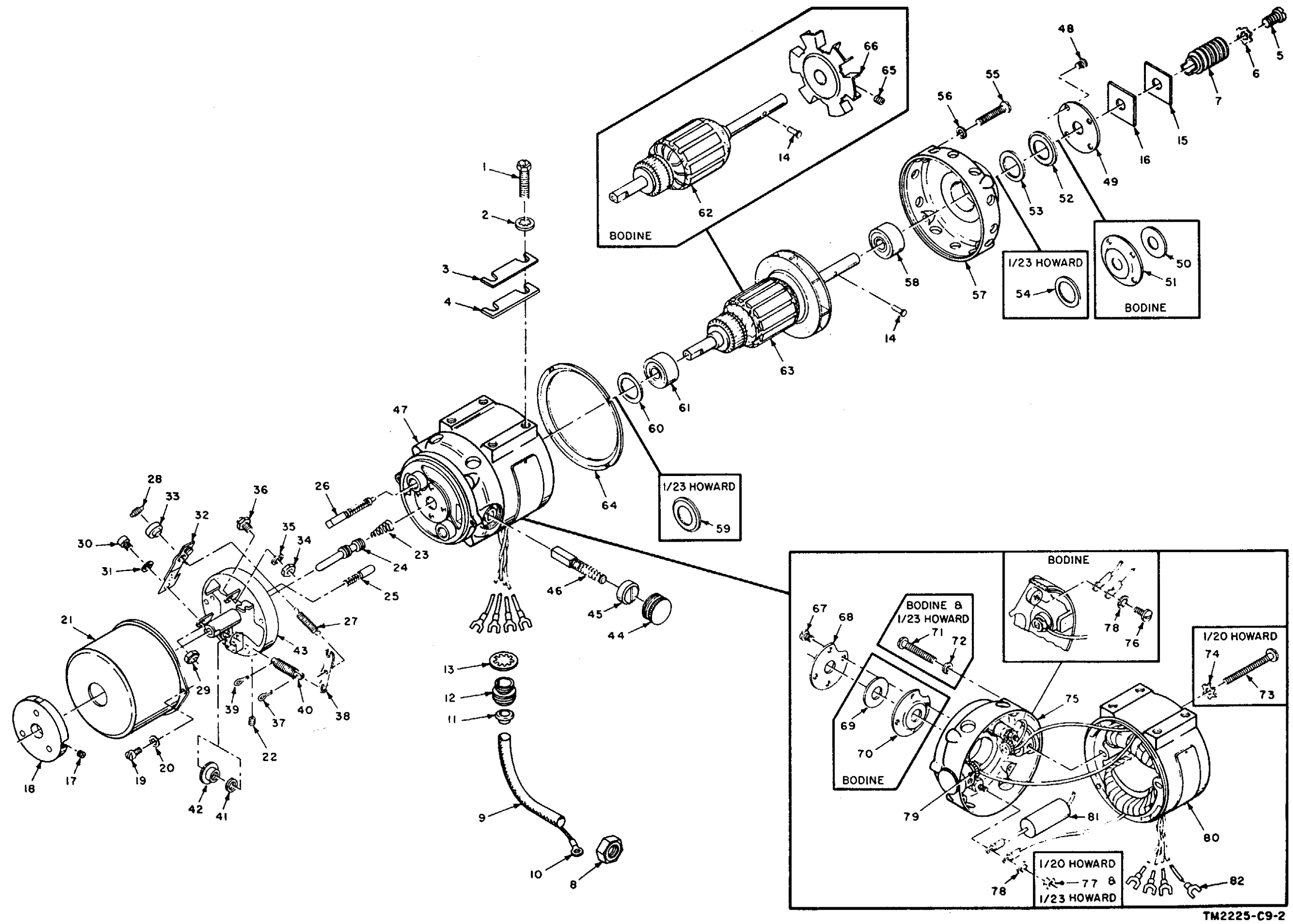



*Figure 4-56. Series-governed motor, exploded view.*

(7) Reassemble the capacitors in the motor by reversing the procedures described in (6) through (2) above.
(8) Reassemble the series-governed motor as described in *c*(4), (5), (6), (7), (9), and (10) below.

*c. Reassembly.*

(1) Check the motor brushes (46). Clean them if they are dirty or glazed; replace them if they are worn, chipped, or saturated with oil.
(2) Begin reassembly by reversing the procedures described in *a*(21) through (13) above.
(3) Perform the adjustment described in paragraph 4-195.
(4) Continue reassembly by reversing the procedures described in *a*(12) through (9) above.
(5) Perform the adjustment described in paragraph 4-197.
(6) Continue reassembly by reversing the procedures described in. *a*(8) and (7) above.
(7) Perform the adjustment described in paragraph 4-198.
(8) Continue reassembly by reversing the procedures described in *a*(6) through (2) above.
(9) Replace the motor as described in paragraph 4-70*b*.
(10) Adjust the motor speed as described in TM 11-5815-238-12.

---

1 Machine screw, 10017-01
2 Lockwasher, 10405
3 Shim, 0.002-in., 51509
4 Shim, 0.005-in., 51510
5 Machine screw, 50207
6 Lockwasher, 10406
7 Worm gear, 50350
8 Cap, 51171
9 Shielding, 20723-06.00
10 Ground lug, 20708
11 Eyelet, 59383A
12 Nipple, 51172
13 Lockwasher, 10478
14 Pin, 50359
15 Grease seal, 50949
16 Grease seal, 50949
17 Setscrew, 10204
18 Motor governor target, 50303A
19 Machine screw, 10321
20 Lockwasher, 10412
21 Motor governor cover, 50311
22 Setscrew, 10203
23 Governor worm spring, 51855
24 Governor worm, 56555A
25 Electrical contact brush, 51154
26 Electrical contact brush, 51543A[a], [b], 63649A[c]
27 Adjustment lever spring, 50334
28 Grooved pin, 50302
29 Self-locking hexagonal nut, 10840
30 Machine screw, 10055
31 Lockwasher, 10403
32 Electrical contact arm, 50281A
33 Sleeve, 50293
34 Plain hexagonal nut, 10507
35 Lockwasher, 10404
36 Electrical contact, 50338
37 Cotter pin, 10800
38 Governor adjustment lever, 50301
39 Cotter pin, 10800
40 Governor adjustment screw, 50299
41 Flat washer, 50148
42 Motor governor adjustment gear, 50278A
43 Motor speed governor base, 51249A
44 Motor brush shield, 51155[a,] 60495[b], [c]
45 Motor brush cap, 20750[a], 60496[b], [c]
46 Motor brush, 56834[a], 60503[b], [c]
47 Motor 65309A (includes items 14, 15, 16, 44, 45, 46, and 48 through 81)
48 Machine screw, 10367[a], 60494[b], [c]
49 End plate, 20738[a], 60500[b], [c]
50 Oil and dust seal, 207398
51 Felt mounting plate, 20749[a]
52 Spring washer, 60501[b], [c]
53 Shim washer, 20748[a], [b], [c]
54 Washer, 60493[b]
55 Machine screw, 10332[a], 10172[b], [c]
56 Lockwasher, 10412[a], 10444[b], [c]
57 End bell, 20751[a], 60505[b], 64752[c]
58 Ball bearing, 10760
59 Spring washer, 60501[b]
60 Shim washer, 20748[a], 60493 or 60506[b], 60493[c]
61 Ball bearing, 10765[b], [c], 10760[a,]
62 Armature, 51187[a]
63 Armature, 60492A[b], 64751A[c]
64 Baffle plate, 64755[c]
65 Setscrew, 10203[a]
66 Fan, 51800[a] (includes item 65)
67 Machine screw, 10367[a], 60494[b.c]
68 End plate, 51060[a], 60491[b, e]
69 Oil and dust seal, 20739[a]
70 Felt mounting plate, 20740[a]
71 Machine screw, 10333[a], 10172[b]
72 Lockwasher, 10412[a], 10444[b]
73 Machine screw, 10384[c]
74 Lockwasher, 10437[c]
75 End bell, 51904[a], 60490[b], 64797[c]
76 Machine screw, 10374[a]
77 Hexagonal nut, 15017[b, c]
78 Lockwasher, 10408
79 Spring clip, 11033[b], [c]
80 Motor housing and field, 51188A[a], 60499A[b], 64753[c]
81 Capacitor, 20212
82 Terminal, 21065

[a] Used on 1/23-hp Bodine motor.
[b] Used on Howard 1/23-hp motor.
[c] Used on Howard 1/20-hp motor.

*Figure 4-56.-Continued*

## 4-72. Removal and Replacement of Motor Brushes

*a. Removal.*

(1) Operate the POWER switch, LIGHT switch, and MOTOR switch to OFF.
(2) Disconnect the reperforator-transmitter from the local power source.
(3) Remove the dust cover.
(4) Remove the tape from the tape supply reel.
(5) Remove the motor or brush shields and caps (44 and 45, fig. 4-56).
(6) Remove the motor brushes (46).

*b. Replacement.*

(1) Insert the motor brushes in the motor brush guides.
(2) Replace the motor brush caps and shields.
(3) Replace the tape in the tape supply reel.
(4) Replace the dust cover.
(5) Connect the reperforator-transmitter to the local power source.
(6) Operate the POWER switch, LIGHT switch, and MOTOR switch to ON.

## 4-73. Repair of Motor Commutator

*a. Cleaning Commutator.*

(1) If there is excessive sparking under the motor brushes when the motor is running, disassemble the motor and clean the commutator with a cloth dampened with cleaning Compound. Reassemble and run the motor.
(2) If there is still excessive sparking, remove the armature from the motor and clean the commutator lightly with No. 0000 sandpaper.

***Caution:* Do not use emery cloth. Wrap the sandpaper around the armature and turn the armature in a lathe or between fixed centers, holding the sandpaper lightly by hand. The copper commutator segments frequently become dark because particles of carbon form the brushes become embedded in the copper commutator segments. This is a desirable condition. Do not polish merely to remove the discoloration.**

*b. Undercutting Mica Separators between Commutator Segments.* Excessive sparking between the commutator and the motor brushes results when the copper segments of the commutator are worn down below the level of the mica separators. To insure adequate contact between the copper segments and the brushes, the top of the mica separators should be cut down 1/64 inch to 1/32 inch below the surface of the copper segments. Repeat for all segments.

***Caution:* After the mica has been undercut between all segments, check to see that no particles of metal remain in the slots. Such metal particles may short the commutator segments and burn out the windings when the motor is started.**

*c. Resurfacing Motor Commutator.* The commutator may be resurfaced as follows by experienced personnel, but only with the specific approval of supervisory personnel responsible for the equipment:

(1) Mount the motor armature on a lathe so that the shaft does not run out of line more than .0005 inch. Make a series of light cuts across the entire width of the commutator with a sharp cutting tool. Continue the cuts until enough metal is removed to eliminate the pits, grooves, and rough spots in the surfaces. Do not remove more metal than necessary.
(2) Polish the commutator with a strip of fine sandpaper (#000 or #0000) held in flat contact with the commutator as it revolves in the lathe.

***Caution:* Do not attempt to smooth a rough commutator with sandpaper unless a lathe is available. Do not use emery cloth or carborundum paper because particles of these abrasives may cause trouble in electrical circuits.**

(3) After the commutator is resurfaced, check to see that the surfaces of the mica separators are below the surfaces of the copper segments of the commutator as described in *b*(2) above.

## 4-74. Disassembly and Reassembly of Motor Governor

(fig. 4-56)

*a. Disassembly.*

(1) Remove the motor governor from the motor as described in paragraph 4-71a (7) through (11).

(2) Remove the adjustment lever spring (27) from the governor adjustment lever (38) and from the grooved pin (28); remove the grooved pin.

(3) Remove the self-locking hexagonal nut (29), machine screw (3), and lock-washer (31) that hold the electrical contact arm (32) to the motor speed governor base (43); remove the electrical contact arm and remove the sleeve (33) from the contact arm.

(4) Remove the plain hexagonal nut (34) and lockwasher (35) that hold the electrical contact (36) to the motor speed governor base (43); remove the electrical contact.

(5) Remove the cotter pin (37) that holds the governor adjustment lever (38) to the governor adjustment screw (40); remove the governor adjustment lever.

(6) Remove the cotter pin (39) from the opposite end of the governor adjustment screw (40); turn out the governor adjustment screw from the mounting on the motor speed governor base (43); catch the fiat washer (41) and the motor governor adjustment gear (42) as they fall from the motor speed governor base.

*b. Reassembly.* If necessary, clean or burnish the governor electrical contact points before Reassembly. Remove any built-up or pitted portions of the contacts with a contact file. Do not remove any more metal than is necessary.

(1) Begin Reassembly of the motor governor by reversing the procedures described in a(6) through (3) above.

(2) Perform the adjustment described in paragraph 4-196.

(3) Continue Reassembly by reversing the procedure described in a (2) above.

(4) Install the motor governor on the motor by reversing the procedures described in paragraph 4-71a(11), (10),and (9).

(5) Perform the adjustment described in paragraph 4-197.

(6) Continue Reassembly of the motor governor by reversing the procedures described in paragraph 4-71a(8) and (7).

(7) Perform the adjustment described in paragraph 4-198.

(8) Adjust the speed of the motor as described in TM 11-5815-238-12.

## 4-75. Disassembly and Reassembly of Function Shaft (TT-76/GGC)

(fig. 4-57)

*a. Disassembly.*

(1) Remove the ribbon supply groups as described in paragraph 4-51a.

(2) Remove the front support assembly as described in paragraph 4-55a. Remove the ball bearing (3) from the front support frame.

(3) Remove the transfer lever shaft as described in paragraph 4-69a.

(4) Remove the two setscrews (4) that hold the transfer lever cam (5) to the function shaft (33); remove the transfer lever cam (5).

(5) Remove the two setscrews (6) that hold the sliding clutch coupling (7) to the function shaft (33); remove the sliding clutch coupling (7), sliding clutch spring (8), and sliding drum clutch (9).

(6) Remove the retainer ring (10) that holds the gear (12) to the function shaft (33); remove the flat washer (11), gear (12), and flat washer (13). Remove the retainer ring (14).

(7) Remove the two machine screws (15),lockwashers (16), and flat washers (17) that hold the ball bearing (23) in the rear frame of the reperforator. Remove the two machine screws (18), lockwashers (19), and flat washers (20) that hold the ball bearing (32) in the front frame of the reperforator.

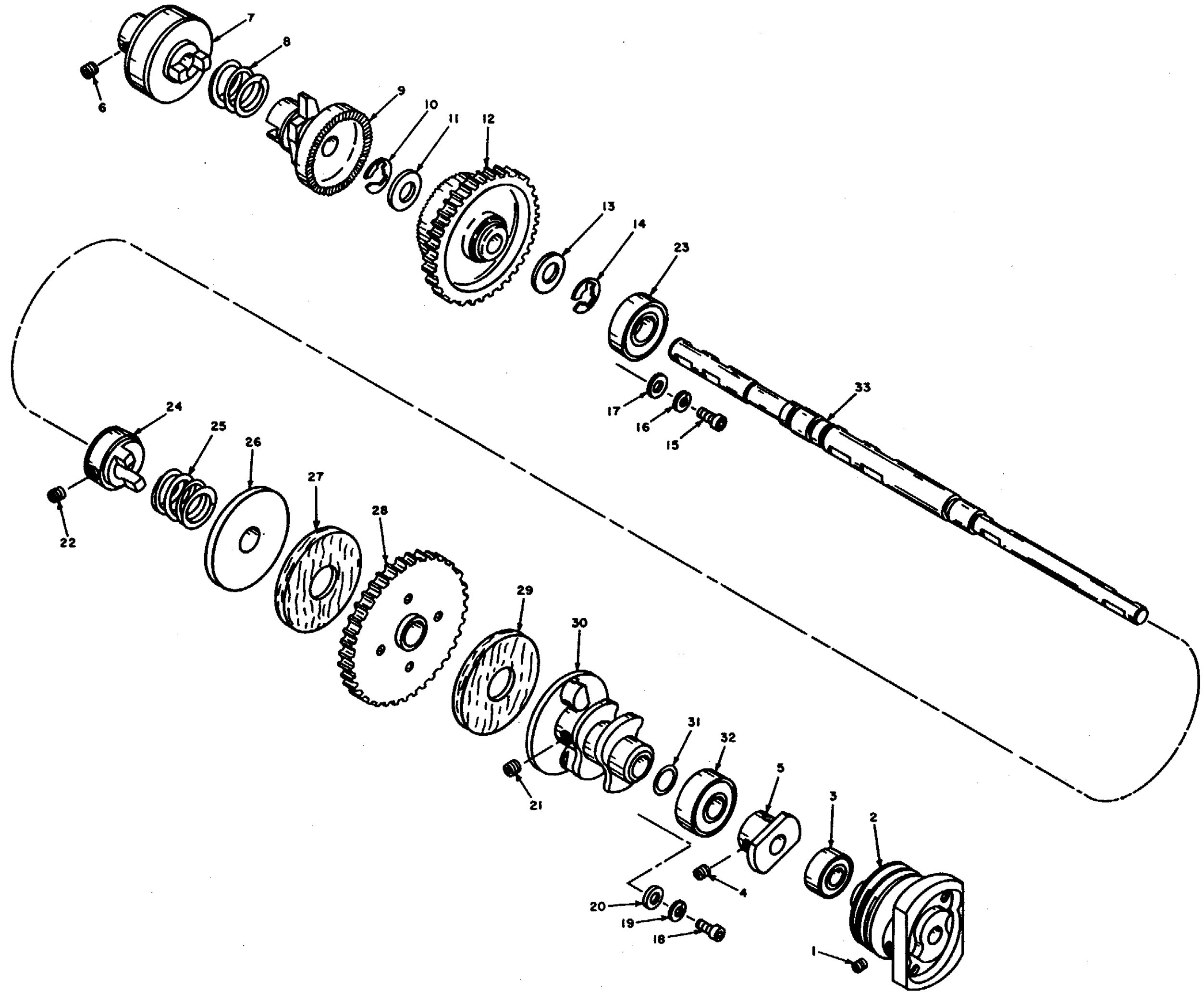



*Figure 4-57. Function shaft, exploded view (TT-76/GGC).*

(8) Remove the two setscrews (21) that hold the type wheel and function cam (30) to the function shaft (33). Remove the two setscrews (22) that hold the drive shaft collar (24) to the function shaft (33); slide the assembled function shaft and ball bearings (23 and 32) out from the front, catch the ball bearing (23), drive shat collar (24), friction clutch spring (25), friction clutch plate (26), friction plate (27), ,Unction shaft drive gear (28), friction law (29), type wheel and function cam (30), and flat washer (31) as they fall free of the function shaft (33).

(9) Remove the ball bearing (32) from the function shaft (33)

*b. Reassembly.*

(1) Reassemble the function shaft by reversing the procedures outlined in a(9) through (4) above.
(2) Replace the transfer lever shaft as described in paragraph 4-69b.
(3) Replace the front support assembly as described in paragraph 4-55b.
(4) Replace the ribbon supply group as described in paragraph 4-51b.
(5) Adjust the function shaft as described in paragraphs 4-124, 4-130, and 4-131.

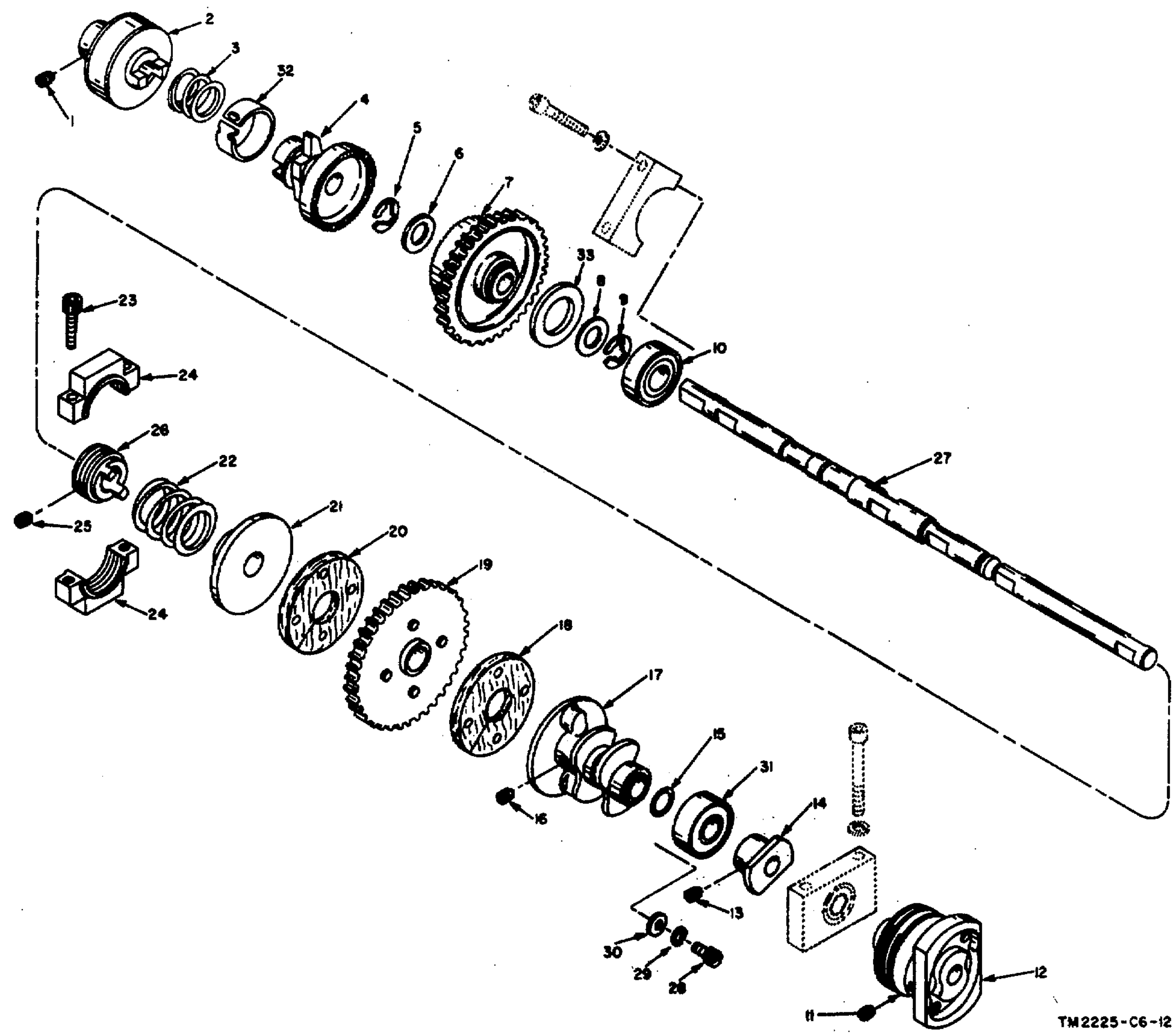
### 4-76. Disassembly and Reassembly of Function Shaft (TT-76A/GGC and Later Models)

*a. Disassembly*.

(1) Remove the tape puller mechanism as described in paragraph 4-45a.
(2) Remove the ribbon supply group as descried in paragraph 4-52a.
(3) Remove the two machine screws (27, fig. 4-69) and lockwashers (28) that hold the function shaft bearing cap (29) to the frame (39); remove the bearing cap.
(4) Remove the two setscrews (1, fig. 4-58) that hold the sliding clutch coupling (2) to the function shaft (27); remove the sliding clutch coupling (2), sliding clutch spring (3), and sliding clutch drum (4). Remove felt washer (32), when supplied.
(5) Remove the retainer ring (5) that holds the gear (7) to the function shaft; remove the flat washer (6), gear (7), and flat washer (8). Remove felt washer (33), when supplied.
(6) Remove the retainer ring (9) that holds the ballbearing (10) to the function shaft; remove the ball bearing (10).
(7) Remove the two setscrews (11) that hold the print and register cam (12) to the function shaft; remove the print and register cam (12) and the bearing block.
(8) Remove the two setscrews (13) that hold the transfer lever cam (14) to the function shaft; remove the transfer lever cam (14).
(9) Pull the function shaft to the rear through the ball bearing (31) in the reperforator frame; remove the flat washer (15).
(10) Remove the two setscrews (16) that hold the type wheel and function lever cam (17) to the function shaft; remove the type wheel and function lever cam (17), friction plate (18),

| | | |
|---|---|---|
| 1 Setscrew, 10209 | 12 Gear, 50512A | 23 Ball bearing, 10763 |
| 2 Print and register cam, 52456A | 13 Flat washer, 50515 | 24 Drive shaft collar, 50492 |
| 3 Ball bearing, 10753 | 14 Retainer ring, 10959 | 25 Friction clutch spring, 50847 |
| 4 Setscrew, 10209 | 15 Machine screw, 10004 | 26 Friction clutch plate, 50491 |
| 5 Transfer lever cam, 50536 | 16 Lockwasher, 10429 | 27 Friction plate, 56273 |
| 6 Setscrew, 10209 | 17 Flat washer, 10450 | 28 Function shaft drive gear, 56274A |
| 7 Sliding clutch coupling, 51167A | 18 Machine, screw, 10004 | 29 Friction plate, 56273 |
| 8 Sliding clutch spring, 50848 | 19 Lockwasher, 10429 | 30 Type wheel and function cam, 52398A |
| 9 Sliding drum clutch, 50516 | 20 Flat washer, 10450 | 31 Flat washer, 52283 |
| 10 Retainer ring. 10959 | 21 Setscrew, 10209 | 32 Ball bearing, 10756 |
| 11 Flat washer, 50515 | 22 Setscrew, 10209 | 33 Function shaft, 52383 |

*Figure 4-57-Continued.*




1 Setscrew, 102009
2 Sliding clutch coupling, 51167A
3 Sliding clutch spring, 50848
4 Sliding clutch drum, 50516
5 Retainer ring, 10959
6 Flat washer, 51847 or 51948 as required
7 Gear, 50512A
8 Flat Washer. 50515
9 Retainer ring, 10959
10 Ball bearing, 10763
11 Setscrew, 10309
12 Print and register cam, 52456A
13 Setscrew, 10209
14 Transfer lever cam, 50536
15 Flat washer, 52283
16 Setscrew, 10209
18 Friction plate, 56764
19 Function shaft drive gear, 56330A
20 Friction plate, 56764
21 Friction clutch plate, 56248
22 Friction clutch spring, 56249
23 Machine screw, 10034
24 Friction adjusting collar, 56382
25 Setscrew, 10208
26 Drive shaft collar, 56246
27 Function shaft, 57159
28 Machine screw, 10003
29 Lockwasher, 10429
30 Flat washer, 10405
31 Ball bearing, 10756
32 Felt washer, 61496
33 Felt washer, 61491

*Figure 4-58. Function shaft, exploded view (TT-76A/GGC and later models).*

function shaft drive gear (19), friction plate (20), friction clutch plate (21), and friction clutch spring (22),

(11) Remove the two machine screws (23) that hold the friction adjusting collar (24) to the drive shaft collar (26); remove the two halves of the friction adjusting collar (24).

(12) Remove the two setscrews (25) that hold the drive shaft collar (26) to the function shaft (27); remove the drive shaft collar (26).

(13) Remove the two machine screws (28), lockwashers (29), and flat washers (30) that hold the ball bearing (31) to the reperforator frame; remove the ball bearing (31).

*b. Reassembly.*

(1) Reassemble the function shaft by reversing the procedures described in a(13) through (4) above.

(2) Position the angled bearing cap (29,figure 4-69) on the frame (39); secure with two machine screws (27) and lockwashers (28).

(3) Replace the ribbon supply group as described in paragraph 4-52b.

(4) Replace the tape puller mechanism as described in paragraph 4-45b.

(5) Adjust the function shaft as described in paragraphs 4-124, 4-130, and 4-131.

## 4-77. Disassembly and Reassembly of Selector Camshaft

(fig. 4-59)

*a. Disassembly.*

(1) On the TT-76A/GGC and later models remove the tape puller mechanism from the front support frame as described in paragraph 4-45a(1).

(2) Remove the rangefinder from the reperforator-transmitter as described in paragraph 4-48a for the TT-76/GGC and 4-49a for the TT-76A/GGC and later models.

(3) Remove the two machine screws (1) and lockwashers (2) that hold the selector camshaft (30) to the reperforator frame.

(4) Remove the two setscrews (3) and setscrew seats (4) that hold the manual tape feedout cam (25) to the selector camshaft (30).

(5) On the TT-76/GGC, remove the two setscrews (5) that hold the friction clutch disk (7) to the selector camshaft (30). Remove the two setscrews (6) that hold the drive shaft collar (13) to the selector camshaft (30). Remove the assembled selector camshaft (30) and ball bearing (27) from the reperforator frame; catch the friction clutch disk (7), friction plate (8), driving disk (9), friction plate (10), friction clutch plate (11), friction clutch spring (12), drive shaft collar (13), and manual tape feed-out cam (25) as they fall from the selector camshaft. (30).

(6) On the TT-76A/GGC and later models remove the two setscrews (14) that hold the friction clutch disk (18) to the selector camshaft (30). Remove the two machine screws (15) that hold the friction clutch adjusting collar (16) to the drive shaft collar (24); remove the two halves of the friction clutch adjusting collar (16). Remove the two setscrews (17) that hold the drive shaft collar (24) to the selector camshaft (30). Remove the assembled selector camshaft (30) and ball bearing (27) from the reperforator frame; catch the friction clutch disk (18), friction plate (19), driving disk (20), friction plate (21), friction. plate (21), friction clutch plate (22), friction clutch spring (23), drive shaft collar (24) and manual tape feedout cam (25) as they fall from the selector camshaft (30).

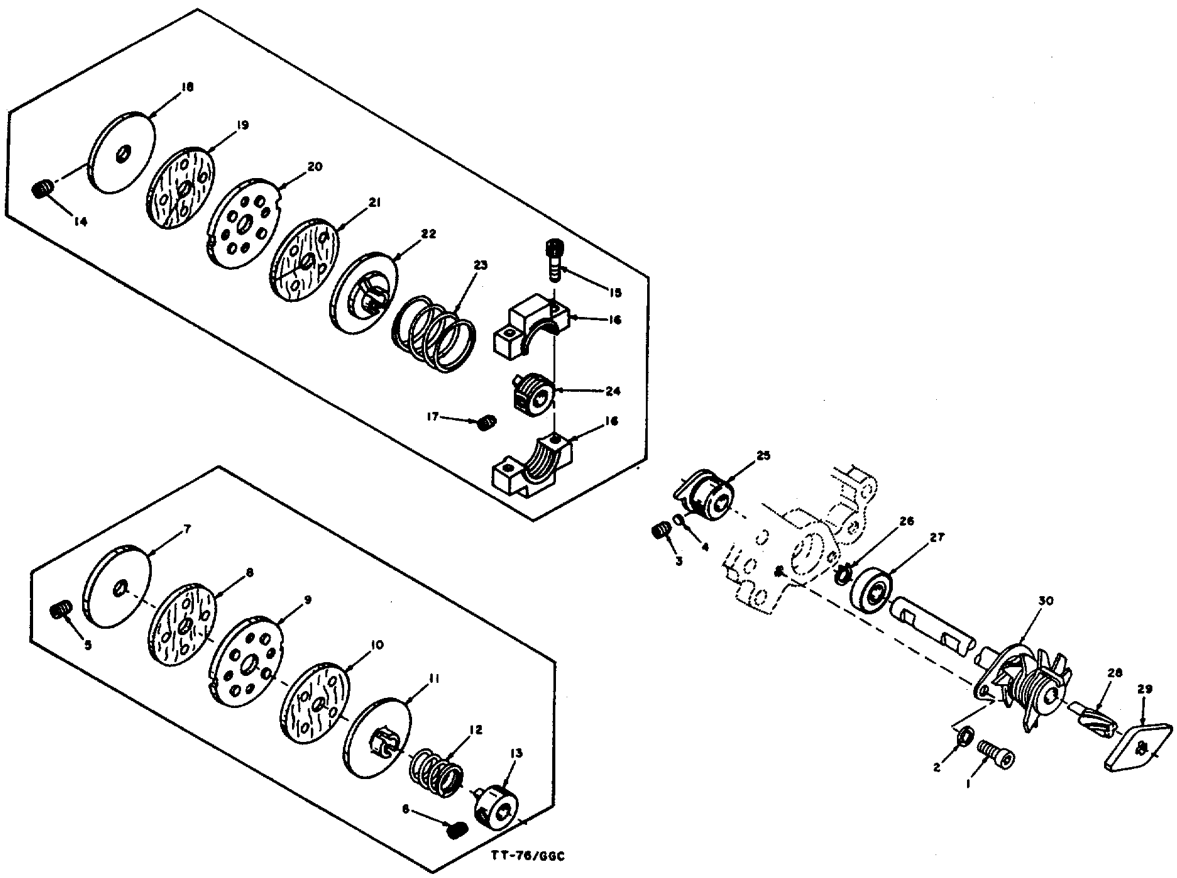
(7) Remove the retainer ring (26) that holds the ball bearing (27) to the selector camshaft (30); remove the ball bearing (27). (8) Remove the grooved spindle (28) and plate (29) from the end of the selector camshaft (30).

b. Reassembly.

(1) Reassemble the selector camshaft by reversing the procedures outlined in a(8) through (3) above. Make certain that the friction clutch driving disk (9, TT-76/GGC or 20, TT-76A/GGC and later models) on the selector cam shaft is engaged by the friction clutch drive assembly on the main shaft.

(2) Adjust the selector camshaft as described in paragraph 4-187 or 4-188.

(3) Replace the rangefinder as described in paragraph 4-49b for the TT-76A/




1 Machine screw, 10003
2 Lockwasher, 10403
3 Setscrew, 10208
4 Setscrew seat, 52159
5 Setscrew, 10209
6 Setscrew, 10208
7 Friction clutch disk, 50200
8 Friction plate, 50013
9 Driving disk, 51117
10 Friction plate, 50013
11 Friction clutch spring 50914
13 Drive shaft collar, 0L. 99
14 Setscrew, 10209
15 Machine screw, 10006
16 Friction clutch adjusting collar, 56381
17 Setscrew, 10208
18 Friction clutch disk, 50200
19 Friction plate, 56765
20 Driving disk, 51117 31 Clip, 67007
21 Friction plate, 56765
22 Friction clutch plate, 54931
23 Friction clutch spring, 54932
24 Drive shaft collar, 54928
25 Manual tape feed-out cam, 52158
27 Ball bearing, 10753
28 Spindle, 50133
29 Plate, 50134
30 Selector camshaft, 67006A (includes 26,27, 28,29,30, and 31)

*Figure 4-59. Selector camshaft, exploded view.*

GGC and later models, or paragraph 4-48b for the TT-76/GGC.

(4) On the TT-76A/GGC and later models, replace the tape puller mechanism as described in paragraph 4-45b.

## 4-78. Disassembly and Reassembly of Main Shaft
(fig. 4-60)

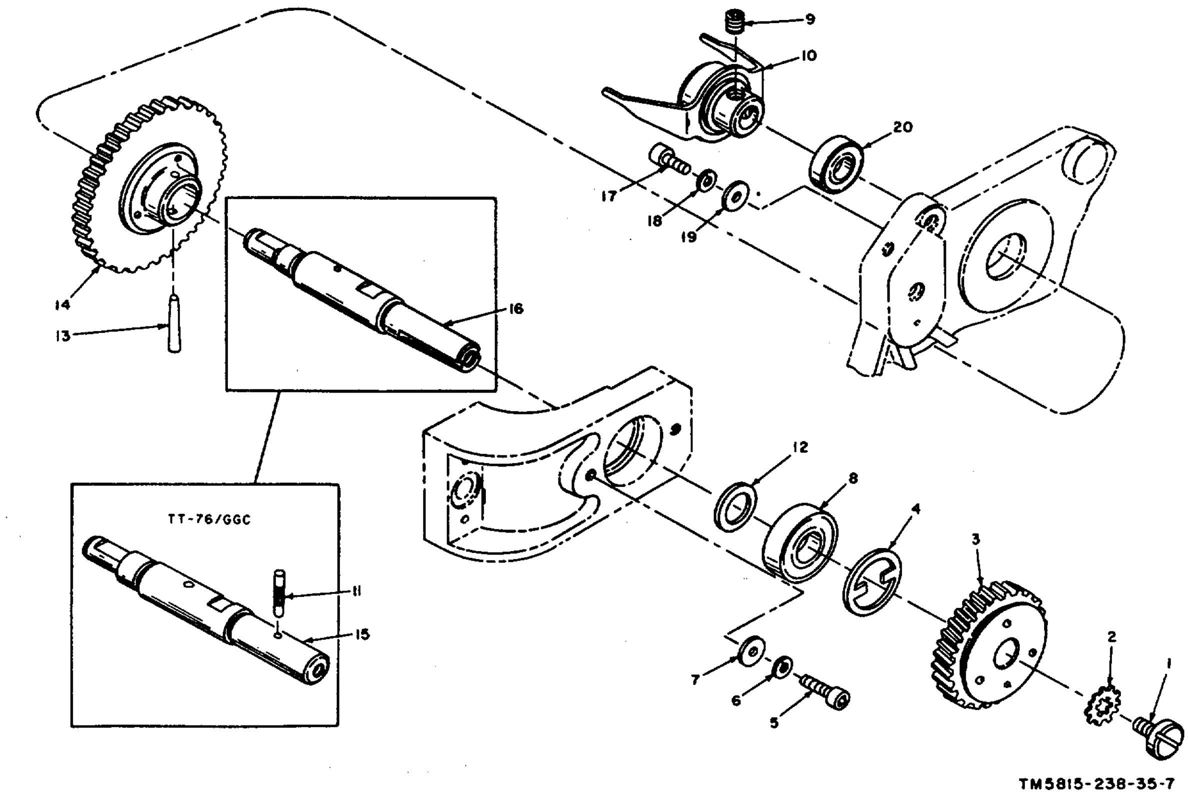
*a. Disassembly.*

(1) Remove the selector camshaft from the reperforator as described in paragraph 4-77a.

(2) On the TT-76/GGC, remove the machine screw (1) and lockwasher (2) that hold the main shaft driven gear (3) to the main shaft (15); remove the main shaft driven gear (3).

(3) On the TT-76A/GGC and later models, remove the machine screw (1) and lockwasher (2) that hold the main shaft driven gear (3) to the main. shaft (16); remove the main shaft driven gear (3) and gear key (4).

(4) Remove the two machine screws (5),lockwashers (6), and flat washers (7)




| | |
|---|---|
| 1 Machine screw, 50207 | 11 Gear pin, 50359 |
| 2 Lockwasher, 10406 | 12 Flat washer, 50746 |
| 3 Main shaft driven gear, 52513A | 13 Taper pin, 10852 |
| 4 Gear key, 54566 | 14 Function shaft driving gear, 50354A |
| 5 Machine screw, 10004 | 15 Main shaft, 52338 |
| 6 Lockwasher, 10429 | 16 Main shaft, 57142 |
| 7 Flat washer, 10450 | 17 Machine screw, 10004 |
| 8 Ball bearing, 10758 | 18 Lockwasher, 10429 |
| 9 Setscrew, 10209 | 19 Flat washer, 10450 |
| 10 Friction clutch drive assembly, 50484A | 20 Ball bearing, 10757 |

*Figure 4-60. Reperforator main shaft, exploded view.*

that hold the ball bearing (8) in the bearing bracket; remove the ball bearing (8).

(5) Remove the two setscrews (9) that hold the friction clutch drive assembly (10) to the main shaft; remove the friction clutch drive assembly (10) from the main shaft.

(6) (6) On the TT-76/GGC, remove the gear pin (11) from the main shaft (15); slide the flat washer (12) off the main shaft (15).

(7) On the TT-76A/GGC and later models, slide the flat washer (12) off the main shaft (16).

(8) Remove the taper pin (13) that holds the function shaft driving gear (14) to the main shaft; slide the main shaft to the rear of the reperforator and remove the function shaft driving gear (14) from the main shaft. Remove the main shaft from the bearing bracket.

(9) Remove the two machine screws (17), lockwashers (18), and flat washers (19) that hold the ball bearing (20) in the reperforator frame; remove the ball bearing (20).

*b. Reassembly.*

(1) Reassemble the main shaft by reversing the procedures outlined in a(9) through (2) above.

(2) Replace the selector camshaft on the reperforator as described in paragraph 4-77b.

**4-79. Disassembly and Reassembly of Power Shaft (TT-76/GGC)**

*a. Disassembly*.

(1) Remove the tape reel assembly from the reperforator as described in paragraph 4-43a(1) and (2).

(2) Remove the gear case cover (6, fig. 4-69) from the motor support as described in paragraph 4-70a(4).

(3) Remove the machine screw (1, fig. 4-61) and lockwasher (2) that hold the power shaft drive gear (3) to the power shaft (14); remove the power shaft drive gear (3).

(4) Remove the two machine screws (4), lockwashers (5), and flat washers (6) that hold the ball bearing (7) in the bearing bracket (22); remove the ball bearing (7).

(5) Remove the gear pin (8); slide the assembled power shaft (14) and drive gears (11) and (13) toward the bearing bracket (22) and remove the flat washer (9) from the power shaft (14).

(6) Remove the taper pin (10) that holds the keyboard shaft drive gear (11)to the power shaft (14); remove the keyboard shaft drive gear (11).

(7) Remove the taper pin (12) that holds the main shaft drive gear (13) to the power shaft (14); remove the main shaft drive gear (13).

(8) Remove the power shaft (14) by sliding it clear of the gear case and lifting it free of the bearing bracket (22, fig. 4-61)

(9) Remove the two machine screws (15), lockwashers (16), and flat washers (17) that hold the ball bearing (18) in the gear case; remove the ball bearing (18).

(10) Remove the two machine screws (19) and lockwashers (20) that hold the bearing bracket (22) to the reperforator frame; remove the bearing bracket (22). Remove the two taper pins (21) and shims (23 and 24).

*b. Reassembly.*

(1) Reassemble the power shaft by reversing the procedures outlined in a(10) through (3) above.

(2) Replace the gear case cover as described in paragraph 4-70b.

(3) Replace the tape reel assembly as described in paragraph 4-43b.

**4-80. Disassembly and Reassembly of Power Shaft (TT-76A/GGC below serial No. 525 on order No. 49651-Phila-56)**

*a. Disassembly.*

(1) Remove the tape reel assembly from

the reperforator as described in paragraph 4-44a.

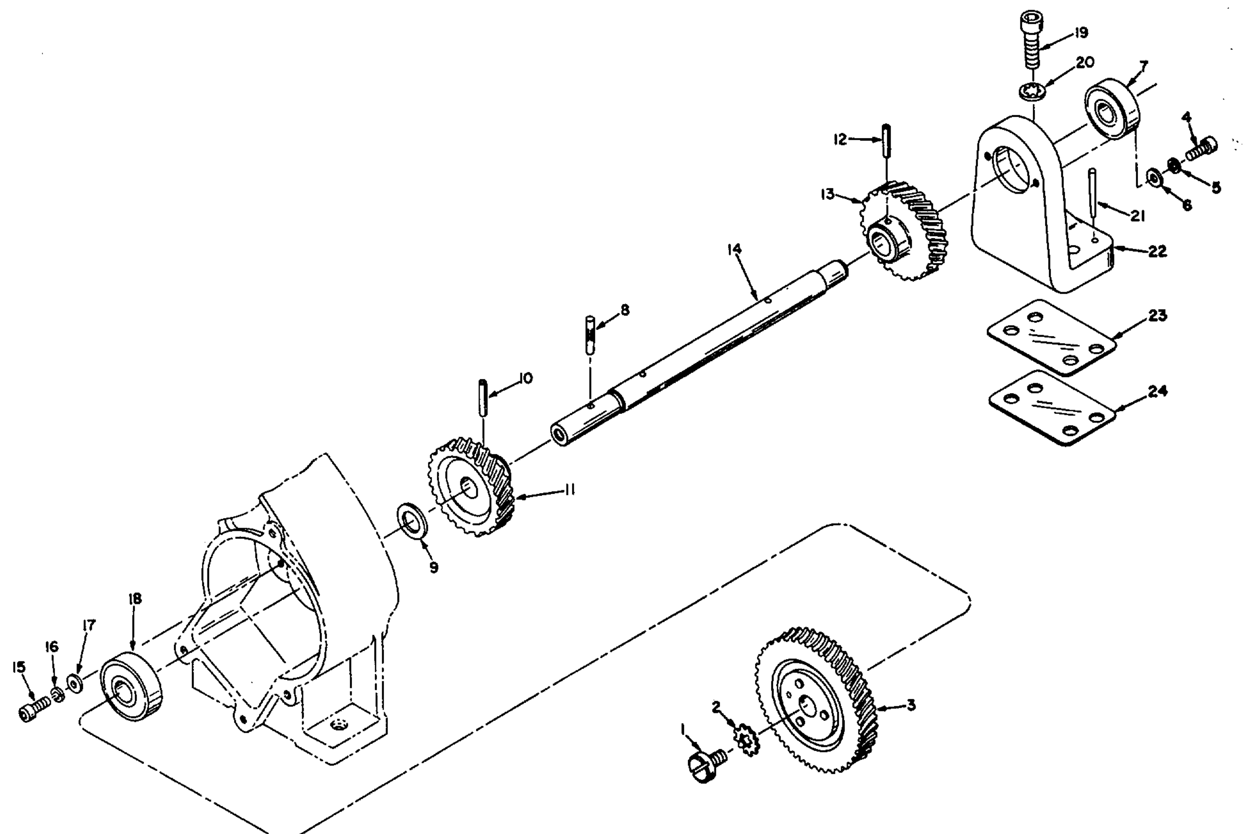
(2) Remove the gear case cover (6, fig. 4-69) from the motor support as described in paragraph 4-70a(3).

(3) Remove the machine screw (1, fig. 4-62) and lockwasher (2) that hold the power shaft drive gear (3) to the power shaft (18); remove the power shaft drive gear (3) and gear key (4).

(4) Remove the two machine screws (5),lockwashers (6), and flat washers (7) that hold the ball bearing (8) in the gear case; remove the ball bearing (8).

(5) Remove the two machine screws (9) and lockwashers (10) that hold the bearing cap (11) to the bearing bracket (22); remove the bearing cap (11) and slide the ball bearing (12) off the power shaft (18).

(6) Slide the assembled power shaft (18) and gears (15) and (17) toward the bearing bracket (22); remove the flat washer (13) from the power shaft (18).



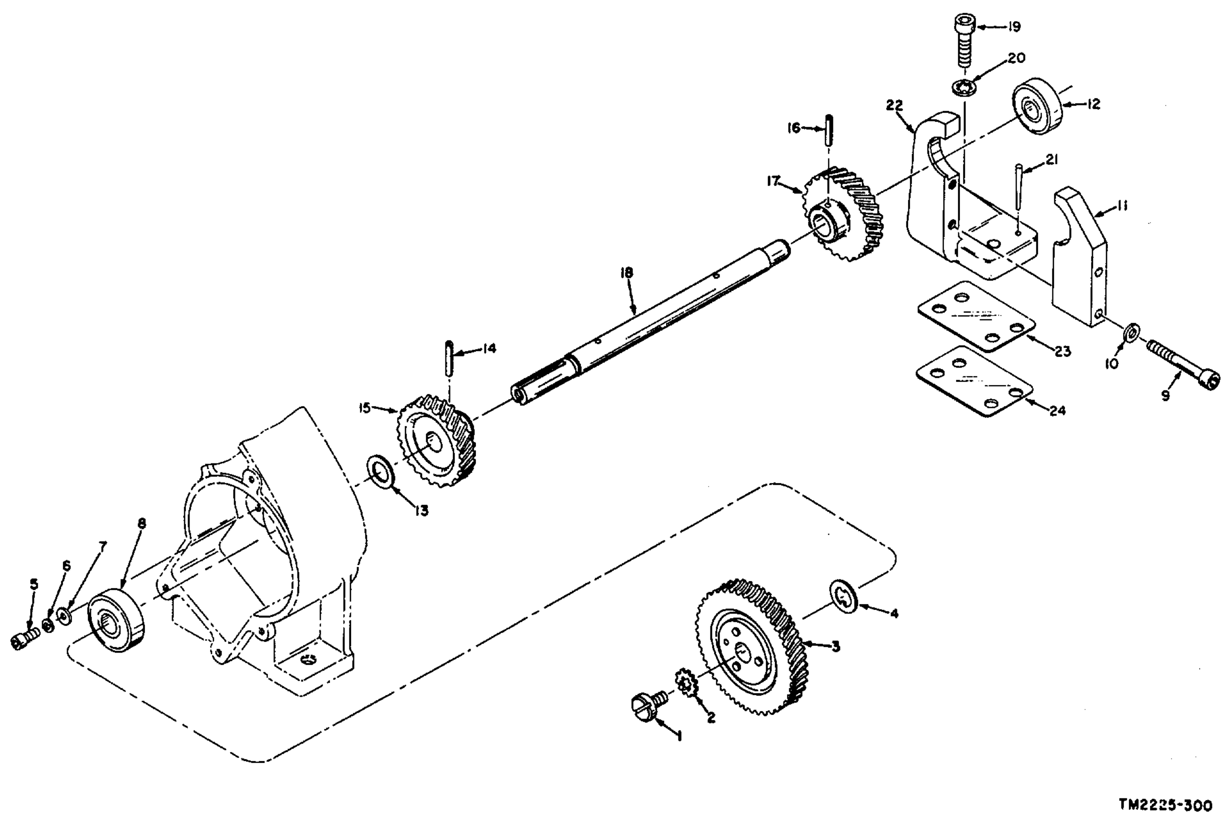

1 Machine screw, 50207
2 Lockwasher, 10406
3 Power shaft drive gear, 50352A
4 Machine screw, 10003
5 Lockwasher, 10429
6 Flat washer, 10450
7 Ball bearing, 10757
8 Gear pin, 50359
9 Flat washer, 50746
10 Taper pin, 10852
11 Keyboard shaft drive gear, 52510
12 Taper pin, 10852
13 Main shaft drive gear, 52509
14 Power shaft, 52518
15 Machine screw, 10003
16 Lockwasher, 10429
17 Flat washer, 10450
18 Ball bearing, 10758
19 Machine screw, 10018-01
20 Lockwasher, 10405
21 Taper pin, 10860
22 Bearing bracket, 52619
23 002-in. shim, 52502
24 005-in. shim, 52503

*Figure 4-61. Power shaft assembly, exploded view (TT-76/GGC).*

7) Tap out the gear pin (14) that holds the keyboard shaft drive gear (15) to the power shaft (18); remove the key board shaft drive gear (15)
8) Tape out the gear pin (16) that holds the main shaft drive gear (17) to the power shaft (18); remove the main shaft drive gear (17).
9) Remove the power shaft (18) by sliding it clear of the gear case and lifting it free of the bearing bracket (22).
10) Remove the two machine screws (19) and lockwashers (20) that hold the bearing bracket (22) to the reperforator frame; remove the bearing bracket (22). Tap out the two taper pins (21) and remove the shims (23 and 24).

*b. Reassembly.*

(1) Reassemble the power shaft by reversing the procedures outlined in a(10) through (3) above.
(2) Replace the gear case cover as described in paragraph 4-70b.
(3) Replace the tape reel assembly as described in paragraph 4-44b.




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Machine screw, 50207 | 9 | Machine screw, 10063 | 17 | Main shaft drive gear, 57223 |
| 2 | Lockwasher, 10406 | 10 | Lockwasher, 10430 | 18 | Power shaft, 57222 |
| 3 | Power shaft drive gear, 50352A | 11 | Bearing cap, 57230 | 19 | Machine screw, 10018 |
| 4 | Gear key, 54566 | 12 | Ball bearing, 10757 | 20 | Lockwasher, 10405 |
| 5 | Machine screw, 10003 | 13 | Flat washer, 50746 | 21 | Taper pin, 10860 |
| 6 | Lockwasher, 10429 | 14 | Gear pin, 11015 | 22 | Bearing bracket, 57228 |
| 7 | Flat washer, 10450 | 15 | Keyboard shaft drive gear, 57224 | 23 | . 002-in. shim, 52502 |
| 8 | Ball bearing, 10758 | 16 | Gear pin, 11015 | 24 | . 005-in. shim, 52503 |

*Figure 4-62. Power shaft assembly, exploded view (TT-76A/GGC below serial number 525 on order No. 49651-Phila-56).*

## 4-81. Disassembly and Reassembly of Power Shaft (TT-76A/GGC, Serial Numbers 525 and Above on Order No. 4965-Phila-56 and Subsequent Procurements)

*a. Disassembly.*

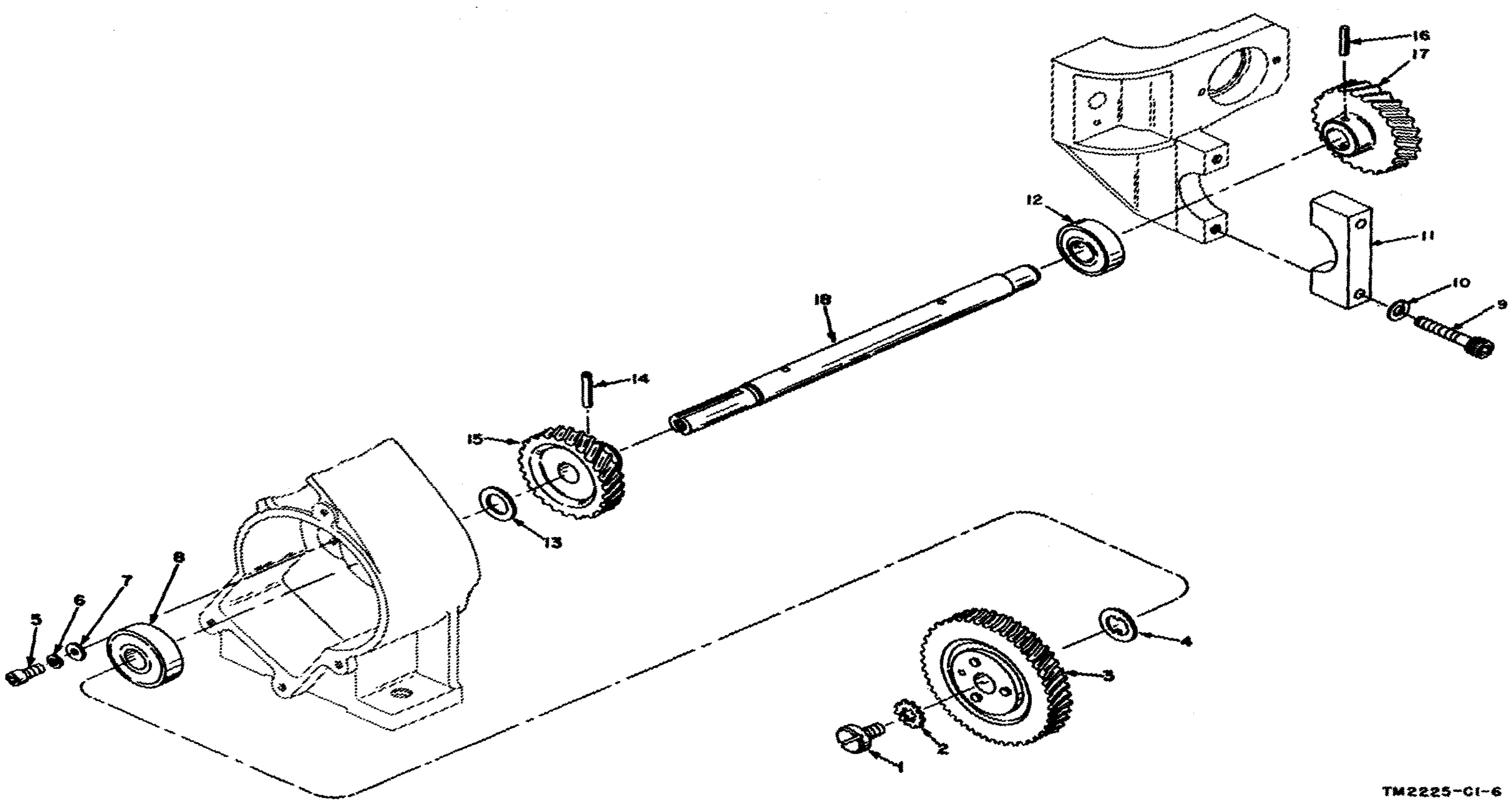
(1) Remove the tape reel assembly from the reperforator as described in paragraph 4-44a.
(2) Remove the gear case cover (6, fig. 4-70) from the motor support (45)
(3) Remove the machine screw (1, fig. 4-63) and lockwasher (2) that hold the power shaft drive gear (3) to the power shaft (18); remove the power shaft drive gear and gear key (4).
(4) Remove the two machine screws (5), that hold the ball bearing (8) in the gear case; remove the ball bearing.
(5) Remove the two machine screws (57, fig. 4-70) and lockwashers (58) that hold the bearing cap (59) to the bearing bracket (35). Remove the bearing cap.
(6) Remove the assembled power shaft from the bearing bracket and the motor support; remove the flat washer (13, fig. 4-63) from the power shaft.
(7) Tap out the gear pin (14) that holds the keyboard shaft drive gear (15) to the power shaft; remove the keyboard shaft drive gear and the ball bearing (12) from the power shaft.
(8) Tap out the gear pin (16) that holds the main shaft drive gear (17) to the power shaft; remove the main shaft drive gear.

*b. Reassembly*. Reassemble the power shaft as indicated in figure 4-63; the sequence for assembling the parts in the reverse of the disassembly sequence.

## 4-82. Disassembly and Reassembly of Keyboard-Transmitter Drive Shaft
(fig. 4-64)

*a. Disassembly*.

(1) Remove the transmitter-distributor chassis from the base as described in paragraph 4-11a.
(2) Remove the keyboard-transmitter the reperforator as described in paragraph 4-5a.
(3) On the TT-76/GGC, remove the two setscrews (1) that hold the friction clutch disk (3) to the keyboard-transmitter drive shaft (31). Remove the two setscrews (2) that hold the drive shaft collar (9) to the keyboard transmitter drive shaft (31). Remove the two setscrews (2) that hold the drive shaft collar (9) to the keyboard-transmitter drive shaft (31). Remove the friction clutch disk (3), friction plate (4), clutch driver plate (5), friction plate (6), friction clutch plate (7), friction clutch spring (8), and drive shaft collar (9) from the keyboard-transmitter drive shaft (31).
(4) On the TT-76A/GGC and later models, remove the setscrew (10) that holds the friction clutch disk (14) to the keyboard-transmitter drive shaft (31). Remove the two machine screws (11) that hold the friction adjusting collar (12) to the drive shaft collar (20); remove the friction adjusting collar (12). Remove the two setscrews (13) that hold the drive shaft collar (20) to the keyboard-transmitter drive shaft (31). Remove the friction clutch disk (14), friction plate (15), clutch drive plate (16), friction plate (17), friction clutch plate (18), friction clutch spring (19), and drive shaft collar (20) from the keyboard transmitter drive shaft (31).
(5) Remove the self-locking hexagonal nut (21), flat washer (22), and two setscrews (23) that hold the keyboard-transmitter shaft driven gear (24) to the keyboard-transmitter drive shaft (31); remove the keyboard- transmitter shaft driven gear (24).
(6) Remove the two machine screws (25), lockwashers (26), and flat washers (27) that hold the ball bearing (28) in




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Machine screw, 50207 | 6 | Lockwasher, 10429 | 11 | Bearing cap | 16 | Gear pin, 11015 |
| 2 | Lockwasher, 10406 | 7 | Flat washer, 10450 | 12 | Ball bearing, 10763 | 17 | Main shaft drive gear, 57223 |
| 3 | Power shaft drive gear, 50352A | 8 | Ball bearing, 107568 | 13 | Flat washer, 50746 | 18 | Power shaft, 57222 |
| 4 | Gear key, 54566 | 9 | Machine screw, 10067 | 14 | Gear pin, 11015 | | |
| 5 | Machine screw, 10003 | 10 | Lockwasher, 10430 | 15 | Keyboard shaft drive gear, 57224 | | |

*Figure 4-63. Power shaft assembly, exploded view (TT-76A/GGC, serial numbers 525 and above, on Order No. 49651-Phila-56 and subsequent procurements).*

the bearing support of the frame; remove the ball bearing (28).

(7) Remove the two setscrews (29) that hold the transmitter-distributor drive gear (30) to the keyboard transmitter drive shaft (31); remove the keyboard-transmitter drive shaft (31) catching the transmitter-distributor drive gear (30) as it falls free. Remove the flat washer (32).

(8) Remove the two machine screws (33), lockwashers (34), and flat washers(35), that hold the ball bearing (36) to the bearing bracket; remove the ball bearing (36).

*b. Reassembly.*

(1) Reassemble the keyboard-transmitter shaft by reversing the procedures outlined in a(8) through (3) above.

(2) Replace the keyboard-transmitter as described in paragraph 4-5b.

(3) Adjust the keyboard-transmitter drive shaft as described in paragraph 4-106 or 4-107.

(4) Replace the transmitter-distributor chassis on the base as described in paragraph 4-27b.

(5)

**4-83. Disassembly and Reassembly of Transmitter-Distributor Drive Shaft**
(fig. 4-65)

*a. Disassembly.*

(1) Remove the reperforator-transmitter chassis from the mounting base as described in paragraph 4-4a.

(2) Remove the transmitter-distributor from the reperforator-transmitter as described in paragraph 4-27a. (8)

(3) On the TT-76/GGC, remove the two setscrews (1) that hold the friction clutch disk (2) to the transmitter- distributor drive shaft (27). Remove the friction clutch disk (2), friction plate (8), clutch drive plate (4), friction plate (5), friction clutch plate (6), and friction clutch spring (7) from the transmitter-distributor drive shaft (27). Remove the two setscrews (8) that hold the drive shaft collar (9) to the transmitter-distributor drive shaft (27); remove the drive shaft collar (9).

(4) On the TT-76A/GGC and later models, remove the two setscrews (10) that hold the friction clutch disk (11) to the transmitter-distributor drive shaft (27). Remove the friction clutch disk (11), friction plate (12), clutch driver plate (13), friction plate (14), friction clutch plate (15), and friction clutch spring (16) from the transmitter-distributor drive shaft (27). Remove the two machine screws (17) that hold the friction adjusting collar (18) to the drive shaft collar (20); remove the two halves of the friction adjusting collar (18). Remove the two setscrews (19) that hold the drive shaft collar (20) to the transmitter-distributor drive shaft (27); remove the drive shaft collar (20).

(5) Remove the two machine screws (21), lockwashers (22), and flat washers (23) that hold the ball bearing (28) in the bearing bracket.

(6) Remove the two setscrews (24) that hold the transmitter-distributor driven gear (25) to the transmitter-distributor drive shaft (27). Slide the transmitter-distributor drive shaft to the left, catching the transmitter-distributor driven gear (25) as it falls free; remove the bearing (26) from the transmitter-distributor drive shaft.

(7) Remove the bearing (28) from the bearing support.

*b. Reassembly.*

(1) Reassemble the transmitter-distribute or drive shaft by reversing the procedures outlined in a (7) through (3) above.

(2) Replace the transmitter-distributor as described in paragraph 4-27b

(3) Adjust the transmitter-distributor drive shaft as described in paragraphs 4-221 and 4-222

(4) Replace the reperforator-transmitter chassis on the base as described in paragraph 4-4b.

**4-84. Disassembly and Reassembly of Motor Suppression Filter Unit (TT-76/GGC)** (fig. 4-66)

*a. Disassembly.*

(1) Remove the reperforator-transmitter from the base as described in paragraph 4-4a.

(2) Remove the four machine screws (1) and lockwashers (2) that hold the cover (3) to the mounting studs (6); remove the cover (3).

(3) Disconnect the electrical leads to and from the filter box.

(4) Remove the four lockwashers (4), mounting studs (5), and lockwashers

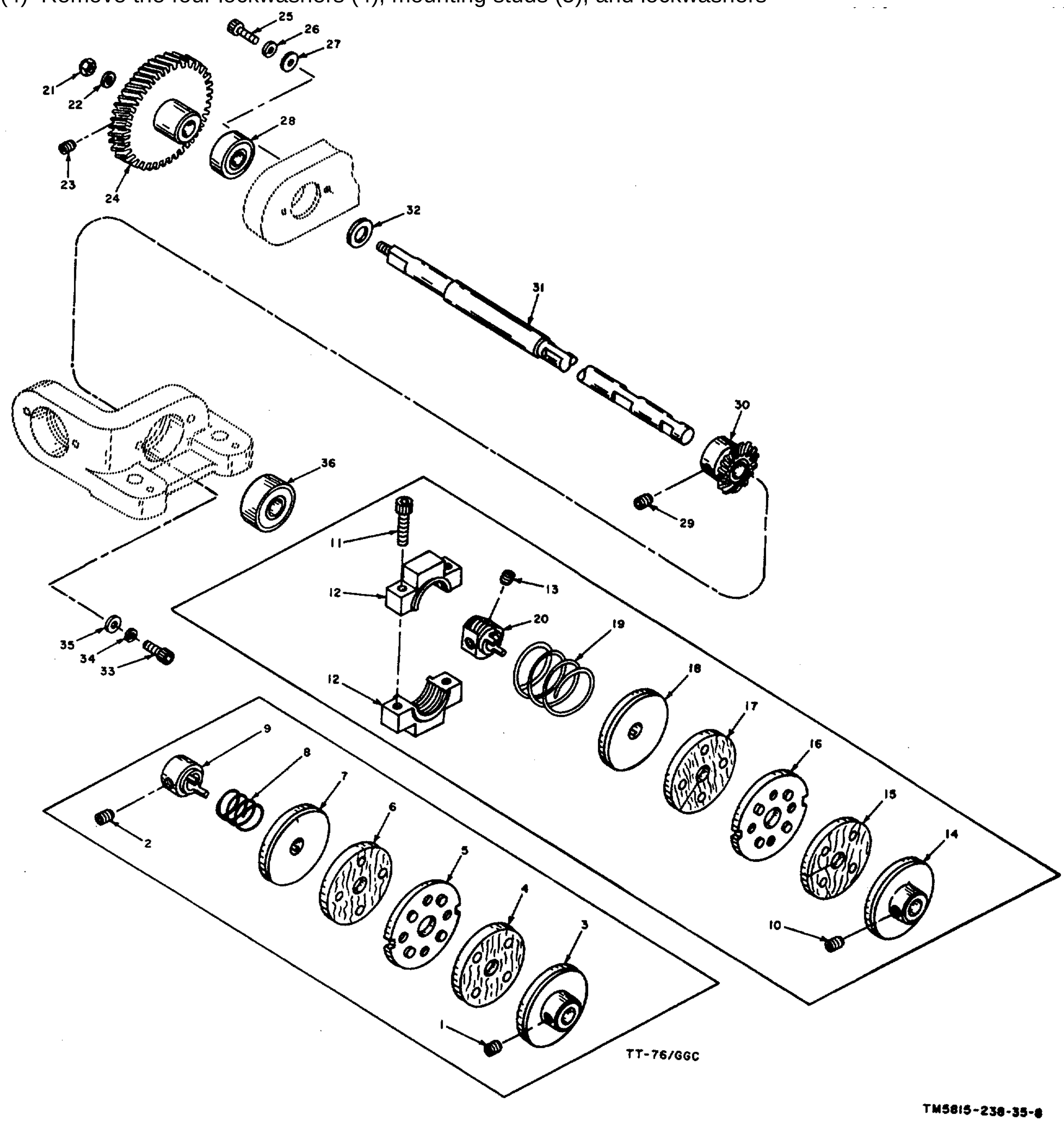



*Figure 4-64. Keyboard-transmitter drive shaft, exploded view.*

(6) that hold the filter box assembly (49) to the reperforator frame; remove the assembled filter box assembly (49) and electrical components.

(5) Remove the plain hexagonal nuts (7 and 14), lockwashers (8 and 15), terminal lugs (9 and 16), lockwashers (10 and 17), machine screws (11 and 18), lockwashers (12 and 19), and terminal lug (13) that attach the capacitor (20) to the bracket on the filter box assembly (49); remove the capacitor (20).

(6) (6) Remove the two machine screws (21) and lockwashers (22) that hold the terminal board (23) to the filter box assembly (49); remove the terminal board (23).

(7) Remove the plain hexagonal nut (24),lockwasher (25), and resistor mounting stud (26) that hold the resistor (28) to the brackets on the filter box assembly (49); remove the centering washer (27), resistor (28), and centering washer (29).

(8) Remove the two machine screws (30) and lockwashers (31) that hold the terminal board (32), to the filter box assembly (49); remove the terminal board (32).

(9) Remove the two plain hexagonal nuts (33), lockwashers (34), machine screws (35), and lockwashers (36) that hold the filter (37) to the filter assembly (49); remove the filter (37).

(10) Remove the two machine screws (38) and lockwashers (39) that hold the terminal board (42) to the filter box assembly (49); remove the terminal board (42).

