TM 9-1430-656-14-1

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DS AND GS
MAINTENANCE MANUAL:
ELECTRONIC DATA PRINTER,
KLEINSCHMIDT, MODEL 7302
GUIDED MISSILE AIR DEFENSE SYSTEM AN/TSQ-73

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

HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1978

WARNING

DANGEROUS VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result If personnel fail to observe safety precautions

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent In administering first aid. When the technician is aided by operators, he must warn them about dangerous areas

When ever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

EXTREMELY DANGEROUS POTENTIALS

115 volts exists In the logic power supply

WARNING

EMERGENCY SYSTEM POWER SHUTDOWN

For emergencies requiring Immediate shutdown of system power, press SYSTEM POWER OFF switch located on power cabinet power transfer unit. Observe that SYSTEM POWER ON indicator light goes off.

WARNING

TRICHLOROETHANE FUMES

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. Do not use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

WARNING

PRINTER SPRINGS

Protect eyes when removing or installing springs.

LIST OF EFFECTIVE PAGES

Insert latest change pages, dispose of superseded pages in accordance with applicable regulations.

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TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 334, CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
a	1	4-32 Blank	0	6-1	1
b Blank	1	4-33	0	6-2-6-3	0
A	6	4-34 Blank	0	6.4	5
B Blank	6	4-35	0	6-5	0
i	3	4-36 Blank	0	6-6	3
ii-iii	0	4-37-4-39	0	6-7-6-14	1
iv-v	1	4-40 Blank	0	6-15-6-16	0
vi	0	4-41-4-42	0	6-17-6-118	1
vii	1	443	2	6-119	6
viii	6	4-44 Blank	2	6-120-6-152	1
ix	1	4-45	0	6-153	2
x Blank	1	4-46 Blank	0	6-154 Blank	2
1-1	6	4-47	0	6-155	2
1-2-1-3	0	4-48 Blank	0	6-156 Blank	2
1-4	6	4-49-4-51	0	6-157-6-165	1
2-1	3	4-52 Blank	0	6-166-6-168	6
2-2-2-5	0	4-53	0	6-169-6-185	1
2-6 Blank	0	4-54 Blank	0	6-186 Blank	1
3-1-3-2	0	4-55-4-56	0	6-187	1
3-3	4	4-57	5	6-188 Blank	1
3-4	0	4-58 Blank	5	6-189	1
3-5	1	5-1-5-2	0	6-190 Blank	1
3-6	6	5-3	3	6-191	1
3-7-3-10	0	5-4	6	6-192 Blank	1
4-1	0	5-5	0	6-193	1
4-2 Blank	0	5-6	3	6-194 Blank	1
4-3	0	5-7-5-13	0	6-195-6-196	1
4-4 Blank	0	5-14-5-18.1	1	6-197	6
4-5-4-23	0	5-18.2 Blank	1	6-198	6
4-24 Blank	0	5-19-5-38	0	A-1	0
4-25	0	5-39-5-40.1	1	A-2 Blank	0
4-26 Blank	0	5-40.2 Blank	1	B-1-B-6	0
4-27	0	5-41-5-48	0	Index 1-Index 12	.6
4-28 Blank	0	5-49	1		
4-29-4-31	0	5-50	0		

*Zero in this column indicates an original page.

TECHNICAL MANUAL
NO. 9-1430-656-14-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 31 October 1978

ORGANIZATIONAL AND GENERAL SUPPORT MAINTENANCE MANUAL: ELECTRONIC DATA PRINTER, KLEINSCHMIDT, MODEL 7302

GUIDED MISSILE AIR DEFENSE SYSTEM AN/TSQ-73

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope. This manual contains the necessary information to maintain the electronic data printer, Kleinschmidt model 7302 (printer) (fig. 1-1) in normal operation. This manual is published for the use and guidance of personnel responsible for operating, maintaining, and repairing the printer.

1-2. Forms, Records, and Reports. Refer to DA PAM 738-750 for the use and completion of all forms required for operating and maintaining the equipment.

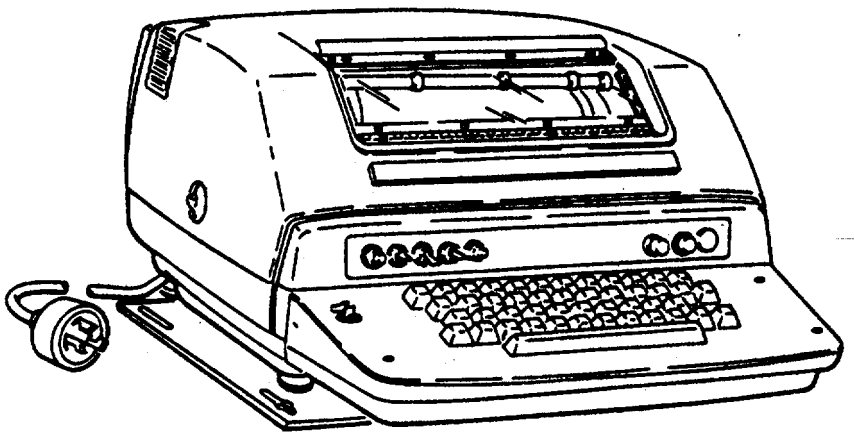
1-3. Destruction of Army Materiel to Prevent Enemy Use. If capture of this equipment appears imminent, or if the equipment must be abandoned, it should be destroyed to prevent enemy use. Destruction procedures should be carried out only on orders from the cognizant authority. Refer to TM 43-0002-21 for procedures required for destruction of the equipment and related system materiel to prevent enemy use.

1-4. Reporting Equipment Publications Improvements. Reporting of errors and omissions and recommendations by the individual user for improving this publication is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded to: Commander, U.S. Army Missile Command, ATTN: AMSMI-LC-ME-P, Redstone Arsenal, Alabama 35898-5238.

1-5. References. Refer to List of Applicable Publications TM 9-1425-655-L for a list of related publications and reference documents.

1-6. Abbreviations. Refer to appendix A for a list of abbreviations used in this manual.

1-7. Fabrication Drawings. Appendix B contains fabrication drawings for test equipment required for maintenance of the printer.



MS 196305

Figure 1-1. Electronic Data Printer, Kleinschmidt Model 7302

Section II. DESCRIPTION AND DATA

1-8. Purpose and Use. The printer is a electromechanical equipment with facilities for transmitting, monitoring, and receiving data in a communications or data processing system. The printer is a send-receive page printer that transmits and receives six-bit ASCII code on a ready/busy parallel six-level basis.

1-9. General Description. The printer consists of a base assembly which mounts a keyboard mechanism, a mode panel, a printing mechanism, and an electronic unit that includes logic power supply and a rack that contains five circuit card assemblies. The base assembly also includes cables and connectors for the wiring between the components of the printer as well as a dust cover which provides environmental protection for mechanical and electronic components.

a. Keyboard Mechanism. The keyboard mechanism fastens to the front of the base assembly. It includes typing keys and associated electronic component boards, and a keyboard inhibit switch.

b. Mode Panel The mode panel fastens across the front of the base assembly, above and slightly behind the keyboard mechanism. The panel consists of control switches and indicator lamps. The switch contacts and indicator lamps are cabled to connectors that plug into the electronic unit.

c. Printing Mechanism. The printing mechanism includes the following components: an induction motor that drives the print drum, a print drum 72-characters in length and 64-character positions in circumference, a double hammer carriage and associated mechanisms, the appropriate cable and plugs for connections to the base assembly wiring, and a mounting for a paper roll.

d Electronic Unit The electronic unit consists of the logic power supply and the printer electronics.

(1) The logic power supply converts 115 volts ac power to dc voltages required by solenoids of the printer, the keyboard and printer control electronics, and mode indicator lamps. It also provides low voltage ac to the two copy lamps which are located in the dust cover.

(2) The keyboard control electronics includes one circuit card assembly mounted below the keyboard assembly.

(3) The printer control electronics include the logic circuit card assemblies. The circuit cards plug into connector jacks which are wired to the logic power supply.

e. Dust Cover. The dust cover protects the printing mechanism, contains two copy lamps, and has a window for viewing page copy. Hinges allow the cover to be raised for replacing the ribbon, replenishing the paper supply, and maintenance of the printing mechanism.

1-10. Technical Characteristics. Technical characteristics of the Printer are listed in table 1-1.

1-11 .On-Site Spare Parts. Refer to TM 9-1430-655-24P for spare parts and supplies.

Table 1-1. Technical Characteristics

Item/function	Characteristics
Type of installation	Sending and receiving
Keyboard symbols	Standard
Type of characters	English
Characters per line	72 (10 characters per horizontal inch)
Printing rate	Ready busy input: 40 characters per second (average printing rate based on the transmitting device providing a new character on the data lines within 3 milliseconds after the printer goes ready).
Character assignment	6-bit ASCII
Keyboard	4-row ASCII
Type style	Modified Murray
Line feed operation	Single (six lines per vertical inch)
Paper feed operation	Friction or sprocket feed (as selected by operator)
Paper supply location	Printer for roll paper: external for fanfold

Table 1-1. Technical Characteristics
-Continued

Item/function	Characteristics
Paper capacity	Paper roll (5-inch diameter x 8-1/2 inch wide) Fanfold (8-1/2 inch wide) for sprocket feed operation
Number of copies	Original only from paper roll (friction feed operation). Original and two copies from fanfold (sprocket feed operation)
Low paper alarm	Fanfold paper: 45 ± 10 lines remain to be printed before the paper supply is exhausted Roll paper: 20 ± 10 feet remain on the paper roll for printing
Receive signal lines	Mark: -12.0 ± 7.5 vdc Space: +12.0 ± 7.5 vdc Impedance: 2500 ohms ± 20% between data line and ground
Receive control lines	Ready state: -12.0 ± 7.5 vdc Busy state: +12.0 ± 7.5 vdc Impedance: 2500 ohms p20% between data line and ground
Receive strobe line	Normal state: +7.5 vdc Strobe pulse: -12.5 ± 7.5 vdc pulse Impedance: 2500 ohms ± 20% between data line and ground
Strobe timing	Data sender changes data only when the printer indicates a ready condition. New data on data lines is indicated by the leading edge of the strobe pulse. A minimum of 150 microseconds occurs between the changed data reaching 90% of its new condition and the positive to negative transition of the strobe pulse. The transition time is a maximum of 100 microseconds. A new character on the data lines is indicated by the leading edge of the strobe pulse, which follows data change by no less than 10 milliseconds. The transition time is a maximum of 100 microseconds.
Transmit signal lines	Mark: -12.0 ± 7.5 vdc Space: +12.0 ± 7.5 vdc Data line current: 8.0 milliamperes maximum Data pulse rise time: 100 microseconds maximum
Transmit control lines	Keyboard strobe line Normal state: +12.0 ± 7.5 vdc Strobe pulse: -12.0 ± 7.5 vdc for 52 microseconds ± 10% Request to send lines Normal state: +12.0 ± 4.0 vdc on XB line -12.0 ± 4.0 vdc on SB line

Table 1-1. Technical characteristics
-Continued

Item/function	Characteristics
	Request state: -12.0 ± 4.0 vdc on XB line + 12.0 ± 4.0 vdc on SB line Clear to send line Normal state (indicator off): -12.0 vdc nominal (ranging from -3.0 to -25.0 vdc) Clear state (indicator on): + 7.0 vdc nominal (ranging from + 3.0 to + 25.0 vdc) Impedance: 1400 ohms ± 20%
Power requirement	120 watts nominal. 140 watts maximum
Operating voltage	115 vac ± 10%, 60 Hz ± 3 Hz
Operating temperature range	+ 32◦ F to + 125◦F
Dimensions	Width - 17 inches maximum Depth - 25-3/4 inches maximum Height - 9-3/4 inches maximum Weight: 66 pounds (without paper roll)

CHAPTER 2

SERVICE UPON RECEIPT AND INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Siting. Consider the following when selecting a site for the printer.

a. Access to a 105 to 125 volt, 60 ± 3 Hz, single phase, alternating current (ac) power source.

b. Provision for adequate lighting during both day and night operation.

2-2. Unpacking.

a. Packaging Data (Fig. 2-1). When packaged for shipment, each printer is mounted on a 3/8-inch thick plywood shipping board with two machine screws, lockwashers, and flat washers. The printer is then placed in a fiberboard carton 25-7/8 inches long, 21-1/4 inches wide, and 11 inches high. A double-wall taped tube 25-3/4 inches long, 21-1/8 inches wide, and 10-5/8 inches high is then placed inside the carton and around the printer. The edge of the taped tube rests on the shipping board. The carton is then closed and sealed with tape. Four corner pads are then placed in the four inside corners of an open double wall fiberboard outside shipping carton 30-3/16 inches long, 25-9/16 inches wide, and 15-9/16 inches high. The sealed inner carton is then placed inside the shipping carton and four more corner pads added to the upper corners to secure the sealed inner carton in place. The outside shipping carton is then closed and sealed with tape.

b. Removing Contents. Be careful when unpacking equipment. Do not thrust tools into the interior of the shipping containers as this procedure may damage the equipment.

(*1*) *Removing teletypewriter fig. 2-1)*

(a) Open outside shipping carton by slitting three upper edges of carton to permit fourth edge to act as a hinge.
(b) Open top of carton and remove upper four corner pads.
(c) Carefully remove sealed inner carton from shi pping carton.
(d) Slit three upper edges of inner carton to permit the fourth to act as a hinge.
(e) Open top of inner carton and remove taped tube.
(f) Remove printer with attached plywood shipping board from carton.
(g) Remove two machine screws that mount printer to plywood board.
(h) Remove printer from plywood board.

2-3. Checking Unpacked Equipment.

a. Inspect equipment for any damage incurred during shipment. If equipment has been damaged, report damage on DD Form 6 (para 1-2).

b. Check received equipment against component listing in operator's manual and packing slip. Report all discrepancies in accordance with paragraph 1-2. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether equipment has been modified. Equipment which has been modified will have the MWO number on the front panel, near the nomenclature plate. Check also to see whether all current applicable MWO's have ■ been applied. Current MWO's applicable to equipment are listed in DA Pam 310-1.

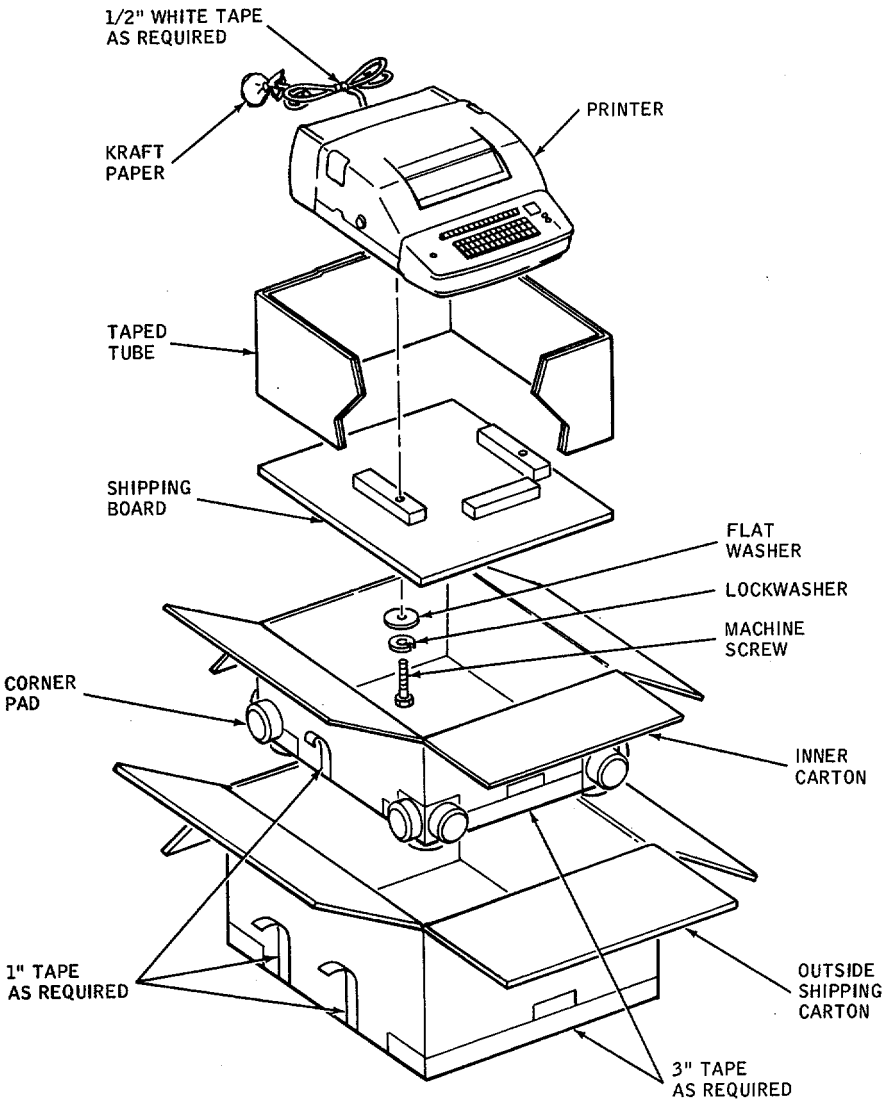


Figure 2-1. Printer Packing

Section II. INSTALLATION INSTRUCTIONS

NOTE

The procedures described in this section should be performed by qualified teletypewriter maintenance personnel.

2-4. Tools, Test Equipment, and Materials. The following tools, test equipment' s, and materials are required but not supplied for installation of the printer.

a. Tool kit, NSN 5180-00-427-7682. (Reference SC 5180-95-CL-A61.)
b. Multimeter, Simpson, model 269-3 or equivalent.
c. Oil, general lubricating, NSN 9150-00-687-4241.

2-5. Installation. To install printer in AN/TSQ-73 equipment shelter, proceed as follows:

a. On cabinet dc power panel, set KEYBOARD PRINTER circuit breaker to OFF.
b. Locate printer at mounting position on maintenance bench and secure with four bolts, lockwashers, and flat washers.
c. Connect data cable W236 connector P2 to printer mounting connector J1.
d. Connect, printer power cable connector P1 to maintenance bench connector J9.
e. Open the cover by turning the knobs on either side of the printer cover and lift the cover until the cover latch locks the cover to the half open position. Release the latch on the left hand support arm and lift the cover to its full open position.
f. Loosen (do not remove) the four shipping screws (fig. 2-2) at the corners of the printer frame until the entire weight of the printer frame is supported by the shocks mounts
g. Install paper roll (para. 3-11).
h. If not installed, install inking ribbon (para. 3-12).
i. Close the printer cover.

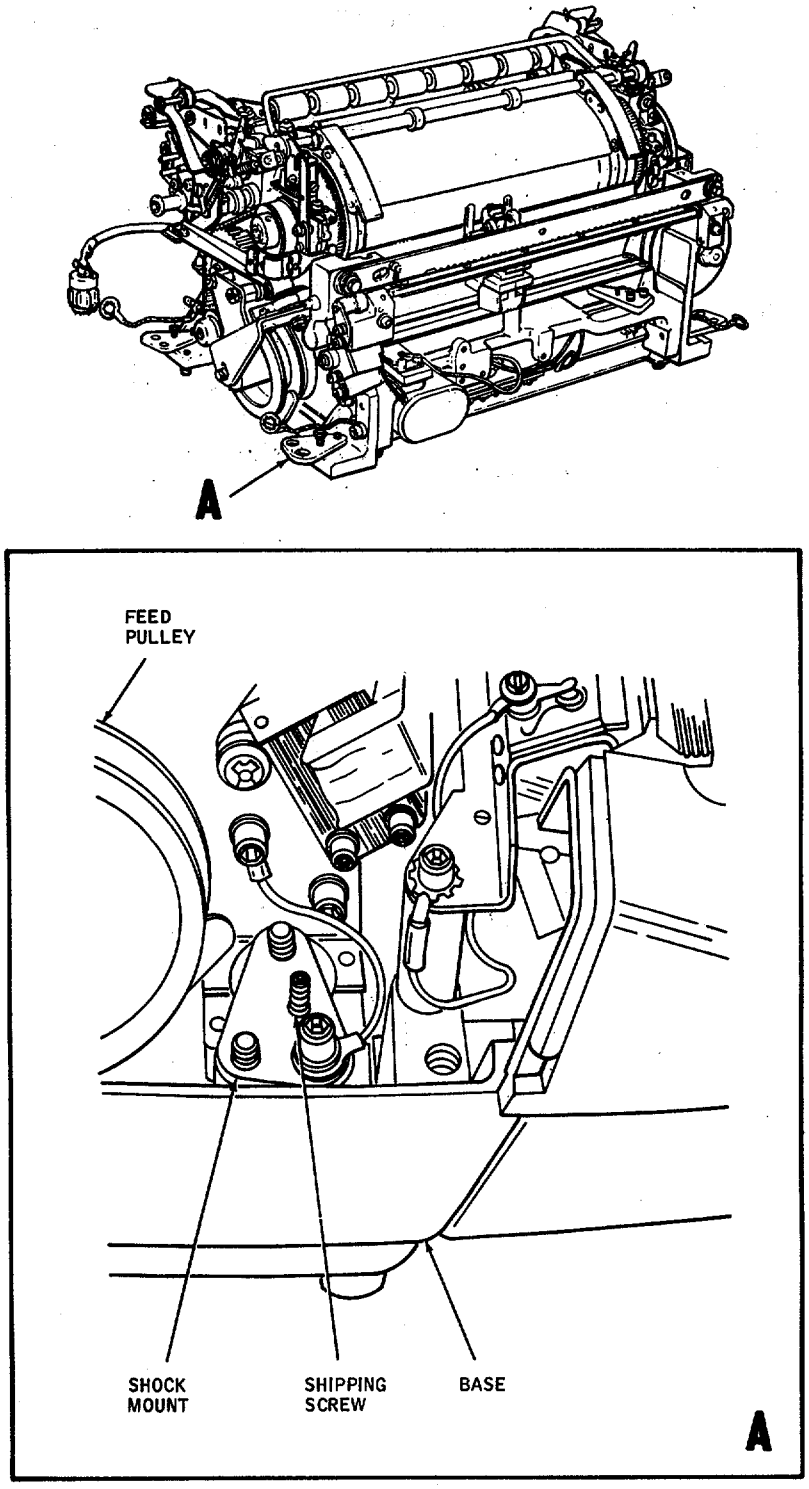


Figure 2-2. Printer Shipping Screw Location

Section III. PRELIMINARY CHECKS AND LUBRICATION PROCEDURES

2-6. Scope. This section provides checks and lubrication procedures that must be made before the printer can be operated in a working circuit. Preliminary adjustments are not ordinarily required since the printer has been adjusted and tested prior to shipment.

2-7. Installation Checks.

a. Check that shipping screws have been loosened (para 2-5, step f).
b. Check that all cable connections are secure (fig. 2-3) and that interfacing signal lines are as sho wn in figure 6-74.
c. Check security of all mechanical components.
d. Check that paper roll has been installed properly (para 3-11).
e. Check that inking ribbon has been installed properly (para 3-12).
f. Check that all fuses are installed and are of the proper value (para 3-13).
g. Check that copy lamps and indicating lamps are installed (para 3-14).
h. Perform preliminary lubrication procedures (para 2-8).
i. Perform operating checks (para 3-6).

2-8. Preliminary Lubrication. Using a clean cloth, wipe carriage shaft clean and dry. Apply a film of oil (NSN 9150-00-687-4241) to the entire surface of the carriage shaft with a fine bristle brush.

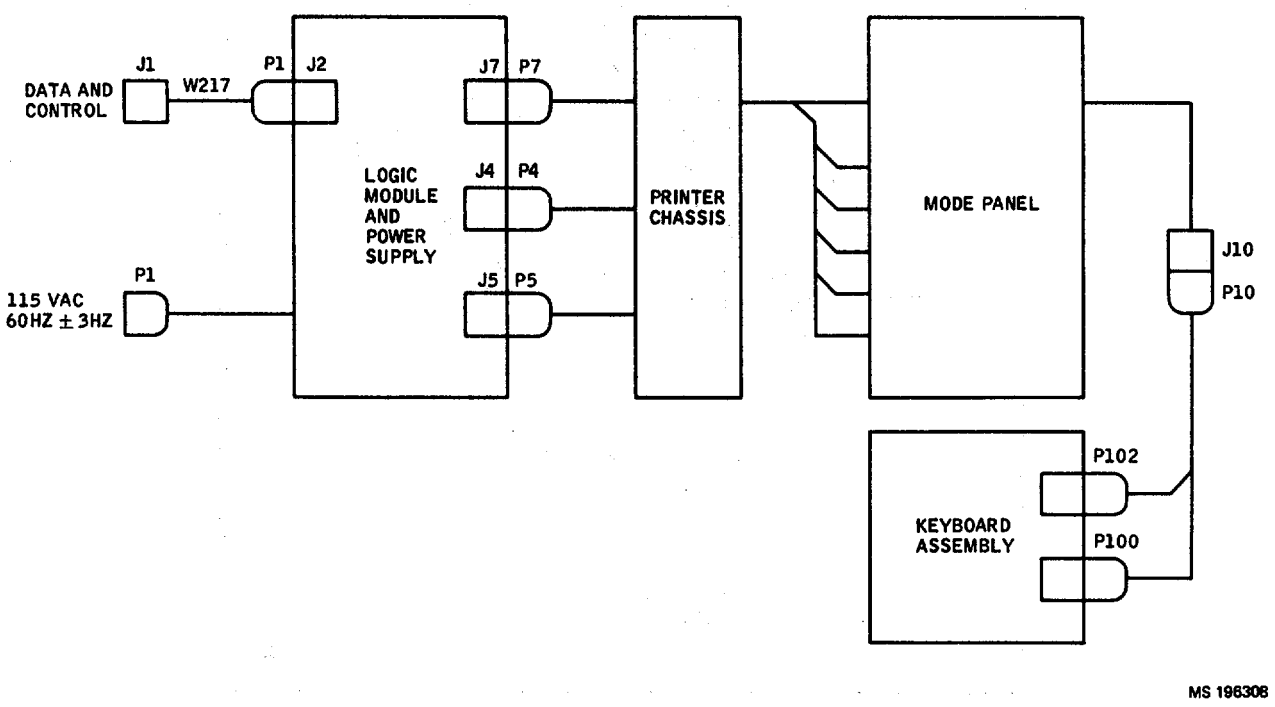


Figure 2-3. Printer Cabling Diagram

CHAPTER 3

OPERATING AND OPERATOR'S MAINTENANCE INSTRUCTIONS

Section I. OPERATING INSTRUCTIONS

3-1. Scope. This section provides a description of the printer controls and indicators and instructions for operating the equipment. Section II provides operator's maintenance instructions for the printer including replacement of the printer paper and inking ribbon.

3-2. Controls and Indicators. Controls and indicators for operating the printer are illustrated in figure 3-1 and described in table 3-1. Paper pressure mechanism controls are illustrated in figure 3-2 and described in table 3-2.

3-3. Modes of Operation. The printer may be operated on-line, off-line, or conditioned for receive-only operation.

a. *On-Line*. The on-line mode of operation is selected by placing the ON-LINE PRINTER switch (fig. 3-1) in the ON LINE position and the INHIBIT switch in the down (enable) position. Positioning the switch on-line enables both the keyboard transmit and the printer receive circuits for on-line operation.

b. *Off-Line.* The off-line mode of operation is selected by placing the ON LINE-PRINTER switch in the PRINTER position and the INHIBIT switch in the down (enable) position. In the off-line mode of operation (used for testing or typing copy), on-line signaling is inhibited, and the keyboard transmits directly to the printer.

c. *Receive-Only Operation.* Place the ON LINE-PRINTER switch in the ON LINE position and the INHIBIT switch in the up (disable) position. The printer can receive only.

3-4. Preliminary Checks. Perform daily preventive maintenance checks (para 3-9) prior to operating the printer.

3-5. Starting Procedure. Prior to operating the equipment the operator must determine which mode of operation is required. This is necessary as the positioning of each switch, singularly or in combination with other switches, depends on the on-line or off-line conditioning of components. Refer to paragraph 3-3 to determine which settings are used for a particular mode of operation.

NOTE

During operation of the printer, the mode of operation may be changed without turning off the equipment.

a. Set ac power source circuit breaker to ON.
b. Set printer POWER switch to ON.
c. To send a message, press and release MOTOR START switch.

NOTE

The printer motor will stop automatically after 90 seconds of non-use. When a message is being received by the printer, the printer motor will start automatically.

3-6. Operating Checks. The printer operating checks are divided into off-line and on-line checks. The off-line checks check the mechanical components of the printer and the electronic communications between the keyboard and the printing elements. The on-line operating checks pertain to the printer only when it is interfacing with a AN/TSQ-73 system. The on-line checks check the interface send and receive circuits to the AN/TSQ-73 system as well as the mechanical and keyboard to printing elements of the printer.

a. *Off-Line Checks.* To check the printer off-line, perform the following procedures:

(1) Set ON LINE-PRINTER switch to PRINTER.
(2) Set INHIBIT switch to the enable keyboard position (down).
(3) Set POWER switch to ON. The motor will start and after approximately 90-seconds of non-use, automatically stops.

NOTE

With ON LINE-PRINTER switch set to ON-LINE, the motor should not start until MOTOR START switch is pressed.

(4) Press and release MOTOR START switch. The motor will start and after approximately 90 seconds of non-use, automatically stop.

(5) Press LF switch; paper advances one space.

(6) Raise LF switch; paper advances until switch is released.

(7) Press and release CR switch. If carriage assembly (print ham mers) is to the right of the left margin, the carriage assembly will return to the left margin.

(8) Press and release MOTOR START switch. Type a full set of keyboard characters. Observe that printer prints all characters as entered. Also observe that the ribbon is feeding continuously while the motor is running.

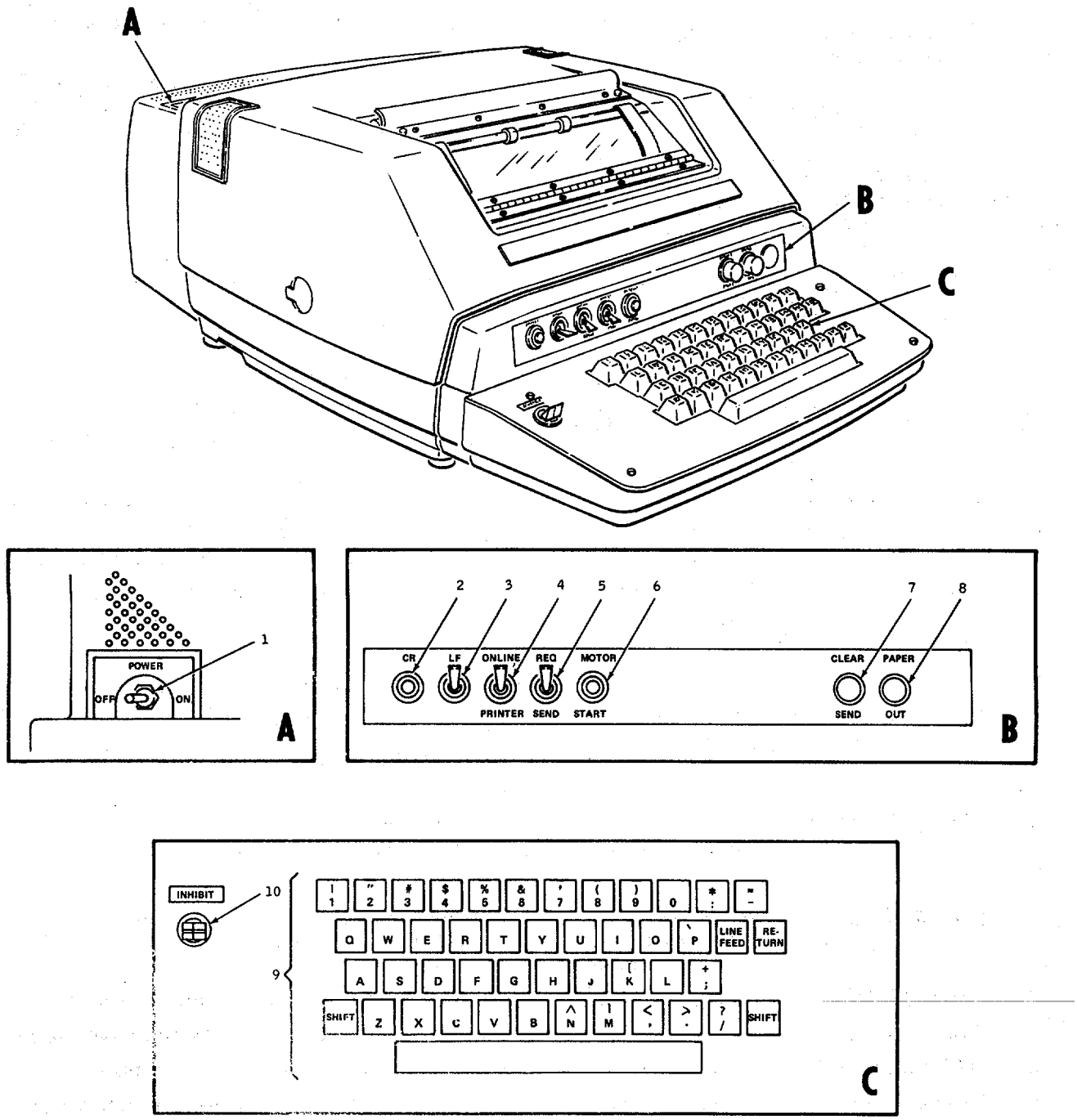


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Figure 3-1. Printer, Controls and Indicators

(9) Continue entering characters until carriage assembly automatically returns to left margin. Observe that the printed line is 72 characters long and that the paper advances one line.