(11) Remove the two machine screws (40) that hold the jumper (41) to the terminal board (42); remove the jumper (41).

(12) Remove the two plain hexagonal nuts (43), lockwasher (44), machine screws (45), and lockwashers (46) that hold the capacitor (47) to the bracket on the filter box assembly (49); remove the capacitor (47). (13) Remove the grommet (48) from the filter box assembly (49).

*b. Reassembly.*

(1) Reassemble the motor suppression filter unit by reversing the procedures outlined in a(13) through (4) above.

(2) Reconnect all electrical leads that have been disconnected and coat the electrical components with fungus resistant compound.

(3) Replace the reperforator-transmitter as described in paragraph 4-4b.

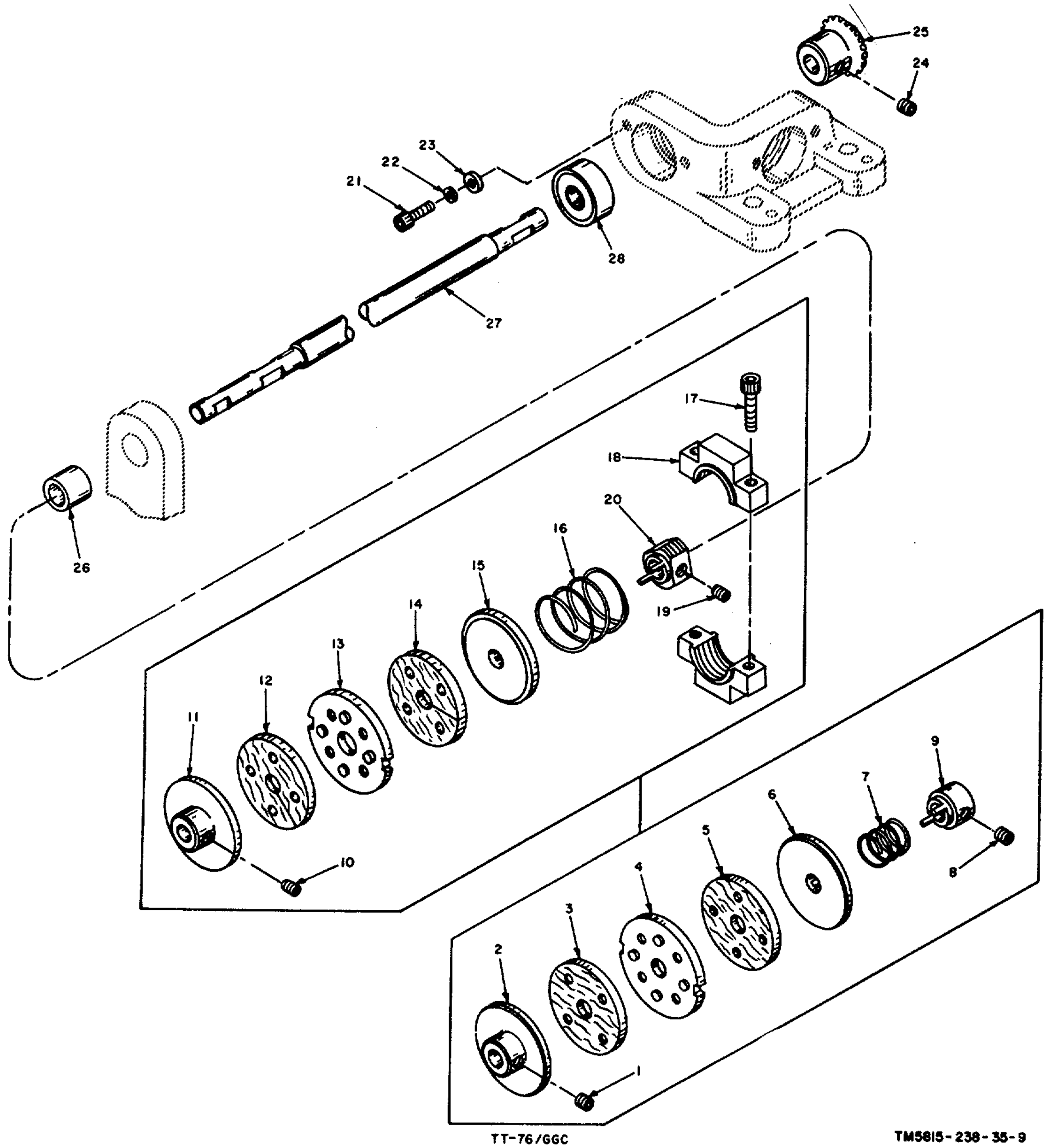
**4-85. Disassembly and Reassembly of Motor Suppression Filter Unit (TT-76A/GGC and Later Models)** (fig. 4-67)

*a. Disassembly.*

(1) Remove the reperforator-transmitter

| | | | |
|---|---|---|---|
| 1 | Setscrew, 10209 | 19 | Friction clutch spring, 54932 |
| 2 | Setscrew, 10209 | 20 | Drive shaft collar, 54928 |
| 3 | Friction clutch disk, 50200 | 21 | Self-locking hexagonal nut, 10501 |
| 4 | Friction plate, 50013 | 22 | Flat washer, 10467 |
| 5 | Clutch driver plate, 51117 | 23 | Setscrew, 10209 |
| 6 | Friction plate, 50013 | 24 | Keyboard-transmitter shaft driven gear 52505A |
| 7 | Friction clutch plate, 50198 | 25 | Machine screw, 10003 |
| 8 | Friction clutch spring, 50914 | 26 | Lockwasher, 10429 |
| 9 | Drive shaft collar, 50199 | 27 | Flat washer, 10450 |
| 10 | Setscrew, 10209 | 28 | Ball bearing, 10753 |
| 11 | Machine screw, 10005 | 29 | Setscrew, 10209 |
| 12 | Friction adjusting collar, 56381 | 30 | Transmitter-distributor gear set, 63389A |
| 13 | Setscrew, 10208 | 31 | Keyboard-transmitter drive shaft, 52515 |
| 14 | Friction clutch disk, 50200 | 32 | Flat washer, 50494 |
| 15 | Friction plate, 56765 | 33 | Machine screw, 10429 |
| 16 | Clutch driver plate, 51117 | 34 | Lockwasher, 10429 |
| 17 | Friction plate, 56765 | 35 | Flat washer, 10450 |
| 18 | Friction clutch plate, 54931 | | |
| 36 | Ball bearing, 10761 | | |

*Figure 4-64. - Continued*




| | | | |
|---|---|---|---|
| 1 | Setscrew, 10209 | 15 | Friction clutch plate, 54931 |
| 2 | Friction clutch disk, 50200 | 16 | Friction clutch spring, 54932 |
| 3 | Friction plate, 56765 | 17 | Machine screw, 10005 |
| 4 | Clutch driver plate, 51117 | 18 | Friction adjusting collar, 56381 |
| 5 | Friction plate, 56765 | 19 | Setscrew, 10208 |
| 6 | Friction clutch plate, 50198 | 20 | Drive shaft collar, 54928 |
| 7 | Friction clutch spring, 50914 | 21 | Machine screw, 10003 |
| 8 | Setscrew, 10209 | 22 | Lockwasher, 10429 |
| 9 | Drive shaft collar, 50199 | 23 | Flat washer, 10450 |
| 10 | Setscrew, 10209 | 24 | Setscrew, 10209 |
| 11 | Friction clutch disk, 50200 | 25 | Transmitter-distributor gear set, 63389A |
| 12 | Friction plate, 56765 | 26 | Bearing, 10717 |
| 13 | Clutch driver plate, 51117 | 27 | Transmitter-distributor drive shaft, 52514 |
| 14 | Friction plate, 56765 | 28 | Ball bearing, 10761 |

*Figure 4-65. Transmitter-distributor drive shaft, exploded view.*

from the base as described in paragraph 4-4a.

(2) Remove the four machine screws (1) and lockwashers (2) that hold the cover (3) to the mounting studs (5); remove the cover (3).

(3) Disconnect all electrical leads to and from the filter box.

(4) Remove the four lockwashers (4), mounting studs (5), and lockwashers (6) that hold the filter box (30) to the reperforator frame; remove the assembled filter box (30) and electrical components.

(5) Remove the two self-locking hexagonal nuts (7) and machine screws (8) that hold the terminal board (9) to the filter box (30); remove the terminal board (9) and the terminal marker strip (10).

(6) Remove the plain hexagonal nut (11), lockwasher (12), and resistor mounting stud (13) that hold the resistor (15) to the brackets on the filter box (30); remove the centering washer (14), resistor (15), and centering washer (16).

(7) Remove the four self-locking hexagonal nuts (17) and machine screws (18) that hold the filter (19) to the filter box (30); remove the filter (19) and the four lockwashers (20).

(8) Remove the two self-locking hexagonal nuts (21) and machine screws (22) that hold the capacitor (23) to the filter box (30); remove the capacitor '(23).

(9) Remove the two self-locking hexagonal nuts (24) and machine screws (25) that hold the terminal board (26) to the filter box (30); remove the terminal board (26) and terminal marker strip (27).

(10) Remove the grommets (28 and 29) from the filter box (30).

*b. Reassembly.*

(1) Reassemble the motor suppression unit by reversing the procedures outlined in a(l) through (4) above.

(2) Reconnect all electrical leads (fig. 6-5) that have been disconnected and coat the electrical components with fungus resistant compound.

(3) Replace the reperforator-transmitter on the base as described in paragraph 4-4b.

**4-86. Disassembly and Reassembly of Reperforator Frame (TT-76/GGC)**

*a. Disassembly.*

(1) Remove the reperforator-transmitter chassis from the base as described in paragraph 4-4a.

(2) Remove the keyboard-transmitter as described in paragraph 4-5a.

(3) Remove the transmitter-distributor as described in paragraph 4-27a.

(4) Remove the power supply and terminal unit as described in paragraph 4-39a.

(5) Remove the tape reel as described in paragraph 4-43a(1) and (2).

(6) Remove the selector magnet and terminal board cover (11, fig. 4-68) as described in paragraph 4-46a(1) and (2).

(7) Remove the rangefinder as described in paragraph 4-48a(1) and (2).

(8) Remove the manual tape feed-out mechanism as described in paragraph 4-50a(1) through (6).

(9) Remove the ribbon supply group as described in paragraph 4-51a.

(10) Remove the front support frame as described in paragraph 4-55a.

(11) Remove the Y-levers and selector levers as described in paragraph 4-62a.

(12) Remove the type wheel reciprocating mechanism as described in paragraph 4-65a.

(13) Remove the function sensing mechanism as described in paragraph 4-66a(2) through (7).

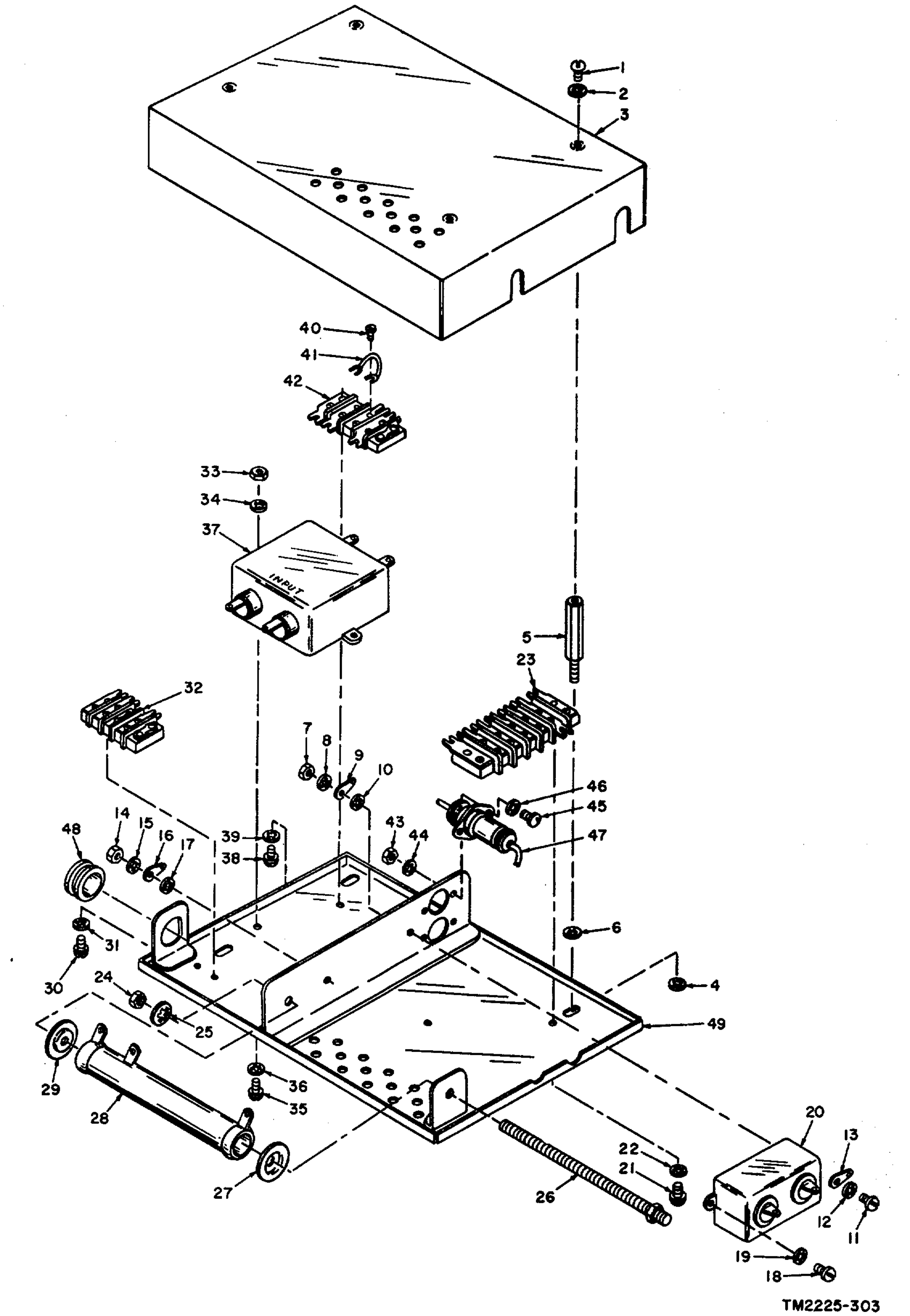



*Figure 4-66. Motor suppression filter unit, exploded view (TT-76/GGC).*

(14) Remove the code-ring cage as described in paragraph 4-67a(6) and (7).
(15) Remove the transfer lever shaft as described in paragraph 4-69a.
(16) Remove the motor as described in paragraph 4-70a.
(17) Remove the function shaft as described in paragraph 4-75a.
(18) Remove the selector camshaft as described in paragraph 4-77a.
(19) Remove the main shaft as described in paragraph 4-78a.
(20) Remove the power shaft as described in paragraph 4-79a.
(21) Remove the keyboard-transmitter drive shaft as described in paragraph 4-82a.
(22) Remove the transmitter-distributor drive shaft as described in paragraph 4-83a.
(23) Remove the motor suppression filter unit as described in paragraph 4-84a (1) through (4).
(24) If the alternate power shaft drive gear (5) is needed, remove the cotter pin (4) that holds gear (5) to the gear case cover (6). Remove the worm. gear (8) by extracting the cotter pin (7) that holds the gear (8) to the worm gear bracket (9).
(25) Remove the terminal board cover (11) and disconnect the terminal leads from the power cable (15, fig. 4-73) at the terminal board (14, fig. 4-68). Remove the two machine screws (13) that hold the terminal board (14) to the selector frame of the reperforator (39); remove the terminal board (14) and terminal marker strip (15).
(26) Remove the two machine screws and lockwashers (18) that hold the detents (19) to the selector frame of the reperforator (39); remove the detents (19). Remove the two selector-magnet adjusting screws (20).
(27) Remove the four machine screws (21) and lockwashers (22) that hold the assembled selector and rear frames (39) and (50) to the base frame (74); remove the assembled selector and rear frames (39 and 50).
(28) Remove the three machine screws (23) and lockwashers (24) that hold the selector frame (39) and rear frame (50) together separate the two frames.
(29) Remove the retainer ring (25) that holds the spring guide (26) to the selector frame (39); remove the spring guide (26) and the spring (27).

| | | | |
|---|---|---|---|
| 1 | Machine screw, 10308 | 26 | Resistor mounting stud, 56220A |
| 2 | Lockwasher, 10403 | 27 | Centering washer, 10456 |
| 3 | Cover, 51654 | 28 | Resistor, 51628 |
| 4 | Lockwasher, 10406 | 29 | Centering washer, 10456 |
| 5 | Mounting stud, 51058 | 30 | Machine screw, 10301 |
| 6 | Lockwasher, 10404 | 31 | Lockwasher, 10402 |
| 7 | Plain hexagonal nut, 10511 | 32 | Terminal board, 20359A |
| 8 | Lockwasher, 10403 | 33 | Plain hexagonal nut, 10511 |
| 9 | Terminal lug, 20735 | 34 | Lockwasher, 10403 |
| 10 | Lockwasher, 10403 | 35 | Machine screw, 10301 |
| 11 | Machine screw, 10308 | 36 | Lockwasher, 10403 |
| 12 | Lockwasher, 10403 | 37 | Filter, 20210 |
| 13 | Terminal lug, 20735 | 38 | Machine screw, 10301 |
| 14 | Plain hexagonal nut, 10511 | 39 | Lockwasher, 10402 |
| 15 | Lockwasher, 10403 | 40 | Machine screw |
| 16 | Terminal lug, 20735 | 41 | Jumper, 53254A |
| 17 | Lockwasher, 10403 | 42 | Terminal board, 20358 (includes item 48) |
| 18 | Machine screw, 10308 | 43 | Plain hexagonal nut, 10511 |
| 19 | Lockwasher, 10403 | 44 | Lockwasher, 10403 |
| 20 | Capacitor, 20200 | 45 | Machine screw, 10301 |
| 21 | Machine screw, 10301 | 46 | Lockwasher, 10403 |
| 22 | Lockwasher, 10402 | 47 | Capacitor, 20208 |
| 23 | Terminal board, 20360 | 48 | Grommet, 21000 |
| 24 | Plain hexagonal nut, 10516 | 49 | Filter box assembly, 51647A |
| 25 | Lockwasher, 10404 | | |

*Figure 4-66. -Continued.*

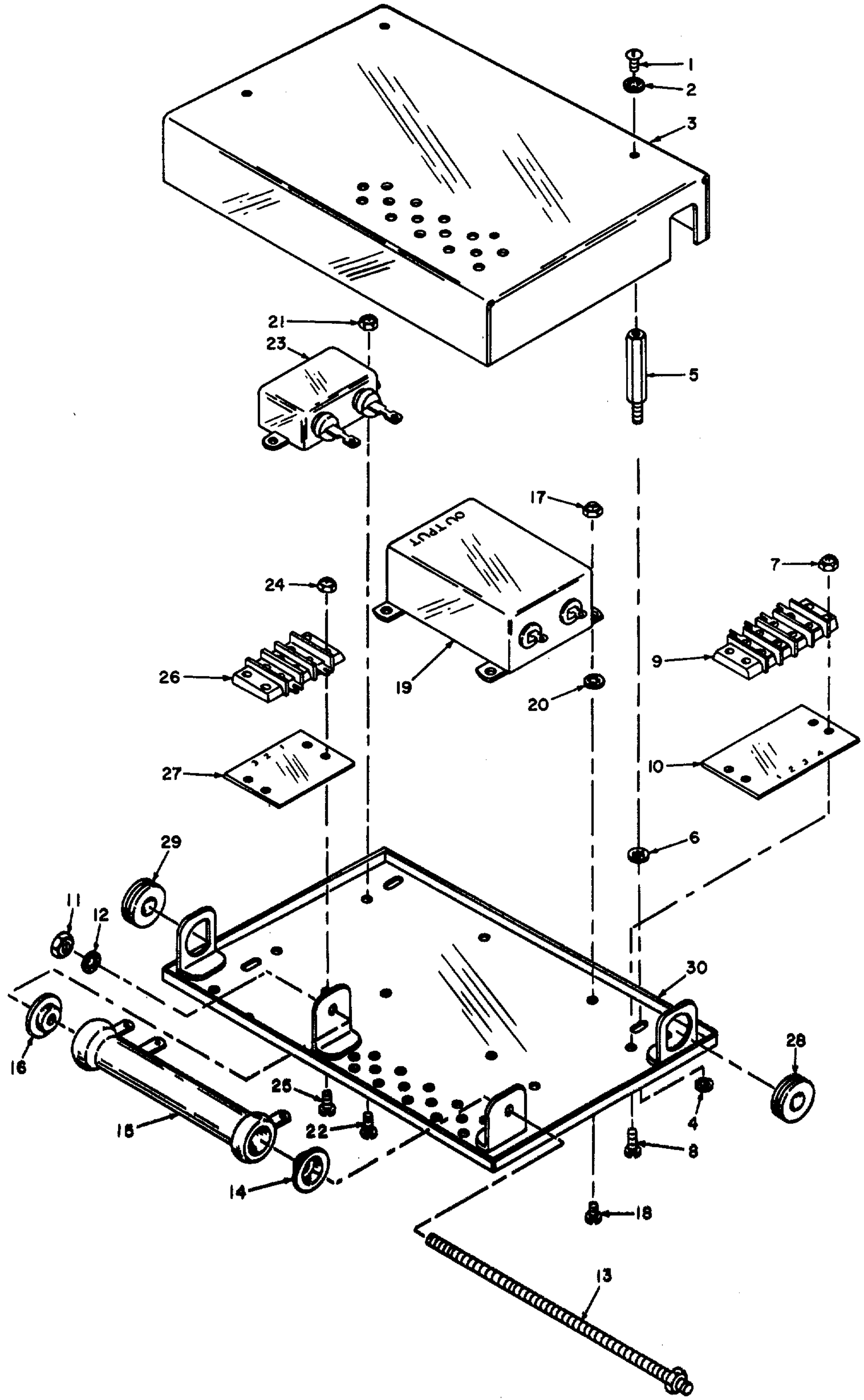



*Figure 4-67. Motor suppression filter unit, exploded view (TT-76A/GGC and later models).*

(30) Remove the self-locking hexagonal nut (28) and setscrew (29) from the selector frame (39). Remove the springs posts (30 and 31) and the bearings (32, 33, and 34) if any of these parts need to repaired or replaced.

(31) Remove the machine screw (35) lockwashers (36 and 37), and the cable clamp (38) from the selector frame (39).

(32) Remove the machine screw (40) and lockwasher (41) that hold the signal bell (42) to the rear frame (50); remove the signal bell (42).

(33) Remove the machine screw (43) and lockwasher (44) and two taper pins (45) that hold the bearing bracket (46) to the rear frame (50); remove the bearing bracket (46).

(34) Remove the jack (47), taper pin (48) and bearing (49) from the rear frame (50).

(35) Remove the three machine screws (51) and lockwashers (52) that hold the motor support (63) to the base frame (74); remove the shims (53 and 54) and the motor support (63) from the base frame (74). Remove the stud (55) from the motor support (63).

(36) Remove the plain hexagonal nut (56) lockwasher (57), and cable clamp (58) from the banana plug (59); remove the banana plug (59) from the jack (62). Remove the plain hexagonal nut (60) and lockwasher (61) that hold the jack (62) in the motor support (63); remove the jack (62).

(37) Remove the four machine screws (64), grommets (65), grounding straps (66), and lockwashers (67) from the base frame (74).

(38) Remove the two machine screws (68) and lockwashers (69) that hold the bearing bracket (70) to the base frame (74); remove the bearing bracket (70). (39) Remove the taper pins (71, 72, and 73) from the base frame if they are damaged.

*b. Reassembly.*

Note. If any of the spring posts, pins, or studs are loose or damaged, they must be replaced. Support the frame near the post to be removed to prevent damage to the frame. Press new posts in at right angles to the plane of the frame. Replace a frame that has worn threads, enlarged holes, or is otherwise damaged.

(1) Reassemble the reperforator frame by reversing the procedures outlined in *a*(39) through (24) above.

(2) Replace the motor suppression filter unit as described in paragraph 4-84*b*.

(3) Replace the transmitter-distributor drive shaft as described in paragraph 4-83*b*.

| | | | |
|---|---|---|---|
| 1 | Machine screw, 10308 | 16 | Centering washer, 10456 |
| 2 | Lockwasher, 10408 | 17 | Self-locking hexagonal nut, 10500 |
| 3 | Cover, 57237 | 18 | Machine screw, 10106 |
| 4 | Lockwasher, 10406 | 19 | Filter, 54581 |
| 5 | Mounting stud, 51058 | 20 | Lockwasher, 10408 |
| 6 | Lockwasher, 10404 | 21 | Self-locking hexagonal nut, 10500 |
| 7 | Self-locking hexagonal nut, 10540 | 22 | Machine screw, 10106 |
| 8 | machine screw 10109 | 23 | Capacitor, 20214 |
| 9 | Terminal board, 20868 | 24 | Self-locking hexagonal nut, 10540 |
| 10 | Terminal marker strip, 20388 | 25 | Machine screw 10109 |
| 11 | Plain hexagonal nut, 10516 | 26 | Terminal board, 20398 |
| 12 | Lockwasher, 10430 | 27 | Terminal marker strip, 20883 |
| 13 | Resistor mounting stud, 56220A | 28 | Grommet, 21000 |
| 14 | Centering washer, 10456 | 29 | Grommet, 21000 |
| 15 | Resistor. 51628 (TT-76A/GGC), 59994 (TT-76B/GGC) | 30 | Filter box, 57238A |

*Figure 4-67. -Continued.*

(4) Replace the keyboard-transmitter drive shaft as described in paragraph 4-82*b*.
(5) Replace the power shaft as described in paragraph 4-79*b*.
(6) Replace the main shaft as described in paragraph 4-78*b*.
(7) Replace the selector camshaft as described in paragraph 4-77*b*
(8) Replace the function shaft as described in paragraph 4-75*b*.
(9) Replace the motor as described in paragraph 4-70*b*.
(10) Replace the transfer lever shaft as described in paragraph 4-69*b*.
(11) Replace the code-ring cage as described in paragraph 4-67*b*(1) and (2)
(12) Replace the function sensing mechanism as described in paragraph 4-66*b*.
(13) Replace the type wheel reciprocating mechanism as described in paragraph 4-65*b*.

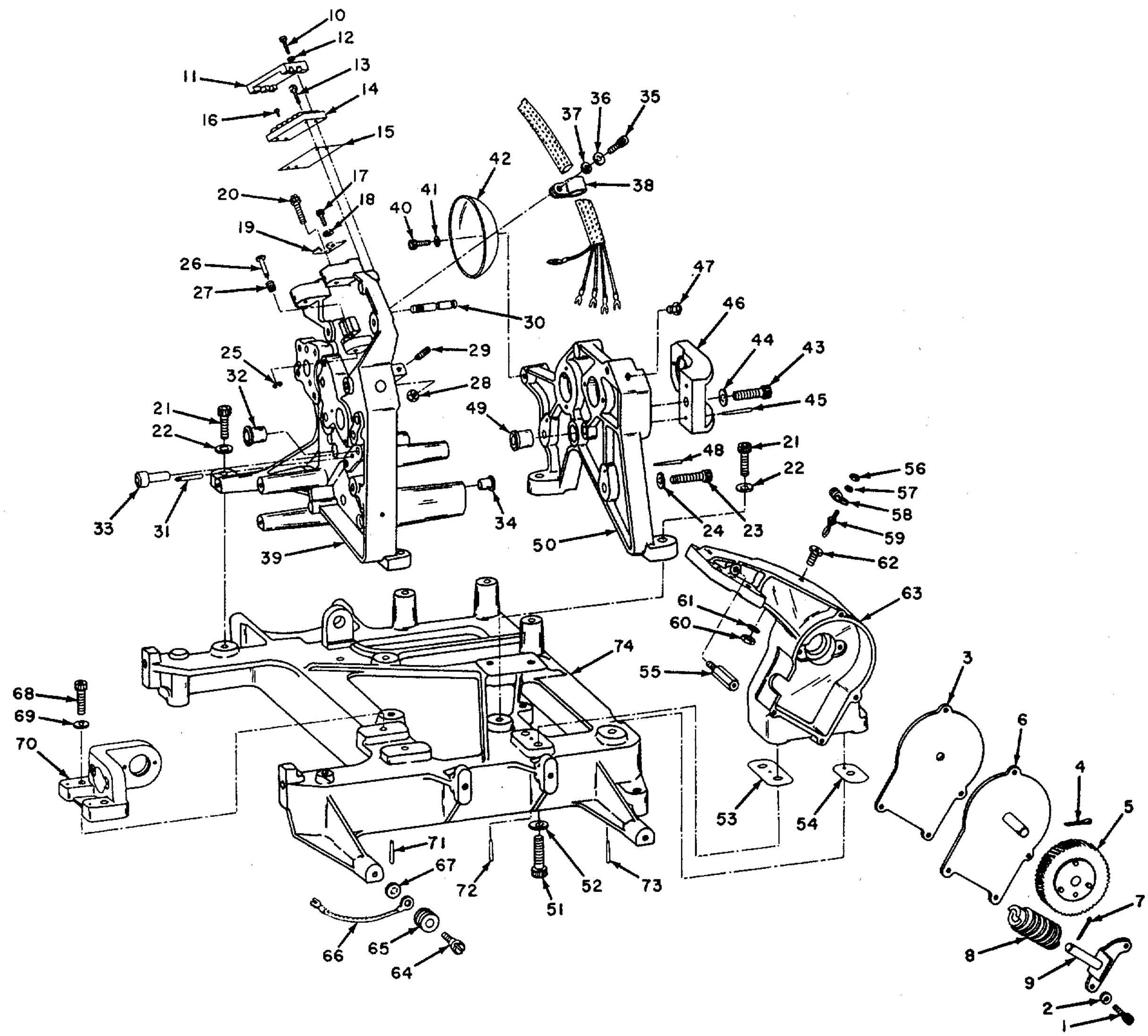



*Figure 4-68. Reperforator frame assembly, exploded view (TT-76/GGC).*

(14) Replace the selector Y-levers and selector levers as described in paragraph 4-62b.
(15) Replace the front support frame as described in paragraph 4-55b.
(16) Replace the ribbon supply group as described in, paragraph 4-51b.
(17) Replace the manual tape feed-out mechanism as described in paragraph 4-50b.
(18) Replace the rangefinder as described in paragraph 4-48b.
(19) Replace the selector magnet and terminal board cover (11) as described in paragraph 4-46b(6) through (8).
(20) Replace the tape reel as described in paragraph 4-43b.
(21) Replace the power supply and terminal unit as described in paragraph 4-39b.
(22) Replace the transmitter-distributor as described in paragraph 4-27b.
(23) Replace the keyboard-transmitter as described in paragraph 4-5b.
(24) Replace the reperforator-transmitter chassis on the mounting base as described in paragraph 4-4b.

**4-87. Disassembly and Reassembly of Reperforator Frame (TT-76A/GGC and Later Models)** (fig. 4-69)

*a. Disassembly.*

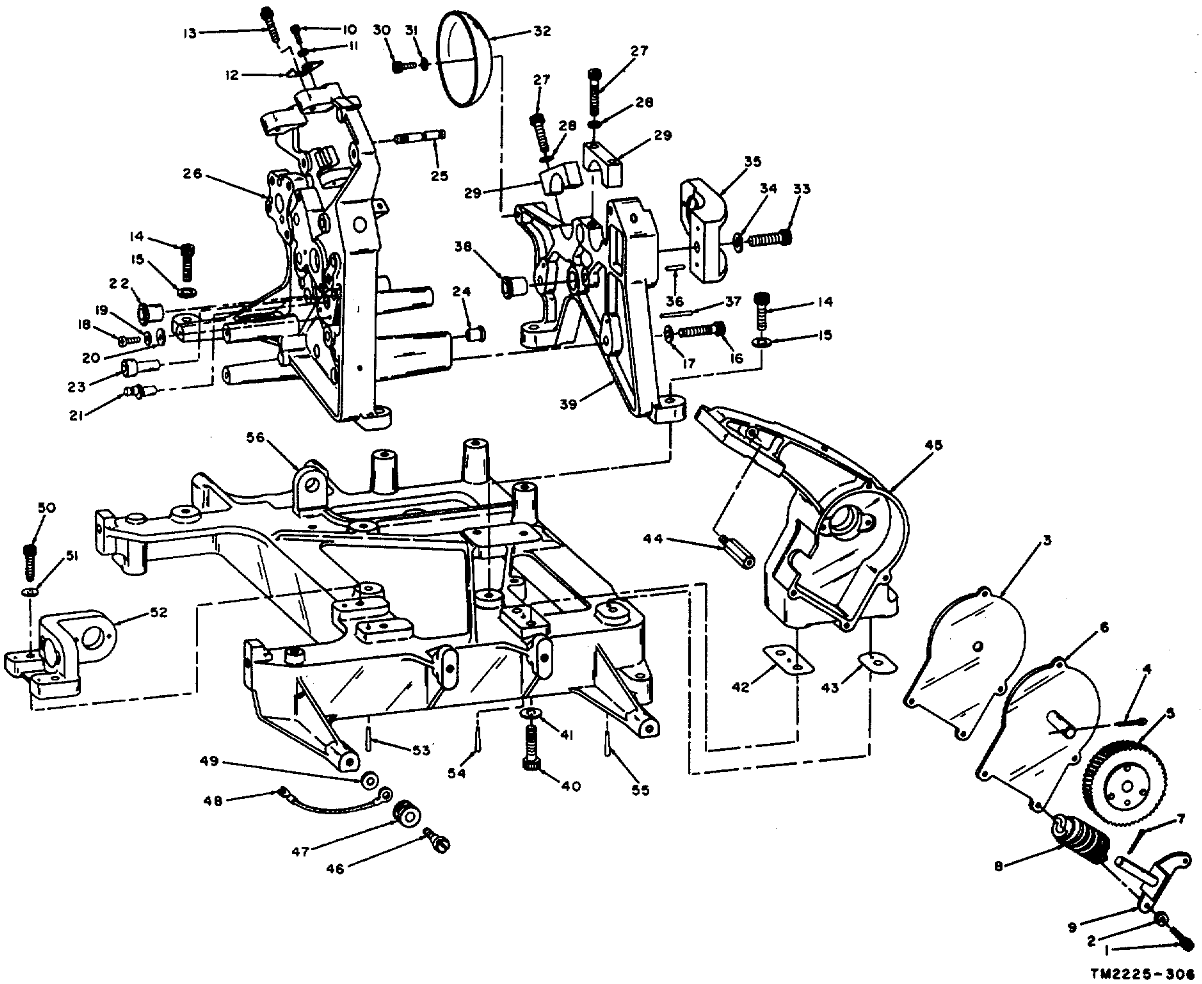
(1) Remove the reperforator-transmitter from the mounting base as described in paragraph 4-4a.
(2) Remove the keyboard-transmitter as described in paragraph 4-5a.
(3) Remove the transmitter-distributor as described in paragraph 4-27a.

---

1 Machine screw, 10004
2 Lockwasher, 10429
3 Gasket, 50725
4 Cotter pin, 10805
5 Spare power shaft drive gear 50597A
6 Gear case cover, 50853A
7 Cotter pin, 10805
8 Spare worm gear, 50596
9 Gear bracket, 50858A
10 Machine screw, 10044
11 Terminal board cover, 53653
12 Lockwasher, 10432
13 Machine screw, 10043
14 Terminal board, 20375
15 Terminal marker strip, 20381
16 Machine screw, 10362
17 Machine screw, 10004
18 Lockwasher, 10429
19 Detent, 52687
20 Selector magnet adjusting screw, 52688
21 Machine screw, 10035
22 Lockwasher, 10405
23 Machine screw, 10035-01
24 Lockwasher, 10405
25 Retainer ring, 10981
26 Spring guide, 53099
27 Spring, 52188
28 Self-locking hexagonal nut, 10501
29 Setscrew, 10207
30 Spring post, 53451
31 Spring post, 50326
32 Bearing, 10708
33 Bearing, 52137
34 Bearing, 10716
35 Machine screw, 10008-01
36 Lockwasher, 10404
37 Lockwasher, 10430
38 Cable clamp, 20513
39 Frame, 52497
40 Machine screw, 10008
41 Lockwasher, 10430
42 Signal bell, 51080
43 Machine screw, 10021-01
44 Lockwasher, 10400
45 Taper pin, 10860
46 Bearing bracket, 52341
47 Jack, 20827
48 Taper pin, 10860
49 Bearing, 10708
50 Frame, 52499
51 Machine screw, 10021
52 Lockwasher, 10400
53 . 002-in. shim, 52310 or 52311
54 . 005-in. shim, 52312 or 52313
55 Stud, 52537
56 Plain hexagonal nut, 10521
57 Lockwasher, 10402
58 Cable clamp, 20513
59 Banana plug, 20826
60 Plain hexagonal nut, 10502
61 Lockwasher, 10400
62 Jack, 20827
63 Motor support, 52626A
64 Machine screw, 52701
65 Grommet, 52254
66 Grounding strap, 53907A
67 Lockwasher, 10405
68 Machine screw, 10018-01
69 Lockwasher, 10405
70 Bearing bracket, 52618
71 Taper pin, 10860
72 Taper pin, 10859
73 Taper pin, 10859
74 Frame, 52546A

*Figure 4-68. -Continued*

(4) Remove the power supply and terminal unit as described in paragraph 4-42a.
(5) Remove the tape reel as described in paragraph 4-44a.
(6) Remove the tape puller mechanism as described in paragraph 4-45a(1).




1 Machine screw, 10004
2 Lockwasher, 10429
3 Gasket, 50725
4 Cotter pin, 10805
5 Spare power shaft drive gear, 50597A
6 Gear case cover, 50853A
7 Cotter pin, 10805
8 Spare worm gear, 50596
9 Worm gear bracket, 50858A
10 Machine screw, 10004
11 Lockwasher, 10429
12 Detent, 52687
13 Selector magnet adjusting screw, 56288
14 Machine screw, 10035
15 Lockwasher, 10405
16 Machine screw, 10035-01
17 Lockwasher, 10405
18 Machine screw, 55511
19 Lockwasher, 10429
20 Flat washer, 50839
21 Spring post, 56076
22 Bearing, 10708
23 Bearing, 52137
24 Bearing, 10716
25 Spring post, 52451
26 Frame, 57152A
27 Machine screw, 10012
28 Lockwasher, 10430
29 Bearing cap, 57150
30 Machine screw, 10008
31 Lockwasher, 10430
32 Signal bell, 51080
33 Machine screw, 10021-01
34 Lockwasher, 10400
35 Bearing bracket, 52341
36 Taper pin, 10932
37 Taper pin, 10860
38 Bearing, 10708
39 Frame, 57146A
40 Machine screw, 10021
41 Lockwasher, 10400
42 . 002-in. shim, 52310 or 52811
43 . 005-in. shim, 52312 or 52313
44 Stud, 52537
45 Motor support, 52626A
46 Machine screw, 52701
47 Grommet, 52254
48 Grounding strap, 53907A
49 Lockwasher, 10405
50 Machine screw, 10018-01
51 Lockwasher, 10405
52 Bearing bracket, 52618
53 Taper pin, 10860
54 Taper pin, 10859
55 Taper pin, 10859
56 Frame, 52546A

*Figure 4-69. Reperforator frame assembly (TT-76A/GGC below serial number 525 on Order No. 49651-Phila-56).*

(7) Remove the selector magnet as described in paragraph 4-47a(1).
(8) Remove the range finder as described in paragraph 4-49a(1).
(9) Remove the manual tape feed-out mechanism as described in paragraph 4-50a(1) through (6).
(10) Remove the ribbon supply group as described in paragraph 4-51a.
(11) Remove the front support frame as described in paragraph 4-55a.
(12) Remove the Y-levers and selector levers as described in paragraph 4-63a.
(13) Remove the type wheel reciprocating mechanism as described in paragraph 4-65a.
(14) Remove the function sensing mechanism as described in paragraph 4-66a(2) through (7).
(15) Remove the code-ring cage as described in paragraph 4-67a(6) and (7).
(16) Remove the transfer lever shaft as described in paragraph 4-69a.
(17) Remove the motor as described in paragraph 4-70a.
(18) Remove the function shaft as described in paragraph 4-76a.
(19) Remove the selector camshaft as described in paragraph 4-77a.
(20) Remove the main shaft as described in paragraph 4-78a.
(21) Remove the power shaft as described in. paragraph 4-80a for TT-76/GGC or TT-76A/GGC below serial number 525 and paragraph 4-81a for TT-76A/GGC, serial numbers 525 and above, on Order No. 49651-Phila-56 and subsequent procurements.
(22) Remove the key-board transmitter drive shaft as described in paragraph 4-82a.
(23) Remove the transmitter-distributor drive shaft as described in paragraph 4-83a.
(24) Remove the motor suppression filter unit as described in paragraph 4-85a(1) through (4).
(25) If the alternate power shaft drive gear (5) is needed, remove the cotter pin (4) that holds the gear (5) to the gear case cover (6). Remove the alternate worm gear (8) by extracting the cotter pin (7) that holds the worm gear to the worm gear bracket (9).
(26) Remove the two machine screws (10) and lockwashers (11) that hold the detents (12) to the selector frame (26); remove the detents (12). Remove the selector magnet adjusting screws (13).
(27) Remove the four machine screws (14) and lockwashers (15) that hold the assembled selector and rear frames (26 and 39) to the base frame (56); remove the assembled selector and rear frames (26 and 39).
(28) Remove the three machine screws (16) and lockwashers (17) that hold the selector frame (26) to the rear frame (39); separate the two frames.
(29) Remove the adjusting machine screw (18), lockwasher (19), flat washer (20), spring post (21), bearings (22), (23), and (24), and spring post (25) from the selector frame (26) if any of these parts need to be repaired or replaced.
(30) Remove the machine screw (30) and lockwasher (31) that hold the signal bell (32) to the rear frame (39); remove the signal bell (32).
(31) Remove the machine screw (33) and lockwasher (34) that hold the bearing bracket (35) to the rear frame (39); remove the bearing bracket (35).
(32) Remove the pins (36 and 37) and the bearing (38) from the rear frame (39).
(33) Remove the three machine screws (40) and lockwashers (41) that hold the motor support (45) to the base frame (56); remove the shims (42 and 43)

and the motor support (45) from the base frame (56). Remove the stud (44) from the motor support (45).

(34) Remove the four machine screws (46), grommets (47), grounding straps (48), and lockwashers (49) from the base frame (56).

(35) Remove the two machine screws (50) and lockwashers (51) that hold the bearing bracket (52) to the base frame (56); remove the bearing bracket (52).

(36) Remove the pins (53, 54, and 55) from the base frame if they are damaged.

*b. Reassembly.*

*Note*. If any of the spring posts, pins, or studs are loose or damaged, they must be replaced. Support the frame near the post to be removed to prevent damage to the frame. Press new posts in at right angles to the

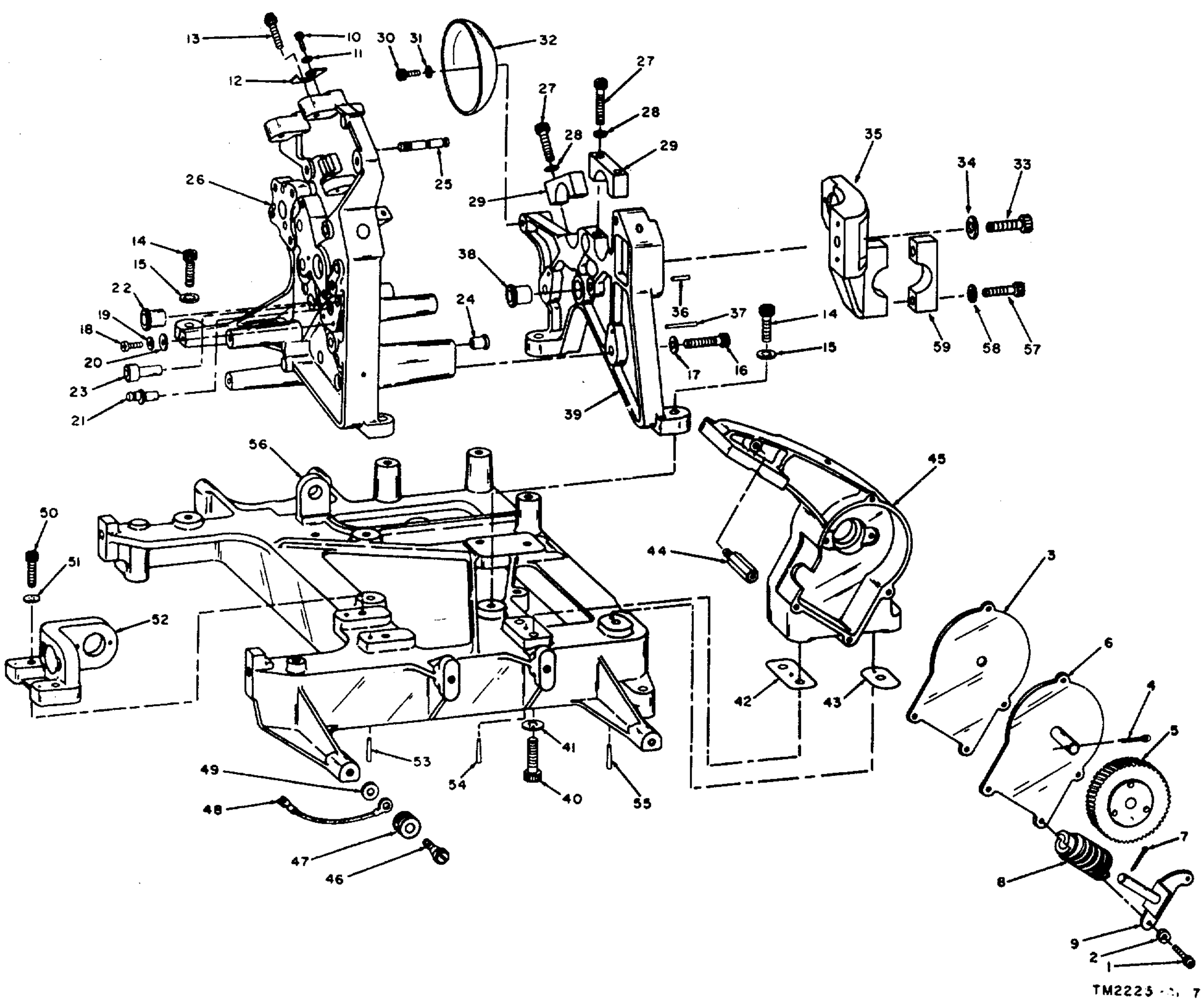


*Figure 4-70. Reperforator frame assembly (TT-76A/GGC, serial numbers 525 and above, on Order No. 49651-Phila-56 and subsequent procurements).*

plane of the frame. Replace a frame that has worn threads, enlarged holes, or is otherwise damaged.

(1) Reassemble the reperforator frame by reversing the procedures outlined in a(36) through (25) above.
(2) Replace the motor filter suppression unit as described in paragraph 4-85b.
(3) Replace the transmitter-distributor drive shaft as described in paragraph 4-83b.
(4) Replace the keyboard-transmitter drive shaft as described in paragraph 4-82b.
(5) Replace the power shaft as described in paragraph 4-80b for TT-76/GGC or TT-76A/GGC below serial number 525 and paragraph 4-81b for TT-76A/GGC, serial numbers 525 and above on Order No. 49651-Phila-56 and subsequent procurements.
(6) Replace the main shaft as described in paragraph 4-78b.
(7) Replace the selector camshaft as described in paragraph 4-77a.
(8) Replace the function shaft as described in paragraph 4-76b.
(9) Replace the motor as described in paragraph 4-70b.
(10) Replace the transfer lever shaft as described in paragraph 4-69b.
(11) Replace the code-ring cage as described in paragraph 4-67b.
(12) Replace the function sensing mechanism as described in paragraph 4-66b.
(13) Replace the type wheel reciprocating mechanism as described in paragraph 4-65b.
(14) Replace the Y-levers and selector levers as described in paragraph 4-63b.
(15) Replace tile front support frame as described in paragraph 4-55b.
(16) Replace the ribbon supply group as described in paragraph 4-52b.
(17) Replace the manual tape feed-out mechanism as described in paragraph 4-50b.
(18) Replace the rangefinder as described in paragraph 4-49b.

1 Machine screw, 10004
2 Lockwasher, 10429
3 Gasket, 50725
4 Cotter pin, 10805
5 Spare power shaft drive gear, 50597A
6 Gear case cover, 50853A
7 Cotter pin, 10805
8 Spare worm gear, 50596
9 Worm gear bracket, 50858A
10 Machine screw, 10004
11 Lockwasher, 10429
12 Detent, 52687
13 Selector magnet adjusting screw, 56288
14 Machine screw, 10035
15 Lockwasher, 10405
16 Machine screw, 10035-01
17 Lockwasher, 10405
18 Machine screw, 55511
19 Lockwasher, 10429
20 Flat washer, 50839
21 Spring post, 56076
22 Bearing, 10708
23 Bearing, 52137
24 Bearing, 10716
25 Spring post, 52451
26 Frame, 57152A
27 Machine screw, 10012
28 Lockwasher, 10430
29 Bearing cap, 57150
30 Machine screw, 10008
31 Lockwasher, 10430
32 Signal bell, 51080
33 Machine screw, 10021-01
34 Lockwasher, 10400
35 Bearing bracket, 59400
36 Taper pin, 10932
37 Taper pin, 10860
38 Bearing, 10708
39 Frame, 57146A
40 Machine screw, 10021
41 Lockwasher, 10400
42 .002-in. shim, 52310 or 52311
43 .005-in. shim, 52312 or 52313
44 Stud, 52537
45 Motor support 52636A
46 Machine screw, 52701
47 Grommet, 52254
48 Grounding strap, 53907A
49 Lockwasher, 10405
50 Machine screw, 10018-01
51 Lockwasher, 10405
52 Bearing bracket, 52618
53 Taper pin, 10860
54 Taper pin, 10859
55 Taper pin, 10859
56 Frame, 52546
57 Machine screw, 10067
58 Lockwasher, 10430
59 Bearing cap

*Figure 4-70. -Continued*

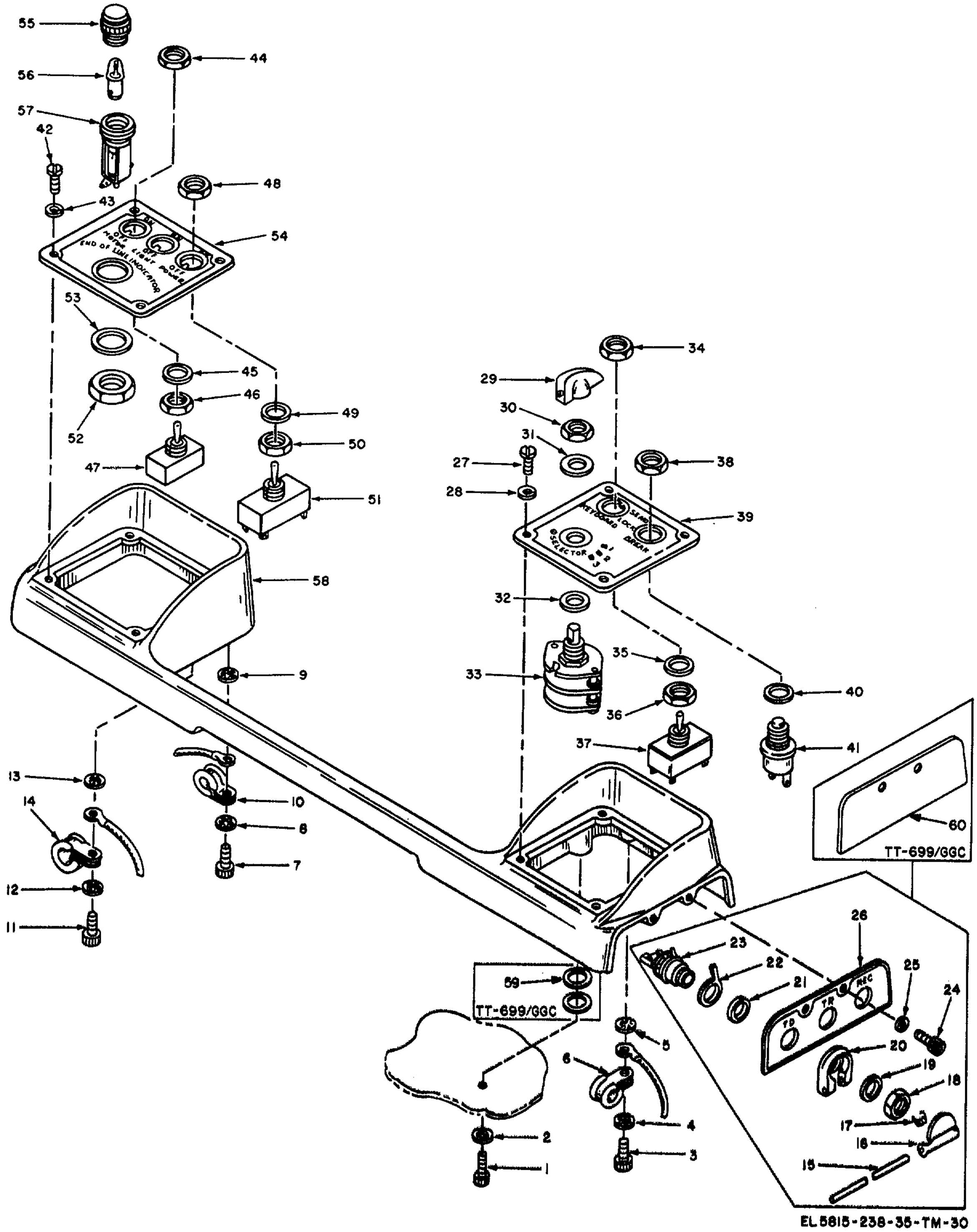



*Figure 4-71. Keyboard guard assembly, exploded view (TT-76/GGC and TT-699/GGC).*

(19) Replace the selector magnet as described in paragraph 4-47*b*.
(20) Replace the tape puller mechanism as described in paragraph 4-45*b*.
(21) Replace the tape reel as described in paragraph 4-44*b*.
(22) Replace the power supply and terminal unit as described in paragraph 4-42*b*.
(23) Replace the transmitter-distributor as described in paragraph 4-27*b*.
(24) Replace the keyboard-transmitter as described in paragraph 4-5*b*.
(25) Replace the reperforator-transmitter chassis on the mounting base as described in paragraph 4-4.

**4-88. Removal and Replacement of Keyboard Guard Assembly (TT-76/GGC and TT-699/GGC)**
(fig. 4-71)

*a. Removal.*
(1) Remove the two machine screws (1) and lockwashers (2) that hold the keyboard guard (58) to the mounting base.
(2) Remove the machine screw (3) and lockwasher (4) that hold the cable clamp (6) and electrical terminal lug to the right side of the keyboard guard (58); remove the cable clamp (6), electrical terminal lug, and lockwasher (5).
(3) Remove the machine screws (7 and 11) and lockwashers (8 and 12) that hold the cable clamps (10 and 14) and electrical terminal lugs to the left side of the keyboard guard (58); remove the cable clamps (10 and 14), electrical terminal lugs, and lockwashers (9 and 13).
(4) Unsolder and disconnect al electrical wire leads from terminals on the switches, connectors, and indicator lamp mounted on the keyboard guard (58).
(5) Remove the keyboard guard assembly from the reperforator base.

*b. Replacement*. Replace the keyboard guard assembly by reversing the procedures outlined in a above.

1 Machine screw, 10024
2 Lockwasher, 10405
3 Machine screw, 10008-01
4 Lockwasher, 10404
5 Lockwasher, 10404
6 Cable clamp, 20514
7 Machine screw, 10008-01
8 Lockwasher, 10404
9 Lockwasher, 10404
10 Cable clamp, 20513
11 Machine screw, 1008-01
12 Lockwasher, 10404
13 Lockwasher, 10404
14 Cable clamp, 10514
15 Jack guard shaft, 52652[a]
16 Jack guard door, 52320[a]
17 Jack guard door spring, 52579[a]
18 Plain hexagonal nut[a]
19 Flat washer, 10465[a]
20 Jack guard, 52672[a]
21 Flat washer[a]
22 Terminal lug[a]
23 Jack (J9, J10 and J11), 20777 (includes items 18, 21, 22)[a]
24 Machine screw, 10008[a]
25 Lockwasher, 10430[a]
26 Jack plate, 52635[a]
27 Machine screw, 10393
28 Lockwasher, 10429
29 Selector switch knob, 20704
30 Plain hexagonal nut, 10529
31 Flat washer, 10468
32 Flat washer, 10465
33 Selector switch (S9), 20107 (TT-76/GGC)[b]
34 Plain hexagonal nut
35 Flat washer, 10466
36 Plain hexagonal nut
37 Keyboard switch (S10), 20122 (includes items 34 and 36)
38 Plain hexagonal nut
39 Selector switch plate
40 Flat washer, 10466
41 Break switch S8, 20101 (includes item 38)
42 Machine screw, 12393
43 Lockwasher, 10429
44 Plain hexagonal nut
45 Flat washer, 10466
46 Plain hexagonal nut
47 Motor switch (S3), 20119 (includes items 44 and 46)
48 Plain hexagonal nut
49 Flat washer, 10466
50 Plain hexagonal rut
51 Power switch (S5), 30115 (includes items 48 and 50)
52 Plain, hexagonal nut
53 Flat washer
54 Power switch plate, 52634
55 Indicator lamp jewel, 20771
56 Indicator lamp (12), 20791
57 Indicator lamp bracket, 20790 (includes items 52 and 53)
58 Keyboard guard, 52495
59 Flat washer, MS15795-808 (No. 10)
60 Cover plate, SM-C-785969

[a] Not applicable to TT-699/GGC.
[b] For TT-699/GGC-selector switch, SM-C-785981.

*Figure 4-71. -Continued.*

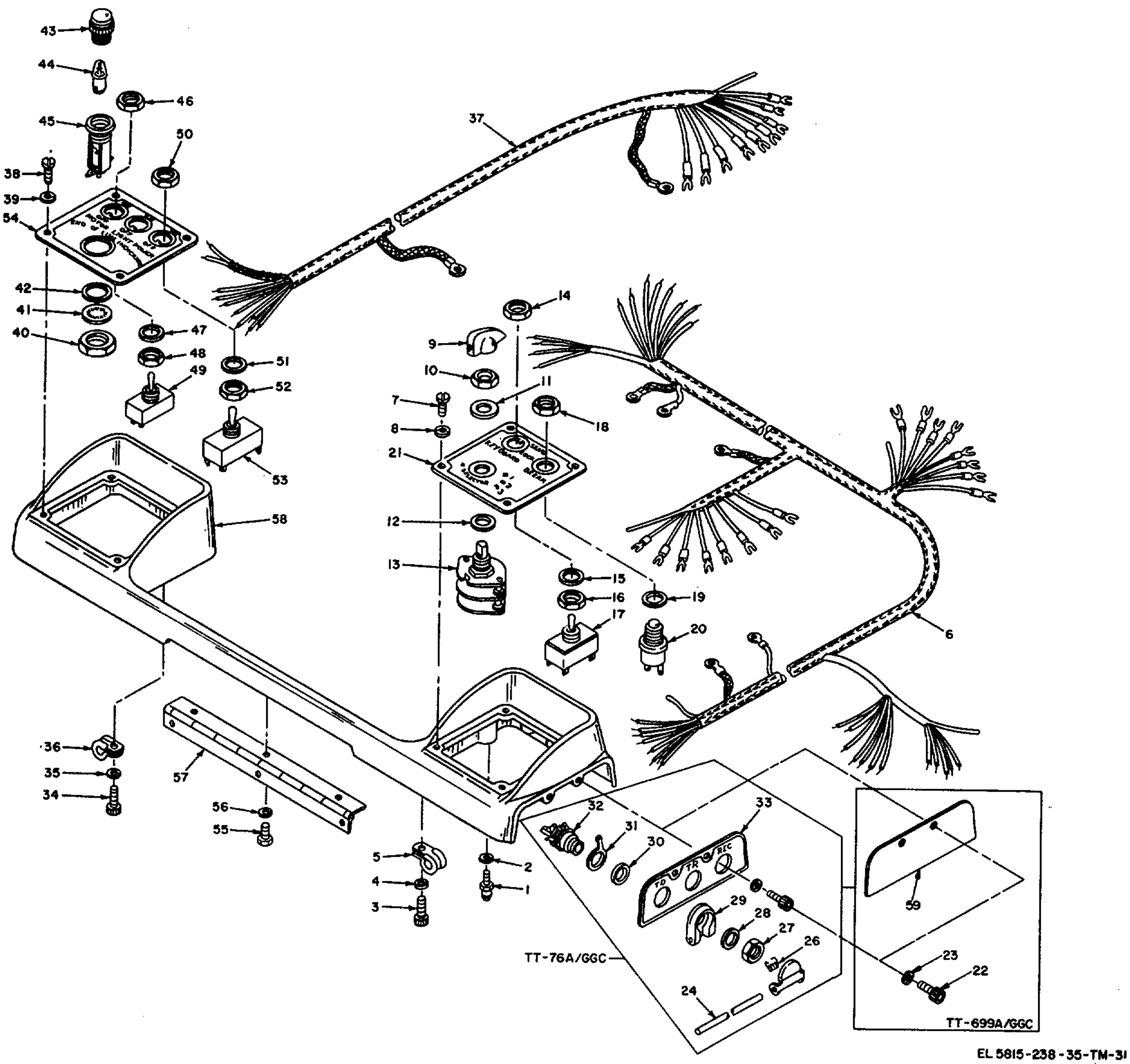



*Figure 4-72. Keyboard guard assembly, exploded view (TT-76A/GGC, TT-699A/GGC and later models).*

Key to fig. 4-72.

1 Ball catch, 57253
2 Lockwasher, 10426
3 Machine screw, 10008-01
4 Lockwasher, 10430
5 Cable clamp, 20514
6 Selector cable assembly 57246A
7 Machine screw, 10393
8 Lockwasher, 10429
9 Selector switch knob, 20704
10 Plain hexagonal nut, 10529
11 Flat washer, 10468
12 Flat washer, 10465
13 Selector switch, 20107, (20142 for TT-76A GGC, serial numbers 670 and above, on Order No. 49651-Phila-56 and subsequent procurements)
14 Plain hexagonal nut
15 Flat washer, 10414
16 Plain hexagonal nut
17 Keyboard switch, 20122 (includes item 14, 16)
18 Plain hexagonal nut
19 Flat washer, 10414
20 Break switch, 20101 (includes item 18)
21 Selector switch plate, 57235
22 Machine screw, 10008
23 Lockwasher, 10430
24 Jack guard shaft, 52652[b]
25 Jack guard door, 52320[b]
26 Jack guard door spring, 52579[b]
27 Plain hexagonal nut[b]
28 Flat washer, 10465[b]
29 Jack guard, 52672[b]
30 Flat washer,[b]
31 Terminal lug[b]
32 Jack 20777 (includes items 27, 30, and 31)[b]
33 Jack plate, 57233[b]
34 Machine screw, 10008-01
35 Lockwasher, 10430
36 Cable clamp, 20513
37 Power cable assembly, 57245A
38 Machine screw, 10393
39 Lockwasher, 10429
40 Plain hexagonal nut
41 Lockwasher
42 Fibre washer
43 Indicator lamp jewel, 20771)
44 Indicator lamp, 20791
45 Indicator lamp bracket, 20790 (includes items 40, 41, and 42)
46 Plain hexagonal nut
47 Flat washer
48 Plain hex
49 Motor switch, 20119 (includes items 46, 47, and 48)
50 Plain hexagonal nut
51 Flat washer
52 Plain hexagonal nut
53 Power switch, 20115 (includes items 50-51 and 52)
54 Power switch plate, 57234
55 Machine screw, 10399
56 Lockwasher, 10430
57 Keyboard guard hinge, 57252
58 Keyboard guard, 57251
59 Cover plate, SM-C-785969

[a] For TT-699A/GGC-selector switch (S9). SM-C-785981.
[B] Not Applicable to TT-699A/GGC.

**4-89. Removal and Replacement of Keyboard Guard Assembly (TT-76A/GGC, TT-669A/GGC and Later Models)** (fig. 4-72)

*a. Removal.*

(1) Unsnap the ball catches on the keyboard guard from the reperforator-transmitter mounting table. Tilt the keyboard guard away from the reperforator-transmitter and unsolder and disconnect all electrical leads from the selector cable assembly (6) at the selector, keyboard, and break switches and jacks.

(2) Unsolder and disconnect the electrical leads from the power cable assembly (37) at the motor, light, and power switches and indicator lamp bracket.

(3) Remove the three machine screws (55) and lockwashers (56) that hold the keyboard guard (58) to the keyboard guard hinge. Remove the keyboard guard assembly.

*b. Replacement*. Replace the keyboard guard assembly by reversing the procedures outlined in *a* above.

**4-90. Disassembly and Reassembly of Keyboard Guard Assembly TT-76/GGC and 669/GGC)** (fig. 4-71)

*a. Disassembly.*

(1) Remove the keyboard guard assembly from the mounting base as described in paragraph 4-88a.

(2) Remove the four machine screws (27) and lockwashers (28) that hold the selector switch plate (39) to the keyboard guard (58); remove the assembled selector switch plate from the keyboard guard.

(3) Loosen the setscrew in the selector switch

knob (29) and remove the selector switch knob from the shaft of the selector switch (33).

(4) Remove the plain hexagonal nut (30) and flat washer (31) that hold the selector switch (33) to the selector switch plate; remove the selector switch and the flat washer (32).

(5) Remove the plain hexagonal nut (34) that holds the keyboard switch (37) to the selector switch plate (39); remove the keyboard switch, flat washer (35), and plain hexagonal nut (36).

(6) Remove the plain hexagonal nut (38) that holds the break switch (41) to the selector switch plate; remove the break switch and flat washer (40).

(7) Remove the two machine screws (24) and lockwashers (25) that hold the jack plate (26) to the keyboard guard; remove the jack plate from the keyboard guard. On TT-699/GGC, this will be cover plate (60).

(8) Remove the jack guard shaft (15) that holds the three jack guard doors (16) and jack guard door springs (17) to the jack guards (20); remove the jack guard doors and jack guard door springs (TT-76/GGC only).

(9) Remove the three plain hexagonal nuts (18) and flat washers (19) that hold the three jack guards (20) and jacks (23) to the jack plate (26); remove the three jack guards, jacks, flat washers (21), and terminal lugs (22) (TT-76/GGC only).

(10) Remove the four machine screws (42) and lockwashers (43) that hold the power switch plate (54) to the keyboard guard; remove the assembled power switch plate from the keyboard guard.

(11) Remove the plain hexagonal nut (52) and flat washer (53) that hold the indicator lamp bracket (57) to the power switch plate; remove the indicator lamp bracket. Remove the indicator lamp jewel (55) from the indicator lamp bracket.

(12) Remove the indicator lamp (56) from the indicator lamp bracket.

(13) Remove the two plain hexagonal nuts (44) that hold the motor switch (47) and light switch to the power switch plate; remove the motor switch, light switch, two plain hexagonal nuts (46). and flat washers(45).

(14) Remove the plain hexagonal nut (48) that holds the power switch (51) to the power switch plate; remove the power switch, flat washer (49), and plain hexagonal nut (50).

*b. Reassembly.*

(1) Reassemble the keyboard guard assembly by reversing the procedures outlined in a(14)through (2) above.

(2) Replace the keyboard guard assembly on the mounting base as described in paragraph 488b.

**4-91. Disassembly and Reassembly of Keyboard Guard Assembly (TT-76A/GGC, TT-699A/GGC and Later Models)** (fig. 4-72)

*a. Disassembly.*

(1) Remove the two ball catches (1) and lockwashers (2) from the keyboard guard (58).

(2) Remove the machine screw (3) and lockwashers (4) that hold the cable clamp (5) to the right side of the keyboard guard; remove the cable clamp.

(3) Remove the four machine screws (7) and lockwashers (8) that hold the selector switch plate (21) to the keyboard guard; remove the assembled selector switch plate.

(4) Loosen the setscrew in the selector switch knob (9) and remove the knob from the shaft on the selector switch (13).

(5) Remove the plain hexagonal nut (10) and flat washer (11) that hold the selector switch (13) to the selector switch (13) to the selector switch plate (21); remove the selector switch (13) and the flat washer (12).

(6) Remove the plain hexagonal nut (14) that holds the keyboard switch (17) to the selector switch plate; remove the keyboard switch (17), flat washer (15), and plain hexagonal nut (16).

(7) Remove the plain hexagonal nut (18) that holds the break switch (20) to the selector switch plate; remove the break switch and flat washer (19).

(8) Remove the two machine screws (22) and lockwashers (23) that hold the jack plate (33) to the keyboard guard; remove the assembled jack plate (33). On the TT-699A/GGC, this will be cover plate (59).