10) Enter several characters and then press keyboard RETURN key. Observe that carriage assembly returns to left margin.

(11) Press keyboard LINE FEED key. Observe that paper advances one space.

(12) Set ON LINE-PRINTER and INHIBIT switches to selected operational mode (para 3-3).

b. *On-Line Checks.* The on-line checks are applicable to the printer only when used in the AN/TSQ-73 system. Prior to performing the on-line checks, the off-line checks should be performed. To check the printer on-line, perform the following procedures:

(1) Initialize AN/TSQ-73 system. (Refer to TM 9-1430-652-10-3 to initialize and operate the AN/TSQ-73 system.)

(2) Set ON-LINE-PRINTER switch to ON-LINE.

(3) Set INHIBIT switch to the down (enable) keyboard position.

(4) Press and release MOTOR START switch.

NOTE

In the following step, enter the applicable operational configuration. (Refer to TM 9-1430- 652-10-6 for definition and limitation). In KPU printout listed below, nn refers to configuration number selected.

(5) Press and release REQ SEND switch. Enter applicable operation configuration. (Note that CLEAR SEND indicator lights.) Press and release REQ SEND switch.

(6) Printer prints:

<77 nn 02 RESTART REQUIRED>

(7) On ADP status and control panel, press and release RESTART switch within 30 seconds of step (6) printout.

(8) Printer prints:

<77 nn 11 SYSTEM RESTART>
<77 nn 20 RESET TIME OF DAY>
<77 nn 00 REQUESTED LOAD COMPLETE>

Table 3-1. Printer, Controls and Indicators

Key	Control/indicator	Description	Function
1	POWER	Two-position toggle switch	ON - Applies primary power to printer. OFF - Removes primary power from printer.
2	CR	Pushbutton switch	When pressed, returns carriage to left margin.
3	LF	Momentary-action, two-position toggle switch	LF - Advances paper until released. Down - Advances paper one line space.
4	ON LINE-PRINTER	Two-position toggle switch	ON LINE - printer is placed online. PRINTER - Printer is placed offline.
5	REQ-SEND	Momentary-action, push-to-operate switch	When pressed, indicates that operator wants to communicate with computer.
6	MOTOR START	Pushbutton switch	When pressed, starts motor after automatic shutoff.
7	CLEAR SEND	Indicator, green	Lights when computer is ready to receive printer inputs.
8	PAPER OUT	Indicator, red	Lights when paper supply requires replacement.
9	Keyboard controls	Standard teletype Keyboard	Used to enter commands and communicate with computer.
10	INHIBIT	Two-position toggle switch	INHIBIT - disables keyboard. DOWN - enables keyboard.

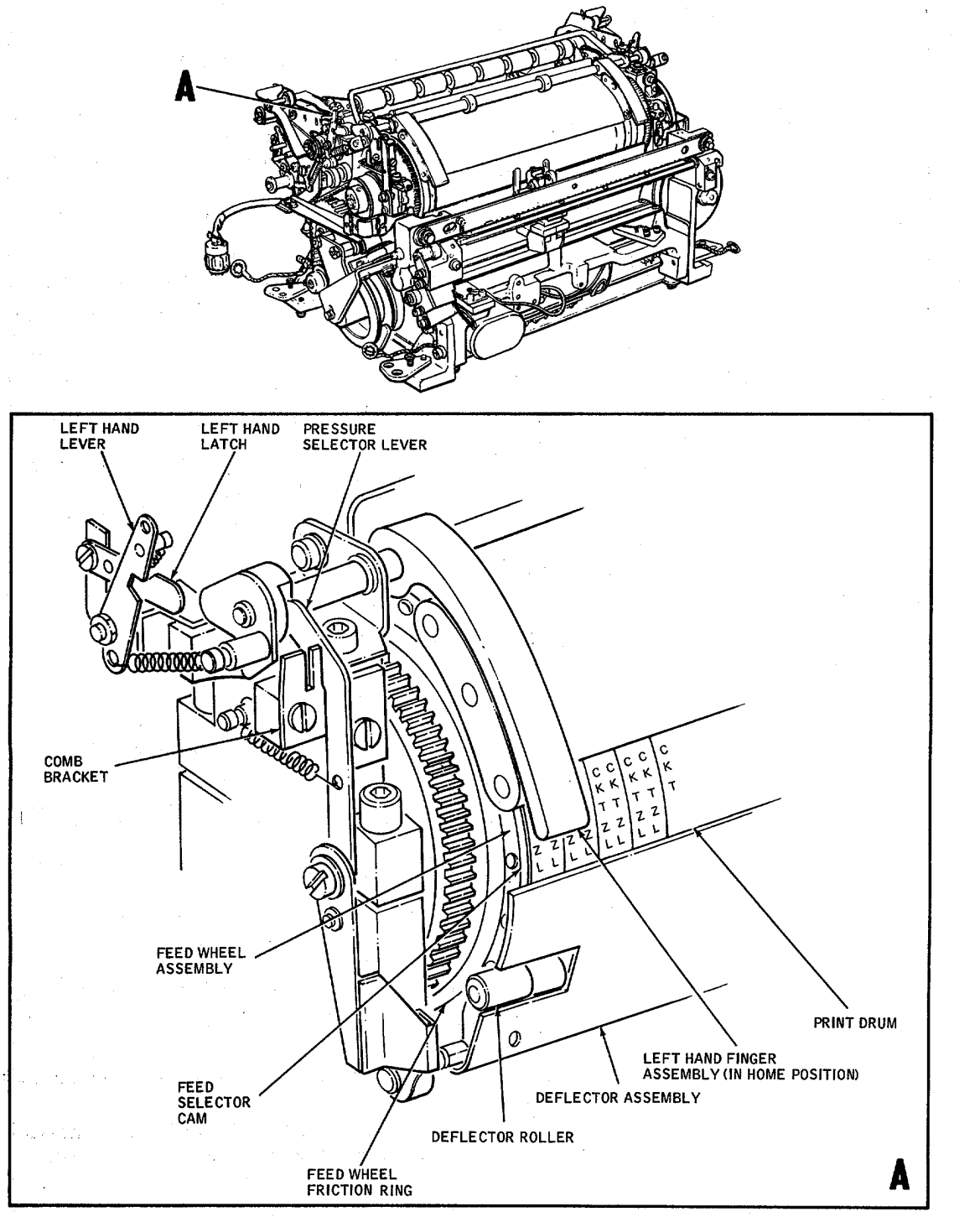

Figure 3-2. Paper Pressure Mechanism Controls

(9) Press and release REQ SEND switch. Enter CC53. Press and release REQ SEND switch.
(10) Printer prints message shown in figure 3-2.1.
(11) Press and release REQ SEND switch. Enter Y. Press and release REQ SEND switch.
(12) Printer prints:

INPUT THE FOLLOWING TEST MESSAGE -
POST(#126+L)

(13) Press and release REQ SEND switch. Enter POST(# 126+L). Press and release REQ SEND switch.
(14) Printer prints:

POST(#126+L)
530000 NO FAULT FOUND

NOTE

If on-line check fails, refer the equipment and system to organizational maintenance for AN/TSQ-73 system fault isolation procedures (refer to TM 9-1430-655-20- 1).

3-7. Stopping Procedure. To stop the printer, proceed as follows:

a. Set printer POWER switch to OFF.
b. Set ac power source circuit breaker to OFF.

<77 53 00 REQUESTED LOAD COMPLETE>
KEYBOARD PRINTER UNIT FAULT ISOLATION
AABBCCDDEEFFGGHHIIJJKKLLMMNNOOPPQQRRSSTTUUVVWWXXYYZZ00112233445566778899
AABBCCDDEEFFGGHHIIJJKKLLMMNNOOPPQQRRSSTTUUVVWWXXYYZZ
! !' ' ' ' $$%%&&"(("))
**++--..//::<<;;>>==??##
IF TEST MESSAGE IS CORRECT TYPE IN Y,ELSE N

MS 197067

Figure 3-2.1. KPU Fault Isolation Message

Table 3-2. Paper Pressure Mechanism, Controls

Control	Function
Pressure selector lever	Lever in right-hand notch of comb presses deflector roller against feed wheel friction ring. This position is selected when using roll paper. Lever in left-hand notch of comb moves deflector roller away from feed wheel friction ring. This position is selected when using perforated fanfold paper.
Left- and right-hand levers	These levers, one on each side, control pressure with which finger assemblies press paper against feed wheel assemblies. With levers in latched (forward) position, increased pressure is applied to finger assemblies. This position is selected when using roll paper. With levers in unlatched (backward) position, decreased pressure is applied to finger assemblies. This position is selected when using perforated fanfold paper.
Left- and right-hand latches	Latches hold spring-loaded left- and right-hand levers in latched (forward) position. Pressing latches allows left- and right-hand levers to snap back into unlatched position.
Feed selector cam	Cams extend and retract sprocket pins of feed wheel assemblies. Extended position is used for perforated fanfold paper. Retracted position is used for roll paper.
Left- and right-hand finger assemblies	Holds paper securely against paper guide assembly. **NOTE** Do not permit finger assemblies to snap into place when returning to normal position.

Section II. OPERATOR' S MAINTENANCE

3-8. Scope of Maintenance. The operator's maintenance duties for the printer are listed below, together with a reference to the paragraph covering the specific maintenance function. Any malfunction of the equipment which cannot be corrected by the procedures referenced in the list below should be reported to higher category maintenance personnel.

a. Preventive maintenance (para 3-9).
b. Troubleshooting (para 3-10).
c. Installing paper (para 3-11).
d. Replacement of inking ribbon (para 3-12).
e. Replacement of fuses (para 3-13).
f. Replacement of lamps (para 3-14).
g. Cleaning (para 3-15).

3-9. Preventive Maintenance. Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime and to assure that the equipment is serviceable. The preventive maintenance checks and services charts (tables 3-3 and 3-4) outline functions to be performed at specific intervals. The charts indicate what to check, how to check and the resultant normal conditions. The references column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher level maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in DA PAM 738-750.

3-10. Troubleshooting.

a. *General.* The troubleshooting procedures listed are based on the operational portion of the operator's daily and monthly preventive maintenance checks and services charts. Only those corrective measures within the scope of operating personnel are given.

b. *Procedure.* With the equipment in operation, note the apparant trouble symptom. Locate the symptom in the chart (table 3-5). Note the probable trouble and take the indicated corrective action for each probable trouble. If the indicated corrective action does not restore the equipment to normal operation, report the deficiency to organizational maintenance personnel.

3-11. Installing Paper. When end of paper is near, a red stripe appears at center or side of the paper, the audio alarm will sound and the PAPER OUT indicator will light. The markings and alarms allow enough time to finish message being received. Install a roll of paper as follows:

a. Open cover of printer by turning cover knobs toward rear of printer. Lift cover until the cover latch locks the cover in the half-open position. Release latch on the left-hand support arm and lift cover to the full open position.
b. Lift finger assembly to upright position to release pressure on paper (fig. 3-3).
c. Remove paper shaft assembly from mounting.

Table 3-3. Daily Preventive Maintenance Checks

Item to be inspected	Procedure	References
Printer	Check that all components of the printer set are properly mounted and secured.	
Dust Cover	Check dust cover for proper opening and closing.	
Intercabling and connectors	Check power cords and intercabling for breaks, frayed insulation and damaged plug connectors (always inspect plug connectors before connecting).	
Exterior surfaces	Clean all exterior surfaces of the equipment.	Para 3-15
Printer belts	Inspect the carriage feed, return and drive belts for signs of fraying or deterioration.	
Paper supply	Check paper supply. Install fresh supply if low. Check paper alinement.	Para 3-11
Inking ribbon	Inspect for signs of dryness, wear or damage.	Para 3-12
Operation	Check mechanical action of each knob, key and switch for smooth operation.	
Copy lamps	Check copy lamps for illumination. Replace lamps as necessary.	Para 3-14

d. Remove paper roll hub from shaft and discard hub.
e. Insert paper shaft in hub of new roll of paper.
f. Install paper shaft and paper roll in mounting with paper feeding from underside of roll towards front of printer.
g. Unroll about 12 inches of paper from roll.
h. With paper lying over the top of paper roller, insert paper in area between print drum and paper trough assembly.
i. With printer power ON, press the LF switch on mode panel until about 6 inches of paper emerges from front of drum.
j. Pull finger assembly down to home position.
k. Be sure that paper is correctly aligned.
1. Place pressure selector lever in right-hand slot of comb.
m. Place right- and left-hand levers in latched (forward) position.
n. For friction feed operation, insert screwdriver or similar tool in feed selector cam cutout and move feed selector cam downward to retract all sprocket pins.
0. Return cover to closed position.

3-12. Replacement of Inking Ribbon (fig. 3-4).

a. *Removing Old Ribbon*
(1) Set POWER ON-OFF switch to OFF.
(2) Open cover of printer.
(3) Hand wind ribbon completely on one spool.

Table 3-4. Monthly Preventive Maintenance Checks

Item to be inspected	Procedure	References
Dust covers	Remove dirt, dust, grease and moisture from accessible areas of the dust covers, including the window of the printer.	Para 3-15
Fuses	Inspect all fuses and lamps for correct value, proper fit, and electrical condition.	Para 3-13
Inter-unit power cable connections	See that all connections are secure.	
Operation	Operate equipment. Check for smooth operation with no evidence of friction, binding, malfunctions, or vibrations.	Para 3-6

Table 3-5. Operator' s Troubleshooting Chart

Symptoms	Probable trouble	Checks and corrective measures
No power in printer	Ac power fuse blown. Failure of power source.	Check fuses (para 3-13). Correct defect or use another power source. Check power cables and connectors.
Loss of all functions in printer	Fuses blown.	Check fuses (para 3-13).
Line feed fails	Paper supply bound. Sprocket pins not aligned with holes in fanfold paper.	Check installation (para 3-11).
Ribbon feed fails	Ribbon improperly installed.	(Check installation (para 3-12).
Carriage return fails	Belt broken.	
Rumbling sound when motor starts	Loose motor beit.	

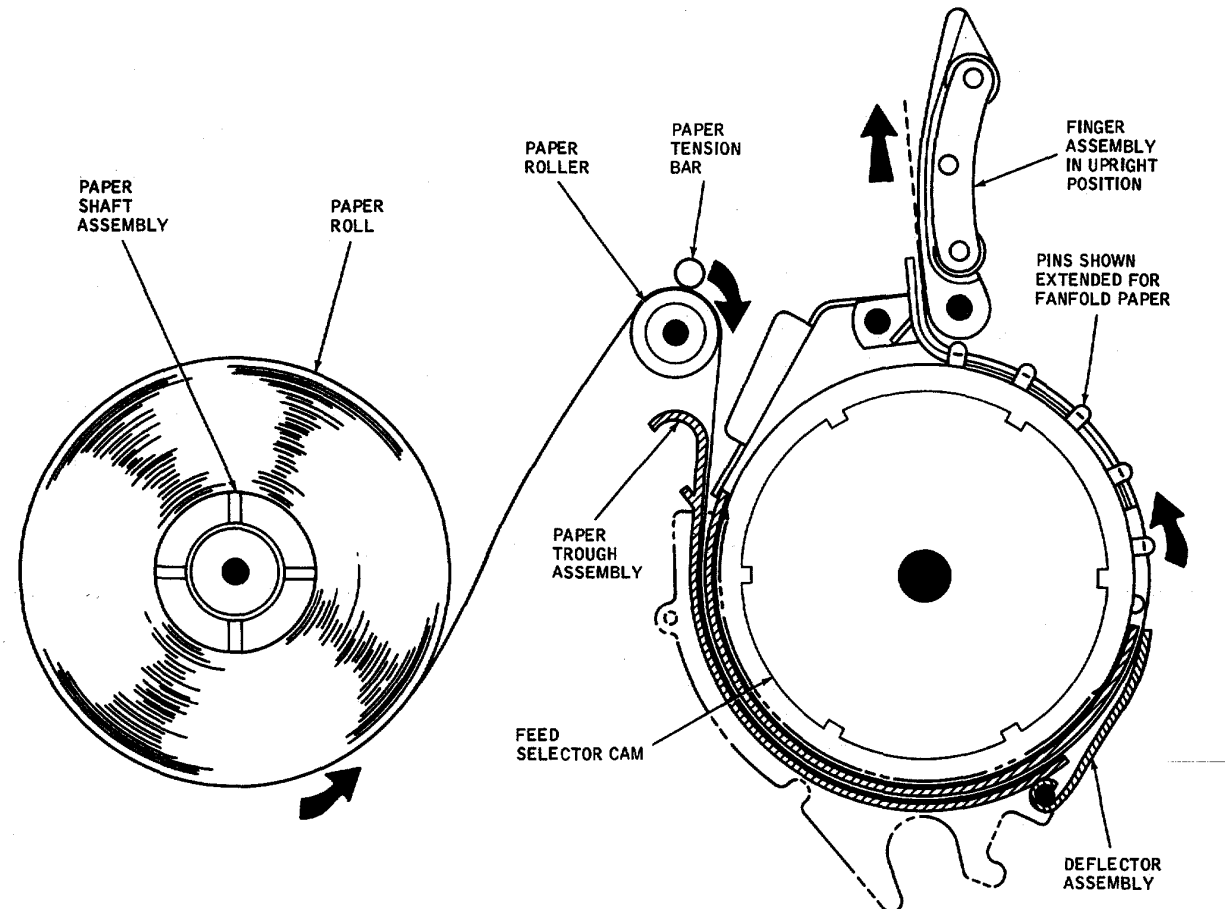

Figure 3-3. Paper Roll Installation

(4) Disengage ribbon from empty spool and sensing arm.
(5) Wind all ribbon on spool.
(6) Set spool lock on full spool in unlocked position. Remove and discard spool.

b. *Installing New Ribbon*

(1) Place empty spool on spool shaft engaged with driving mechanism with hub spear pointing toward front of printer. Lock spool.
(2) Place full spool on free shaft with free end of ribbon down at rear of spool. Lock spool.
(3) Pull end of the ribbon toward front and over upper roller at rear of full spool.
(4) Insert ribbon in sensing arm slot and around lower roller. Thread it through ribbon guides to other side of printer.
(5) Pass ribbon around lower roller, through sensing arm slot, around upper roller, and impale ribbon on hub spear.
(6) Rotate spool to wind a few turns of ribbon on spool hub.

c. *Checking Ribbon.* After each ribbon installation, and at reasonable intervals thereafter, check the ribbon as follows:

(1) Ribbon should be firmly not tightly) supported, free of twists, wrinkles, creases, holes, tears, and lie flat in ribbon guides.
(2) Ribbon spools should turn in opposite directions when machine is printing.
(3) Ribbon spools should be seated properly and be locked.
(4) Ribbon spools should reverse direction when spool is emptied.

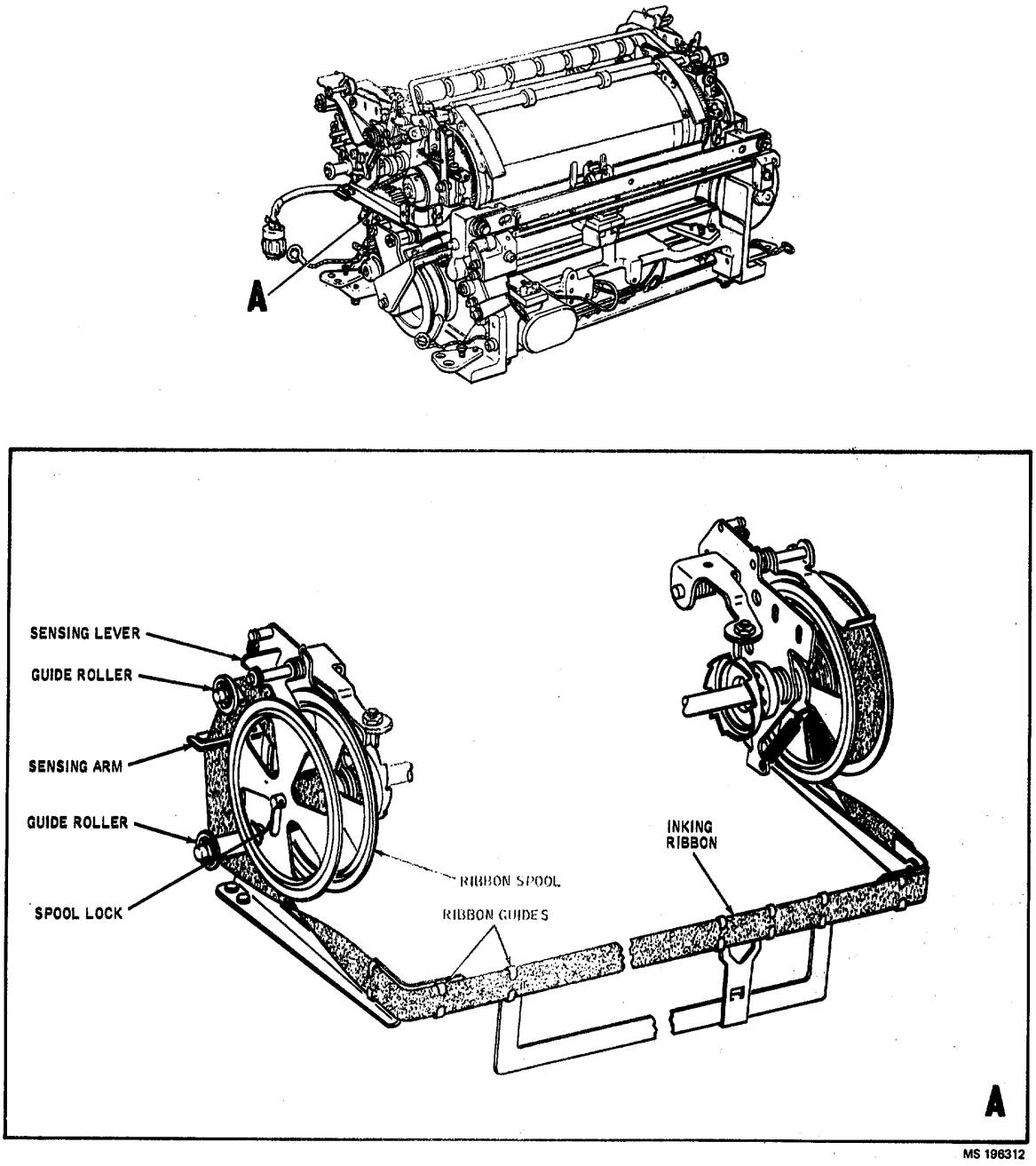

Figure 3-4. Inking Ribbon Installation

3-13. Replacement of Fuses. The printer is protected by five fuses. The fuses are located inside the printer case on the front left side of the power supply (fig. 3-5). Fuse functions, ratings, and part numbers are listed in table 3-6.

Table 3-6. Fuses

Ref desig.	Function	Value	Part no.
F1,F2	Ac input power	2 amp, 250v slow blow	F02B250V2A
F3	+36v magnet supply	3 amp, 250v	F02A250V3A
F4	12 vdc supply	5 amp, 250v	F02A250V5A
F5	5 vdc supply	1/2 amp, 250v	F02A250V1/2A

3-14. Replacement of Lamps. The printer has two copy lamps, pn 23274 (82423), and two indicator lamps, 24400 (82423). The copy lamps are located on the inside of the dust cover next to the viewing window (fig. 3-5). The indicator lamps are located on the right side of the mode panel. The copy lamps have a bayonet base while the indicator lamps are cartridge type that plug into the indicator lens.

3-15. Cleaning. Inspect the exterior surfaces of the printer. The exterior surfaces should be clean, free of dust, dirt, grease, and fungus.

a. Clean the outer surfaces, removing dust and loose dirt with a clean, dry, lint-free cloth.

b Use No. 0000 sandpaper to remove corrosion.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. Do not use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

c. Remove deposits of oil, grease, or ground-in dirt from exterior surfaces using a cloth dampened (not wet) with trichloroethane. After cleaning, wipe exterior surfaces with dry cloth.

d. Remove dust and dirt from plugs and jacks with a brush.

e. Clean panels and controls with a soft clean cloth. If dirt is difficult to remove, dampen the cloth with mild soap and water solution. Wipe dry.

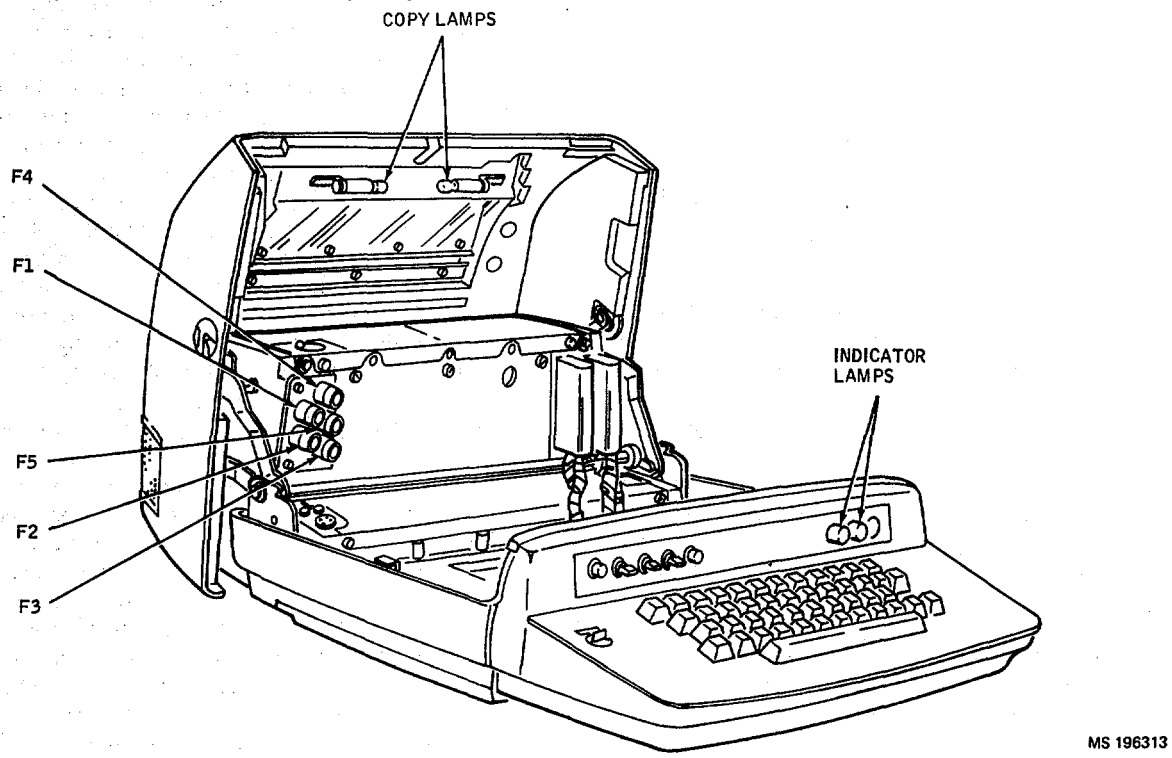

Figure 3-5. Fuse and Lamp Locations

CHAPTER 4
FUNCTIONAL THEORY OF OPERATION

Section I. OVERALL FUNCTIONAL THEORY OF OPERATION

4-1. General. This section contains an overall description of the mechanical and electronic functioning of the printer. An overall mechanical schematic and block diagram of the printer are provided in figures 4-1 and 4-2, respectively. A detailed description of the mechanical and electronic functioning of the printer is provided in Sections II and III, respectively.

4-2. Overall Mechanical Functioning of Printer (fig. 4-1). The printer comprises seven major functional mechanisms which cooperate to accomplish the following mechanical operations: mechanical power distribution, paper handling, printing, inking ribbon feed and lift, electrical and mechanical timing, and low paper sensing. The functional mechanisms of the printer include the power distribution, paper handling, printing, inking ribbon, ribbon lift, timing, and low paper sensing mechanisms. These mechanisms are described in detail in Section II. An overall description of the function and cooperation of the mechanisms is contained in the following paragraphs. The printer keyboard is electrical in operation and is described in Section III.

a. *Mechanical Power Distribution.* Mechanical power required for operation of the printer is provided by the power distribution mechanism. The power distribution mechanism includes motor B1 (1, fig. 4-1) and drive belt (2). Excitation for motor B1 is controlled by the motor control circuit (para 4-22). The drive belt delivers rotary power to print drum (3), timing disc (4), power shaft (5), and clutch housing assembly (6) for operation of the functional mechanisms.

b. *Paper Handling.* The paper handling operation is accomplished by the paper handling mechanism. The mechanism consists of a line feed mechanism and a paper pressure mechanism. The line feed mechanism functions to advance the paper (not shown) vertically for printing, and the paper pressure mechanism permits selection of the correct predetermined pressure on the paper for either friction feed or sprocket feed operation. The line feed mechanism includes clutch assembly (7), armature (8), line feed magnet assembly L5, cam (9), and cam follower (10). Magnet assembly L5 is energized whenever a line feed signal is received from the line feed circuit (para 4-20). When magnet assembly L5 is energized, the armature is rotated clockwise allowing the clutch assembly to engage the power shaft and rotate the cam. The cam follower is driven by the cam and causes feed pawl bail (11) to engage detent wheel (12) and advance paper feed shaft (13). Driving gears attached to each end of the paper feed shaft drive corresponding paper feed wheel assemblies (14) on the print drum, thereby advancing the paper upward against the print drum. The paper pressure mechanism includes the paper feed wheel assemblies, pressure selector lever (15), and feed selector cam (16). The pressure selector lever can be placed in one of two positions for varying the pressure of the paper against the paper feed wheel assemblies for friction feed operation. Sprocket feed operation of the paper is selected by manually rotating the feed selector cam. Rotating the feed selector cam causes a sleeve bearing internal to the paper feed wheel assemblies to extend the wheel sprockets and advance the paper as the wheels turn.

c. *Printing.* The printing operation is accomplished by three functional mechanisms: a carriage mechanism, a carriage feed mechanism, and a carriage return mechanism. The carriage mechanism includes carriage assembly (17), which contains two print hammers (18) and corresponding print hammer magnet assemblies L9 and L10. Magnet assemblies L9 and LI are energized by the print hammer control circuit (para 4-18), thereby actuating the respective print hammer. The print hammer presses the inking ribbon and paper against the print drum, thereby printing the character. The print drum contains 72 characters across and 64 characters in circumference, and is continuously rotated by the drive belt. The carriage assembly moves across the face of the print drum and its lateral position is controlled by the carriage feed and carriage return mechanisms. The carriage feed mechanism includes carriage feed drum assembly (19) and carriage feed belt (20), which is attached to the carriage assembly. The carriage feed drum assembly is spring-loaded and causes the carriage feed belt to pull the carriage assembly to the right. The carriage assembly is prevented from moving to the right by space pawl (21) (attached to the carriage assembly) engaging carriage rack (22). Whenever a line space signal is received by space magnet assembly L3 from the line space and carriage return circuit (para 4-19), magnet assembly L3 is energized, thereby rotating space bail (23). Rotating the space bail releases the space pawl from the carriage rack, permitting the carriage assembly to advance to the right. The carriage return mechanism includes clutch housing assembly (6), carriage return belt (24), and carriage return magnet assembly L11. Whenever a

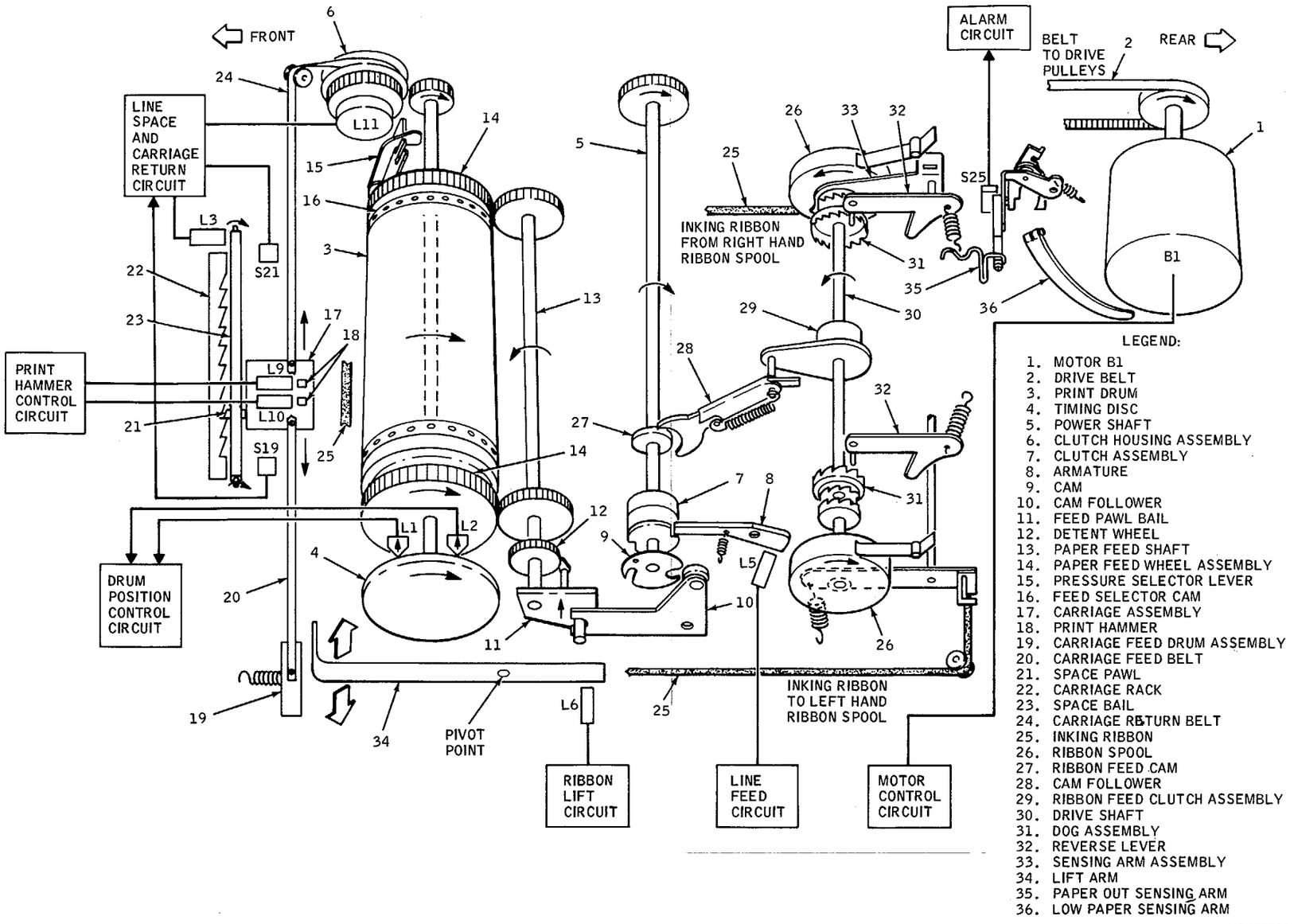

Figure 4-1. Printer Mechanical Schematic

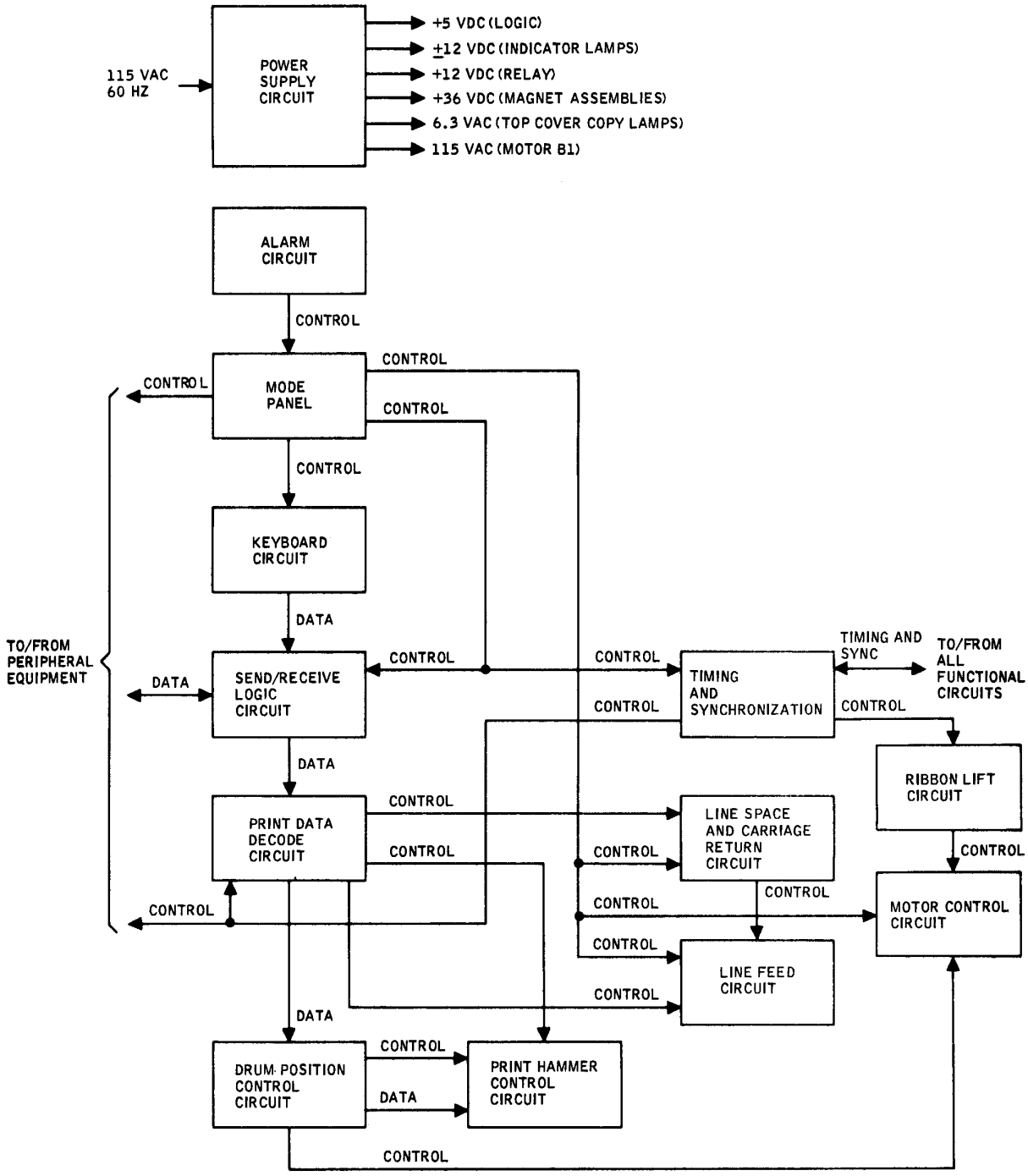

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Figure 4-2. Printer Block Diagram

carriage return signal is received by magnet assembly L11 from the line space and carriage return circuit, or whenever right-hand margin switch S19 is actuated by the carriage assembly reaching the right-hand margin, magnet assembly L11 is energized, thereby engaging the clutch housing assembly. The clutch housing assembly enables drive belt (2) to rotate a carriage return pulley contained on the clutch housing assembly and attached to the carriage return belt, thereby pulling the belt and the carriage assembly attached thereto, to the left-hand margin. A magnet on the bottom of the carriage assembly actuates left-hand margin switch S21 when the carriage assembly reaches the left margin. Actuating switch S21 deenergizes magnet assembly L11, permitting the carriage assembly to be again advanced to the right for printing.

d. *Inking Ribbon Feed and Lift.* Inking ribbon (25) is fed back and forth between ribbon spools (26) by the ribbon feed mechanism and the ribbon reverse mechanism (both mechanisms are part of the inking ribbon mechanism). The normal position of the inking ribbon is below the printing line during operation and must be lifted for printing and lowered after the print hammers have retracted. The ribbon lift mechanism accomplishes the lift operation. The ribbon feed mechanism includes ribbon feed cam (27), cam follower (28), ribbon feed clutch assembly (29), drive shaft (30), and the right- and left-hand ribbon spools. The ribbon feed mechanism advances the inking ribbon a short distance each time the power shaft rotates the ribbon feed cam one complete revolution. As the cam follower moves to the top of its stroke, it moves the ribbon feed clutch assembly clockwise into engagement, thereby gripping and turning the drive shaft and one of two dog assemblies (31) (part of the ribbon reverse mechanism), whichever one is engaged. The engaged dog assembly turns the respective ribbon spool and advances the inking ribbon. The ribbon reverse mechanism includes right- and left-hand reverse levers (32) and sensing arm assembly (33). The reversing operation is done automatically when the last turn of inking ribbon is unwound from the pay out spool. As the ribbon spool empties, an eyelet in the inking ribbon engages a slot in the sensing arm assembly, pivoting the sensing arm assembly until a stud on the sensing arm assembly is disengaged from the reverse lever. The reverse lever is spring-loaded and rotates until a pin extending from the reverse lever engages the respective dog assembly. On the next feed stroke of the drive shaft, the drive shaft is forced toward the opposite side of the printer by the camming action of the dog assembly against the reverse lever pin. The opposite dog assembly thereby engages the respective ribbon spool, and the empty spool becomes the driving spool. The ribbon lift mechanism includes lift arm (34) and ribbon lift magnet assembly L6. Magnet assembly L6 is energized by the ribbon lift circuit (para 4-21), when either or both of the print energized, the lift arm which supports the inking ribbon is pivoted upward, lifting the inking ribbon into the printing position. After the hammers print, magnet assembly L6 is deenergized and the lift arm drops under its own weight to its deactuated position.

e. *Electrical and Mechanical Timing.* Synchronization of the electrical to the mechanical functions of the printer is controlled by the timing mechanism. The timing mechanism includes a rotating timing disc (4) (attached to the print drum) and two stationary clock assemblies (main clock L1 and index clock L2). The timing disc has 64 main clock teeth located close to its outside diameter, and one index clock tooth located closer to its center. As the teeth on the timing disc pass the clocks, synchronization signals are generated by the clocks for timing control. The index clock functions to initially synchronize the electronic logic circuits for each revolution of the print drum. The main clock functions to synchronize the logic circuits with the angular position (64 positions per revolution) of the print drum for every printable character. The clock pulses are applied to the drum position control circuit (para 4-17) for timing synchronization.

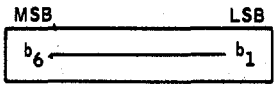
f. *Low Paper Sensing.* Sensing when the supply paper is low or out is provided by the low paper sensing mechanism. The mechanism includes paper out sensing arm (35), low paper sensing arm (36), and sensitive switch S25. The low paper sensing arm follows the outside diameter of the roll paper and actuates switch S25 whenever a low-paper condition exists. The paper out sensing arm presses against the paper as the paper is fed into the printing mechanism and actuates switch S25 as the end of the paper passes over the arm. Actuating switch S25 applies a ground to the alarm circuit (para 4-24) to light mode panel PAPER OUT lamp DS4 and sound audio alarm DS3.

4-3. Overall Electronic Functioning of Printer (fig. 42). The printer consists of 12 major functional circuits which cooperate to accomplish the various electronic operations of the printer. The functional circuits of the printer consist of the power supply circuit, timing and synchronization circuit, send/receive logic circuit, key-board circuit, print data decode circuit, drum position control circuit, print hammer control circuit, line feed circuit, line space and carriage return circuit, ribbon lift circuit, motor control circuit, and alarm circuit. The printer also includes the mode panel which contains the majority of the operational controls and indicators. In operation, primary power is applied to the power supply circuit which converts the power to the secondary voltages required for the printer operation. The timing and synchronization circuit generates the clock and control pulses necessary for timing and synchronization of the operations. The send/receive logic circuit accepts character data on a ready/busy basis from either the printer keyboard (keyboard circuit) or from the peripheral equipment. The send/receive logic circuit transmits

output data from the keyboard to the peripheral equipment, likewise, on a ready/busy basis. When the printer is ready to process new data, the timing and synchronization circuit generates a ready control. Signal which enables transmission of the data. The send/receive logic circuit contains EIA interface circuitry which functions to interface the parallel, TTL, six-level ASCII-coded data transmitted between the printer and the peripheral equipment. The code convention for the characters transmitted is described in paragraph 4-4. The keyboard circuit converts keyboard generated data to parallel, seven-level ASCII codes (only six levels are utilized) and transmits the data to the send/receive logic circuit. Depending upon the position of mode panel ON LINE-PRINTER (offline) switch S3, the send/receive logic circuit will transmit keyboard generated data to either the peripheral equipment (ON LINE), or to the print data decode circuit (PRINTER) for printing by the printer. The data from either the keyboard or the peripheral equipment is transmitted through the send/receive logic to the print data decode circuit. The print data decode circuit decodes each ASCII-coded character to determine if the character is a printable character or nonprintable character (line feed, carriage return, or space operation). If the character is decoded as printable, the character data is transmitted to the drum position control circuit, the printer is set to the busy state, and a print flag clock pulse is transmitted from the print data decode circuit to the print hammer control circuit to initialize a print timing sequence (print timer). If the character is decoded as being a nonprintable operation (line feed, carriage return, or space), the print data decode circuit simultaneously triggers the appropriate circuit (which activates the respective printer mechanisms), sets the printer to the busy state, and inhibits printing until the respective operation is completed. After the operation is completed, the appropriate circuit (line feed or line space and carriage return) will reset the timing and synchronization circuit to the ready state, permitting the next character to be decoded. When the character decoded is printable, the drum position control circuit determines where the character is located on the rotating print drum with respect to the print line (print hammers). The character position data is then transmitted to the print hammer control circuit for use in the printing operation. The print hammer control circuit includes two print hammer counters (one for each print hammer), a print timer, and a steering register. Since there are two print hammers, the steering register is provided to steer the next character to be printed to the appropriate print hammer counter. When the print timing sequence is initiated by the print data decode circuit, three timing pulses are generated (T1 thru T3). During time T1, the steering register steers the character position data to the appropriate print hammer counter. During time T2, the data is loaded into the respective counter, the counter counts down, and the respective hammer prints. During time T3, the printer is reset to the ready state, thereby permitting the next character to be decoded. The printer inking ribbon is normally in a lowered position with respect to the print hammers, and must be raised to the print line for the printing operation. During the print timing sequence, the timing and synchronization circuit triggers the ribbon lift circuit which raises the inking ribbon to the print position. After the hammers have printed, the ribbon lift circuit is disabled and the ribbon drops under its own weight to its reset position. The motor control circuit includes a motor stop counter which functions to turn off the printer motor after a 90-second period has elapsed from which a print command was generated. The purpose of turning off the motor when printing is not required, is for equipment cooling and reduced wear on the printer components. The alarm circuit functions to sense when a low paper or paper out condition occurs, and to sound low paper alarm DS3 and light mode panel PAPER OUT indicator DS4 to alert the operator to the condition.

4-4. Information Interchange Code Convention. The data transmitted between the printer and the peripheral equipment is coded in parallel, TTL, six-level ASCII codes (EIA standard RS-232-C). The ASCII codes are industry standard, 6-bit binary codes assigned to the keyboard characters. The code assigned to each character is given in figure 4-3. The data format of the characters transmitted is also given in figure 4-3. The operation of the EIA interface between the printer and the peripheral equipment is described in the send/receive logic circuit, paragraph 4-15a.

DATA FORMAT



CODE ASSIGNMENT

BITS				b_5	b_6	b_5	b_6	b_5	b_6	b_5	b_6
b_1	b_2	b_3	b_4	0	0	1	0	0	1	1	1
0	0	0	0	SPACE (SEE NOTE 1)		Ø		(SEE NOTE 2)		P	
1	0	0	0	! (SEE NOTE 2)		1		A		Q	
0	1	0	0	" (SEE NOTE 2)		2		B		R	
1	1	0	0	# (SEE NOTE 2)		3		C		S	
0	0	1	0	$ (SEE NOTE 2)		4		D		T	
1	0	1	0	% (SEE NOTE 2)		5		E		U	
0	1	1	0	& (SEE NOTE 2)		6		F		V	
1	1	1	0	' (SEE NOTE 2)		7		G		W	
0	0	0	1	((SEE NOTE 2)		8		H		X	
1	0	0	1	) (SEE NOTE 2)		9		I		Y	
0	1	0	1	* (SEE NOTE 2)		:		J		Z	
1	1	0	1	+ (SEE NOTE 2)		;		K		[(SEE NOTE 2)	
0	0	1	1	,		< (SEE NOTE 2)		L		LINE FEED (SEE NOTE 1)	
1	0	1	1	-		= (SEE NOTE 2)		M		] (SEE NOTE 2)	
0	1	1	1	.		> (SEE NOTE 2)		N		^ (SEE NOTE 2)	
1	1	1	1	/		? (SEE NOTE 2)		O		RETURN (SEE NOTE 1)	

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NOTES:

1. NONPRINT CHARACTER.
2. SHIFTED CHARACTER.
3. BIT 6 IS ORIGINALLY THE SEVENTH BIT TRANSMITTED FROM THE KEYBOARD. THE SIXTH BIT TRANSMITTED IS NOT USED (EXCEPT AS EXPLAINED IN THE ELECTRONIC FUNCTIONING OF THE KEYBOARD CIRCUIT) AND THE SEVENTH BIT BECOMES THE SIXTH BIT FOR THE CODE ASSIGNMENT.
4. ALL CODE ASSIGNMENTS ARE PARALLEL, 6-LEVEL ASCII CODES.

Figure 4-3. Keyboard Character Data Format and Code Assignments

Section II. MECHANICAL THEORY OF OPERATION

4-5. General. The printer contains seven major functional mechanisms mounted on or between the two side frames of the printer. The mechanisms consist of the power distribution mechanism, paper handling mechanism printing mechanism, inking ribbon mechanism, ribbon lift mechanism, timing mechanism, and low paper sensing mechanism. The mechanical operation of these mechanisms is described in detail in the following paragraphs.

4-6. Power Distribution Mechanism (**fig. 4-4).** The power distribution mechanism provides the mechanical power required for operation of the various mechanical assemblies of the printer. Mechanical power is distributed to the printer mechanism from motor B1 through a drive pulley and drive belt. The drive belt drives a print drum pulley, a power shaft pulley, and a carriage return pulley. The print drum pulley continuously rotates a print drum and a timing disk The power shaft pulley continuously rotates a power shaft ant extends power to the right hand side of the printer to operate the inking ribbon and line feed mechanisms (part of the paper handling mechanism). The carriage return pulley continuously rotates and supplies power to move the printer carriage to the left-hand margin when the carriage is actuated.

4-7. Paper Handling Mechanism (fig. 4-5 and 4-6). The paper handling mechanism functions to advance and guide the paper around the print drum during operation of the printer. The mechanism consists of two functional mechanisms: a line feed mechanism and a paper pressure mechanism.

a. Line Feed Mechanism (fig. 4-5). The line feed mechanism is located on the right-hand side of the printer chassis, and is used to advance the paper vertically whenever a line feed code group is received or whenever mode panel LF (line feed) switch S2 is pressed. The line feed mechanism includes line feed magnet assembly L5 a line feed armature, a detent wheel and feed pawl, a line feed cam follower (collar), and a line feed clutch assembly. The line feed clutch assembly includes a stop plate, a line feed cam, two clutch pawls with respective pawl springs, and a clutch ratchet. The mechanical power to operate the line feed mechanism is received through the line feed clutch assembly, mounted on the right-hand end of the continuously rotating power shaft. When a line feed is required, line feed magnet assembly L5 is energized, moving the line feed armature clockwise, away from a cutout on the line feed clutch assembly stop plate. This allows the line feed clutch assembly pawl spring to pull the clutch pawls into engagement with the clutch ratchet (attached to the power shaft), causing the line feed clutch assembly to rotate. The line feed armature is restored, as soon as magnet assembly L5 deenergizes, and stops the stop plate after it has rotated 180 degrees.

Slots in the stop plate permit the clutch pawls to continue rotating, disengaging from the clutch ratchet. At the same time, the line feed cam follower drops to a low point on the line teed cam, ensuring the line feed clutch assembly does not rebound when its clockwise movement is suddenly arrested. At the start of the 180degree rotation of the line feed clutch assembly, the line feed cam rotates, causing a lobe on the cam to pivot the line feed cam follower clockwise, and a detent lever to disengage a detent wheel. A cam follower link (attached to the line feed cam follower) moves upward, causing a feed pawl bail to pivot counterclockwise. The feed pawl (attached to the feed pawl bail) moves upward, engaging a tooth of the detent wheel, turning the detent wheel counterclockwise. The detent wheel is attached to a paper feed shaft and causes the shaft to rotate counterclockwise. A detent cam follower abut' the line feed cam. When the detent cam follower reaches the end of the 180 degrees rotation of the line feed cam, a detent lever at the opposite end of the detent cam follower reengage' the detent wheel. The line feed cam follower then drops to a low point on the line feed cam, moving the cam follower link and the feed pawl bail downward. The feed pawl drops between teeth on the detent wheel and is ready for the next line feed. A driving gear attached to each end of the paper feed shaft turns respective driven gears on two paper feed wheel assemblies clockwise. The paper feed wheel assemblies are located at each end of the print drum and rotate independently of the print drum. The paper is held against the paper feed wheel assemblies by two finger assemblies which are part of the paper pressure mechanism.

b. Paper Pressure Mechanism (fig. 4-6). The paper pressure mechanism is located on each side of the print drum, and permits selection of the correct predetermined pressure on the paper for either friction feed or sprocket feed operation. The mechanism includes a left- and right-hand feed wheel assembly, a pressure selector lever and spring, a left- and right hand latch and lever with associated springs, a left- and right-hand arm assembly, a left and right hand finger assembly, and a deflector assembly. Manual positioning of the pressure selector lever and both the left- and right-hand revere is necessary for either friction feed or sprocket feed operation.

(1) *Friction feed operation* . The pressure for creating the necessary friction between the finger assemblies and the feed wheel friction ring, located on each feed wheel assembly, is obtained by pulling the left- and right-hand levers forward to the latched position, stretching the respective latch spring. The latch springs pull the arm assemblies, a finger assembly shaft, and the finger assemblies clockwise, thereby urging the finger assemblies against the respective feed wheel friction ring. The feed wheel friction rings are

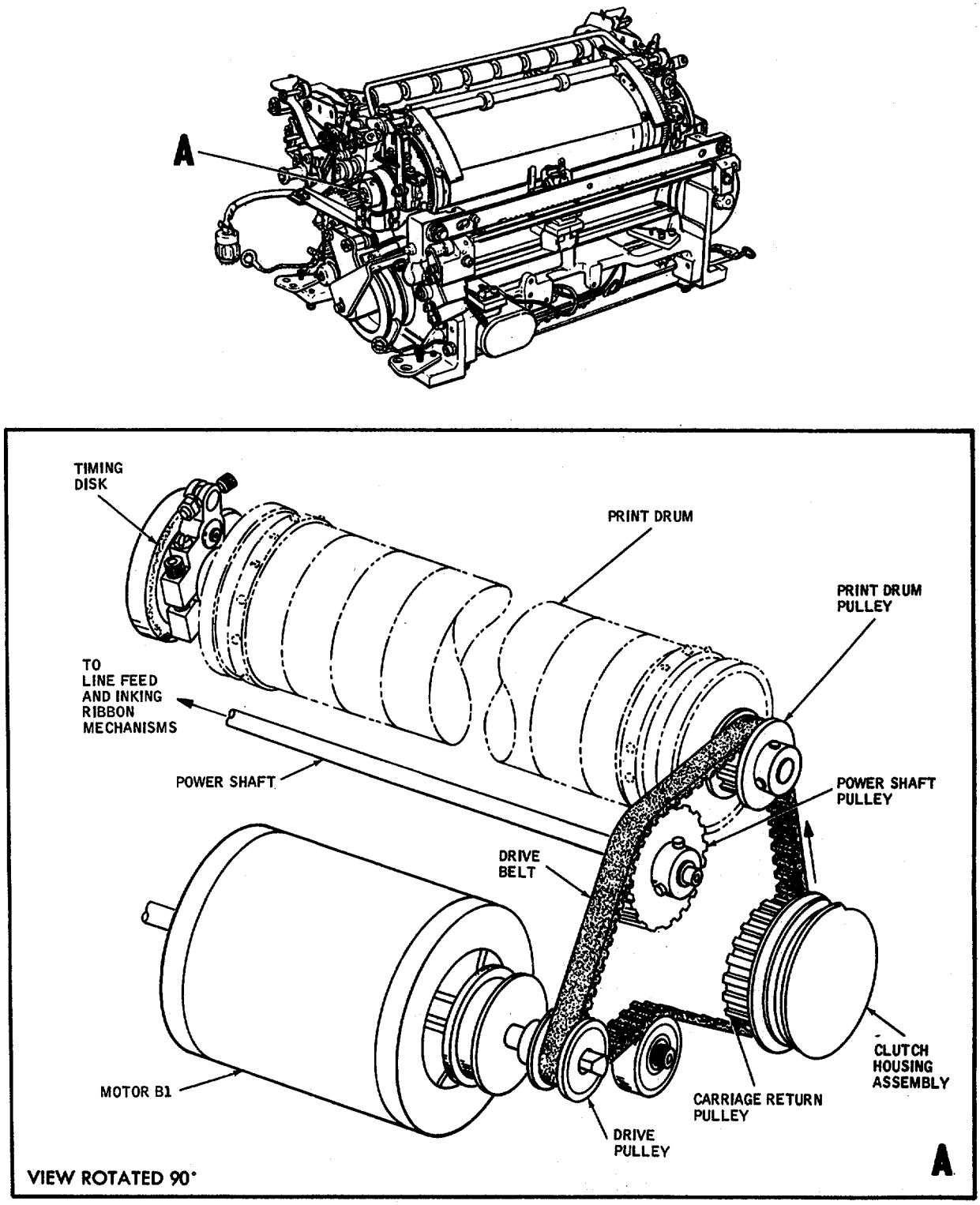


Figure 4-4. Power Distribution Mechanism

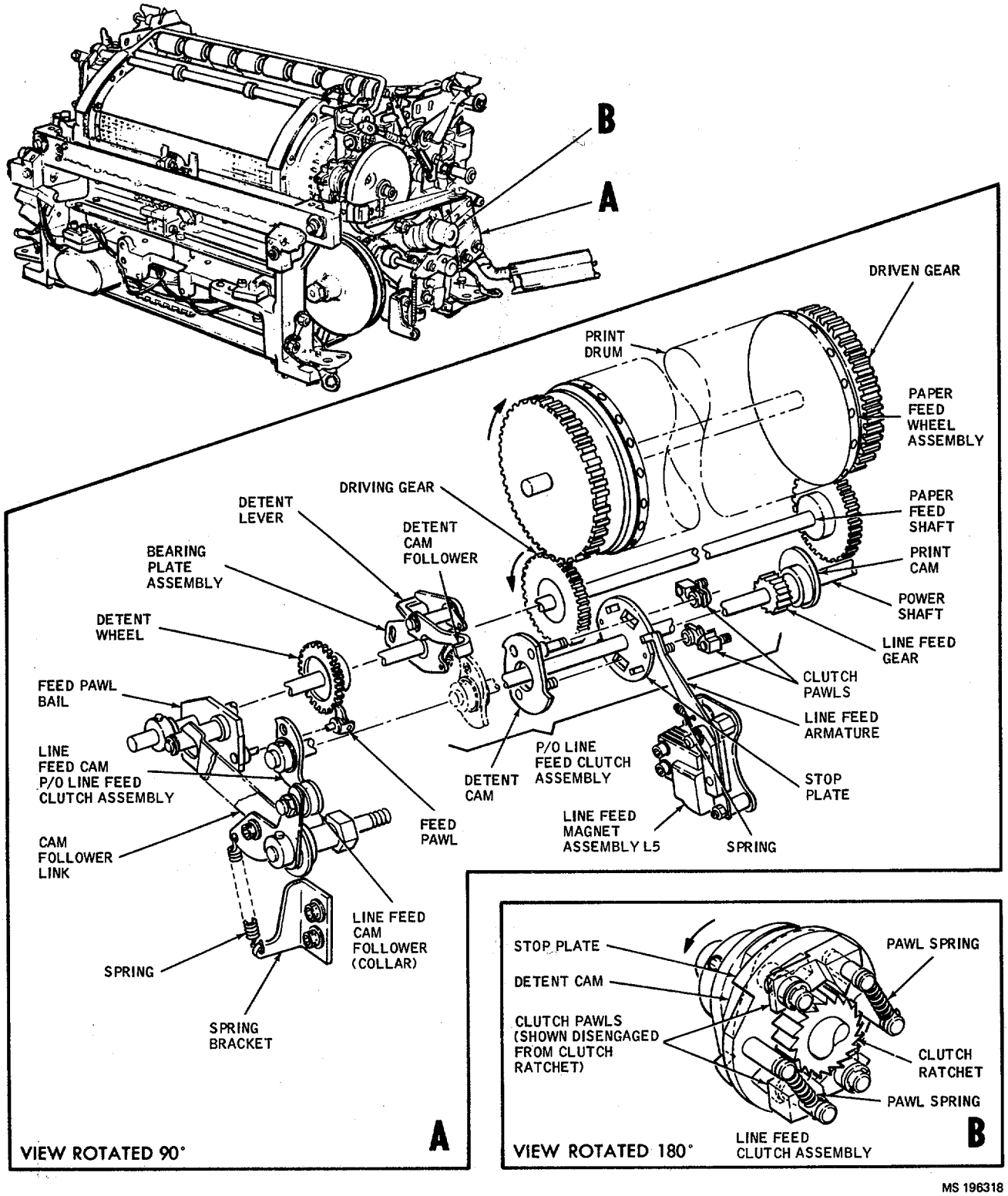


Figure 4-5. Line Feed Mechanism

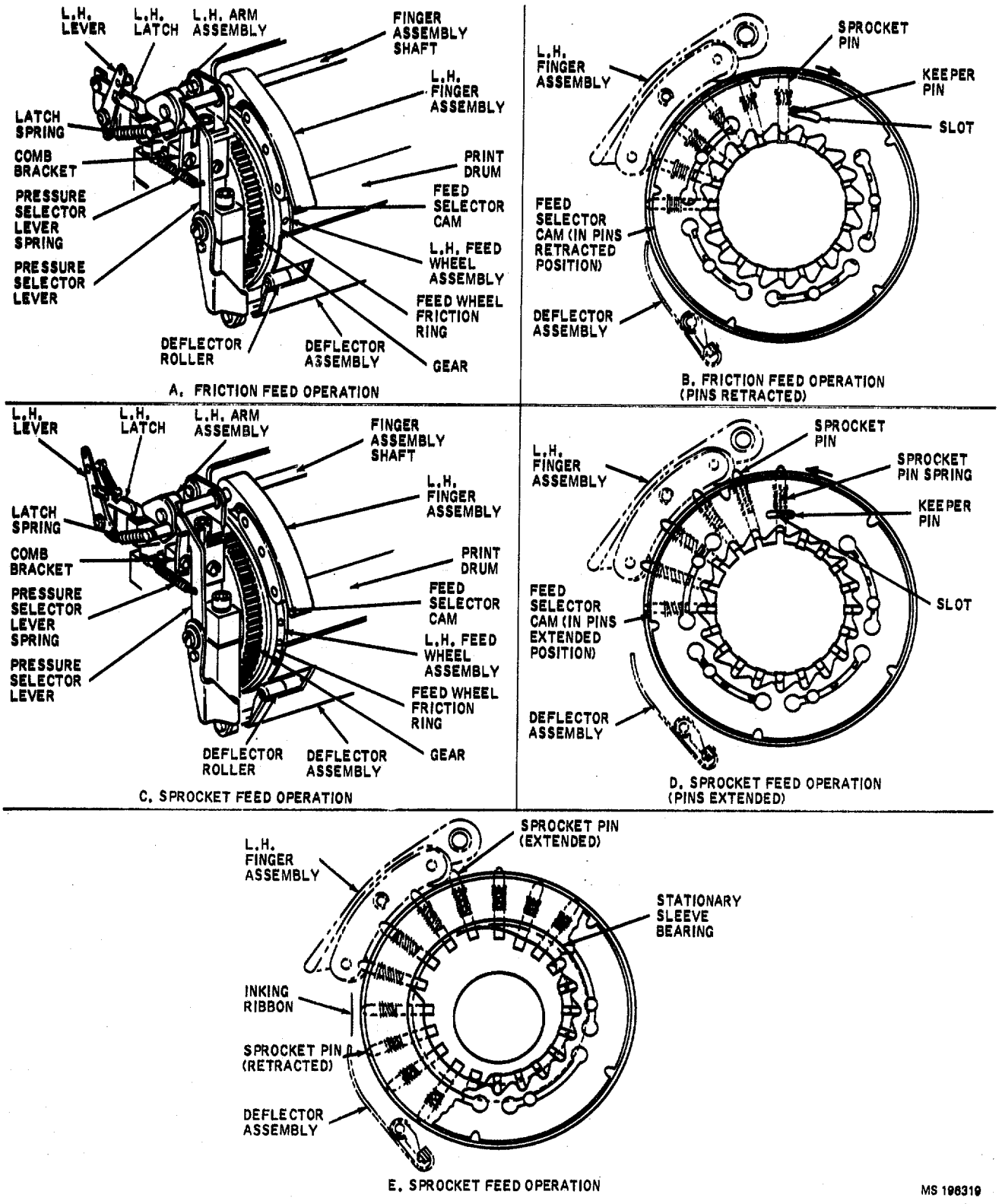


Figure 4-6. Paper Pressure Mechanism

also abutted by respective deflector rollers for guiding the paper past the deflector assembly. The pressure for creating the necessary friction between the deflector rollers and the feed wheel friction rings is obtained by positioning the pressure selector lever into the right hand slot of a comb bracket mounted on the printer frame, thereby stretching the selector lever spring. This position allows the round end of the pressure selector lever to be pulled against the low part of the left-hand arm assembly. Therefore, the deflector assembly is moved forward (toward the print drum) and the deflector rollers are held against the feed wheel friction rings. The 'spring-loaded sprocket pins in the left- and right-hand feed wheel assemblies (fig. 4-6, view B) must be in the retracted position for friction feed operation. To retract the sprocket pins, a feed selector cam, located adjacent to the inside edge of both feed wheel friction rings, must be manually rotated downward (part & 8.11). A keeper pin in the feed selector cam slot acts as a stop to limit movement of the feed selector cam to the retracted position or to the extended position. Projections on the inside periphery of the feed selector cam push the sprocket pins to the retracted position.

(2) *Sprocket feed operation.* Less friction is required to hold the finger assemblies against the feed wheel friction rings for sprocket feed operation than is required for friction feed operation. When the left- and right-hand levers are moved backward to the unlatched position, the latch springs are stretched less than in the latched position, and the finger assemblies are held against the feed wheel friction rings under less pressure than for friction feed. Clearance between the deflector rollers and the feed wheel friction rings is necessary for sprocket feed operation. This clearance is obtained by moving the pressure selector lever to the left-hand slot in the comb bracket. This position allows the round end of the pressure selector lever to be pulled against the high part of the arm assembly. Therefore, the deflector assembly is moved away from the print drum and the deflector rollers are held free of the feed wheel friction rings. The spring-loaded sprocket pins in the feed wheel assemblies (fig. 4-6, view D) must be in the extended position where they provide a positive feed for sprocket feed paper. To extend the pins, the feed selector cam must be manually rotated downward. Depressions on the inside periphery of the feed selector cam allow the springs to push the pins to the extended position. A stationary sleeve bearing, internal to each feed wheel assembly, withdraws the pins at the proper interval (fig. 4-6, view E) to avoid interference with the inking ribbon and deflector rollers as the feed wheel assemblies rotate.