(9) Remove the jack guard shaft (24) that holds the three jack guard doors (25) and jack guard door springs (26) to the jack guards (29); remove the jack guard doors and jack guard door springs (TT-76A/GGC only).

(10) Remove the three plain hexagonal nuts (27) and flat washers (28) that hold the jack

guards (29) and jacks (32) to the jack plate (33); remove the jack guards (29), jacks (32), flat washers (30) and terminals (31) (TT-76A/GGC only).

(11) Remove the machine screw (34) and lockwasher (35) that hold the cable clamp (36) to the left side of the keyboard guard (58); remove the cable clamp.

(12) Remove the four machine screws (38) and lockwashers (39) that hold the power switch plate (54) to the keyboard guard; remove the assembled power switch plate (54).

(13) Remove the plain hexagonal nut (40), lockwasher (41), and fibre washer (42) that hold the indicator lamp bracket (45) to the power switch plate; remove the indicator lamp bracket. Remove the indicator lamp jewel (43) and the indicator lamp (44) from the indicator lamp bracket.

(14) Remove the two plain hexagonal nuts (46) that hold the motor switch (49) and light switch to the power switch plate; remove the motor switch, light switch, flat washers (47), and two plain hexagonal nuts (48).

(15) Remove the plain hexagonal nut (50) that holds the power switch (53) to the power switch plate; remove the power switch (53), flat washer (51), and plain hexagonal nut (52).

*b. Reassembly*. Reassemble the keyboard guard assembly by reversing the procedures outlined in a above.

**4-92. Disassembly and Reassembly of Reperforator-Transmitter Base Components (TT-76/GGC)**
(fig. 4-73)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator-transmitter as described in paragraph 4-27a.

(2) Disconnect the connectors, terminal leads, and grounding lugs on the electrical cables (10, 11, and 15) from their respective connecting points.

(3) Remove the reperforator-transmitter chassis from the base as described in paragraph 4-14a.

(4) Remove the keyboard guard from the reperforator base as described in paragraph 4-88a.

(5) Remove the seven self-locking hexagonal nuts (3), machine screws (4), and flat washers (5) that hold the base board (6) to the base plate (46); remove the base board (6).

(6) Remove the self-locking hexagonal nut (7), machine screw (8), and cable clamp (9) that hold the power cord (10) and the cable (11) to the base plate (46); remove the power cord (10) and cable (11).

(7) Remove the self-locking hexagonal nut (12), machine screw (13), and cable clamp (14) that hold the cable (15) to the base plate (46); remove the cable (15).

(8) Remove the self-locking hexagonal nuts (16 and 21) and machine screws (17 and 22) that hold the grounding straps (18, 19, 23, and 24) to the base plate (46); remove the grounding straps (18, 19, 23, and 24) and the lockwashers (20 and 25).

(9) Remove the four self-locking hexagonal nuts (26), machine screws (27), and flat washers (28) that hold the two retaining clips (29) to the base plate (46); remove the retaining clips (2) and the tape storage guide (30).

(10) Remove the lock nuts (31 and 37), lockwashers (32 and 38), and machine screws (33 and 39), that hold the vibration mount limit stops (34 and 40) and the vibration mounts (35 and 41) to the base plate (46); remove the vibration mount limit stops (34 and

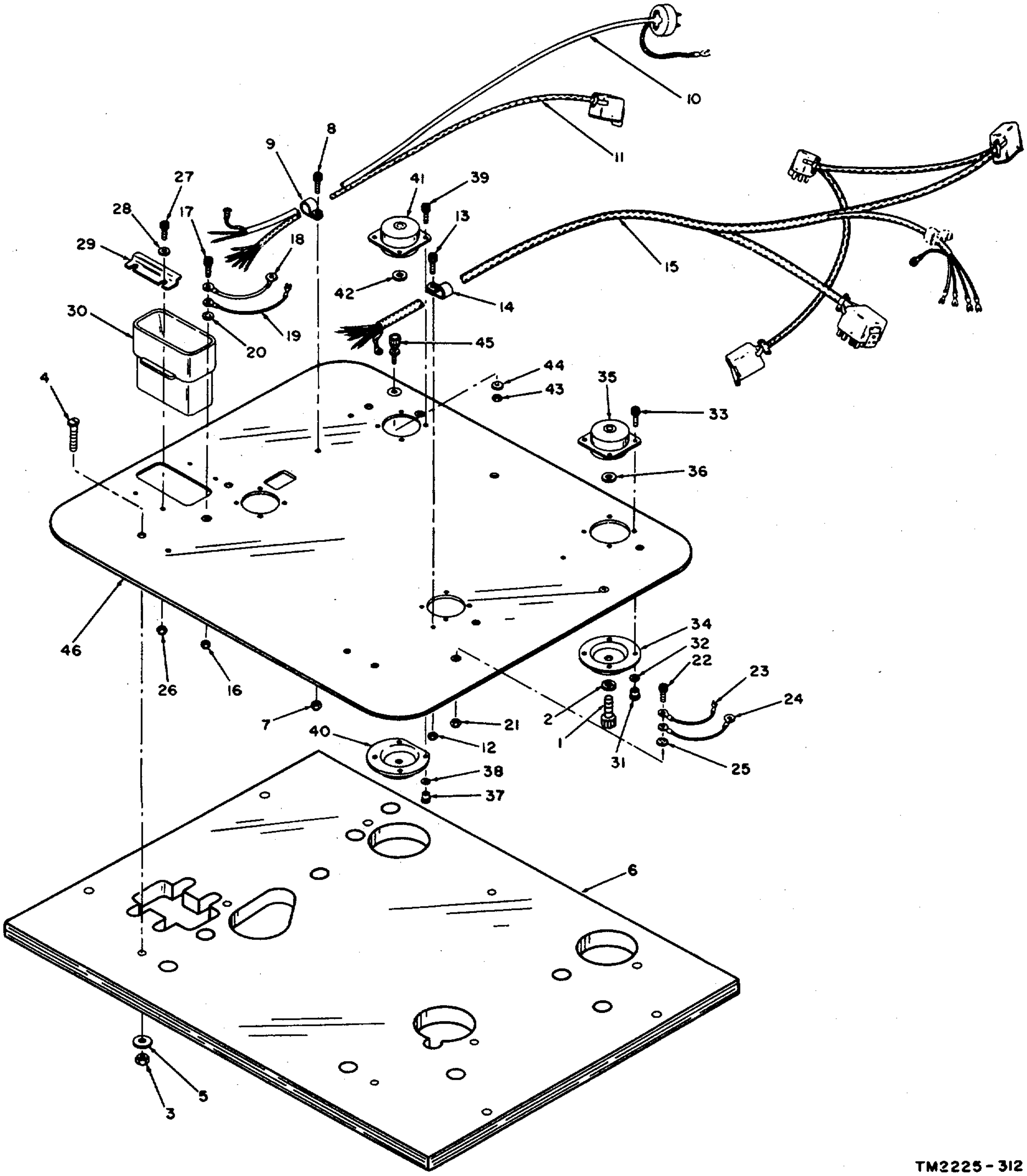



*Figure 4-73. Reperforator-transmitter base components, exploded view (TT-76/GGC).*

40), vibration mounts (35 and 41), and flat washers (36 and 42).

(11) Remove the plain hexagonal nut (43) and lockwasher (44) that hold the grounding post (45) to the base plate (46); remove the grounding post (45).

*b. Reassembly.*

(1) Reassemble the reperforator-transmitter base components by reversing the procedures described in a(11) through (5) above.

(2) Replace the keyboard guard as described in paragraph 4-88b.

(3) Connect the connectors, terminal leads, and grounding lugs on the electrical cables (10, 11, and 15) to their respective connecting points.

(4) Replace the transmitter-distributor as described in paragraph 4-27b.

**4-93. Disassembly and Reassembly of Reperforator-Transmitter Base Components (TT-76A/GGC and Later Models)** (fig. 4-74)

*a. Disassembly.*

(1) Remove the transmitter-distributor from the reperforator-transmitter as described in paragraph 4-27a.

(2) Remove the reperforator-transmitter from the base as described in paragraph 4-4a.

(3) Remove the keyboard guard from the reperforator-transmitter base as described in paragraph 4-90a.

(4) Remove the three machine screws (3) and lockwashers (4) that hold the three cable clamps (5) to the mounting base (80). Disconnect the terminal lugs on the three electrical cables (7) from the terminal board (78); remove the three cable clamps (5), strain reliefs (6), and cables (7).

(5) Remove the machine screw (8) and lockwasher (9) that hold the cable clamp (10). to the mounting base (80). Disconnect the terminal leads from the power cable (15) at the terminal board (74) and disconnect the grounding lug by removing the machine screw (11) and lockwashers (12 and 13); remove the cable clamp (10), strain relief (14), and power cable (15).

(6) Remove the four self-locking hexagonal nuts (16 and 22), machine

---

1 Machine screw, 10040
2 Lockwasher, 10427
3 Self-locking hexagonal nut, 10534
4 Machine screw, 53821
5 Flat washer, 10470
6 Base board, 52711
7 Self-locking hexagonal nut, 10501
8 Machine screw, 10003
9 Cable clamp
10 Power cord, 52571A (P3)
11 Cable, 53466A (P5)
12 Self-locking hexagonal nut, 10501
13 Machine screw, 10003
14 Cable clamp, 20516
15 Cable, 53467A (P2,P7,P8 and P12)
16 Self-locking hexagonal nut, 10501
17 Machine screw, 10009
18 Grounding strap
19 Grounding strap, 53494A
20 Lockwasher, 10404
21 Self-locking hexagonal nut, 10501
22 Machine screw, 10009
23 Grounding strap, 53585A
24 Grounding strap
25 Lockwasher, 10404
26 Self-locking hexagonal nut, 10500
27 Machine screw, 10004
28 Flat washer, 10450
29 Retaining clip, 53166
30 Tape storage guide, 52778
31 Lock nut, 10537
32 Lockwasher, 10430
33 Machine screw, 10025
34 Vibration mount limit stop, 53175
35 Vibration mount, 52095
36 Flat washer, 53181
37 Lock nut, 10537
38 Lockwasher, 10430
39 Machine screw, 10025
40 Vibration mount limit stop, 53398A
41 Vibration mount, 52095
42 Flat washer, 53181
43 Plain hexagonal nut, 10511
44 Lockwasher, 10403
45 Grounding post, 20825
46 Base plate, 52710

*Figure 4-73. -Continued.*

screws (17 and 23), and lockwashers (18 and 24) that hold the four vibration mounts (19 and 25), four flat washers (20 and 26), three vibration mount limit stops (21), and the vibration mount limit stop (27) to the mounting base (80); remove the vibration mounts (19 and 25), flat washers (20 and 26), and vibration mount limit stops (21 and 27).

(7) Remove the machine screws (28 and 32) and lockwashers (29 and 33) that hold the two grounding leads (30 and 34) to the mounting base (80); remove the gounding leads (30 and 34) and lockwashers (31 and 35).

(8) Remove the two machine screws (36) and lockwashers (37) that hold the

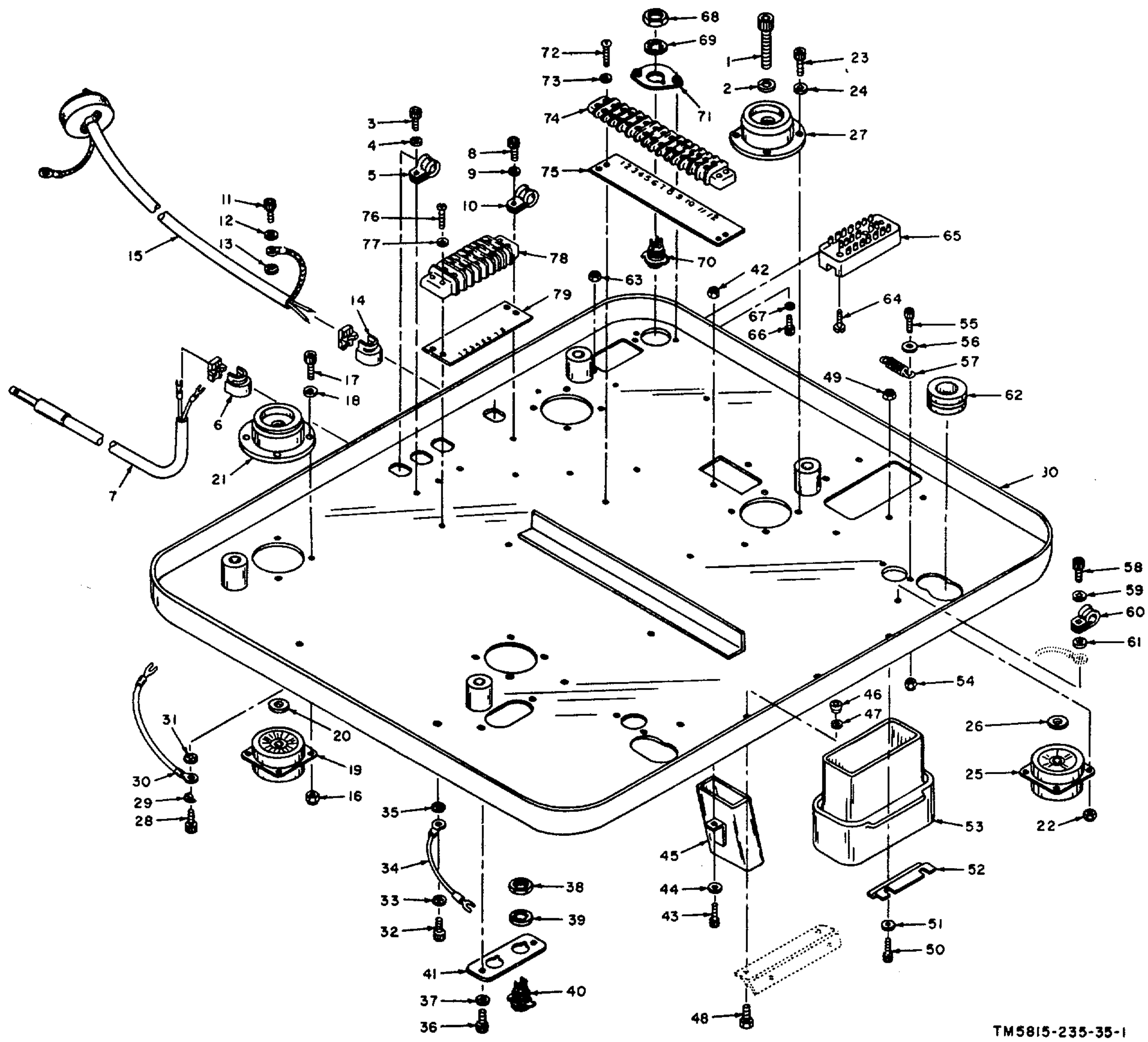



*Figure 4-74. Reperforator-transmitter base components, exploded view (TT-76A/GGC and later models).*

mounting plate (41) to the mounting base (80); remove the assembled receptacle connectors (40) and mounting plate (41).

(9) Remove the two plain hexagonal nuts (38) and lockwashers (39) that hold the two receptacle connectors (40) to the mounting plate (41); remove the two receptacle connectors (40).

(10) Remove the two self-locking hexagonal nuts (42), machine screws (43), and flat washers (44) that hold the chad tube extension (45) to the mounting base (80); remove the chad tube extension (45).

(11) Remove the three clinch nuts (46), lockwashers (47) and machine screws (48) that hold the keyboard guard hinge to the mounting base.

(12) Remove the four self-locking hexagonal nuts (49), machine screws (50), fiat washers (51), and two tape storage guide clips (52) that hold the tape storage guide (53) to the mounting base (80); remove the tape storage guide (53).

(13) Remove the four self-locking hexagonal nuts (54), machine screws (55), and flat washers (56) that hold the two detent springs (57) to the mounting base (80); remove the two detent springs (57).

1 Machine screw, 10040
2 Lockwasher, 10427
3 Machine screw, 10008
4 Lockwasher, 10430
5 Cable clamp, 20887
6 Strain relief 20886
7 Cable assembly, 57241A, 57242A, 57243A
8 Machine screw, 10008
9 Lockwasher, 10430
10 Cable clamp, 20887
11 Machine screw, 10008-01
12 Lockwasher, 10404
13 Lockwasher, 10404
14 Strain relief, 20886
15 Power cable, 57244A
16 Self-locking hexagonal nut, 10501
17 Machine screw, 10025
18 Lockwasher, 10430
19 Vibration mount, 52095
20 Flat washer, 53181
21 Vibration mount limit stop, 53175A
22 Self-locking hexagonal nut, 10501
23 Machine screw, 10025
24 Lockwasher, 10430
25 Vibration mount, 52095
26 Flat washer, 53181
27 Vibration mount limit stop, 53398
28 Machine screw, 10008
29 Lockwasher, 10404
30 Grounding lead, 53494A
31 Lockwasher, 10404
32 Machine screw, 10008
33 Lockwasher, 10404
34 Grounding lead, 53585A
35 Lockwasher, 10404
36 Machine screw, 10008
37 Lockwasher, 10430
38 Plain hexagonal nut
39 Lockwasher, 10478
40 Receptacle connector, 23149 (includes item 38)
41 Mounting plate, 57249A
42 Self-locking hexagonal nut, 10500
43 Machine screw, 10004
44 Flat washer, 10450
45 Chad tube extension, 57260A
46 Clinch nut, 10531
47 Lockwasher, 10430
48 Machine screw, 10399
49 Self-locking hexagonal nut, 10500
50 Machine screw, 10004
51 Flat washer, 10450
52 Tape storage guide clip, 56931
53 Tape storage guide, 52778
54 Self-locking hexagonal nut, 10500
55 Machine screw, 10004
56 Flat washer, 10450
57 Detent spring, 57247
58 Machine screw, 10008
59 Lockwasher, 10404
60 Cable clamp, 20888
61 Lockwasher, 10404
62 Grommet, 21006
63 Self-locking hexagonal nut, 10540
64 Machine screw, 12125
65 Receptacle connector, 20276
66 Machine screw, 10004
67 Lockwasher, 10421
68 Plain hexagonal nut
69 Lockwasher, 10478
70 Receptacle connector, 23149 (includes item 68)
71 Mounting plate, 57248A
72 Machine screw, 10114
73 Lockwasher, 10429
74 Terminal board, 20389
75 Terminal marking strip, 20390
76 Machine screw, 12114
77 Lockwasher, 10429
78 Terminal board, 20397
79 Terminal marking strip, 20374
80 Mounting base, 57255A

*Figure 4-7. -Continued.*

(14) Remove the five machine screws (58), lockwashers (59), cable clamps (60), and lockwashers (61) that hold the power cable (15) to the mounting base (80).
(15) Remove the two grommets (62) from the mounting base (80).
(16) Remove the two self-locking hexagonal nuts (63) and machine screws (64) that hold the receptacle connector (65) to the mounting base (80); remove the receptacle connector (65).
(17) Remove the two machine screws (66) and lockwashers (67) that hold the mounting plate (71) to the mounting base (80); remove the assembled receptacle connector (70) and mounting plate (71).

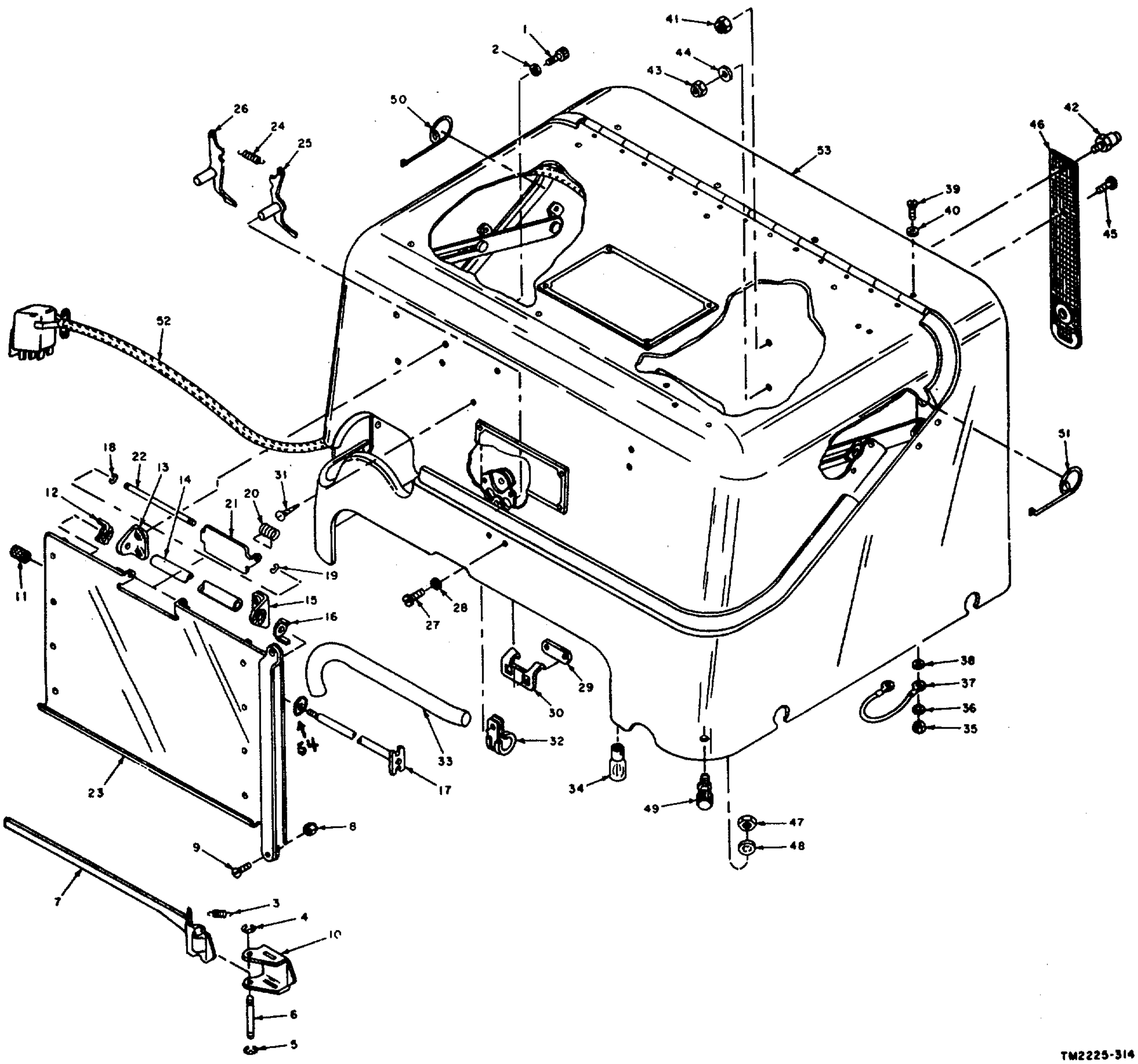



*Figure 4-75. Dust cover, exploded view (TT-76/GGC).*

(18) Remove the plain hexagonal nut (68) and lockwasher (69) that hold the receptacle connector (70) to the mounting plate (71); remove the receptacle connector (70).

(19) Remove the four machine screws (72) and lockwashers (73) that hold the terminal board (74) and terminal marking strip (75) to the mounting base (80); remove the terminal board (74) and terminal marking strip (75).

(20) Remove the two machine screws (76) and lockwashers (77) that hold the terminal board (78) and terminal marking strip (79) to the mounting base (80); remove the terminal board (78) and terminal marking strip (79).

*b. Reassembly.*

(1) Reassemble the reperforator-transmitter base components by reversing the procedures outlined in a(21) through (4) above.

(2) Replace the keyboard guard as described in paragraph 4-89*b*.

(3) Replace the reperforator-transmitter on the mounting base as described in paragraph 4-4*b*.

(4) Replace the transmitter-distributor as described in paragraph 4-27*b*.

**4-94. Disassembly and Reassembly of Dust Cover (TT-76/GGC)** (fig. 4-75)

*a. Disassembly.*

(1) Disconnect the plug connector on the copy light cable (52) from the receptacle connector on the power supply and terminal unit. Lift the dust cover off the reperforator-transmitter.

(2) Remove the four machine screws (1) and lockwashers (2) that hold the copy holder brackets (13 and 15) to the dust cover (53); remove the copy holder assembly.

(3) Remove the copy retaining arm spring (3) from the copy retaining arm (7) and from the bracket (10). Remove the two retainer rings (4 and 5) that hold the pin (6) to the bracket (10); remove the pin (6) and the copy retaining arm (7).

| | | | |
|---|---|---|---|
| 1 | Machine screw, 10001 | 28 | Lockwasher, 10429 |
| 2 | Lockwasher, 10429 | 29 | Nut plate, 52561 |
| 3 | Copy retaining arm spring, 54948 | 30 | Latch plate, 52562 |
| 4 | Retainer ring, 10960 | 31 | Self-tapping screw, 10379 |
| 5 | Retainer ring, 10960 | 32 | Clamp, 20500 |
| 6 | Pin, 53193 | 33 | Copy light director, 52744 |
| 7 | Copy retaining arm, 53192 | 34 | Copy lamp, 20701 |
| 8 | Self-locking hexagonal nut, 10500 | 35 | Plain hexagonal nut, 10517 |
| 9 | Machine screw, 10304 | 36 | Lockwasher, 10408 |
| 10 | Bracket, 50675 | 37 | Grounding strap, 51191A |
| 11 | Clamping nut, 53819 | 38 | Lockwasher, 10408 |
| 12 | Key 52267 | 39 | Machine screw, 10335 |
| 13 | Copy holder bracket, 52555 | 38 | Lockwasher, 10408 |
| 14 | Spacer, 52317 | 40 | Lockwasher 10408 |
| 15 | Copy holder bracket, 52555 | 41 | Self-locking hexagonal nut, 10501 |
| 16 | Key, 562267 | 40 | Lockwasher, 10408 |
| 17 | Copy holder adjusting shaft, 52314A | 42 | Fastener, 10912 |
| 18 | Retainer ring, 10969 | 43 | Self-locking hexagonal nut, 10501 |
| 19 | Retainer ring, 10969 | 44 | Flat washer, 51338 |
| 20 | Copy holder clip spring,52551 | 45 | Machine screw, 10376 |
| 21 | Copy holder clip, 52549 | 46 | Cord retaining strap, 53791 or 60695 |
| 22 | Pin, 52258 | 47 | Plain hexagonal nut, 10511 |
| 23 | Copy holder, 157076 (See note below) | 48 | Lockwasher, 10403 |
| 24 | Latch spring, 53148 | 49 | Grounding post, 20825 |
| 25 | Cover latch, 52302A | 50 | Cover spring, LH, 57165 |
| 26 | Cover latch, 52301A | 51 | Cover spring RH, 57167 |
| 27 | Machine screw, 10357 | 52 | Copy light cable, 52784A |
| | | 53 | Dust cover, 52500A |
| | | 54 | Washer, shim, 52284 |

**NOTE**

Copy holder includes items 3 through 23 and 54.

*Figure 4-75. -Continued.*

(4) Remove the self-locking hexagonal nut (8) and the machine screw (9) from the copy holder; slide the bracket (10) off the guide bar on the copy holder (23).
(5) Remove the clamping nut (11) and pull the copy holder adjusting shaft (17) to the right; catch the key (12), copy holder bracket (13), spacer (14), copy holder bracket (15), and key (16) as they fall free. Remove the copy holder adjusting shaft (17).
(6) Remove the retainer rings (18 and 19) that hold the pin (22) to the copy holder (23). Remove the copy holder clip spring (20), copy holder clip (21), and pin (22).

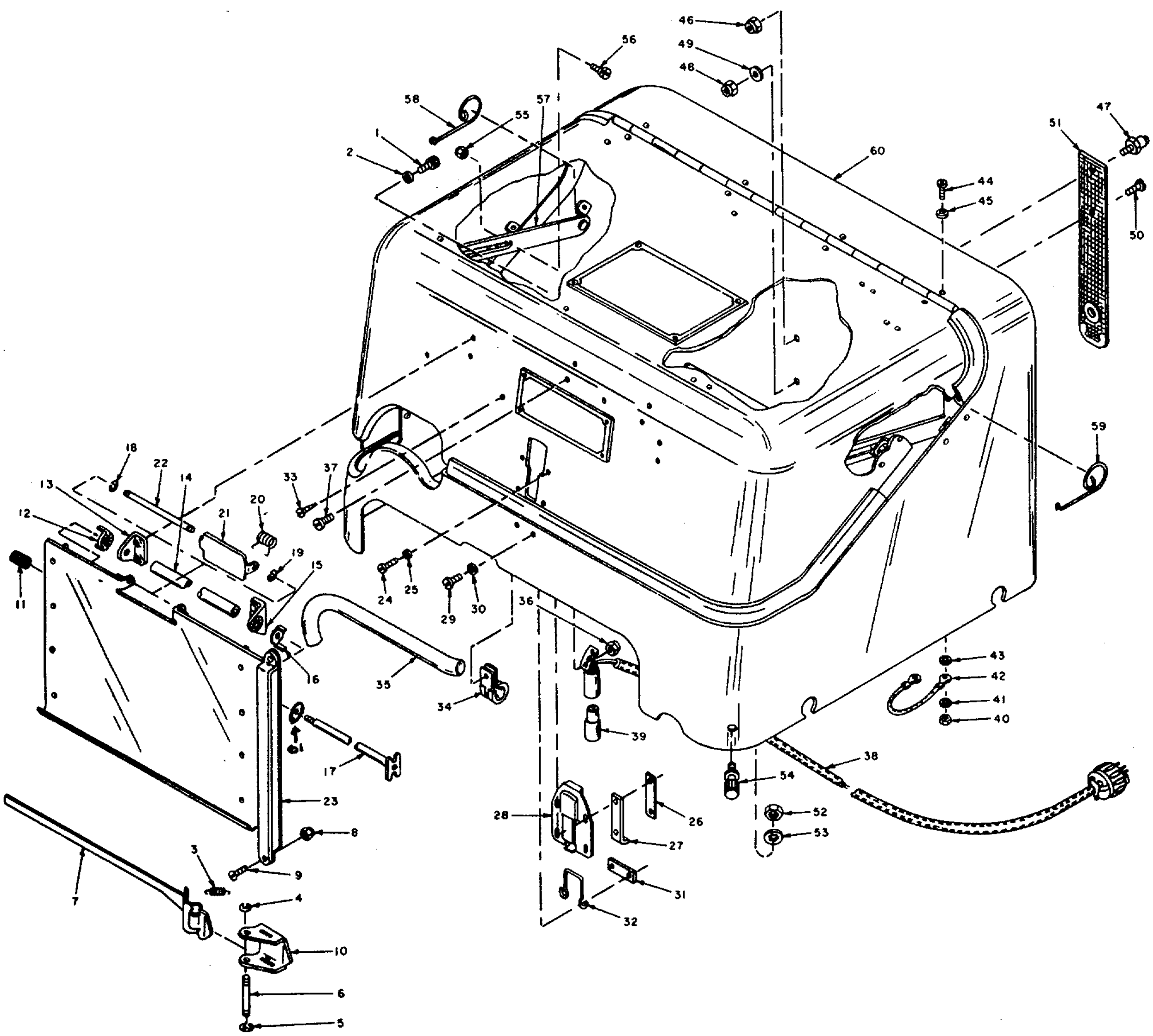



*Figure 4-76. Dust cover, exploded view (TT-76A/GGC and later models).*

(7) Remove the latch spring (24) from the cover latches (25 and 26); remove the cover latches from the dust cover (53).

(8) Remove the two machine screws (27), lockwashers (28), and nut plate (29) that hold the latch plate (30) to the dust cover (53).

(9) Remove the self-tapping screw (31) that holds the clamp (32) to the dust cover (53); remove the clamp and the copy light director (33). Remove the copy lamp (34) from the copy light holder.

(10) Remove the two plain hexagonal nuts (35), lockwashers (36), grounding straps (37), lockwashers (38), machine screws (39), and lockwashers (40) from the dust cover (53).

(11) Remove the self-locking hexagonal nut (41), fastener (42), self-locking hexagonal nut (43), flat washer (44), and machine screw (45) that hold the power cord retaining strap (46) to the dust cover (53); remove the power cord retaining strap (46).

(12) Remove the plain hexagonal nut (47), lockwasher (48), and grounding post (49) from the dust cover (53).

(13) Remove the cover springs (50 and 51) from the dust cover (53).

*b. Reassembly.* Reassemble the dust cover by reversing the procedures described in *a* above.

**4-95. Disassembly and Reassembly of the Dust Cover (TT-76A/GGC and later Models)** (fig. 476)

*a. Disassembly.*

(1) Disconnect the plug connector on the copy light cable assembly (38) from the receptacle connector on the reperforator-transmitter mounting base.

---

| | | | |
|---|---|---|---|
| 1 | Machine screw, 10001 | 32 | Latch spring, 57177 |
| 2 | Lockwasher, 10429 | 33 | Self-tapping screw, 10329 |
| 3 | Copy retaining arm spring, 54948 | 34 | Clamp, 20500 |
| 4 | Retainer ring, 10960 | 35 | Copy light director, 57178 |
| 5 | Retainer ring, 10960 | 36 | Self-locking hexagonal nut, 10500 |
| 6 | Pin, 53193 | 37 | Machine screw, 10393 |
| 7 | Copy retaining arm, 53192 | 38 | Copy light cable assembly, 57173A |
| 8 | Self-locking hexagonal nut, 10500 | 39 | Copy lamp, 20701 (DS1) |
| 9 | Machine screw, 10304 | 40 | Plain hexagonal nut, 10517 |
| 10 | Bracket, 50676 | 41 | Lockwasher, 10408 |
| 11 | Clamping nut, 53819 | 42 | Grounding strap, 51191A |
| 12 | Key, 52267 | 43 | Lockwasher, 10408 |
| 13 | Copy holder bracket, 52555 | 44 | Machine screw, 10335 |
| 14 | Spacer,52317 | 45 | Lockwasher, 10408 |
| 15 | Copy holder bracket, 52555 | 46 | Self-locking hexagonal nut, 10501 |
| 16 | Key, 52267 | 47 | Fastener, 10912 |
| 17 | Copy holder adjusting shaft, 52314A | 48 | Self-locking hexagonal nut, 10501 |
| 18 | Retainer ring, 10969 | 49 | Flat washer, 51338 |
| 19 | Retainer ring, 10969 | 50 | Machine screw, 10376 |
| 20 | Copy holder clip spring, 52551 | 51 | Cord retaining strap, 53791 or 60695 |
| 21 | Copy holder clip, 52549 | 52 | Plain hexagonal nut, 10511 |
| 22 | Pin, 52258 | 53 | Lockwasher, 10403 |
| 23 | Copy holder 157076 (See note below) | 54 | Grounding post, 20825 |
| 24 | Machine screw, 10124 | 55 | Self-locking hexagonal nut, 10500 |
| 25 | Lockwasher, 10435 | 56 | Adjusting stud, 56206 |
| 26 | Nut plate, 57179 | 57 | Dust cover stay, 52694 |
| 27 | Latch bracket, 57176 | 58 | Cover spring, LH, 57168 |
| 28 | Latch, 57175A | 59 | over spring, RH, 57169 |
| 29 | Machine screw, 10393 | 60 | Dust cover; 57170A |
| 30 | Lockwasher, 10429 | 61 | Washer, shim, 52284 |
| 31 | Nut plate, 52561 | | |

**NOTE**

Copy holder includes items 3 through 23 and 61.

*Figure 4-76. -Continued.*

(2) Remove the four machine screws (1) and lockwashers (2) that hold the copy holder brackets (13 and 15) to the dust cover (60); remove the copy holder assembly.
(3) Remove the copy retaining arm spring (3) from the copy retaining arm (7) and from the bracket (10). Remove the two retainer rings (4 and 5) that hold the pin (6) to the bracket (10); remove the pin (6) and the copy retaining arm (7).
(4) Remove the self-locking hexagonal nut (8) and the machine screw (9) from the copy holder (23); slide the bracket (10) off the guide bar on the copy holder (23).
(5) Remove the clamping nut (11) and pull the copy holder adjusting shaft (17) to the right; catch the key (12), copy holder bracket (13), spacer (14), copy holder bracket (15), and key (16) as they fall free. Remove the copy holder adjusting shaft (17).
(6) Remove the retainer rings (18 and 19) that hold the pin (22) to the copy holder (23). Remove the copy holder clip spring (20), copy holder clip (21), and pin (22).

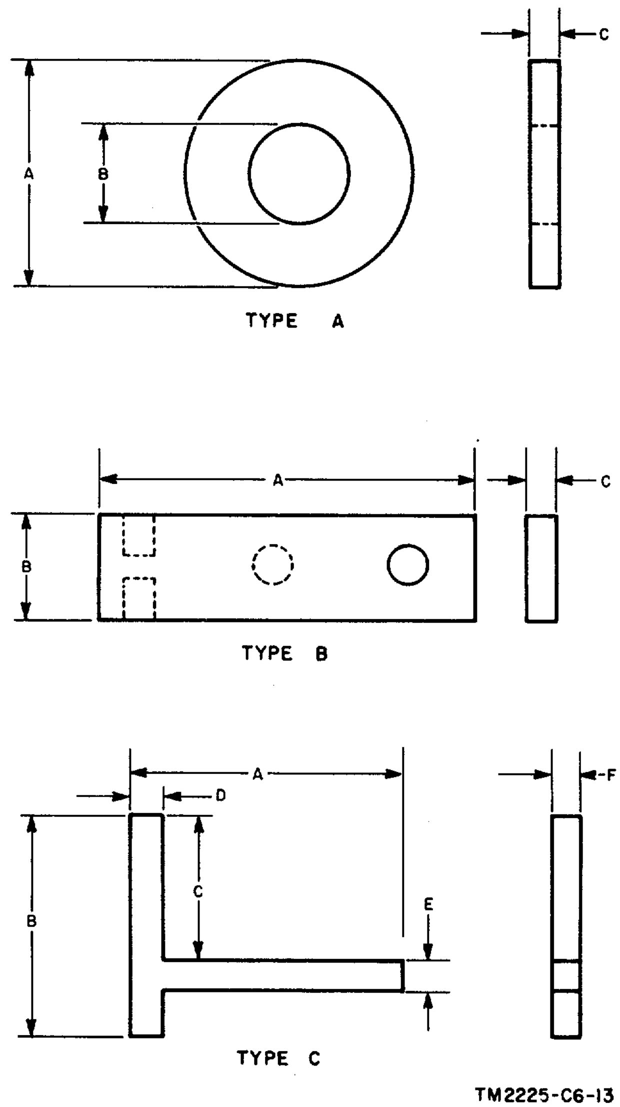



*Figure 4-77. Felt lubricating washer data (TT-76B/GGC and later models).*

(7) Remove the four machine screws (24) and lockwashers (25) and the two nut plates (26) that hold the two latch brackets (27) and the latch (28) to the dust cover (60); remove the latch brackets (27) and the latch (28).
(8) Remove the two machine screws (29) and lockwashers (30) and the nut plate (31) that hold the latch spring (32) to the dust cover (60); remove the latch spring (32).
(9) Remove the self-tapping screw (33) that holds the clamp (34) to the dust cover (60); remove the clamp (34) and the copy light director (35).
(10) Remove the two self-locking hexagonal nuts (36) and machine screws (37) that hold the copy lamp holder of the copy light cable assembly (38) to the dust cover (60); remove the copy light cable assembly (38). Remove the copy lamp (39) from the copy lamp holder.
(11) Remove the plain hexagonal nut (40), lockwasher (41), grounding strap (42), lockwasher (43), machine screw (44), and lockwasher (45) from the dust cover (60).
(12) Remove the self-locking hexagonal nut (46), fastener (47), self-locking hexagonal nut (48), flat washer (49), and machine screw (50) that hold the cord retaining strap (51) to the dust cover (60); remove the cord retaining strap (51).
(13) Remove the two plain hexagonal nuts (52), lockwashers (53), and grounding posts (54) from the dust cover (60).
(14) Remove the four self-locking hexagonal nuts (55) and adjusting studs (56) that hold the two dust cover stays (57) to the dust cover (60); remove the dust cover stays (57). Remove the cover springs (58 and 59).

*b. Reassembly*. Reassemble the dust cover by reversing the procedures outlined in *a* above.

**4-96. Felt Lubricating Washer Data (TT-76B/GGC)** (fig. 4-77)

*a. Type "A" Plain Round Washer.*

| Reference No. | A Outside diameter (in.) | B Inside diameter (in.) | C Thickness (in.) |
|---|---|---|---|
| 61466 | 3/4 | 15/32 | 1/16 |
| 61467 | 5/8 | 3/8 | 1/8 |
| 61468 | 5/16 | 7/32 | 1/8 |
| 61469 | 33/64 | 3/8 | 1/8 |
| 61471 | 13/16 | 5/8 | 1/16 |
| 61472 | 9/16 | 3/8 | 1/4 |
| 61474 | 7/16 | 3/16 | 1/8 |
| 61475 | 15/32 | 3/16 | 1/8 |
| 61476 | 1/2 | 3/16 | 1/16 |
| 61477 | 7/16 | 1/4 | 1/32 |
| 61478 | 7/16 | 5/16 | 1/8 |
| 61479 | 5/8 | 7/16 | 1/16 |
| 61480 | 5/8 | 3/8 | 1/16 |
| 61482 | 9/16 | 3/8 | 1/16 |
| 61483 | 33/64 | 5/16 | 1/16 |
| 61485 | 3/4 | 1/2 | 1/16 |
| 61488 | 3/4 | 9/16 | 1/16 |
| 61490 | 5/8 | 5/16 | 1/16 |
| 61491 | 15/16 | 9/16 | 1/8 |
| 61492 | 1/2 | 5/16 | 1/32 |
| 61670 | 3/4 | 7/16 | 1/32 |
| 61681 | 5/16 | 3/16 | 1/32 |

*b. Type "B" Rectangular Washer.*

| Reference | A Length (in.) | B Width (in.) | C Thickness (in.) |
|---|---|---|---|
| 61496 | 2 1/2 | 3/8 | 1/16 |

*c. Type "C" T-Shaped Washer.*

| Refer-ence | Dim. A (in.) | Dim. B (in.) | Dim. C (in.) | Dim. D (in.) | Dim. E (in.) | Dim. F (in.) |
|---|---|---|---|---|---|---|
| 61460 | 1 1/64 | 13/64 | 1/2 | 9/64 | 1/8 | 1/16 ±0.007 |

## SECTION II. REPERFORATOR-TRANSMITTER ADJUSTMENT PROCEDURES

### 4-97. General

This section contains the requirement and adjustment procedures for the reperforator transmitter. Complete the individual checks and make the necessary adjustments, if required. Adjustments are arranged in sequence for a complete readjustment of the reperforator transmitter. Adjustments not otherwise identified apply to all units, those applicable only to TT-76/GGC, TT-76A/GGC, TT-76B/GGC, or TT-76C/GGC are so indicated. When making individual adjustments, check all related adjustments. When removing parts to make an adjustment refer to paragraph 4-1 through 4-96 for instruction. Perform adjustments described in paragraphs 4-98 through 4-222 in the order presented.

### 4-98. Sensing Levers Clearance Adjustment

(fig. 4-78)

*a. Requirement*. The sensing levers and code bars should be line and there should be 0.001to 0.005-inch clearance between the laminated flat washer and the sensing lever.

*b. Adjustment*. Peel the laminated flat washer until the sensing lever and code bar are in line. Move the selector lever pivot stud in or out to obtain the 0.001- to 0.005-inch clearance; tighten the set screw.

### 4-99. Selector Levers and Sensing Levers Adjustment

(fig. 4-79)

*a. Requirement*. With the selector lever on the low part of the cam, there should be a minimum of .005-inch clearance between the selector levers and the sensing levers.

*b. Adjustment*. Move the selector levers comb to obtain the required clearance. This adjustment should be made and checked at the same time as the minimum clearance when making the stop selector lever latch adjustment. Check related adjustment (par. 4-100).

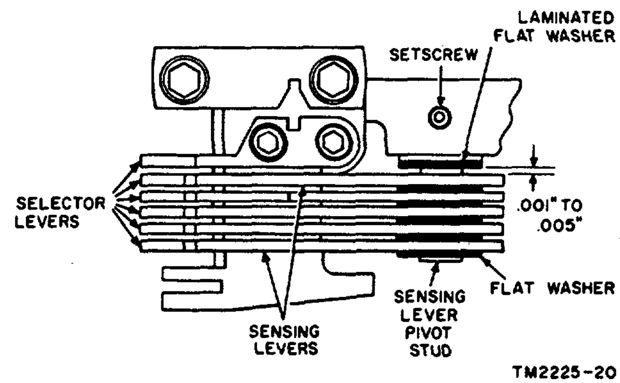



*Figure 4-78. Sensing levers clearance adjustment.*

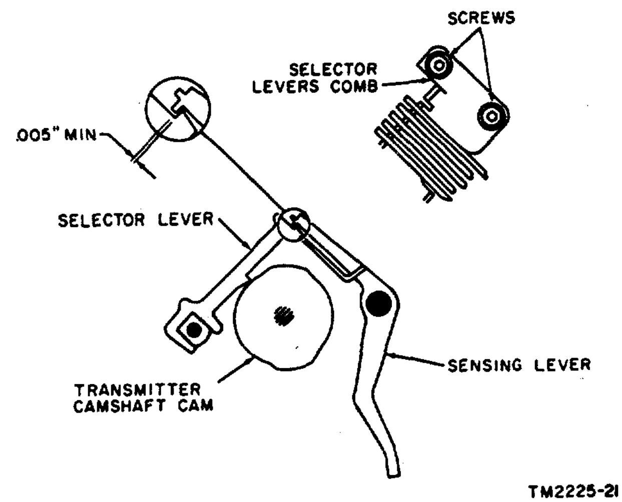



*Figure 4-79. Selector levers and sensing levers adjustment.*

### 4-100. Keyboard Stop Pulse and Contacts Adjustment TT-76(*)/GGC

(fig. 4-80)

*Note*. Place the POWER switch to ON, the MOTOR switch to OFF, and the selector switch to position 3 (LOCAL REPUNCH) while performing this adjustment.

*a. Requirements.*

(1) There should be minimum breaks in the send circuit between successive marking impulses.

(2) The stop selector lever latch should be adjusted to give a minimum break in the send circuit between the 5th marking impulse and the stop pulse. There should be 0.005-inch minimum clearance between the stop selector lever and the stop 1 selector lever latch when the stop selector lever is on the low point of its cam.

*b. Method of Checking.*

(1) Set Multimeter TS-297/U to read on the 100 ma scale. Connect the multimeter and Cord CX-468/U into the TR jack at the right side of the keyboard guard. This will place the multimeter in series with the signal line. Depress the LTRS key lever and slowly turn the motor by hand. There should be slight, but minimum, breaks between the marking impulses.

(2) Connect a milliammeter in series with the signal line in (1) above. Depress the T-key lever and turn the motor slowly by hand. There should be a slight, but minimum, break between the marking 5th intelligence impulse and the stop pulse. With the stop selector lever on the low point of its cam, check the clearance between the stop selector lever latch with a feeler gage.

*c. Adjustments.*

(1) Connect a milliammeter in series with the signal line (b(1) above). Depress the LTRS key lever and slowly turn the motor by hand. Turn the mark stationary contact in or out until the requirement of a(1) above is met.

(2) With the milliammeter still connected in series with the line (b(1) above), loosen the machine screws that hold the stop selector lever latch. Depress the T-key lever and slowly turn the motor by hand. Move the stop selector lever latch to the right or left until a slight, but minimum, break is obtained between the 5th marking impulse and the stop pulse. Move the stop selector lever latch to the right to decrease the break and to the left to increase the break. With the stop selector lever against the low part of its cam, check the clearance between the stop selector lever and the stop selector latch. If the clearance is less then 0.005 inch, remake adjustment in paragraph 4-99. Then reposition the stop selector lever latch to meet the requirement of b(2) above.

*Note*. TT-76A/GGC and later models have a screwdriver slot to aid in the adjustment of the stop selector lever latch.

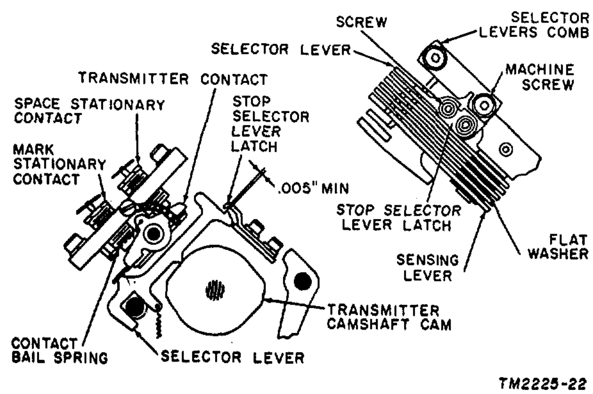



*Figure 4-80. Keyboard stop pulse and contacts adjustment.*

**4-100.1 Keyboard Stop Pulse and Contacts Adjustment TT-499(*)/GGC** (fig. 4-80.1)

*a. Requirement.*

(1) The stop selector lever latch should be adjusted to give the correct stop pulse length. There should be a 0.003-inch minimum clearance between the stop selector lever and stop selector lever latch when the stop selector lever is on a low point of its cam.

(2) The mark and space impulses from the sequential keyboard transmitter should be of equal time duration.

*b. Methods of Checking*. An oscilloscope should be used to measure signals transmitted by the keyboard transmitter.

*c. Adjustment*.

(1) On the A1 terminal box assembly, connect an oscilloscope to terminals 5 and 6 of terminal board A1TB1.

(2) Loosen the socket head screws that secure the selector lever latch. Turn the motor on and push the blank key repeatedly. With a screwdriver-in the notch of the selector lever latch and latch bracket, move the selector latch to obtain the required stop signal length (19.2 milliseconds at 100 wpm) on the oscilloscope. Move it to the left to decrease, and to the right to increase the pulse length; tighten the screws and recheck the signal length.

(3) Type the "R" character repeatedly. Adjust the mark stationary contact on the contact assembly until a wave shape appears with negative and positive transitions (bits) of equal time duration.

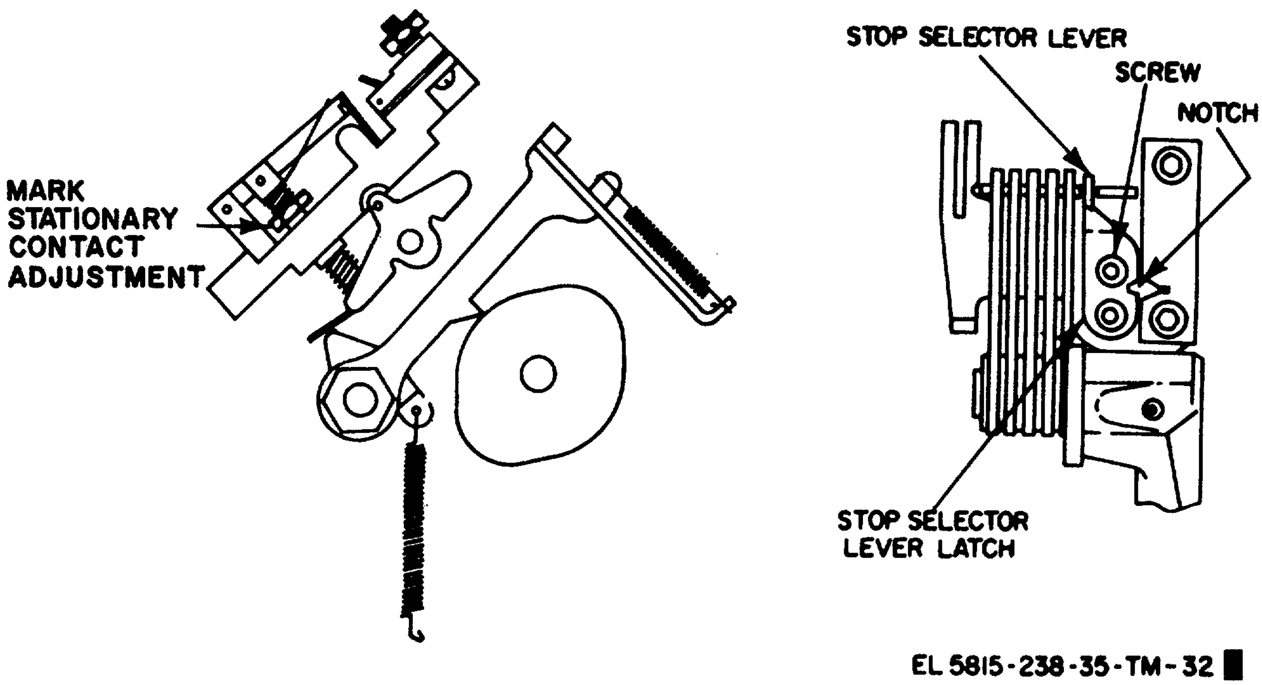



*Figure 4-80.1. Keyboard Stop Pulse and Contacts Adjustment.*

**4-101. Sensing Lever Locking Bail Adjustment** (fig. 4-81)

*a. Requirement*. There should be equal clearance between the sensing lever locking bail latching surface and the sensing levers latching surface when the sensing levers are in both the mark and space positions.

*b. Method of Checking*. Depress either the R or Y-key lever. Turn the transmitter camshaft clockwise by hand until the sensing lever locking bail engages the sensing levers; check the clearance visually.

*c. Adjustment*. Loosen the self-locking hexagonal nut. With the sensing lever locking bail engaged with the sensing levers, turn the sensing lever locking bail bearing clockwise or counterclockwise until the requirement is met; tighten the self-locking hexagonal nut.

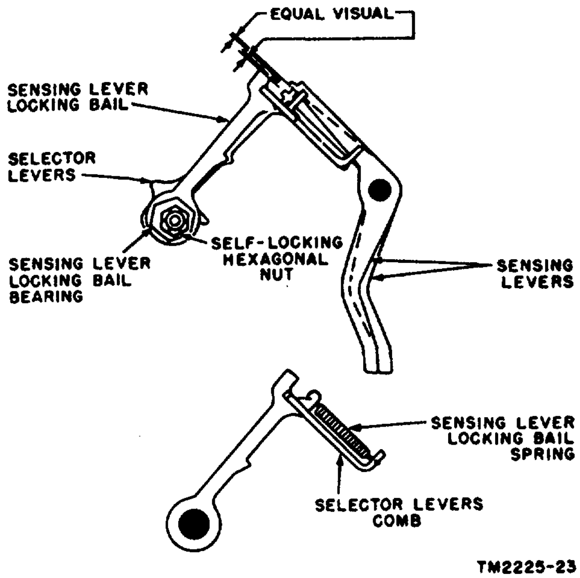



*Figure 4-81. Sensing lever locking bail adjustment.*

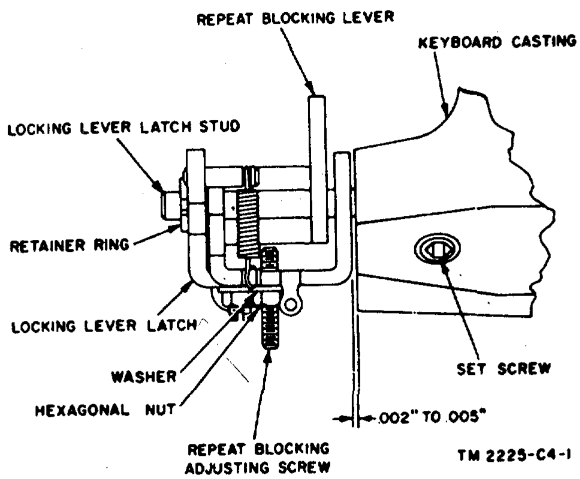



*Figure 4-82. Locking lever latch end play adjustment.*

**4-102. Locking Lever Latch End Play Adjustment** (fig. 4-82)

*a. Requirement*. There should be a 0.005-inch clearance between the lock latch and the keyboard casting.

*b. Adjustment*. Loosen the setscrew and position the locking lever latch stud to m, requirement. Tighten the setscrew and recheck the requirement.

**4-103. Universal Bar Adjustment** (fig. 4-83)

*a. Requirement*. There should be 0.005 to 0.015-inch clearance between the cam-stop lever and the repeat blocking lever when the key lever giving the minimum amount of clearance is depressed.

***Note***. Check all key levers.

*b. Adjustment*. Loosen the hexagonal nut and turn the universal bar adjusting screw in or out to meet the requirement; tighten the hexagonal nut. Check related adjustments (par. 4-114).

**4-104. Universal Bar Stop Screw Adjustment (TT-76B/GGC) Serial Nos. 256 anti Above, Order No. 13931-PC-58 and Subsequent Procurements)** (fig. 4-84)

*a. Requirement*. When the universal bar is to the left against the stop screw and the universal bar adjusting screw is against the universal bar, the upper edge of the locking lever latch should engage tile mating edge of the

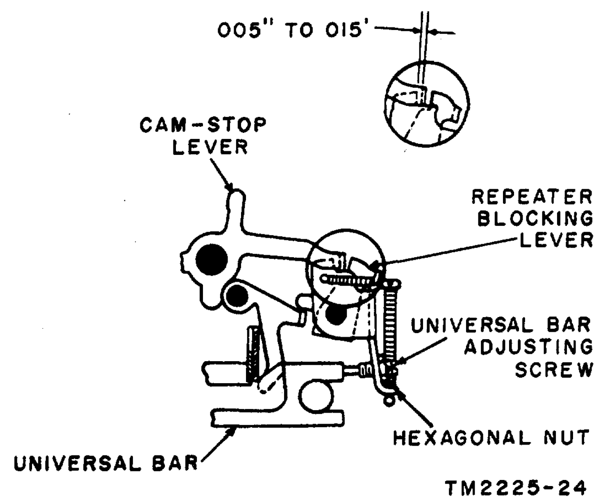



*Figure 4-83. Universal bar adjustment.*

cam stop lever by one-half the thickness of the cam stop lever.

*b. Adjustment*. Loosen the plain hexagonal nut on the universal bar bracket and position the stop screw to meet the requirement. Tighten the plain hexagonal nut.

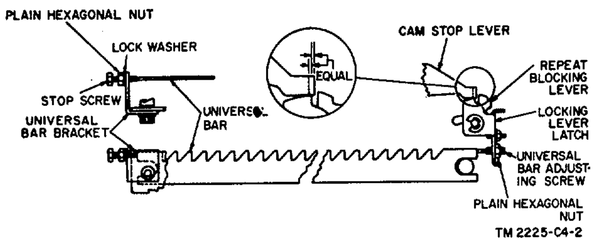



*Figure 4-84. Universal bar stop screw adjustment (TT-76B/GGC, serial Nos. 256 and above, Order No. 13931-PC-58 and all subsequent procurements).*

**4-105. Repeat Blocking Lever Adjustment (TT76B/GGC Serial Nos. 256 and Avoce, Order No. 13931-PC48 and Subsequent Procurements)** (fig. 4-85)

*a. Requirement*. With the cam stop lever in the restored position there should be 0.045- to 0.050-inch clearance between the opposing edges of the repeat blocking lever and the locking lever latch.

*b. Method of Checking*. Turn the transmitter camshaft by hand until the cam stop lever is in the restored position and transmitter camshaft no longer turns. Check the required clearance.

*c. Adjustment*. Loosen the hexagonal nut which secures the repeat blocking lever setscrew. Turn the setscrew until the requirement is met. Tighten the hexagonal nut.

**4-106. Keyboard-Transmitter Friction Clutch Adjustments (TT-76/GGC and TT** (A, fig 4-86)

*a. Requirements*.

(1) On the TT-76/GGC, it should require a pull of 25 to 30 ounces to prevent the keyboard transmitter friction clutch from turning when the motor is on and the camshaft is not operating any levers.

(2) On the TT-699/GGC, it should require a pull of 38 to 44 ounces to prevent the keyboard transmitter friction clutch from turning when the motor is on and the camshaft is not operating any levers.

*b. Method of Checking*. Hook a spring scale on the clutch yoke. While holding the scale rigidly, depress the space bar and allow the camshaft to turn slightly until it is not operating any levers. When the free spot has been established, hold the clutch yoke from turning and read the scale.

*c. Adjustment*. Loosen the two setscrews in the drive shaft collar, shift the collar forward or backward to obtain the proper spring tension on the friction clutch; tighten the set-screws. Recheck the requirement and readjust if necessary.

*Figure 4-85. Repeat blocking lever adjustment (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and all subsequent procurements).*

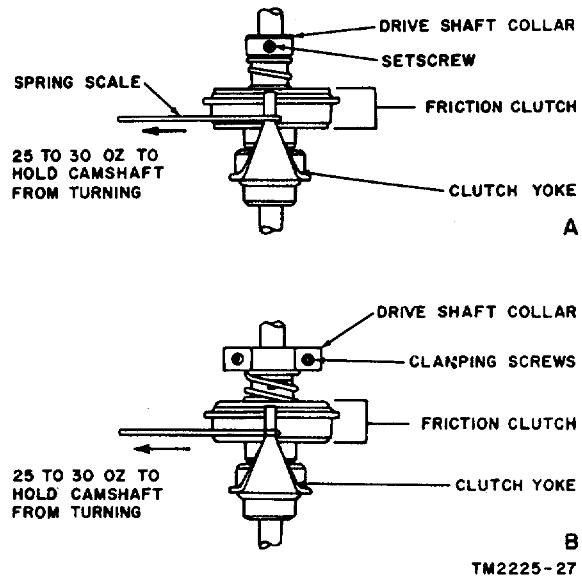



*Figure 4-86. Keyboard-transmitter friction clutch adjustment.*

**4-107. Keyboard-Transmitter Friction Clutch Adjustment TT-76A/GGC, TT-699A and Later Models** (B, fig. 4-86)

*a. Requirements*.

(1) On the TT-76A/GGC, it should require a pull of 25 to 30 ounces to prevent the keyboard transmitter friction clutch from turning when the motor is on and the camshaft is not operating any levers.

(2) On the TT-699A/GGC, it should require a pull of 38 to 44 ounces to prevent the keyboard transmitter friction clutch from turning when the motor is on and the camshaft is not operating any Levers.

*b. Method of Checking*. Hook a spring scale on the clutch yoke. While holding the scale rigidly, depress the space bar and allow the camshaft to turn slightly until it is not operating any levers. When the free point has been established, hold the clutch yoke from turning and read the scale.

*c. Adjustment*. Loosen the two clamping screws in the drive shaft collar, rotate the collar to obtain the proper spring tension on the friction clutch; tighten the clamping screws. Recheck the requirement and readjust if necessary.

**4-108. Line Indicator Adjustments (TT-76/GGC and TT-76A/GGC)** (fig. 4-87)

*a. Clearance Adjustment*.

(1) Requirement. There should be 0.001-to 0.005-inch clearance between the retainer ring and the bearing.

(2) Adjustment. Remove the retainer ring next to the laminated flat washer. Peel the laminated flat washer to meet the requirement. Replace the retainer ring and recheck the clearance.

*b. Spring Adjustment*.

(1) Requirement. The indicator carriage should return to the left-hand margin from one space out when the carriage return is selected. It should require a pull of 4 to 5 ounces to rotate the ratchet wheel one space.

(2) Method of checking. Move the indicator carriage one space out. Select the carriage return; the indicator carriage should move to the lefthand margin.

(3) Adjustment. Remove both retainer rings on the right-hand side and move the line indicator drive shaft to the right. Hold the indicator return spring assembly while moving the line indicator drive shaft. Rotate the indicator return spring assembly clockwise to increase the spring tension and counterclockwise to decrease the spring tension. Replace the line indicator drive shaft and indicator return spring assembly; make sure the tab on the indicator return spring assembly goes into the slot on the frame to prevent the indicator return spring assembly from turning. Replace the retainer rings and recheck the tension. Check related adjustments (par. 4-110).

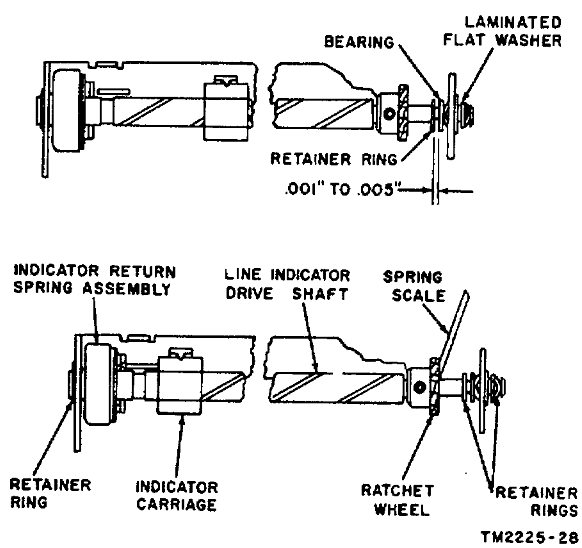



*Figure 4-87. Line indicator adjustments (7T-76/GGC and TT-76A/GC)*

**4-109. Line Indicator Adjustments (TT76B/GGC and Later Models)** (fig. 4-88)

*a. Requirements*.

(1) There should be 0.002-to 0.005-inch clearance between the retainer ring

and laminated spacers on the line indicator drive shaft.

(2) The indicator carriage should return to the left-hand margin from only one space out when the carriage return is selected.

*b. Method of Checking*. Move the indicator carriage one space out. Select the carriage return; the indicator carriage should move to the left-hand margin.

*c. Adjustments*.

(1) Remove the spring washer that holds the beaing. Remove the bearing through the hole in the indicator frame. Peel the laminated washers to meet the requirement. Replace the bearing and secure the spring washer. Recheck the requirement.

(2) With the indicator carriage fully in left-hand margin position, loosen the support stud retaining screw until the support stud stops unwinding (clockwise). Then proceed to wind the support stud 22 ±2 turns clockwise. Refer to the hole in the knurled edge of the support stud when counting turns. Tighten the support stud retaining screw; be careful not to let the drive shaft spring unwind. Recheck the requirement.

**4-110. Drive Shaft Ratchet Wheel Alignment Adjustment** (fig. 4-89)

*a. Requirements*.

(1) There should be a 0.005 to 0.010-inch clearance between the blocking por-

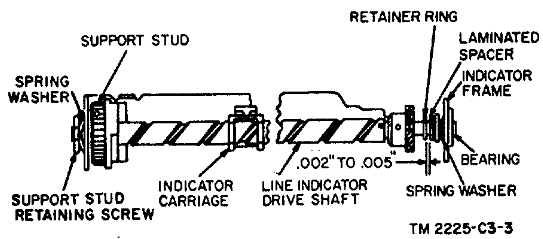



*Figure 4-88. Line indicator adjustments (TT-76B/GGC and later models.*

tion of the ratchet wheel detent and a tooth on the ratchet wheel when the indicator carriage is in its extreme left-hand position.

(2) There should be 0.005- to 0.010-inch clearance between the ratchet pawl and the upper left extension of the function blocking bar when the indicator carriage is in its extreme lefthand position.

(3) With the function blocking bar pushed manually all the way to the right, there should be 5/64-to 9/64-inch clearance between the ratchet wheel detent and the ratchet wheel.

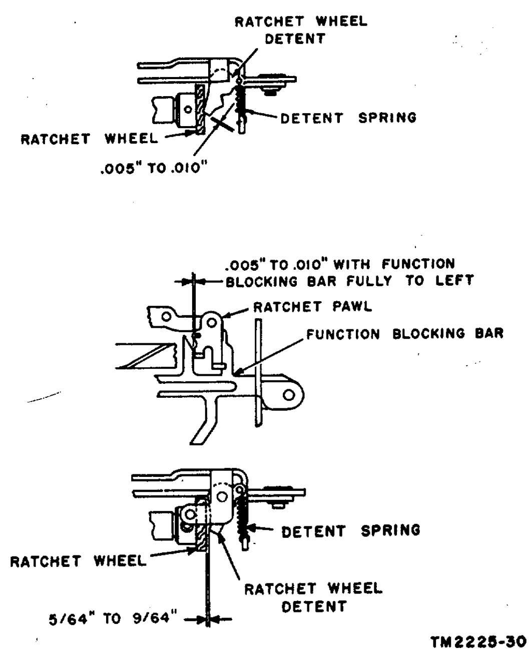



*Figure 4-89. Drive shaft ratchet wheel alignment adjustment (TT-76/GGC and TT-76A/GGC below serial number 302 and Order No. 49651-Phila-56.*

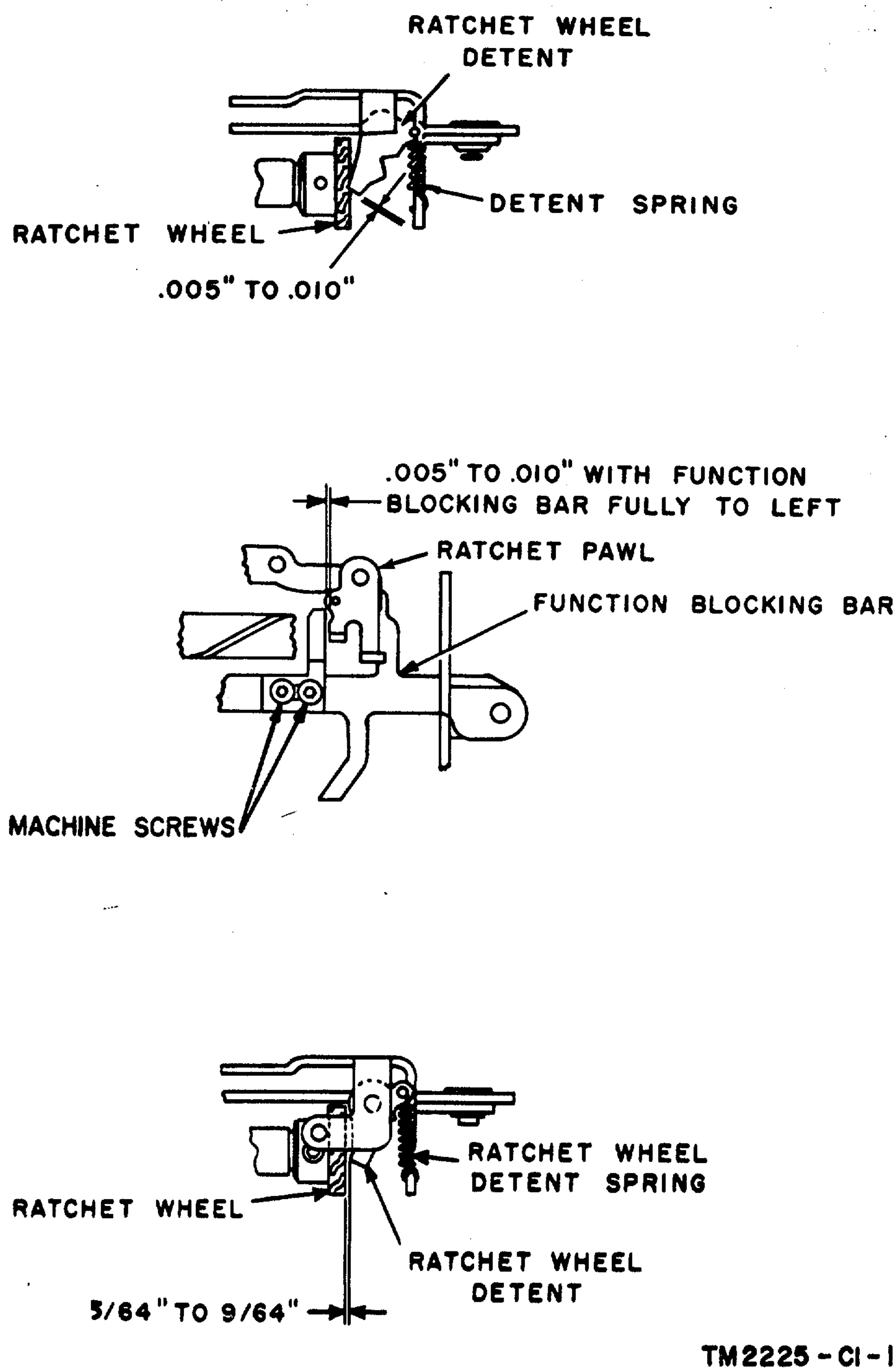



*Figure 4-90. Drive shaft wheel alignment (TT-76A/GGC, serial numbers 302 and above, on Order No. 49651-Phila-56 and subsequent procurements).*

*b. Adjustments.*

(1) Loosen the two setscrews in the ratchet wheel. Hold the ratchet wheel against the shoulder of the drive shaft and rotate it to obtain required clearance. Tighten the setscrews and recheck the adjustment.

(2) On TT-76/GGC and TT-76A/GGC, below serial number 302 on Order No. 49651-Phila-56, bend the upper left extension of the function blocking bar to meet the requirement. On TT-76A/GGC, serial numbers 302 and above, and subsequent procurements, loosen the machine screws (fig. 4-90) that hold the adjustable left extension of the function blocking bar and position the extension to meet the requirement. Tighten the machine screws and check the requirement.

(3) Bend the upper right extension of the function blocking bar until the requirement is met.

(4) Check related adjustments (pars. 4-112, 4-114, and 4-116).

**4-111. Return Latch and Drive Shaft Pin Adjustment (TT-76/GGC)**

(fig. 4-91)

*a. Requirement.* There should be 0.005-to 0.015-inch clearance between the indicator return latch and the pin in the left end of the line indicator drive shaft when the indicator carriage has been spaced out so that the pin in the drive shaft is vertical, and the return latch is against the high portion of the left extension of the function blocking bar.

*b. Method of Checking.* Depress the CAR. RET. key lever; then depress the space bar approximately 5 times so that the return latch is against the high portion of the left extension of the function blocking bar and the pin in the drive shaft is vertical. Check the clearance.

*c. Adjustment.* Bend the return latch as shown in the figure to meet the requirement. Check related adjustments (par. 4-112).

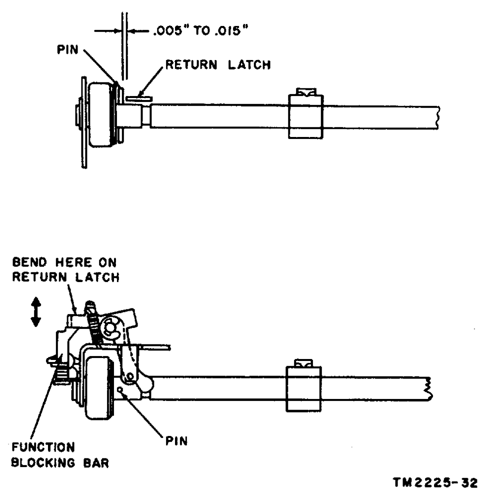



*Figure 4-91. Return latch and drive shaft pin adjustment.*

**4-112. Return Latch Adjustment (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC, Serial Nos. 255 and Below, Order No. 13931-PC-58).**

(fig. 4-92 and 4-93)

*a. Requirement*. There should be 0.010-to 0.025-inch clearance between the ratchet wheel and the ratchet wheel detent when the indicator carriage is held by hand approximately 10 spaces from the extreme left-hand position and the function blocking bar is held latched by the return latch.

*b. Method of Checking.* Space the indicator carriage out approximately 10 spaces from the extreme left-hand position. Manually hold the indicator carriage from returning and depress the CAR. RET. key lever until the function blocking bar is latched by the return latch. Release the CAR. RET. key lever and recheck the clearance.

*c. Adjustment.* On the TT-76/GGC and TT-76A/GGC, bend the return latch, as shown in figure 4-92, until the requirement is met. On the TT-76B/GGC (serial numbers 255 and below, Order No. 13931-PC-58), bend the left

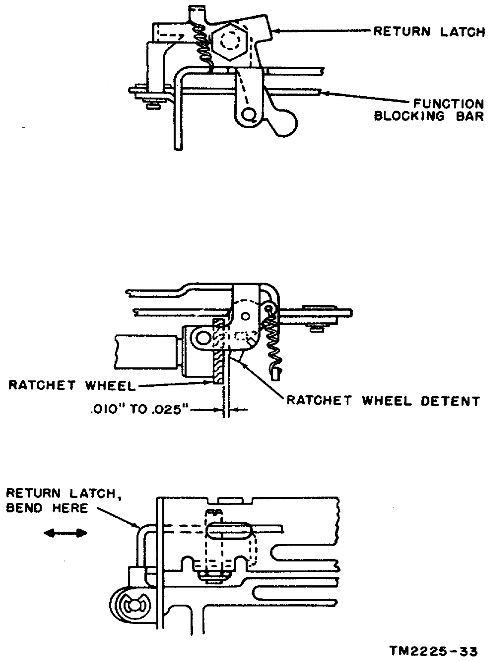



*Figure 4-92. Return latch adjustment (TT-76/ GGC and TT-76A/GGC).*

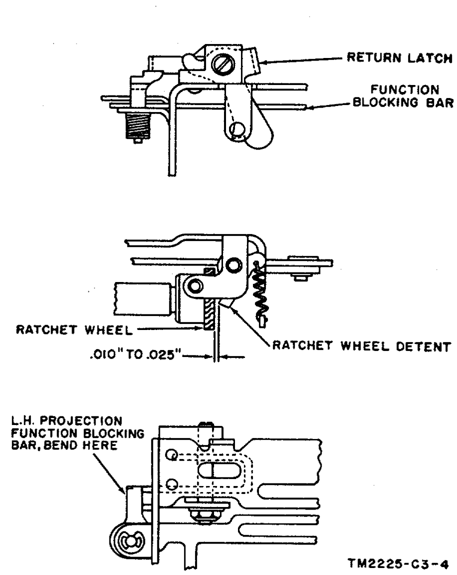



*Figure 4-93. Return latch adjustment (TT-76B/GGC) serial Nos. 255 and below, Order No. 13931-PC-58.*

hand projection of the function blocking bar (fig. 4-93) until the requirement is met. On all models, check related adjustments (pars. 4-114 and 4-116).

**4-113. Carriage Return Blocking Arm Adjustment (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and Subsequent Procurements)**

(fig. 4-94)

*a. Requirement.* There should be 0.010-to 0.020-inch clearance between the ratchet wheel detent and the ratchet wheel when the carriage return blocking bar is latched by the return latch (fig. 4-98).

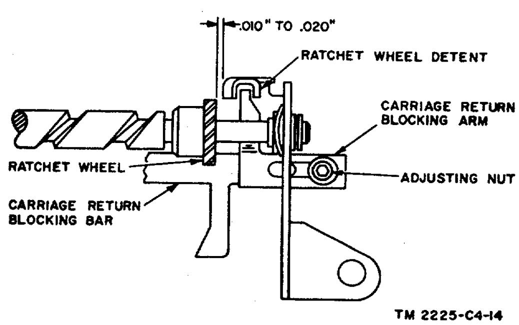



*Figure 4-94. Carriage return blocking arm adjustment (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and subsequent procurements).*

*b. Method of Checking.* With the indicator carriage at least five spaces out, depress the CAR. RET. key lever; at the same time hold the indicator carriage to keep it from returning. Check the clearance with a feeler gage. Release the indicator carriage; the ratchet detent should engage the ratchet wheel.

*c. Adjustment.* Loosen the adjusting nut that holds the carriage return blocking arm. Move the indicator carriage out at least five spaces. Hold the indicator carriage to keep it from returning and depress the carriage-return key lever. This will latch the carriage-return blocking bar. Move the carriage return blocking arm to meet the requirement. Tighten the nut.

**4-114. Figures, Letters, and Line Feed Fingers Adjustment (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC, serial Nos. 255 and below, Order No. 13931-PC-58)**
(fig. 4-95)

*a. Requirement.* With the FIGS, LTRS, and LINE FEED key levers each individually depressed, there should be a 0.015-to 0.025-inch clearance between the top right extension on the function blocking bar and the ratchet wheel detent.

*b. Adjustment.*
(1) Depress the FIGS key lever and bend the FIGS finger until the requirement is met.
(2) Depress the LTRS key lever and bend the LTRS finger until the requirement is met.
(3) Depress the LINE FEED key lever and bend the LINE FEED finger until the requirement is met.

**4-115. Function Blocking Arm Adjustment (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and Subsequent Procurements)**
(fig. 4-96)

*a. Requirement.* With the indicator carriage at least five spaces away from the left-hand margin, there should be a 0.003-to 0.010-inch clearance between the function blocking arm and the feed pawl when any character key lever has been depressed and the cam follower is on the high part of its cam.

*b. Method of Checking.* With the indicator carriage at least five spaces from the left-hand margin, depress any character key lever and turn the motor by hand until the cam follower is on the high part of its cam. Check the requirement.

*c. Adjustment.* Loosen the self-locking hexagonal nut and position the function blocking arm to meet the requirement. Tighten the nut and recheck the requirement.

**4-116. Carriage Return Finger Adjustment (TT-76/GGC, TT-76A/GGC and TT-76B/GGC Serial Nos. 255 and Below, Order No. 13931-PC-58)**
(fig. 4-97)

*a. Requirement.* With the carriage return finger fully depressed, the indicator return

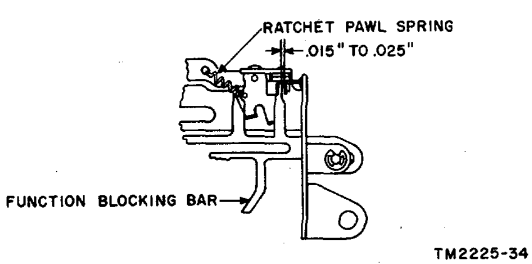



*Figure 4-95. Figures, letters and line feed fingers adjustment (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC, serial Nos. 255 and below, Order No. 13931-PC-58).*

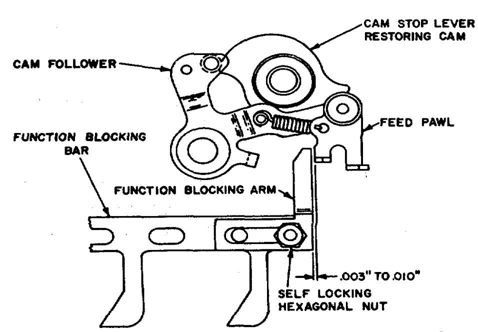



*Figure 4-96. Function blocking arm adjustment (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and subsequent procurements).*

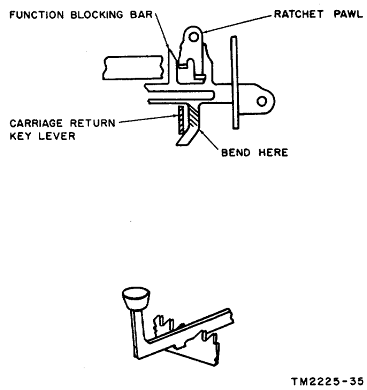



*Figure 4-97. Carriage return finger adjustment (TT-76/GGC, TT-76A/GGC, and TT-76B/GGC serial Nos. 255 and below, Order No. 13931-PC-58)*

latch should just latch the left extension of the function blocking bar just before or at the same time that the keyboard-transmitter cam-shaft trips off.

*b Adjustment.* Hold the indicator carriage to prevent it from returning to the zero position. Depress the CAR. RET. key lever and observe the point at which the indicator return latch latches the left extension of the function blocking bar. If latching occurs before the camshaft is tripped off, bend the carriage return finger counterclockwise. If latching takes place after the camshaft trips off, bend the carriage return finger clockwise.

**4-117. Return Latch Bracket Adjustment (TT-76B/GGC Serial Nos. 256 and Above, Order No. 13931-PC-58 and Subsequent Procurements)**

(fig. 4-98)

*a. Requirement.* When the carriage return key lever is depressed, the return latch should engage the return latch bracket just before or at the same time that the cam stop lever falls off the locking lever latch.

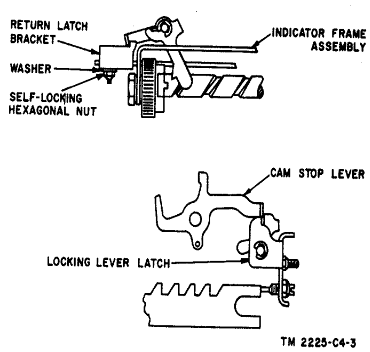



*Figure 4-98. Return latch bracket adjustment (TT-76B/GGC serial Nos. 256 and above, Order No. 13931-PC-58 and subsequent procurements).*

*b. Method of Checking.* Hold the indicator carriage to prevent it from returning to zero. Depress the carriage return key lever and observe the time that the return latch engages the return latch bracket.

*c. Adjustment.* Loosen the self-locking nut that holds the return latch bracket and position the bracket to meet the requirement.

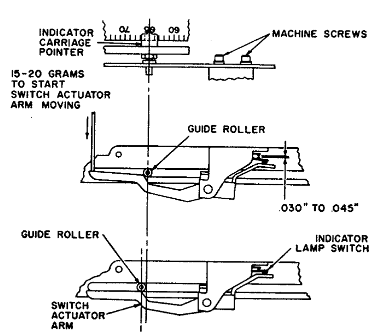



*Figure 4-99. Indicator lamp switch adjustment (TT-76/GGC).*

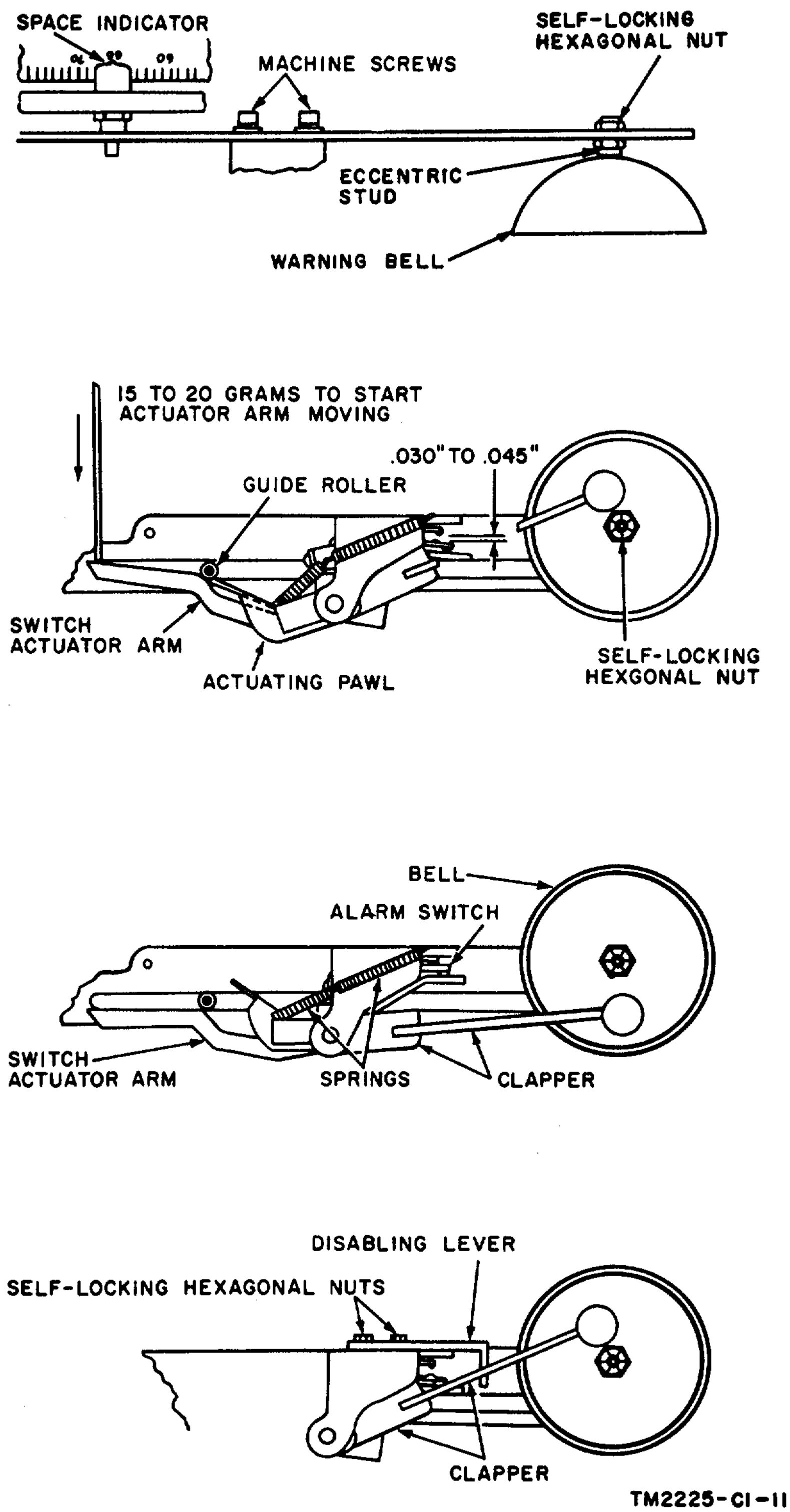



*Figure 4-100. Indicator lamp switch adjustment (TT-76A/GGC and later models).*

**4-118. Indicator Lamp Switch Adjustment (TT-76/GGC)**
(fig. 4-99)

*a. Requirement.*

(1) A push of 15 to 20 grams is required to start the switch actuator arm moving.

(2) There should be a 0.030-to 0.045-inch clearance between the contacts of the switch when the switch actuator is in its unoperated position.

(3) The END OF LINE INDICATOR lamp should light when the indicator carriage pointer is opposite-number 66.

*b. Adjustment.*

(1) Bend the lower switch contact until the requirement is met.

(2) Bend the upper switch contact until the requirement is met.

(3) Loosen the two machine screws and position the indicator lamp switch until the requirement is met.

**4-119. Indicator Lamp Switch Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-100)

*a. Requirement.*

(1) A push of 15 to 20 grams is required to start the actuator arm moving.

(2) There should be a 0.030- to 0.045-inch clearance between the contacts of the switch when the switch actuator arm is in its unoperated position.

(3) The END OF LINE INDICATOR lamp should light and the warning bell should ring when the indicator carriage pointer is moved from number 65 to number 66.

(4) The warning bell should sound loud and clear.

*b. Adjustment.*

(1) Bend the lower switch contact until the requirement*a*(1) above is met.

(2) Bend the upper switch contact until the requirement*a*(2) above is met.

(3) Loosen the two machine screws and position the indicator lamp switch and warning bell clapper until the requirement *a* (3) above is met.

(4) Loosen the self-locking hexagonal nut that holds the eccentric stud to the indicator frame. Adjust the eccentric stud to meet the requirement. Tighten the self-locking hexagonal nut.

*Note.* To disable the warning bell, pull the clapper around and on top of the disabling lever.

**4-120. Indicator Cover Alignment and Cam Follower Stop Adjustment**
(fig. 4-101)

*a. Requirement.*

(1) The space indicator pointer should be opposite the first line to the right of zero when the CAR. RET. key lever and any nonfunction key lever has been depressed.

(2) The cam follower stop should be visually positioned over the cam follower.

(3) The space indicator pointer should advance only one space for each operation of the indicator cam follower when any nonfunction key lever is depressed.

*b. Method of Checking.* With the motor running, depress the CAR. RET. key lever, and

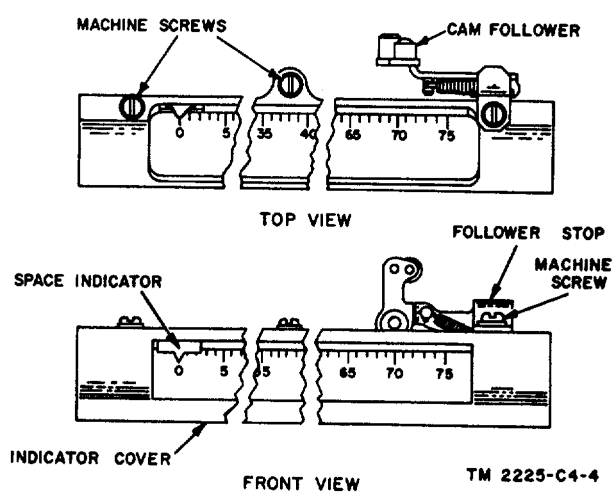



*Figure 4-101. Indicator cover alignment and cam follower stop adjustment.*

then depress any one of the nonfunction key levers. Check the requirements visually.

*c. Adjustment.*

(1) Loosen the three machine screws that fasten the indicator cover to the indicator frame and move the indicator cover to the right or left to meet the requirement. Tighten the left and center machine screws.

(2) Align the cam follower stop over the cam follower and tighten the right machine screw.

(3) Bend the cam follower stop up or down to meet the requirement.

**4-121. Function Plate and Stop Bars Clearance Adjustment**
(fig. 4-102)

*a. Requirement.* There should be 0.001- to 0.010-inch clearance between the function plate and the function stop bar having the least amount of clearance.

*b. Adjustment.* Loosen the machine screws on the function plate. Turn the plate clockwise or counterclockwise until the requirement is met; tighten the machine screws. Recheck the requirements.

**4-122. Sensing Levers Stacking Clearance Adjustment**
(fig. 4-103)

*a. Requirements.*

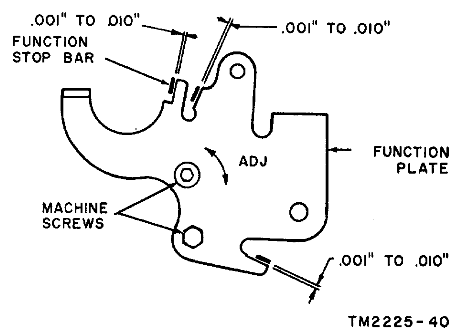



*Figure 4-102. Function plate and stop bars clearance adjustment.*

(1) The code selecting guide plate hub should not project more than 0.003-inch beyond the type wheel reciprocating cam follower.

(2) The cam lever assembly hub should not project more than 0.003-inch beyond the sensing lever spacer.

*b. Adjustments.*

(1) Remove enough laminations from the laminated spacer to meet the requirement in a (1) above.

(2) Remove enough laminations from the sensing lever spacer to meet the requirement in a (2) above. When checking, be sure there is no clearance between the sensing levers and spacers.

(3) Check related adjustments (par. 4-123).

*Note.* Spacers are made of brass laminations bonded together. Each lamination is 0.002-inch thick. Check the adjustment requirements carefully to avoid removal of too

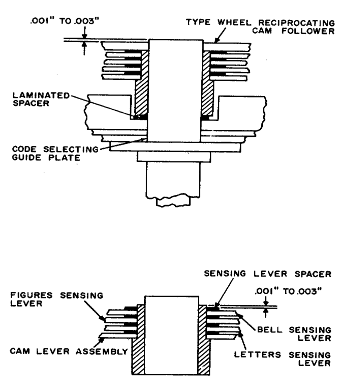



*Figure 4-103. Sensing levers stacking clearance adjustment.*

many laminations. Use a knife blade to remove each lamination. Remove all burrs from laminated spacers.

**4-123. Code-Ring End Play and Function Sensing Levers Clearance Adjustment**

(fig. 4-104)

*a. Requirement.*

(1) The clearance between the ball retainer and the code-ring collar should be 0.002- to 0.004-inch.

(2) There should be 0.002- to 0.005-inch clearance between the thrust bearing and the stop arm shaft driven gear.

*b. Method of Checking.*

(1) Check the clearance by inserting a flat feeler gage from the bottom of the code-ring cage between a code ring and a ball of the ball retainer.

(2) Check the clearance by inserting a flat feeler gage between the stop arm shaft driven gear and the thrust bearing.

*c. Adjustment.*

(1) Insert an allen wrench through the top stop bars, then through the hole in the code cage spacer and into a setscrew in the code-ring collar. Loosen the setscrews and move the code-ring collar to meet the requirement in a (1) above. Tighten the set-screws in the code-ring collar and check the requirement.

(2) Loosen the setscrews in the stop arm shaft driven gear and reposition to meet the requirement in a (2) above. Tighten the setscrews and recheck the requirement.

**4-124. Function Shaft Parts Alignment Adjustment**

(fig. 4-105)

*a. Requirements.*

(1) The flat washer and the transfer lever cam should be tight against the opposite sides of the ball bearing.

(2) The function shaft drive gear on the function shaft should be centered with the stop arm shaft driven gear.

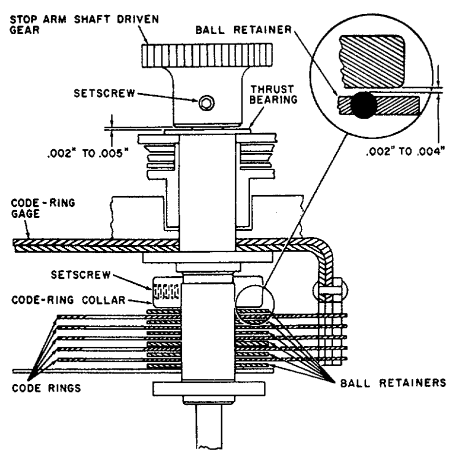



*Figure 4-104. Code ring end play and function sensing levers clearance adjustment.*

(3) There should be 0.010- to 0.015-inch clearance between the sliding drum clutch and the function shaft gear when the clutch latch arm is engaged by the sliding drum clutch.

*b. Method of Checking.*

(1) Push and pull on the transfer lever cam and check for clearance between the transfer lever cam and the ball bearing.

(2) Visually check the alignment between the stop arm shaft driven, gear and the function shaft drive gear.

(3) Make sure the machine is in the stop position and the clutch latch is engaged by the sliding drum clutch. Check the clearance between the function shaft gear and the sliding drum clutch with a flat feeler gage. Both fingers of the sliding drum clutch should be checked.

*c. Adjustments.*

(1) Loosen the transfer lever cam set-

screws and slide the function shaft until it pushes the flat washer tight against the ball bearing. Hold the function shaft and slide the transfer lever cam tight against the ball bearing. Tighten the transfer lever cam setscrews and recheck the requirement.

(2) Loosen the type wheel and function lever cam setscrews. While maintaining a pressure on the keyed clutch disk, move the type wheel and function lever cam to meet the requirement; tighten, the setscrews.

(3) Loosen the setscrews in the transfer lever shaft collar and loosen the function clutch latch screw of the clutch latch arm. Shift the position of the clutch latch arm axially until the requirement is met. Slide the transfer lever shaft collar tight against the clutch latch arm and tighten only the setscrews in the transfer lever shaft collar so as to locate the position of the clutch latch arm. Adjust the clutch latch arm (par. 4-130).

(4) Check related adjustments (pars. 4-130 and 4-131).

**4-125. Type Wheel Reciprocating Levers Clearance Adjustment**
(fig. 4-106)

*a. Requirement.*

(1) The type wheel reciprocating cam follower should be centered with the spring pin of the type wheel reciprocating drive levers.

(2) There should be a 0.001- to 0.005-inch clearance between the retainer plate and the shaft collar when the levers of the lever assembly are held together.

*b. Adjustment.*

(1) Add or remove laminations from the laminated flat washer to meet the requirement in *a*(1) above.

(2) Loosen the setscrews in the shaft collar. Holding the levers together, position the shaft collar to meet the requirement; tighten the setscrews. Recheck the clearance and readjust if necessary.

*Note.* Remove all burrs from laminated flat washers.

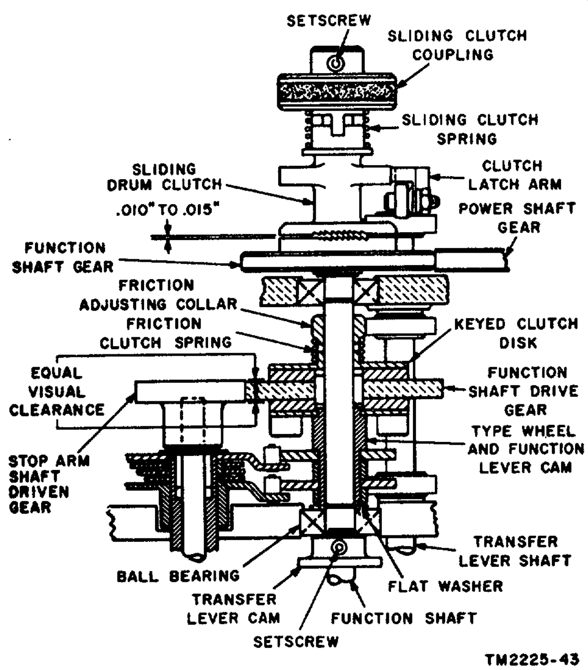



*Figure 4-105. Function shaft parts alignment adjustment.*

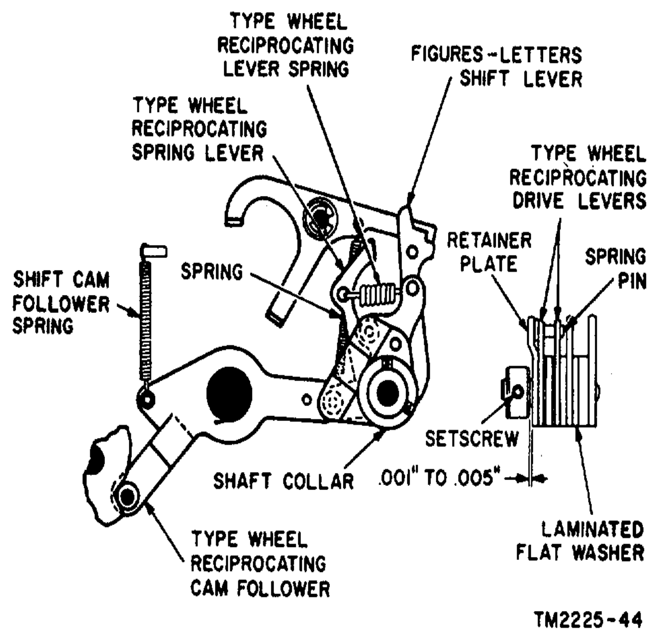



*Figure 4-106. Type wheel reciprocating levers clearance adjustment.*

**4-126. T-Levers and Selector Y-Lever Alignment Adjustment (TT-76/GGC)**
(fig. 4-107)

*a. Requirement.* T-levers should be in line visually with the selector Y-levers.

*b. Adjustment.* With the rear shaft collar loose, loosen the setscrews and slide the transfer lever in or out to meet the requirement. Holding the transfer lever in position, slide the shaft collar tight against the bearing and tighten the setscrews. Check related adjustments (pars. 4-124 and 4-129).

**4-127. T-Lever and Selector Y-Lever Alignment Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-108)

*a. Requirement.* T-levers should be in line visually with the selector Y-levers.

*b. Adjustment.* With the rear shaft collar loose, loosen the clamping machine screws and slide the transfer lever in or out to meet the requirement. Holding the transfer lever in position, slide the shaft collar tight against the bearing and tighten the clamping machine screws. Check related adjustments (pars. 4-124 and 4-128).

**4-128. Transfer Lever Shaft End Play Adjustment (TT-76/GGC)**
(fig. 4-109)

*a. Requirement.* There should be 0.002- to 0.005-inch clearance between the rear shaft collar and the rear bearing when the front shaft collar is tight against the front bearing.

*b. Adjustment.* Loosen the setscrews and slide the front shaft collar tight against the front bearing. With a feeler gage between the rear shaft collar and the rear bearing, tighten the setscrews.

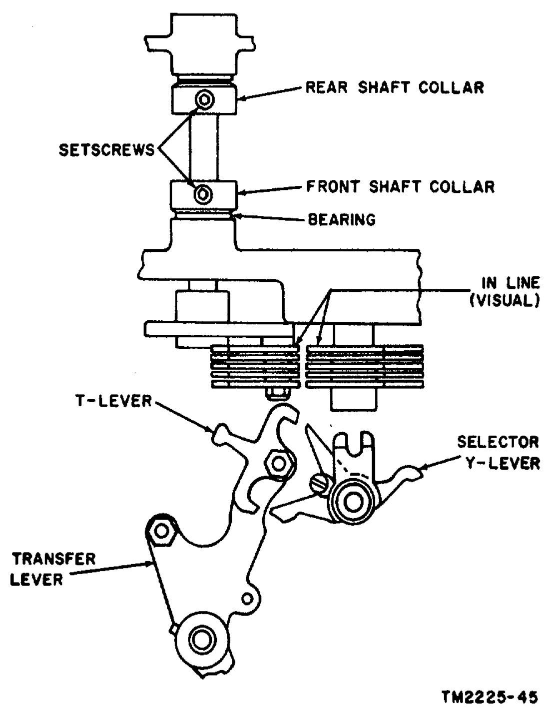



*Figure 4-107. T-lever and selector Y-lever alignment adjustment (TT-76/GGC).*

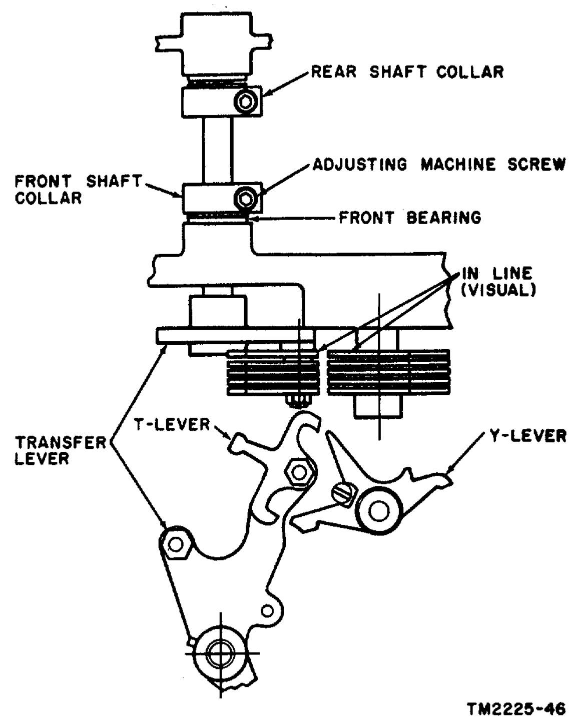



*Figure 4-108. T-lever and selector Y-lever alignment adjustment (TT-76B/GGC and later models).*

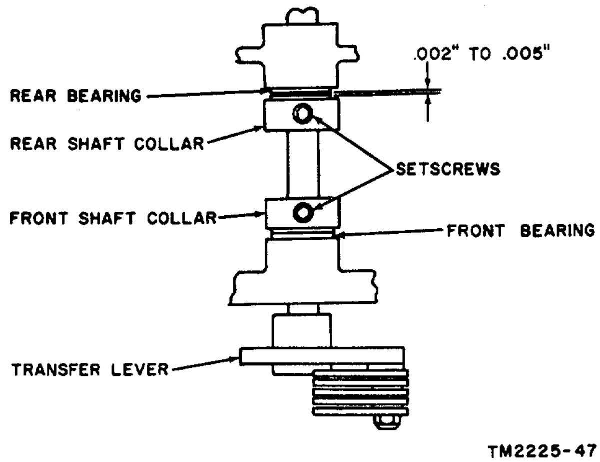



*Figure 4-109. Transfer lever shaft end play adjustment (TT-76/GGC).*

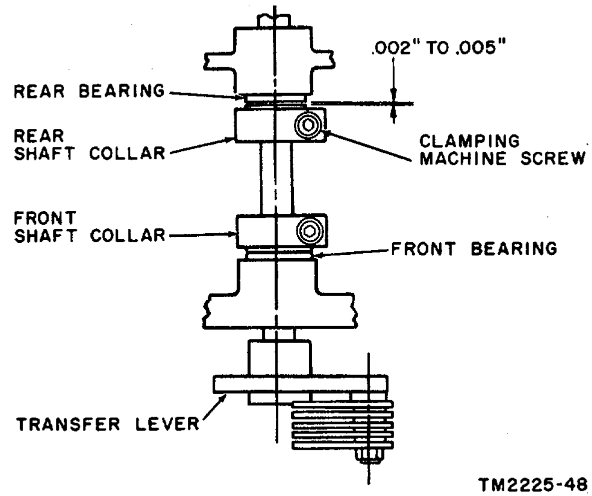



*Figure 4-110. Transfer levers shaft end play adjustment (TT-76A/GGC and later models).*

**4-129. Transfer Lever Shaft End Play Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-110)

*a. Requirement.* There should be 0.002- to 0.005-inch clearance between the rear shaft collar and the rear bearing when the front shaft collar is tight against the front bearing.

*b. Adjustment.* Loosen the clamping screw and slide the front shaft collar tight against the front bearing. Slide the rear shaft collar to meet the requirement. Tighten the clamping screw.

**4-130. Clutch Latch Arm Adjustment**
(fig. 4-111)

*a. Requirement.* There should be 0.015- to 0.25-inch clearance between the clutch latch arm and the sliding drum clutch when the clutch latch arm is disengaged.

*b. Method of Checking.* With the transfer lever latched and the function shaft in the stopped position, trip the transfer lever by pulling the transfer lever trip latch down. The clutch latch arm then will be disengaged from the sliding drum clutch. Check the requirement with a feeler gage.

*c. Adjustment.* Loosen the function clutch latch screw in the clutch latch arm. Position the clutch latch arm to meet the requirement; tighten the function clutch latch screw.

**4-131. Sliding Drum Clutch Clearance and Actuating Load Adjustment**
(fig. 4-112)

*a. Requirements.*

(1) There should be 0.002- to 0.008-inch clearance between the sliding drum clutch and the clutch latch arm when the type wheel reciprocating cam follower is in the indent of the type wheel and function lever cam.

(2) There should be a clearance of 0.080-

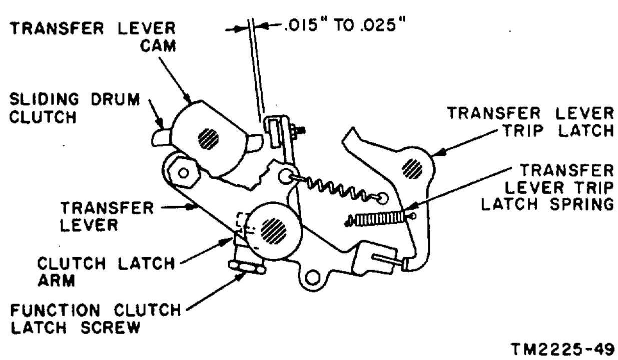



*Figure 4-111. Clutch latch arm adjustment.*

to 0.100-inch between the flexible coupling disk and the function shaft sliding clutch drum, when the sliding clutch drum is fully engaged with the function driven gear.

*b. Adjustments.*

(1) Be sure the type wheel reciprocating cam follower is in the indent of the type wheel and function lever cam. Loosen the setscrews in the sliding clutch coupling and turn the sliding clutch coupling clockwise or counter-clockwise to obtain the requirement. Tighten the setscrews and recheck the requirements.

(2) Trip the transfer lever latch and turn the motor by hand until the sliding clutch drum has fully engaged the function driven gear. Loosen the two setscrews in the flexible coupling disk and shift the flexible coupling disk in the proper direction to obtain the required clearance; tighten the two set-screws.

*Note.* Check both fingers of the sliding drum clutch and establish the clearance with the finger having the least amount of clearance.

**4-132. Functioning Sensing Levers Clearance Adjustment**
(fig. 4-113)

*a. Requirement.* There should be a minimum of .005- but no more than .010-inch clearance between either the bell, figures or letters sensing levers (adjust the one that is closest to its stop bar) and its associated stop bar when the cam lever assembly is on the high part of its cam and none of the associated stop bars are selected.

*b. Adjustment.* Turn the motor by hand until the cam lever assembly is against the high point of the restoring cam. Loosen the hexagonal nut and turn the restoring lever eccentric until the requirement is met; tighten the hexagonal nut and recheck the clearance. Check related adjustment (par. 4-135).

*Note.* Ignore the clearance between the remaining sensing levers and their stop bars. If functional failures occur, replace the particular sensing lever associated with the failure.

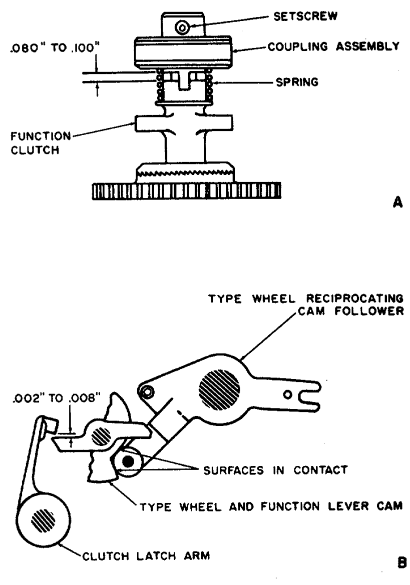



*Figure 4-112. Sliding drum clutch clearance and actuating load adjustment.*

**4-133. Function top Bars Adjustable Fulcrum Alignment (TT-76/GGC and TT-76A/GGC)**
(fig. 4-114)

*a. Requirement.* There should be a 0.010- to 0.015-inch clearance between the tops of each function sensing lever and the associated stop bar when the cam lever assembly is against the low point of the restoring cam and each function stop bar is individually moved to the selected position.

*b. Method of Checking.* Move the T-levers clockwise and check for drag on stop bars. If a drag is present, obtain greater clearance between the stop bar and the selected sensing lever.

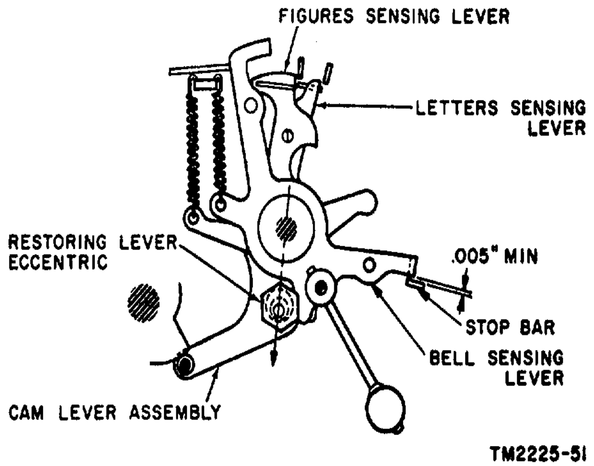



Figure 4-113. Function sensing levers clearance adjustment.

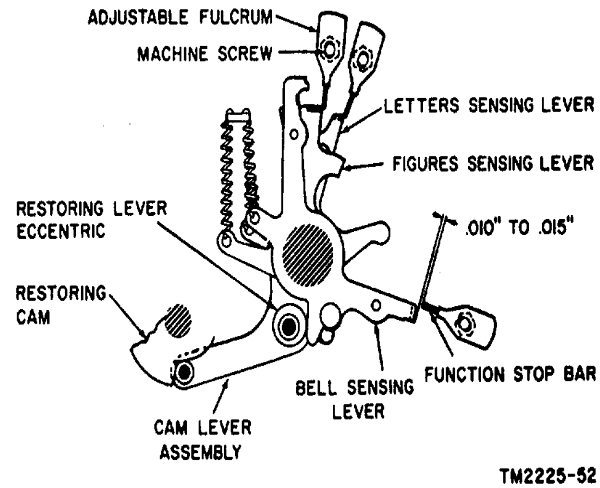



Figure 4-114. Function stop bars adjustable fulcrum alignment (TT-76/GGC and TT-76A/GGC).

*c. Adjustment.* Loosen the machine screws and adjust each adjustable fulcrum to meet the requirement. Tighten the machine screws and recheck the clearance.

**4-134. Function Stop Bar Adjustable Fulcrum Alinement (TT-76B/GGC and Later Models)**

(fig. 4-115)

*a. Requirement.* There should be a 0.010- to 0.015-inch clearance between the selected function stop bar and each function sensing lever when the sensing lever is adjacent to its associated stop bar.

*b. Adjustment*. Select figures, then turn the motor by hand until the figures sensing lever is in line with the figures stop bar. Loosen the machine screw that holds the figures fulcrum. Loosen the self-locking hexagonal nut which holds the eccentric stud. Turn the eccentric stud with a screw driver until the requirement is met. Hold the eccentric stud and tighten the self-locking hexagonal nut. Recheck the clearance. Tighten the machine screw. Use the same procedure to obtain the required clearances on the letters and the bell sensing levers.

**4-135. Signal Bell Clapper Adjustment**

(fig. 4-116)

*a. Requirement.* The signal bell should ring with a clear tone when the S code group is received while the machine is in the figure-shift position.

*b. Adjustment*. Loosen the setscrew in the bell sensing lever. Position the signal bell clapper approximately 3/32 of an inch from the signal bell, until the requirement is met.

**4-136. Transfer Lever Roller Stud Adjustment**

(fig. 4-117)

*a. Requirement.* There should be 0.007- to 0.020-inch clearance between the transfer lever and the transfer lever- trip latch when the transfer lever roller is on the high portion of the transfer lever cam.

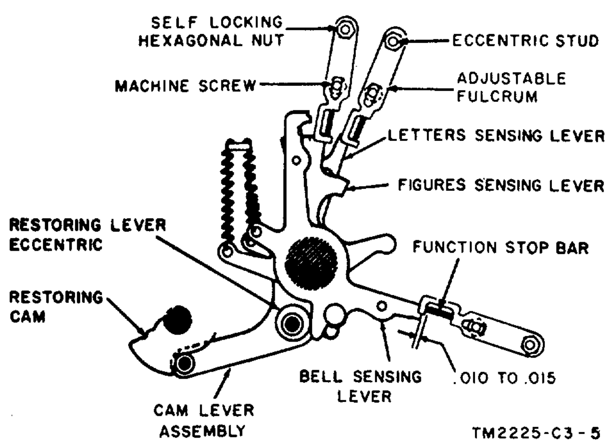



Figure 4-115. Function stop bars adjustable fulcrum alignment (TT-76B/GGC and later models).

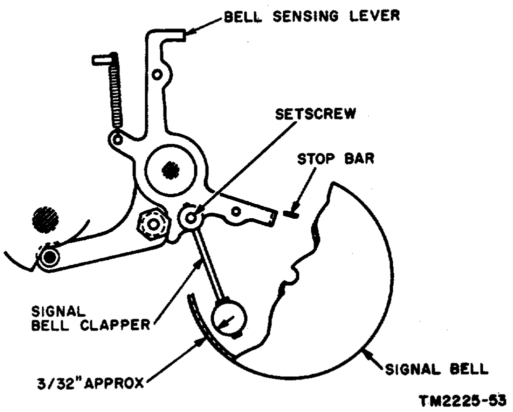



*Figure 4-116. Signal bell clapper adjustment.*

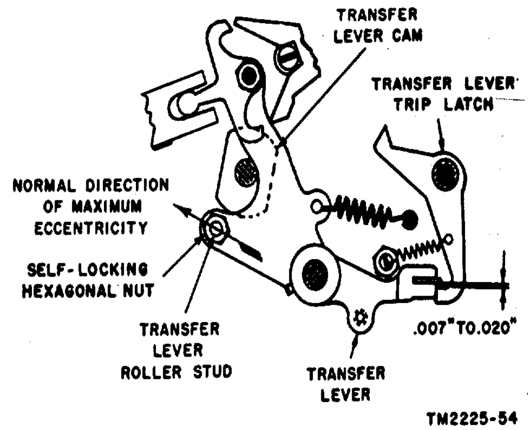



*Figure 4-117. Transfer lever roller stud adjustment.*

*b. Adjustment.* Loosen the self-locking hexagonal nut and set the transfer lever roller stud for the maximum, eccentricity. Manually rotate the function shaft until the roller is on the high portion of the transfer lever cam. Turn the transfer lever roller stud in either direction until the requirement is met. Tighten the self-locking hexagonal nut and recheck the clearance.

**4-137. Code-Ring Locking Bail Adjustment**

(fig. 4-118)

*a. Requirement.* When in the locking position, the code-ring locking bail should rest against the bottom of the locking notches in the code rings for both mark and space positions of the code rings.

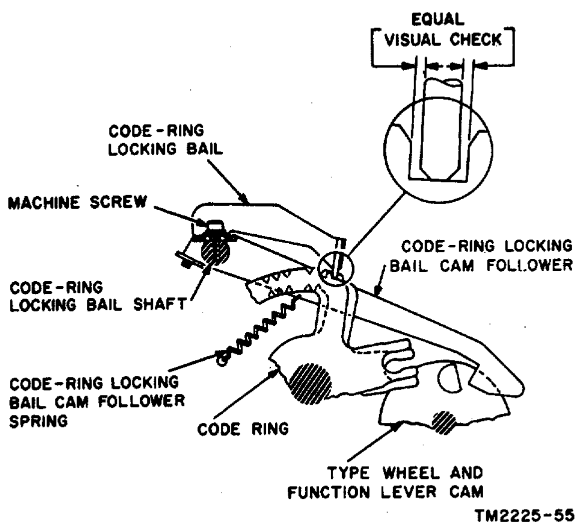



*Figure 4-118. Code-ring locking bail adjustment.*

*b. Adjustment.* Loosen the machine screws in the code-ring locking bail. Position the code-ring locking bail until the requirement is met. Tighten the machine screws and recheck the requirement.

**4-138. Code-Ring Locking Bail Cam Follower Clearance Adjustment**

(fig. 4-119)

*a. Requirement.* There should be a 0.015- to 0.025-inch clearance between the code-ring locking bail and the high part of the code ring when the code-ring locking bail cam follower is against the top of the type wheel and function lever cam.

*b. Adjustment.* With the code-ring locking bail cam follower against the type wheel and function lever cam, loosen the cam follower machine screw and position the code-ring locking bail cam follower to meet the clearance requirement. Tighten the cam follower machine screw and recheck the clearance.

**4-139. Code Rings Actuating Load Adjustment**

(fig. 4-120)

*a. Requirement.* A maximum force of 12

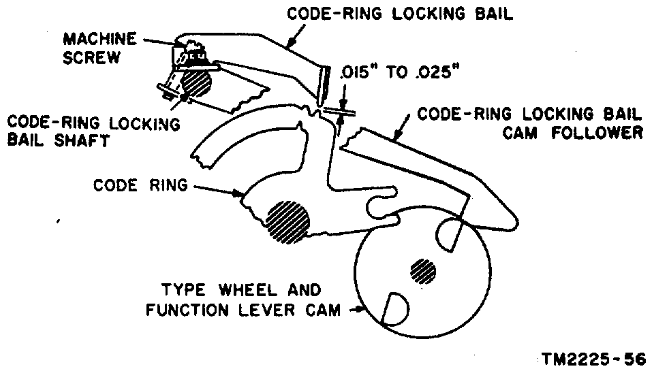



*Figure 4-119. Code-ring locking bail cam follower clearance adjustment.*

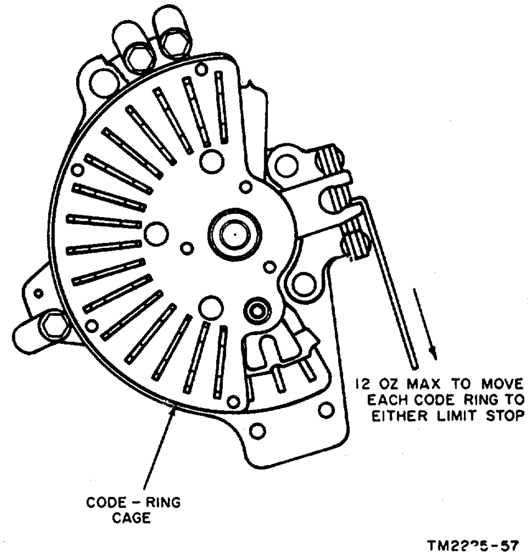



*Figure 4-120. Code rings actuating load adjustment.*

ounces should be required to move the code ring from mark to space position and from space to mark position.

*b. Adjustment.* Correct any burr on working surfaces of the code-ring cage. Replace distorted code rings with a new set.

**4-140. Stop Arm Torque Adjustment**

(fig. 4-121)

*a. Requirement.* With the motor running and the function shaft rotating, a pull of 12 to 17 ounces is required to hold the stop arm stationary.

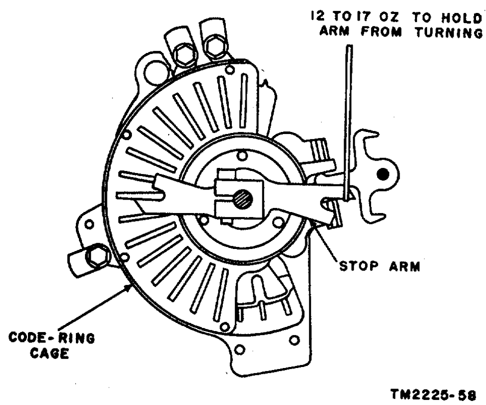



*Figure 4-121. Stop arm torque adjustment.*

*b. Adjustment.* With the motor off, loosen the setscrews on the friction adjusting collar. Move the friction adjusting collar in or out to meet the requirement; tighten the setscrews and recheck the tension.

*Note.* On the TT-76A/GGC and later models, the friction adjusting collar on the function shaft is secured by clamping screws.

**4-141. Y-Lever, T-Lever, and Code-Ring Cage Adjustment**

(fig. 4-122)

*a. Requirements.*

(1) The Y-lever eccentric stop should be set, within ±10°, in the normal direction of maximum eccentricity.

(2) The T-lever pivot stud should be set, within ±10°, in the normal direction of maximum eccentricity.

(3) When the T-levers are in the transferred position:

(a) They should engage the Y-levers for both mark and space positions of the Y-levers.

(b) The code-ring tails should be tight against their stops on the code-ring cage for both mark and space positions of the T-levers. At least one T-lever and associated Y-lever must fully engage. There may be a clearance not to exceed 0.012 inch between each of the other T-levers and associated Y-levers.

(4) On equipment furnished with the Y-lever stabilizer assembly, the Y-lever eccentric stop should be locked in place by the Y-lever eccentric tie (B, fig. 4-123).

*b. Method of Checking.*

(1) Check the requirement given in a(1) and (2) above visually.

(2) With the power off and the function shaft in the normal stopped position, set the Y-levers for the "R" code group. Trip the transfer lever latch and check the requirement visually. Check the Y-code group in the same manner. Reposition the transfer lever and the T-levers. Attempt to rotate the code-ring tails away from their stops. If a clearance exists between the Y-levers and the T-levers, check the clearance with a feeler gage.

(3) Check the requirement given in *a* (4) above visually.

*c. Adjustments.*

(1) Loosen the Y-lever eccentric stop setscrew and the machine screws that secure the Y-lever eccentric ties. Position the eccentric stop to meet the requirement given in *a* (1) above. Tighten the setscrew and the machine screw.

(2) Loosen the plain hexagonal nut at the rear of the T-lever pivot stud. Recheck the requirement.

(3) With the transfer lever latched and the function shaft in the normal stopped position, set Y-levers for the R- or Y-code group. Trip the transfer latch. Loosen the code-ring mounting screws and position the cage to meet the requirement given in *a* (3) above. Tighten the mounting screws.

*Note.* If the position of the code-ring cage changed, check related adjustments (pars. 4-121, 4-130, 4-132, 4-155, 4-162, 4-184, and 4-190).

*Note.* On TT-76B/GGC and later models of the equipment supplied with the Y-lever stabilizer assembly, include the procedure given in (4) below:

(4) Loosen the machine screws of the Y- lever eccentric tie. Position the Y-lever eccentric tie for maximum engagement with the Y-lever eccentric stop. Tighten the machine screw. Check the related adjustment (par. 4-142).

## 4-142. Y-Lever Stud Bracket Adjustment (Equipment Supplied With Y-Lever Stabilizer Assembly) (fig. 4-123)

*a. Requirement.* There should be 0.002- to 0.005-inch clearance between the spacer and flat washer.

*b. Method of Checking.* With the transfer lever held engaged by the transfer lever latch,

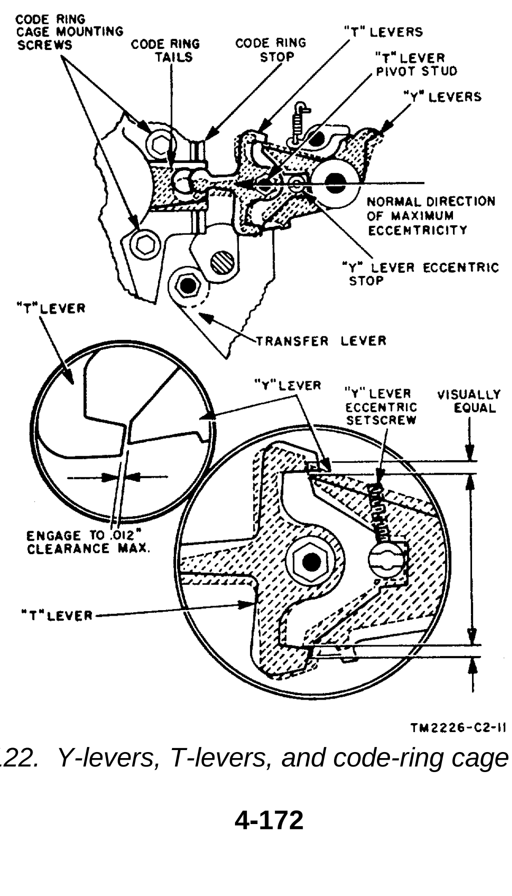
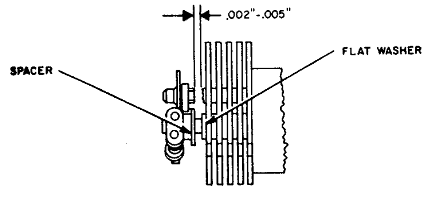
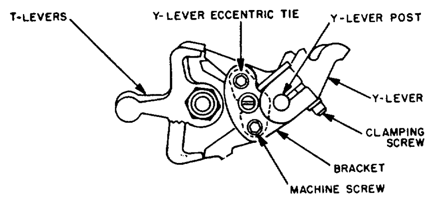



*Figure 4-122. Y-levers, T-levers, and code-ring cage adjustment.*




A. SIDE VIEW




B. FRONT VIEW

TM2226-C2-12

*Figure 4-123. Y-lever stud bracket adjustment (equipment furnished with Y-lever stabilizer assembly).*

take up the play of the Y-levers in the direction of the frame assembly. Check the requirement with feeler gages.

*c. Adjustment.* Loosen the mounting machine screws of the Y-lever eccentric tie and the clamping screw of the Y-lever stud bracket. Position the bracket to meet the requirement. Tighten the clamping screw and the mounting machine screws. Check related adjustment (par. 4-141).

**4-143. Rangefinder Cam and Selector Lever Stop Comb Adjustment (TT-76/GGC)**
(fig. 4-124)

*a. Requirements.*

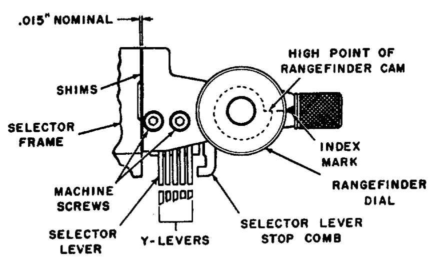
(1) The selector levers should be centered visually with their corresponding Y-levers.

(2) The rangefinder dial must read 55 to 65 when the rangefinder cam high point is in line with the index mark on the rangefinder and comb bracket.

*b. Adjustments.*

(1) Loosen the machine screws and position the selector lever stop comb to visually center the selector levers with the Y-levers; tighten the machine screws. If the selector lever stop comb cannot be adjusted to meet the requirement, loosen the machine screws that hold the rangefinder and comb bracket. Add or remove shims to provide the desired clearance. Tighten the machine screws and recheck the clearance.

(2) Loosen the setscrews in the rangefinder cam. Center the rangefinder cam visually with the spindle in the selector camshaft assembly. Set the rangefinder dial at 60 and tighten the knurled nut. Rotate the rangefinder cam until the high point is in line with the index mark; tighten the setscrews.



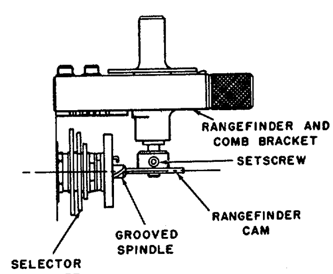




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*Figure 4-124. Rangefinder cam and selector lever stop comb adjustment (TT-76/GGC).*

**4-144. Selector Lever Stop Comb, Rangefinder Cam, and Rangefinder Detent Adjustment (TT-76A/GGC and Later Models)**

(fig. 4-125)

*a. Requirements.*

(1) The selector levers should be centered with their corresponding Y-levers.

(2) The dial must read 55 to 65 when the rangefinder cam high point is in line with the index mark on the range-finder and comb bracket.

(3) The detent should be set so that the detent holds the rangefinder dial firmly without excessive tightness.

*b. Adjustments.*

(1) Loosen the machine screws and position the selector lever stop comb to visually center the selector levers with the Y-levers; tighten the screws. If the selector lever stop comb cannot be adjusted to meet the requirement, loosen the machine screws that secure the rangefinder and comb bracket. Add or remove shims to provide the desired clearance.

(2) Loosen the setscrews in the range-finder cam. Center the rangefinder cam visually with the grooved spindle in the selector camshaft assembly. Set the rangefinder dial assembly at 60. Rotate the rangefinder cam until the high point is in line with the index mark; tighten the setscrews.

(3) Loosen the setscrew holding the detent. Slide the detent against the rangefinder dial to obtain the required detent action. Tighten the setscrew holding the detent.

**4-145. Y-Levers Friction and Eccentric Stop Adjustment (TT-76/GGC)**

(fig. 4-126)

*a. Requirements.*

(1) A push from 40 to 50 grams with a spring scale is required to start each selector Y-lever movings.

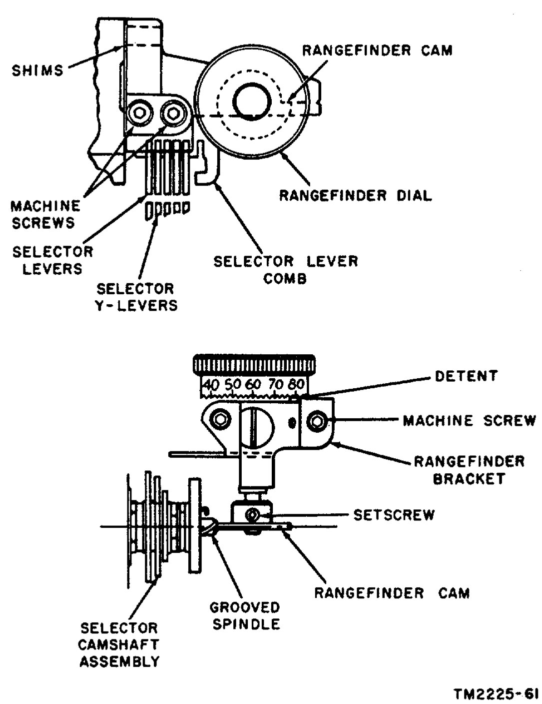



*Figure 4-125. Selector lever comb, rangefinder cam and rangefinder detent adjustment (TT-76A/GGC and later models).*

(2) The Y-lever eccentric stop should be set in its normal direction of maximum eccentricity.

*b. Adjustments.*

(1) Loosen the two setscrews in the spring retaining collar. Move the collar on the Y-lever pivot post stud to obtain the required spring pressure. Tighten the setscrews and recheck the requirement.

(2) Loosen the setscrew holding the Y-lever eccentric stop; set the Y-lever eccentric stop in the normal direction of maximum eccentricity and tighten the setscrew.

(3) Check related adjustments (pars. 4-130, 4-141, and 4-184).

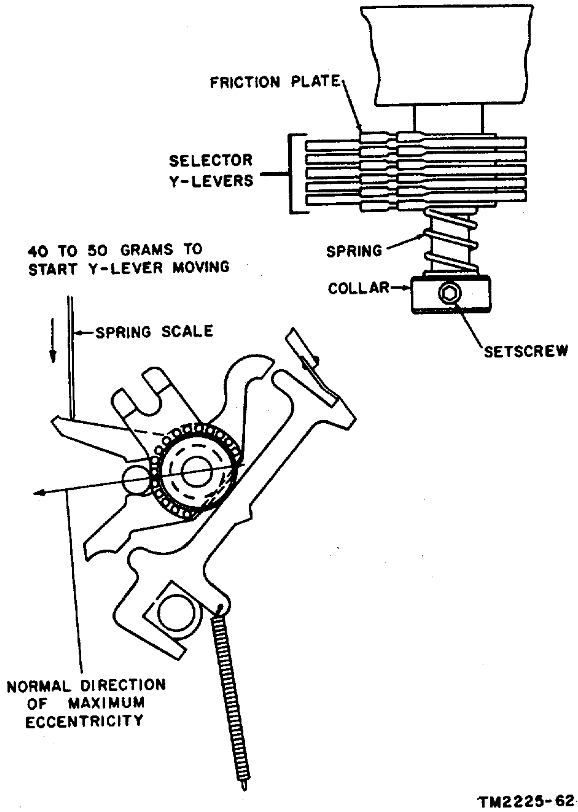



*Figure 4-126. Y-levers friction adjustment (TT-76/GGC).*

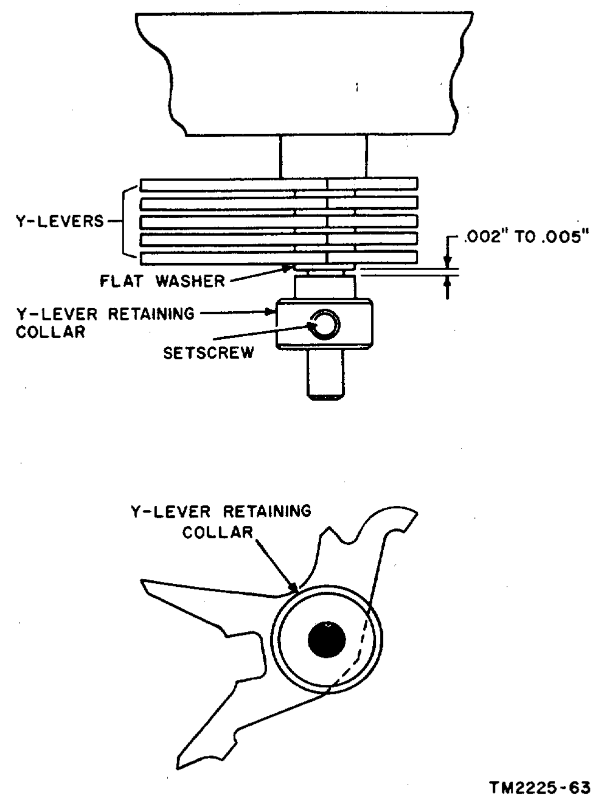



*Figure 4-127. Y-levers collar adjustment (TT-76A/GGC and later models).*

**4-146. Y-Levers Collar Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-127)

*a. Requirement.* There should be 0.002- to 0.005-inch clearance between the Y-lever retaining collar and flat washer.