4-8. Printing Mechanism (fig. 4-7). The printing mechanism consists of three functional mechanisms: a carriage mechanism, a carriage feed mechanism, and a carriage return mechanism. The carriage mechanism contains the carriage assembly (print hammers); and the carriage feed and carriage return mechanisms control the lateral position of the carriage assembly with respect to the print drum. These mechanisms are described in the following paragraphs.

a. *Carriage and Carriage Feed Mechanism* . The carriage mechanism is located on the front of the printer and includes a space pawl, a carriage assembly (which includes a carriage frame assembly), a space bail shaft, and a carriage rack. The carriage assembly is supported on a carriage shaft. A guide stud, that extends down from the carriage assembly, is held between parallel mounted carriage guide rails, thereby mounting the carriage assembly upright on the carriage shaft. The carriage assembly further includes a hammer block assembly, a left- and right-hand print hammer with respective compression springs, an armature assembly, and left- and right-hand print hammer magnet assemblies L9 and LIO. The carriage feed mechanism is located on the right-hand side of the printer frame and includes a clock-type, flat, coiled spring (not shown) contained within a carriage feed drum assembly and attached to a carriage feed belt, The carriage feed belt is attached at Its opposite end to the carriage assembly. The carriage feed drum assembly is mounted near the front of the right-hand frame assembly. In operation, a steady pull to the right is applied to the carriage assembly by the carriage feed belt. The space pawl is mounted on the carriage assembly and prevents the carriage assembly from moving to the right by engaging the carriage rack. When either magnet assembly L9 or L10 is energized, the associated hammer presses the inking ribbon and paper against the print drum, thereby printing the character, After' the hammers have printed, space magnet assembly LB is energized to turn the space bail toward the back (counterclockwise). The space bail disengages the space pawl from the carriage rack momentarily, allowing the carriage feed drum assembly spring to pull the carriage assembly to the right. The clockwise rotation of the carriage feed drum winds the carriage feed belt onto the grooved outside diameter of the drum. Timing of the space bail is such that it permits the space pawl to re-engage the carriage rack after a space movement.

b. *Carriage Return Mechanism.* The carriage return mechanism is located on the left-hand side of the printer frame and consists of carriage return magnet assembly L11, an armature assembly, a clutch housing assembly, and a carriage return pulley. When a carriage return code group is received by the printer or when mode panel CR switch SI is pressed, the carriage return circuit energizes magnet assembly L11 located in the clutch housing assembly. Magnetic assembly L11 is also energized whenever the carriage assembly reaches the right-hand margin. A permanent magnet on the guide stud (underside of carriage assembly) actuates right-hand margin switch S19, thereby energizing magnet assembly L11 via the carriage return circuit.

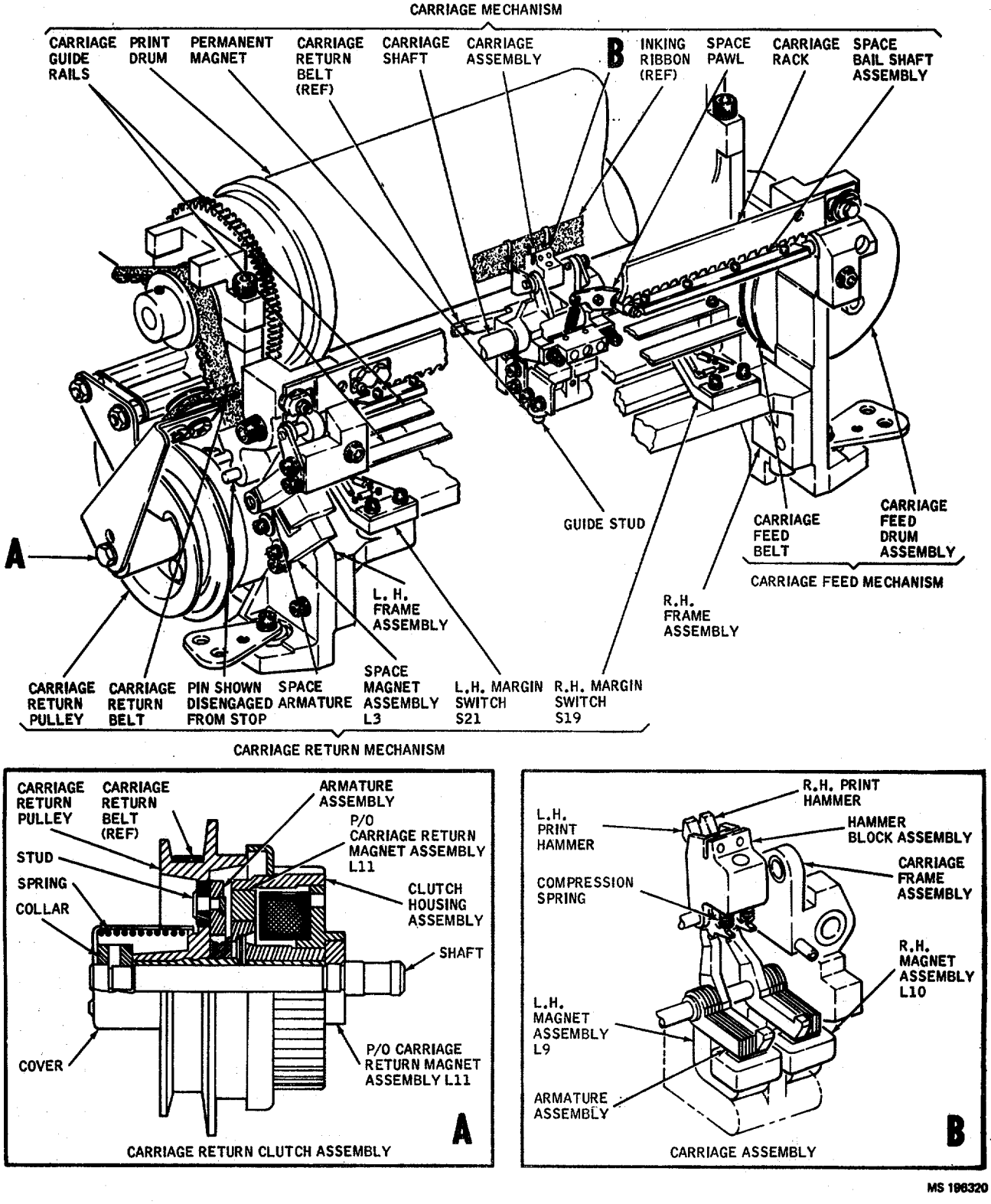


Figure 4-7 Printing Mechanism

When magnet assembly L11 is energized, the armature assembly moves against the magnet, providing a friction drive between the carriage return pulley and the clutch housing assembly. Three studs on the armature assembly engage three corresponding holes in the carriage return pulley. The carriage assembly is pulled to the left margin by the carriage return belt, and the counterclockwise rotation of the motor-driven carriage return pulley winds the carriage return belt into the groove of the carriage return pulley. While the carriage assembly is moving to the left margin, energy is being stored in the carriage feed drum assembly spring for the carriage feed operation. At the same time magnet assembly L11 is energized, space magnet assembly L3 is energized to turn the space bail counterclockwise. The space bail pushes the space pawl out of engagement with the rack to prevent the pawl from trailing across the teeth of the carriage rack. When the carriage assembly reaches the left margin, the permanent magnet on the guide stud actuates left-hand margin switch S21, thereby deenergizing magnet assembly L11.

4-9. Inking Ribbon Mechanism (fig. 48). The inking ribbon mechanism, mounted on each side of the printer frame, consists of two functional mechanisms: a ribbon feed mechanism and a ribbon reverse mechanism. Included in the ribbon feed mechanism are a right- and left-hand ribbon spool and enough inking ribbon to fill only one spool. The ribbon feed mechanism feeds continuously while the motor is on, causing the inking ribbon to be unwound from one spool and wound onto the other. When the inking ribbon is almost fully wound on one spool, the ribbon reverse mechanism reverses the direction of ribbon feed and begins to transfer the inking ribbon to the empty spool. The ribbon feed and ribbon reverse mechanisms are described in detail in the following paragraphs.

a. *Ribbon Feed Mechanism* The ribbon feed mechanism includes a ribbon feed cam and cam follower, a ribbon feed clutch assembly, and a right- and left-hand ribbon feed assembly mounted on their respective sides of the printer chassis. Both ribbon spools are mounted on respective ribbon spool shaft assemblies. A dog assembly on one or the other of the ribbon feed assemblies is maintained in constant engagement with its mating ribbon spool shaft assembly. In operation, the ribbon feed mechanism functions to advance the inking ribbon a short distance through a ribbon vibrator (guide) (fig. 4-9) each time the ribbon feed cam (fig. 4-8) makes a complete revolution. Power to operate the ribbon feed mechanism is supplied by the ribbon feed cam and the cam follower affixed to the rotating power shaft. The cam follower fits over the ribbon feed cam and is held captive between a flange on the ribbon feed cam and a spacer. A stud mounted on the ribbon feed clutch assembly engages the notch in the cam follower and is held there by an extension spring. The ribbon feed clutch assembly is mounted on the ribbon feed drive shaft and houses a one-way bearing. As the cam follower moves to-the top of its stroke, it moves the ribbon feed clutch assembly counterclockwise permitting the one-way bearing to grip the drive shaft and supply the. power needed to drive the ribbon feed mechanism. As. the cam follower moves downward, it pulls the ribbon feed clutch assembly clockwise permitting the one way bearing to disengage and rotate freely around the derive shaft.

b. *Ribbon Reverse Mechanism* . The ribbon reverse mechanism includes a sensing arm assembly and a left- and right-hand reverse lever. After the inking ribbon is wound almost entirely onto one ribbon spool, the ribbon reverse mechanism reverses the direction of feed. This reversing operation is done automatically by the ribbon reverse mechanism when the last turn of inking ribbon is unwound from the payout spool. As the left-hand ribbon spool empties, an eyelet in the inking ribbon engages a slot in the sensing arm assembly, pivoting the sensing arm assembly counterclockwise until a stud on the sensing arm assembly is disengaged from the reverse lever. The reverse lever is spring-loaded and rotates clockwise until a pin extending from the reverse lever engages the left-hand dog assembly. On the next feed stroke of the ribbon feed drive shaft, the drive shaft is forced to the left by the camming action of the dog assembly against the reverse lever pin. The left-'hand dog assembly thereby engages the left-hand spool shaft, and the empty left-hand spool becomes the driving spool. Thereafter, all feed strokes are used to turn the left-hand spool instead of the right-hand spool. A spring-loaded detent plunger holds the drive shaft in the new lateral position until the inking ribbon feed direction is again reversed.

4-10. Ribbon Lift Mec hanism (fig. 49). The ribbon lift mechanism includes a ribbon lift armature assembly attached to a ribbon lift link, ribbon lift magnet assembly L6, a ribbon lift shaft that mounts a left- and right-hand bracket, and a left- and right-hand lift arm that supports a ribbon vibrator bail. The ribbon vibrator bail supports a ribbon vibrator (guide). In operation, the normal position of the inking ribbon is below the printing line. In order not to obscure the printing, the inking ribbon must be; raised to print each character and must be lowered after printing. When magnet assembly L6 is energized, the: ribbon lift armature assembly and ribbon lift link move downward to move the right-hand bracket, ribbon lift shaft, and left-hand bracket upward. The right- and left-hand lift arms attached to the brackets also move upward and lift the ribbon vibrator (guide) and attached inking ribbon to the printing position. When magnet assembly L6 is de-energiztad, the ribbon vibrator bail drops under its own weight and resets the remainder of the ribbon lift mechanism. An adjustment setscrew is provided in the right-hard frame casting for varying the vertical position of the ribbon guide during alinement .

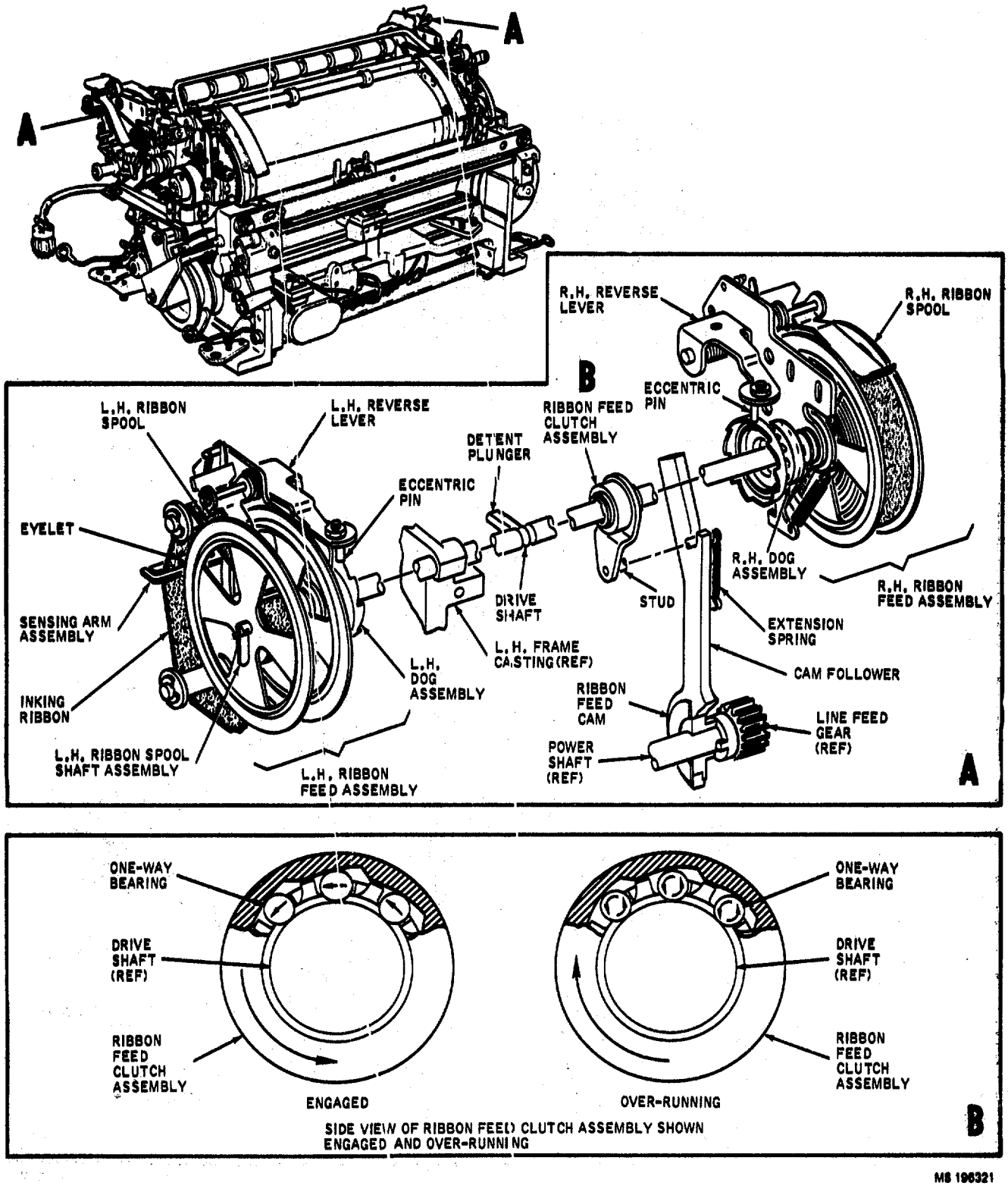


Figure 4-8. Inking Ribbon Mechanism

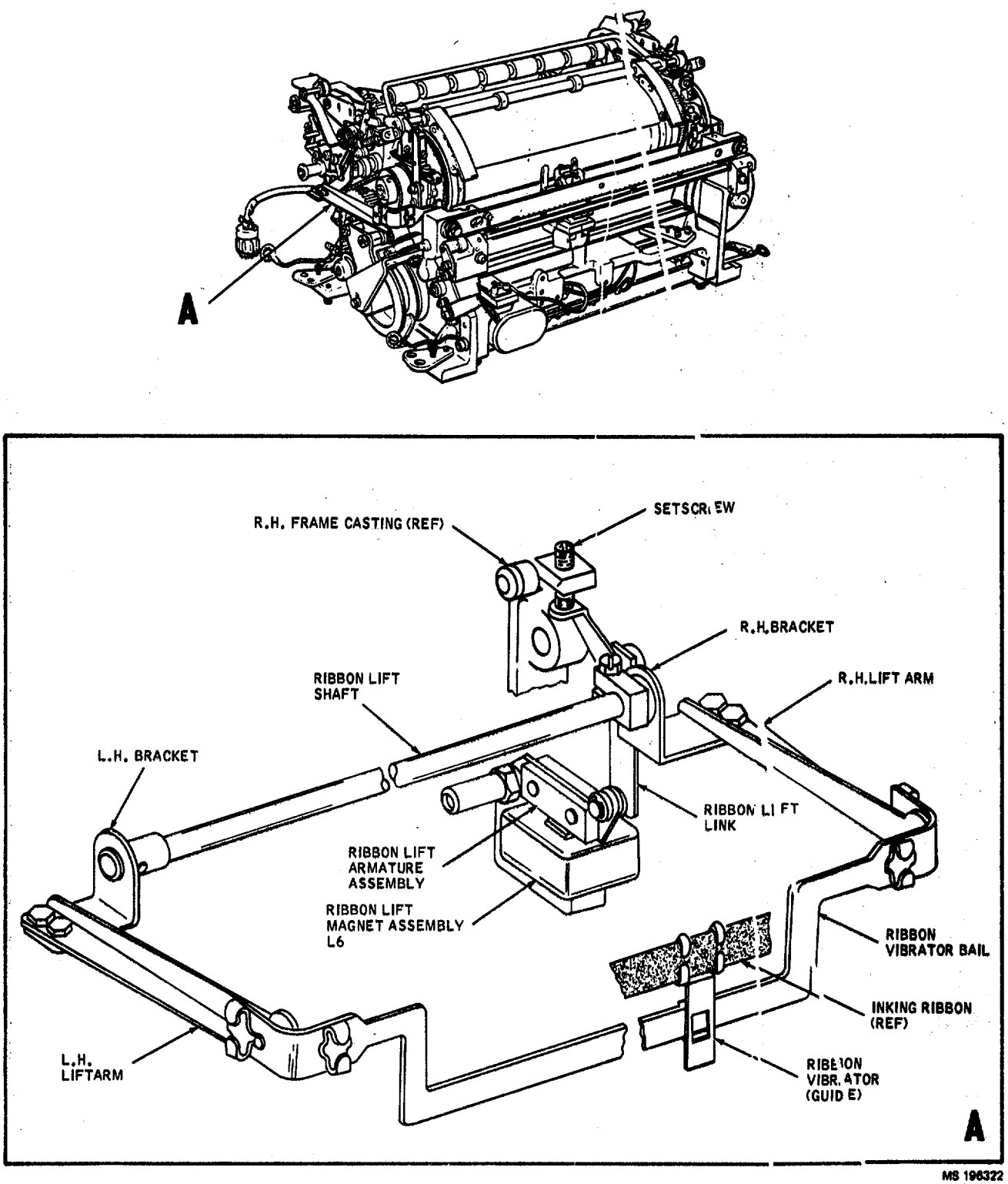
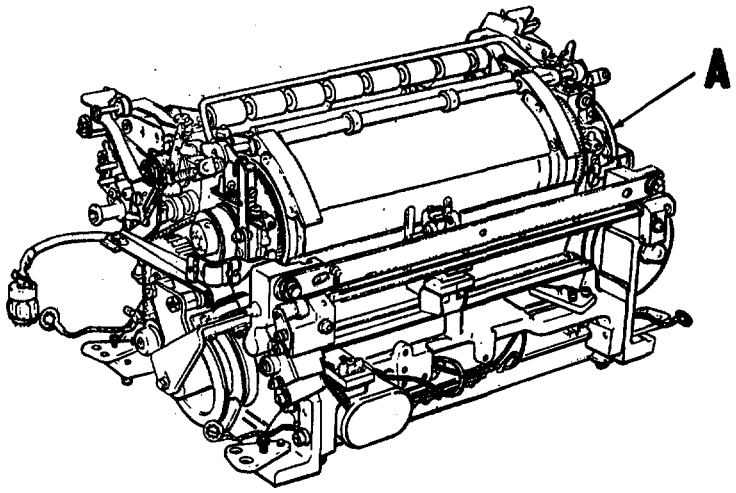


Figure 4-9. Ribbon Lift Mechanism

4-11. Timing Mechanism (fig. 4-10). The timing mechanism is located on the right-hand side of the print drum and consists primarily of a timing plate assembly that holds main clock bobbin assembly L1 and index clock bobbin assembly L2, a timing disk, an adjusting plate, and a cover. The timing mechanism generates the main clock and index clock pulses necessary to synchronize the mechanical and electrical functions of the printer. The function of the main clock pulses is to synchronize the electronic logic circuits within the angular position (64 positions per revolution) of the print drum for every printable character. The index clock functions to synchronize the electronic logic circuits for each revolution of the print drum. The timing disk has 64 main clock teeth located close to its outside diameter and one index clock tooth located closer to its center. The timing disk rotates continuously with the print drum while the timing plate remains fixed. As the 64 main clock teeth on the timing disk pass main clock bobbin assembly L1, 64 main clock pulses, are generated by each revolution of the print drum. The main clock pulses are transmitted to the drum position control circuit (para 4-17) for processing. As the one index clock tooth on the timing disk passes index clock bobbin assembly L2, one index clock pulse is generated by each revolution of the print drum. The index clock pulse is also transmitted to the drum position control circuit.

4-12. Low Paper Sensing Mechanism (fig. 4-11).
The low paper sensing mechanism is located on the left side of the printer chassis to the inside of the left-hand ribbon feed assembly. The low paper sensing mechanism consists of cam actuated sensitive switch S25, a cam, a cam follower, a switch actuator, and two sensing arms (low paper and paper out). When actuated by a low paper supply condition, sensitive switch S25 applies a ground to the alarm circuit (para 4-24) to light PAPER OUT lamp DS4 and sound audio alarm DS3. A low paper condition is detected by two methods for roll paper and one method for fan fold paper. With roll paper, the low paper sensing arm follows the outside diameter of the paper roll while the paper out sensing arm detects the end of the paper. The cam, which is driven by the shaft of the low paper sensing arm, serves two functions. One function of the cam is to actuate sensitive switch S25 by contacting the switch actuator when a low roll paper condition is detected and the other function is to enable or disable the paper out sensing arm. The switch actuator is contacted by a pin located on the cam lobe. The paper out sensing arm is enabled or disabled by a cutout in the cam dwell. With a normal supply of roll paper the cam follower rides on the cam race thus disabling the paper out sensing arm action. With a low paper condition (or with fan fold paper, the absence of a roll of paper), the cutout in the cam is opposite the finger of the cam follower. This enables the paper out sensing arm action so that when a paper out condition exists, the cam follower finger drops into the cam cutout to allow sufficient throw of the switch actuator to actuate sensitive switch S25.



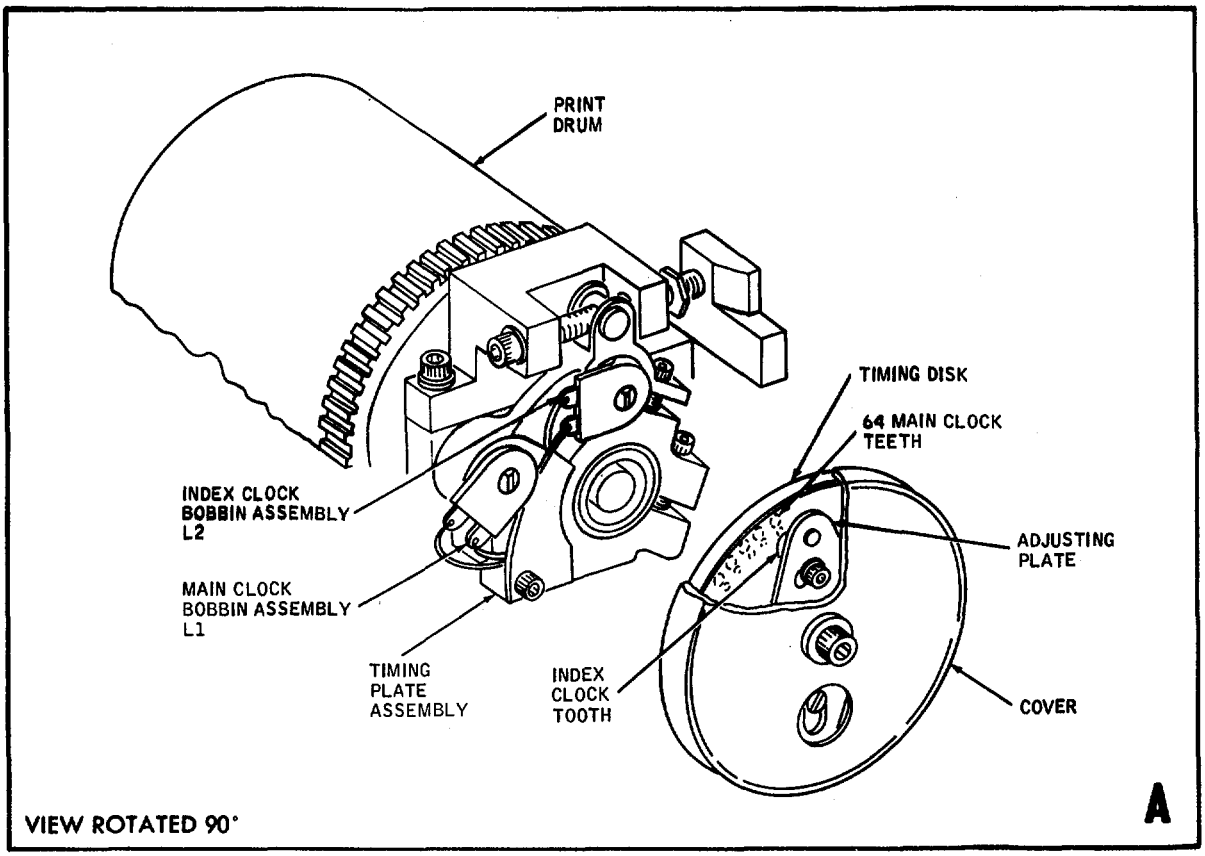


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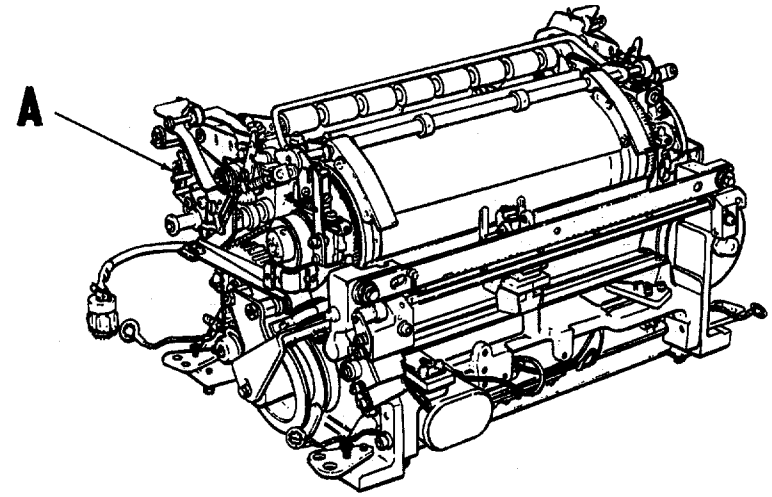
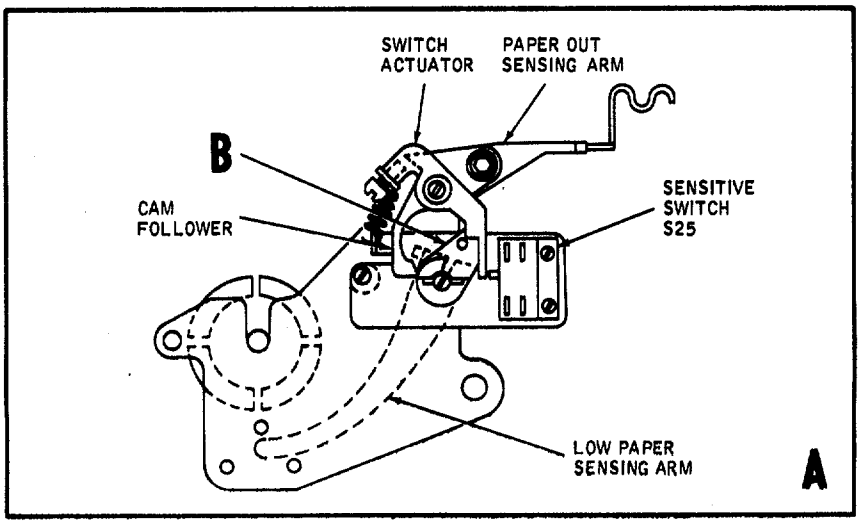
Figure 4-10. Timing Mechanism





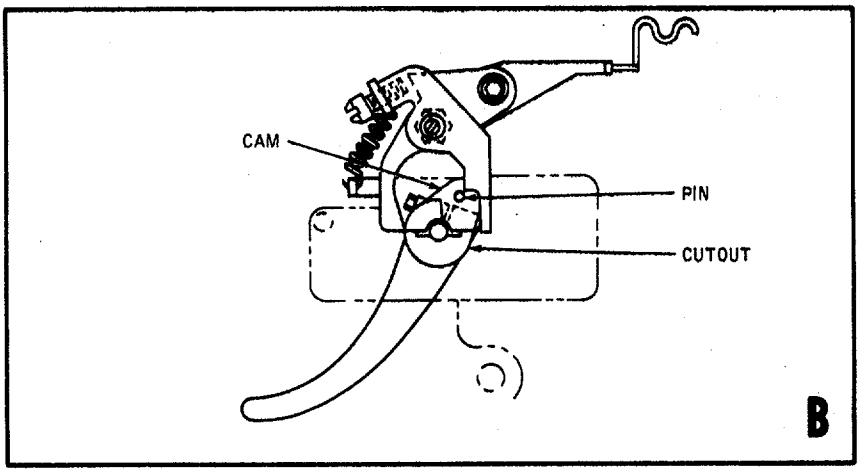


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Figure 4-11. Low Paper Sensing Mechanism

Section III. ELECTRONIC THEORY OF OPERATION

4-13. General. The printer contains 12 major functional circuits consisting of the keyboard circuit, send receive logic circuit, print data decode circuit, drum position control circuit, print hammer control circuit, line space and carriage return circuit, line feed circuit, ribbon lift circuit, motor control circuit, timing and synchronization circuit, alarm circuit, and power supply circuit. The operation and interface of these circuits are described in detail in the following paragraphs.

4-14. Keyboard Circuit (fig. 412). The keyboard circuit is contained on keyboard printed circuit card P102 and ASCII keyboard control circuit card P100. The keyboard circuit functions to convert the keyboard input data (keyboard characters) first to parallel, seven-level ASCII codes, then to parallel, six-level ASCII codes, and to transmit the coded data to the send/receive logic circuit for processing (para 4-15). When a key switch (circuit card P102) is pressed, a transducer, internal to the key switch, codes the character into a code matrix, also internal to the key switch. The of the code matrix is applied to encoders IC7 and IC8 (which generate data bits 1 thru 4 of the character), encoders IC6 and IC9 (which generate data bits 5, 6, and 7 of the character, and an inhibit bit), and to integrated circuit IC5 and associated components (which generate the strobe pulse). The output of encoders IC7 and IC8 (data bits 1 thru 4) is inverted and applied to circuit card P100. The output of encoders IC6 and IC9 (data bits 5, 6, and 7) is applied to control circuitry which inverts bit 5 if the shift key has been pressed. Data bits 5, 6, and 7 are also applied to circuit card P100. A strobe pulse is provided for triggering the transmission of the data bits. The strobe pulse is generated by integrated circuit IC5 and its associated circuitry when a high from the keyboard switch matrix is applied to integrated circuit IC5. Integrated circuit IC5 inverts the strobe pulse and applies it to an electronic monitor detector. Integrated circuit IC5 inverts the strobe pulse again and transmits the high signal to circuit card P100 to clock flip-flop FF1. Circuit card P100 accepts the parallel, seven-level ASCII Coded character when the strobe pulse is applied to flip-flop FF1, and stores the character (data bits 1 thru 7) in data registers RG1 and RG2. Circuit card P100 generates another strobe which transmits the character to the peripheral equipment or to the printer printing mechanism, depending on the moding of the send/receive logic circuit. Circuit card P100 accepts the seventh level of the ASCII code generated by the keyboard printed circuit card, which becomes the sixth level of the code sent to the printing mechanism or on-line to the peripheral equipment (para 4-15). The data bit that was generated as the sixth level is not used except to detect certain codes as explained in paragraphs b and c, below. The data format and code assignments for the keyboard characters are provided in figure 4-3.

a. Data Registers and Strobe Generation. The data from keyboard printed circuit card P102 is applied to data registers RG1 and RG2. When the positive strobe pulse is generated by circuit card P102 it is applied to the clock input of flip-flop FF1 (circuit card P100). The output of flip-flop FF1 switches low and clocks single-shot SS1, provided gates AN1 or AN2 are not low (refer to para b). When single-shot SS1 is clocked, its $\overline{Q}$ output goes low. The low is inverted by inverters IN5 and IN6 which clock the character into the data registers. The low of single-shot SS1 is also applied through the normally closed contacts of REQ SEND switch S4, resetting flip-flop FF1. Pressing REQ SEND switch S4 momentarily inhibits flip-flop FF1, and transmits an SB signal (-12 volts) out connector J2 pin 46, indicating to the peripheral equipment that the printer operator wants to communicate with the system computer. After 33 milliseconds, the Q output of single-shot SS1 switches low and is applied to gate AN5 causing its output to switch high, clocking flip-flop FF2. The D input of flip-flop FF2 is high, provided the keyboard transmission is not inhibited by keyboard INHIBIT switch S6, which applies a low to circuit card P100 pin BB, or by the peripheral equipment, which applies a low to pin AA. If transmission is not inhibited, the Q output of flip-flop FF2 switches high when it is clocked, and is applied to the D input of flip-flop FF3. On the next positive fast clock (FC) transition, flip-flop FF3 is clocked and its $\overline{Q}$ output goes low while its Q output goes high. The Q output of flip-flop FF3 resets flip-flop FF2 and is inverted by inverter IN7 to become the leading edge of the strobe pulse going to transmit moding logic circuit card P97 (send/receive logic circuit, para 4-15). When flip-flop FF2 is reset, its Q output switches low and is applied to the D input of flip-flop FF3. On the next positive FC transition, flip-flopFF3 is clocked back to its normal condition, and its $\overline{Q}$ output goes high, which means the strobe pulse duration is the length of one FC cycle.

b. Transmission Inhibit on SHIFT 0 or SHIFT L.