*b. Adjustment.* Loosen the setscrews, move the Y-lever retaining collar in or out to meet the requirement. Tighten the setscrews.

**4-147. Y-Levers Detent End Play Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-128)

*a. Requirement.* There should be 0.002- to 0.005-inch clearance between the centering sleeve and the thrust washer.

*b. Adjustment.* Y-lever detents and thrust washers are placed on the centering sleeve, then the stackup is slipped on the Y-lever detent pivot. Tighten the hexagonal nut and check the clearance between the thrust washer and centering sleeve. If the clearance is not right, remove the hexagonal nut, slide the stackup off, and peel the laminated flat washer to meet the requirement. Check related adjustment (par. 4-148).

*Note*. The one thrust washer adjacent to the laminated flat washer may have to be replaced by five laminated flat washers to help meet the requirement.

**4-148. Y-Lever Detents and Y-Levers Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-129)

*a. Requirement.* There should be an equal engagement of each Y-lever detent with each

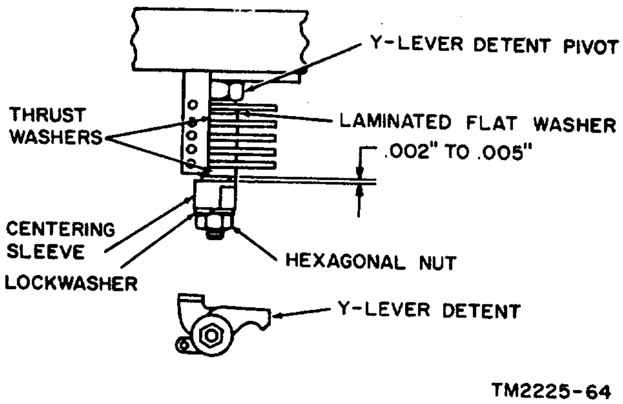



Figure 4-128. Y-levers detent end play adjustment (TT-76A/GGC and later models).

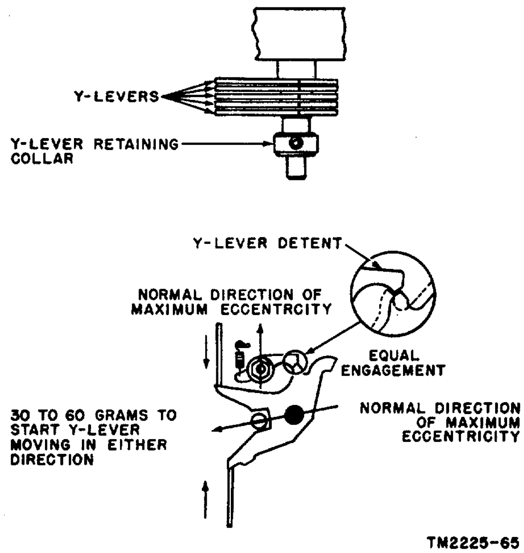



Figure 4-129. Y-lever detents and Y-levers adjustment (TT-76A/GGC and later models).

Y-lever when the Y-levers are in either the mark or space position.

*b. Adjustment.* Loosen the hexagonal nut and turn the centering sleeve until the requirements in a above are met. Tighten the hexagonal nut.

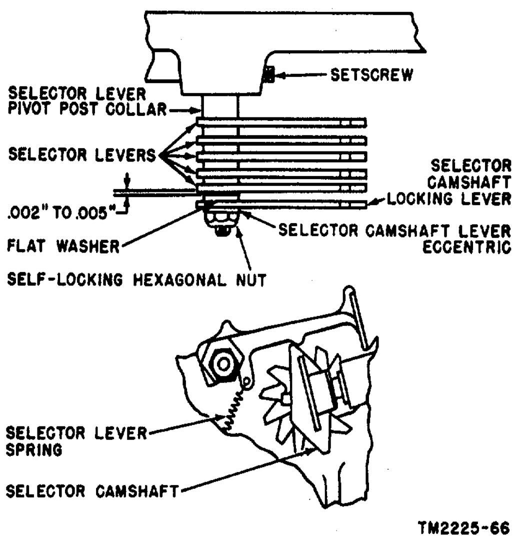



Figure 4-130. Selector lever clearance adjustment.

**4-149. Selector Lever Clearance Adjustment**

(fig. 4-130)

*a. Requirement.* There should be 0.002- to 0.005-inch clearance between the flat washer and the first selector lever.

*b. Adjustment.* Loosen the setscrew and slide the selector lever pivot stud in or out to meet the requirement. Tighten the setscrew.

**4-150. Code Hole Punch Levers Clearance Adjustment**

(fig. 4-131)

*a. Requirement.* There should be 0.001- to 0.003-inch clearance between the .last flat washer and the punch arm assembly.

*b. Adjustment.* Loosen the self-locking hexagonal nut and adjust the pivot stud for proper clearance; tighten the self-locking hexagonal nut and recheck the requirement.

**4-151. Punch Interference and Code Hole Punch Levers Alignment Adjustment**

(fig. 4-132)

*a. Requirement.* The code hole punch levers and punch interference levers should be aligned for equal spacing.

*b. Adjustment.* Loosen the setscrew in the front support frame and position the punch arm pivot post to meet the requirement. Tighten the setscrew and recheck the requirement. Check related adjustment (par. 4-153).

**4-152. Feed Pawl Assembly and Ratchet Wheel Clearance Adjustment**
(fig. 4-133)

*a. Requirement*. The feed pawl assembly should turn the ratchet wheel one tooth for each operation and should clear the tooth used in feeding by not more than 0.010 inch after the detent has operated.

*b. Method of Checking.* Release the transfer lever trip latch and turn the motor by hand until the detent operates and completes one feed. Note which tooth is directly above the feeding surface of the feed pawl assembly. Turn the motor until the tip of that tooth and the tip of the feed pawl are at their closest point. There should be some visual clearance. Use feeler gage to check if clearance is not over maximum.

*c. Adjustment.* Loosen the self-locking hexagonal nut and turn the machine screw in or out to meet the requirement. Check related adjustment (par. 4-194).

**4-153. Code Punch Bars and Code Hole Punch Levers Alignment and Clearance Adjustment**
(fig. 4-134)

a. Requirements.

(1) There should be a 0.001- to 0.013-inch clearance between each code hole punch lever and the flat surfaces of its associated code punch bar.

(2) There should be a 0.001- to 0.003-inch clearance between the comb and the flat surface of each code punch bar.

*b. Adjustments.*

(1) Loosen the machine screws that hold the punch and die assembly to the front support frame. Insert or re-

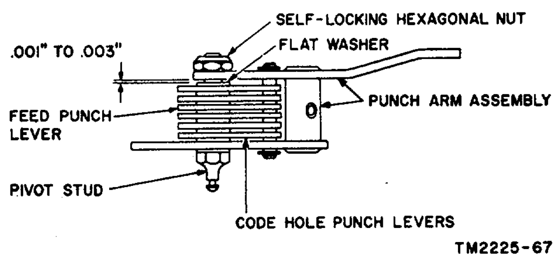
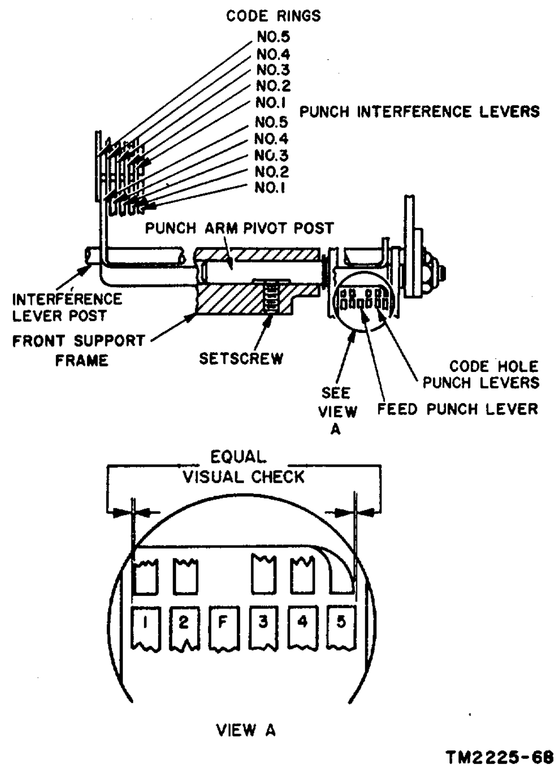



*Figure 4-131. Code hole punch levers clearance adjustment.*

*Figure 4-131. Code hole punch levers clearance adjustment.*



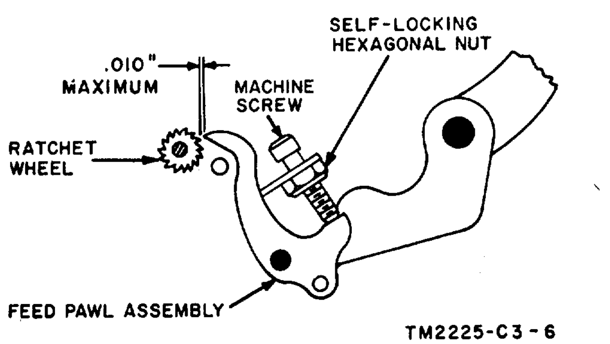




*Figure 4-133. Feed pawl assembly and ratchet wheel clearance adjustment.*

*Figure 4-132. Punch interference and code hole punch levers alignment adjustment.*

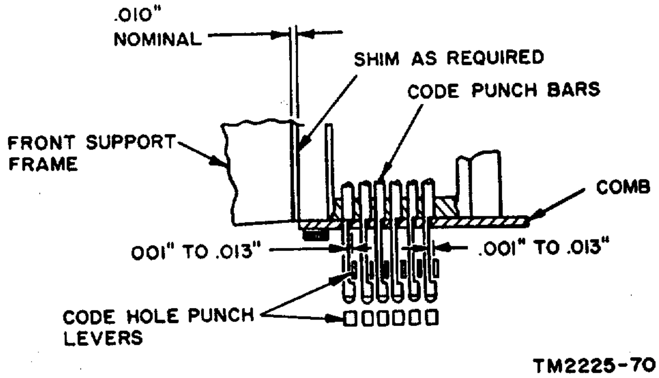
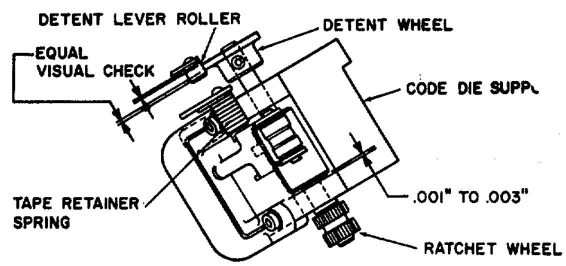



*Figure 4-134. Code punch bars and code hole punch levers alignment and clearance adjustment.*



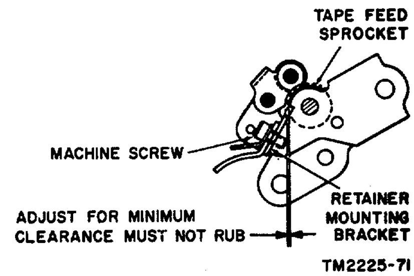




*Figure 4-135. Tape feed sprocket and retainer bracket adjustment.*

move enough shims to meet the requirements in *a*(1) above; tighten the machine screws and recheck the clearance.

(2) Loosen the machine screws that hold the comb to the code die support. Position the comb until the requirement in *a*(2) above is met; tighten the machine screws and recheck the clearance.

**4-154. Tape Feed Sprocket and Retainer Bracket Adjustments**
(fig. 4-135)

*a. Requirements.*

(1) There should be a 0.001- to 0.003-inch clearance between the tape feed sprocket and the code die support.

(2) The retainer mounting bracket must be mounted as closely as possible to the tape feed sprocket without touching it.

*b. Adjustments.*

(1) Loosen the two setscrews in the tape feed sprocket. Position the sprocket until the requirement in *a*(1) above is met. Tighten the setscrews and recheck the clearance.

(2) Loosen the retainer mounting bracket machine screws. Position the retainer mounting bracket against the tape feed sprocket to meet the requirement in *a*(2) above. Tighten the machine screws and recheck the requirement.

(3) Check related adjustment (par. 4-157).

**4-155. Code Hole Punch Levers and Cam Roller Clearance Adjustment**
(fig. 4-136)

*a. Requirement.* Adjust for clean punching and proper back-spacing action.

*b. Method of Checking*. Operate back space lever. Any burring or elongation of perforated holes indicates code hole punch levers are too high.

*c. Adjustment.* Loosen the hexagonal nut and adjust the eccentric stud until the requirement is met. The eccentric stud is to be adjusted for minimum clearance between the cam roller and the print and register cam. Tighten the hexagonal nut and recheck the clearance. Check related adjustments (pars. 4-156 and 4-152).

**4-156. Feed Pawl Assembly Alignment**
(fig. 4-137)

*a. Requirement.* There should be 0.010- to 0.025-inch clearance between the feed pawl assembly and the ratchet wheel when the print and register cam is in the stop position.

*b. Adjustment.* Loosen the self-locking hexagonal nut on the feed pawl pivot and turn the feed pawl pivot until the requirement is met; tighten the self-locking hexagonal nut and recheck the clearance. Check related adjustment (par. 4-152).

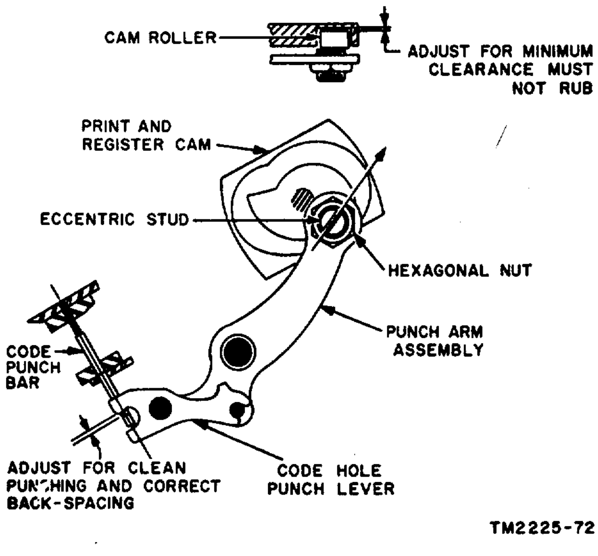



*Figure 4-136. Code hole punch levers and cam roller clearance adjustment.*

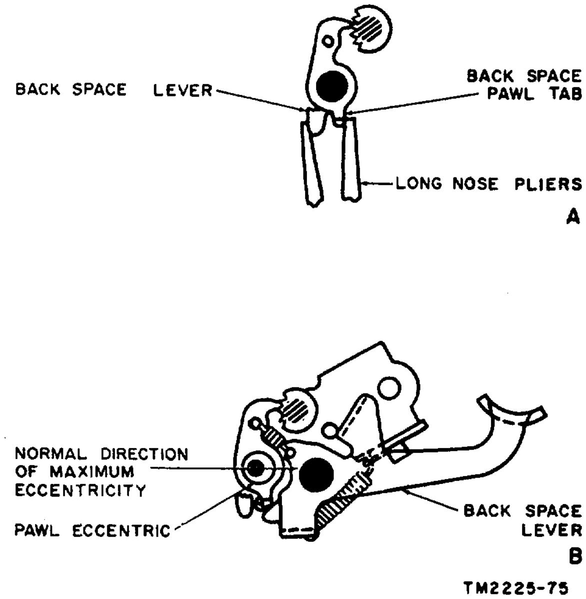



*Figure 4-137. Feed pawl assembly alignment.*

## 4-157. Feed Hole Spacing and Detent Lever Alignment Adjustment

(fig. 4-138)

*a. Requirement.* Punched feed holes in the message tape should be spaced evenly; 10 holes per inch.

*b. Adjustment.* Measure the distance between 60 consecutive holes. The distance should be 6 inches plus or minus 1/64 inch. If the requirement is not met, loosen the self-locking hexagonal nut; turn the eccentric stud clockwise to decrease spacing or counterclockwise to increase spacing until the requirement is met. Tighten the self-locking hexagonal nut and recheck the requirement. Repeat this procedure until the requirement is met. Check related adjustments (pars. 4-152 and 4-158 or pars. 4-159 and 4-194).

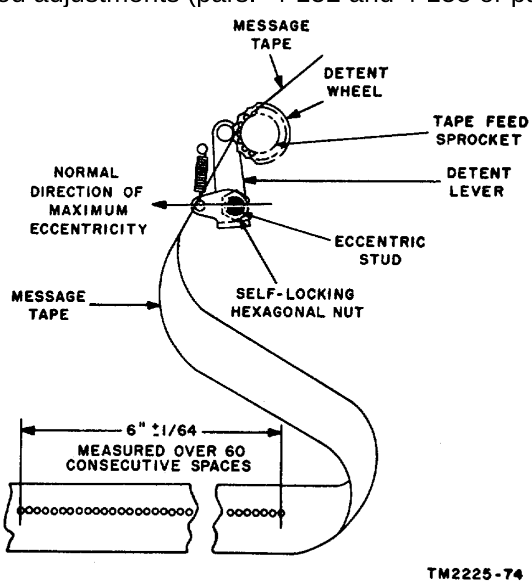



*Figure 4-138. Feed hole spacing and detent lever alignment adjustment.*

## 4-158. Back Space Mechanism Alignment Adjustment (TT-76/GGC)

(fig. 4-139)

*a. Requirements.*

(1) With full depression of the back space lever the tape should back space one character, and the

detent lever should be seated in the detent wheel. Any additional pressure applied to the back space lever should not cause the tape or the detent wheel to move.

(2) The back space pawl should engage the ratchet wheel directly between two of its teeth when the back space lever is depressed.

*b. Adjustments.*

(1) Loosen the self-locking hexagonal nut and rotate the pawl eccentric stud to meet the requirement of a(1) above. Tighten the self-locking hexagonal nut and recheck the requirement.

(2) Bend the back space pawl tab with a long nose pliers until the requirement of *a*(2) above is met.

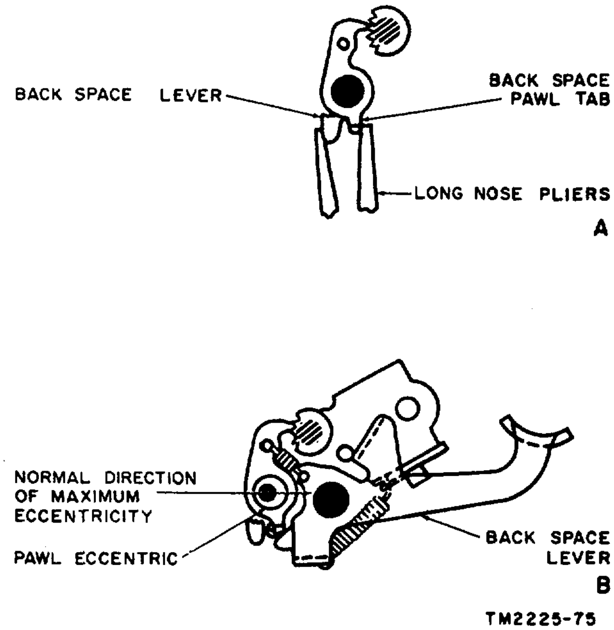



*Figure 4-139. Back space mechanism alignment adjustment (TT-76/GGC).*

**4-159. Back Space Mechanism Alignment Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-140)

*a. Requirements.*

(1) With full depression of the back space lever the tape should back space one character, and the detent lever should be seated in the detent wheel. Any additional pressure applied to the back space lever should not cause the tape or the detent wheel to move.

(2) The back space pawl should engage the ratchet wheel directly between two of its teeth when the back space lever is depressed.

(3) When the above requirements have been met and the back space lever is depressed, the indicator should point directly at the previously typed character on the message tape.

*b. Adjustments.*

(1) Loosen the self-locking hexagonal nut and rotate the pawl eccentric stud to meet the requirement of *a*(1) above. Tighten the self-locking hexagonal nut and recheck the requirement.

(2) Bend the back space pawl tab with a long nose pliers until the requirement of *a*(2) above is met.

(3) Remove the retainer ring, tape guide lever, and tape guide lever spring from the tape guide lever pivot. Loosen the tape guide lever pivot and position the indicator to meet the requirement of *a*(3) above. Tighten the tape guide lever pivot and recheck the requirement. Assemble the tape guide lever spring, tape guide lever, and retainer ring on the tape guide pivot.

**4-160. Type Wheel Register Lever Alignment in Operated Position**
(fig. 4-141)

*a. Requirement.* There should be a 0.001- to 0.005-inch clearance between the type register lever and the print hammer eccentric stop.

*b. Adjustment.* Loosen the self-locking hexagonal nut and position the print hammer eccentric stop until the requirement is met; tighten the self-locking hexagonal nut and recheck the clearance.

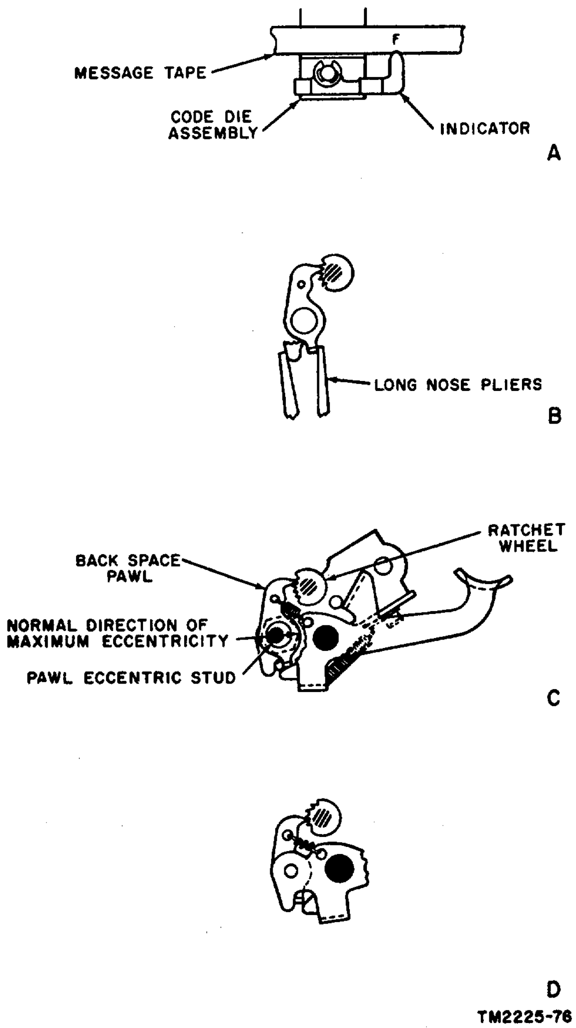



Figure 4-140. Back space mechanism alignment adjustment (TT-76A/GGC and later models).

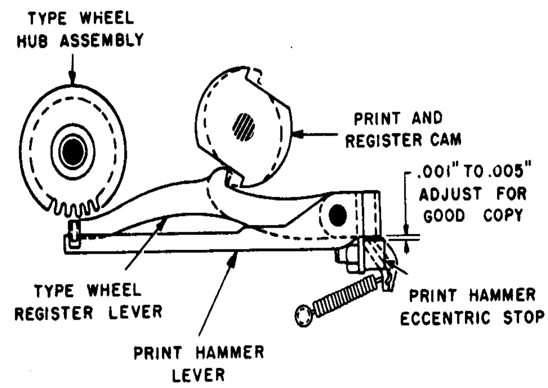



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Figure 4-141. Type wheel register lever alignment in operated position.

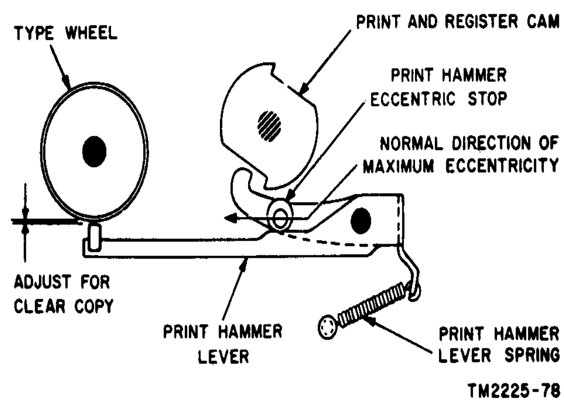


Figure 4-142. Print hammer lever alignment in operated position (TT-76/GGC).

## 4-161. Print Hammer Lever Alignment in Operated Position Adjustment (TT-76/GGC)

(fig. 4-142)

*a. Requirement.* The print hammer eccentric stop should be adjusted to give clear copy.

*b. Adjustment.* Loosen the self-locking hexagonal nut on the print hammer eccentric stop. Rotate the print and register cam to the position shown. Adjust the print hammer eccentric stop until the requirement is met. Tighten the self-locking hexagonal nut and recheck the requirement. Check the related adjustment (par. 4-160).

## 4-162. Stop Arm and Type Wheel Hub Assembly Alignment Adjustment

(fig. 4-143)

*a. Requirement.* With the stop arm against the left side of the selected V stop bar, the type wheel register lever should engage the fifth notch counterclockwise from the blank portion of the type wheel hub assembly.

*b. Adjustment.*

(1) Operate the code rings manually, placing the first code ring in the space position and the other four in the mark position.

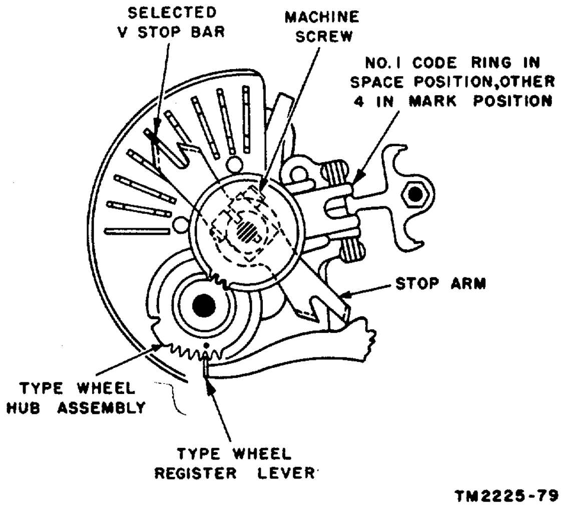


*Figure 4-143. Stop arm and type wheel hub assembly alignment adjustment.*

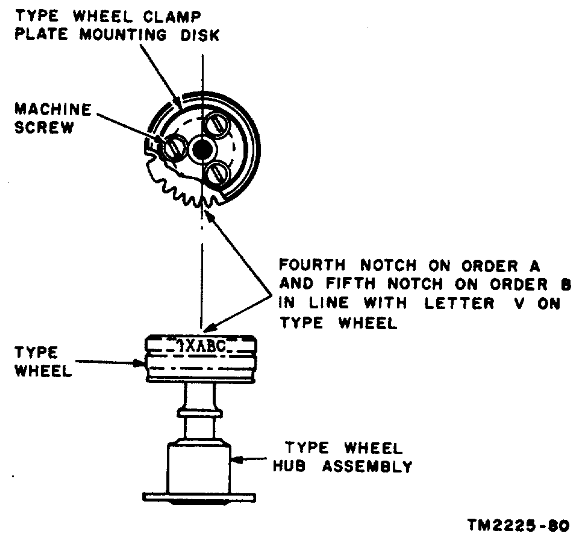


*Figure 4-144. Type wheel and type wheel hub assembly alignment adjustment.*

This will allow the V stop bar to be selected.

(2) Loosen the machine screw in the stop arm. Manually turn the type wheel driving gear until the type wheel register lever engages the fifth notch counterclockwise from the blank portion of the type wheel hub assembly.

When this requirement is met, tighten the machine screw.

(3) Check related adjustment (par. 4-163).

*Note.* On the TT-76/GGC, the type wheel register lever engages the fourth notch counterclockwise from the blank portion of the type wheel hub assembly.

**4-163. Type Wheel and Type Wheel Hub Assembly Alignment Adjustment**

(fig. 4-144)

*a. Requirement.* The letter V on the type wheel must be aligned with the fifth notch counterclockwise from the blank portion of the type wheel hub assembly.

*b. Adjustment.* Loosen the machine screws of the type wheel clamp plate mounting disk and turn the type wheel until the requirement is met; tighten the machine screws. The stop arm and type wheel hub assembly must be aligned (par. 4-162) before this adjustment is made.

*c. Final Check.* All characters must be fully printed.

*Note*. On the TT-76/GGC, the letter V is aligned with the fourth notch counterclockwise from the blank portion of the type wheel hub assembly.

**4-164. Type Wheel Reciprocating Transfer and Bell Crank Levers End Clearance Adjustments**

(fig. 4-145)

*a. Requirements.*

(1) There should be a 0.005-inch clearance between the type wheel reciprocating transfer lever and the type wheel upper bell crank lever. The upper bell chank machine screw should clear the frame.

(2) There should be a 0.005- to 0.010-inch clearance between the type wheel lower bell crank lever and the type wheel hub assembly.

(3) There should be a 0.002- to 0.005-inch clearance between the upper shaft collar and the frame.

*b. Adjustment.*

(1) Loosen the machine screw in the type wheel upper bell crank lever and position the lever to give the required clearance; tighten the machine screw and recheck the clearance.

(2) Loosen the machine screw in the type wheel lower bell crank lever. Adjust for the required clearance between the type wheel lower bell crank lever and the type wheel hub assembly; tighten the machine screw and recheck the clearance.

(3) Loosen the setscrew in the upper shaft collar and position the shaft collar to give the proper clearance. Tighten the setscrew and recheck the clearance.

(4) Check related adjustment (par. 4-173).

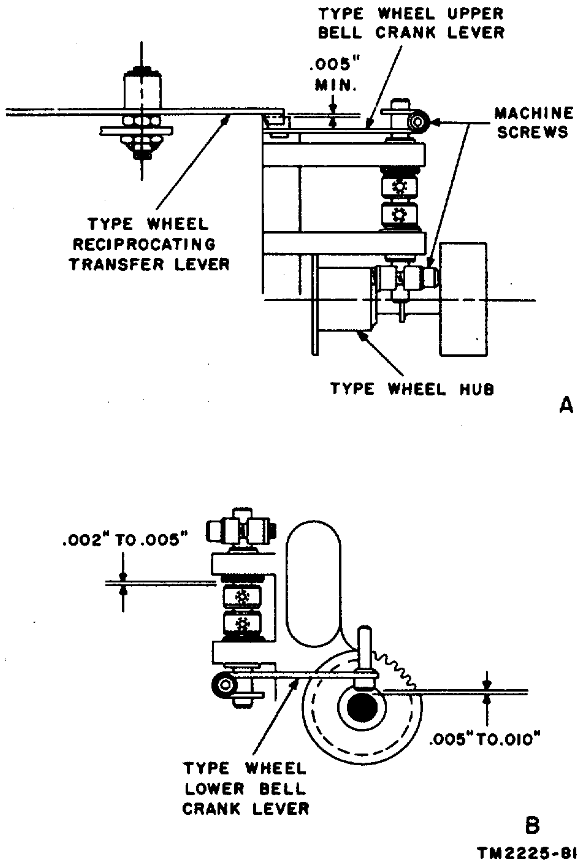


*Figure 4-145. Type wheel reciprocating transfer and bell crank levers end clearance adjustments.*

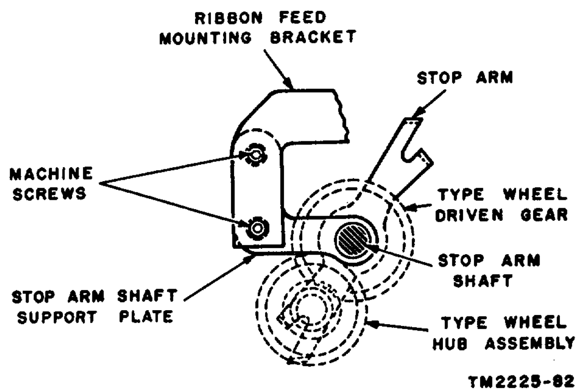


*Figure 4-146. Stop arm shaft support plate alignment adjustment.*

**4-165. Stop Arm Shaft Support Plate Alignment Adjustment**
(fig. 4-146)

*a. Requirement.* The stop arm shaft should turn freely in the stop arm shaft support plate.

*b. Adjustments.* Loosen the stop arm shaft support plate machine screws. Position the stop arm shaft support plate until the stop arm shaft rotates freely. Tighten the stop arm shaft support plate machine screws. Check related adjustment (par. 4-166 or 4-167).

**4-166. Cam Follower Eccentric Stud Adjustment (TT-76/GGC**)
(fig. 4-147)

*a. Requirement*. When the left side of the ribbon feed cam follower is against the low side of the cam, there should be a 0.015- to 0.030-inch clearance between the ribbon reversing arm and the empty spool sensing lever.

*b. Adjustment.* Adjust the eccentric stud until the requirement is met. Check related adjustment (par. 4-171).

**4-169. Ribbon Feed Reversing Toggle Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-148)

*a. Requirement*. When the ribbon feed cam follower is against the low side of the cam, there should be

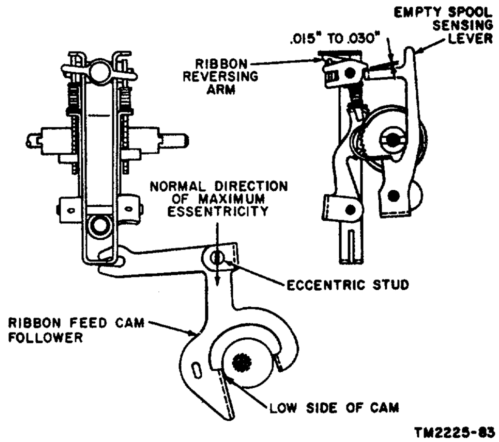


*Figure 4-147. Cam follower eccentric stud adjustment (TT-76/GGC).*

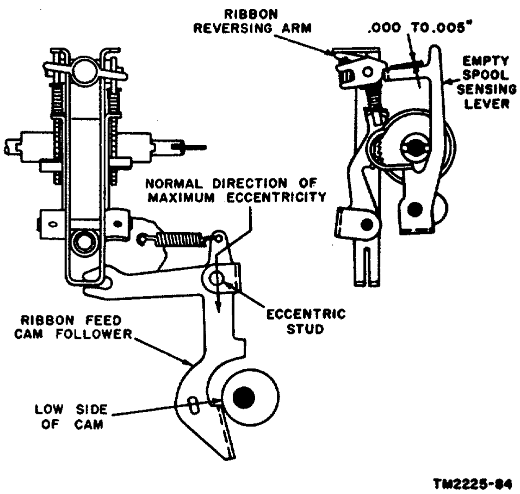


*Figure 4-148. Ribbon feed reversing toggle adjustment (TT-76A/GGC and later models).*

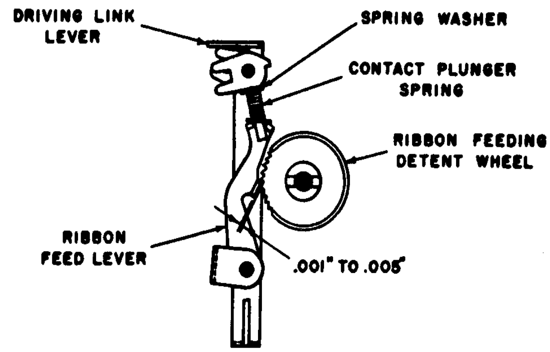


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*Figure 4-149. Ribbon feed lever clearance adjustment.*

some clearances but not more than 0.005-inch between the ribbon reversing arm and the empty spool sensing lever.

*b. Adjustment.* Bend the ear on the empty spool sensing lever to meet the requirement. Check related adjustment (par. 4-171).

*Note.* The ear should engage the ribbon reversing arm approximately 50 percent of the thickness of the empty spool sensing lever.

**4-168. Ribbon Feed Lever Clearance Adjustment**

(fig. 4-149)

*a. Requirement.* The ribbon feed lever should engage the ribbon feeding detent wheel with 0.001- to 0.005-inch clearance between the ribbon feed lever and the bottom of the tooth in the ribbon feeding detent wheel.

*b. Adjustment.* If the ribbon feed lever does not meet the requirement, carefully bend the limiting tabs of the driving link lever until the requirement is met. Check related adjustment (par. 4-171).

**4-169. Sensing Lever Retracting Levers Adjustment (TT-76A/GGC and Later Models)**

(fig. 4-150)

*a. Requirements.*

(1) There should be approximately 14-inch clearance between the lower extension of the sensing lever retracting lever and the ribbon feeding detent wheel when the sensing lever is all the way forward against the ribbon feeding detent wheel.

(2) When the ribbon retainer lever is against the hub of the empty spool, the sensing lever must be free to move all the way forward against the ribbon feeding detent wheel. When the ribbon

retainer lever is held back, the sensing lever must be retracted enough to remove the empty ribbon spool.

*b. Method of Checking.*

(1) Remove the ribbon spool. With the sensing lever all the way forward against the ribbon feeding detent wheel, visually check the clearance.

(2) Place an empty ribbon spool on the ribbon spool shaft. With the ribbon retainer lever against the empty ribbon spool, check to see that the sensing lever moves all the way forward against the ribbon feeding detent wheel. Then hold the ribbon retainer lever back and check to see that the sensing lever is retracted enough to remove the empty ribbon spool.

*c. Adjustments.*

(1) Bend the lower extension of the sensing lever retracting lever to meet the requirement of *a*(1) above.

(2) Remove the ribbon retainer lever, the ribbon retainer lever spring, and the ribbon retainer lever collar. With the sensing lever retracting lever still on the ribbon retainer shaft, wind or unwind the coiled portion of the sensing lever retracting lever until the requirement of *a*(2) above is met. To check the requirement while making the adjustment, place the ribbon retainer lever on the ribbon retainer shaft without the collar. When the requirement has been met, reassemble the ribbon retainer lever, the ribbon retainer lever collar, and the ribbon retainer lever spring, and make the adjustment in, paragraph 4-170.

*Note*. Unwinding the coiled portion of the sensing lever retracting lever causes the sensing lever to be retracted farther. Winding will allow the sensing lever to move farther forward.

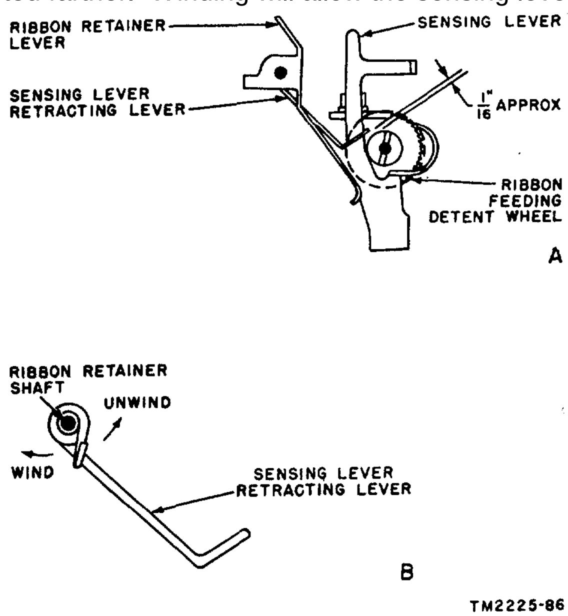



*Figure 4-150. Sensing lever retracting levers adjustment (TT-76A/GGC and later models).*

### 4-170. Ribbon Retainer Levers Adjustment (TT-76A/GGC and Later Models)

(fig. 4-151)

*a. Requirement.*

(1) The ribbon retainer levers should be positioned so there is a slight clearance between the ribbon retainer levers and the inside of the ribbon spool when the ribbon spool is fully engaged with the ribbon feeding detent wheel.

(2) The ribbon retainer levers should prevent the ribbon spools from becoming disengaged with the ribbon feeding detent wheels.

*b. Method of Checking.*

(1) Visually check for clearance.

(2) Unlock the ribbon spool clips and pull outward on the ribbon spool. When the outward motion of the spool is stopped by the ribbon retainer lever check for the requirement by turning the ribbon spool. The spool should not turn unless the ribbon feeding detent wheel turns with it.

*c. Adjustment*. Loosen the two setscrews in each of the ribbon retainer lever collars and position the retainer levers to meet the requirements. Tighten the setscrews and recheck the requirements.

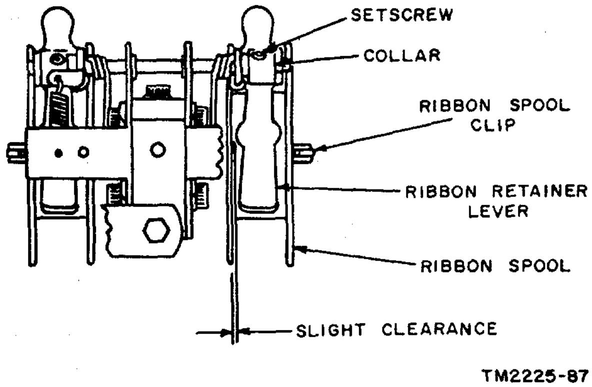



*Figure 4-151. Ribbon retainer levers adjustment (TT-76A/GGC and later models).*

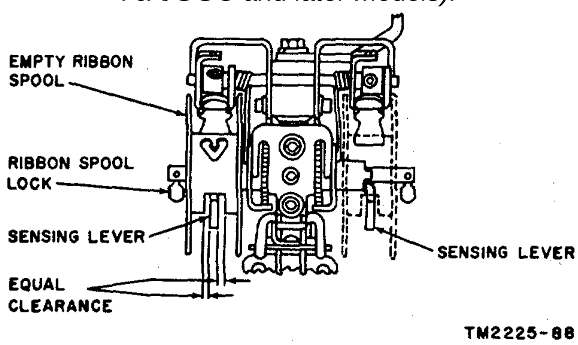



*Figure 4-152. Empty spool sensing levers adjustment (TT-76A/GGC and later models).*

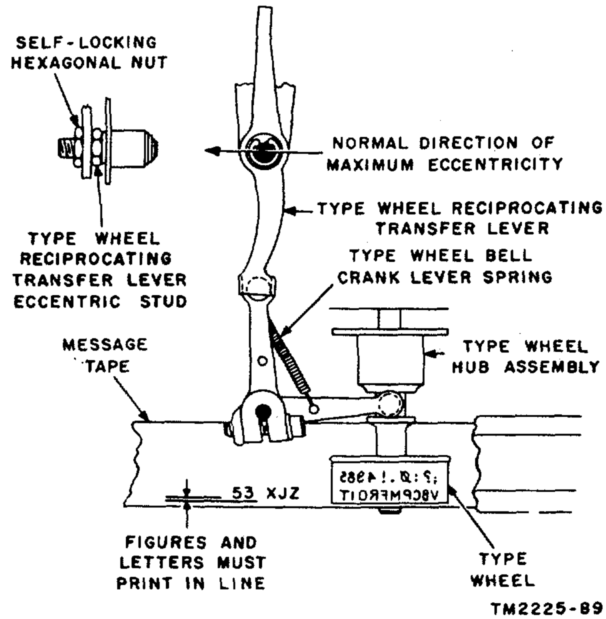



*Figure 4-153. Type wheel figures-letters alignment adjustment.*

*Note.* After this adjustment has been, made, be sure the sensing levers move all the way forward under the ribbon reversing arm (par. 4-171).

**4-171. Empty Spool Sensing Levers Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-152)

*a. Requirement.* The empty spool sensing levers must move forward through the hole in the empty ribbon spools.

*b. Method of Checking.* Place an empty ribbon spool on the ribbon spool shaft; be sure the spool is on all the way. Lock on the spool with the ribbon spool clip. Rotate the spool slowly. The sensing lever should move forward approximately in the center of the hole in the empty ribbon spool. Check both sensing levers in this manner.

*c. Adjustment.* Remove the empty ribbon spool and bend the lower extension of the empty spool sensing lever to the right or left to meet the requirement. Adjust both sensing levers in this manner.

**4-172. Type Wheel Figures-Letters Alignment Adjustment**
(fig. 4-153)

*a. Requirement.* The printing of figures and letters on the paper tape must appear in a straight line of print.

*b. Adjustment.* Loosen the self-locking hexagonal nut on the type wheel reciprocating transfer lever eccentric stud and adjust the type wheel reciprocating transfer lever eccentric stud until the requirement is met. Tighten the self-locking hexagonal nut and recheck the requirements. Check related adjustment (par. 4-173).

**4-173. Copy Alignment Adjustment**
(fig. 4-154)

*a. Requirement.* The copy should be equally spaced within 1/32 inch between the first line of the punched code holes and the edge of the paper tape.

*b. Adjustment.* Loosen the machine screw in the type wheel lower bell crank lever and adjust the type wheel lower bellcrank lever until the requirement is met; tighten the machine screw. Check related adjustment (par. 4-164).

### *4-174. Selector Magnet Bracket Alignment and Armature Preliminary Adjustment

(fig. 4-155)

*a. Requirements.*

(1) When the selector magnet bracket is against the bracket adjustment screws, the threaded holes in the teletypewriter side casting should be centered with their associated holes in the selector magnet bracket.

(2) When the selector magnet bracket is secured in the position described in (1) above, the armature adjusting screws should be adjusted to hold the armature in a position which permits No. 1 selector lever to barely pass the armature blade without engaging the knife edge of the blade.

**NOTE**

**This is a preliminary adjustment to establish a condition necessary for performing the adjustment described in paragraph 4-177.**

*b. Adjustments.*

(1) Remove the two selector bracket mounting screws, hold the bracket against the bracket

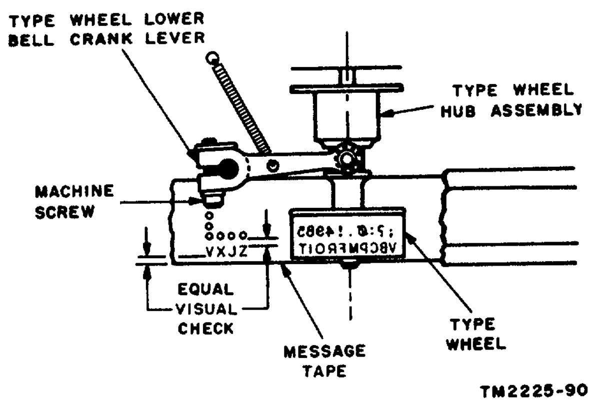



Figure 4-154. Copy alignment adjustment.

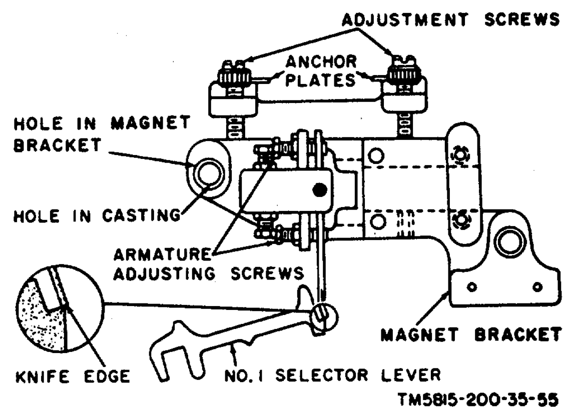



Figure 4-155. Armature stop bracket and bar magnet preliminary clearance.

adjustment screws, and adjust the screws to meet the requirement in *a*(1) above. Replace and tighten the selector bracket mounting screws.

(2) Hold the armature against either armature adjusting screw and turn the adjusting screw until the position of the armature permits the No. 1 selector lever to barely pass the knife edge of the armature blade. Turn the other armature adjusting screw slowly and carefully toward the armature until it barely touches the armature.

**CAUTION**

**Do not exert any pressure against the armature when adjusting the second armature adjusting screw. Failure to observe this caution will result in either a bent armature or bent armature mounting shaft.**

(3) Perform the related adjustments (paras. 4-175 through 4-186).

### *4-175. Armature Stop Bracket and Bar Magnet Preliminary Clearance Adjustment TT-76/GGC

(fig. 4-156)

**NOTE**

**Some teletypewriters include a bar magnet that is 1 3/4 in. long; others include a bar magnet that is 1 11/16 inch**

**long. The bar magnets are interchangeable, but certain adjustment requirements vary, depending upon which bar magnet is used. Disconnect plug P8 from the SELECTOR MAGNET receptacle on the left side of the base. Remove the two screws that secure the selector magnet bracket to the teletypewriter side casting, remove the selector magnet bracket, and measure the length of the bar magnet to determine the appropriate tolerances in a below and in paragraph 4-177*a*.**

*a. Requirement.*

(1) There should be a 0.014- to 0.016-inch clearance between the armature stop bracket and the south pole of the bar magnet if the bar is 1 11/16 inch long.

(2) There should be a 0.030-inch clearance between the armature stop bracket and the south pole of the bar magnet if the bar magnet is 1 3/4 inches long.

*b. Adjustment.*

(1) Loosen the two screws that secure the selector magnet to the magnet bracket, slide the selector magnet and the conductor bracket (fig. 4-158) away from the armature, and tighten the two screws.

(2) Loosen the setscrew that secures the bar magnet to the selector magnet bracket. Insert either a 0.015-inch or 0.030-inch feeler gage, as appropriate (a(1) or (2) above), between the armature stop bracket and the bar magnet, press the magnet against the gage, tighten the setscrew, and remove the feeler gage.

(3) Perform the related adjustments (paras. 4-177 through 4-186).

## 4-175.1. Armature Stop Bracket and Bar Magnet Preliminary Clearance Adjustment TT-699/GGC

**NOTE**

Some selector magnets include a bar magnet that is 1 3/4 inches long; others include one that is 1 11/16 inches long. Disconnect the selector magnet leads from the terminal board. Remove the two screws that secure the selector magnet bracket to the teletypewriter side casting; remove the selector magnet bracket, and measure the length of the bar magnet. The bar magnet used in the low-level teletypewriter must be the shorter magnet (1 11/16 inches long).

**NOTE**

Examine the selector magnet toffets (wafer-like raised faces on armature (A, fig. 4-160). Some toffets are 0.325 inch by 0.200 inch (rectangular). Other magnets have toffets that are 0.325 inch by 0.325 inch (square). The selector magnets are interchangeable, but certain adjustment requirements vary, depending on which selector magnet is used. Measure the toffets (square or rectangular) to determine the appropriate tolerances referenced in *a* and *b* below.

*a.* The clearance between the armature stop bracket and the south pole of the bar magnet should be either 0.008 inch (rectangular toffets) or 0.040 inch (square toffets).

*b.* To make the adjustment, loosen the two screws that secure the selector magnet to the magnet bracket, slide the selector magnet and the conductor bracket (fig. 4-158) away from the armature, and tighten the two screws. Loosen the setscrew that secures the bar magnet to the selector magnet bracket. Insert either an 0.008-inch or 0.040-inch feeler gage, as appropriate (a above), between the armature stop bracket and the bar magnet; press the magnet against the gage, tighten the setscrew, and remove the feeler gage.

## 4-176. Selector-Magnet Pole Faces and Armature Alignment Adjustment (TT-76/GGC)

(fig. 4-157)

*a. Requirement*. The selector-magnet pole faces should be parallel with the armature and there

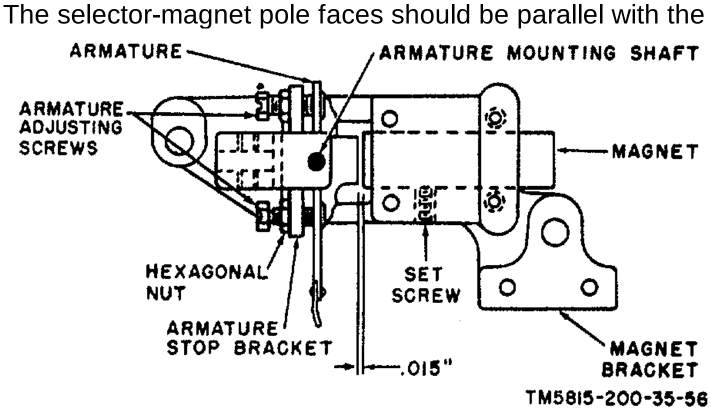



*Figure 4-156. Armature stop bracket and bar magnet preliminary clearance.*

should be 0.008-inch clearance between both selector-magnet pole faces and the armature with the armature in the fixed position as a result of the adjustment in paragraph 4-174.

*b. Adjustment.* The selector magnet is fastened to the selector-magnet bracket by two machine screws. Loosen the two machine screws slightly. This allows the selector magnet to be moved toward and away from the armature. Place 0.008-inch flat gages (brass, if possible) between the selector-magnet pole faces and the armature. Move the selector magnet toward the armature until the flat gages are held in place. Hold the bracket (fastened between the selector magnet and the selector-magnet bracket) against the north end of the bar magnet. Tighten the machine screws slightly and remove the flat gages. Adjust the setscrews to make the selector-magnet pole faces parallel with the armature. When parallel, recheck the 0.008-inch clearance and tighten the machine screws. Check related adjustment (par. 4- 178).

**4-177. Selector-Magnet Pole Faces and Armature Alignment Adjustment (TT-76A/GGC and Later Models)**

(fig. 4-158)

**NOTE**

Remove the selector magnet bracket and determine whether the bar magnet is 1 ¾ inch long or 1 11/16 inch long (par. 4-175 note.).

*a. Requirements.*

(1) There should be a 0.027- to 0.0033-inch (0.022 to 0.030 inch for TT-699(*)/GGC) clearance between the conductor bracket and the north pole of the bar magnet, if the bar magnet is 1 11/16 inch long (B, fig. 4-158). If the bar magnet is 1 ¾ inch long, there should be no clearance between the conductor bracket and the bar magnet.

(2) When the armature is locked in position by the armature adjusting screws (para 4-174b(2)), there should be a 0.004-inch clearance (0.003 inch for TT-699(*)/GGC) between each pole face of the selector magnet and its adjacent toffet (raised portion of armature; A, fig. 4-158). The center of the pole faces should be aligned with the center of the armature adjusting screws.

(3) The pole faces of the selector magnet and their associated toffets on the armature should be parallel within 0.002 inch (B, fig. 4-158).

(4) The armature should not touch either armature adjusting screw when the armature is moved to the marking and spacing positions.

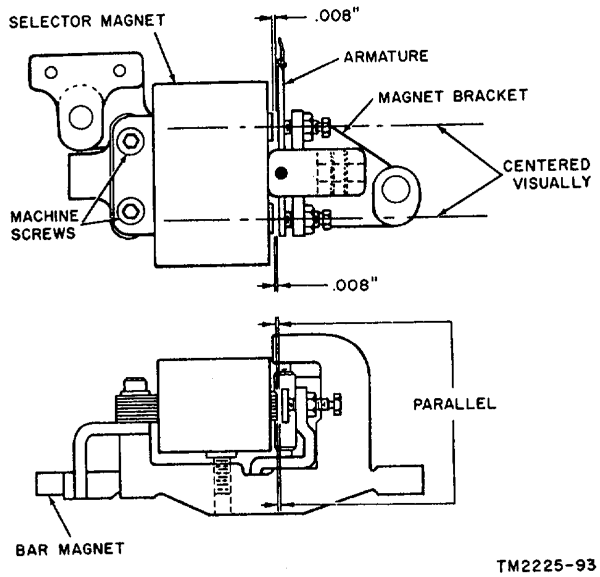



*Figure 4-157. Selector-magnet pole faces and armature alignment adjustment (TT-76/GGC).*

*b. Method of Checking.*

(1) If the bar magnet is 1 11/16 inch long, use feeler gages to check the requirement in *a*(1) above. Check the requirement visually, if the bar magnet is 1 3/4 inch long.

(2) Use feeler gages to check the requirements in *a*(2) and (3) above.

(3) After requirements *a*(2) through (3) above are met, backoff the armature adjusting screws and check the requirement in *a*(4) above visually.

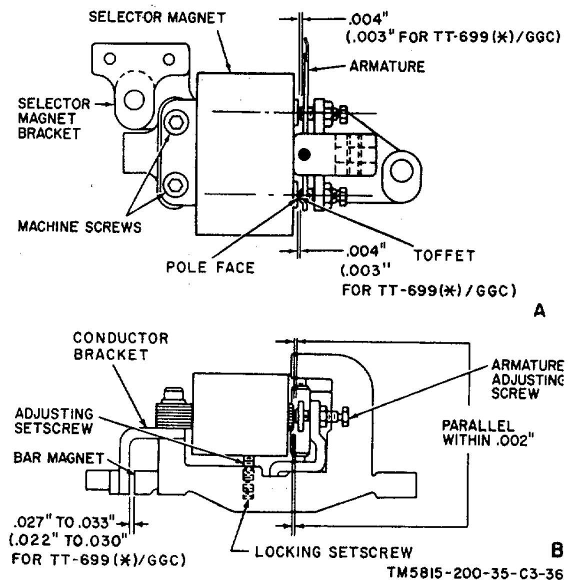



*Figure 4-158. Selector-magnet pole faces and armature alignment requirements.*

*c. Adjustments.*

(1) Loosen the selector magnet mounting screws. If the bar magnet is 1 3/4 inch long, slide the conductor bracket against the bar magnet and tighten the selector magnet mounting screws friction-tight. If the bar magnet is 1 11/16 inch long, insert a 0.030-inch feeler gage between the north pole of the bar magnet and the conductor bracket, slide the conductor bracket against the feeler gage, and tighten the selector magnet mounting screws friction-tight. Perform the adjustments in (2) through (4) below.

(2) Insert a 0.004-inch feeler gage between each pole face and its associated toffet on the armature. Position the selector magnet to meet the requirement in *a*(2) above.

(3) If the pole faces and the toffets are not parallel within 0.002 inch, use the four setscrews located under the' selector magnet (B, fig. 4-158) to make this adjustment. Remove the locking (outer) setscrew of each pair of setscrews, turn the adjusting (inner) setscrews in the direction necessary to meet the requirement in *a*(3) above; then tighten the locking setscrews against the adjusting setscrews.

(4) Loosen the locknuts in the armature adjusting screws (B, fig. 4-158), turn the screws away from the armature to meet the requirement in *a*(4) above, and tighten the locknuts.

(5) Perform the related adjustments (paras 4-179 through 4-186).

**4-177.1. Selector-Magnet Pole Faces and Armature Alignment Adjustment (TT-699A/GGC and Later Models)**

(fig. 4-158)

**NOTE**

Determine if the selector magnet armature has rectangular or square toffets (note, par. 4-175.1).

*a*. Check for the following requirements:

(1) The clearance between the conductor bracket and the north pole of the bar magnet should be either 0.030 inch (rectangular toffets) or 0.022 inch (square toffets).

(2) When the armature is locked in position by the armature adjusting screws as described in paragraph 4-174*b* (2), there should be a tight 0.003 inch clearance between each pole face of the selector magnet and its adjacent armature toffet (A, fig. 4-158). The center of the pole faces should be aligned with the center of the armature adjusting screws.

(3) The pole faces of the selector magnet and their adjacent armature toffets should be parallel within 0.002 inch as shown in B, fig. 4-158.

(4) The armature should not touch either armature adjusting screw when the armature is moved to the marking and spacing positions.

*b.* Check the requirement as follows:

(1) Use feeler gages to check the appropriate requirements in *a*(1), (2), and (3) above.

(2) After the first three requirements are met, back off the armature adjusting screws and check the requirement in *a*(4) above visually.

*c*. Make the adjustments as follows:

(1) Loosen the selector magnet mounting screws. Insert either a 0.030-inch gage (rectangular toffets) or a 0.022-inch gage (square toffets) between the north pole of the armature and the conductor bracket. Slide the conductor bracket against the feeler gage and tighten the selector magnet mounting screws friction tight. Perform adjustments (2), (3), and (4) below.

(2) Insert a 0.004-inch feeler gage between each pole face and its associated armature toffet.

Position the selector magnet to meet requirement in *a*(2) above.

(3) If the pole faces and the toffets are not parallel within 0.002 inch, use the four setscrews located under the selector magnet (B, fig. 4-158) to make this adjustment. Remove the locking (outer) setscrew of each pair of setscrews, turn the adjusting (inner) setscrew in the direction necessary to meet the requirement in *a*(3) above; then tighten the locking setscrews against the adjusting setscrews. Recheck the requirement and readjust, if necessary.

(4) Loosen the locknuts on the armature adjusting screws (B, fig. 4-158), turn the screws away from the armature to meet the requirement in *a*(4) above, and tighten the locknuts.

## 4-178. Armature Machine Screws Final Adjustment and Bar Magnet Attractive Force (TT-76-GGC)

(fig. 4-159)

**NOTE**

**Perform adjustments in paragraphs 4-174, 4-175, and 4-176 before making this adjustment.**

*a. Requirements.*

(1) There should be a 0.004-inch clearance between the selector-magnet pole faces and the armature when the opposite end of the armature is against its machine screw.

(2) A force of 50 to 65 grams should be required to start the armature moving from either the mark or space position when the selector magnet bracket is removed from the machine, the signal and bias current are removed, and the two armature leaf spring stop screws are away from the leaf springs of the armature.

*b. Method of Checking.*

(1) With the armature held in the space position, there should be 0.004-inch clearance between the armature and the selector-magnet pole face. With the armature in the mark position, there should be 0.004-inch clearance between the selector-magnet pole face and the armature.

(2) Use a spring scale to measure the 50 to 65 grams required to move the armature from mark to space position.

*c. Adjustments.*

(1) Loosen the hexagonal nuts on the armature machine screws and slowly back one machine screw away from the armature until the clearance requirement of 0.004 inch is met between the opposite end of the armature and its selector-magnet pole face. Tighten the hexagonal nut.

(2) If a force greater than 65 grams is required to move the armature from either the mark or space position, check to determine that no bind is present at the armature pivot point. If the armature pivots with no bind, readjust the position of the bar magnet as directed in paragraph 4-175. Increase the clearance between the bar magnet and the armature stop bracket until the attractive force requirement is met. If the force is less than 50 grams, decrease the bar magnet clearance. When the attractive force requirement is met, recheck the adjust-

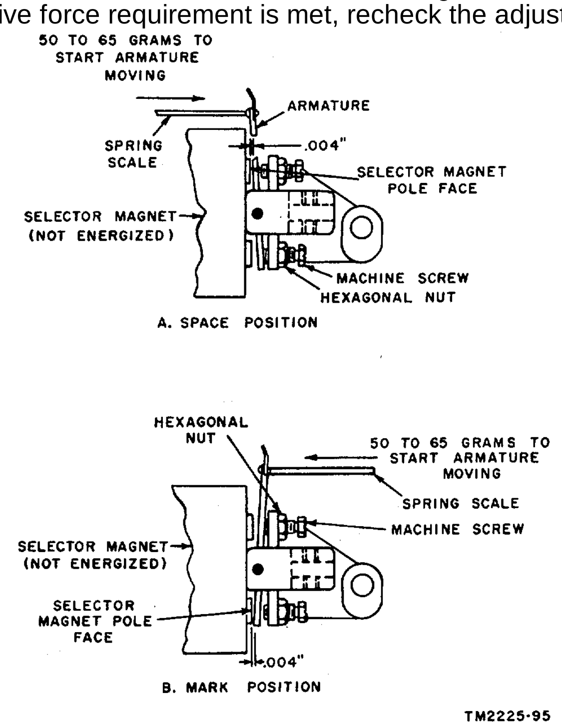



*Figure 4-159. Armature machine screws final adjustment and bar magnet attractive force (TT-76/GGC).*

ments in paragraphs 4-174 and 4-176, and the requirement in a(1) above. If the requirements cannot be met after this adjustment, replace the bar magnet. Check related adjustments (paras 4-180 and 4-182).

## ★4-179. Bar Magnet Field Strength Adjustment (TT-76A/GGC and Later Models)
(fig. 4-160)

**NOTE**

This adjustment applies only to the selector mechanisms which include a bar magnet that is 1¾ inch long. Disconnect plug P8 from the SELECTOR MAGNET receptacle on the left side of the base, remove the selector magnet bracket, and check the length of the bar magnet. If the bar magnet is 1-11/16 inch long, replace the selector magnet bracket on the teletypewriter and perform the adjustments described in paragraphs 4-181 through 4-186. If the bar magnet is 1¾ inch long, perform the following checking and adjustment procedure before replacing the selector magnet bracket.

*a. Requirement*. When the armature leaf spring stop screws (fig. 4-162) are not in contact with their associated leaf springs, a 40-to 75-gram (1½-to 2-ounce) force, applied as shown in figure 4-160, should be required to move the armature from the mark to the space position, and from the space to the mark position.

*b. Method of Checking.*

(1) Loosen the locknuts on the armature leaf spring stop screws (fig. 4-162) (or the machine screws if the selector mechanism includes locking tabs (fig. 4-160.1)). Back off the armature leaf spring stop screws until they no longer touch the leaf springs.

(2) Use either a suitable spring scale or a gram gage to check the requirement.

*c. Adjustment.*

(1) Insert a 0.004-inch feeler gage between each pole face of the selector magnet and its associated toffet on the armature, loosen the locknuts on the armature stop screws, and carefully turn each screw toward the armature until it *barely* touches the armature. Tighten the locknuts and remove the feeler gages.

(2) Loosen the machine screws that secure the selector magnet and the conductor bracket to the selector magnet bracket.

(3) Loosen the setscrew that secures the bar magnet (fig. 4-156), to the selector magnet bracket. Either move the bar magnet closer to the armature stop bracket to increase the force required to move the armature (a above), or move the bar magnet away from the armature stop bracket to *decrease* the force required to move the armature. Tighten the setscrew to secure the bar magnet in its adjusted position.

(4) Insert a 0.004-inch feeler gage between each pole face and its associated armature toffet, slide the selector magnet pole faces against the feeler gages, slide the conductor bracket against the south pole of the bar magnet, align the center of the pole faces with the center of the armature adjusting screws, and tighten the machine screws to secure the selector magnet and conductor bracket in place.

(5) Remove the feeler gages and turn armature adjusting screws away from the armature until they no longer make contact with the armature (when in either marking or spacing position). Tighten the locknuts on the armature adjusting screws.

(6) Recheck the requirement in a(1) above; if the requirement is met, recheck the requirements described in paragraph 4-177a(2), (3), and (4). Perform the adjustments described in paragraphs 4-181 through 4-186.

## ★4-179. Armature Positioning Adjustment (TT-76A/GGC and Later Models)
(fig. 4-160.1)

*a. Requirements*.

(1) The toffets on the armature and the pole faces of the selector magnet must be in alignment (when viewed from direction shown in A, fig. 4-160.1).

(2) The step in the blade of the armature

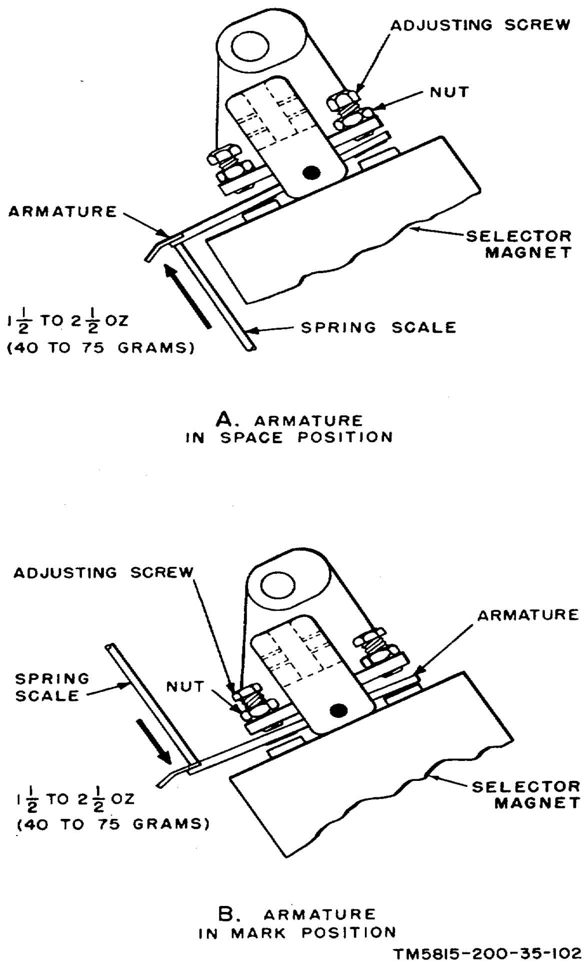



*Figure 4-160. Magnet attractive force and armature clearance (adjustment (TT-76A/GGC and later models).*

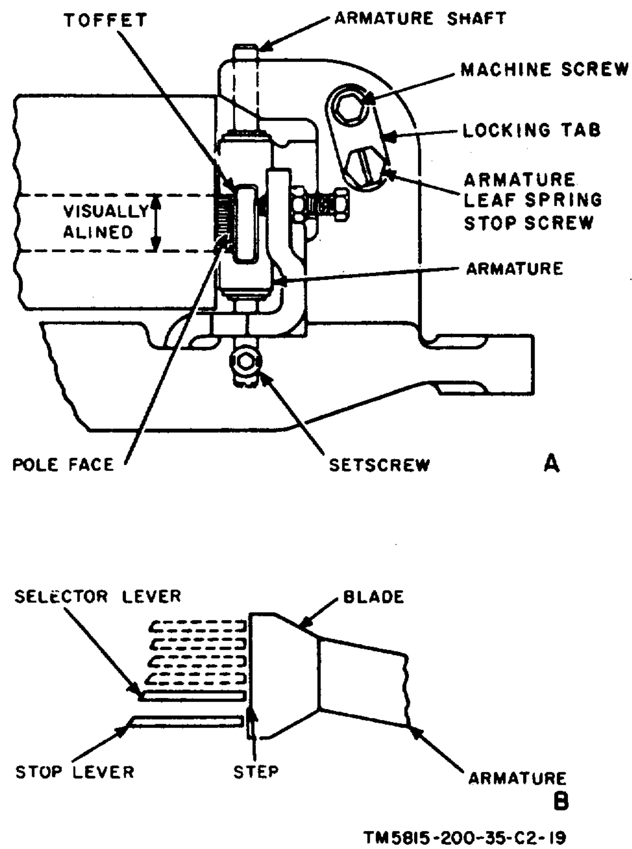



*Figure 4-160.1 Magnet positioning adjusting requirements.*

(B, fig. 4-160.1) should engage the full width of the stop lever but should not touch the outer selector lever when the end play of the armature is taken up in either direction (visual) check).

*b. Adjustment.* Loosen the setscrew that secures the armature shaft (A, fig. 4-160.1). Position the armature to meet both requirements. Tighten the setscrew and recheck the requirements.

**4-180. Armature Leaf Spring Adjustment (TT-76/GGC)**
(fig. 4-161)

**NOTE**

This adjustment is to be completed after those in paragraph 4-178.

*a. Requirement.* It should require a force of 30 to 50 grams to start the armature moving to the space position, and 0 gram to start the armature moving to the mark position.

*b. Method of Checking*. Move the armature to the mark position. Place the push end of the spring scale in the center of the armature blade. Check the required force to start the armature moving toward the space position. Hold the armature in the space position. When released, the armature should immediately return to the mark position.

*c. Adjustment*. Loosen the hexagonal nuts on the armature leaf spring stop screws. Place the armature in the mark position and turn the spacing armature leaf spring stop screw in or out until it just makes contact with the leaf spring. Then place the armature in the space position and turn the marking armature leaf spring stop screw until it makes contact with the leaf spring. Continue adjusting the armature leaf spring stop screws until the requirement is made. Tighten the plain hexagonal nuts.

**4-181. Armature Leaf Spring Adjustment (TT-76A-GGC and Later Models)**
(fig. 4-162)

**NOTE**

On the TT-76B/GGC and later models, there is no hexagonal nut locking the spring stop screw. A locking tab is provided to lock the spring stop screw in its required position. The locking tabs are secured or loosened by a machine screw (fig. 4-37).

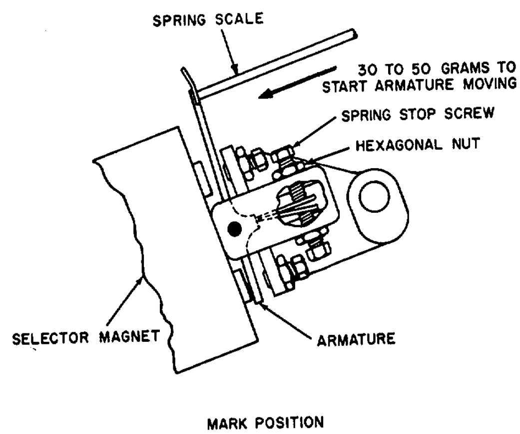



*Figure 4-161. Armature leaf-spring adjustment (TT-76/GGC) .*

*a. Requirement*. When the selector mechanism is mounted on the teletypewriter and the selector magnet is de-energized, a force of 10 to 35 grams (1/3 to 1¼ ounce) applied at the point shown in figure 4-162, should be required to move the armature from the mark position to the space position and from the space position to the mark position. The forces required to move the armature in both directions should be within 10 grams of each other.

*b. Method of Checking.* Disconnect plug P8 from the SELECTOR MAGNET receptacle on the side of the base and turn the motor manually until none of the cams on the selector camshaft is in contact with its associated lever. Use either a spring scale or gram gage to check the requirement.

*c. Adjustment*. Loosen the locknuts on the armature leaf spring stop screws (fig. 4-162) (or the machine screws (A, fig. 4-160.1). Adjust the position of the armature leaf spring stop screws to meet the requirement, tighten the locknuts (or machine screws), as applicable, and recheck the requirement.

**4-181.1. Armature Leaf Spring Adjustment (TT-699A/GGC and Later Models)**
(fig. 4-162)

**NOTE**

On the TT-699B/GGC and later models, there is no hexagonal nut locking the spring stop screw. A locking tab is provided to lock the spring stop screw in its required position. The locking tabs are secured or loosened by a machine screw (fig. 4-37).

*a. Requirement.*

(1) When the selector magnet is removed from the teletypewriter, a force of 8 to 12 grams, applied at the point shown in A, figure 4-162, should be required to move the armature from the mark position to the space position. A force of 18 to 20 grams, applied to the armature at the point shown in B, figure 4-162, should be required to move the armature from the space to mark position.

(2) Hold the selector magnet assembly perpendicular to the work surface and use a gram gage to check the requirement.

*b. Adjustment.* Make the adjustment as follows:

(1) Loosen the locknuts on the armature leaf spring stop nuts (A, fig. 4-162), or the machine screws shown in A, figure 4-160, as applicable.

(2) Hold the armature blade in the space position and screw both leaf spring stop screws outward until they no longer are in contact with the leaf springs.

(3) Turn the rear leaf spring stop screw (B, fig. 4-162), inward until the armature toffet leaves the adjacent magnet pole face (space-to-mark transition): then back the screw off 1/2 turn.

(4) Turn the front leaf spring stop screw (A, fig. 4-162) inward until the armature toffet leaves the adjacent magnet pole face (mark-to-space transition); then back the screw off 1/2 turn.

**NOTE**

Upon completion of the above adjustments, the armature should now be "side stable;" that is, it should remain in the position (mark or space) when manually set to either position.

(5) Adjust the leaf spring stop screws to meet the requirement in a above. Tighten the locknuts (or machine screws), as applicable, and recheck the requirement.

### 4-182. Selector Lever and Armature Alignment and Selector Camshaft Lever Eccentric Adjustment (TT-76/GGC)

(fig. 4-163)

*a. Requirements.*

(1) With the armature in its midtravel position, the armature blade should contact the selector levers.

(2) There should be 0.002-inch engagement between the armature and the selector camshaft locking lever when the armature is in its midtravel position.

*b. Method of Checking.*

(1) Place 0.008-inch feeler gages between the selector-magnet pole faces and the armature. Manually move the selector levers toward the armature and check the requirement visually.

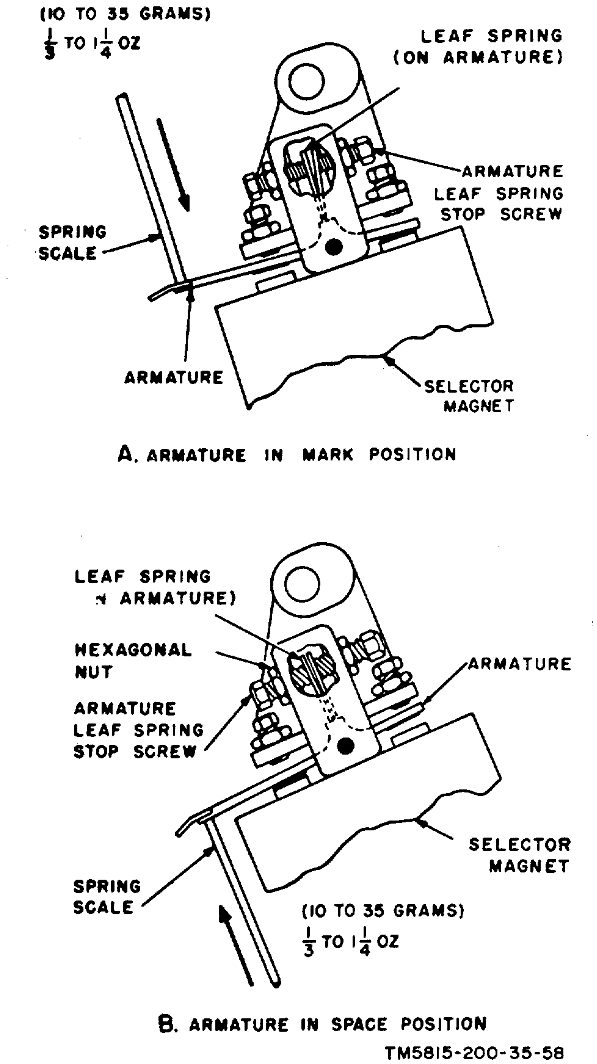



Figure 4-162. Armature leaf spring adjustment (TT-76A/GGC and later models).

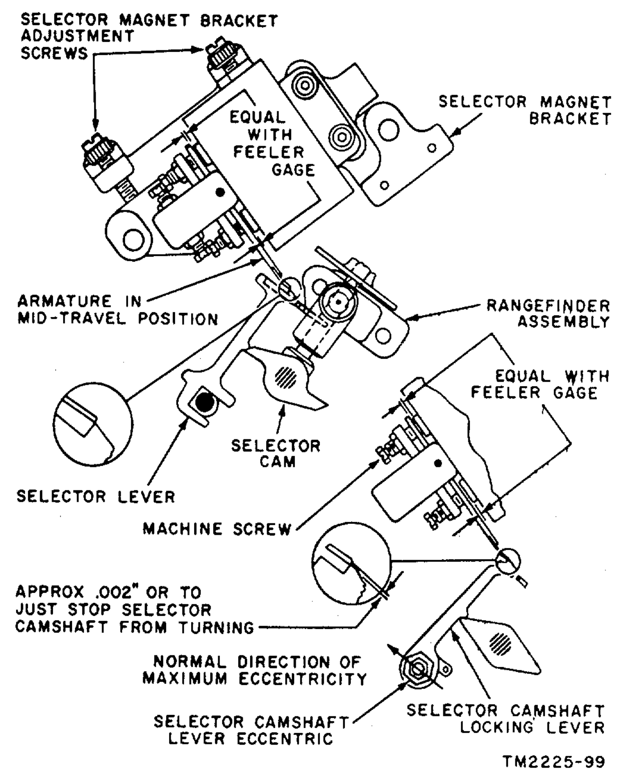



Figure 4-163. Selector lever and armature alignment and selector camshaft lever eccentric adjustment (TT-76/GGC).

(2) Place 0.008-inch feeler gages between the selector-magnet pole faces and the armature. Manually move the selector camshaft locking lever toward the armature and visually check the requirement.

*c. Adjustments.*

(1) Set the armature in the individual position by inserting 0.008-inch feeler gages between the armature and the selector-magnet pole faces.

(2) Loosen the selector-magnet bracket machine screws; leaving them tight enough to set firm tension against the selector-magnet bracket.

(3) Turn the right hand selector-magnet bracket adjusting screw clockwise; rotate the selector-magnet bracket clockwise about its pivot pin, until the first selector lever just touches the armature. Tighten the selector-magnet bracket machine screws.

(4) Loosen the self-locking hexagonal nut that holds the selector camshaft lever eccentric. Place 0.008-inch feeler gages between the armature and the selector-magnet pole faces. Manually move the selector camshaft locking lever toward the armature and turn the selector camshaft lever eccentric clockwise or counterclockwise until the requirement is met. Tighten the self-locking hexagonal nut. Check related adjustment (para 4-184).

**(Reverse blank)**

**4-183. Selector and Stop Levers Alignment with Armature (Preliminary Adjustment) (TT-76A/GGC and Later Models).**
(fig. 4-164)

*a. Requirement*. With a .004-inch clearance between the pole faces and the armature toffets, the selector levers should just pass the knife edge of the armature and the stop lever should be stopped by the knife edge of the armature blade.

*b. Adjustment*. Place .004-inch feeler gages between the pole faces and the armature toffets. Loosen the magnet bracket mounting screws sufficiently to allow friction pressure to hold the magnet bracket to the teletypewriter casting. While manually moving the selector levers past the knife edge of the armature, position the magnet bracket (use the adjustment screws) until the requirement is met. Tighten the magnet bracket mounting screws. Loosen the self-locking hexagonal nut on the end of the selector lever pivot stud. Turn the stop lever eccentric bearing until the stop lever just engages the knife edge of the armature. Tighten the self-locking hexagonal nut while holding the eccentric bearing stationary. Check the adjustment described in paragraph 4-185.

**4-184. Selector-Magnet Bracket Final Adjustment (TT-76/GGC)**
(fig. 4-165)

**NOTE**

Make this adjustment after adjustment paragraph 4-182.

*a. Requirement*. The selector camshaft should not rotate with a 0.006-inch feeler gage between the Y-lever and the bottom of the Y-lever eccentric stop when the letters code group is received by the selector mechanism and the motor is running. The selector camshaft should rotate when a 0.002-inch feeler gage is inserted at that position.

*b. Adjustment*. Adjust the selector magnet bracket adjustment screws until the above requirement is met. Check related adjustments (paras 4-182 and 4-186).

**★4-185. Selector Magnet Alignment with Selector and Y-Levers**
(fig. 4-166)

**NOTE**

This adjustment is to be made only after the adjustment in paragraph 4-183 has been made.

*a. Requirement*. The selector camshaft should not rotate with a .006-inch feeler gage between the Y-lever and the left side of the Y-lever eccentric stop when the letters code group is received by the selector mechanism and the motor is running. The selector camshaft should rotate when a .002-inch feeler gage is inserted at that position.

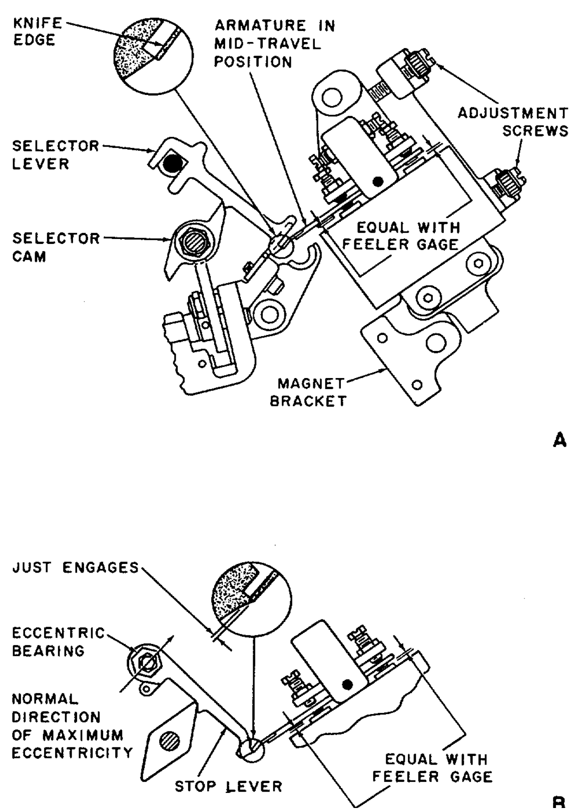



*Figure 4-164. Selector and stop levers alignment with armature (preliminary adjustment) (TT-76A/GGC and later models).*

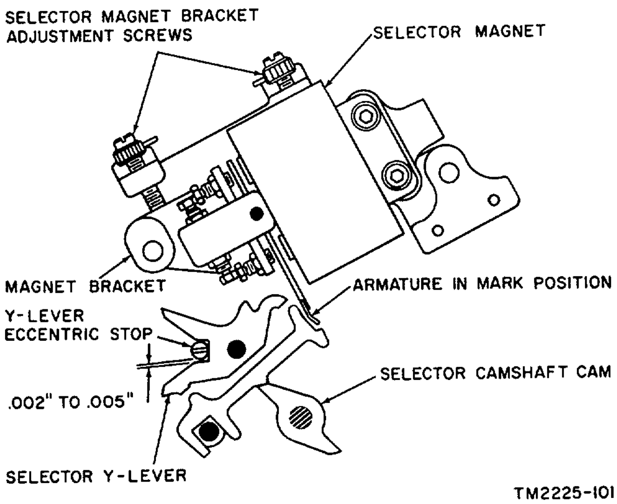



*Figure 4-165. Selector magnet bracket final adjustment (TT-76/GGC).*

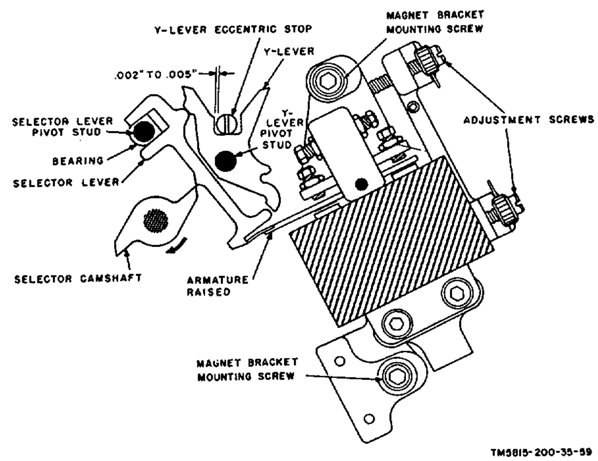



*Figure 4-166. Selector magnet alignment with selector and Y-levers.*

*b. Adjustment*. Loosen the magnet bracket mounting screws enough to allow friction pressure to hold the magnet bracket to the teletypewriter casting. Use the adjustment screws to position the magnet bracket to meet the requirement. Tighten the magnet bracket mounting screws. Check the related adjustment described in paragraph 4-183.

### ★4-186. Selector Magnet Armature Blade and Selector Lever Clearance
(fig. 4-167)

*a. Requirement*. There should be a .018-to 0.25-inch clearance between the armature blade and the selector levers when the machine is in a standby condition.

*b. Adjustment.* Loosen the selector lever comb bracket adjusting screws. Move the selector lever comb bracket vertically until the requirement is met. Tighten the adjusting screws.

### 4-187. Selector Camshaft Friction Clutch Adjustment (TT-76ZGGC)
(fig. 4-168)

*a. Requirement*. A pull of 44 to 48 ounces is required to prevent the selector camshaft friction clutch from turning when the motor is on and

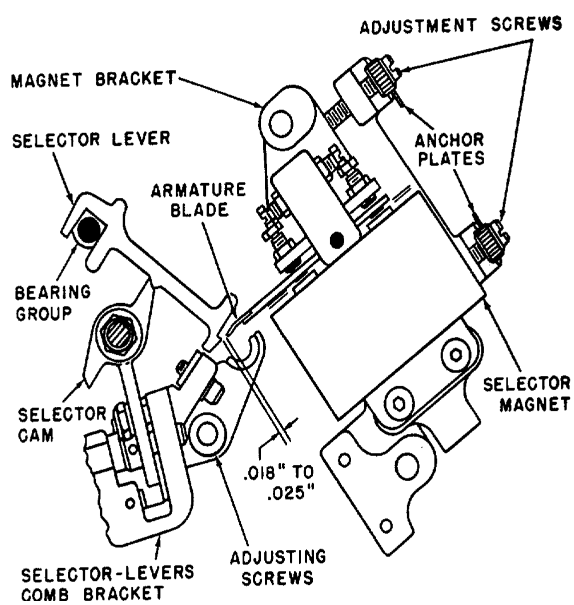



*Figure 4-167. Selector magnet armature blade and selector lever clearance.*

the selector cams are not operating any selector levers.

*b. Method of Checking*. Hook a spring scale on the lug on the selector camshaft. While holding the scale rigidly, allow the camshaft to turn just slightly until it is not operating any levers. When the free spot is established, hold the camshaft from turning and read the scale.

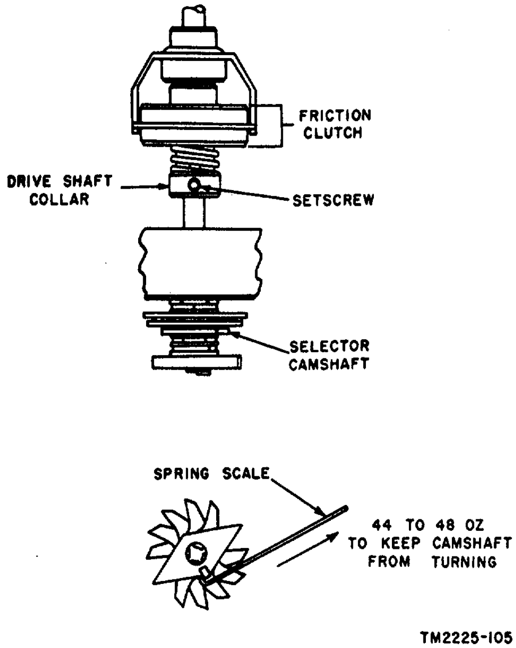



*Figure 4-168. Selector camshaft friction clutch adjustment (TT-76/GGC).*

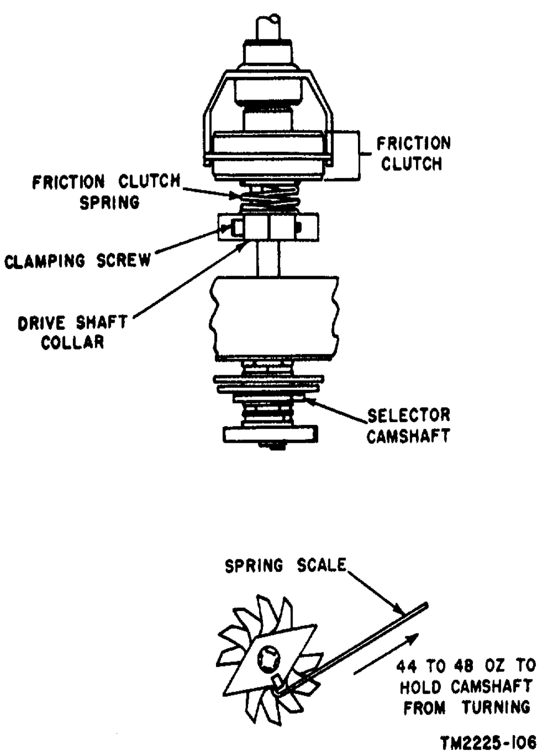



*Figure 4-169. Selector camshaft friction clutch adjustment (TT-76A/GGC and later models).*

*c. Adjustment*. Loosen the two setscrews in the drive shaft collar, shift the collar forward or back to obtain the proper spring tension on the friction clutch, and tighten the setscrews. Recheck the requirement and readjust if necessary.

**4-188. Selector Camshaft Friction Clutch Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-169)

*a. Requirement*. A pull of 44 to 48 ounces is required to prevent the selector camshaft friction clutch from turning when the motor is on and the selector cams are not operating any selector levers.

*b. Method of Checking*. Hook a spring scale on the lug on the selector camshaft. While holding the scale rigidly allow the camshaft to turn just slightly until it is not operating any levers. When the free spot has been established, hold the camshaft from turning and read the scale.

*c. Adjustment*. Loosen the two clamping screws in the drive shaft collar, rotate the collar forward or back to obtain the proper spring tension on the friction clutch, and tighten the clamping screws. Recheck the requirement and readjust if necessary.

**4-189. Selector Y-Lever Eccentric Spindle Preliminary Adjustment**
(fig. 4-170)

*a. Requirement*. With the machine in the transferred position, there should be a slight clearance between the T-levers and the eccentric spindle.

*b. Adjustment*. Position the selector Y-levers to the space position. Trip the transfer lever latch so the T-levers engage the Y-levers. Loosen the plain hexagonal nut that holds the eccentric spindle to the manual tape-out operating arm and adjust the eccentric spindle so that it is barely contacting the Y-levers and there is a slight clearance between the eccentric spindle and the T-levers. Tighten the plain hexagonal nut on the eccentric spindle. Check related adjustment (paras. 4-190 and 4-191).

## 4-190. Limit Stop Lever and Manual Tape Feed-Out Lever Adjustment

(fig. 4-171)

*a. Requirements.*

(1) There should be 0.010-to 0.015-inch clearance between the limit stop lever and the flat washer.

(2) With the eccentric spindle holding the selector Y-levers in position, the limit stop lever should prevent any further movement of the manual tape feed-out lever.

(3) In the unoperated position, the manual tape feed-out lever should be vertical.

*b. Adjustments.*

(1) Loosen the limit stop lever clamping screw. Place a 0.010-to 0.015-inch feeler gage between the limit stop lever and the flat washer and rotate the limit stop lever to meet the requirement in a(2) above. Tighten the limit stop lever clamping screw.

(2) Loosen the manual tape feed-out lever clamping screw and position the manual tape feed-out lever to meet the requirement in a(3) above.

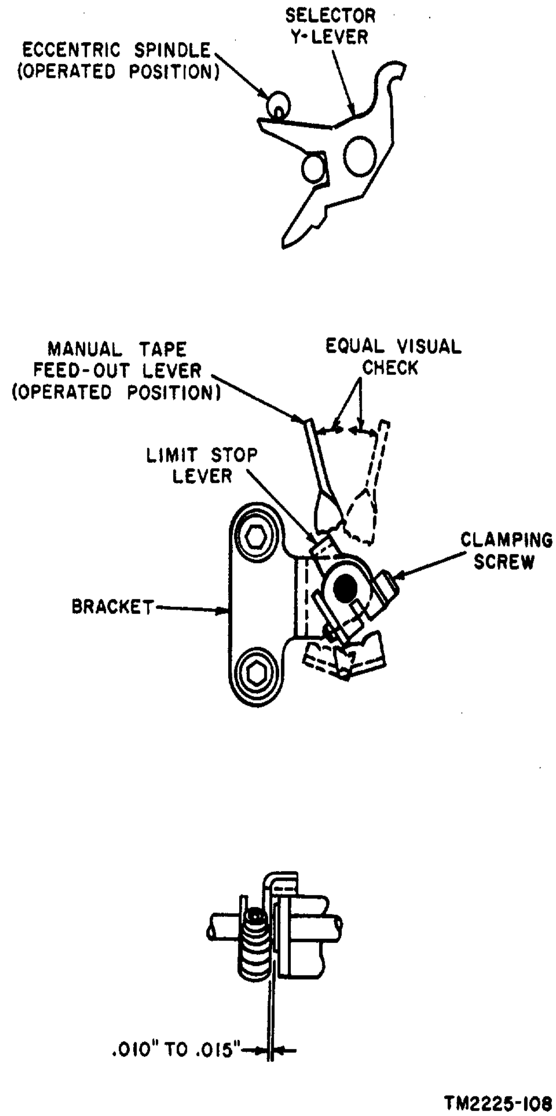



*Figure 4-171. Limit stop lever and manual tape feed-out lever adjustment .*

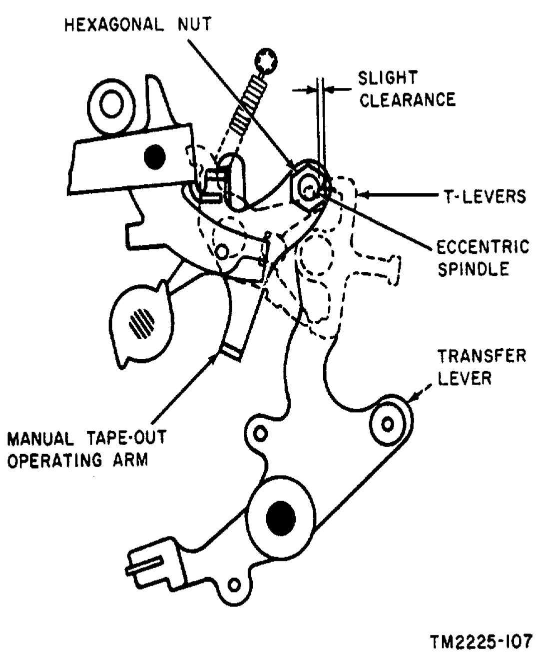



*Figure 4-170. Y-lever eccentric spindle preliminary adjustment*

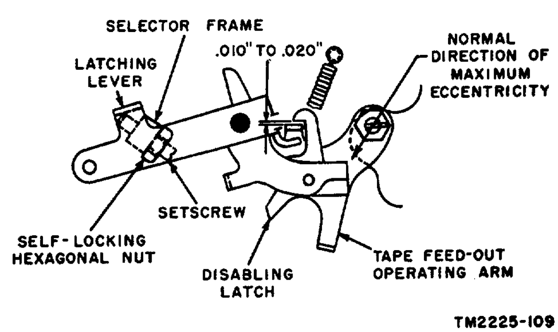



*Figure 4-172. Manual tape feed-out latching lever adjustment.*

Tighten the manual tape feed-out lever clamping screw.

### 4-191. Manual Tape Feed-Out Latching Lever Adjustment
(fig. 4-172)

*a. Requirement*. There should be a 0.010-to 0.020-inch clearance between the tape feed-out operating arm and the disabling latch.

*b. Adjustment*. Loosen the self-locking hexagonal nut and turn the setscrew in or out to meet the requirement. Tighten the self-locking hexagonal nut and recheck the clearance.

### 4-192. Trip Latch Lever and Disabling Cam Adjustments
(fig. 4-173)

*a. Requirements.*

(1) There should be a 0.020-to 0.030-inch clearance between the transfer lever trip latch and the transfer lever assembly when the eccentric spindle is holding the selector Y-levers in the space position.

(2) There should be a 0.002-to 0.005-inch clearance between the trip latch lever and the bearing sleeve.

(3) The disabling cam should be aligned with the disabling latch and there should be 0.001-to 0.020-inch clearance between them when the first selector lever is against the high portion of the first selector cam and the latching lever is in the operated position.

*b. Adjustments..*

(1) Loosen the trip latch lever clamping screw. Position the trip latch lever until requirements in a (1) and (2) above are met. Tighten the trip latch lever clamping screw and recheck both requirements.

(2) Loosen the setscrews of the disabling cam and align the cam until the requirement in a(3) above is met. Tighten the setscrew and recheck the alignment.

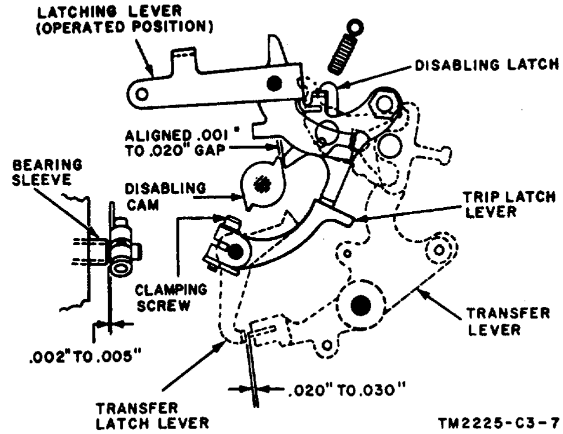



*Figure 4-173. Trip latch lever and disabling cam adjustments.*

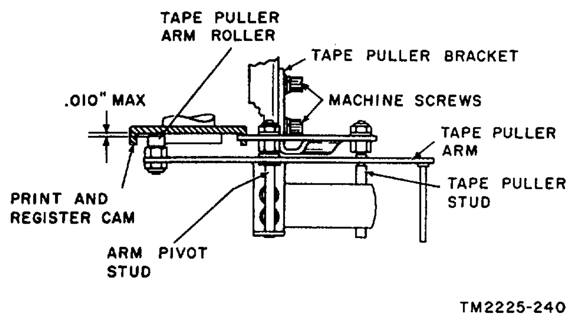



*Figure 4-174. Tape puller bracket adjustment*

### 4-193. Tape Puller Bracket Adjustment
(fig. 4-174)

*a. Requirement*. The tape puller arm roller should have some clearance but not more than 0.010-inch between the edge of the tape puller arm roller and the bottom of the print and register cam.

*b. Adjustment.* Loosen the two machine screws and position the tape puller bracket to meet the requirement. Tighten the machine screws.

### 4-194. Tape Puller Arm Adjustment
(fig. 4-175)

*a. Requirement*. There should be a 0.003-to 0.010-inch clearance between the tape puller spring and the tape puller stud when the feed pawl has just cleared the feed ratchet and the feed operation is completed. The tape puller arm roller should be held toward the center of the print and register cam.

*b. Adjustment*. Move the tape puller stud to the bottom of the slot of the tape puller bracket and tighten the tape puller stud nut. Move the arm pivot stud to the right of the slot and tighten the arm pivot stud nut friction tight. Release the transfer lever trip latch and turn the motor by hand until the feed pawl assembly just clears the ratchet wheel and the feed operation is completed. Move the arm pivot stud to the left until there is 0.003-to 0.010-inch clearance between the tape puller spring and the tape puller stud. The 0.003-to 0.010-inch gap should be measured when. The tape puller arm roller is held toward the center of the punch cam. If, when the arm pivot stud is moved all the way to the right, and the clearance is greater than the requirement, loosen the tape puller stud nut and move the tape puller stud upward against the tape puller spring. Tighten the tape puller stud nut. Then move the arm pivot stud to the left until the requirement is met. Tighten the arm pivot stud nut.

*Note.* To check for completion of the feed operation, turn the ratchet wheel backwards while turning the motor slowly. At the point where the ratchet wheel is just free to turn backwards, the feed operation is completed.

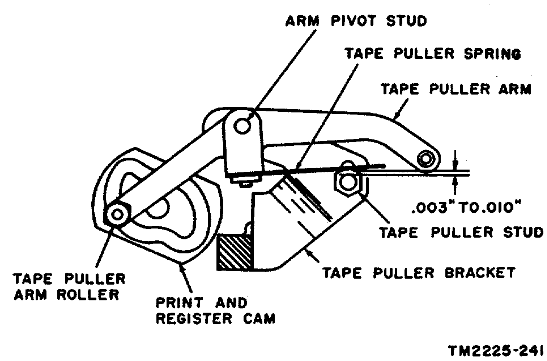



*Figure 4-175. Tape puller arm adjustment*

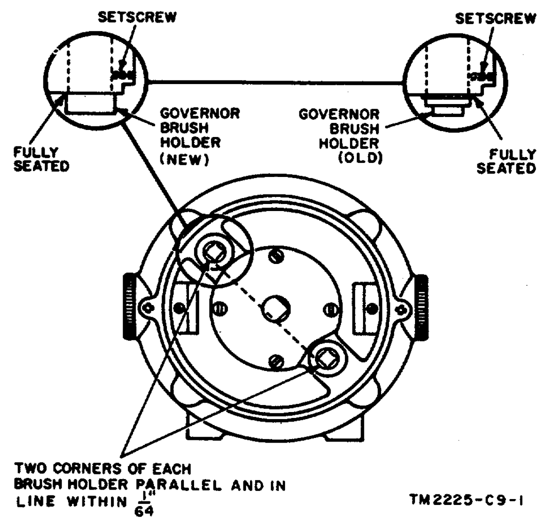



*Figure 4-176. Motor governor brush holder adjustment.*

**4-195. Motor Governor Brush Holder Adjustment** (fig. 4-176)

*Note.* This adjustment should be performed when the governor brush holders have been removed or replaced. The adjustment applies to the old and new types of holders shown in figure 4-176.

*a. Requirements.*
(1) The governor brush holders should be fully seated.
(2) The side surfaces of the square hole in the governor brush holders should be in alignment within 1/64 inch as shown in figure 4-176.

*b. Methods of Checking.*
(1) Visually check the requirement in a (1) above.
(2) Use a 6-inch steel rule to make a visual check of the requirement in a(2) above.

*c. Adjustment*. Loosen the setscrew that retains each governor brush holder and position each brush holder to meet the requirements. Tighten the setscrews and recheck the requirements.

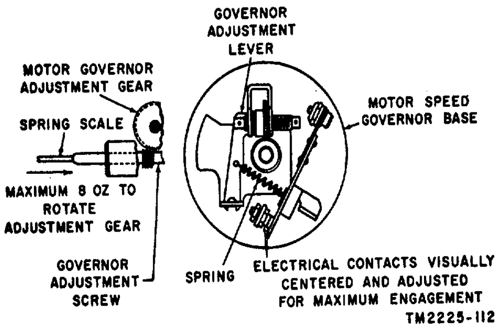



*Figure 4-177. Motor governor contacts alignment.*

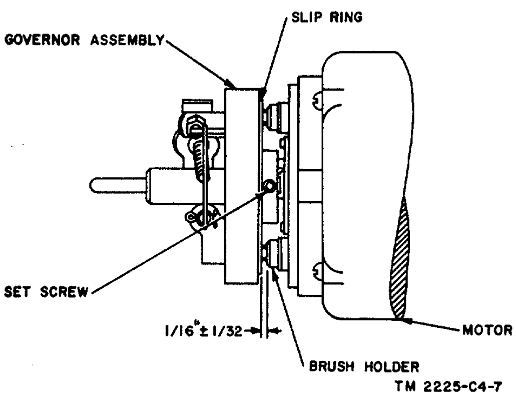



*Figure 4-178. Governor assembly adjustment.*

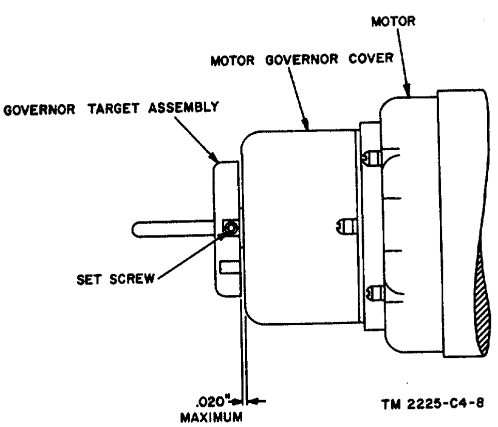



*Figure 4-179. Governor target assembly adjustment.*

**4-196. Motor Governor Contacts Alignment** (fig. 4-177)

*a. Requirements.*

(1) The contacts should be visually centered and adjusted for maximum area of engagement.

(2) A maximum force of 8 ounces should be required to turn the gear assembly at any point within the operating range of the motor.

*b. Adjustment.*

(1) Loosen the contact arm spring mounting screw and position the contact arm assembly to meet the requirement.

(2) Check for dirt or bind between the governor adjustment screw and the adjustment gear.

**4-197. Governor Assembly Locating Adjustment** (fig. 4-178)

*a. Requirement*. There should be a clearance of 1/16 ±-1/32 inch between the slip ring on the governor assembly and the motor brush holder.

*b. Adjustment*. Loosen the two setscrews and position the governor assembly to meet the requirement. Tighten one setscrew friction-tight; then tighten the other setscrew and retighten the first. This procedure will insure that the governor assembly remains properly in line with the motor shaft.

*Note.* The governor slip-rings must be clean and smooth to insure good brush contact. The area between the slip-rings must be clean and free of any foreign material.

**4-198. Governor Target Assembly Adjustment** (fig. 4-179)

*a. Requirement*. There should be some clearance but not more than 0.020-inch, between the governor target assembly and the motor governor cover.

*b. Adjustment*. Loosen the setscrew and position the governor target assembly to meet the requirement. Tighten the setscrew.

**4-199. Tape-Out Alarm Adjustment (TT-76/GGC)** (fig. 4-180)

*a. Requirement. The tape alarm buzzer*

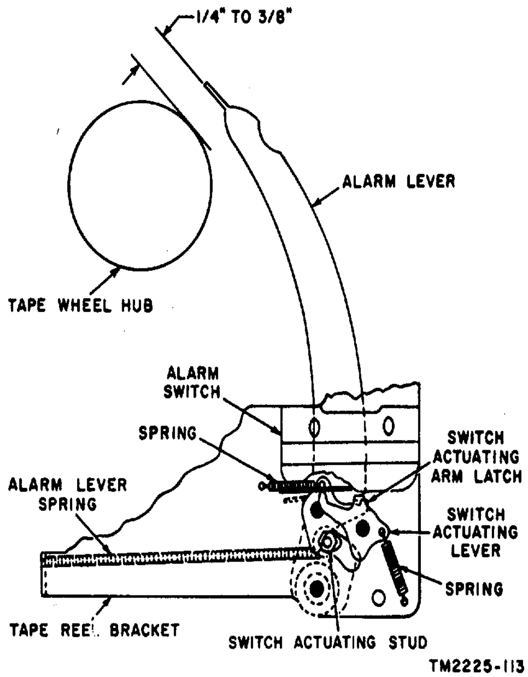



*Figure 4-180. Tape-out alarm adjustment (TT-76/GGC).*

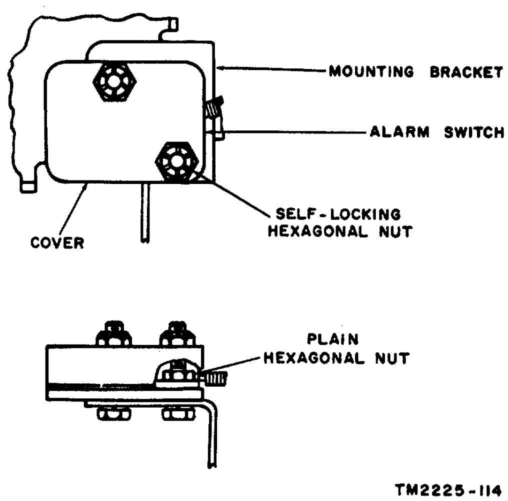



*Figure 4-181. Tape-out alarm preliminary adjustment (TT-76A/GGC and later models).*

should sound when the alarm lever is moved within one-fourth to three-eighths of an inch of the tape reel hub.

*b. Adjustment*. Loosen the self-locking hexagonal nut on the switch actuating stud. Adjust the stud to trip the switch actuating arm latch when the alarm lever is in the position shown. Tighten the self-locking hexagonal nut.

**4-200. Tape-Out Alarm Preliminary Adjustments (TT-76A/GGC and Later Models)**
(fig. 4-181)

*a. Requirements*. The alarm switch should be centered from right to left in the elongated holes, and the bottom of the alarm switch should be aligned with the bottom edge of the mounting bracket.

*b. Adjustment*. Remove the two self-locking hexagonal nuts that hold the cover on the alarm switch. Remove the switch cover and loosen the two plain hexagonal nuts that hold the alarm switch to the mounting bracket. Position the alarm switch to meet the requirement and tighten the two plain hexagonal nuts. Then replace the cover and tighten the two self-locking hexagonal nuts. Check related adjustment (par. 4-201).

**201. Alarm Lever Adjustment (TT-76A/GGC and Later Models)**
(fig. 4-182)

*a. Requirement*. The alarm switch should close and the tape-out alarm should sound when the alarm lever is one-fourth to three-eighths inch from the hub of the tape supply reel.

*b. Adjustment*. Loosen the machine screw that holds the alarm lever to the switch operating plate; position the alarm lever to meet the requirement. 'Tighten the machine screw and recheck the requirement.

*Note.* If the above requirement cannot be met, reposition the alarm switch slightly (par. 4-200). Moving the alarm switch to the left should-allow the alarm lever to move farther before the alarm switch operates. Moving the alarm switch to the right will allow the alarm switch to operate with less movement of the alarm lever. Then readjust to meet the above requirement.

**4-202. Switch Actuating Arm Latch (TT-76A/GGC and Later Models)**
(fig. 4-183)

*a. Requirement*. When the alarm lever is latched in its downward position there should be ¼- to ⅜-inch clearance between the alarm lever and the lower edge of the tape supply reel.

*b. Adjustment*. Loosen the self-locking hexagonal nut that holds the switch actuating arm latch to the switch operating plate, and position the switch actuating arm latch to meet the requirement. Tighten the self-locking hexagonal nut and recheck the clearance.

**4-203. Transmitter Contact Bail End Play Adjustment**
(fig. 4-184)

*a. Requirement*. There should be 0.002-to 0.005-inch clearance between the retainer ring on the post and the contact bail.

*b. Adjustment*. Loosen the setscrew. Move the post axially to meet the requirement; tighten the setscrew.

**4-204. Selector Lever End Play Adjustment**
(fig. 4-185)

*a. Requirement*. There should be 0.002-to 0.005-inch clearance between the spacer and the first selector lever.

*b. Adjustment*. Loosen the setscrew and slide the stud in or out to meet the requirement. Tighten the setscrew.

**4-205. Transmitter-Distributor Selector Lever Comb Adjustment**
(fig. 4-185)

*a. Requirements*.
(1) There should be a 0.010-to 0.025-inch clearance between the clutch magnet armature and the camshaft stop lever when the camshaft stop lever is resting against the selector lever comb

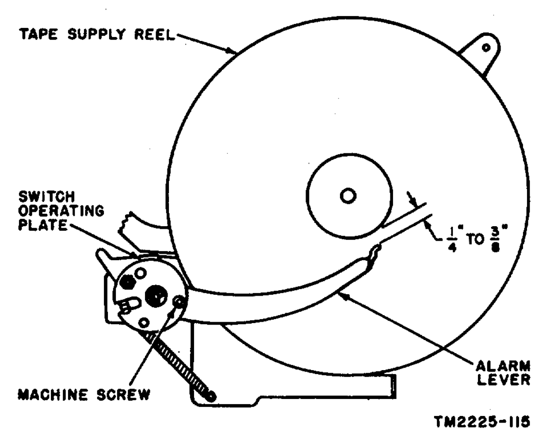



*Figure 4-182. Alarm lever adjustment (TT-76A/GGC and later models).*

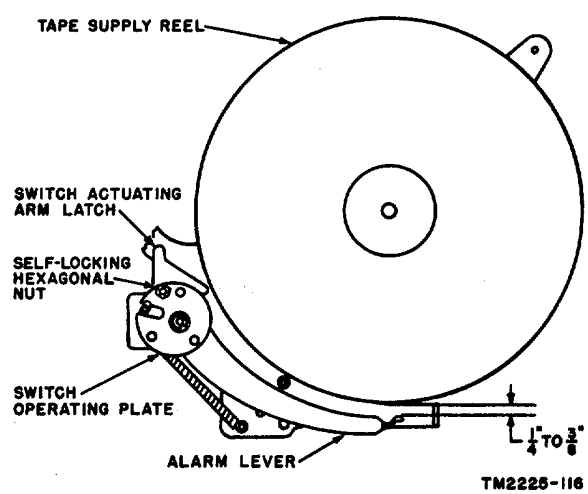



*Figure 4-183. Switch actuating arm latch (TT-76A/GGC and later models).*

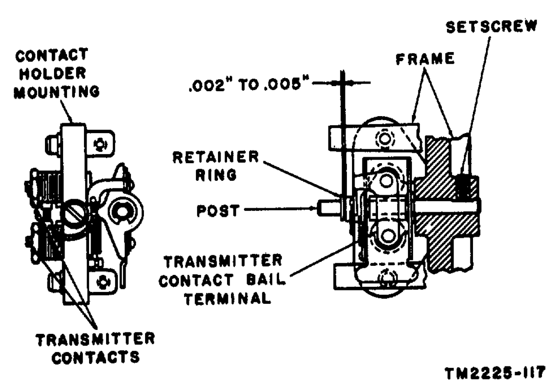



*Figure 4-184. Transmitter contact bail end play adjustment.*

and the clutch magnet armature is in its unenergized position. (2) There should be a minimum of 0.005-inch clearance between the latching surface of each code sensing lever and the latching surface of its mating selector lever.

*b. Method of Checking.*

(1) Rotate the transmitter-distributor camshaft until the camshaft stop lever is resting against the selector lever comb. Check the clearance with a feeler gage.

(2) Rotate the transmitter-distributor camshaft until the sensing lever restoring bail is on the low part of the restoring cam and the latching ends of the code sensing levers are in engagement with their mating selector levers. Check the clearance at each of the five selector levers.

*c. Adjustment*. Loosen the two comb mounting machine screws and position the selector levercomb until the requirements are met. Tighten the machine screws. Recheck the clearances and readjust if necessary. Check related adjustment (par. 4-208).

### 4-206. Clutch Magnet Armature Eccentric Stud Adjustment
(fig. 4-187)

*a. Requirement*. When the clutch magnet armature is held in its operated position, there should be a 0.003-to 0.006-inch clearance between the top of the camshaft stop lever and the clutch magnet armature.

*b. Method of Checking*. With the top cover removed from the transmitter-distributor, manually hold the clutch magnet armature in the operated position. With the front of the transmitted-distributor facing you, rotate the transmitter-distributor camshaft toward you until the front edge of the camshaft stop lever is just under the clutch magnet armature. Check the clearance with a feeler gage.

*c. Adjustment*. Loosen the setscrew in the frame above the eccentric stud and position the eccentric stud until the requirement is met. Tighten the setscrew. Check related adjustment (par. 4-207).

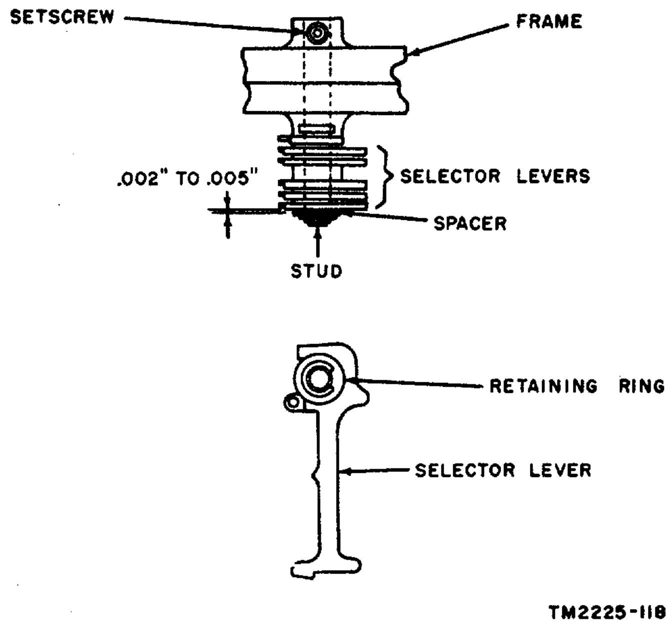



*Figure 4-185. Selector lever end play adjustment.*

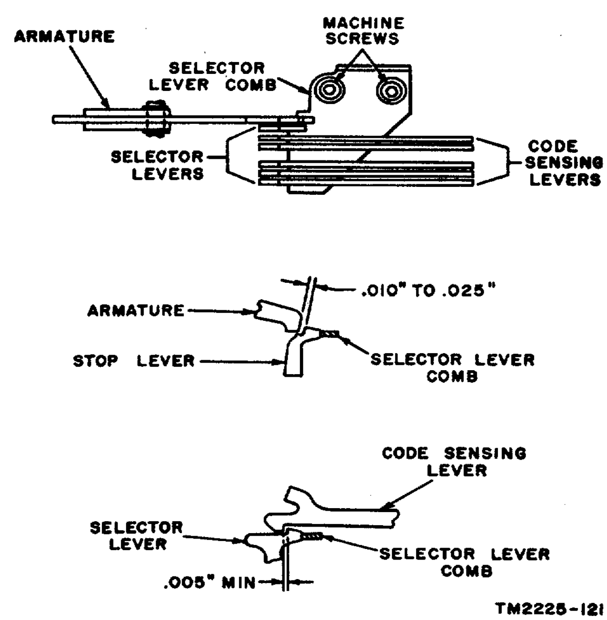



*Figure 4-186. Transmitter-distributor selector lever comb adjustment.*

**4-207. Clutch Magnet Laminated Cores Adjustment** (fig. 4-188)

*a. Requirement*. When the clutch magnet armature is in its operated position, there should be 0.003-to 0.004-inch clearance between the clutch magnet laminated cores and the clutch magnet armature. Use a piece of blank message tape for a feeler gage.

*b. Method of Checking*. Energize the clutch magnet; make sure the clutch magnet armature is against the eccentric stud, and check the clearance.

*c. Adjustment*. Loosen the two machine screws that are used for mounting the clutch magnet laminated cores and position the cores to meet the requirement. Tighten the machine screws and recheck the clearance.

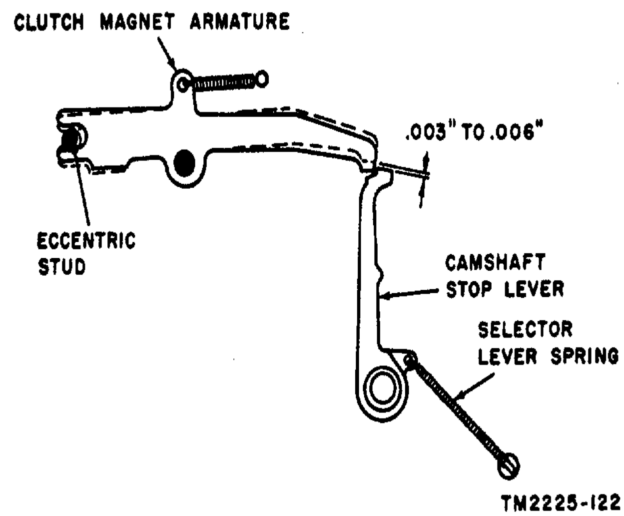



*Figure 4-187. Clutch magnet armature eccentric stud adjustment.*

**4-208. Transmitter-Distributor Stop Pulse and Contacts Adjustment**
(fig. 4-189)

Place the POWER switch to ON, the MOTOR switch to OFF, and the SELECTOR switch to position 3 (LOCAL REPUNCH) while performing this adjustment.

*a. Requirements.*
(1) There should be minimum breaks in the send circuit between successive marking impulses.
(2) The stop selector lever latch should be adjusted to give a minimum break in the send circuit between the marking fifth intelligence impulse and the stop pulse. There should be 0.005-inch minimum clearance between the stop selector lever and the stop selector lever latch when the stop selector lever is on the low point of its cam.

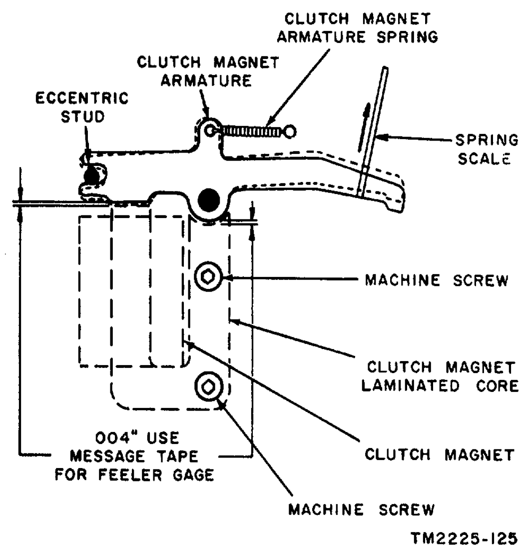



*Figure 4-188. Clutch magnet laminated cores adjustments.*

*b. Method of Checking.*

(1) Set Multimeter TS-297/U to read on the 100-ma scale. Connect the Multimeter with Cord CX-468/U to the TD jack on the right side of the key-board guard. This will place the Multimeter in series with the signal line. Place a piece of message tape, perforated with the LTRS code group, under the tape cover. Move the stop-start lever to the START position and slowly turn the motor by hand. There should be slight, but minimum, breaks between the marking impulses.
(2) Connect a milliammeter in series with the signal line ((1) above). Place a piece of message tape, perforated with the T code group, under the tape

cover. Move the stop-start lever to the START position and turn the motor slowly by hand. There should be a slight, but minimum, break between the marking fifth intelligence impulses and the stop pulse. With the stop selector lever on the low point of its cam, check the clearance between the stop selector lever and the stop selector lever latch with a feeder gage.

*c. Adjustments.*

(1) Connect a milliammeter in series with the signal line (b (1) above). Place a piece of message tape perforated with the LTRS code group under the tape cover. Move the stop-start lever to the START position and slowly turn the motor by hand. Turn the mark stationary contact in or out until the requirement in a(1) above is met.

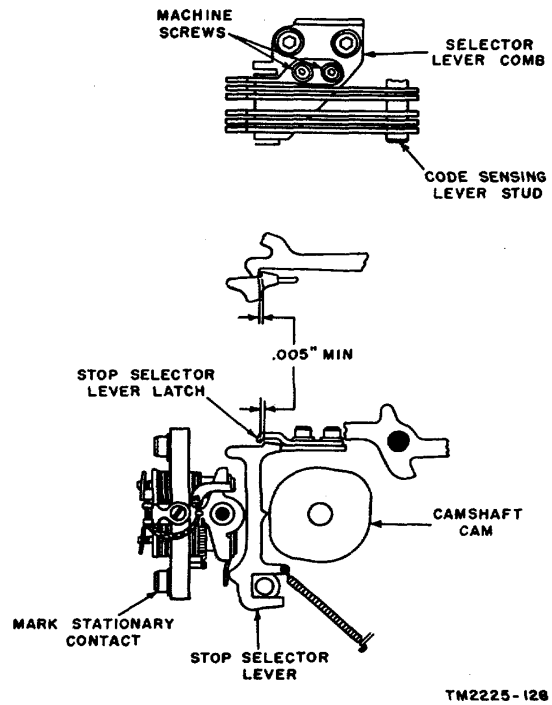



*Figure 4-189. Transmitter-distributor stop pulse and contacts adjustment.*

(2) With the milliammeter still connected in series with the line, place a piece of message tape perforated with the T code group under the tape cover. Loosen the machine screws that hold the stop selector lever latch. Move the stop-start lever to the START position and slowly turn the motor by hand. Move the stop selector lever latch to the right or left until a slight, but minimum, break is obtained between the marking fifth intelligence impulse and the stop pulse. Move the stop selector lever latch to the right to decrease the break and to the left to increase the break. With the stop selector lever against the low part of its cam, check the clearance between the stop selector lever and the stop selector lever latch. If the clearance is less than 0.005-inch, remake the adjustment in paragraph 4-205, setting the 0.010-to 0.025-inch clearance between the clutch magnet armature and the stop lever to the high side. Then reposition the stop selector lever latch to meet the requirement of a(2) above.

**4-209. Tape-Out Lever Spring Adjustment**
(fig. 4-190)

*a. Requirement*. With the tight-tape lever held in the up position, it should require a force of 84 to 98 grams to rotate the tape-out lever.

*b. Adjustment*. Wind the tape-out lever spring about the tape-out lever pivot shaft to meet the requirement.

**4-210. Tape Cover and Tape Guide Adjustment**
(fig. 4-191)

*a. Requirement*. There should be 0.003-inch maximum clearance between the tape guide and the tape cover.

*b. Adjustment*. Back the setscrews away from the adjustment screws. Adjust' the adjustment screws to meet the requirement when the tape guide is held against the heads of the adjustment screws. Tighten the

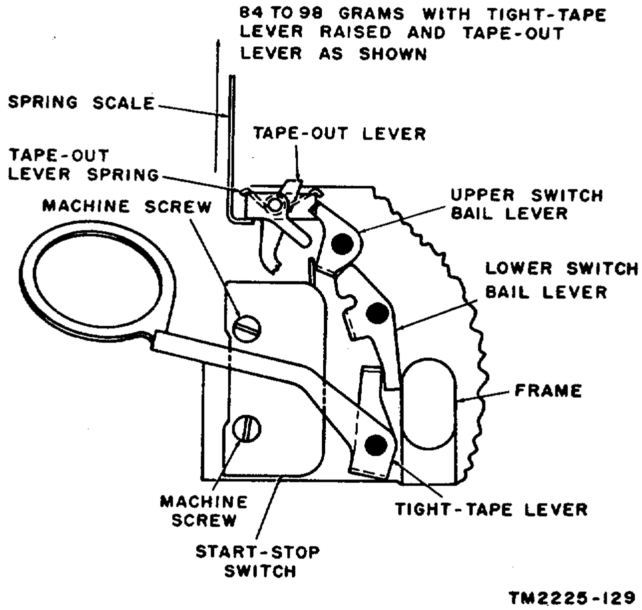



*Figure 4-190. Tape-out lever spring adjustment.*

setscrews against the adjustment screws. Check related adjustments (par. 4-211, 4-214, 4-216, 4-217, and 4-219).

*Note.* To make this adjustment, remove the tape cover from the top cover.

**4-211. Top Cover Preliminary Adjustment (TT-76A/GGC and Later Models)** (fig. 4-192)

*a. Requirement*. The tape cover should be parallel with the tape guide in the top cover.

*b. Adjustment*. Loosen the setscrew and turn the eccentric screw clockwise or counterclockwise to meet the requirement. Check related adjustment (par. 4-212).

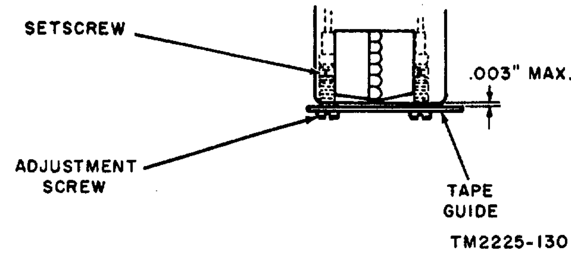



*Figure 4-191. Tape cover and tape guide adjustment.*

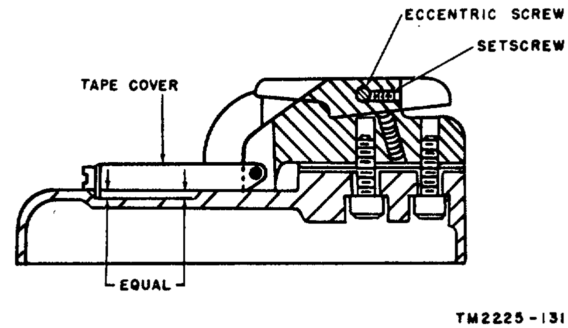



*Figure 4-192. Top cover preliminary adjustment (TT-76A/GGC and later models).*

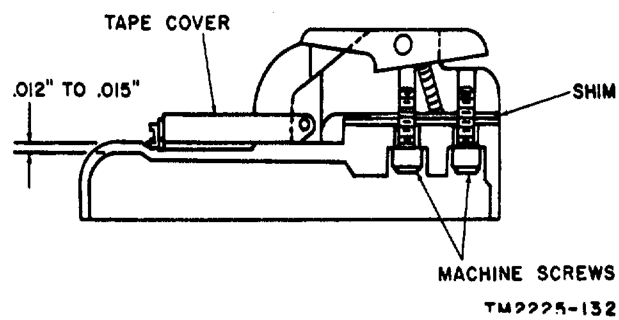



*Figure 4-193. Tape cover clearance adjustment (TT-76A/GGC and later models*

**4-212. Tape Cover Clearance Adjustment (TT-76A/GGC and Later Models)** (fig. 4-193)

*a. Requirement*. There should be 0.012-to 0.015-inch clearance between the tape cover and the top cover of the transmitter-distributor.

*b. Adjustment*. Loosen the machine screws and add or remove shims (ref Nos. 57201 and 57202) to meet the requirement. Tighten the machine screws and recheck clearance. Check related adjustment (par. 4-213). Note. To make this adjustment, remove the top cover from the transmitter-distributor.

**4-213. Tape Cover Block Adjustment (TT-76A/GGCpand Later Models)** (fig. 4-194)

*a. Requirement*. There should be 0.002-to 0.005-inch clearance between the edge of the tape guide of the top cover and the message tape when the code holes of a message tape

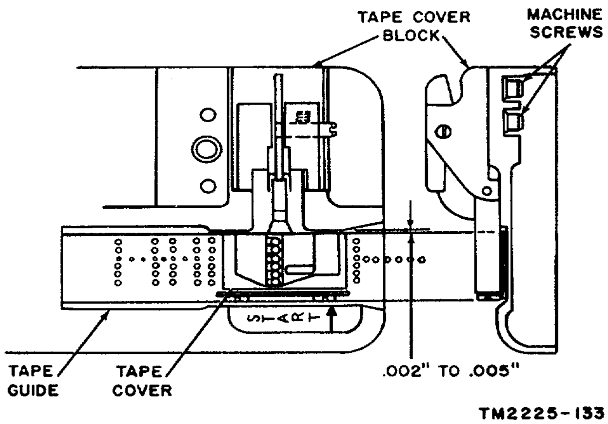



Figure 4-194. Tape cover block adjustment (TT-76A/GGC and later models).

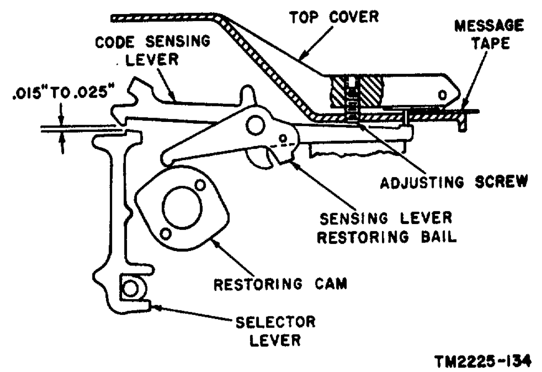



Figure 4-195. Selector lever and code sensing Lever clearance adjustment.

perforated with the LTRS code combination is centered with the holes in the tape cover.

*b. Method of Checking.* Perforate a message tape with the LTRS code combination and position the message tape 0.002-to 0.005-inch from the tape guide. The holes of the tape cover should be centered over the perforations in the message tape.

*c. Adjustment*. Loosen the two machine screws and position the tape cover block, to meet the requirement. Check related adjustment (par. 4-214).

**4-214. Selector Lever and Code Sensing Lever Clearance Adjustment**
(fig. 4-195)

*a. Requirement*. There should be 0.015-to 0.025-inch clearance between the top of the selector levers and the tip of the code sensing levers, when the sensing lever restoring bail is on the low part of the restoring cam and the sensing levers are held downward in the space position by a blank piece of message tape.

*b. Method of Checking*. With a piece of blank message tape inserted under the tape cover, move the stop-start lever to the START position. Rotate the transmitter-distributor camshaft until the sensing lever restoring bail is against the low part of the restoring cam and the sensing levers are against the message tape. Check the clearance.

*c. Adjustment.* With the top cover held in place with only the two rear mounting screws, fold a piece of blank message tape as shown in figure 4-195 and position it under the tape cover so that one thickness of message tape is 4-206 over the sensing lever pins and three thicknesses are under the front part of the tape cover. Manually energize the clutch magnet armature lever and turn the transmitter-distributor camshaft until the sensing lever restoring bail is on the low part of the cam and the sensing levers are against the message tape. Hold down the tape cover tight against the top cover and turn the adjusting screws in the top cover up or down until the requirement is met. Replace and tighten the front mounting screw. Recheck the clearance. On the TT-76/GGC, make the adjustments in paragraph 4-216. Check related adjustments (paras. 4-218, 4-219, and 4-220).

*Note.* Turn the adjusting screw clockwise to decrease the clearance or counterclockwise to increase the clearance.

**4-215. Tape Cover Latch Eccentric Adjustment (TT-76/GGC)**
(fig. 4-196)

*a. Requirement*. The lockwasher should be fully compressed by the adjusting nut and hexagonal nut.

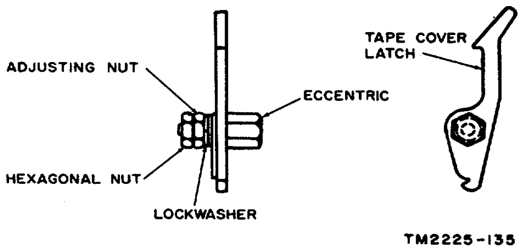



*Figure 4-196. Tape cover latch eccentric adjustment (TT-76/GGC).*

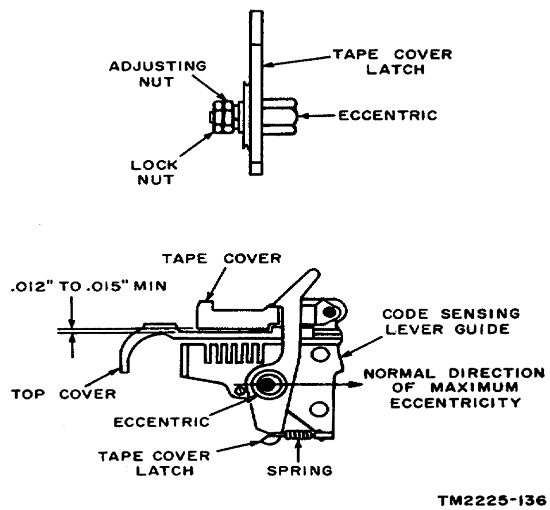



*Figure 4-197. Tape cover latch adjustment (TT-76/GGC).*

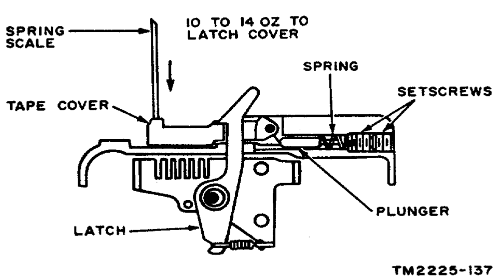



*Figure 4-198. Tape cover actuating load (TT-76/GGC).*

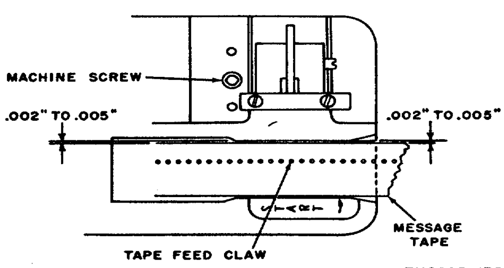



*Figure 4-199. Top cover adjustment 4207(TT-76A/GGC and later models).*

*b. Adjustment*. Loosen the hexagonal nut and tighten the adjusting nut until the lockwasher is fully compressed. Tighten the hexagonal nut. Check related adjustments (par. 4-214 and 4-216).