Since the keyboard generates codes based on seven-level ASCII data, but only six levels are used by the printer or EIA interface, provisions are made to use the codes that would have been SHIFT 0 and SHIFT L (in seven-level ASCII) for the carriage return (CR) and line feed (LF) codes, respectively (para c below). Thus, when the SHIFT key is used with the 0 or L key, the printer must be inhibited from transmitting. This is the function of gates AN1 and AN2 on ASCII keyboard control circuit card P100. When SHIFT 0 is transmitted from the keyboard to circuit card P100, the seven-level code is 1011111, and all inputs to gate AN1 go high causing the output to switch low. This places a low at one of the inputs to gate OR1, whose output switches high, inhibiting the setting of flip-flop FF1. Thus, the data is not clocked into data registers RG1 and RG2,

and no strobe is transmitted out of circuit card P100. Similarly, transmission is inhibited for SHIFT L, for which the seven-level code is 1011100.

c. *Code Change on Carriage Return or Line Feed.* When the keyboard RETURN (CR) or LINE. FEED (LF) key is pressed, the code must be modified to appear the same as the SHIFT 0 or SHIFT L code, respectively, in conformance with the bit code assignment (fig. 4-13). For example, when the RETURN key is pressed, CR detector gate AN3 detects that the seven-level code is 0001101. The output of gate AN3 goes low, placing a low at the B address inputs of data selectors 1 and 2 (Z12 and Z9, respectively). This causes the data selectors to select the C1 inputs for bits 2, 3, 5, and 6 (data bits 1 and 4 remain unchanged). The C1 inputs are tied high, so the code becomes 111111, which is the six-level CR code required. Likewise, if the LINE FEED key is pressed, the code is 0001010 and the output of gate AN4 goes low, placing a low at the A address inputs of the data selectors. This causes the C2 inputs to be selected, and the code becomes 111100, the required six-level LF code. Thus, the LF code transmitted is the same as the SHIFT L code generated by the keyboard when the 6th bit is dropped and replaced by the 7th bit. Likewise, the CR code transmitted is the same as the SHIFT 0 code when the 6th bit is replaced by the 7th bit. For all codes other than CR and LF, the data selector address inputs are all high, causing the C3 inputs to be selected. The C3 inputs are connected to the actual data bit lines from the keyboard, so the codes are transmitted unmodified.

4-15. Send/Receive Logic Circuit (fig. 4-13). The send/receive logic circuit is contained on EIA interface logic circuit card P98, transmit moding logic circuit card P97, and ready/busy receive logic circuit card P95. The purpose of the send/receive logic circuit is to provide interface for the parallel, six-level ASCII data (EIA standard RS-232-C) transmitted between the printer and the peripheral equipment, and to accept the data transmitted to the printer on a ready/busy basis. Data received by the printer is processed by circuit cards P98 and P95, while data sent to the peripheral equipment by the printer is processed by circuit cards P97 and P98. Transmit moding logic circuit card P97 functions to steer keyboard-generated data from the keyboard circuit to either the print data decode circuit (para 4-16) for internal use, or to the peripheral equipment. The send/receive logic circuit functions as described in the following paragraphs.

a. *EIA Interface*. The EIA interface converts the receive and transmit data line signals between levels of EIA standard RS-232-C and TTL-compatible logic levels. The circuit functions as described below. The receive strobe timing pulse for the EIA interface is de-scribed in the timing and synchronization circuit (para4-23).

(1) *Receive data*. Data received by the printer from the peripheral equipment is applied to zener diodes CR22 thru CR25 of EIA interface logic circuit card P98. When the receive data is a printable character (-5 to -20.volts), as opposed to a non-printable character (space, carriage return, or line feed, +4.5 to +19.5 volts), diodes CR22 thru CR25 are reversed biased, dropping 3.3 volts. Therefore, the input voltage to EIA receivers 1 and 2 is -1.7 to -16.7 volts, resulting in a high output of receivers 1 and 2 for a printable character. Conversely, when the data input is a non-printable character (+4.5 to +19.5 volts), diodes CR22 thru CR25 are forward biased, resulting in a low output of EIA receivers 1 and 2. The outputs of receivers 1 and 2 are inverted by gates AN1 thru AN6, provided mode panel ON LINE-PRINTER (off-line) switch S3 is set to ON LINE. With switch S3 set to ON LINE, a low is applied to the input of inverter IN1, enabling gates AN1 thru AN6. The inverted data is then applied to ready/busy receive logic circuit card P95. The output of inverter IN1 is also applied to gate AN9 of EIA interface logic circuit card P98 for timing and synchronization (para 4-23).

(2) *Transmit data.* With ON LINE-PRINTER switch S3 set to ON LINE, transmit moding logic circuit card P97 applies keyboard-generated data to EIA interface logic circuit card P98 (para c). The data applied to the EIA interface is low for a printable character and high for a non-printable character. The data is inverted by inverters IN3 thru IN8, applied to EIA transmitters 1 thru 3, and then transmitted to the peripheral equipment. For a printable character the output of EIA transmitters 1 thru 3 is nominally -8 volts, and for a non-printable character, the output is nominally +8 volts.

b. *Ready/Busy Receive Logic.* The function of the ready/busy receive logic is to accept parallel, six-level ASCII data on a ready/busy basis. The data is received by ready/busy receive logic circuit card P95 from either the peripheral equipment or the keyboard circuit, depending upon the position of ON LINE-PRINTER (off line) switch S3. The receive strobe timing pulse for, the ready/busy receive logic is described in the timing and synchronization circuit (para 4-23).

(1) *Online.* The data which is applied to circuit card P95 from circuit card P98 is inverted by gates OR2 thru OR7. The output of inverter IN9 is low, thereby enabling gates OR2 thru OR7 to invert the data and to apply the data to gates AN3, AN4, AN6, and AN8 thru AN11. Gates AN3, AN4, AN6, and AN8 thru AN11 invert the data again and allow the data to be applied to inverters IN10 thru IN15 provided ON LINE PRINTER switch S3 is in the ON LINE position. With switch S3 set to ON LINE, pin N of circuit card P95 will be low causing the output of inverter IN19 to go high, thereby enabling gates AN3, AN4, AN6, and AN8.

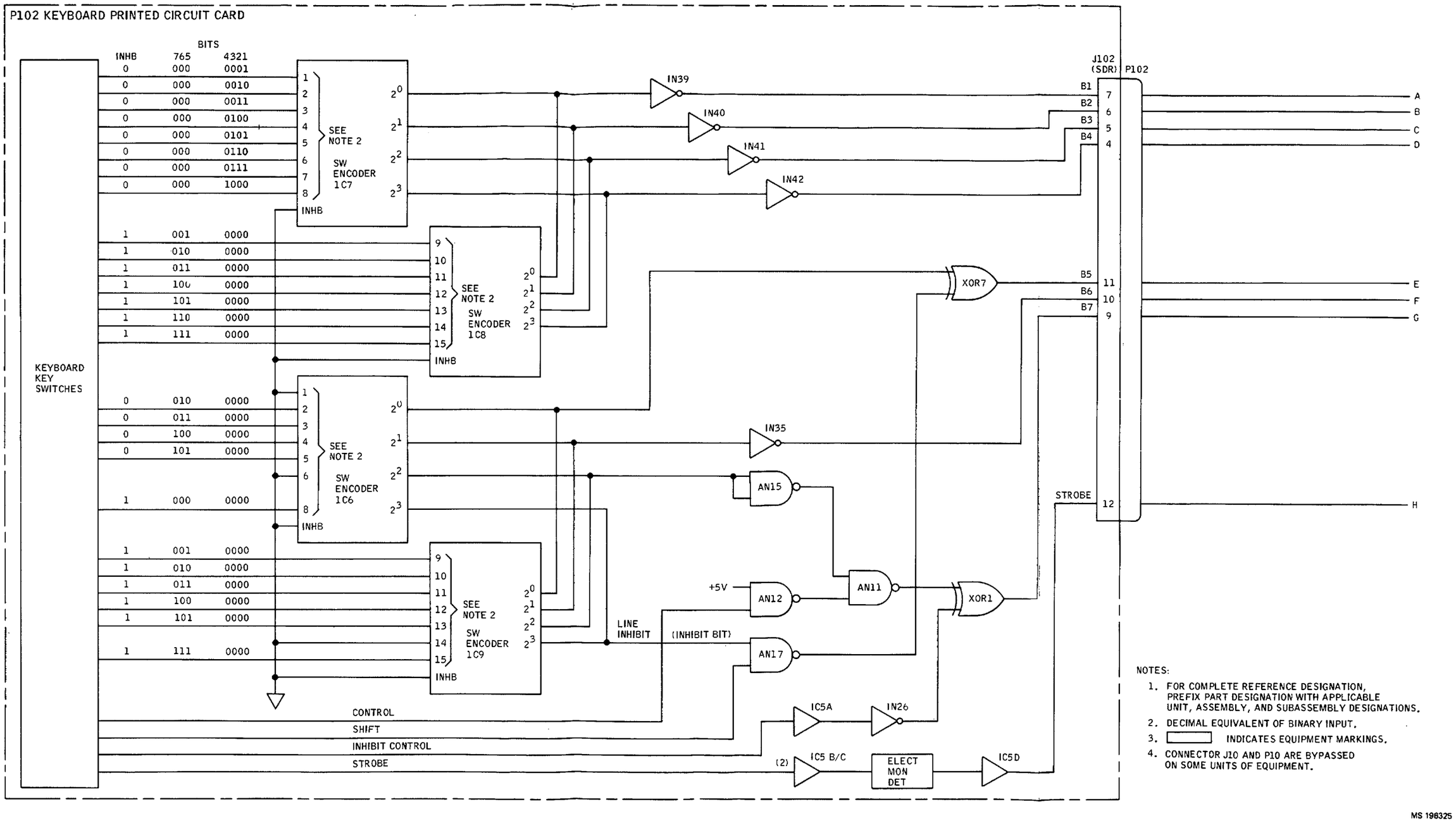


Figure 4-12. Keyboard Circuit Signal Flow Diagram
(Sheet 1 of 2)

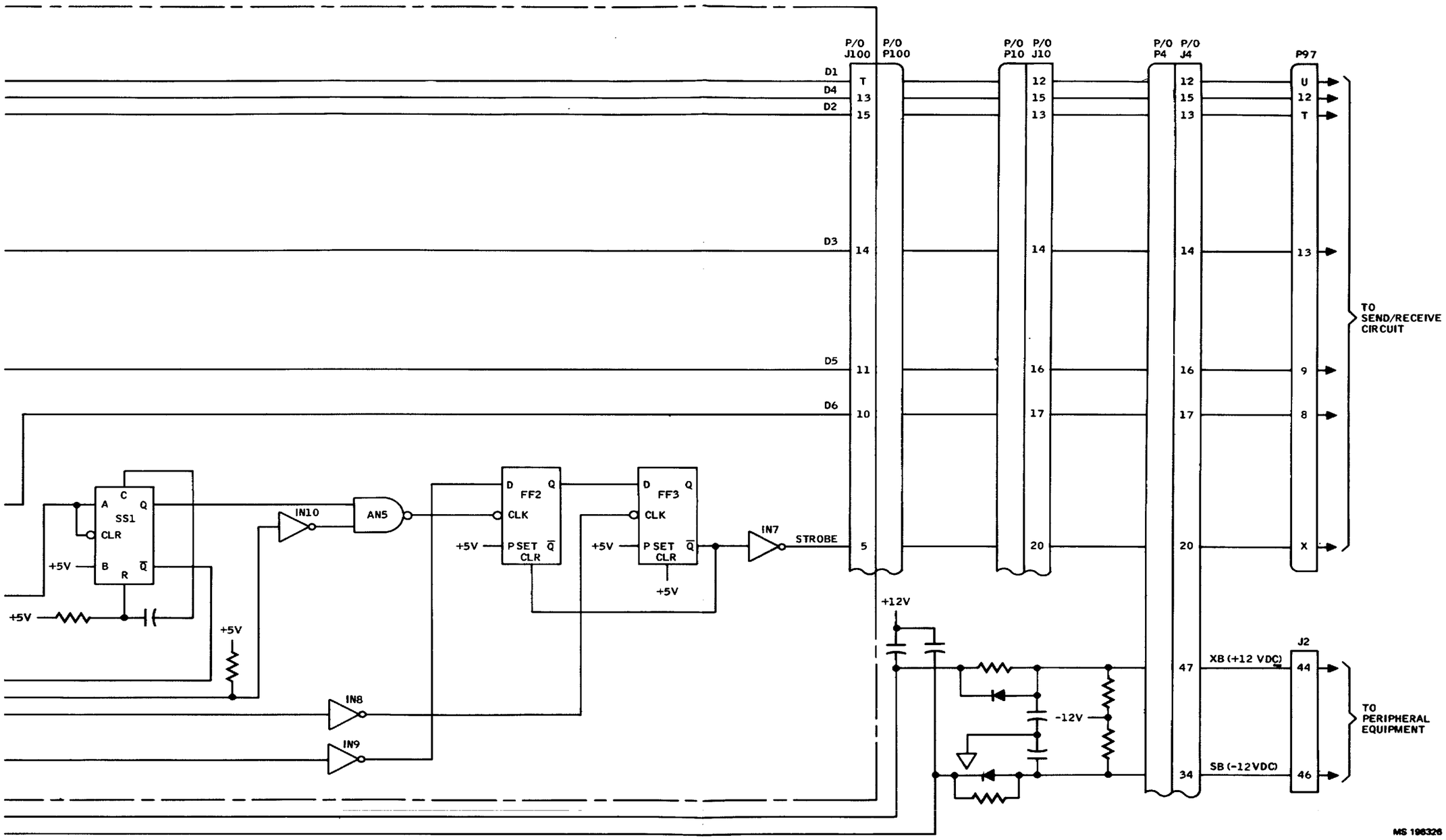


Figure 4-12. Keyboard Circuit Signal Flow Diagram
(Sheet 2 of 2)

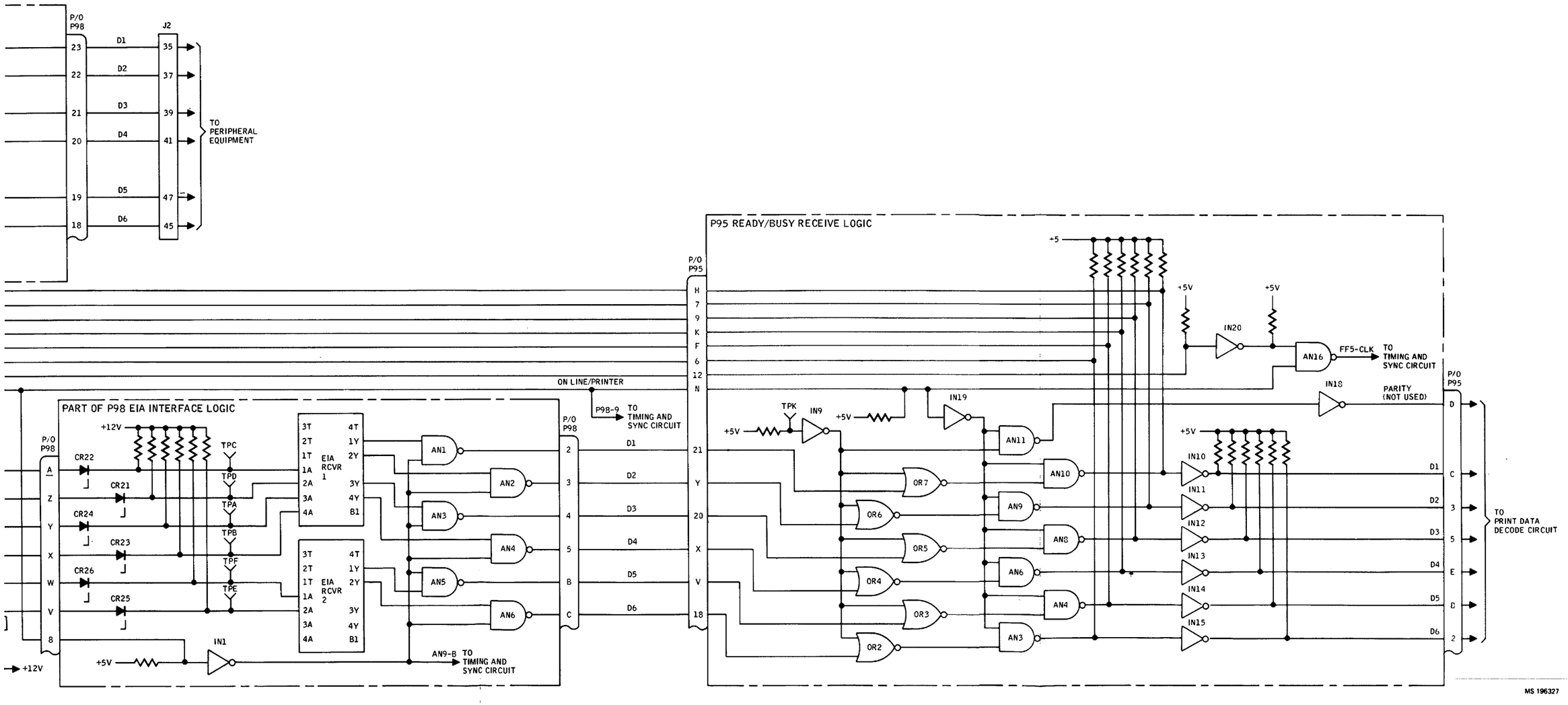


Figure 4-13. Send/Receive Logic Signal Flow Diagram

thru AN11. Inverters IN10 thru IN15 invert the output of these gates and apply the data to the print data decode circuit (para 4-16). The print data decode circuit, however, will not accept or process the data unless a latch clock pulse is generated by ready/busy receive logic circuit card P95 (para 4-23).

(2) Offline. When ON LINE-PRINTER switch S3 is in the PRINTER position (Offline), pin N of circuit card P95 will be high. The high is inverted by inverter IN19 and disables gates AN3, AN4, AN6, and AN8 thru AN1, thereby preventing the peripheral equipment from transmitting data or strobe pulses to the print data decode circuit. With pin N high, gate AN16 is enabled and when a key is pressed on the keyboard, data is applied to pins H, 7, 9, K, F, and 6 of circuit card P95, and a low strobe pulse is applied to pin 12. The strobe pulse is inverted first by inverter IN20 and again by gate AN16, and applied to the timing and synchronization circuit as a low strobe pulse. The data applied to pins H, 7, 9, K, F, and 6 is inverted by inverters IN10 thru IN15 and transmitted to the print data decode circuit (para 4-16) for processing. As with the on-line mode, the print data decode circuit will not accept or process the data unless a latch clock pulse is generated by ready/busy receive logic circuit card P95 (para 4-23).

c. *Printer Transmit Moding*. Transmit moding logic circuit card P97 accepts parallel, six-level ASCII data with the strobe timing pulse from the keyboard circuit, and steers it either to the peripheral equipment or to the print data decode circuit (para 4-16) for input to the printing mechanism. ON LINE-PRINTER (off-line) switch S3 controls where the data will be transmitted.

(1) *Online.* When switch S3 is set to the ON LINE position, pin b of circuit card P97 goes low and disables gate AN57, which prevents the keyboard data from being transmitted to the print data decode circuit. Inverter IN4 inverts the low at pin b enabling gate AN58, thereby providing a high output. When the output of gate AN58 goes high, gates AN50 thru AN56 are enabled and keyboard data is steered to the peripheral equipment.

(2) *0ffline.* When switch S3 is set to the PRINTER (offline) position, pin b of circuit card P97 goes high. When pin b goes high, the output of gate AN58 goes low (because of inverter IN4), thereby disabling gates AN50 thru AN56. Therefore, keyboard data is inhibited from being transmitted to the peripheral equipment. When pin b goes high, gate AN57 goes high and enables gates AN41 thru AN47, which steer keyboard data to the print data decode circuit.

4-16. Print Data Decode Circuit (fig. 4-14). The print data decode circuit is contained on printer control logic circuit card P96. The circuit includes data registers RG1 and RG2, line feed gate (LF) AN32, carriage return (CR) gate AN36, space gate AN37, function detector DEC1, and associated gates AN20, OR14, and AN17. The circuit functions to decode each character that is clocked into data registers RG1 and RG2, and to determine if the character is printable or nonprintable (line feed, carriage return, or space). If the character is decoded as being printable, the print data decode circuit transmits a clock pulse to print flag register FF8, thereby starting a print timing sequence (print hammer control circuit, para 4-18). If the character is nonprintable the print flag register is not clocked, thereby inhibiting a print timing sequence, and the appropriate functional circuit is triggered (line feed, carriage return, or space). When a character is clocked into data registers RG1 (data bits 1 thru 4) and RG2 (data bits 5 and 6), the output of the registers is simultaneously applied to LF gate AN32, CR gate AN36, and space gate AN37 for decoding. The output of the registers is also applied to the drum position control circuit (para 4-17) for use in determining the rotary position of the print drum. The LF, CR, and space gates determine if the character is nonprintable. If the character is printable, it is processed and printed during the next print timing sequence. The operation of the circuit for nonprintable and printable characters is described in the following paragraphs.

a. *Nonprintable Characters (LF, CR, Space).* When a line feed or carriage return nonprintable character is clocked into data registers RG1 and RG2, the appropriate gate (AN32 or AN36) goes low when a high is also applied to the respective gate from the ready/busy register, flip-flop FF4 (timing and synchronization circuit, para 4-23), indicating that the ready/busy register is set to busy. The low output of gate AN32 or AN36 is applied to gate OR17. The output of gate OR17 goes low and is applied to gate AN20. The output of gate AN20 switches high and is applied to gate OR14. The output of gate AN21 is high for a line feed or carriage return code, and is also applied to gate OR14. With both inputs to gate OR14 high, its output goes low, thereby inhibiting the print flag register and delaying the printing operation during the line feed or carriage return operation. The low output of gate AN32 or AN36 is also applied to the line feed circuit (para 4-20) or carriage return circuit (line space and carriage return circuit, para 4-19), to trigger the respective operation. The ready/busy register is reset to its ready condition, through gates AN17 and AN13, after completion of the line feed or carriage return operation (para 4-23). When a space code is clocked into data registers

RG1 and RG2 and when a high is received from the ready/busy register (indicating that the register is busy), the inputs to space gate AN37 are all high. The output of gate AN37 goes low and is applied through gates AN20 and OR14 to the print hammer control circuit (para 4-18), as a low, to inhibit the printing operation by not clocking print flag register FF8. The output of gate AN37 is also inverted by inverter IN13 and applied to the line space and carriage return circuit as a space code detector signal for use in the space operation. The ready/busy register is reset to its ready condition after completion of the space operation.

b *Printable Characters.* When printable characters are clocked into data registers RG1 and RG2, print flag register FF8 is clocked because the character was decoded as not being a line feed, carriage return, or space code. Clocking print flag register FF8 causes a print timing sequence to begin. During the print timing sequence, the character is steered to the appropriate print hammer circuit, processed and printed (print hammer control circuit, para 4-18). After both hammers have printed a character, the auto space circuit is triggered (line space and carriage return circuit, para 4-19), causing the carriage assembly to advance two print positions to the right. In operation, ready/busy register FF4 is reset to its ready condition after the character is stored (if the character is for hammer no. 1) or after both hammers have fired (if the character is for hammer no. 2). Because a line feed, carriage return, or space character is not decoded by gates AN32, AN36, or AN37, respectively, two inputs to gate AN20 will be high when ready/busy register FF4 goes busy. A third high (for one fast clock cycle) is applied to gate AN20 from the timing and synchronization circuit (para 4-23), starting on the first positive transition of the fast clock after ready/busy register FF4 goes busy. With all inputs high, the output of gate AN20 goes low and is applied to gate OR14 causing its output to switch high and clock print flag register FF8, thereby starting the print timing sequence.

4-17. Drum Position Control Circuit (fig. 4-15). The drum position control circuit is contained on printer control logic circuit card P96, and includes main and index clock bobbin assemblies L1 and L2, respectively, the drum position counter (flip-flops FF13 and FF14 and binary counter BC5), and data subtractors AD1 and AD2. The function of the circuit is to calculate the position of the next character on the print drum, to be printed, with respect to the print hammers (print line), and to transmit the character position data to the print hammer control circuit (para 4-18) for the printing operation. In operation, the main and index clocks, which are located on the printer frame, generate low pulses whenever the print drum is rotating (para 4-11). The main clock generates 1 pulse for each character on the drum or 64 pulses per drum revolution, while the index clock generates 1 pulse per revolution. Both the index and main clocks have their pulses amplified by transistors Q1 or Q2, respectively, on circuit card P96. The output of each transistor is applied to Schmidt trigger ST1 or ST2. The outputs of the Schmidt triggers are applied to single-shots SS12 and SS14 which are fired on the negative transition of the Schmidt triggers, and remain active for 60 microseconds. The Q output of single-shot SS12 is transmitted to the print hammer control circuit for initialization of the print timer sequence. The Q output of single-shot SS12 is the trigger input to the first stage of the six-stage drum position counter, which counts from 000000 to 111111 (64 counts). When the index pulse is generated, the Q output of single-shot SS14 resets the first and second stages of the drum position counter, while the Q output resets the third thru sixth stages. The index pulse is generated when the binary zero position on the drum is in the print position, therefore both the drum and the drum position counters are in synchronization with each other. The output of the drum position counter (which is the binary count of the character in the print position) is applied to data subtractors AD1 and AD2. The inverted data output of data registers RG1 and RG2, of the print data decode circuit (para 4-16), is also applied to the data subtractors. The data subtractors add the two inputs, and the output is the difference between what the character is in the print position, and where the new character to be printed is located on the drum. The output of the data subtractors is loaded into the hammer no. 1 or hammer no. 2 counter, of the print hammer control circuit. The hammer counters then count down until they cause the respective hammer to print. The Q output of index clock single-shot SS14 is also inverted by inverter IN27 and applied to the motor control circuit to drive the motor stop counter (para 4-22). One output line of the drum position counter is also applied to the timing and synchronization circuit for line space and carriage return control (para 4-23).

4-18. Print Hammer Control Circuit (fig. 4-16). The print hammer control circuit is contained on printer control logic circuit card P96, and includes printer driver TB1O and right-hand (hammer no. 1) and left-hand (hammer no. 2) magnet assemblies L1O and L9, respectively. The circuit functions to energize magnet assemblies L9 and L10, thereby actuating the respective print hammer when the printing operation is triggered (printable character decoded). The print hammer control circuit on circuit card P96 comprises print flag flip-flop FF8, print timer (flip-flop FF11 and shift register SR1), hammer no. 1 and no. 2 counters (binary counters BC3 and BC4, and BC1 and BC2, respectively), steering register flip-flop FF3, and print detectors 1 and 2 (flip-flops FF12 and FF10, respectively). When a printable character is decoded, the print timer is clocked which triggers the hammer no. 1 and no. 2