### 4-216. Tape Cover Latch Adjustment (TT-76/GGC) (fig. 4-197)

*a. Requirement*. There should be a 0.012-to 0.015-inch clearance at the tightest point between the bottom of the tape cover and the surface of the tape guide slot when the tape cover is latched by the tape cover latch.

*b. Adjustment*. Rotate the eccentric until the requirement is met. Check the related adjustment (par 4-214).

*Note*. If the adjusting nut and hexagonal nut work loose while adjusting the eccentric, remake the adjustment in paragraph 4-215.

### 4-217. Tape Cover Actuating Load (TT-76/GGC) (fig. 4-198)

*a. Requirement*. It should require a pressure of 10 to 14 ounces to latch the tape cover.

*b. Adjustment*. Remove the outer setscrew. Adjust the inner setscrew until the requirement is met. Then replace the outer setscrew.

*Note.* There are two setscrews for this adjustment. The inner setscrew is used to vary the compression of the spring and the outer setscrew locks the front set-screw in position.

**4-218. Top Cover Adjustments (TT-76A/GGC and Later Models)**
(fig. 4-199)

*a. Requirement*. With the tape feed claw engaging the feed holes of the message tape, the edge of the message tape should be .002 to .005-inches from the guide of the top cover.

*b. Adjustment*. Loosen the three machine screws that mount the top cover and position the top cover to meet the requirement. Tighten the mounting machine screws and recheck the requirement.

**4-219. Upper Switch Bail Lever Adjustment**
(fig. 4-200)

*a. Requirement.*

(1) With the start-stop lever detent and the stop-start lever in the position shown, there should be a clearance of 0.005 to 0.025 inch between the tape-out lever and the upper switch bail lever.

(2) The start-stop switch should be actuated in the center of the STOP-START positions of the stop-start lever.

*b. Adjustment.*

(1) Obtain the required clearance by bending the upper switch bail lever.

(2) Loosen the two start-stop switch machine screws and position the start-stop switch to meet the requirement; tighten the machine screws.

**4-220. Transmitter-Distributor Top Cover Alignment (TT-76/GGC)**
(fig. 4-201)

*a. Requirement*. The holes in a piece of message tape perforated with the LTRS code group should be centered with the holes in the tape cover when the tape feed claw is fully engaged with the tape feed holes.

*b. Adjustment*. Install a piece of message tape perforated with the LTRS code group under the tape cover. Move the stop-start lever to the START position. This will cause the tape feed claw to engage in the tape feed holes. Loosen the three machine screws and reposition the top cover until the requirement is met. Tighten the three machine screws and recheck the requirement.

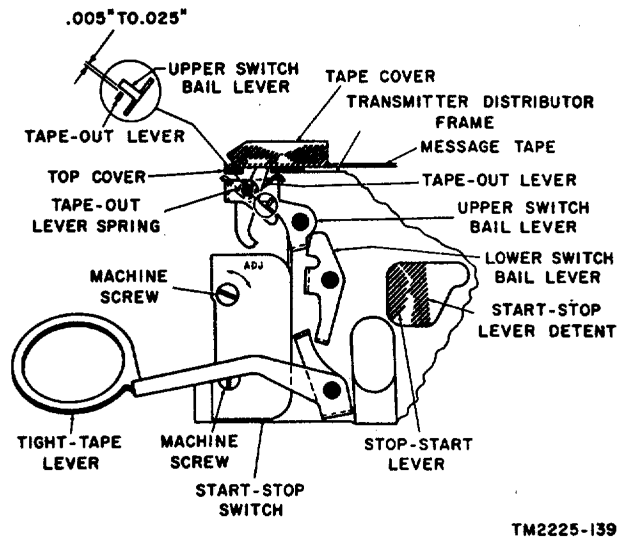



*Figure 4-200. Upper switch bail lever adjustment.*

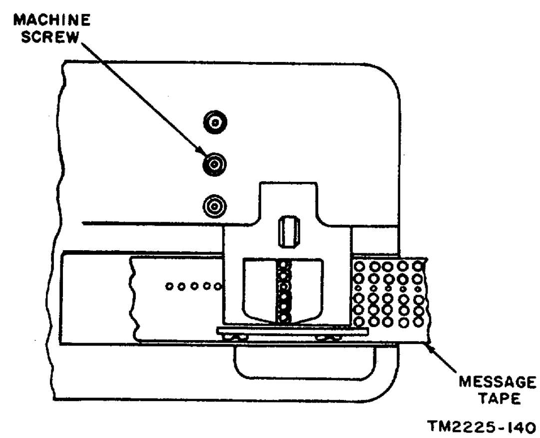



*Figure 4-201. Transmitter-distributor top cover alignment (TT-76/GGC).*

**4221. Transmitter-Distributor Friction Clutch Adjustment (TT-76/GGC)**
(fig. 4-202)

*a. Requirement*. It should require a pull of 25 to 30 ounces to prevent the transmitter-distributor friction clutch from turning when the motor is on and the transmitter-distributor camshaft is not operating any levers.

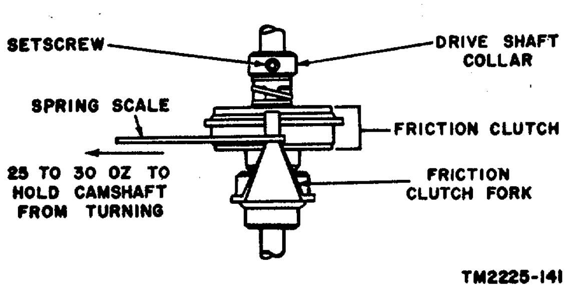



*Figure 4-202. Transmitter-distributor friction clutch clutch adjustment (TT-76/GGC).*

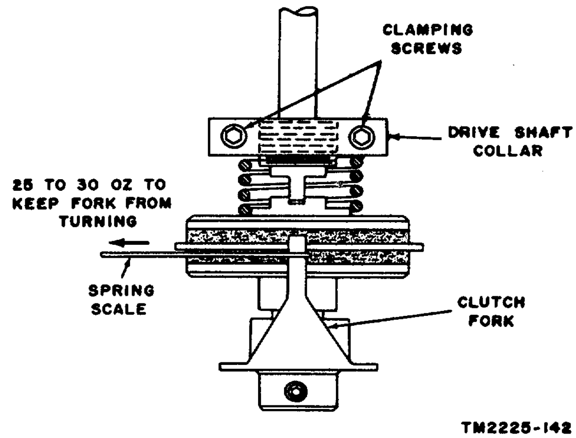



*Figure 4-203. Transmitter-distributor friction adjustment (TT-76A/GGC).*

*b. Method of Checking*. Install a piece of punched message tape in the transmitter-distributor. Hook a spring scale on the friction clutch fork. Move the stop-start lever to the START position. While holding the scale rigidly, allow the transmitter-distributor camshaft to turn just slightly until it is not operating any levers. When the free spot has been established, hold the friction clutch fork to keep it from turning and read the scale.

*c. Adjustment*. Loosen the two setscrews in the drive shaft collar, shift the collar forward or backward to obtain the proper spring tension on the friction clutch, and tighten the setscrews. Recheck the requirement and readjust if necessary.

**4-222. Transmitter-Distributor Friction Clutch Adjustment (TT-76A/GGC)**
(fig. 4-203)

*a. Requirement*. It should require a pull of 25 to 30 ounces to prevent the transmitter-distributor friction clutch from turning when the motor is on and the transmitter-distributor camshaft is not operating any levers.

*b. Method of Checking*. Install a piece of punched message tape in the transmitter-distributor. Hook a spring scale on the friction clutch fork. Move the stop-start lever to the START position. While holding the scale rigidly, allow transmitter-distributor camshaft to turn just slightly until it is not operating any levers. When the free spot has been established, hold friction' clutch fork to keep it from turning and read the scale.

*c. Adjustment*. Loosen the clamping screws in drive shaft collar, shift collar forward or back to obtain the proper spring tension on the friction clutch, and tighten clamping screws. Recheck requirement and readjust if necessary.

# CHAPTER 5

# FINAL TESTING

## 5-1. General

Reperforator-Transmitters TT-76(*)/GGC and TT-699(*)/GGC should meet certain performance requirements before being returned to operational service. This chapter describes the procedures for final testing operational limits of these sets.

## 5-2. Test Sets

Equipment used most frequently or teletypewriter final testing is described below.

*Note*. New test equipments have been developed and will replace the equipments described in this chapter. AN/UGM-1 will replace TS-2/TG and AN/GGM-1 will replace TS-383/GG. The narrative text will be changed to reflect the use of the new test equipment when significant quantities of the new equipment is available to the field.

*a. Test Set TS-2/TG*. This test set (fig. 3-1) is a portable, motor-driven unit which transmits test signals of controlled distortion. It is normally used to test the ability of high-level teletypewriter receiving mechanisms to operate with distorted signals. It provides test signals with either marking or spacing bias and marking or spacing end distortion. Bias and end distortion in the test signals are adjustable from 0 to 50 percent. Four test signals (R, Y, space, or test message) can be transmitted continuously by this test set. TM 11-2208, Test Sets TS-2/TG, TS-2A/TG and TS- 2B/TG, contains detailed information on the use of this set.

*b. Distortion Test Set TS-383/GG*. This test set (fig. 3-2) is motor-driven set used for analyzing distortion in signals transmitted by a high-level teletypewriter and, like Test Set TS-2/TG, for testing the effects of distortion on receiving mechanisms. It is not as portable as Test Set TS-2/TG and normally is used in the larger repair shops. The set can transmit a test message or Y.T.O.M.V.R. BLK (blank) and LET (letters) code groups with controlled distortion for testing the operational limits of teletypewriter selector mechanisms. The signals provided by this set can be either undistorted or distorted to a controlled degree up to 100 percent. Signals transmitted by a high-level transmitter under test can be visually analyzed to, detect any deviations from undistorted signals. TM 11-2217, Distortion Test Sets TS-383/GG and TS-383A/GG, gives detailed information on the use of this test set.

*c. Telegraph Test Set AN/GGM-15(V)(*).* This test set is comprised of three units: Signal Generator SG-860/GGM-15(V); Signal Distortion Analyzer TS-2862/GGM-15(V); and Oscilloscope OS-206/GGM-15(V). It is the primary test set used to test low-level signaling teletypewriters. The three major components of the AN/GGM- 15(V) are completely self-contained. The TS-2862/GGM-15(V) and the OS-206/GGM-15(V) function as a unit and may be used in conjunction with the SG-860/GGM-15(V).

(1) The SG-860/GGM-15(V) will produce a test message, either clear or distorted, to simulate telegraph data signals. The SG-860/GGM-15(V) output can be selected as a repeated character, 1:1 reversals, or quick brown fox test message. Distortion is produced in 1-percent increments up to 49-percent marking, spacing, switching bias, marking, or spacing end. The output data signal is selected as a 5, 6, 7, or 8 level code with a character length of from 7 to 16 bits. Both high and low-level outputs are available.

(2) The TS-2862/GGM-15(V) is used to measure distortion on high or low-level data signals without interrupting traffic. Average and peak distortion is measured on synchronous 5, 6, 7, or 8 level data signals. The distortion percentage is displayed through digital readout nixie tubes on the TS-2862/GGM-15(V) front panel. The TS-2862/GGM-15(V) also generates a low-level, undistorted MIL-STD-188B error code. Distortion can be introduced when the SG-860/GGM-15(V) and the TS-2862/GGM-15(V) are in the proper mode of operation for such function. The error code is then available at both high-level and low-level outputs. Errors are detected and counted by monitoring the error code with another TS-2862/GGM-15(V).

(3) The OS-206/GGM-15(V) receives a vertical input signal from the TS-2862/GGM-15(V) input circuits.

The same signal presented to the TS-2862/GGM-15(V) is displayed on the cathode-ray tube (CRT). Positioning gain and sweep controls facilitate display adjustment. Calibration signals are provided to aid in accurate waveshape analysis.

**5-3. Receiving Test**

*a. Preparation.*

(1) Position the reperforator-transmitter selector switch to LOCAL REPUNCH.

(2) Turn the motor switch to ON and adjust :he motor speed as described in TM11-5815-238-12.

(3) If you are testing the TT-67(*)/GGC, insert send card from the TS-2/TG or TS-383/GG into the TD or TR jack located in the keyboard guard assembly.

(4) If you are testing the TT-699(*)/GGC, connect the ±6 volts low-level output from signal generator SG-860/GGM-15(V) to RCVR IN terminals 8 and 9 of A1TB1.

(5) Arrange the test set to send a test message with undistorted signals.

(6) Check the tape for incorrect printing and lunching.

*b. Range Test (TT-76/GGC ).*

(1) Connect the reperforator-transmitter as Described in *a* (3) above. Arrange the test set to transmit the test message with undistorted signals.

(2) While receiving the test message, set the rangefinder dial at 60. Slowly turn the bias potentiometer knob for maximum and minimum good copy positions. Note the dial reading and set the potentiometer 5 points above the midpoint between the two readings.

(3) While still receiving the test message, determine the upper limit of the range with the rangefinder dial.

(4) After the upper limit is established, determine the lower limit.

(5) Calculate the difference between the upper and lower limits. This difference (range of the reperforator) should be at least 72 units on the dial.

(6) Set the range dial at the midpoint between the two limits. Tighten the rangefinder dial lock on TT-76/GGC.

*c. Range Test (TT-76A/GGC and later models ).*

(1) Connect the reperforator-transmitter as described in *a* (3) above. Arrange the test set to transmit the test message with undistorted signals.

(2) Remove the strap across the BIAS TEST MA terminals on the power supply and terminal unit. Connect a milliameter in series with the terminal posts.

(3) Loosen the locknut on the shaft of the bias potentiometer and turn the shaft with a screwdriver until a reading of 8.75 ma is obtained for 20-ma operation or a reading of 12.25 ma is obtained for 60-ma operation. Tighten the locknut and recheck the adjustment.

(4) Disconnect the milliameter and reconnect the strap between the BIAS TEST MA terminals.

(5) Complete the range test as described in *b* (3) through (6) above.

*d. Range Test TT-699 (*)/GGC.*

(1) Connect the reperforator-transmitter as described in *a* (4) above. Arrange the test set to transmit the test message with undistorted signals.

(2) Complete the range test as described in *b* (3) through (6) above.

*e. Bias Tolerance Test*. Within certain minimum limits of distortion, this reperforator- transmitter should normally operate properly while receiving signals that contain bias distortion. The bias tolerance of a properly adjusted reperforator-transmitter operating at 60 words per minute should be a minimum of 40 percent, computed as described in (5) below. The bias tolerance of a properly adjusted reperforator- transmitter operating at 100 words per minute should be a minimum of 35 percent, computed as described in (6) below. When signal distortion tests sets are arranged to transmit test signals with bias distortion, the set changes the beginning time of each marking impulse with respect to the beginning time of the start impulse. When adjusted to transmit signals with marking bias, the test set advances the beginning of each marking impulse, when adjusted to transmit signals with spacing bias, the set retards the beginning of each making impulse. The bias tolerance of a reperforator-transmitter may be tested in the following manner:

(1) Interconnect the reperforator and a distortion test set in a test circuit as described in *a* above.

Arrange the test set to transmit the test message.

(2) Set the bias potentiometer dial at the optimum point as determined in *b* above.

(3) Adjust the test set to transmit signals with a marking bias of 35 percent for 60 words per minute operation or 30 percent for 100 words per minute operation. Use these test signals to determine the upper range limit with the rangefinder.

(4) Adjust the test set to transmit signals with a spacing bias of 35 percent for 60 words per minute or 30 percent for 100 words per minute operation. Determine the lower limit of the range with the rangefinder.

(5) Compute the bias tolerance of the reperforator operating at 60 words per minute using the following formula:

$$\text{Bias tolerance} = 35 + \left( \frac{\begin{matrix}\text{Upper limit} & \text{Lower limit} \\ \text{marking bias} & \text{--spacing bias}\end{matrix}}{2} \right)$$

(6) Compute the bias tolerance of the reperforator operating at 100 words per minute using the following formula:

$$\text{Bias tolerance} = 30 + \left( \frac{\begin{matrix}\text{Upper limit} & \text{Lower limit} \\ \text{marking bias} & \text{--spacing bias}\end{matrix}}{2} \right)$$

*f. End Distortion Test*. The reperforator-transmitter should operate properly while receiving signals containing end distortion within certain minimum limits. The end distortion tolerances of a properly adjusted reperforator-transmitter operating at 60 words per minute should be a minimum of 35 percent computed as described in (5) below. The end distortion tolerances of a properly adjusted reperforator- transmitter operating at 100 words per minute should be 30 percent computed as described in (6) below. When signal distortion test sets are arranged to transmit signals with end distortion, the set changes the ending time of each marking impulse with respect to the beginning time of the start impulse. When adjusted to transmit test signals with spacing end distortion, the test set advances the end of each marking code impulse. When adjusted to transmit test signals with marking end distortion, the test set retards the end of each marking code impulse. The end distortion tolerance of a reperforator-transmitter may be tested in the following manner:

(1) Interconnect the reperforator-transmitter and a distortion test set in test circuit as described in *a* above. Arrange the test set to transmit test message signals.

(2) Set the bias potentiometer at the optimum point as determined in *b* above.

(3) Adjust the test set to transmit test signals with 35 percent spacing end distortion for 60 words per minute operation or with 30 percent spacing end distortion for 100 words per minute operation. Use the test signals to determine the upper range limit with the rangefinder.

(4) Adjust the test set to transmit test signals with 35 percent marking end distortion for 60 words per minute operation or with 30 percent marking end distortion for 100 words per minute operation. Use the test signals to determine the lower limit of the range with the rangefinder.

(5) Compute the end distortion tolerance of the reperforator-transmitter operating at 60 words per minute using the following formula:

$$\text{End Distortion tolerance} = 35 + \left( \frac{\begin{matrix}\text{Upper limit} & \text{Lower limit} \\ \text{spacing end} & \text{-marling end} \\ \text{marking bias} & \text{--spacing bias}\end{matrix}}{2} \right)$$

(6) Compute the end distortion tolerance of the reperforator-transmitter operating at 100 words per minute using the following formula:

$$\text{End Distortion tolerance} = 30 + \left( \frac{\begin{matrix}\text{Upper limit} & \text{Lower limit} \\ \text{spacing end} & \text{-marling end} \\ \text{marking bias} & \text{--spacing bias}\end{matrix}}{2} \right)$$

*g. Internal Bias*. Internal bias of a teletypewriter receiving unit is a computed measurement of the effect of maladjustment, wear, or some other mechanical fault within the mechanism. It is used as a measure of mechanical efficiency of a receiving unit. The internal bias of the reperforator-transmitter is found by calculating the difference between the bias tolerance orientation point (midpoint between the high and low range limits (as described in *c* above) and the end distortion orientation point as described in *d* above. If the difference between the two orientation points at 60 words-per-minute operation is greater than six points, some mechanical fault is present in the reperforator-transmitter and the mechanism should be rechecked for maladjustment or other mechanical fault.

## 5-4. Sending Sets

The keyboard-transmitter and transmitter- distributor may be tested by either of two methods. The first method requires the use of Distortion Test Set TS-383/GG for the high-level TT-76(*)/GGC unit, or Signal Distortion Analyzer TS-2862/GGM-15(V) for the low-level TT-699(*)/GGC unit. The second method requires the use of a teletypewriter receiving unit known to be in good operating condition, and a source of undistorted teletypewriter signals.

*a.* If the high-level unit TT-76(*)/GGC is to be tested, and Test Set TS-383/GG is available, proceed as follows:

(1) Place the SELECTOR switch in the LOCAL REPUNCH position.

(2) Connect the receive cord from the test set to the TD jack in the keyboard guard assembly.

(3) Connect the test set to power and set the controls and test as directed in TM 11-2217 for testing transmitting contacts of teletypewriters.

*b.* If the low-level unit TT-699(*)/GGC is to be tested, and Signal Distortion Analyzer TS-2862/GGM-15(V) is available, proceed as follows:

(1) Place the SELECTOR switch in the TD SEND-TR SEND-RECEIVE position.

(2) Connect the input of the test set to the XMTR OUT terminals 5 and 6 of A1TB1 on the reperforator transmitter.

(3) Connect the test set to power and set the controls and test as directed in TM 11-6625-1668-45-1 for teletypewriter transmitter distortion testing.

*c*. If Test Set TS-383/GG or Signal Distortion Analyzer TT-2862/GGM-15(V) is not available, determine whether the receiving unit of the set is operating according to the instructions paragraph 5-3 and proceed as follows:

(1) Place the SELECTOR switch in the LOCAL REPUNCH position.

(2) Send from the keyboard-transmitter and the transmitter-distributor, in turn, five copies of the following: THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890, LTRS, CAR. RET., LINE FEED, then follow by all the remaining upper case characters.

(3) Inspect the tape reproduced by the reperforator for errors in printing or punching.

(4) Check the range of the reperforator as described in paragraph 5-3b. If there is a difference of more than 10 points between the range of the reperforator-transmitter when receiving from either the keyboard-transmitter or transmitter-distributor and the range when receiving from a known source of undistorted signals such as Test Set TS-2/TG or Signal Generator SG-860/GGM-15(V) the transmitting section is out of tolerance and must be adjusted.

# ★CHAPTER 7

# DEPOT OVERHAUL STANDARDS

## 7-1. Applicability of Depot Overhaul Standards

The tests outlined in this chapter are designed to measure the performance capability of a repaired teletypewriter set or reperforator-transmitter. Sets that are to be returned to stock should meet the standards given in these tests.

## 7-2. Applicable References

*a. Repair Standards*. Applicable procedures of the depots performing these tests and the general standards for repaired electronic equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3, form a part of the requirements for testing this equipment.

*b. Technical Publications*. The following technical publications are applicable to the equipment (refer to DA Pam 310-4 for TM changes in force):

| | |
|---|---|
| Depot Inspection Standard for Repaired Signal Equipment | TB SIG 355-1 |
| Depot Inspection Standard for Refinishing Repaired Signal Equipment | TB SIG 355-2 |
| Depot Inspection for Moisture and Fungus Resistant Treatment | TB SIG 355-3 |
| U.S. Army Equipment Index of Modification of Work Orders | DA Pam 310-7 |
| Test Set I48B and Ohmmeter AM-21A/U | TM 11-2050 |
| Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart: Transformer, Variable Power CN-16/U | TM 11-5950-205-14P |
| Depot Maintenance Manual for Fractional Horsepower Motors | TM 11-6105-200-50 |
| Field and Depot Maintenance Repair Parts and Special Tool List: Ohmmeter ZM-21/U and ZM-21A/U | TM 11-6625-298-34P |
| Organization, DS, GS, and Depot Maintenance Manual, Multimeter TS-352B/U | TM 11-6625-366-15 |
| Maintenance Repair Parts and Special Tool List: Ammeter ME-65/U | TM 11-6625-585-24P |
| Organizational Maintenance Manual: Test Set, Teletypewriter AN/UGM-1 | TM 11-6625-620-12 |
| Operator and Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Test Sets, Telegraph AN/GGM-15(V)1 and AN/GGM-15()2 | TM 11-6625-1668-12 |

*c. Modification Work Orders*. Perform all modification work orders (MWO's) applicable to this equipment before making the tests specified. DA Pam 3107 lists all applicable MWO's.

**7-3. Additional Equipment Required**

In addition to the test equipment listed in the maintenance allocation chart, the following equipment is required:

| Item | Federal stock number | Quantity |
|---|---|---|
| Transformer, Variable Power CN-16/U, or equivalent. | 5950-235-2086 | 1 |
| Transformer, Variable Power GR Type W10HM. | 6120-828-1490 | 1 |
| Megohmmeter AM-21A/U, or equivalent. | 6625-581-2466 | 1 |
| Megohmmeter AM-21A/U, or equivalent. | 6625-782-8817 | 1 |
| Ammeter ME-65/U, or equivalent. | 6625-965-0195 | 1 |
| Test Set, Teletypewriter AN/UGM-1 [a] | | |

[a] Test Set TS-383/GG may be used until Test Set Teletypewriter AN/UGM-1 becomes available.

**7-4. General Test Requirements**

When a repaired teletypewriter set or reperforator-transmitter is being tested, perform tests in sequence and comply with preparatory instructions.

*a. Scope of Tests*. The following tests will be performed to determine the acceptability of repaired sets for return to stock:

(1) Physical test and inspection

(2) Resistance tests.

(3) Electrical tests.

(4) Operational tests.

*b. Initial Conditions.*

(1) Perform all tests at room temperature.

(2) Properly ground all equipment before making power connections.

**7-5. Physical Test and Inspection**

*a*. The equipment shall meet the mechanical and visual requirements specified in Repair Standards TB SIG 355-1, -2, and -3.

*b*. The equipment shall be lubricated in accordance with the instructions in chapter 3, section III.

**7-6. Resistance Tests**

Continuity, insulation resistance, and dielectric breakdown tests will be performed with power removed.

*a. Continuity*. Continuity of the teletypewriter wiring will be verified by point-to-point measurements except where continuity is verified by operating tests.

*b. Insulation Resistance* (fig. 7-1). Insulation resistance shall be measured with Multimeter TS-352(*)/U.

(1) Position the teletypewriter POWER, LIGHT, and MOTOR switches to ON. Position the SELECTOR switch to 1.

(2) Measure the resistance from each side of the ac power cord to ground. The resistance should be a minimum of 8 megohms.

(3) On the TT-76(*)/GGC, the insulation resistance between ground and the tip and sleeve of each line cord plug should be a minimum of 8 megohms. This step is not applicable to the TT-699(*)/GGC.

**NOTE**

On the TT-699(*)/GGC, measure the insulation resistance from each terminal 5 and 6 of TB1 to ground. The resistance should be a minimum of 8 megohms.

(4) Repeat (3) above with the SELECTOR switch in positions 2 and 3. The results should be the same.

*c. Dielectric Breakdown* (fig. 7-2). Dielectric breakdown tests shall be made with Megohmmeter AM-21 A/U.

(1) Remove all external power and signal connections.

(2) Position the teletypewriter POWER and MOTOR switches to ON.

(3) The ac power cord and the signal line cords should withstand 400 volts or twice the peak operating voltage

$$\left[\frac{2\ \text{Erms}}{0.707}\right]$$

(whichever is greater) applied for 10 seconds as follows:

(*a*) Between ground and each of the two ac conductors of the power cord and between each conductor and cable sheath.

(*b*) Between ground and the tip and sleeve of the SEND, TD, and TR signal line

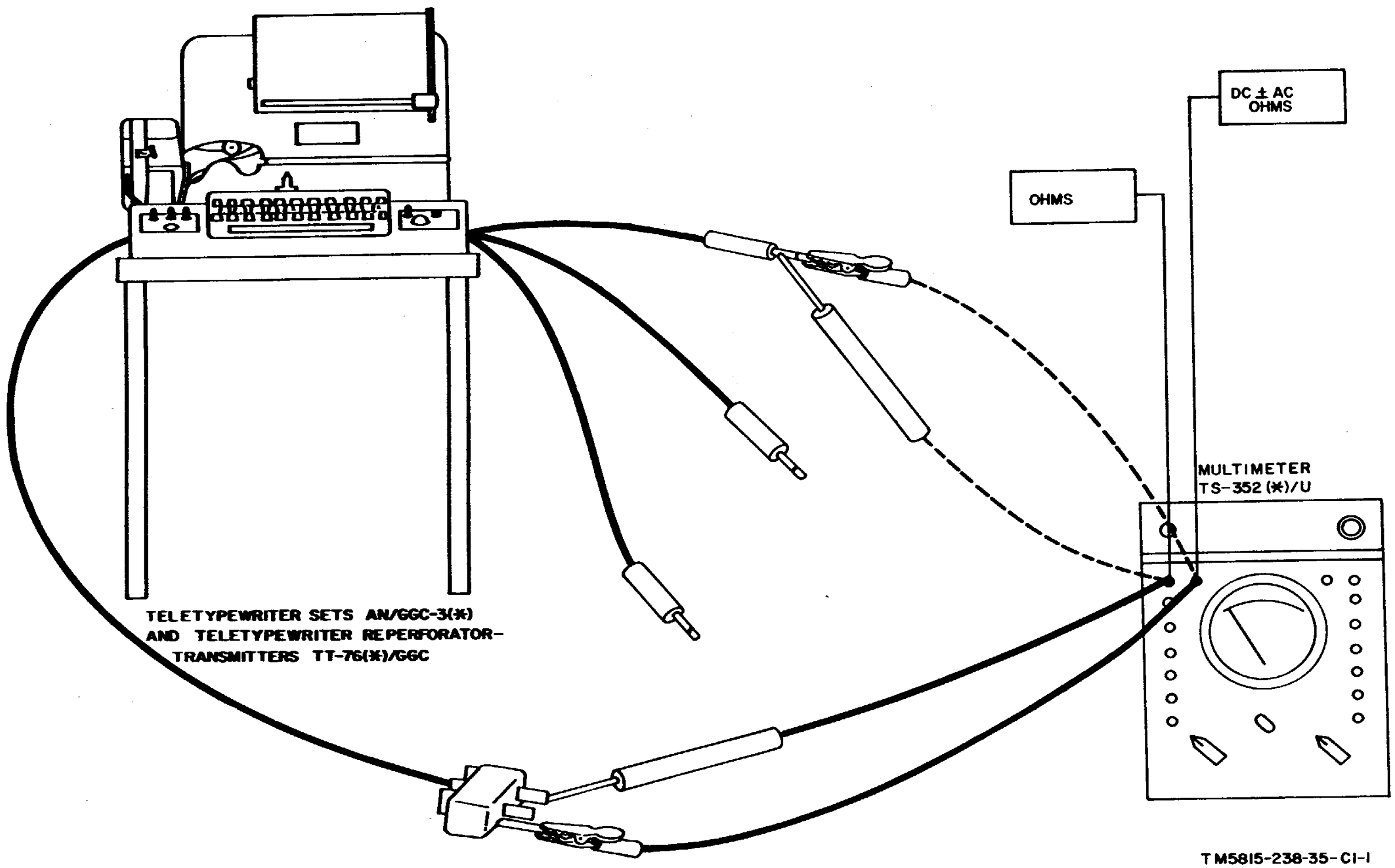



*Figure 7-1. Insulation resistance test connections.*

cords with the SELECTOR switch in each of its three positions (TT-76(*)/GGC only).

(*c*) Between ground and P3 and P7 with J3 and J7 disconnected (TT-76/GGC only).

(*d*) Between ground and P7 and P11 with J7 and J11 disconnected (TT-76(*)/GGC).

## 7-7. Electrical Tests

*a*. *Power Input* (fig. 7-3). The TT-76(*)/GGC and TT-699(*)/GGC shall operate on either a 115 or 230-volt, plus or minus 10 percent, 60-Hz ac power supply.

(1) Position the power selector switch to match the ac voltage input.

(2) Connect Variable Power Transformer CN-16/U (115-volt operation) or GR Type W10HM (230-volt operation) between the ac power source and the input to the teletypewriter.

(3) Connect Multimeter TS-352(*)/U to measure the ac input voltage across terminals 3 and 4 of TB-2.

(4) Position the POWER and MOTOR switches to ON.

(5) Adjust the input voltage in turn to 103.5, 115, and 126.5 vac (or 207, 230, and 253 vac, as applicable), and hold each setting for 10 minutes.

(6) At each voltage setting, the motor should operate efficiently without overheating.

(7) Position the POWER and MOTOR switches to OFF.

*b*. *Motor Adjustments* (fig. 7-4).

(1) Adjust the input voltage to its nominal value (115 or 230 vac, as applicable).

(2) Motor speeds to be tested are as follows:

(*a*) 368.1 opm for 60 wpm operation.

(*b*) 600 opm for 100 wpm operation.

(*c*) Motors shall be subjected to a run-in period as follows:

1. 368.1 opm-4 hours.
2. 600 opm-4 hours.

(*d*) The time required for testing and adjustment may be considered as part of the run in period.

(3) Set the Ammeter ME-65/U scale to 0-5 amperes.

(4) Insert the ammeter in series with one leg of the motor leads.

(5) Position the POWER and MOTOR switches to ON.

(6) During the run-in period, current drain should not exceed the current rating specified on the motor nameplate. An excessive rise in current will indicate overheating or faulty operation.

(7) While the teletypewriter is on, but not typing, view the rotating target wheel through the vibrating shutter of a 180-vps tuning fork.

(8) There shall not be any speed variation greater than plus or minus 0.17 percent. (Not more than three target spots should pass a given point in either direction in 10 seconds.)

(9) Repeat this test several times at reasonable intervals during the run-in period.

## 7-8. Operational Tests

*a*. *Preparation for Tests*.

(1) Connect a telephone cord from the Teletypewriter Test Set AN/UGM-1 SIGNAL INPUT jack to the TD jack of the teletypewriter keyboard guard assembly (TT-76(*)/GGC only).

(2) Position the teletypewriter POWER, MOTOR and LIGHT switches to ON.

(3) The copy and target lamps should light. Illumination of the completed copy as it enters the tape chute should be provided.

*b*. *Keyboard Transmitter Test*.

(1) Position the SELECTOR switch to 3, LOCAL REPUNCH.

(2) Position the KEYBOARD switch to LOCK. Depress keys at random. The reperforator should not type or perforate.

(3) Position the KEYBOARD switch to SEND.

(4) Depress and hold the REPEAT key and any other character key simultaneously. The character key should type and perforate continuously. The character counter should advance one count for each character or space perforated.

(5) Operate the CAR RET and the number group keys 1, 2, 3, 4, 5, 6. 7, 8, 9 and 0.

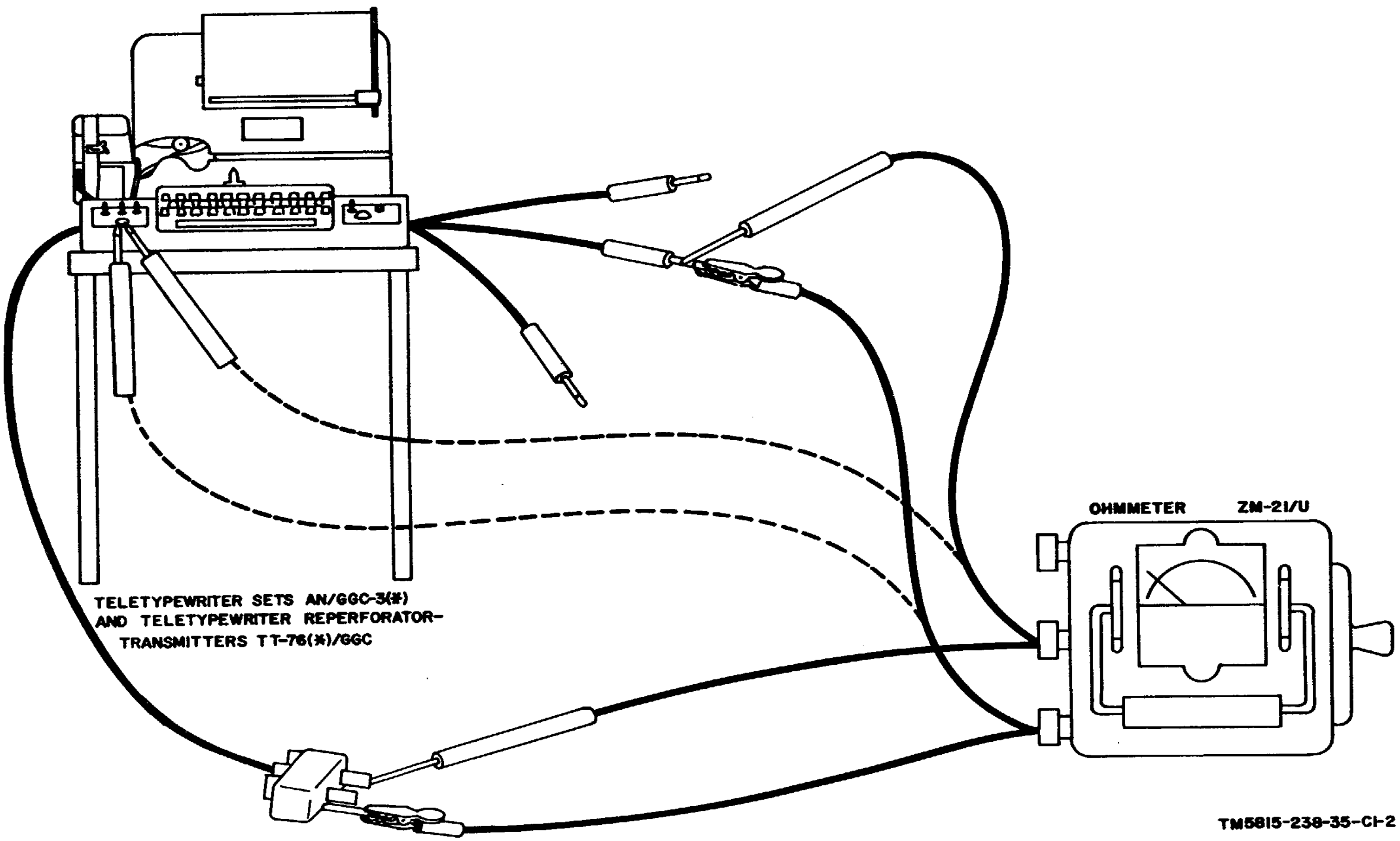



*Figure 7-2. Dielectric breakdown test connections.*

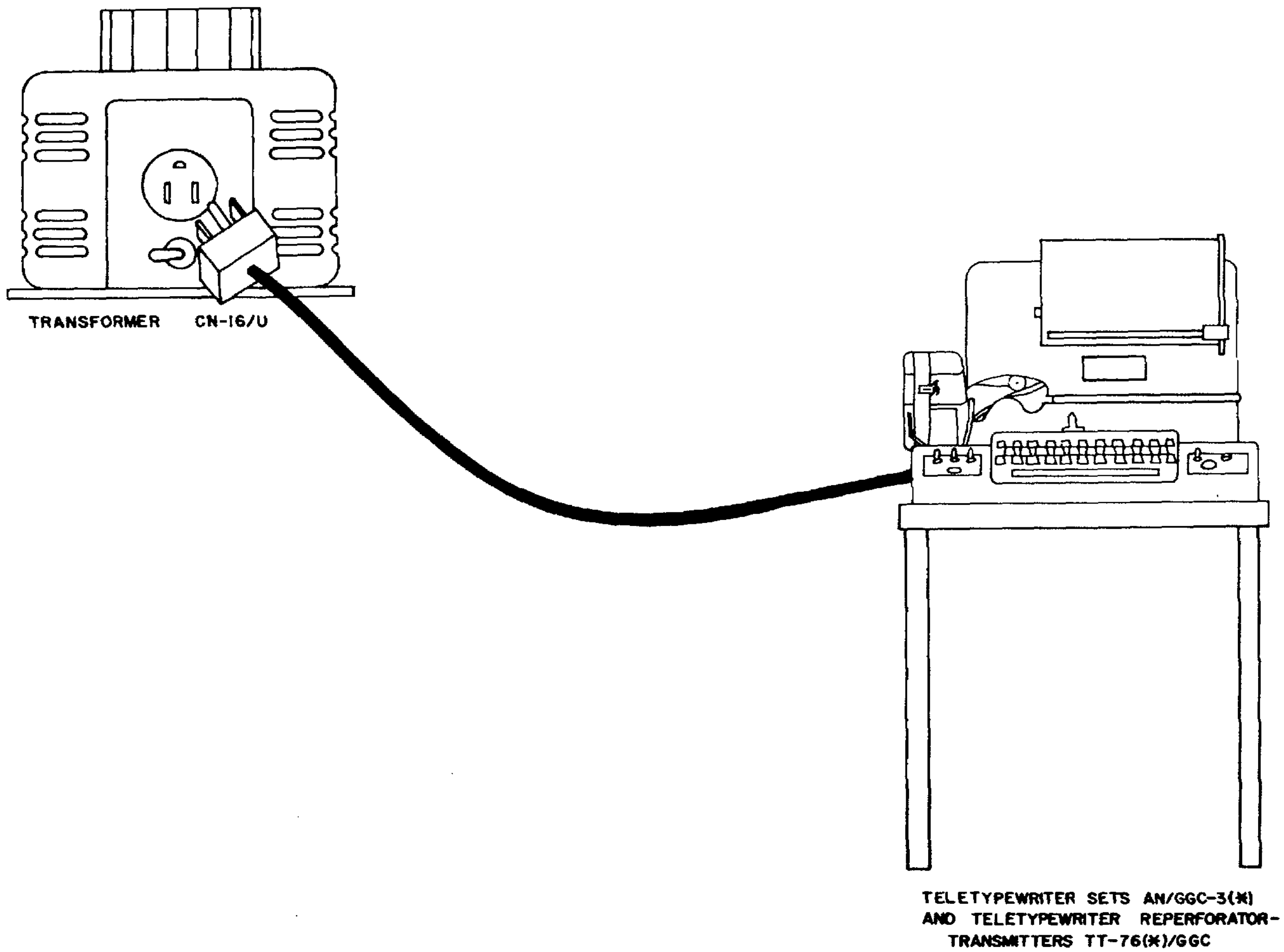



*Figure 7-3. Power input test connections.*

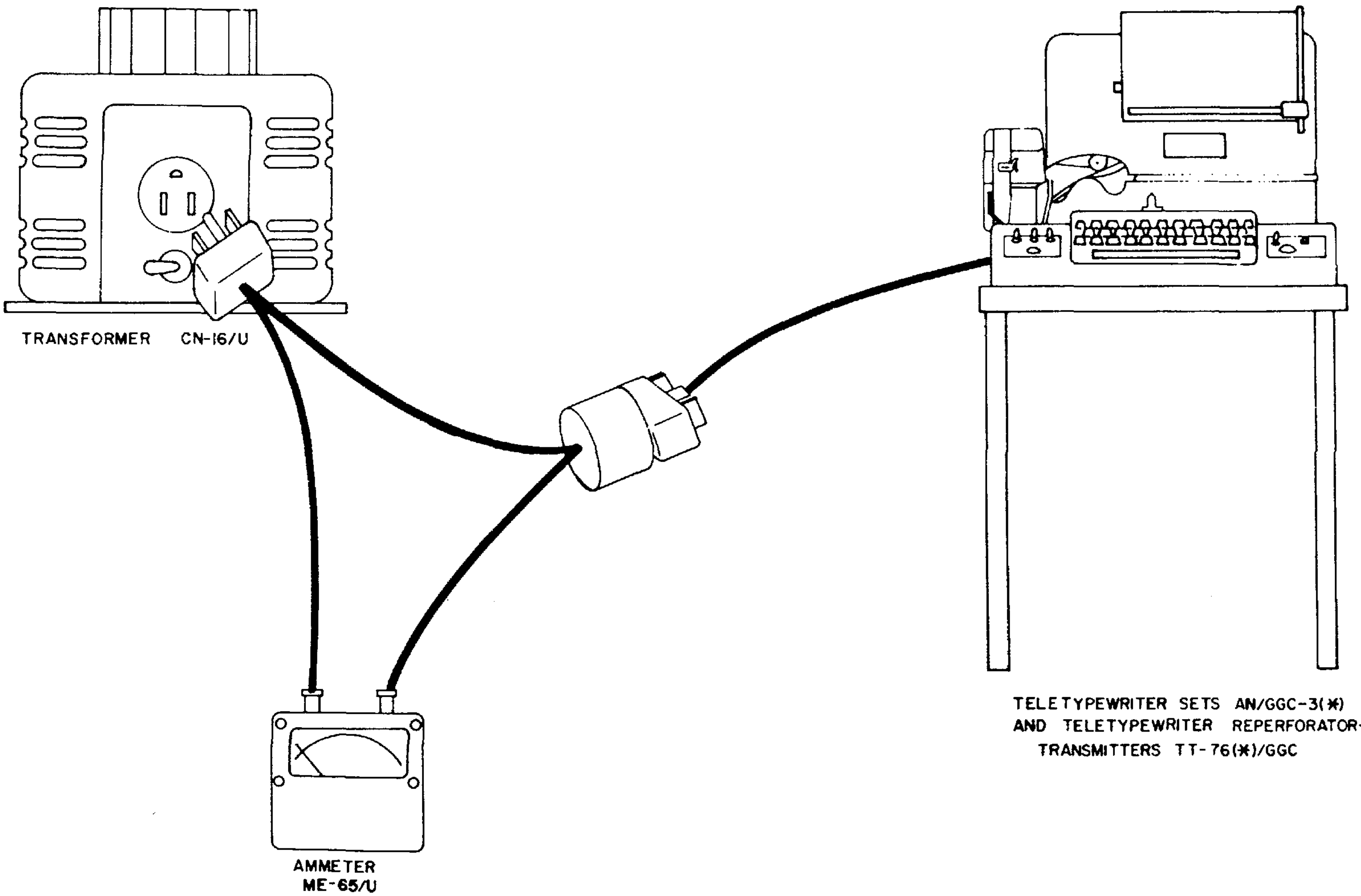



*Figure 7-4. Motor adjustment test connections.*

(6) Repeat the number group until the end of line indicator lights. The indicator should light with printing of the 66th plus or minus 1 character (applies to all models). The indicator bell should also ring with printing of the 66th character (applies to all models except TT-76/GGC).

(7) Depress the CAR RET key. The end of line indicator should extinguish, and the character counter should return to zero.

(8) Depress the FIGS and BELL (upper case S) keys. The signal bell should ring each time the BELL key is depressed.

(9) Operate the space bar. A single spacing operation should occur.

(10) Depress the blank key. The tape should advance, the blank key symbol should be printed on the tape, and the only perforations should be feed holes.

(11) Operate the manual tape feed-out lever. A tape printed with blank code characters should be unpunched and should feed as long as the manual tape feed-out lever is held down.

(12) Hold the manual tape feed-out lever in the operating position and transmit the test message from the test set.

(13) The manual tape feed-out mechanism should be disabled as soon as the first character is received on the input line. The maximum allowable garble should be the first character of the incoming message.

(14) Depress the back space lever several times. The tape should move backward one character space through the punch and die assembly each time the lever is depressed.

*c. Keylever pressure*. The required force to operate the keys shall not exceed 11 ounces for the carriage return key and 8 ounces for all other keys.

*d. Typing Reperforator.*

(1) *Ribbon feed and tape feed.*

(*a*) The type wheel and ribbon should project themselves as a unit and be restored after each operation.

(*b*) The ribbon should feed and advance to a different inking surface with every other character printed.

(*c*) The perforator paper tape should advance one position to the left before each operation cycle takes place.

(2) *Message tape.*

(*a*) The printed characters should be clear and legible.

(*b*) Copy should be equally spaced between the fifth line of punched code holes and the edge of the tape.

(*c*) Perforations should be spaced 10 feed holes per inch.

(*d*) The code and feed holes should be punched cleanly with no evidence of fibrous edges or tears.

(3) *Tape-out alarm buzzer*. The tape-out alarm buzzer should sound when the tape-out sensing lever, which is in continuous contact with the outer edge of the tape roll, is approximately 3/8 inch from the hub of the tape reel.

*e. Tape Transmitter.*

(1) Insert the standard test message into the transmitter-distributor as follows:

(*a*) Position the STOP-START lever to FEED RETRACT.

(*b*) Insert the perforator tape under the tape cover and line up the first letter or symbol of the message opposite the start arrow on the top cover of the transmitter-distributor.

(*c*) Position the STOP-START lever to STOP and then to START, and send the test message five times. The tape should feed steadily into the transmitter-distributor without binding.

(2) While the transmitter-distributor is sending the test message, each of the following actions should stop transmission:

(*a*) Moving the STOP-START lever to STOP or FEED RETRACT positions.

(*b*) Raising the tight-tape lever.

(*c*) Passing the end of the message tape over the tape-out lever.

*f. Receiving Tests (TT-76(*)/GGC)* (fig. 7-5).

(1) *Preparation for tests*.

(*a*) Connect the reperforator-transmitter in a 20-ma neutral test circuit utilizing Teletypewriter Test Set AN/UGM-1 in accordance with figure 7-5.

(*b*) Position the POWER and MOTOR switches to ON.

(*c*) Position the SIGNAL/BIAS switch to 20 MA.

**NOTE**

The TT-76/GGC selector magnet is wired for 20-ma neutral operation and must be rewired for 60 ma operation. One later models, the SIGNAL/BIAS switch permits either 20- or 60-ma neutral operation.

(2) *Orientation range (TT-76/GGC).*

(*a* ) Adjust the test set to transmit an undistorted standard test message to the teletypewriter set.

(*b* ) While receiving the test message from the test set, determine the upper and lower good copy limits.

(*c* ) Calculate the difference between the limits. The difference should be at least 72 points for 368.1 opm (60 wpm) or 60 points for 600 opm (100 wpm) operation.

(*d* ) Set the RANGEFINDER dial five points above the midpoint between the upper and lower limits.

(3) *Orientation range (TT-76A/GGC and later models*).

(*a* ) Adjust the test set to transmit an undistorted standard test message to the teletypewriter set.

(*b* ) Remove the strap across the BIAS TEST MA terminals on the power supply and terminal unit. Connect Multimeter TS-352(*)/U to measure dc current between the terminals.

(*c* ) Loosen the locknut on the shaft of the bias potentiometer and turn the shaft with a screwdriver until a reading of 8.75 ma (20-ma operation) is obtained on the multimeter.

(*d* ) Disconnect the multimeter and reconnect the strap across the BIAS TEST MA terminals.

(*e* ) Complete the range test as described in (2) (*b*) through (*d*) above.

(4) *Bias tolerance test*.

(*a )* Adjust the test set to transmit the test message with 30 percent marking and spacing bias.

(*b* ) While receiving marking bias signals, turn the RANGEFINDER dial slowly toward 120 to find the upper limit of the RANGEFINDER dial at which clear tape perforation is received. Record this upper limit.

(*c* ) While receiving spacing bias signals, turn the RANGEFINDER dial slowly toward 0 to find the lower limit of the RANGEFINDER dial at which clear tape perforation is received. Record this lower limit.

(*d*) Use the following formula for bias tolerance:

$$\text{Bias tolerance} = 30 + \frac{\begin{array}{cc}\text{(upper limit)} & \text{(lower limit)}\\ \text{(marking bias}- & \text{(spacing bias)}\end{array}}{2}$$

(*e)* Perform (*a*) through (*d*) above for 60 or 100 wpm operation. The minimum permissible bias is 40 percent for 60 wpm and 35 percent for 100 wpm.

(5) *End distortion test.*

(*a*) Adjust the test pattern generator to transmit the test message with 30 percent marking and spacing end distortion.

(*b*) Determine the upper and lower limits of good copy as in (3) (*b*) and (*c*) above.

(*c*) Use the following formula for end distortion:

$$\text{End distortion tolerance} = 30 + \frac{\begin{array}{cc}\text{(upper limit)} & \text{(lower limit)}\\ \text{(spacing end)} & \text{(marking end)}\\ \text{(distortion)} - & \text{(distortion)}\end{array}}{2}$$

(*d*) Perform (*a*), (*b*), and (*c*) above for 60 or 100 wpm operation. The minimum permissible end distortion is 35 percent for both 60 wpm and for 100 wpm.

*g. Receiving Test TT-76(*)/GGC (60-Ma operation).*

(1) Adjust the signal line current to 60 ma.

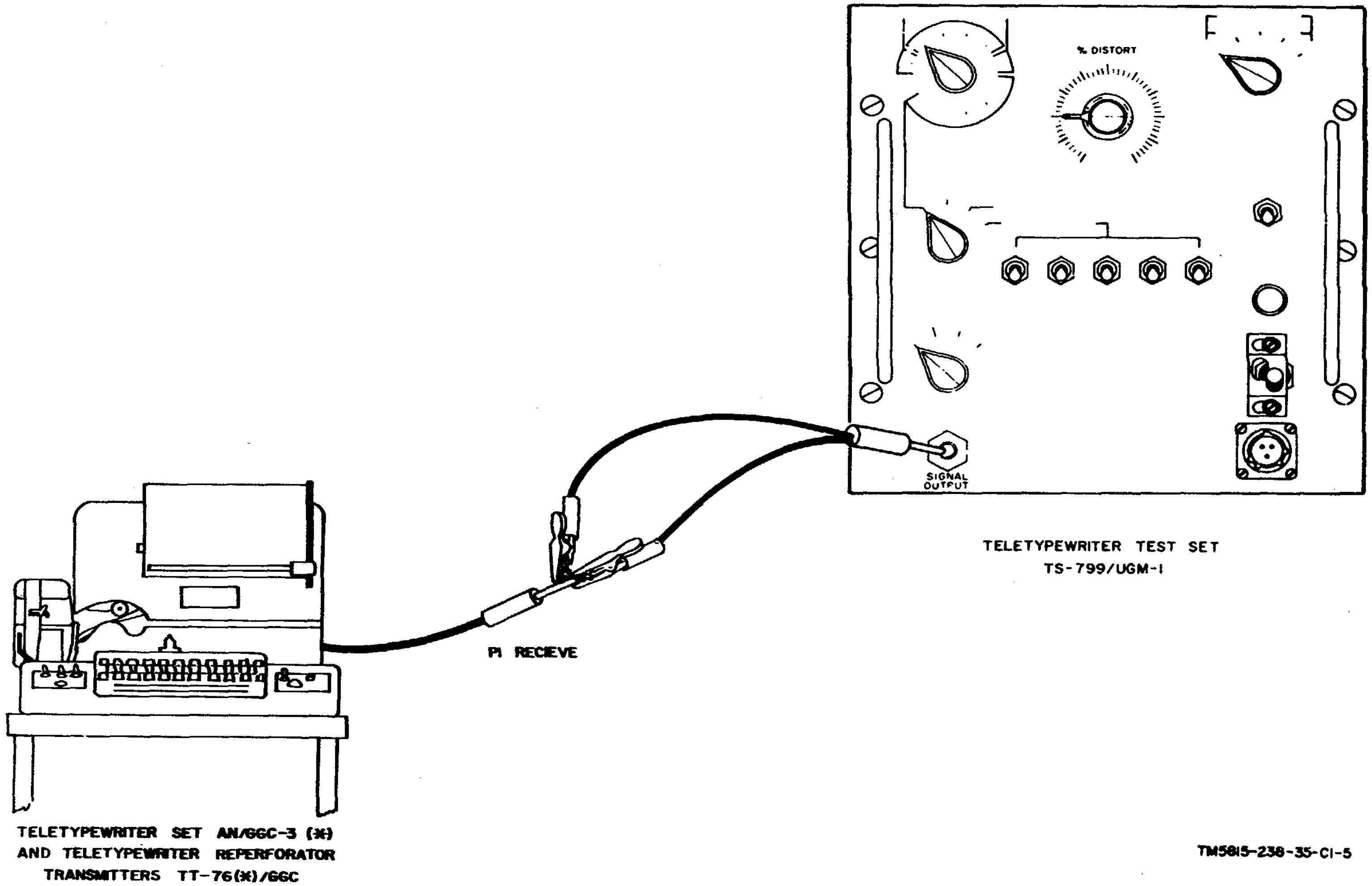



*Figure 7-5. Receiving test connections.*

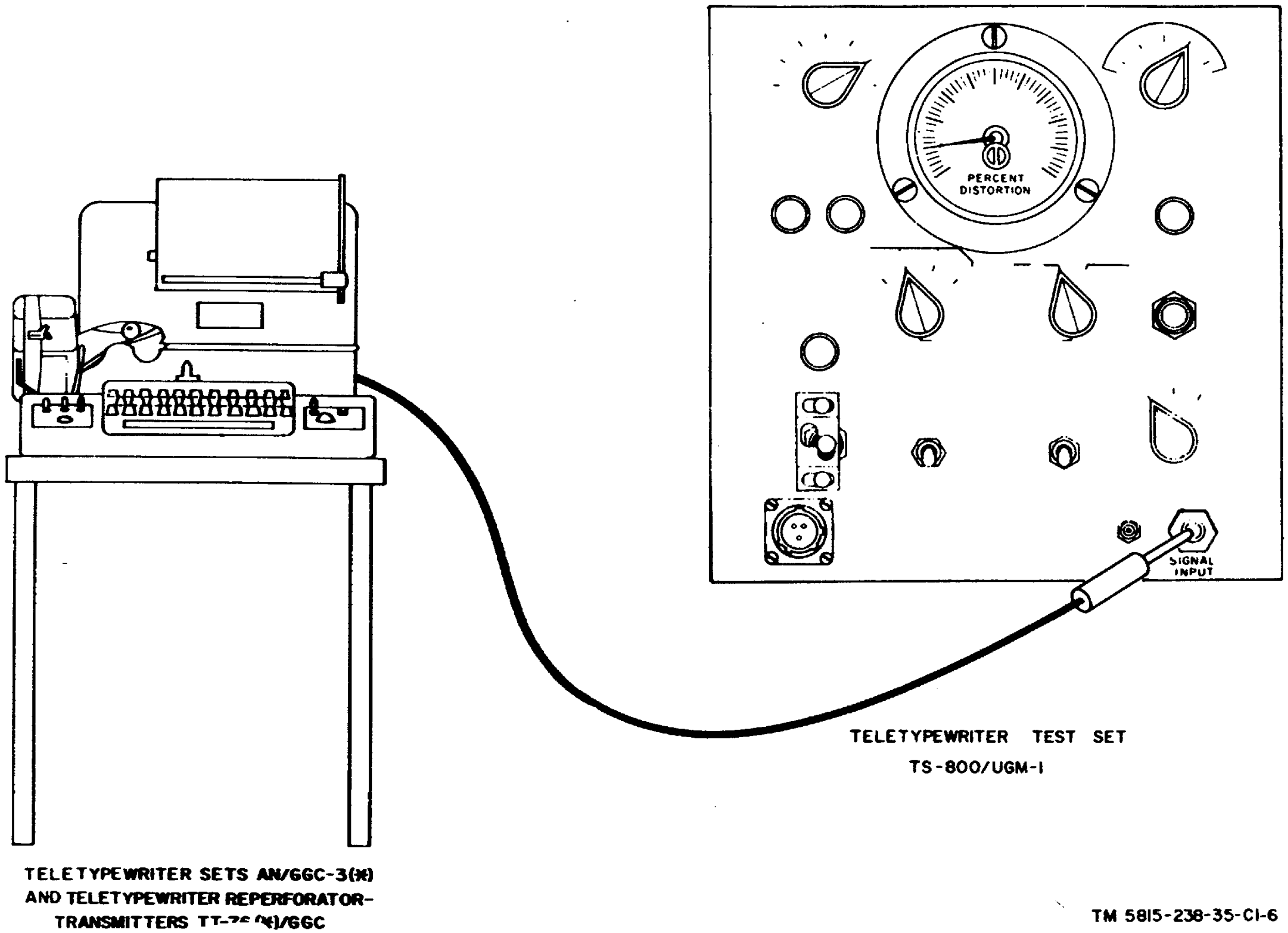



*Figure 7-6. Keyboard and transmitter-distributor bias test connections.*

(2) Position the SIGNAL/BIAS switch to 60 MA.

(3) Repeat the procedures of *f* above for a signal line current of 60 ma except that the current in *f* (3) above shall be adjusted for 12.25 ma (60-ma operation).

(4) The test results should meet the minimum permissible requirements, for bias and end distortion that are specified for 20-ma operation.

*h. Keyboard and Transmitter-Distributor Bias TT-76(*)/GGC* (fig. 7-6).

(1) Connect the Teletypewriter in a 20 ma test circuit utilizing Teletypewriter Test Set AN/UGM-1 in accordance with figure 7-5 .

(2) Transmit E, LINE FEED, space CAR RET, and T signal combinations from the keyboard five consecutive times. Transmit three copies of standard test message from TD.

(3) Transmit three copies of the standard test message from the transmitter-distributor.

(4) The transmitted signals set should not show more than a 5-percent distortion on the test set.

(5) At the conclusion of the test, position the POWER and MOTOR switches to OFF. Remove all power cables from the power source. Remove all signal connections between the teletypewriter set and test equipment.

*i. Receiving Test (TT-699(*)/GGC)* (fig. 7-7).

(1) *Preparation*.

(*a*) Connect the Telegraph Test Set AN/GGM-15(V) to an ac source.

(*b*) Set the following Signal Generator SG-860/GGM-15(V) controls, in accordance with figure 7-7, as shown below:

| *Control* | *Position* |
|---|---|
| Power switch | On |
| Distortion select | No dist |
| Percent distortion | 0-0 |
| Message select | MSG |
| Code level | 5 |
| Character length | 7 |
| Character release | Free run |
| OSC | INT |
| Alarm reset | On |
| Band rate | 75 |

(*c*) Connect the data $\pm$6/12 V signal generator output to terminals 8 and 9 of TB-1 on the reperforator-transmitter.

(*d*) Connect the reperforator-transmitter to an ac source.

(*e*) Set the following reperforator-transmitter controls as shown below:

| *Control* | *Position* |
|---|---|
| Power switch | On |
| Light switch | On |
| Keyboard switch | Send |

(2) *Orientation range.*

(*a*) Send low-level test message signals with the CHARACTER RELEASE SWITCH in the FREE RUN position. Stop the test message signal by placing the CHARACTER RELEASE SWITCH to the MANUAL position.

(*b*) While sending low-level test messages, turn the RANGE dial slowly clockwise, and then counterclockwise, to, find the highest and lowest positions of the dial at which the test message is printed without error. Record both readings. Subtract the lower reading from the higher reading. The minimum permissible difference is 72 for 60-wpm operation, and 60 at 100wpm operation. Set the RANGE dial midway between the high and low readings obtained above. If the difference between the highest and lowest readings is less than the minimum permissible difference, check the adjustment of the reperforator-transmitter in accordance with chapter 4 section II.

*j. Sending Test.*

(1) *Preparation*.

(*a*) Connect Telegraph Test Set AN/GGM-15(V) to an ac source.

(*b*) Connect keyboard transmitter output terminals 5 and 6 of A1TB1 to the BRIDGING input on Signal Distortion Analyzer TS-2862/GGM-15(V) as shown in figure 7-7 .

**NOTE**

The BRIDGING input of the TS- 2862/GGM(V) also serves as the input to Oscilloscope OS-206/GGM-15(V). The TS-2862/GGM(V) does *not* serve any other purpose during this test.

(*c*) On Oscilloscope OS-206/GGM-15(V), set the power switch to ON and adjust the FOCUS ASTIG, INTENSITY, VERTICAL, and HORIZONTAL POSITION for the best display.

(*d*) Set the following Oscilloscope OS-206/GGM-15(V) controls, in accordance with figure 7-7, as shown below.

| *Control* | *Position* |
|---|---|
| Vertical volts | 5 |
| Display. release rate | Normal |
| Trigger & sweep select | Free run |
| Time millisec | 50-5 |

(*e*) Set the following reperforator-transmitter controls as shown below:

| *Control* | *Position* |
|---|---|
| Power switch | On |
| Light switch | On |
| Keyboard switch | Send |

(2) *Transmitter waveform*.

(*a*) Test the quality of impulses transmitted from the keyboard transmitter by transmitting a code group repeatedly. This is accomplished by depressing and holding the REPEAT key and any other character key simultaneously. Usually an R or Y character would be used for this test. The waveform should conform to the requirements of (*c*) below.

(*b*) Test the quality of impulses transmitted from the transmitter-distributor, by inserting a test tape containing a single character. The waveform should conform to the requirements of (*c*) below.

(*c*) The maximum permissible deviation from perfect impulse length is ±5 percent. At 100 wpm, the positive and negative transitions should be equal in time duration 13 ± 0.5 milliseconds. If the length of the transmitted impulses exceeds the maximum tolerance, remove the cover from the transmitter contact assembly and locate the adjustable hex nut. Observe the oscilloscope and adjust the hex nut until the waveshape has negative and positive transitions of equal and correct time duration.