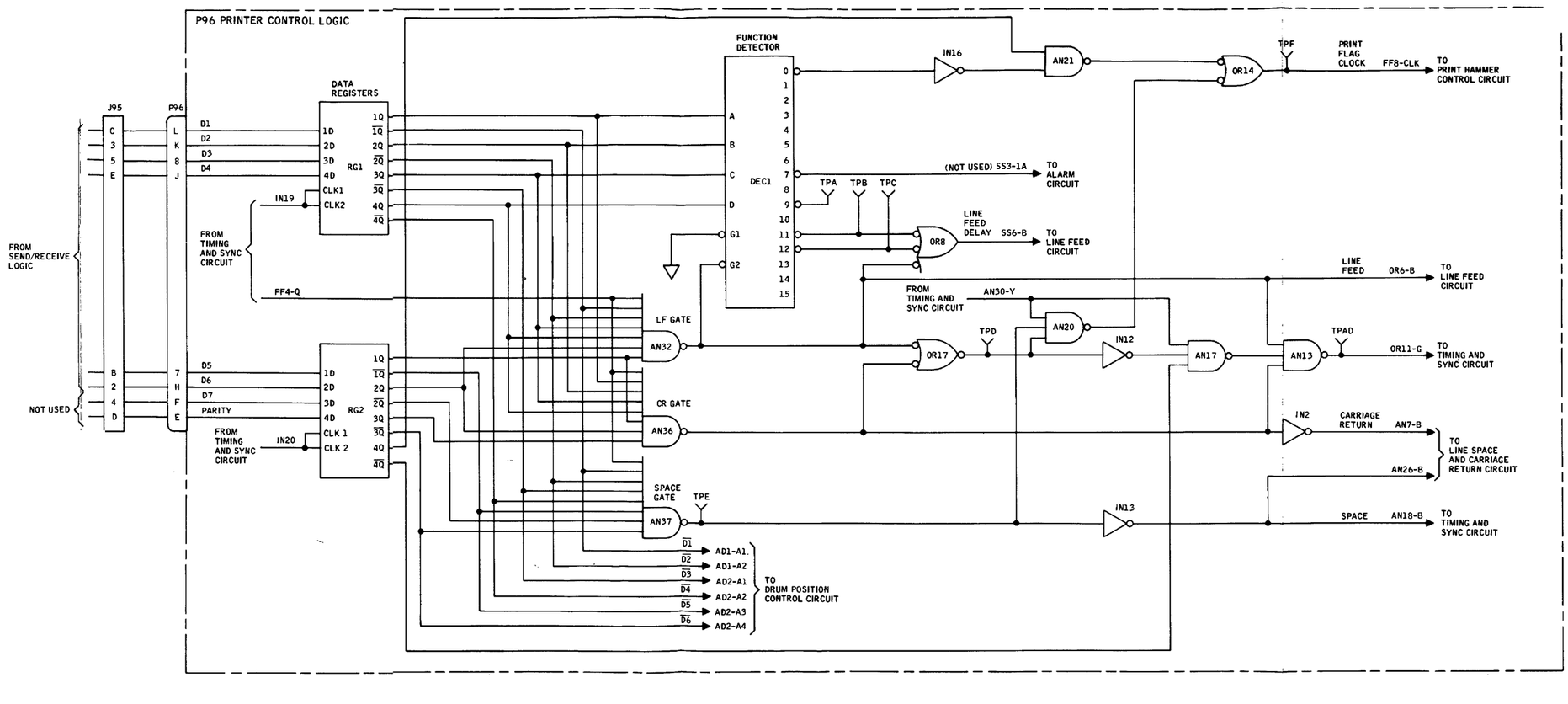


Figure 4-14. Print Data Decode Signal Flow Diagram

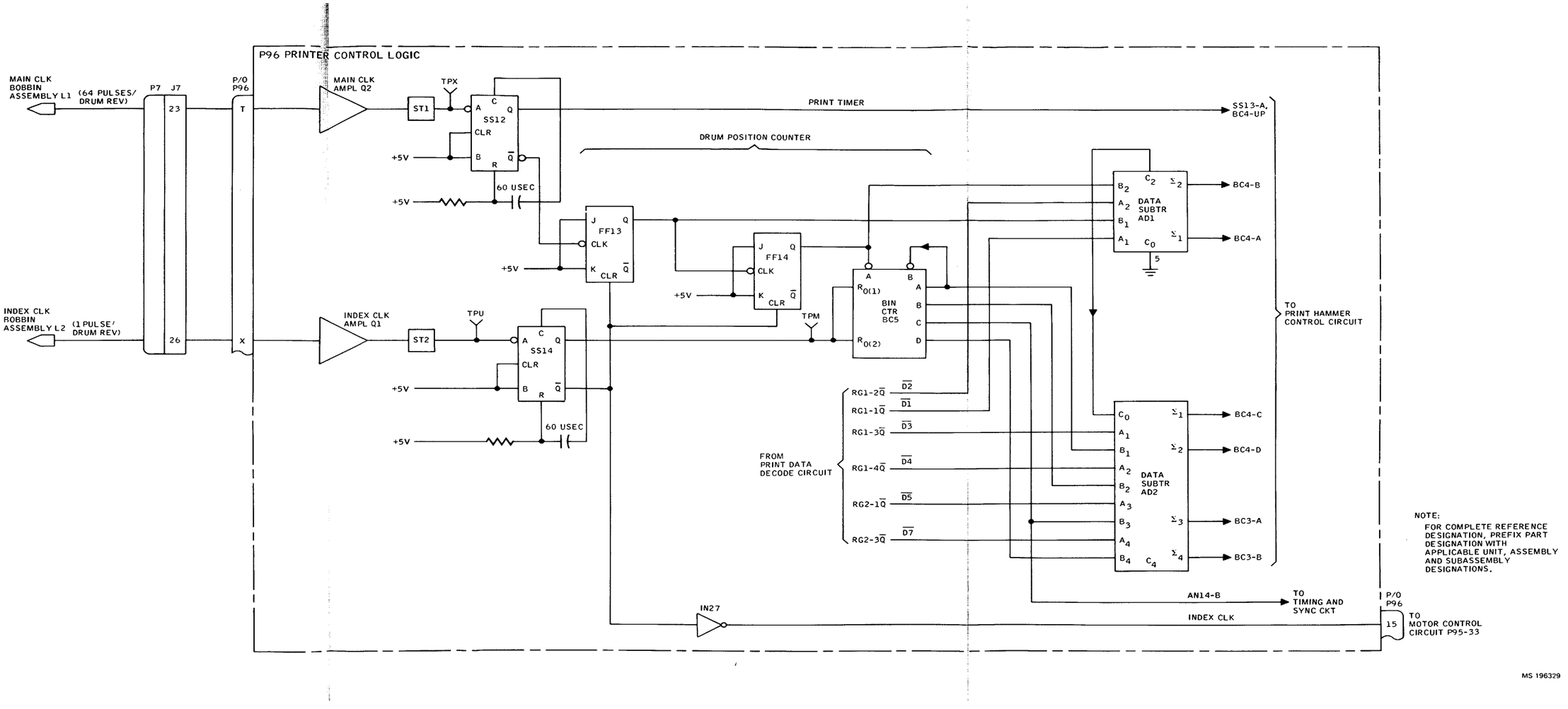


Figure 4-15. Drum Position Control Circuit Signal Flow Diagram

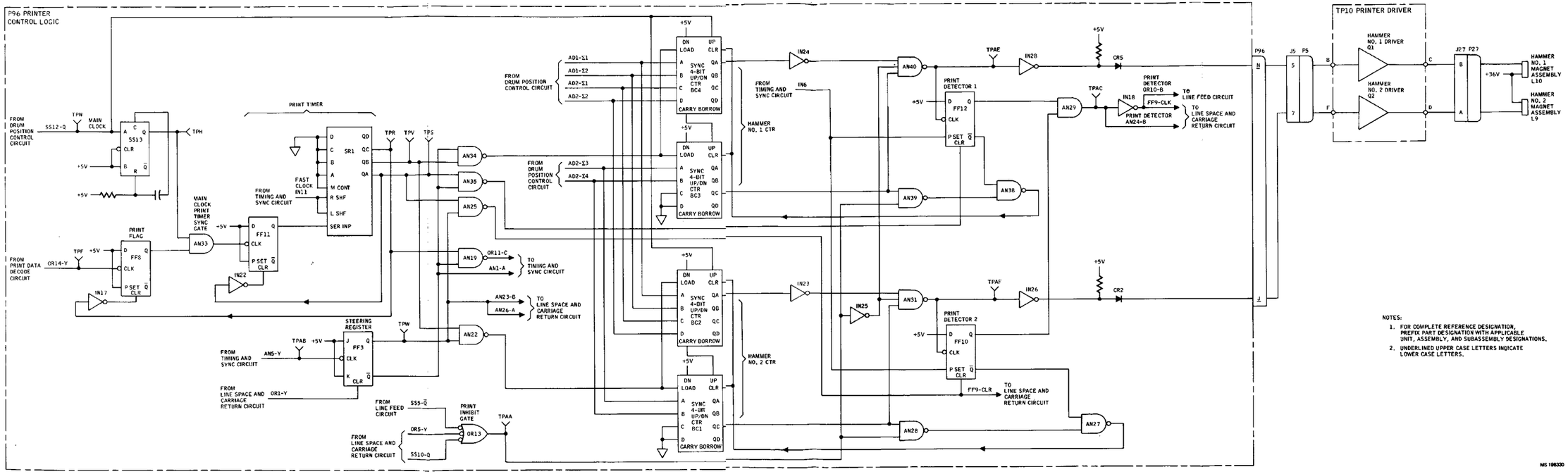


Figure 4-16. Print Hammer Control Circuit Signal Flow Diagram

counters. The counters are loaded with the next character to be printed and, when triggered, will count down and cause the respective hammer to print. The hammer prints when the decoded character on the rotating print drum reaches the print line (print hammers). The count of the hammer counters is a function of the position of the character on the print drum with respect to the print line. The steering register (flip-flop FF3) controls which hammer counter will receive the next character to be printed. In operation, the print data decode circuit (para 4-16) detects a printable character and applies a clock pulse from gate OR14 to print flag flip-flop FF8. When flip-flop FF8 is clocked, its Q output goes high and is applied to gate AN33. On the next main clock pulse from the drum position control circuit (para 4-17), the Q output of single-shot SS13 goes high and is applied to gate AN33. With both inputs to gate AN33 high, its output goes high and triggers the print timer. Gate AN33 thereby functions to synchronize the print timer to the print drum. The high from gate AN33 clocks flip-flop FF11. The Q output of flip-flop FF11 goes high and triggers serial register SR1. The serial register generates three sequential timing pulses (T1 thru T3) for each printable character. The timing pulse (T1, T2, or T3) is generated each time a fast clock pulse is transmitted to serial register SRI from inverter INl1 (timing and synchronization circuit, para 4-23). During time T1, the output of serial register SR1 is: QA high, QB and QC low; during time T2 the output is: QB high, QA and QC low; and during time T3 the output is: QC high, QA and QB low. During time T1 of the print timer sequence, steering register flip-flop FF3 steers the character to the appropriate hammer counter. During time T2, the character is loaded into the counter, the counter counts down, and the respective hammer prints. During time T3, ready/busy register flip-flop FF4 is reset to ready (timing and synchronization circuit) and steering register flip-flop FF3 is clocked to steer one or steer two. Because there are two separate print hammer circuits, each, printable character must be steered to the appropriate hammer; the steering register accomplishes the operation. If the Q output of the steering register is low, the register is in the steer one condition and the next printable character is steered to the hammer no. 1 counter. If the Q output is high, the register is in the steer two condition and the next printable character is steered to the hammer no. 2 counter. After both hammers have printed, the auto space circuit is triggered (which advances the print hammers two spaces to the right), and applies a clear pulse from gate OR1 (line space and carriage return circuit, para 4-19) to reset the steering register to steer one. The state of the steering register is controlled by the output of gate AN5 (timing and synchronization circuit). When the printable character is for hammer no. 1, the steering register is set to steer one, and at time T1 the output of gate AN35 switches low while the output of gate AN25 remains high. The low output of gate AN35 resets print detector 1 flip-flop FF12 (Q output low, Q output high), which enables the print hammer no. 1 control circuitry and effectively cocks hammer no. 1 for printing. The high Q output of flip-flop FF12 is applied to gate AN38 which clears the hammer no. 1 counter. At time T2, with the steering register still set to steer one, the output of gate AN34 goes low while the output of gate AN22 remains high. The low from gate AN34 is applied to the hammer no. 1 counter which enables the character data (from drum position control circuit, para 4-17) to be loaded into the counter. The data loaded is the difference between the character decoded and where the character is located on the print drum. Counting is initiated during time T2, and at the end of the count the counter causes the respective hammer to print unless printing is inhibited by print inhibit gate OR13. At time T3, the QC output of serial register SRI goes high, enables gate AN19, and resets print flag flip-flop FF8 through inverter IN17. When flip-flop FF8 is reset, its Q output goes low which inhibits another print timing sequence from starting until the next printable character is decoded. When gate AN19 is enabled, its output switches low (steering register still set to steer one) and is applied to the timing and synchronization circuit to reset ready/busy register flip-flop FF4 to ready (para 4-23). Also during time T3, a clock pulse is transmitted from gate AN5 (timing and synchronization circuit) to set the steering register to steer two. When the steering register is set to steer two, the next printable character is steered to the hammer no. 2 counter. At time T1, the output of gate AN35 goes high while the output of gate AN25 goes low. The low from gate AN25 resets print detector 2 flip-flop FF10 (Q output low, Q output high), which enables the print hammer no. 2 control circuitry and effectively cocks hammer no. 2 for printing. The high Q output of flip-flop FF10 is applied to gate AN27 which clears the hammer no. 2 counter. At time T2 (steering register still set to steer two), the output of gate AN22 goes low while the output of gate AN34 goes high. The low from gate AN22 is applied to the hammer no. 2 counter which enables the character data to be loaded into the counter. Counting is initiated during time T2 and at the end of the count, the counter causes the respective hammer to print unless printing is again inhibited by gate OR13. At time T3, the QC output of serial register SRI goes high and resets print flag flip-flop FF8. Gate AN19 is disabled (because steering register is set to steer two), therefore, ready/busy register FF4 is not reset to ready, and the steering register is not reset to steer one. The registers are not reset until both hammers have printed, at which time the auto space circuit is triggered (line space and carriage return circuit). When triggered, the auto space circuit applies a clear pulse through gate ORI to reset the steering register to steer one. At the same time, the auto space circuit resets

ready/busy register FF4 to ready. Both hammer no. 1 and no. 2 counters are the same and function in the following manner to trigger the respective print hammer. During time T2, the character data is loaded into either the hammer no. 1 or hammer no. 2 counter, depending upon the state of steer register FF3. The counter then counts from the binary number entered into the counter to 1000000, at which time the QA output of the counter goes high, is inverted, and applied to either gate AN40 or AN31. The output of the gate goes low for one main clock pulse, provided a high is not transmitted from print inhibit gate OR13. A high from gate OR13 ;indicates that one of the functions (line feed, carriage return, or space) is still being performed and printing must be inhibited. The low output of gate AN40 or AN31 is applied to printer driver TBIO to turn on hammer driver transistor Q1 or Q2, respectively. When the transistor conducts, a ground is provided for the +36 volts applied to the coil of the respective magnet assembly L1O or L9, and the respective hammer prints. If printing is inhibited by gate OR13 at count 1000000, the output of gate AN39 (hammer no. 1) or gate AN28 (hammer no. 2) goes low and resets the appropriate counter through gate AN38 or AN27, respectively, and the count is re-initiated. Gate AN29 monitors the print detectors to see when both have been reset, which indicates that the respective hammer has printed. When the hammers have printed, the Q output of both print detectors will be high causing the output of gate AN29 to switch high. The high from gate AN29 is applied to the line feed circuit (para 4-20) and to the line space and carriage return circuit to indicate that both print hammer circuits are reset.

4-19. Line Space and Carriage Return Circuit (fig. 4-17). The line space and carriage return circuit is contained on printer control logic circuit card P96 and includes mode panel CR switch S1, right- and left-hand margin switches S19 and S21, respectively, printer driver TB1O, carriage return magnet assembly L11, and space magnet assembly L3. The circuit functions to energize space magnet assembly L3 or carriage return magnet assembly L11 (both part of printing mechanism, para 4-8) whenever the appropriate circuit is triggered (line space or carriage return). The operation of these circuits is described in detail in the following paragraphs.

a. *Line Space.* The line space circuit functions to actuate the printing mechanism, which advances the carriage assembly (print hammers) two spaces to the right when auto space single-shot SS8 is triggered or when a space code is decoded and steered to hammer no. 2. Auto space single-shot SS8 is triggered after both print hammers have printed, thereby requiring a space operation before the hammers can again print. When print detectors 1 and 2 detect that both hammers have printed (print hammer control circuit, para 4-18), inverter IN18 applies a low clock pulse to auto space flip-flop FF9. The Q output of flip-flop FF9 goes low and clocks auto space single-shot SS8. The Q output of single-shot SS8 goes low and is applied to gate OR16. If either input to gate OR16 is low, the space circuit (space drive single-shot SS9) is triggered. The second input to gate OR16 is low from gate AN24 when a space code is decoded and steered to the hammer no. 2 counter (print hammer control circuit). When a space code is steered to the hammer no. 2 counter, the hammer no. 2 printing operation is inhibited and the carriage assembly is immediately advanced two spaces to the right after hammer no. 1 prints, thereby reducing the overall printing time of the printer. When a space code is detected, inverter IN13 (print data decode circuit, para 4-16) applies a high to gate AN26. The second input to gate AN26 is high when steering register FF3 is set to steer two (print hammer control circuit), indicating that a space code has been steered to the hammer no. 2 counter. With both inputs to gate AN26 high, its output switches low and is inverted by gate OR15 and applied to gate AN24. A second high is applied to gate AN24 by gate AN29 (print hammer control circuit), indicating that the print hammers are reset which is required for a line space operation. With both inputs to gate AN24 high, its output switches low and is applied to gate OR16 to trigger the space drive circuit. Gate OR15 also applies a high to gate AN24 when a low is applied to the input of gate OR15 by gate AN23. Gate AN23 applies a low to gate OR15 when both inputs to gate AN23 are high. Both inputs to gate AN23 are high when steering register FF3 is set to steer two (hammer no. 2 counter loaded with space code) and when a low timing pulse is transmitted from gate AN14 (timing and synchronization circuit, para 4-23). With either input to gate OR16 low, its output goes low and triggers space drive single-shot SS9, which simultaneously triggers space inhibit single-shot SS10. Single-shot SS9 remains active for 5 milliseconds, during which time its low Q output is inverted by inverter IN22 and applied to printer driver TB1O to turn on transistor Q7. When transistor Q7 conducts, a ground is provided for the +36 volts applied to space magnet assembly L3, thereby energizing magnet assembly L3 which actuates the line feed mechanism. When single-shot SS9 goes active, space inhibit single-shot SS10 goes active for 30 milliseconds, during which time its Q output goes low and is applied to gate OR13 (print hammer control circuit). The low applied to gate OR13 inhibits printing during a space operation. At the end of the active time of single-shot SS10, its high Q output switches low and triggers space delay single-shot SS11. The Q output of single-shot SS11 applies a high for 32 microseconds to gates AN16 and ANI (timing and synchronization circuit) to reset ready/busy and steer registers FF4 and FF3, respectively, at the end of the space operation. The time delay is provided to allow sufficient time for the printing mechanism to mechanically reset at the end of a space operation.

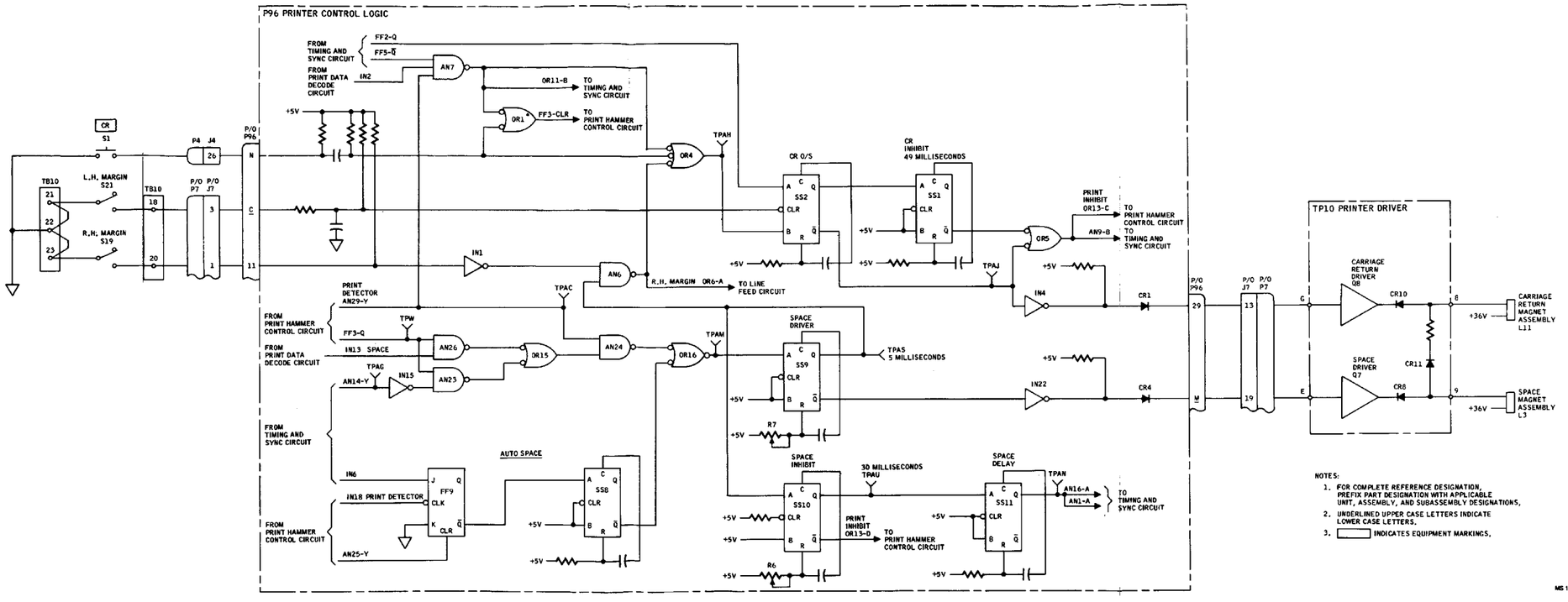


Figure 4-17. Line Space and Carriage Return Circuit Signal Flow Diagram

b. *Carriage Return.* The carriage return circuit functions to actuate the printing mechanism, which causes the carriage assembly to return to the left-hand margin of the print (rum when a carriage return code is decoded or when mode panel CR (carriage return) switch S1 or right-hand margin switch S19 are actuated. When a carriage return code is decoded, a high is applied to gate AN7 from inverter IN2 (print data decode circuit, para 4-16). A second high is applied to gate AN7 by gate AN29 (print hammer control circuit, para 4-18) indicating that the print hammers are not cocked for printing; a carriage return operation is inhibited if the hammers are cocked. The third high required to enable gate AN7 is applied from the Q out-put of flip-flop FF5 (timing and synchronization circuit, para 4-23) indicating that the ready/busy register is reset to ready for a new operation. With all inputs to gate AN7 high, its output switches low and triggers gate OR4. If any input to gate OR4 is low, the carriage return circuit (carriage return single-shot SS2) is triggered. The low output of gate AN7 is also applied to gate OR11 (timing and synchronization circuit) to set ready/busy register flip-flop) FF4 to busy, and through gate OR1 to reset steering register flip-flop FF3 to one (print hammer control circuit). A low is also applied to gate OR4 when CR switch S1 is actuated by the operator, or when right-hand margin switch S19 is actuated (printing mechanism, para 4-8), indicating that the carriage assembly has reached the right-hand margin of the print drum. With any input to gate OR4 low, carriage return single-shot SS2 is triggered, provided a ready/busy register ready signal (high) is transmitted from flip-flop FF2 (timing and synchronization circuit). When single-shot SS2 is triggered, its low Q output is inverted by inverter IN4 and applied to printer driver TB1O to turn on transistor Q8. When transistor Q8 conducts, a ground is provided for the +36 volts applied to the coil of carriage return magnet assembly L11, thereby energizing magnet assembly L11 and actuating the carriage return mechanism. The low Q output from single-shot SS2 is also applied thru gate OR5 to gate OR13 (print hammer control circuit) and to gate AN9 (timing and synchronization circuit) to inhibit printing and to inhibit resetting the ready/busy register to ready, respectively, during the carriage return operation. When the carriage assembly is returned to the left-hand margin, the left-hand margin switch S21 is actuated, thereby applying a low to clear carriage return single-shot SS2 and reset the circuit. When single-shot SS2 is cleared, its Q output goes low and triggers carriage return inhibit single-shot SS1. Single-shot SS1 remains active for 49 milliseconds, during which time its low Q output is applied through gate OR5 to gate AN9 (timing and synchronization circuit) to inhibit the resetting of' ready/busy register, FF4 to ready during the period. The low Q output is also applied to gate OR13 (print hammer control circuit) to inhibit printing. The printing operation is inhibited for the 49-millisecond(period to allow sufficient time for the carriage mechanism (printing mechanism) to mechanically reset.

4-20. Line Feed Circuit (fig. 4-18). The line feed circuit is contained on printer control logic circuit card P96, and includes printer driver TB10 and line feed magnet assembly L5. The circuit functions to actuate the line feed mechanism (part of paper handling mechanism, para 4-7) whenever a line feed code is detected by the print data decode Circuit (para 4-16), whenever mode panel LF switch S2 is actuated, or whenever the line space and carriage return circuit detects that the printer carriage has reached the right-hand margin (para 4-19). Actuating the line feed mechanism causes the printer paper to advance vertically against the print drum. During a line feed operation, the printing operation (print timer) must be inhibited. The print data decode circuit accomplishes this by inhibiting the print timing sequence whenever it detects a line feed code (para 4-16). In operation, whenever the carriage has reached the right-hand margin or a line feed code is detected. a low is applied to gate OR6. Gate OR6, in turn, applies a low to gate OR7, which applies a high to gate AN 15. The output of gate AN15 will be low provided the output of gate ORIO is high. The output of gate OR10 will be high when a low is applied to its input by the print hammer control circuit (para 4-18), indicating that the print detectors (print hammer control circuit) are not cocked, thereby enabling the line feed circuit. When the print detectors are cocked, a printing operation is occurring which inhibits a line feed until after the hammers have printed. With both inputs to gate AN15 high, its output will go low triggering line feed single-shot SS4. When single-shot SS4 is triggered. the Q output will go low for 6 milliseconds. The low output is inverted by inverter IN9, which turns on printer driver TB10 transistor Q6. When transistor Q6 conducts, a ground is provided for the +36 volts applied to the coil of line feed magnet assembly L5, thereby energizing magnet assembly L5 and actuating the line feed mechanism. At the end of the 6-millisecond active state of single-shot SS4, its Q output goes low and triggers line feed inhibit single-shot SS5. .Single-shot SS5 will remain active for 49 milliseconds, during which time its output will be low, disabling line feed single-shot SS4 (line feed operation) and inhibiting printing through print inhibit gate ()R1:3 (print hammer control circuit (para 4-18). The line feed and printing operations are inhibited for the 49-millisecond period to provide sufficient time for the line feed mechanism to reset. The low Q output of single-shot SS5 is also applied through a time delay to trigger line feed delay single-shot SS6. When single-shot SS6 is triggered, it will go active for 3.2 microseconds if its B input is high. The B input of single-shot SS6 will be high if the print

data decode circuit detects , a line feed code. When single-shot SS6 is triggered, its Q output goes high and is applied to gate AN10. The output of gate AN10 goes low and is applied to ready/busy reset gate OR11 (timing and synchronization circuit, para 4-23), which resets the ready/busy circuit to reply, indicating that the line feed operation is complete. Flip-flop FF7 is clocked when the line feed mechanism is disabled (single-shot SS4 Q output goes high), and functions to clear line feed delay single-shot SS6 after the ready/ busy reset signal has been transmitted. The paper can be advanced vertically within the printer also by LF switch S2. The paper can be advanced either one line at a time or slewed depending on the setting of switch S2: the up (LF) position slews the line feed, while the down (blank) position advances the line feed one line. If switch S2 is set to the down position, a single low pulse is applied to gate OR7 and the line feed circuit functions as described above. If switch S2 is set to LF, a low is applied to the input of gate OR3 causing its output to switch high, activating the RC network to the input to gate OR7. The RC network applies a series of low pulses to the input of gate OR7 as long as switch S2 is held in the LF position. The output of gate OR7 switches high each time a low is applied to its input, and the line feed circuit functions as described above.

4-21. Ribbon Lift Circuit (fig. 419). The ribbon lift circuit is contained on a ready/busy receive logic circuit card P95, and includes printer driver TBl0 and ribbon lift magnet assembly L6. To avoid smearing the print, the normal position of' the inking ribbon is below the printing line of the print hammers and must be lifted for printing and lowered after the hammers have printed and retracted. The ribbon lift circuit energizes magnet assembly L6 which actuates the ribbon lift mechanism (para 4-10), thereby lifting the ribbon for the printing operation. Assuming the ribbon is in the lowered position and retriggerable single-shots SS1 and SS2 (circuit card P95), are not active, single-shot SS1 is triggered when the negative-going strobe pulse from the timing and synchronization circuit (4-23) is applied to pin A of single-shot SS1. The Q output of single-shot SS1 goes low for 170 milliseconds, which triggers single-shot SS2. The Q output of single-shot SS1 is also inverted by inverter IN4. The high output of' inverter IN4 is applied to the base of transistor Q3 of printer driver T1310. Transistor Q3 conducts, thereby supplying a ground for the +36 volts applied to the coil of magnet assembly L6. Magnet assembly L6 is energized and the ribbon is raised to the printing position. Due to a slight mechanical delay in raising the ribbon. printing must be delayed until the ribbon is in the printing position. The delay is provided when single-shot SS2 is triggered. The output of single-shot SS2 goes low for 40 milliseconds each time the Q output of single-shot SSI make a negative transition. The Q output of single-shot *SS2* is applied to the timing and synchronization circuit to disable gate AN5 (para 4-23), which prevents a latch clock pulse from being generated during the 40-millisecond period, thereby delaying the printing operation. The time delay provides the time necessary to raise the ribbon to the printing position. The 170-millisecond low pulse from single-shot SS1 is also applied to the motor control circuit (para 4-22) for resetting the motor stop counter.

4-22. Motor Control Circuit (fig. 4-20). The motor control circuit is contained on ready/busy receive logic circuit card P95, and includes printer driver TB10, relay K1, and motor B1. The motor control circuit functions to turn off motor B1 after a 90-second period has elapsed from which a print command was generated or the mode panel MOTOR START switch was pressed. The purpose of turning off the motor is for equipment cooling and reduced wear of the printer components. The motor control circuit utilizes a 90-second motor stop counter comprised of binary counters BC1 thru BC3. The motor stop counter is driven by the clock pulse output of the index clock (para 4-11). An index clock pulse is generated by the index clock for each revolution of the print drum and applied to gate AN13. The initially low output of gate AN12 is also applied to gate AN13, which provides a high (output to start the counter. The counter continues for a 90-second period and then applies a low to both inputs of gate AN12, assuming the counter has not been reset to zero during the period by gate AN15. The high output of gate AN12 is inverted by inverter IN1, turning off transistor Q4 of printer driver TB10. When transistor Q4 is turned off, the ground for the +12 volts applied to the coil of relay K1 is removed. Relay K1 is deenergized, removing the 115 vac applied to motor B1, and the motor is turned off. Gate AN1S applies a high to the reset input of' binary counters BC1 thru BC3. resetting the motor stop counter (thereby preventing motor B1 from being turned off), whenever MOTOR START switch S5 is pressed or a low is received from the Q output of single-shot SS1. A low from single-shot SSI (ribbon lift circuit, para 4-21) is transmitted whenever the ribbon lift mechanism is actuated, indicating that a print command has been generated. The output of' the motor stop counter is also applied to single-shot SS3. The Q output of single-shot SS3 is applied to gate AN, of the timing and synchronization circuit (para 4-23) for generation of the latch clock pulse.

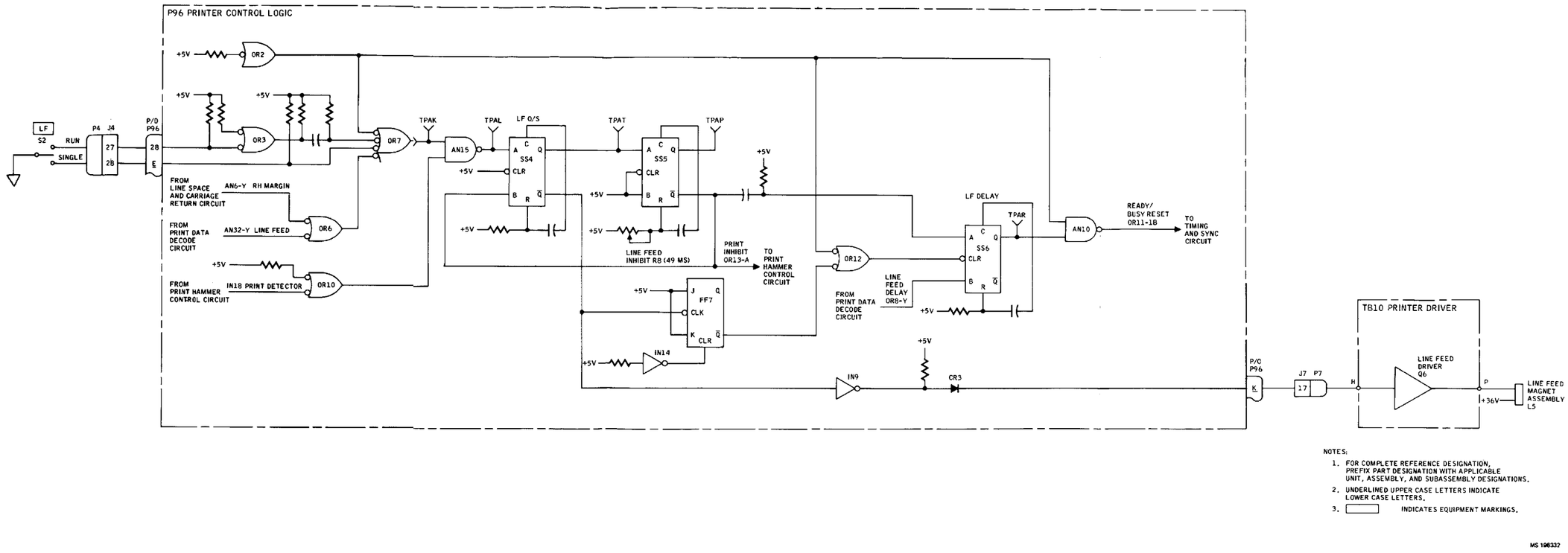


Figure 4-18. Line Feed Circuit Signal Flow Diagram

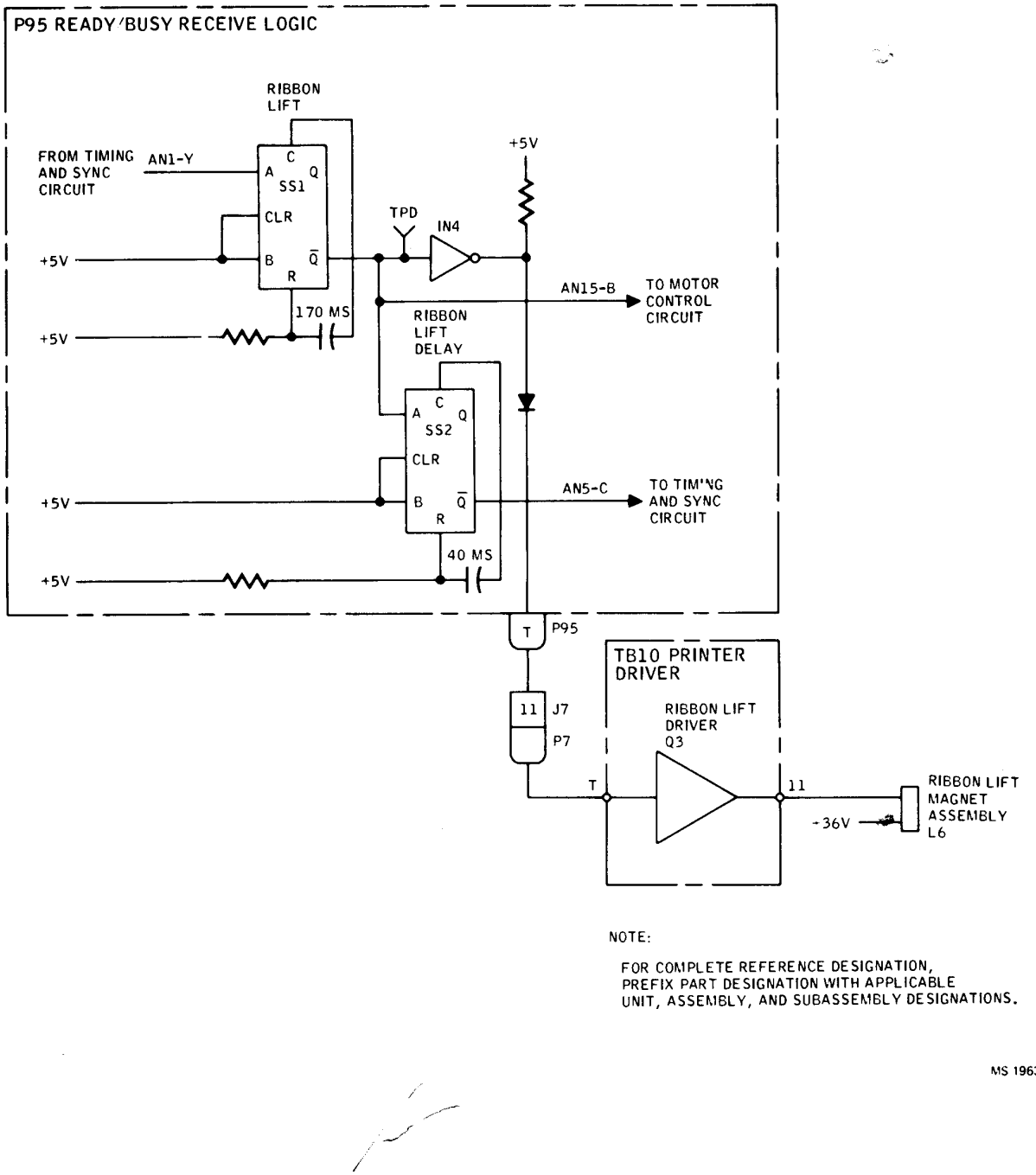
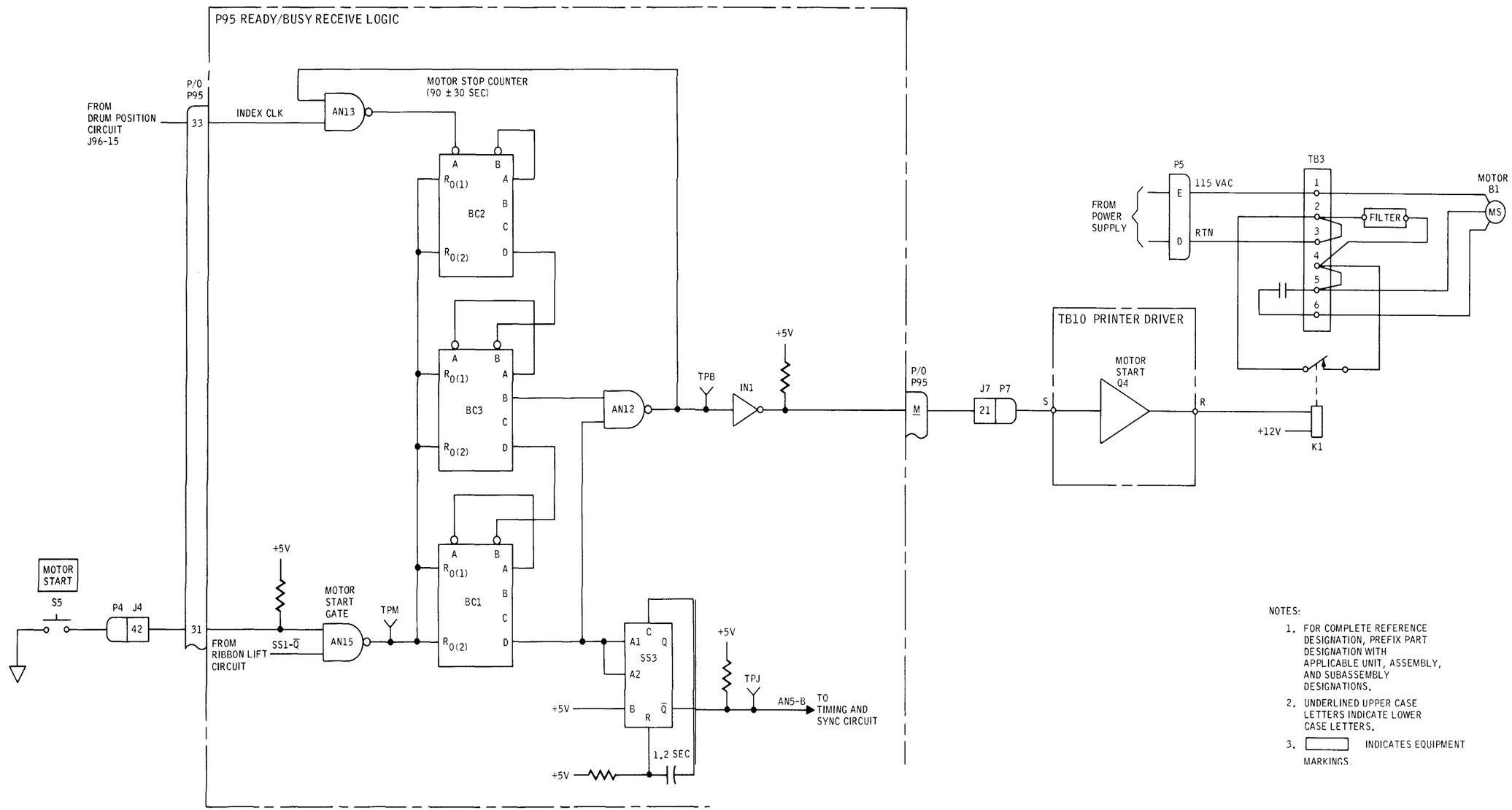


Figure 4-19. Ribbon Lift Circuit Signal Flow Diagram



NOTES:

1. FOR COMPLETE REFERENCE DESIGNATION, PREFIX PART DESIGNATION WITH APPLICABLE UNIT, ASSEMBLY, AND SUBASSEMBLY DESIGNATIONS.
2. UNDERLINED UPPER CASE LETTERS INDICATE LOWER CASE LETTERS.
3. ▭ INDICATES EQUIPMENT MARKINGS.

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Figure 4-20. Motor Control Circuit Signal Flow Diagram

4-23. Timing and Synchronization Circuit (fig. 4-21). The timing and synchronization circuit is contained on ready/busy receive logic, printer control logic, and EIA interface logic circuit cards P95, P96, and P98, respectively. The circuit functions to synchronize the operations of the electronic and mechanical mechanisms of the printer and to generate the various timing pulses necessary for triggering the operations. The circuit includes the fast clock oscillator (timer Y1 and flip-flop FF1, circuit card P95), the latch clock (flip-flops FF5 and FF6, circuit card P95), the ready/busy register (flip-flop FF4, circuit card P96), and steering register control gate AN5 (circuit card P96).

a. *Fast Clock Oscillator.* The fast clock oscillator (circuit card P95) functions to generate the electronic timing pulses required for the printer operation. The first stage of the fast clock oscillator includes a free- running multivibrator made up of timer Y1 and the associated RC network. The frequency output of the multivibrator is 40 kHz (25 microseconds/cycle) which clocks flip-flop FF1. Flip-flop FF1 divides the 40-kHz multivibrator output by two to generate the fast clock (FC) timing pulse (80 kHz or 50 microseconds/cycle).

b. *Latch Clock.* The latch clock (circuit card P95) includes flip-flops FF5 and FF6, gate AN5, and inverter IN16, and works in conjunction with the ribbon lift and motor control circuits (para 4-21 and 4-22, respectively). The latch clock functions to trigger the operation of transferring the character data from either the peripheral equipment or the printer keyboard to data registers RG1 and RG2 for decoding (print data decode circuit, para 4-16). The latch clock pulse sequence is started when a strobe pulse is applied to the input of gate AN1 from either the printer keyboard or the peripheral equipment. The clock pulse. however, is not generated until the inking ribbon is lifted to the printing position and motor Bl is running at the proper printing speed. When a strobe pulse is applied to gate AN1, the negative transition of the pulse resets the Q output of flip-flop FF6 to low, and the positive transition of the pulse clocks flip-flop FF5. When flip-flop FF5 is clocked. its Q output goes high and is applied to gate AN5. If the motor is running at the proper speed and the ribbon is lifted for printing, the other two inputs to gate AN5 will be high, and its output will switch high. The high output of gate AN5 is applied to flip-flop FF6, and on the positive transition of the FC pulse, flip-flop FF6 is clocked and its Q output goes high. The Q output is applied through inverters IN16, IN19. And IN20 to the print data decode circuit, to latch the character data into data registers RG1 and RG2. The output of inverter IN16 also resets flip-flop FF5, which causes its Q output to go low. The low Q output of flip-flop FF5 causes the output of gate AN5 to switch low. The low from gate AN5 is applied to flip-flop FF6, and on the next positive transition of the FC pulse, flip-flop FF6 is clocked and its Q output goes low. Therefore, the latch clock pulse is a 50-microsecond negative pulse.

c. *Ready/Busy Register.* The ready/busy register (flip-flop FF4, circuit card P96) functions to determine which operation (if any) is being performed by the printer (printing, line feed, carriage return, or space), and to strobe the peripheral equipment or keyboard circuit when an operation is complete, indicating that a new character can be loaded into data registers RG1 and RG2 for decoding (print data decode circuit). When an operation is taking place, the ready/busy register is set to busy, and when the operation is completed, the register is reset to ready. The ready/busy register works in conjunction with the latch clock and fast clock pulses to control the loading of data registers RG1 and RG2. When the latch clock makes its negative transition, inverters IN19 and IN20 clock the next character to be decoded into the data registers. When the latch clock makes its positive transition (50 microseconds later), inverter IN19 clocks the ready/busy register to the busy state which will remain busy until the character has been processed. The Q output of the register goes high and clocks flip-flop FF5. The high Q output of the ready/busy register is also transmitted to the print data decode circuit (para 4-16) to partially enable the line feed, carriage return, and space gates for the decoding process. When flip-flop FF5 is clocked, its Q output goes high and is applied to flip-flop FF6. The low Q output of flip-flop FF5 is applied to gate AN7 to indicate that the ready/busy register is set to busy (line space and carriage return circuit, para 4-19). On the next positive transition of the fast clock, flip-flop FF'6 is clocked, its Q output goes high, and its $\overline{Q}$ output goes low and resets flip-flop FF5. On the next positive transition of the fast clock, flip-flop FF6 is again clocked and its Q output goes low. The Q output of flip-flop FF6, therefore, stays high for one fast clock cycle (50 microseconds) after the ready/busy register goes busy. The high Q output of flip-flop FF6 is applied through gate AN30 (which is enabled (luring a fast clock pulse) to enable gate AN17 (print data decode circuit). Gate AN17 is enabled for one fast-clock cycle, during which time the print data decode circuit must decode the new character and determine whether it is a printable character or a nonprintable operation (line feed, carriage return, or space). After the completion of an operation. the ready/busy register must be reset to ready. Ready/busy reset gate OR11 ties all the circuits together that process the character transmitted, and, when a particular operation is completed, the circuit applies a low to gate OR11 which resets the ready/busy register to ready. The ready/busy register is reset when a low is applied to gate OR11 by any of the following inputs:

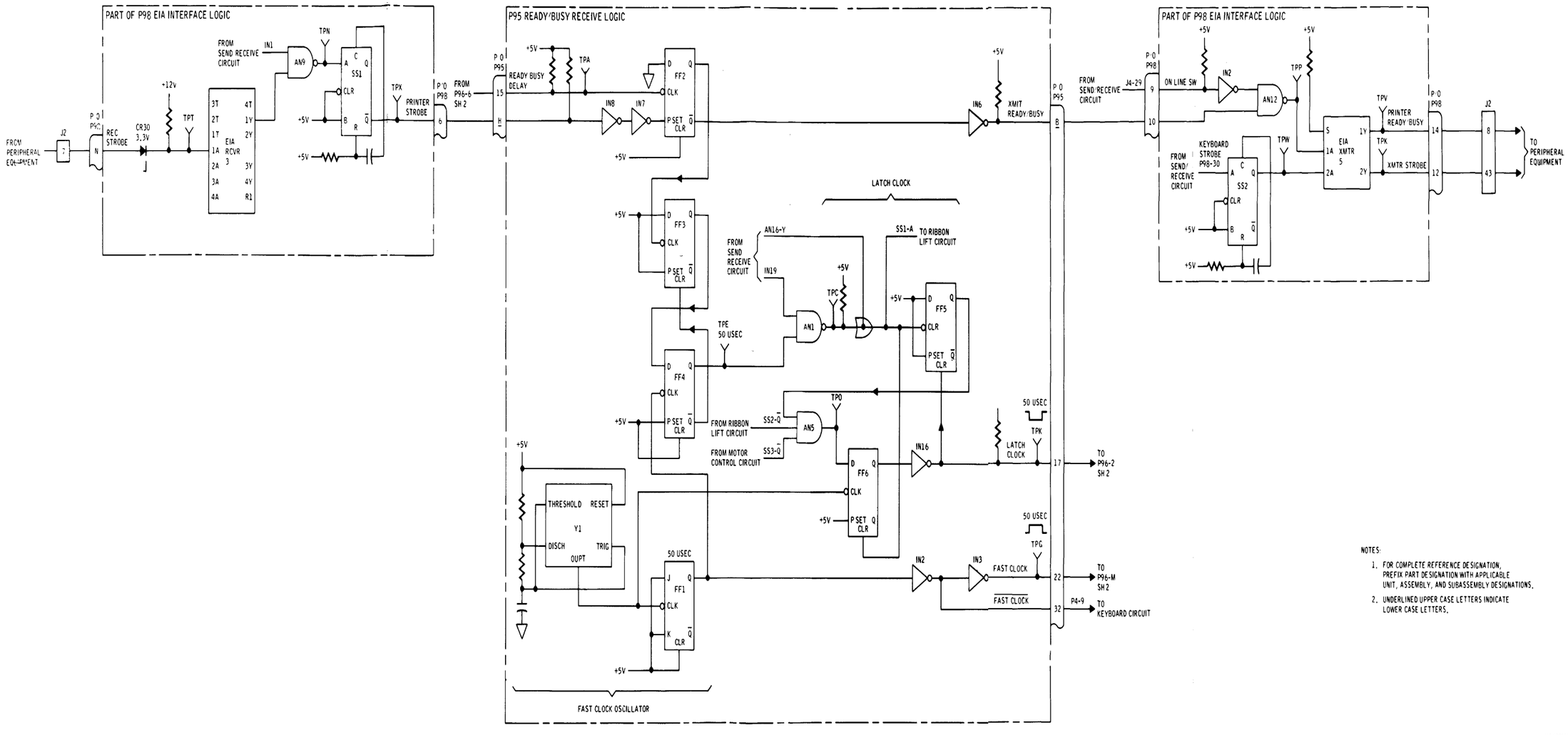
(1) Gate AN18 applies a low when a space code is decoded for hammer no. 1 (fast reset).

(2) Gate AN19 applies a low (fast reset) when a printable character is decoded for hammer no. 1, at time T3 of the print timer sequence (print hammer control circuit, para 4-18).

(3) Gate AN7 applies a low when a carriage return operation is detected.
(4) Gate AN10 applies a low when a line feed operation is completed.
(5) Gate AN13 (early reset) applies a low when a line feed and a carriage return operation are detected.
(6) Gate AN16 applies a low 32 microseconds after a space operation is completed.

When any one of the inputs to gate OR11 goes low, the output of gate OR11 goes high and clocks flip-flop FF2. The Q output of flip-flop FF2 goes high and is applied to gate AN9. The Q output of flip-flop FF2 is also applied as a printer ready signal to carriage return single-shot SS2 (line space and carriage return circuit). The other input to gate AN9 will be high from gate OR5 (line space and carriage return circuit), provided carriage return inhibit and carriage return single-shots SS1 and SS2, respectively, are not active. With both inputs high, the output of gate AN9 goes high and is applied to flip-flop FF1. On the next positive transition of the fast clock pulse, flip-flop FF1 is clocked and its Q output goes high and is applied to gates AN11 and AN12. The other input to gate AN12 goes high on the positive transition of the fast clock, and the output of gate AN12 goes low and resets ready/busy register flip-flop FF4 through gate OR9. When the fast clock pulse makes its negative transition, the inverted clock pulse (FC) goes high and enables gate AN11. Gate AN11 goes low, resets flip-flop FF2, and applies a ready/busy delay pulse to flip-flop FF2 (circuit card P95). Because flip-flop FF2 (circuit card P96) was reset, its Q output goes low and is applied to flip-flop FF1 through gate AN9. On the next positive transition of the fast clock, the Q output of flip-flop FF1 will go back low. The ready/busy delay pulse is applied to circuit card P95 to clock flip- flop FF2. The input to flip-flop FF2 is the peripheral equipment receive strobe transmitted from circuit card P98. The peripheral equipment applies the receive strobe to EIA receiver 3. The output of EIA receiver 3 goes high and is inverted by gate AN9, provided a high is also applied to gate AN9 from inverter IN1 (send/receive logic circuit, para 4-15). A high applied from inverter IN1 indicates that mode panel ON LINE-PRINTER switch S3 is set to ON LINE. The low pulse from gate AN9 is applied to single-shot SS1 which produces a low pulse (nominally 28 microseconds) at its Q output. The low Q output is applied to flip-flop FF2 (circuit card P95) and when flip-flip FF2 is clocked by the ready/busy delay pulse, the Q output of flip-flop FF2 goes low and the Q output goes high. The low Q output is inverted by inverter IN6 and transmitted to gate AN12 (circuit card P98) to indicate to the peripheral equipment that the printer is busy processing the new character. The second input to gate AN12 is high when ON LINE-PRINTER switch S3 is set to ON LINE. With both inputs high, the output of gate AN12 goes low and is applied to EIA transmitter 5. The 1Y output of transmitter 5 goes high and is transmitted to the peripheral equipment as the busy signal. At the end of the busy state, the output of inverter IN6 goes low to indicate to the peripheral equipment that the printer is reset to the ready state and that a new character can be transmitted for processing. When the Q output of flip-flop FF2 (circuit card P95) goes high, it clocks flip-flop FF3. The Q output of flip-flop FF3 goes high and is applied to flip-flop FF4. When the fast clock pulse makes its positive transition, flip-flop FF4 is clocked and its low output resets flip-flop FF3 which applies a high to flip-flop FF4. On the next positive transition of the fast clock, flip-flop FF4 is clocked back to its original state. Because the fast clock is 50 microseconds per cycle, the Q output of flip-flop FF4 will remain high for 50 microseconds. The 50-microsecond high pulse from the Q output of flip-flop FF4 is used as an internal strobe pulse to trigger the latch clock. When data is entered from the printer keyboard, a negative keyboard strobe is applied to single-shot SS2 (circuit card P98) from the send/receive logic circuit. The Q output of single-shot SS2 goes high for 52 microseconds, during which time it is applied to EIA transmitter 5. The 2Y output of transmitter 5 goes low and is applied as a transmit strobe pulse to the peripheral equipment. The transmit strobe pulse triggers the data transfer from the printer to the peripheral equipment.

d. *Steering Register Control Gate.* Gate AN5 (circuit card P96) controls the state of the steering register (print hammer control circuit, para 4-18). When the output of gate AN5 goes low, the two-state steering register is clocked to the next steer condition (steer one or steer two). When the steering register is in steer one, the next character to be printed is steered to the hammer no. 1 counter. When the register is in steer two, the character is steered to the hammer no. 2 counter. After both print hammers have printed, the steering register will be in the steer two state, and must be clocked to steer one as follows. A high is applied to gate AN1 from space delay single-shot SS11 following a space operation, (line space and carriage return circuit, para 4-19). The other input to gate AN1 is high from steering register flip-flop FF3 when the register is in the steer two state. With both inputs high, gate AN1 switches low and causes gate AN2 to switch high. Gate AN3, in turn, switches low when a high is applied to its other input from ready/busy delay flip-flop FF1. The low from gate AN3 is applied to gate AN5 which switches high. When the ready/busy delay pulse is generated by flip-flop FF1 (low pulse), the pulse is applied to gate AN3 which switches high and applies its output to gate AN5. The remaining input to gate AN5 is from gate AN14. The output of gate AN14 is high, when a low is transmitted from either binary counter BC5



NOTES:

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2. UNDERLINED UPPER CASE LETTERS INDICATE LOWER CASE LETTERS.

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Figure 4-21. Timing and Synchronization Circuit Signal Flow Diagram (Sheet 1 of 2)

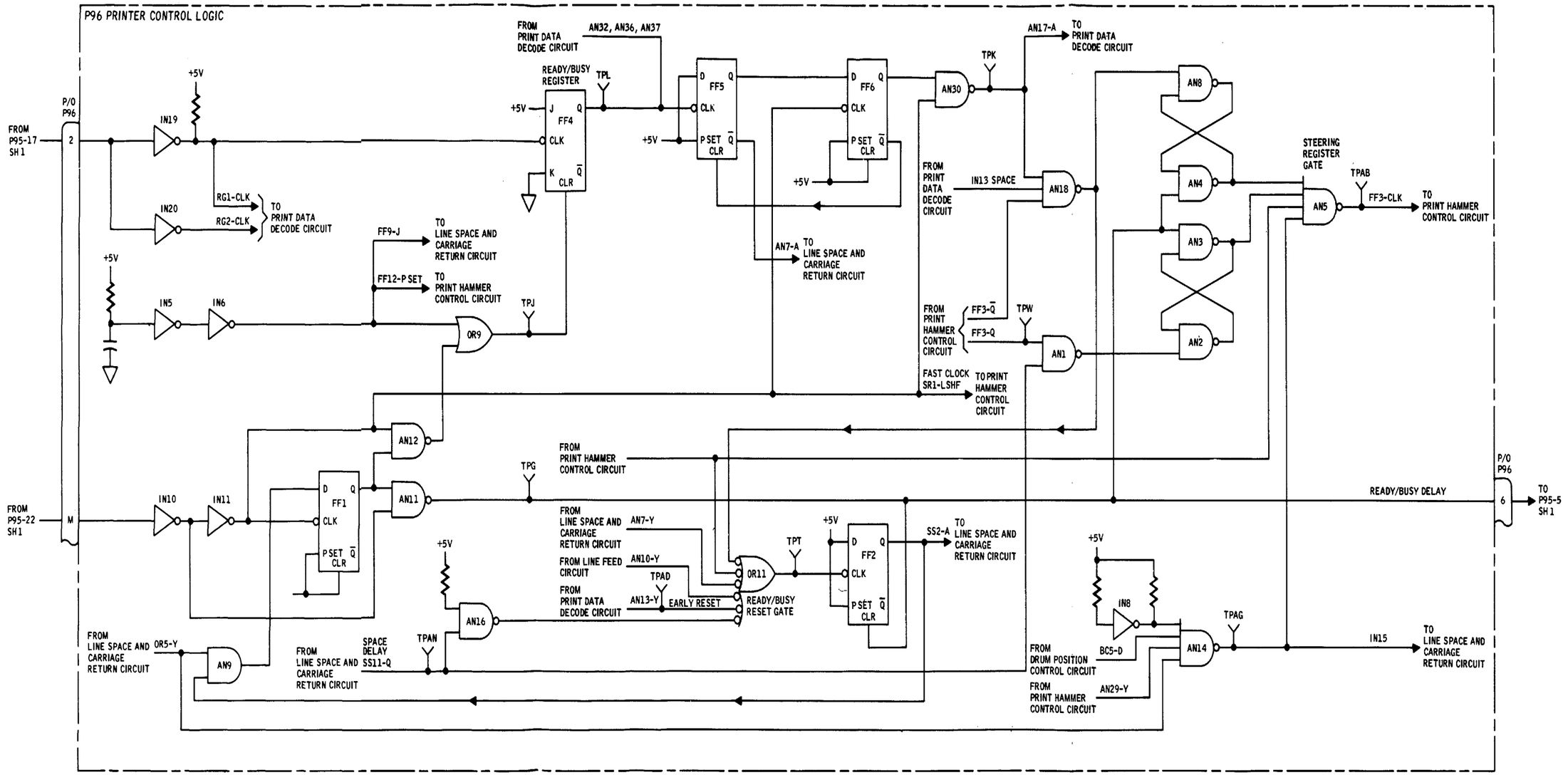

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Figure 4-21. Timing and Synchronization Circuit Signal Flow Diagram (Sheet 2 of 2)

(drum position control circuit, para 4-17), gate AN29 (print hammer control circuit), or gate OR5 (line space and carriage return circuit). With all inputs high, the output of gate AN5 goes low and clocks the steering register to steer one, thereby steering the character to the hammer no. 1 counter. The steering register must then be set to steer two so that the next character to be printed will be steered to the hammer no. 2 counter. Gate AN18 (circuit card P96) functions to enable gate AN5, thereby switching the steering register to steer two. The output of gate AN18 goes low when a high is applied to its input by the Q output of steering register flip-flop FF3 (indicating that the register is in the steer one state), a high is applied from inverter IN13 (print data decode circuit, para 4-16), and a high is applied from gate AN30. Inverter IN13 applies a high to gate AN18 when a space operation is decoded, and gate AN30 applies a high when the ready/busy register is set to busy. With all inputs high, the output of gate AN18 goes low and is applied to gate AN8 which switches high. The high from gate AN8 switches the output of gate AN4 to low which switches the output of gate AN5 to high. When the low ready/busy delay pulse is generated by flip-flop FF1, the output of gate AN4 goes high and switches the output of gate AN5 to low, provided the output of gate AN14 is high. The output of gate AN14 is high (as discussed above), when a low is transmitted from either binary counter BC5, gate AN29, or gate OR5. When the output of gate AN5 goes low, the steering register is switched to steer two.

4-24. Alarm Circuit (fig. 4-22). The alarm circuit includes sensitive switch S25, mode panel PAPER OUT lamp DS4, and audio alarm DS3, and functions to alert the printer operator to a low-paper or paper-out condition. When switch S25 is actuated by the low paper sensing mechanism (para 4-12), the normally open contacts of switch S25 close, supplying a ground to sound alarm DS3 and light PAPER OUT lamp DS4.

4-25. Power Supply (fig. 423). The printer power supply is contained on power supply regulator assembly P101 and includes a +36 volt rectifier (CR11 and CR12), +12 volt rectifier (CR13 and CR14), +5 volt rectifier (CR5 and CR6), and transformer T1. A -12 volt rectifier (CR2 and CR3) is contained on assembly P101. The power supply converts 115 volts, 60 Hz primary power to the following secondary powers: +5 volts (logic circuits), -12 volts (mode panel indicator lamps), +12 volts (relay K1 and mode panel indicator lamps), +36 volts (magnet assemblies), and 6.3 vac (top cover copy lamps). In operation, the primary power is filtered by filter FL1 and applied to transformer T1. The 115 vac primary power is also applied as excitation to motor B1. Transformer T1 steps down the primary power to the secondary voltages. The 6.3 vac secondary voltage is applied through connecter J31 to light the top cover copy lamps. The +36 volt secondary voltage is rectified by diodes CR11 and CR12, regulated by series regulator Q7 and Q8, and applied to terminal board TB8 for the printer use. The +12 volt secondary voltage is rectified by diodes CR13 and CR14, regulated by series regulator Q1, and applied to terminal board TB8. The -12 volt secondary voltage is rectified by CR2 and CR3, regulated by series regulator Q2, and applied to terminal board TB8 and driver transistor Q9 for the printer use. The +5 volt secondary voltage is rectified by diodes CR5 and CR6 and applied to pulse-width, frequency-modulator, switching regulator ZI. Regulator Z1 monitors the +5 volt secondary voltage and biases transistor Q6 through transistor Q3. Transistor Q6 will continuously switch on and off, maintaining a constant +5 volt output from regulator Z1. The +5 volt output of regulator Z1 is applied through connector P101 pin 22 to terminal board TB8. Voltage limiter diode CR9 prevents the +5 volt secondary voltage from going above +6.1 volts.

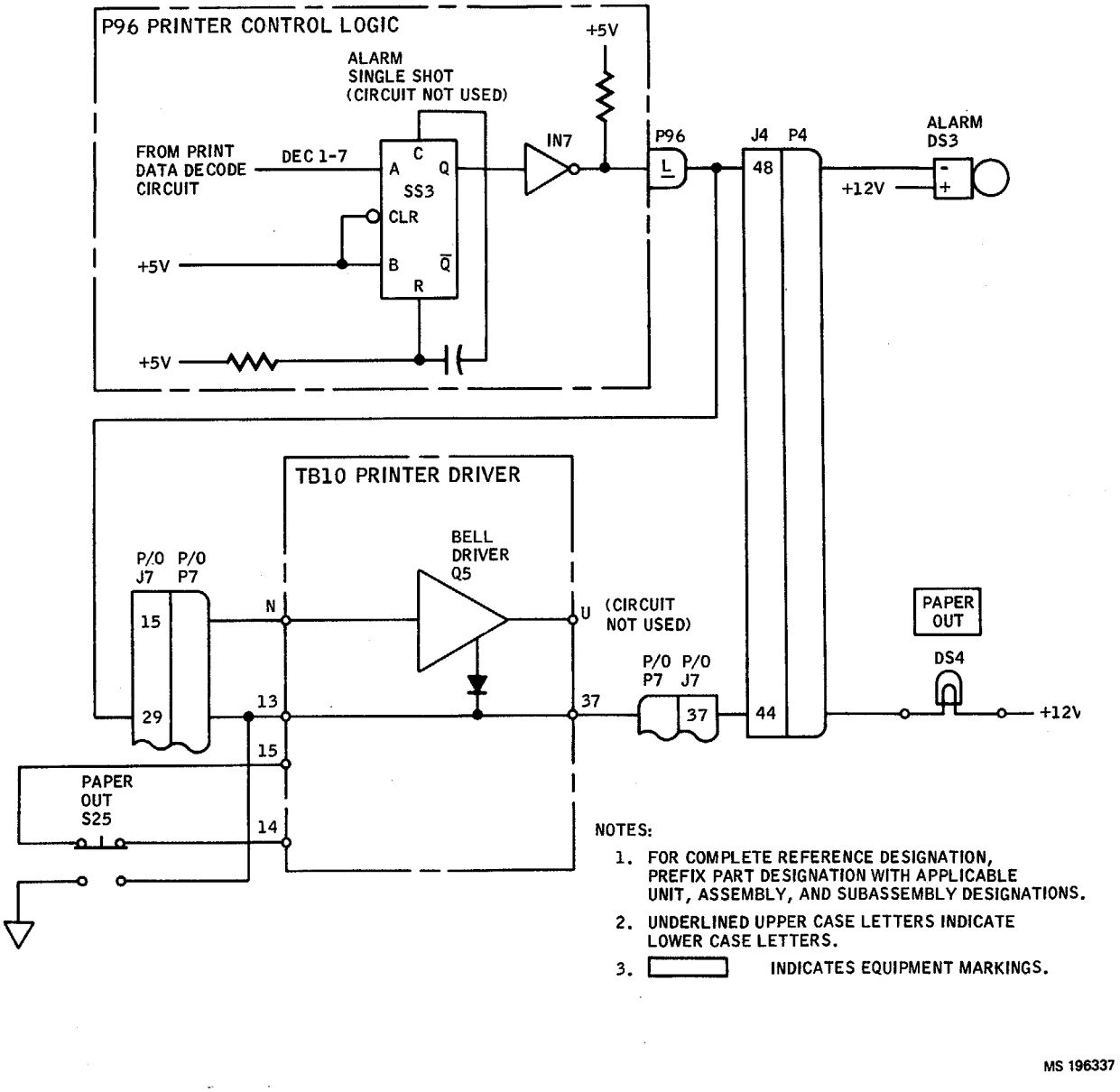


Figure 4-22. Alarm Circuit Signal Flow Diagram

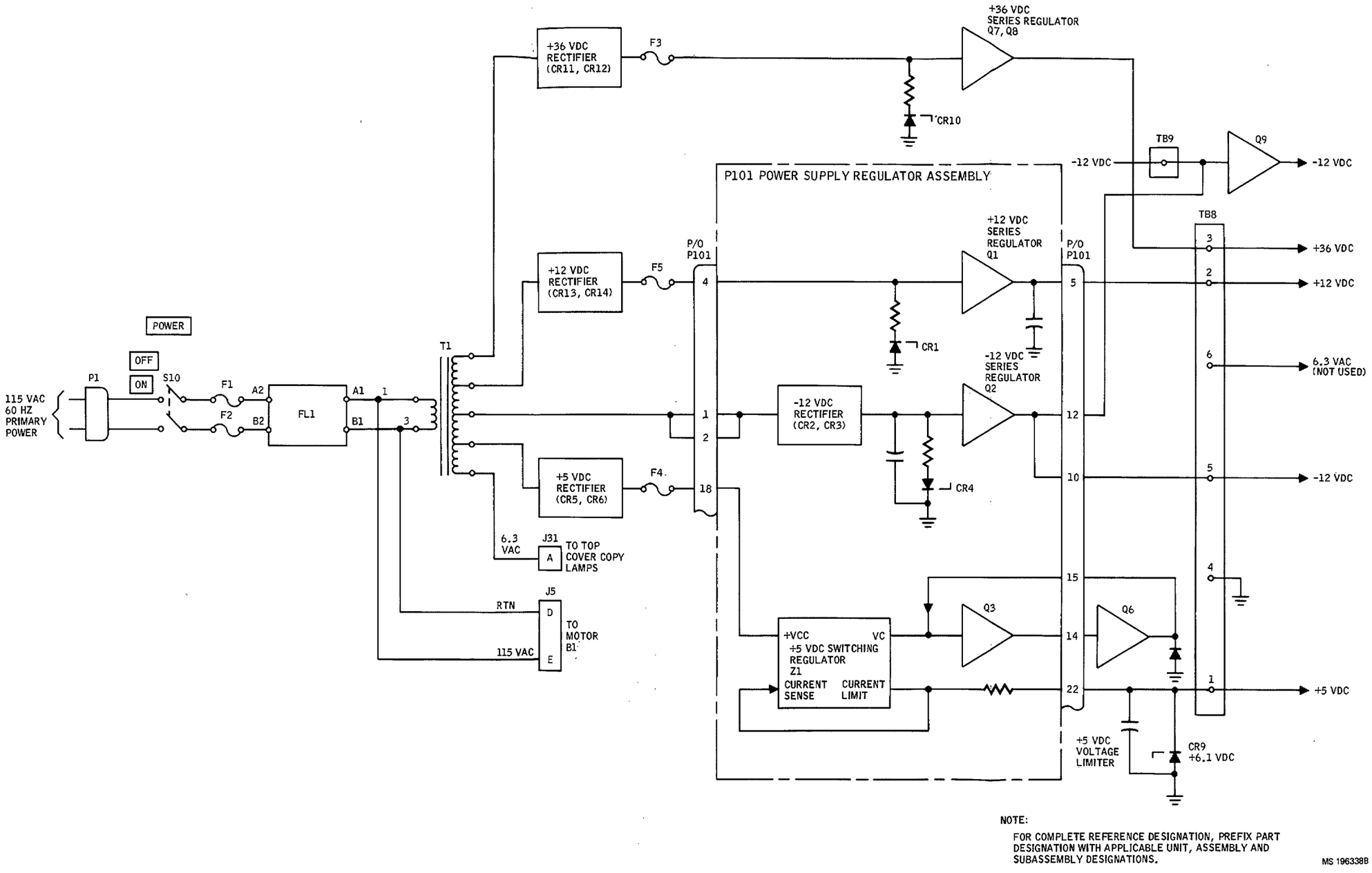


Figure 4-23. Power Supply Power Flow Diagram

CHAPTER 5

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. GENERAL

5-1. Scope of Organizational Maintenance. Organizational maintenance includes all preventive maintenance, corrective maintenance, and testing procedures assigned to organizational maintenance personnel. The maintenance procedures described in the operators' maintenance chapter (Chapter 3) are also a part of organizational maintenance. The organizational maintenance duties are listed below together with a reference to the paragraph covering the specific maintenance function. Any malfunction of the printer which cannot be corrected by the procedures referenced in the list below should be reported to general support maintenance for corrective action.

a. Preventive maintenance (para 5-3, 5-4, and 5-5).

b. Lubrication (para 5-6).

c. Cleaning (para 5-7).

d. Troubleshooting (para 5-8).

e. Adjustments (para 5-10 through 5-23).

f. Removal and replacement of components (para 5-24 through 5-36).