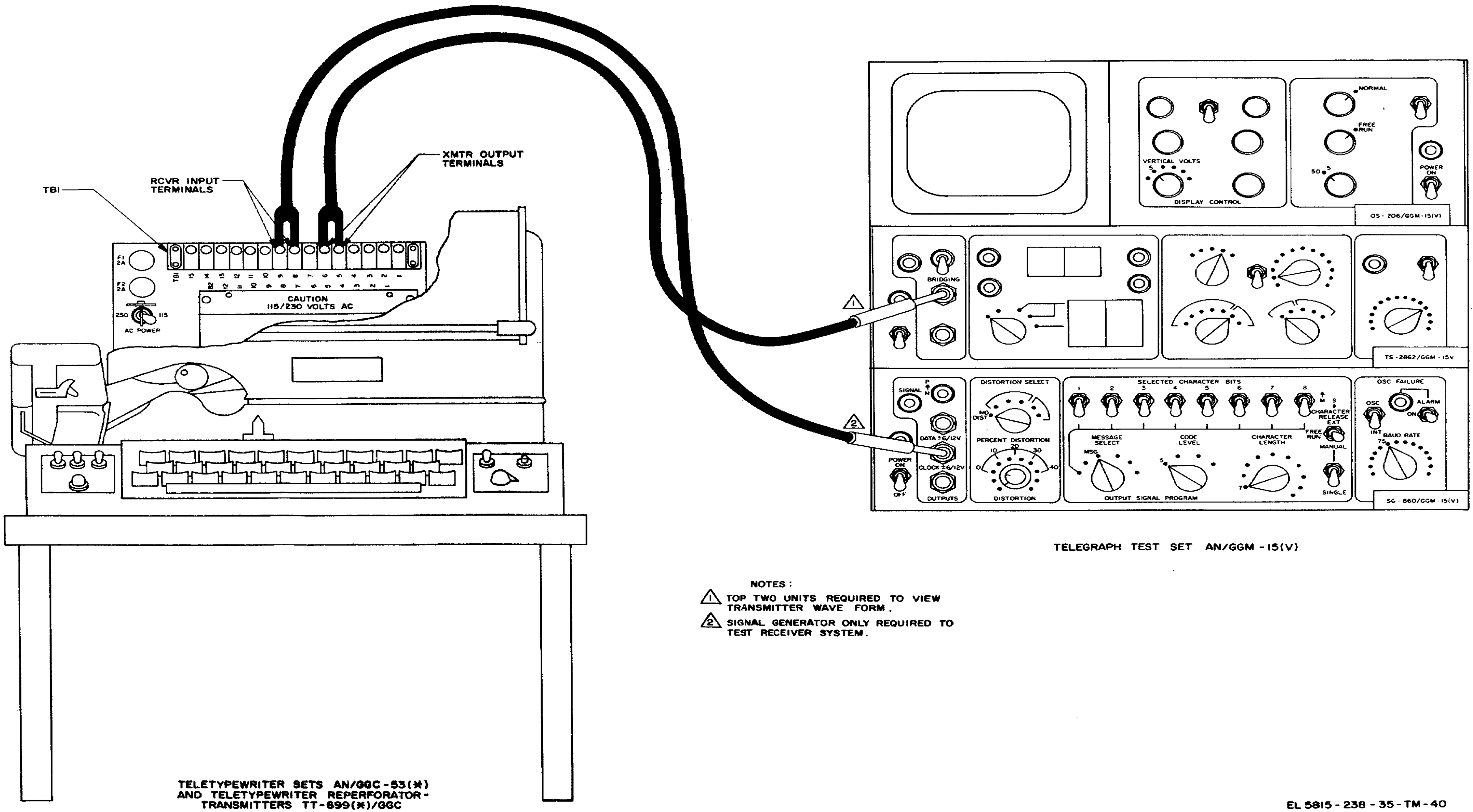



*Figure 7-7. Teletypewriter sets AN/GGC-53(*) and teletypewriter reperforator -transmitters TT-699(*)/GCC*

# APPENDIX I
# REFERENCES

Following is a list of applicable references that are available to the technician of Teletypewriter Sets AN/GGC-3 and AN/GGC-3A, and Teletypewriter Reperforator-Transmitters TT-76/GGC, TT-76A/GGC, TT-76B/GGC, and TT-76C/GGC.

| | |
|---|---|
| DA Pam 310-1 | Consolidated Index of Army Publications and Blank Forms. |
| DA Pam 738-750 | The Army Maintenance Management System (TAMMS). |
| TB 43-0118 | Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters. |
| TB 43-0139 | Painting Instructions for Field Use. |
| TM 11-2208 TO 33A1-8-55-1 | Test Sets, TS-2AB/TG (Teletypewriter Signal Distortion) (NSN 6625-00-243-5173). |
| TM 11-5815-238-34P | Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools): Teletypewriter Sets AN/GGC-3 (NSN 5815-00-503-3309), AN/GGC-3A (5815-00-581-9751), AN/GGC-53 (5815-00-012-8772) and AN/GGC-53A (5815-01-017-0956) and Teletypewriter Reperforator-Transmitters TT-76/GGC (5815-00-503-2760), TT-76A/GGC (5815-00-553-6061), TT-76B/GGC (5815-00-553-6061), TT-76C/GGC (5815-00-503-2760), TT-699/GGC (5815-01-012-8446), TT-699A/GGC (5815-01-017-9166), TT-699B/GGC (5815-01-017-9166) and TT-699C/GGC (5815-01-017-9166). |
| TM 11-6625-203-12 | Operator and Organizational Maintenance Manual for Multimeter AN/URM-105 and AN/URM-105C, Including Multimeter ME-77/U and ME-77C/U. |
| TM 11-6625-320-12 | Operator and Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U. |
| TM 11-6625-366-15 | Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U (NSN 6625-00-553-0142). |
| TM 11-6625-422-12 | Organizational Maintenance Manual (Including Repair Parts List) for Test Sets, Teletypewriter AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, and AN/GGM-5. |
| TM 11-6625-620-12 | Organizational Maintenance Manual: Test Set, Teletypewriter AN/UGM-1 (NSN 6625-00-965-0195). |
| TM 11-6625-1668-12 | Operator and Organizational Maintenance Manual Including Repair Parts and Special Tools List: Test Sets, Telegraph AN/GGM-15(V)1 (NSN 6625-00-424-1702) and AN/GGM-15(V)2 (6625-00-442-6131). |
| TM 740-90-1 | Administrative Storage of Equipment. |
| TM 750-244-2 | Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command). |

# INDEX

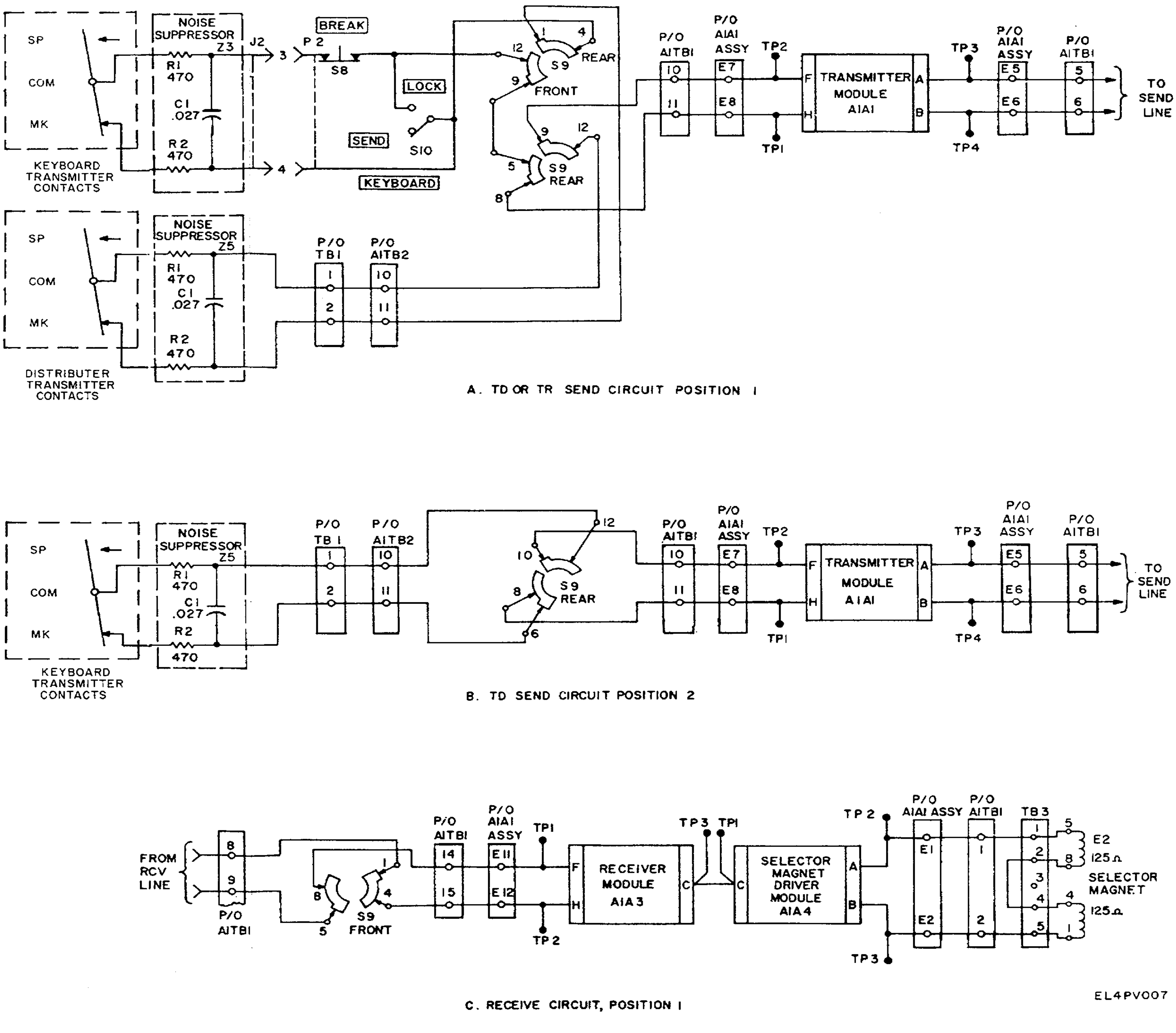



*Figure 2-67. TR SEND, TD send, RECEIVE circuits, position 1 (TT-699/GGC).*

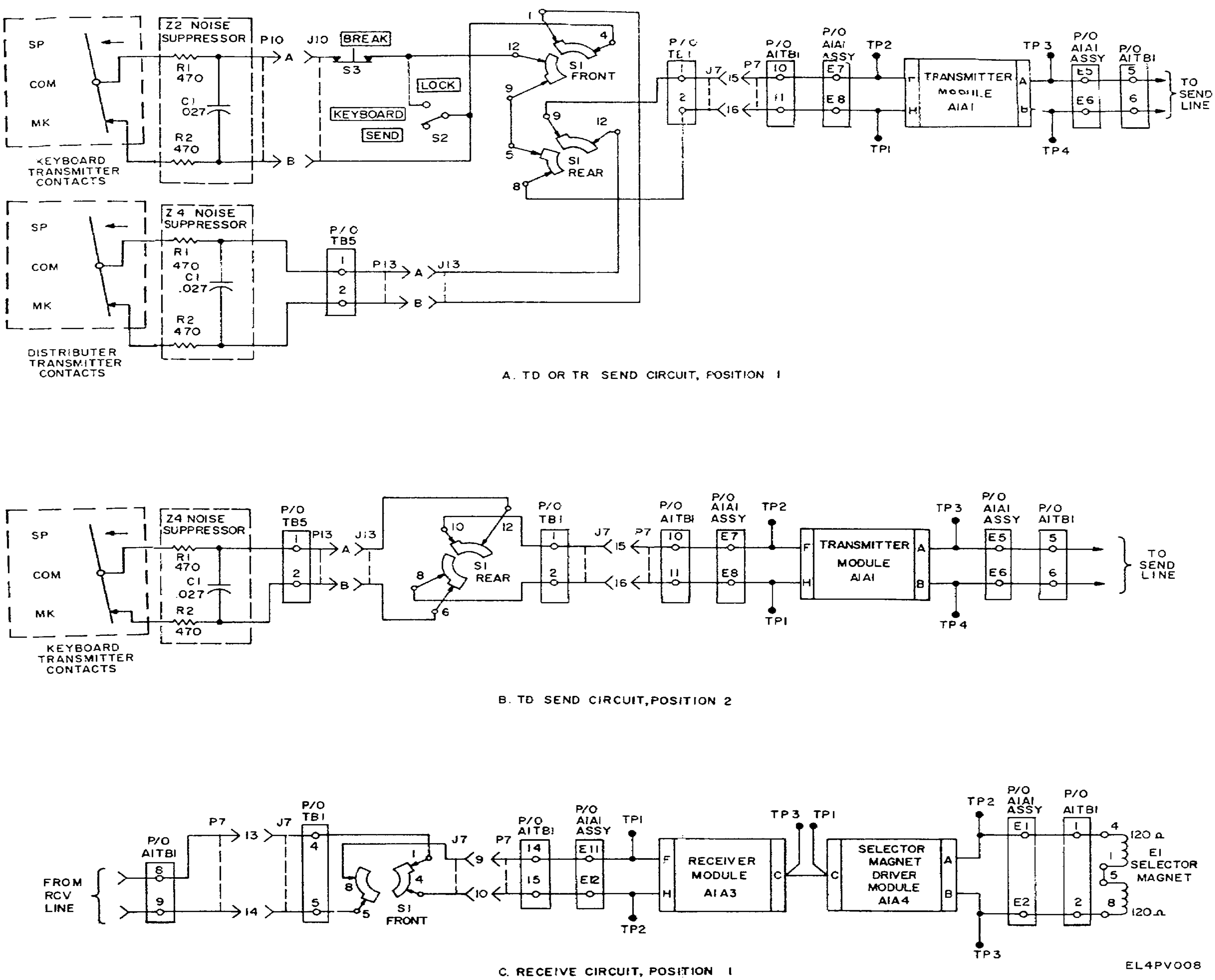
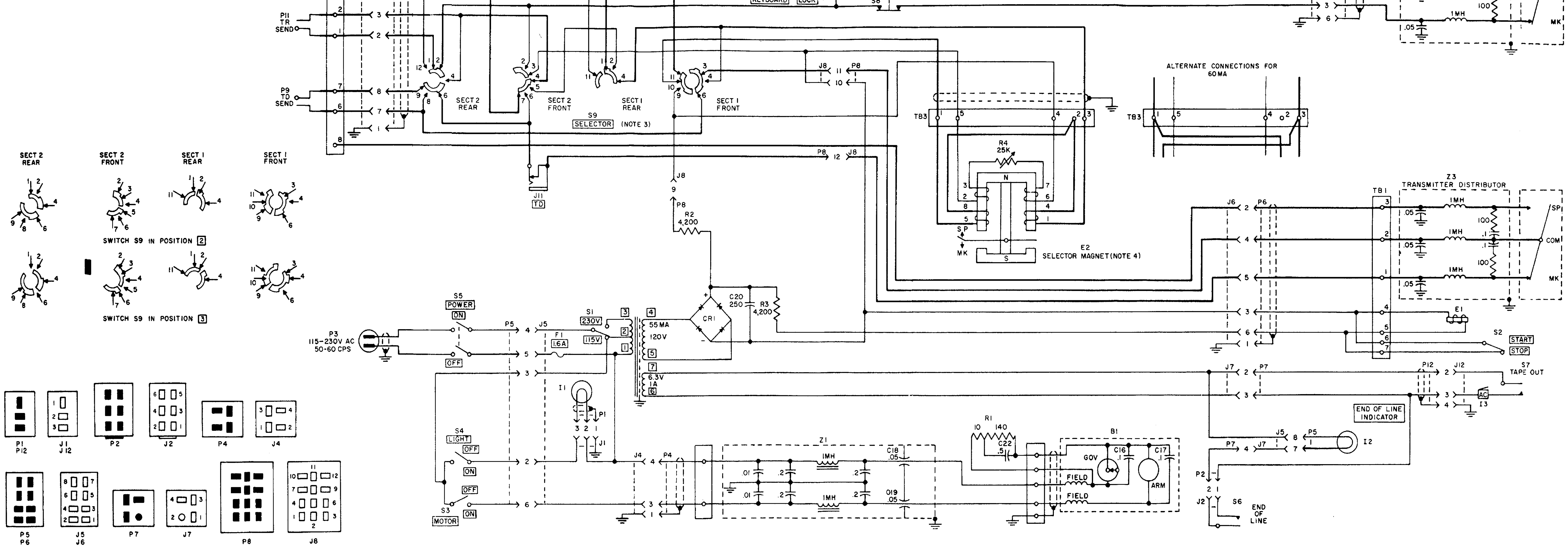



Figure 2-68. TR SEND, TD SEND, RECEIVE circuits, position 1 (TT-699A/GGC and all subsequent models).

NOTES:

1. UNLESS OTHERWISE INDICATED RESISTORS ARE IN OHMS; CAPACITORS ARE IN UF.
2. ▭ INDICATES EQUIPMENT MARKINGS.
3. SELECTOR SWITCH S9, VIEWED FROM KNOB END IS SHOWN IN POSITION 1. ROTATE CLOCKWISE FOR POSITIONS 2 AND 3.
4. E2 SELECTOR MAGNET COILS 1,4 AND 5,8 ARE EACH 125 Ω; COILS 2,3 AND 6,7 ARE EACH 420 Ω.




AGO 10080A

Figure 6-1. Teletypewriter set schematic diagram (TT-76/GGC).

**Change 3**

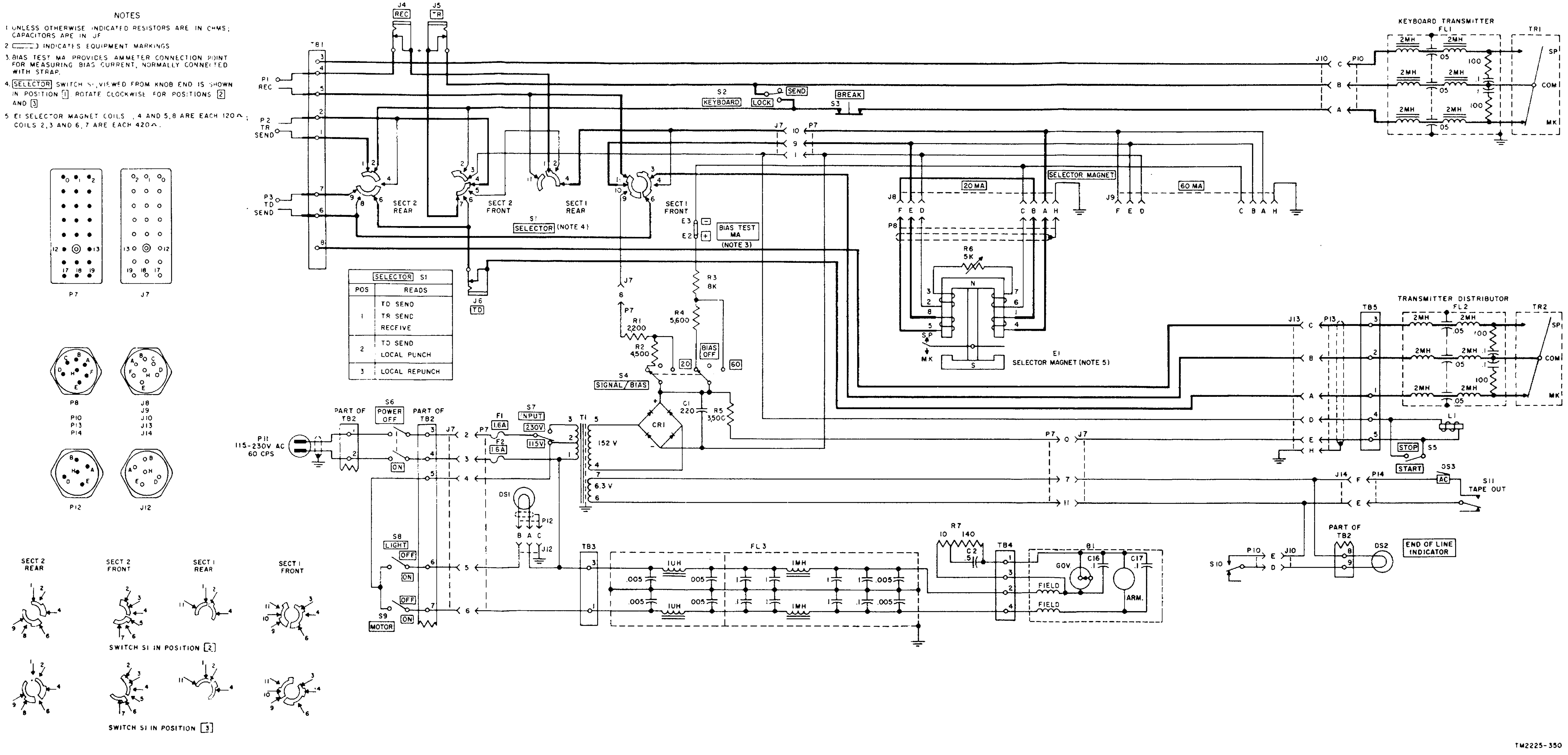
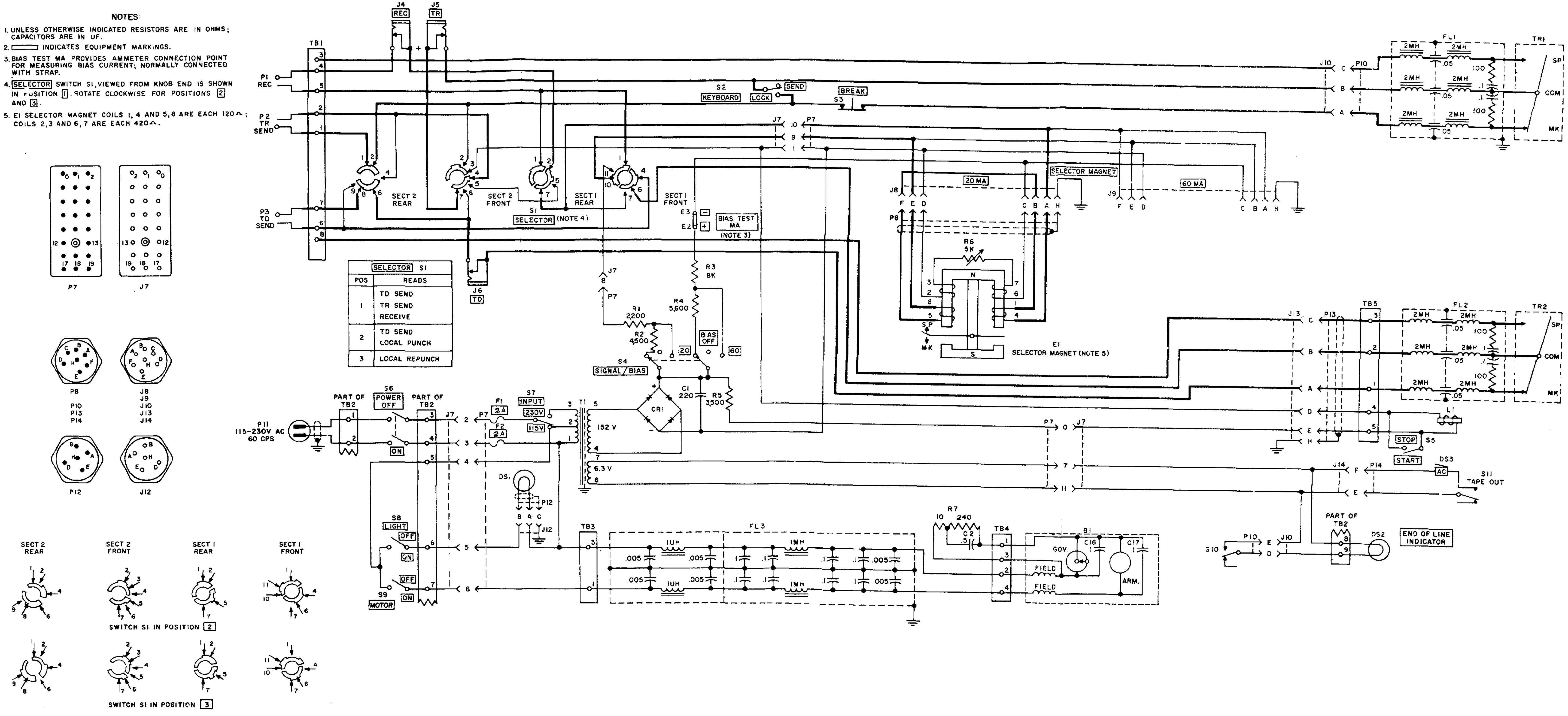



Figure 6-2. Reperforator-transmitter schematic diagram (TT-76A/GGC, below serial number 670 on Order No. 49651-Phila-56).

**Change 3**

NOTES:

1. UNLESS OTHERWISE INDICATED RESISTORS ARE IN OHMS; CAPACITORS ARE IN UF.
2. ▭ INDICATES EQUIPMENT MARKINGS.
3. BIAS TEST MA PROVIDES AMMETER CONNECTION POINT FOR MEASURING BIAS CURRENT; NORMALLY CONNECTED WITH STRAP.
4. SELECTOR SWITCH S1, VIEWED FROM KNOB END IS SHOWN IN POSITION 1. ROTATE CLOCKWISE FOR POSITIONS 2 AND 3.
5. E1 SELECTOR MAGNET COILS 1, 4 AND 5, 8 ARE EACH 120Ω; COILS 2,3 AND 6, 7 ARE EACH 420Ω.



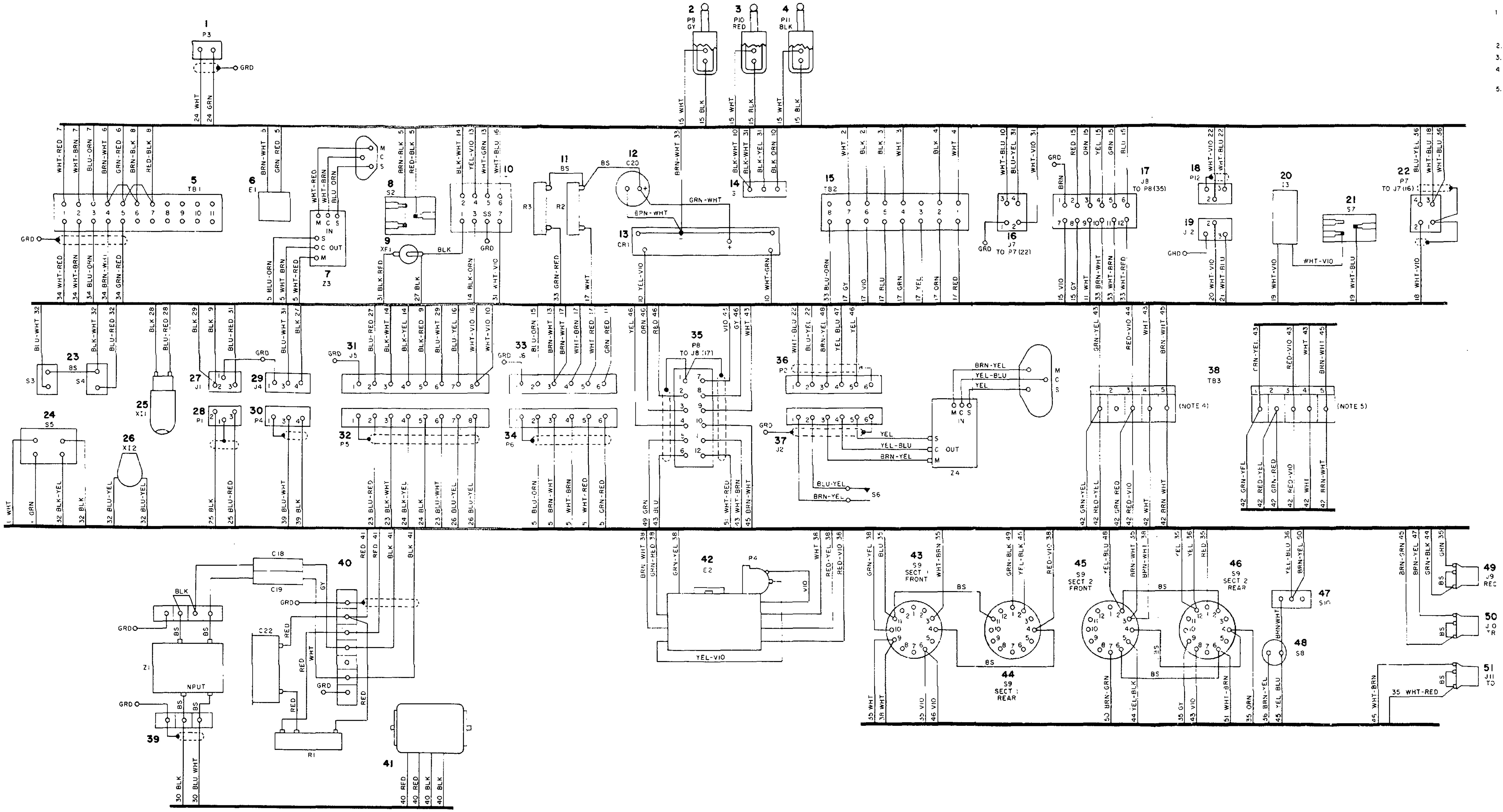

| SELECTOR S1 | |
|---|---|
| POS | READS |
| 1 | TD SEND<br>TR SEND<br>RECEIVE |
| 2 | TD SEND<br>LOCAL PUNCH |
| 3 | LOCAL REPUNCH |

TM2225-C1-9

Figure 6-3. Reperforator-transmitter schematic diagram (TT-76A/GGC, serial numbers 670 and above, Order No. 49651-Phila-56, and subsequent procurements).

NOTES.

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASE LINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. BS DENOTES TINNED COPPER PER ASA H4 4.
3. DENOTES SHIELDED CONNECTION.
4. TERMINAL BLOCK TB3 CONNECTED FOR 60MA OPERATION.
5. TERMINAL BLOCK TB3 CONNECTED FOR 20MA OPERATION.



TM2225-351

Figure 6-4. Teletypewriter, set airline diagram (TT-76/GGC).

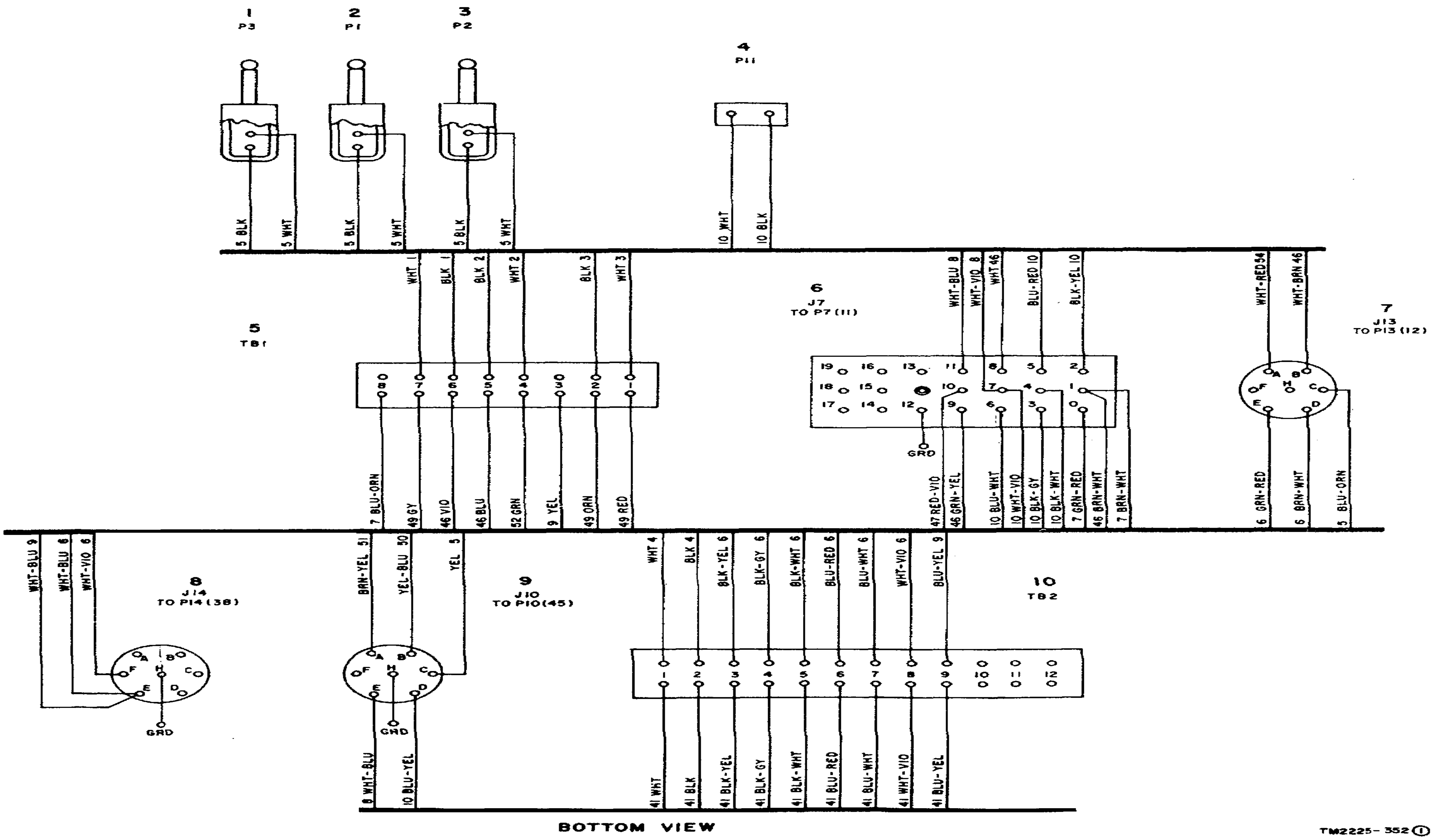
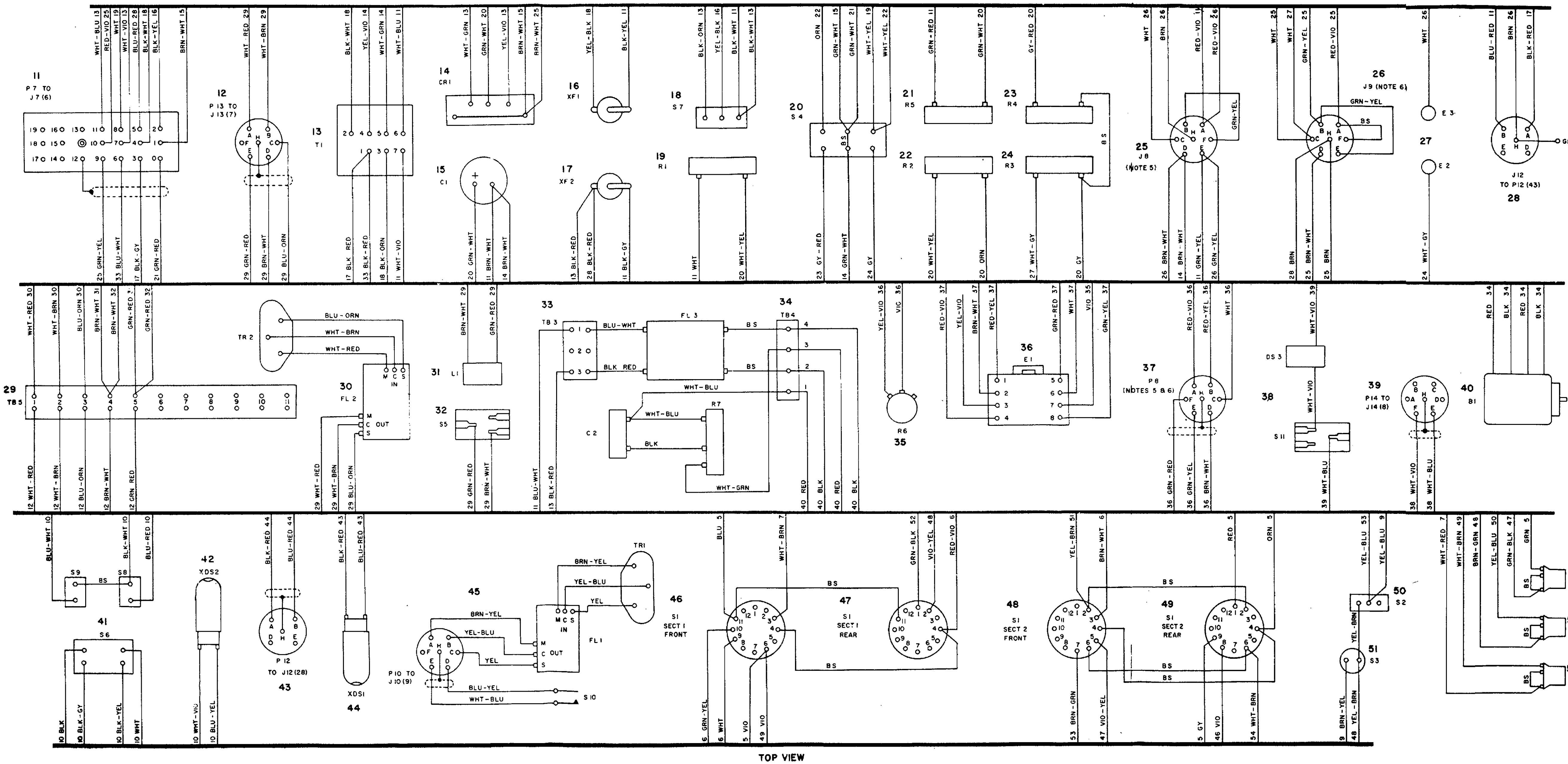



*Figure 6-5①. Reperforator airline diagram (TT-76A/GGC, below serial number 670 on Order No. 49651-Phila-56) (part 1 of 2).*



NOTES:
1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASE LINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS
2. BS DENOTES TINNED COPPER PER ASA H44
3. DENOTES SHIELDED CONNECTIONS
4. E2 AND E3 ARE FOR TEST BIAS MA
5. PLUG P8(37) IS INSERTED INTO JACK J8(25) FOR 20 MA OPERATION
6. PLUG P8(37) IS INSERTED INTO JACK J9(26) FOR 60 MA OPERATION

TOP VIEW

TM2225-352②

AGO 10080A

*Figure 6-5②. Reperforator-transmitter airline diagram (TT-76A/GGC, below serial number 670 on Order No. 49651-Phila-56) (part 2 of 2).*

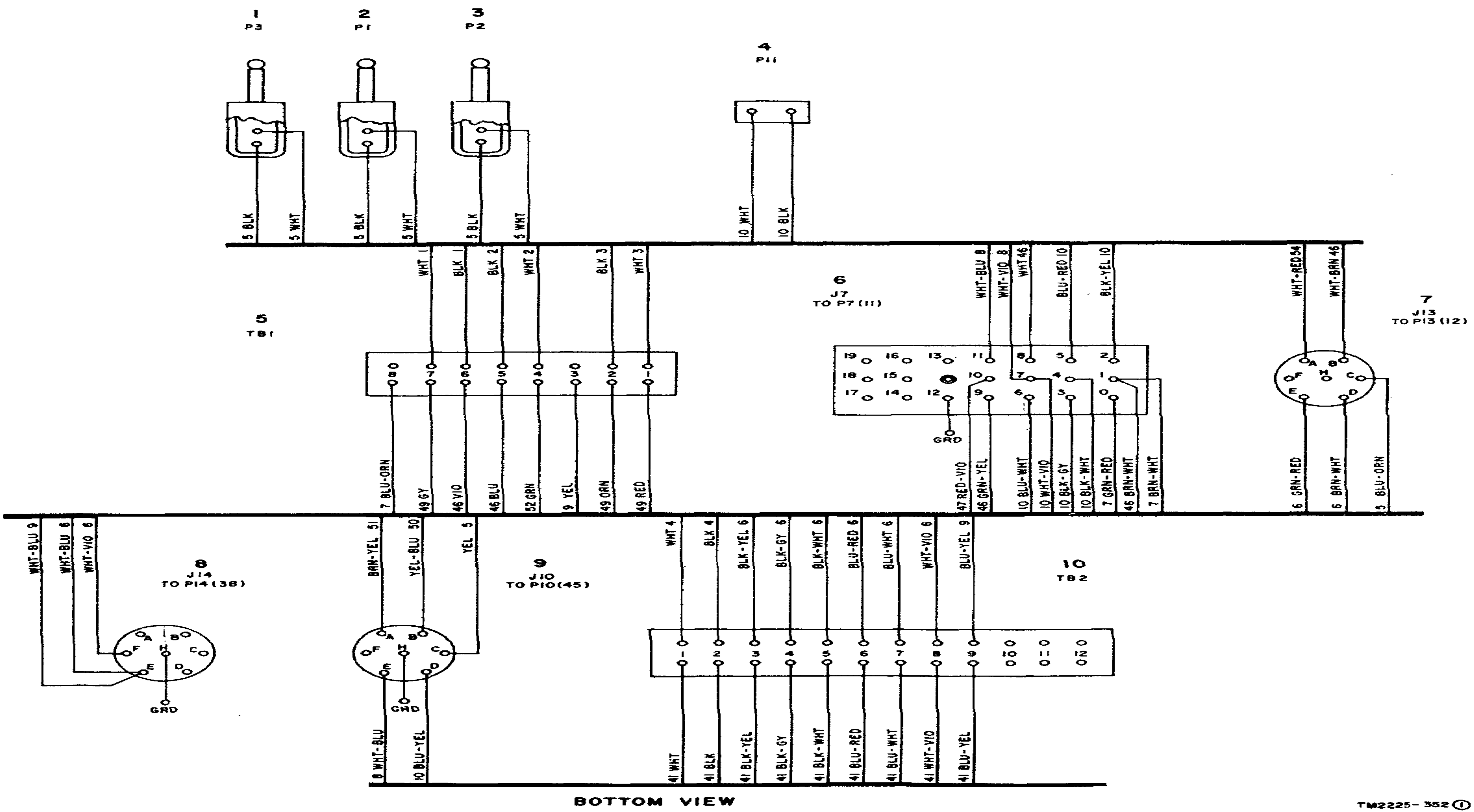
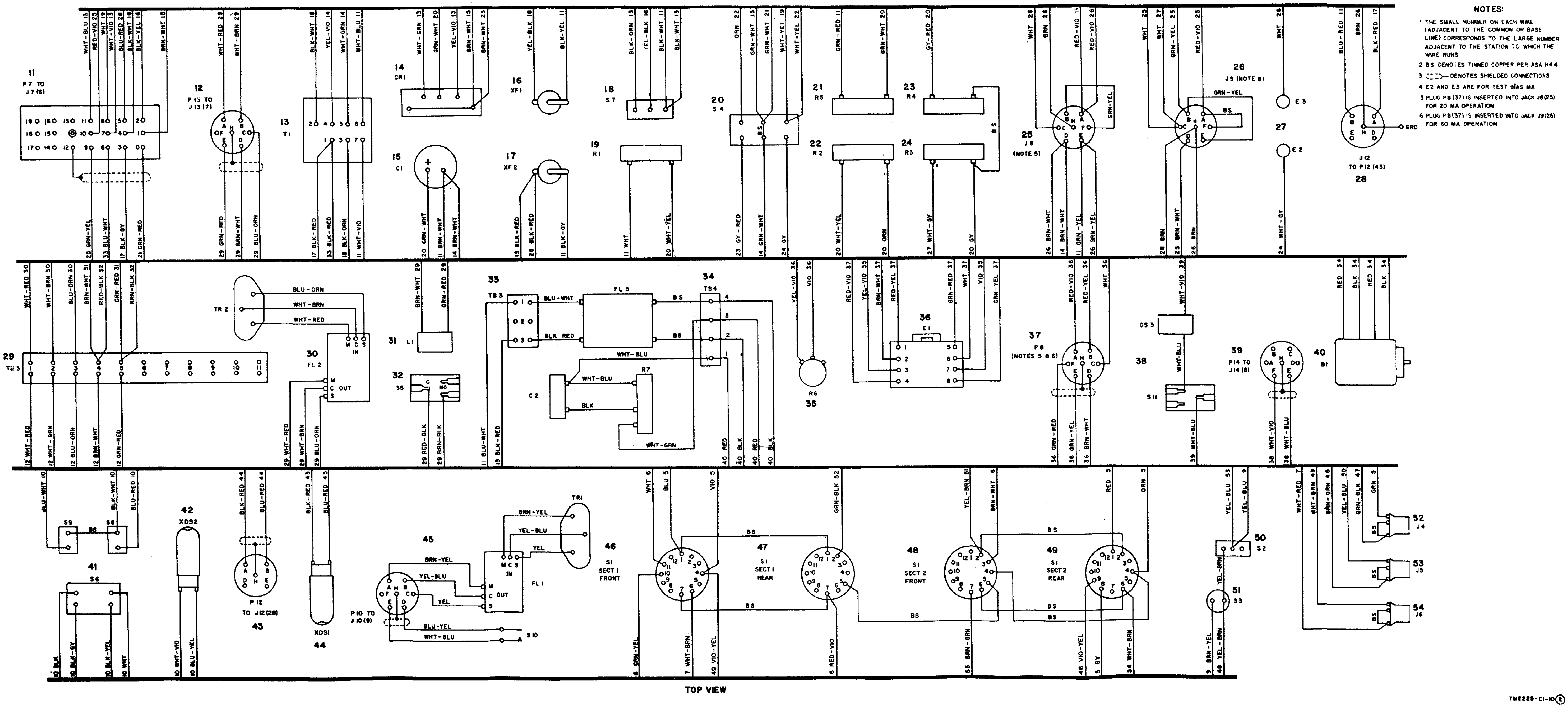


Figure 6-6①. Reperforator-transmitter airline diagram (TT-76A/GGC, serial numbers 670 and above, Order No. 49651-Phila-56, and subsequent procurements (part 1 of 2).




AGO 10080A

*Figure 6-6②. Reperforator-transmitter airline diagram (TT-76A/GGC, serial numbers 670 and above, Order No. 49651-Phila-56, and subsequent procurements (part 2 of 2).*

NOTES:
1. UNLESS OTHERWISE INDICATED RESISTORS ARE IN OHMS, CAPACITORS ARE IN UF.
2. [ ] INDICATES EQUIPMENT MARKINGS.
3. [SELECTOR] SWITCH S9, VIEWED FROM KNOB END IS SHOWN IN POSITION [1] ROTATE CLOCKWISE FOR POSITIONS [2] AND [3]
4. E2 SELECTOR MAGNET COILS 1,4 AND 5,8 ARE EACH 1125Ω, COILS 2,3 AND 6,7 ARE EACH 420Ω.

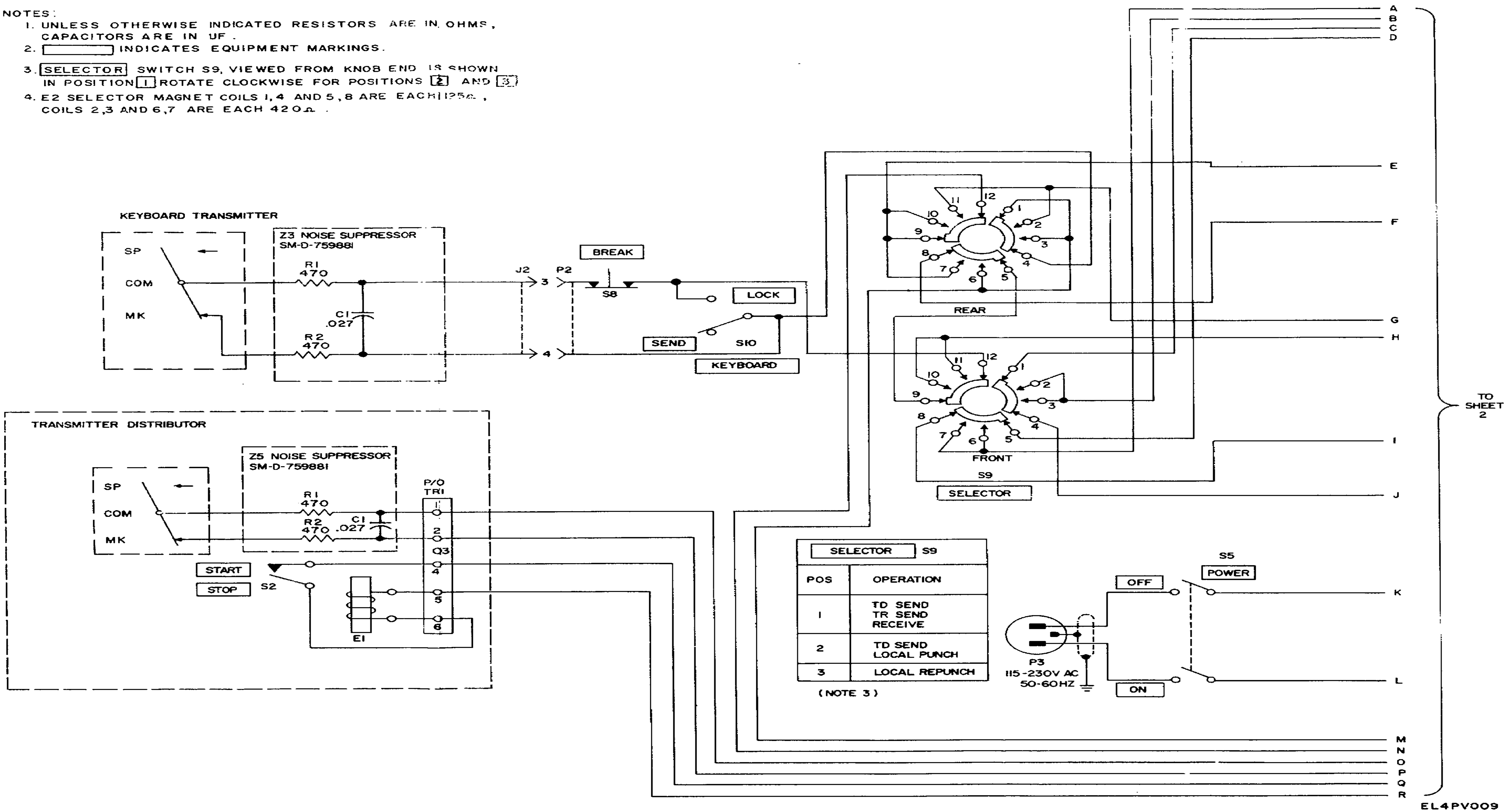



Figure 6-7(1). Teletypewriter set, schematic diagram (TT-699/GGC) (part 1 of 2)

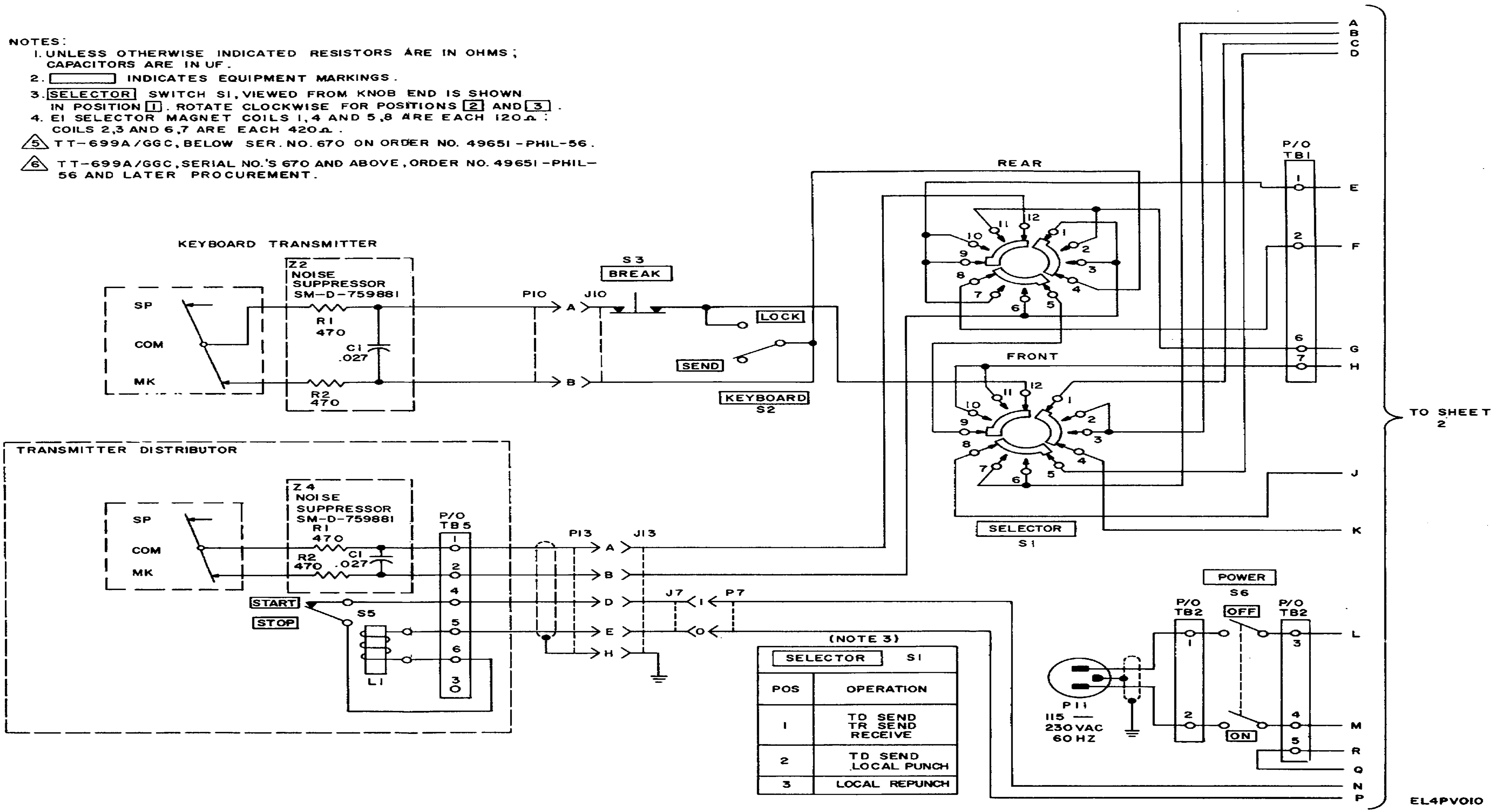



Figure 6-8(1). Teletypewriter set, schematic diagram (TT-699A/GGC and later models) (Part 1 of 2).

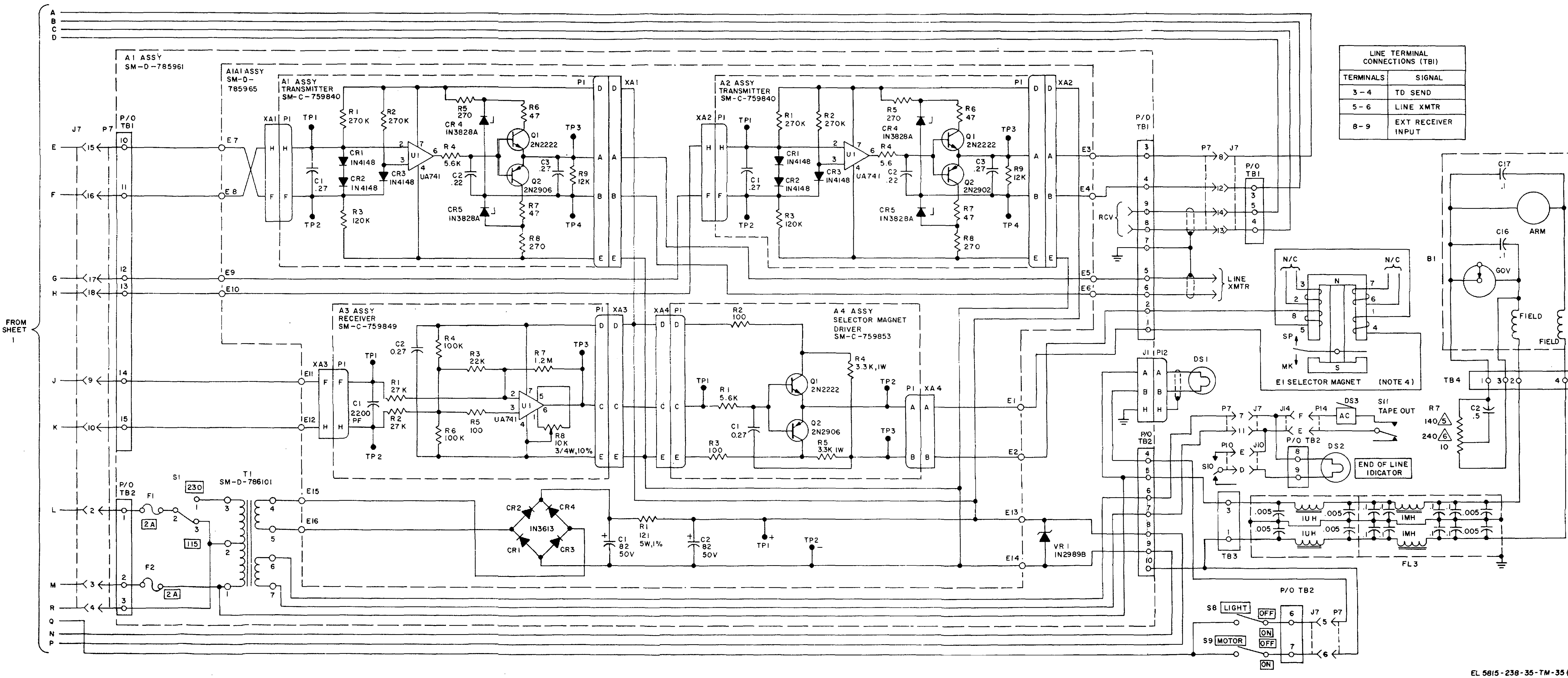


Figure 6-8②. Teletypewriter set, schematic diagram (TT-699A/GGC and later models) (Part 2 of 2).

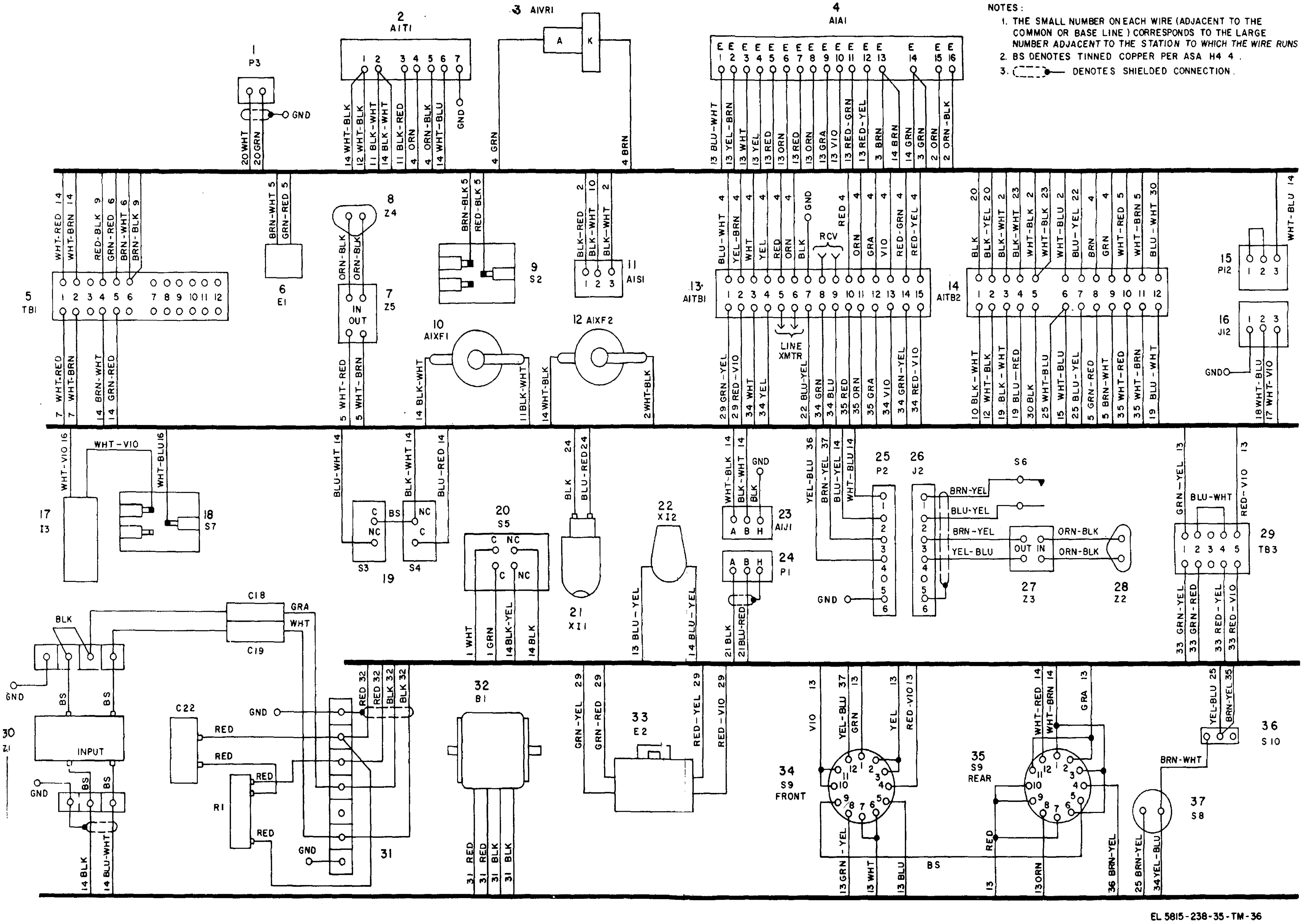



*Figure 6-9. Teletypewriter set, wiring diagram. (TT-699/GGC).*

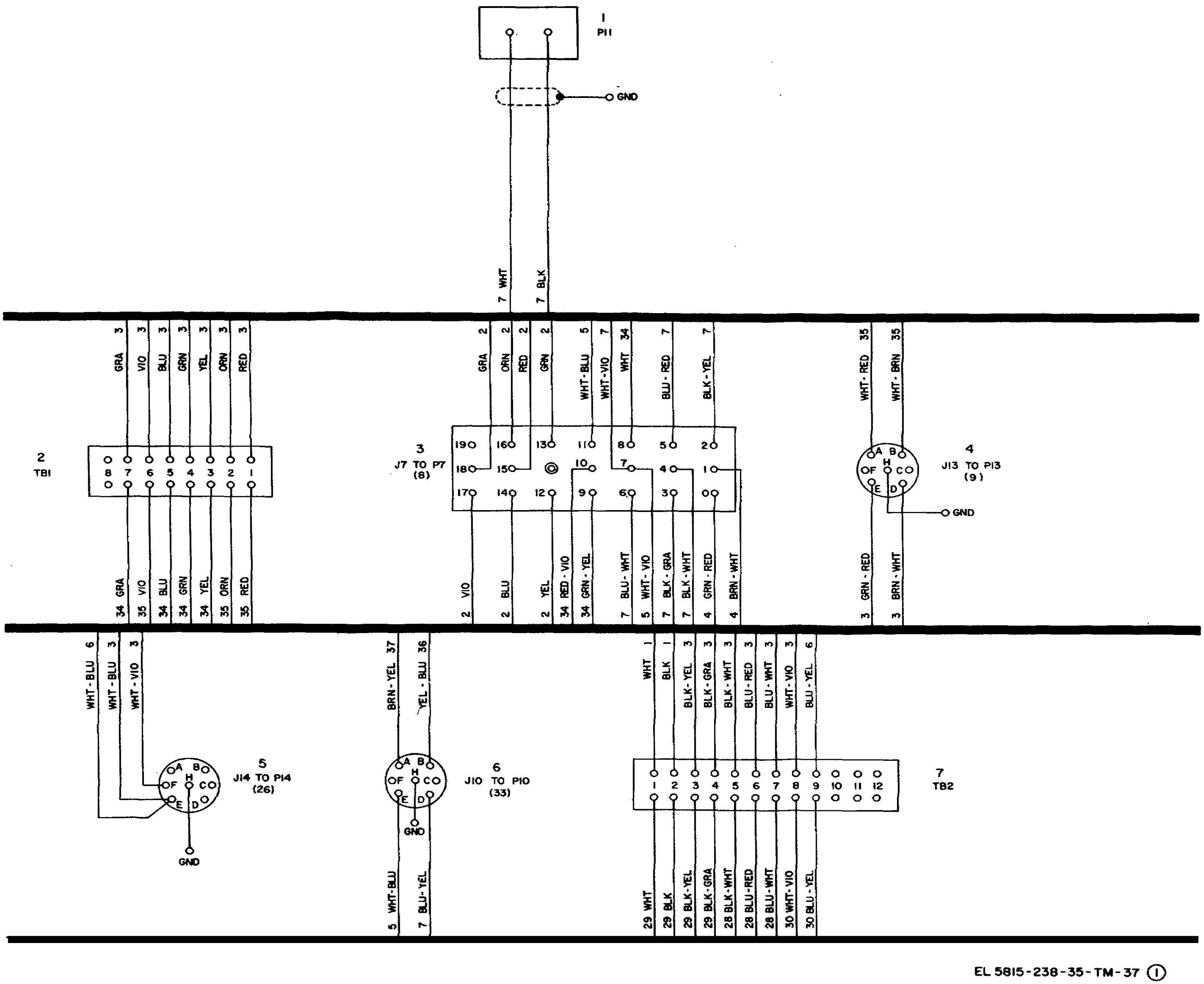



*Figure 6-10①. Teletypewriter set, wiring diagram (TT-669A/GGC and later models) (Part 1 of 2).*

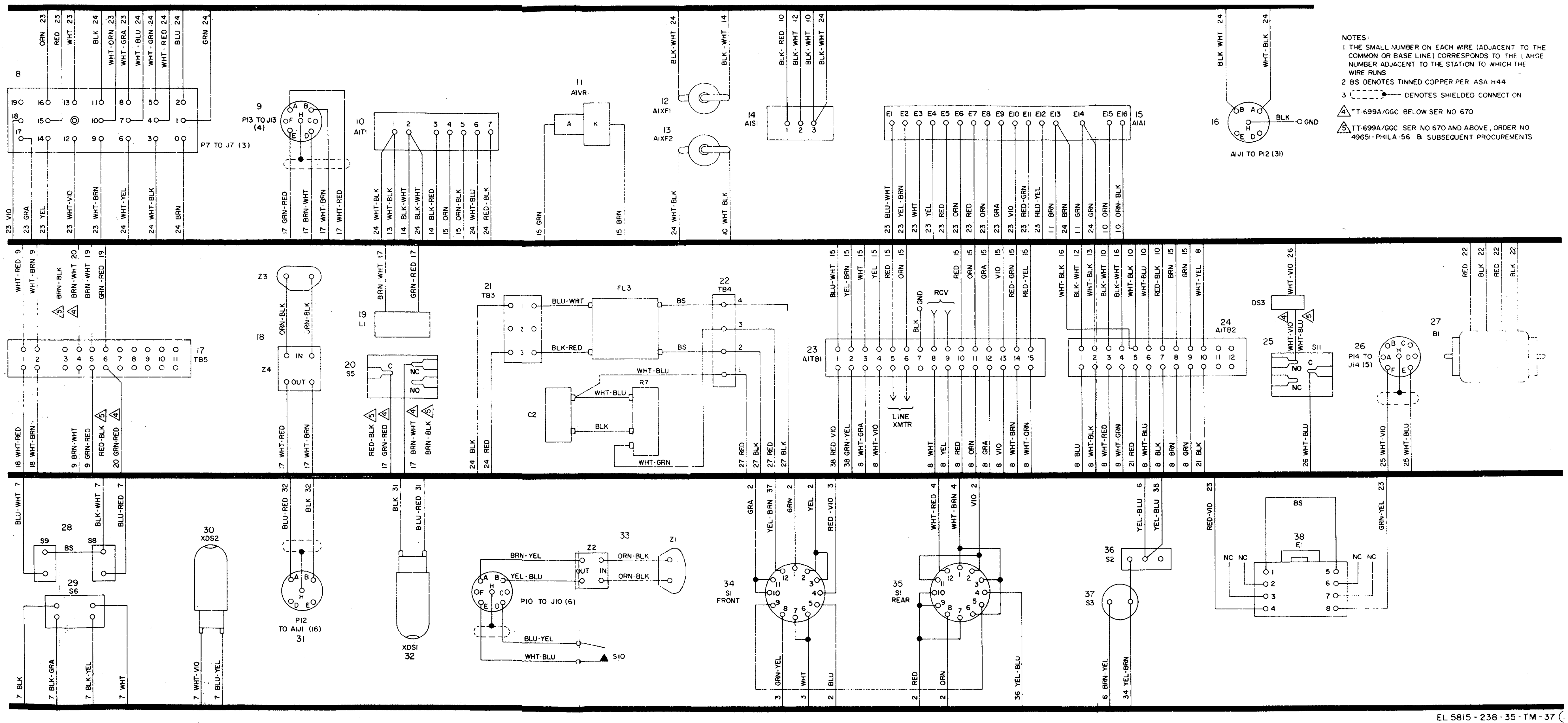



*Figure 6-10②. Teletypewriter set, wiring diagram (TT-669A/GGC and later models) (Part 2 of 2).*

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*NG*: State AG (3); units-same as active Army except allowance is one copy.

*USAR*: None.

For explanation of abbreviations used, see AR 320-50.

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. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

### 'EIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

### SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

### CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

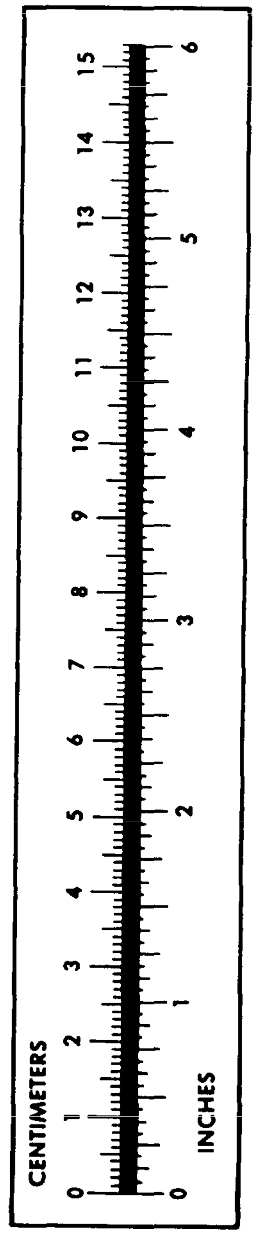
### TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

## APPROXIMATE CONVERSION FACTORS

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Inches | Centimeters | 2.540 |
| Feet | Meters | 0.305 |
| Yards | Meters | 0.914 |
| Miles | Kilometers | 1.609 |
| Square Inches | Square Centimeters | 6.451 |
| Square Feet | Square Meters | 0.093 |
| Square Yards | Square Meters | 0.836 |
| Square Miles | Square Kilometers | 2.590 |
| Acres | Square Hectometers | 0.405 |
| Cubic Feet | Cubic Meters | 0.028 |
| Cubic Yards | Cubic Meters | 0.765 |
| Fluid Ounces | Milliliters | 29.573 |
| its | Liters | 0.473 |
| arts | Liters | 0.946 |
| allons | Liters | 3.785 |
| Ounces | Grams | 28.349 |
| Pounds | Kilograms | 0.454 |
| Short Tons | Metric Tons | 0.907 |
| Pound-Feet | Newton-Meters | 1.356 |
| Pounds per Square Inch | Kilopascals | 6.895 |
| Miles per Gallon | Kilometers per Liter | 0.425 |
| Miles per Hour | Kilometers per Hour | 1.609 |

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Centimeters | Inches | 0.394 |
| Meters | Feet | 3.280 |
| Meters | Yards | 1.094 |
| Kilometers | Miles | 0.621 |
| Square Centimeters | Square Inches | 0.155 |
| Square Meters | Square Feet | 10.764 |
| Square Meters | Square Yards | 1.196 |
| Square Kilometers | Square Miles | 0.386 |
| Square Hectometers | Acres | 2.471 |
| Cubic Meters | Cubic Feet | 35.315 |
| Cubic Meters | Cubic Yards | 1.308 |
| Milliliters | Fluid Ounces | 0.034 |
| Liters | Pints | 2.113 |
| Liters | Quarts | 1.057 |
| 'ers | Gallons | 0.264 |
| ms | Ounces | 0.035 |
| ograms | Pounds | 2.205 |
| Metric Tons | Short Tons | 1.102 |
| Newton-Meters | Pounds-Feet | 0.738 |
| Kilopascals | Pounds per Square Inch | 0.145 |
| 'ometers per Liter | Miles per Gallon | 2.354 |
| meters per Hour | Miles per Hour | 0.621 |



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