5-2. Tools, Test Equipment, and Materials. Tools, test equipment and materials required for organizational maintenance are as follows:

a. Guided Missile Air Defense System AN/TSQ-73 tool kit NSN 5180-00-427-7682. (Reference SC- 5180-95-CL-A61 for a list of tool kit tools.)

b. Artist's hog bristle brush NSN 8020-00-244-0153.

c. Oval synthetic filament brush NSN 8029-00-297-6657.

d. Orangewood stick NSN 5120-00-293-2081.

e. Typewriter brush NSN 7510-00-5550-8446.

f. Spring puller hook NSN 5815-00-370-1299.

g. Hand pump oiler NSN 4930-00-274-5713.

h. Oval body hand oiler NSN 4930-00-273-8934.

i. Multimeter, Simpson Model 269-3.

j. Special lubricating oil 15327 (82423).

k. General lubricating oil NSN 9150-00-687-4241.

l. Grease NSN 9150-00-985-7247.

m. Cleaning cloth.

n. Trichloroethane, liquid form, 1 quart can.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

5-3. Preventive Maintenance. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, minimize breakdowns, and increase maximum operational capability. Preventive maintenance is the responsibility of all maintenance categories concerned with the equipment, and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. The preventive maintenance checks and services described in this section should be performed monthly and quarterly unless otherwise directed by appropriate authority. These preventive maintenance checks and services should be performed in addition to the operator preventive maintenance checks described in Chapter 3. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

5-4. Monthly Maintenance. Perform the maintenance procedures indicated in the monthly preventive maintenance checks and services chart (table 5-1) once each month. A month is defined as approximately 30 calendar days of 8-hour-a-day operation. If the equipment is operated 16 hours a day the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance intervals should be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

5-5. Quarterly Maintenance. Quarterly maintenance checks and services on the printer are required. Daily and monthly checks and services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38-750. Perform all the checks and services listed in the quarterly preventive maintenance checks and services chart (table 5-2) in the sequence listed.

Table 5-1. Monthly Preventive Maintenance Checks and Services

Sequence no.	Item to be inspected	Procedure	References
1	Interior surfaces	Open dust cover and inspect interior of cover base, table, and printer assembly for dirt, dust, grease, moisture, and fungus. Remove all traces from accessible areas and components.	Para 5-7
2	Motor	Motor should turn freely and quietly when turned by hand or when under power. Check for evidence of over-heating. This may be indicated by discoloration or by an odor of burned insulation material.	Para 5-7 and 5-12
3	Mode panel switches	Check mechanical action of each switch. Remove mounting screws from both sides of mode panel, and pivot panel to expose backs of switches. Check for dirt or corrosion. Tighten loose mounting parts. Disconnect all loose, dirty or corroded connections, and clean and install them correctly. Tighten switch connections and repair soldered connections. Replace mode panel and install mounting screws.	Para 5-7 and 5-33
4	Operation	Operate the printer and observe that it is in proper working order.	Para 3-6
5	On-site spare parts	Check that on-site spare parts supply is complete. Reorder supplies as necessary.	Para 1-11

Table 5-2. Quarterly Preventive Maintenance Checks and Services

Sequence no.	Item to be inspected	Procedure	References
1	Preservative coating	Check all surfaces for evidence of fungus. Remove all rust and corrosion. Spot-paint bare spots.	Para 5-7
2	Electronic unit (rear of printer)	Remove cover. Be sure all circuit card assemblies are clean, intact, and properly installed. **NOTE** Remove circuit card assemblies only when troubleshooting this area.	Para 5-7 and 5-27 thru

5-6. Lubrication.

a. *Lubricants.* Table 5-3 lists the lubricants required.

b. *Lubrication Schedule.* Three lubrication schedules are provided. The first schedule (fig. 5-1) shows all parts that must be lubricated monthly, the second (fig. 5-2), shows parts that must be lubricated quarterly and the third (fig. 5-3), shows parts that must be lubricated semiannually. Lubricate only those items that require lubrication for the applicable interval. Do not overlubricate.

c. *Preparation for Lubrications* To lubricate the printer remove the unit from service. The unit must be cleaned before lubrication. Any accumulation of old grease, paper lint, etc., must be removed. Refer to paragraph 5-7 for cleaning instructions.

d. *Methods of Applying Lubricants*

(1) Grease. Hold the grease gun so that the nozzle forms an angle of 45 degrees with the part to be lubricated. Operate the handle of the grease gun until grease is ejected; at the same time, rotate the gear or move the nozzle along the rack to form a continuous ribbon of grease along the periphery of the part. Do not permit grease to contaminate the belts or print drum.

(*2) Oil.* Use a pen-shaped oiler or a piece of wire approximately 0.030 inch in diameter to apply applicable oil to those parts that require only one or two drops of oil. If a wire is used, dip the wire approximately 1 inch into the oil to collect a small amount on the end of the wire; then touch the wire to the lubrication point. This method permits closer control over the amount of oil applied to these points and helps prevent over-lubrication. To lubricate all other parts of the equipment, use the pump-type oiler.

CAUTION

After lubrication, always wipe away all excess lubricant. The presence of excess lubricant is a common cause of damage to wire insulation and other nonmetallic parts.

e. *Detailed Lubrication Instructions*

(*1) General* The points to be lubricated and the quantity of lubricants to be applied are shown in figures 5-1, 5-2, and 5-3. In order that the printer can be lubricated in a systematic manner, the charts are arranged according to time schedule and the type of lubricant required. The following general information applies to all charts.

(a) Use only the lubricating material specified.
(b) Lubricate only at interval specified.
(c) After lubrication, remove any excess lubricating material.
(d) All steel parts must have a film of general lubricating oil (NSN 9150-00-687-4241) to prevent rust.

Table 5-3. Lubricants

Lubricant	NSN or part no.
Grease	NSN 9150-00-985-7247 (1 pt) NSN 9150-00-985-7245 (8 oz)
Oil (general lubricating)	NSN 9150-00-687-4241
Lubricating oil	NSN 9150-01-093-3663

(e) All spring hooks must have a coat of grease (NSN 9150-00-985-7247).
(f) All ball bearings in the printer are sealed and do not require lubrication.

(2) Monthly. The following parts must be lubricated monthly (fig. 5-1): armature assembly pivot points, hammer and armature contact points, hammer pivot points. To facilitate lubrication of the carriage assembly, remove the hammer block assembly as follows:

CAUTION

Do not move the individual hammer setscrews.

(a) Back out print hammer block mounting screw locking setscrew at least three turns.
(b) Remove hammer block assembly mounting screw, washer, and nut plate.
(c) Remove print hammer block assembly from carriage assembly frame.
(d) Clean all foreign matter (dried ink, paper lint, etc.) off the hammer and block.
(e) Lubricate printer as specified in figure 5-1.
(f) Install print hammer block assembly in carriage assembly.
(g) Install nut plate.
(h) Install hammer block assembly mounting screw and lockwasher. Tighten screw just enough to hold block in place but loose enough to allow block to be moved in carriage.
(i) Pivot print hammer block to maximum position towards print drum.
(j) Slowly pivot block assembly away from drum until hammers just start to move due to contacting armatures, then move block towards drum until armatures just touch but do not move hammers.
(k) Tighten print hammer block assembly mounting screw securely.

CAUTION

This procedure is to be used to reposition the hammer block assembly only when lubricating the print hammers and armatures. Do not use this procedure if a new print hammer block assembly was installed.

(1) Turn print hammer block mounting screw locking setscrew down to just contact mounting screw.

5-7. Cleaning.

a. General Cleaning Instructions. When cleaning the printer, the following general instructions should be helpful.

(1) Use No. 0000 sandpaper to remove corrosion.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. Do not use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

(2) Use a clean, dry, lint-free cloth or a dry brush for cleaning purposes.

(a) When necessary use a cloth moistened with trichloroethane to clean metallic parts. Wipe the trichloroethane and dirt from part with a clean, dry cloth.

(b) A flushing action normally is best when cleaning electrical contacts. Dip an orangestick in trichloroethane and allow liquid to drop from stick through contacts. Dry contact using a clean, lint-free dry cloth.

(3) Vacuum cleaning equipment is suitable for removing loose paper lint and dirt. Compressed dry air may be used provided pressure is kept low enough to prevent damage to equipment.

b. *Special Cleaning Instructions*

(1) Parko-lubrized and parkerized parts. Do not keep parko-lubrized and parkerized parts (those with a black finish) in cleaning compound for any extended period because the protective impregnated oils and waxes will be removed. Clean all parko-lubrized and parkerized parts with an oil-soaked cloth.

(2) Oil-impregnated bronze parts. Do not immerse oil-impregnated bronze (oilite) bearings and other oil-impregnated parts in any cleaning fluid because the oils will dissolve. To clean, use a stiff brush or wipe with an oil-soaked cloth.

(3) Ball bearings. The ball bearings used on the printer are sealed. Do not attempt to lubricate or clean them; wipe them with a clean, dry cloth. Replace any bearings that do not spin freely.

(4) Motor. To clean the external surfaces of the motor, use a clean, dry sash brush to remove dust and dirt. Remove all oil and gummy deposits with a clean, lint-free cloth dampened with trichlorothane.

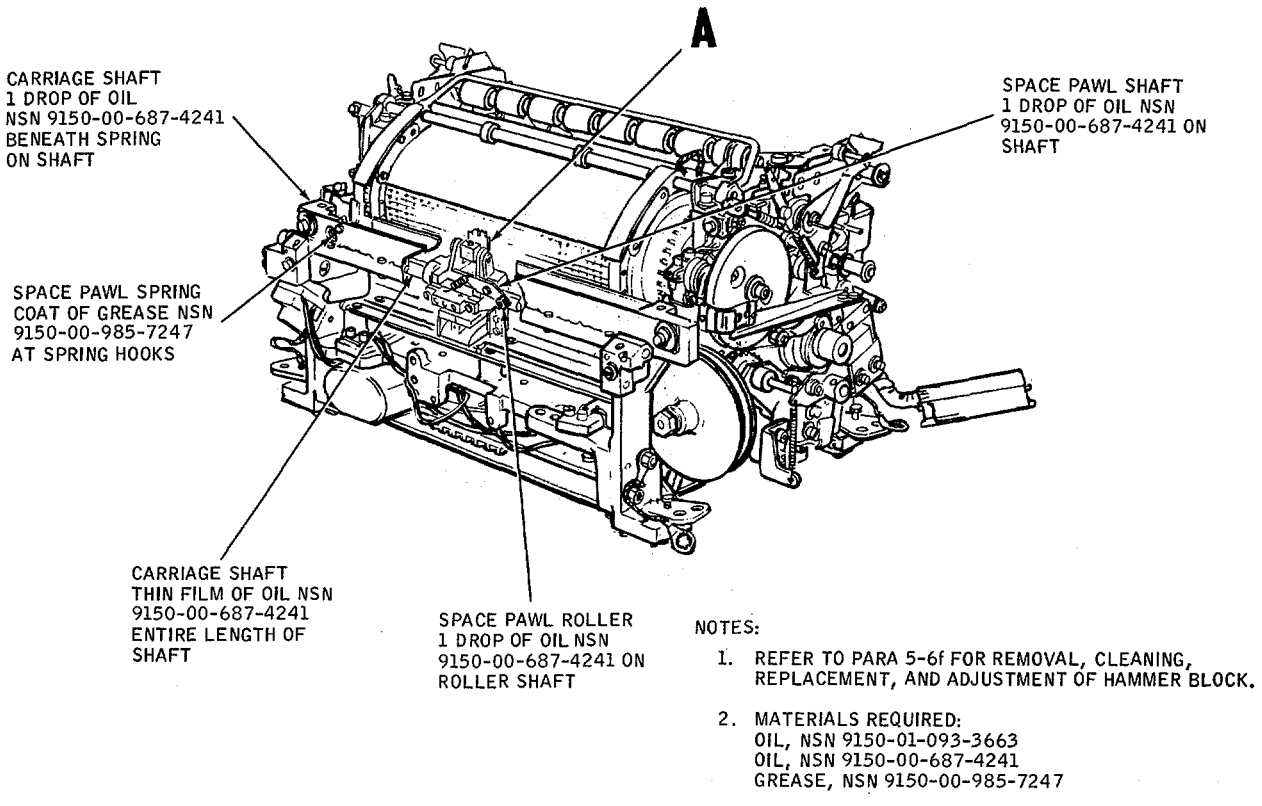
(*5) Electrical coils.* Clean the coils with a cloth dampened in trichloroethane. Remove rust from the polepieces with No. 0000 sandpaper; recoat with a thin film of lacquer.

(6) Wiring and electrical parts. Remove dust and dirt with a clean, dry sash brush. Remove all oil and gummy deposits with a clean piece of cheesecloth or other lint-free cloth lightly dampened with trichloroethane.

(*7) Base.* Clean the base thoroughly. Wipe away all deposits of oil or grease which may have dropped from the mechanical assemblies. Brush away all loose dirt and paper lint. If grimy deposits are difficult to remove with a dry cloth, moisten the cloth with trichloroethane.

(8) Mode panel switches. Wipe off any moisture present. Carefully clean the exterior surfaces with a dry, stiff brush.

(9) Print drum. Clean the print drum with a stiff, dry brush. Do not use trichloroethane to clean type faces.



NOTES:

1. REFER TO PARA 5-6f FOR REMOVAL, CLEANING, REPLACEMENT, AND ADJUSTMENT OF HAMMER BLOCK.
2. MATERIALS REQUIRED:
   OIL, NSN 9150-01-093-3663
   OIL, NSN 9150-00-687-4241
   GREASE, NSN 9150-00-985-7247

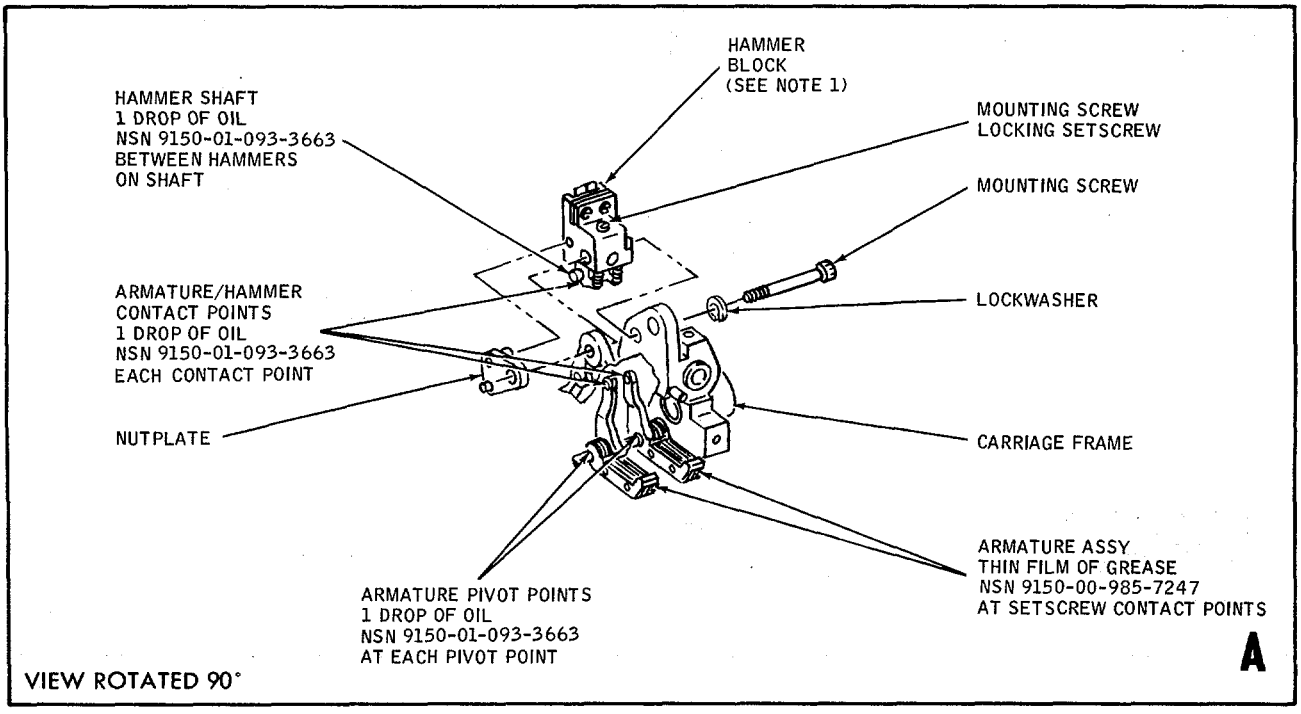


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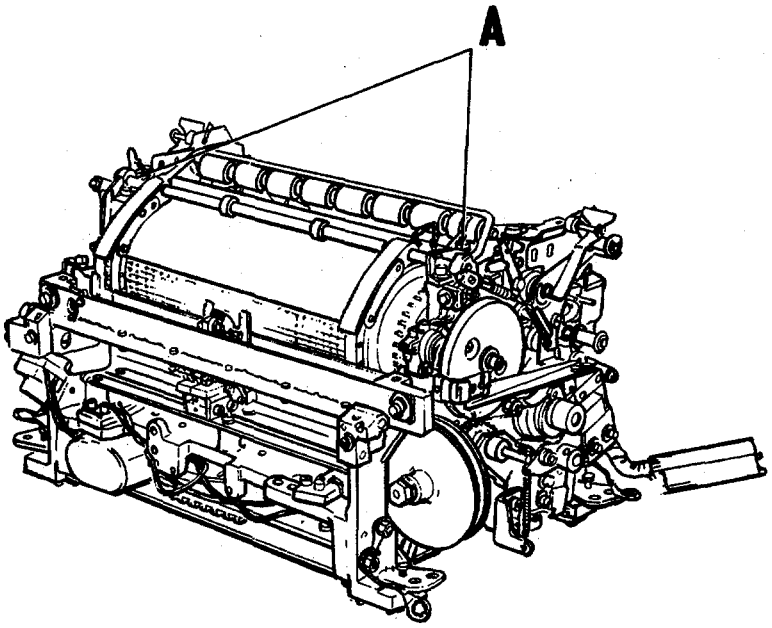
Figure 5-1. Monthly Lubrication Chart



NOTES:

1. WHERE OIL IS SPECIFIED USE OIL NSN 9150-00-687-4241.
2. WHERE GREASE IS SPECIFIED USE GREASE NSN 9150-00-985-7247.

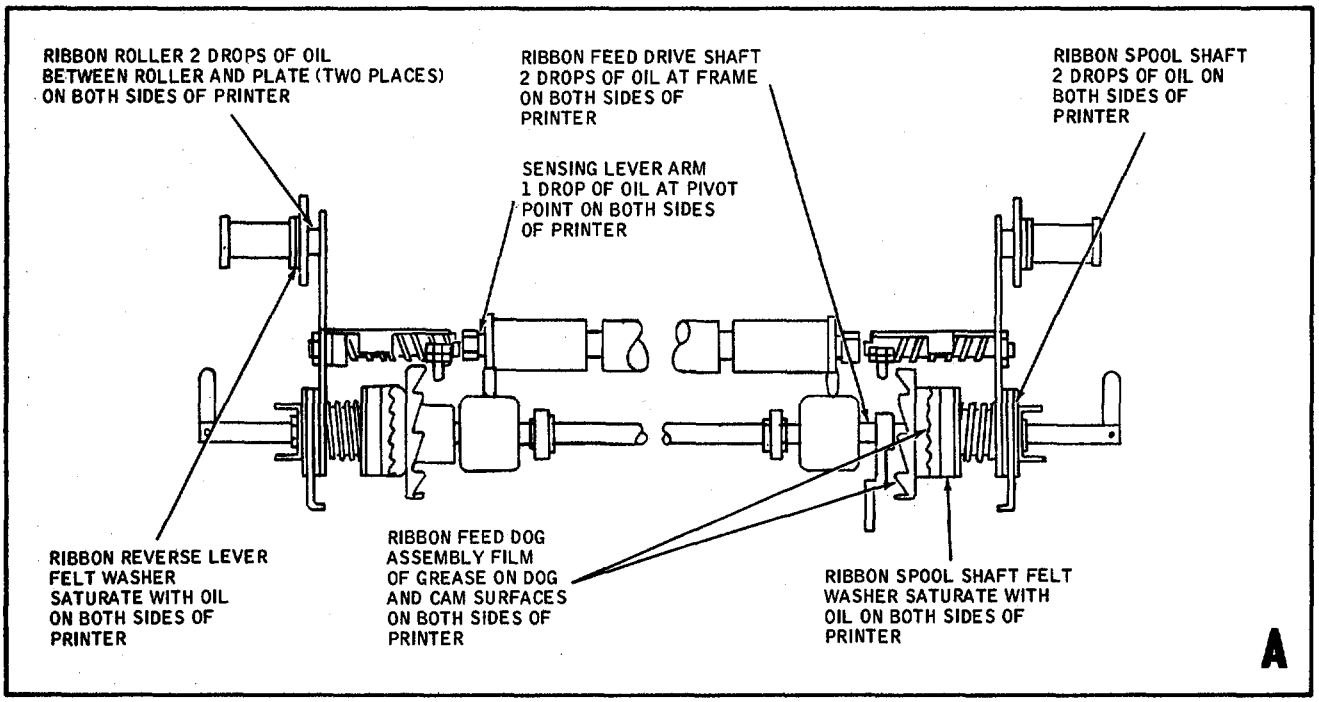


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Figure 5-2. Quarterly Lubrication Chart (Sheet 1 of 6)

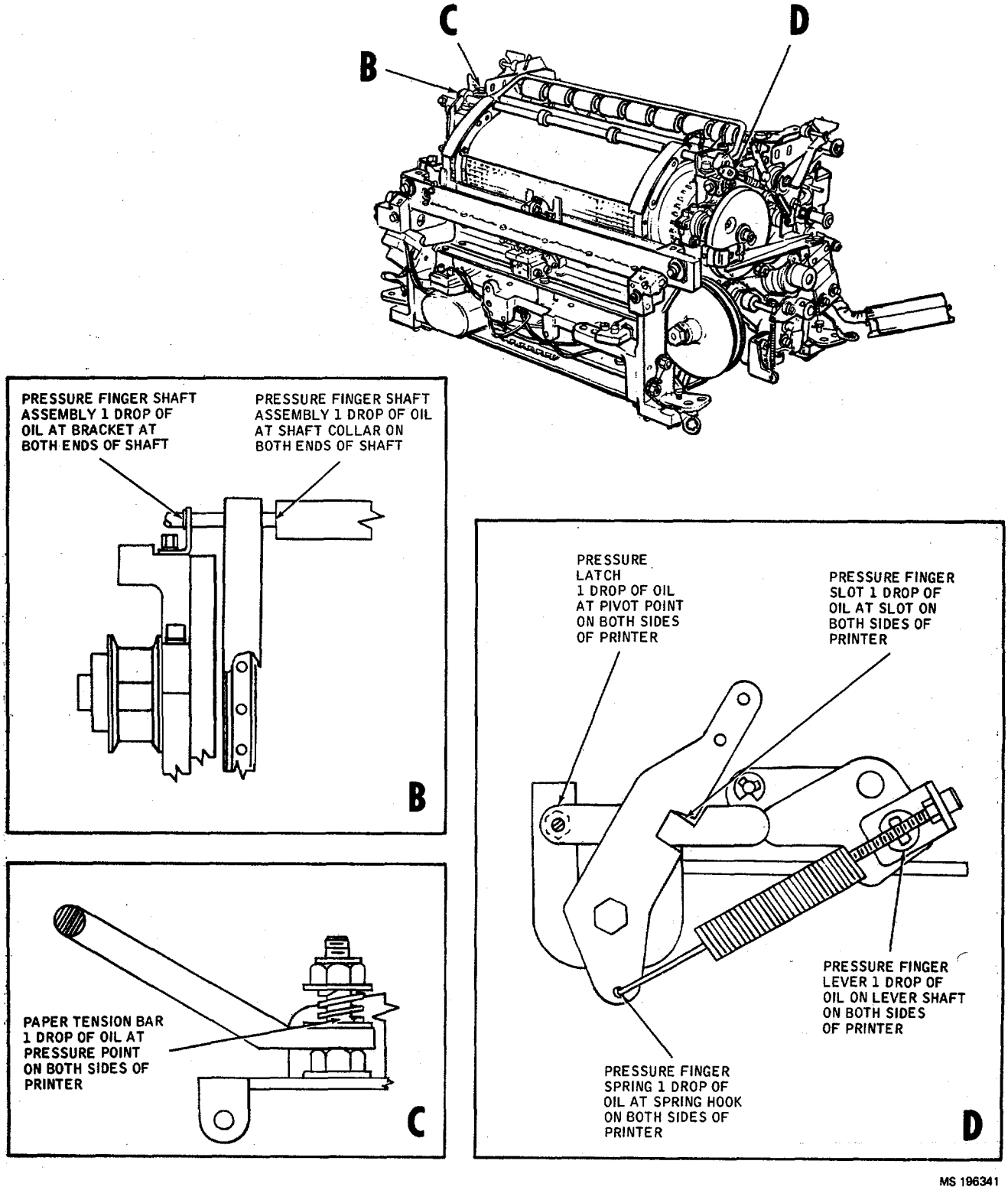


Figure 5-2. Quarterly Lubrication Chart (Sheet 2 of 6)

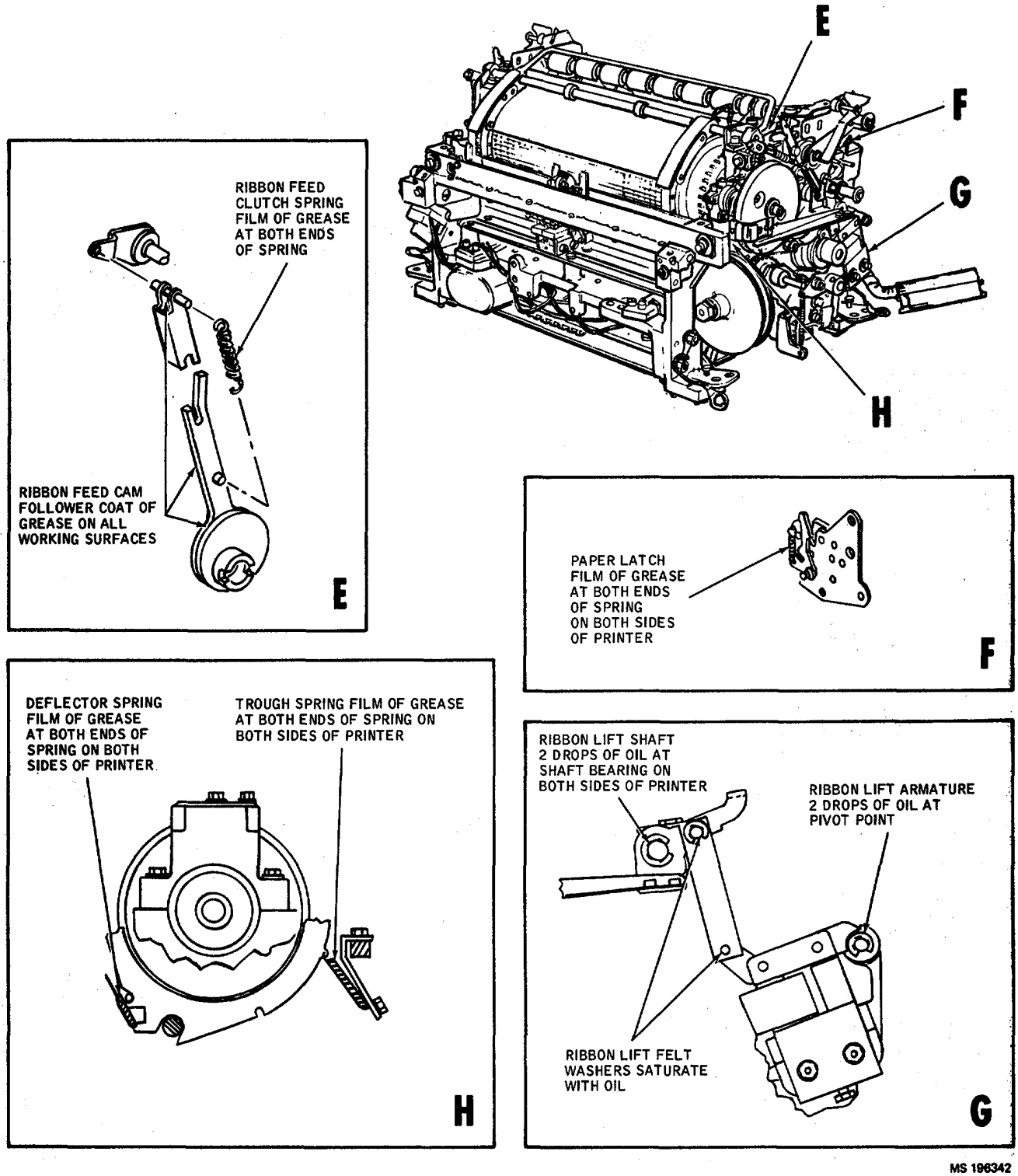


Figure 5-2. Quarterly Lubrication Chart (Sheet 3 of 6)

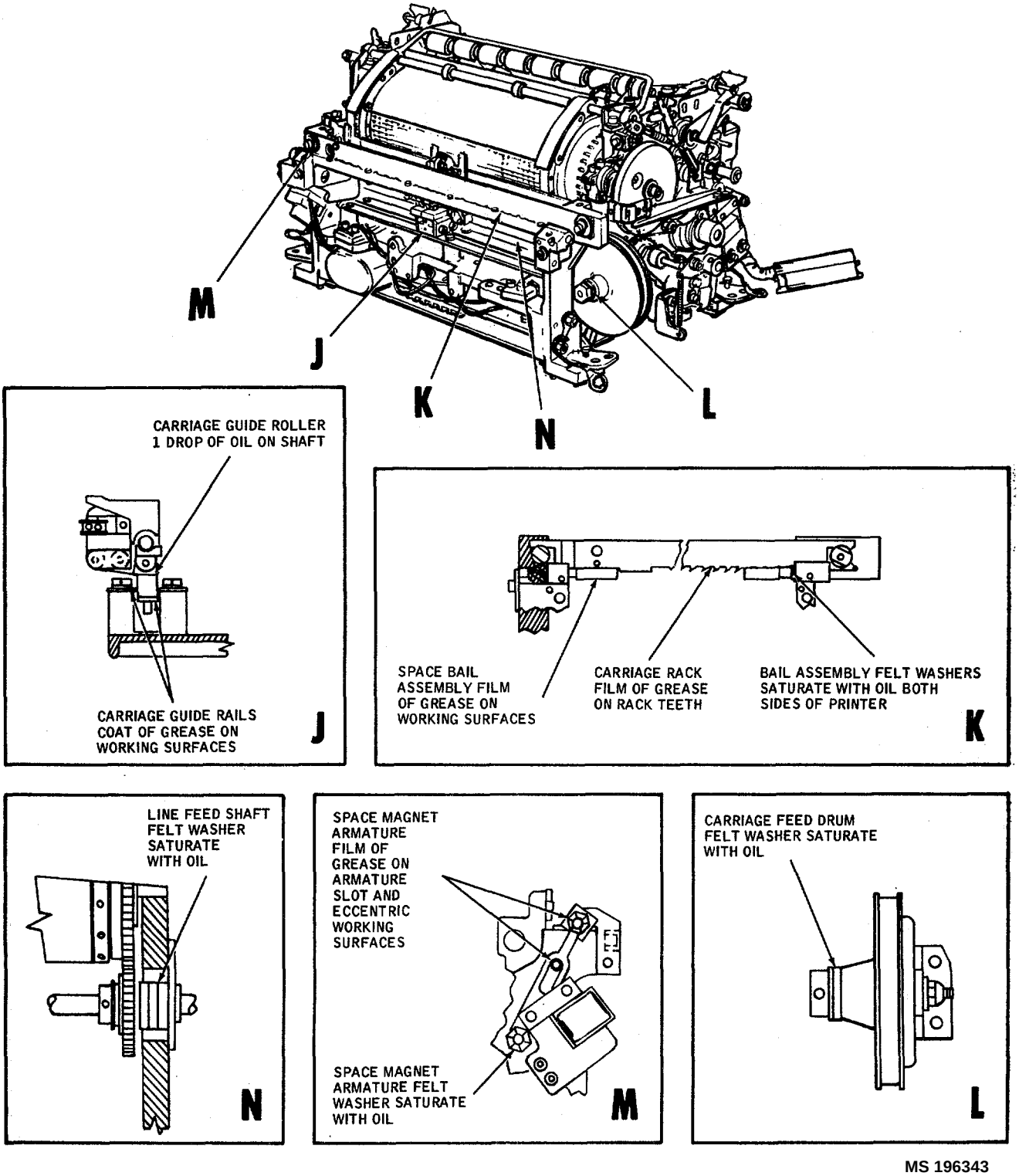


Figure 5-2. Quarterly Lubrication Chart (Sheet 4 of 6)

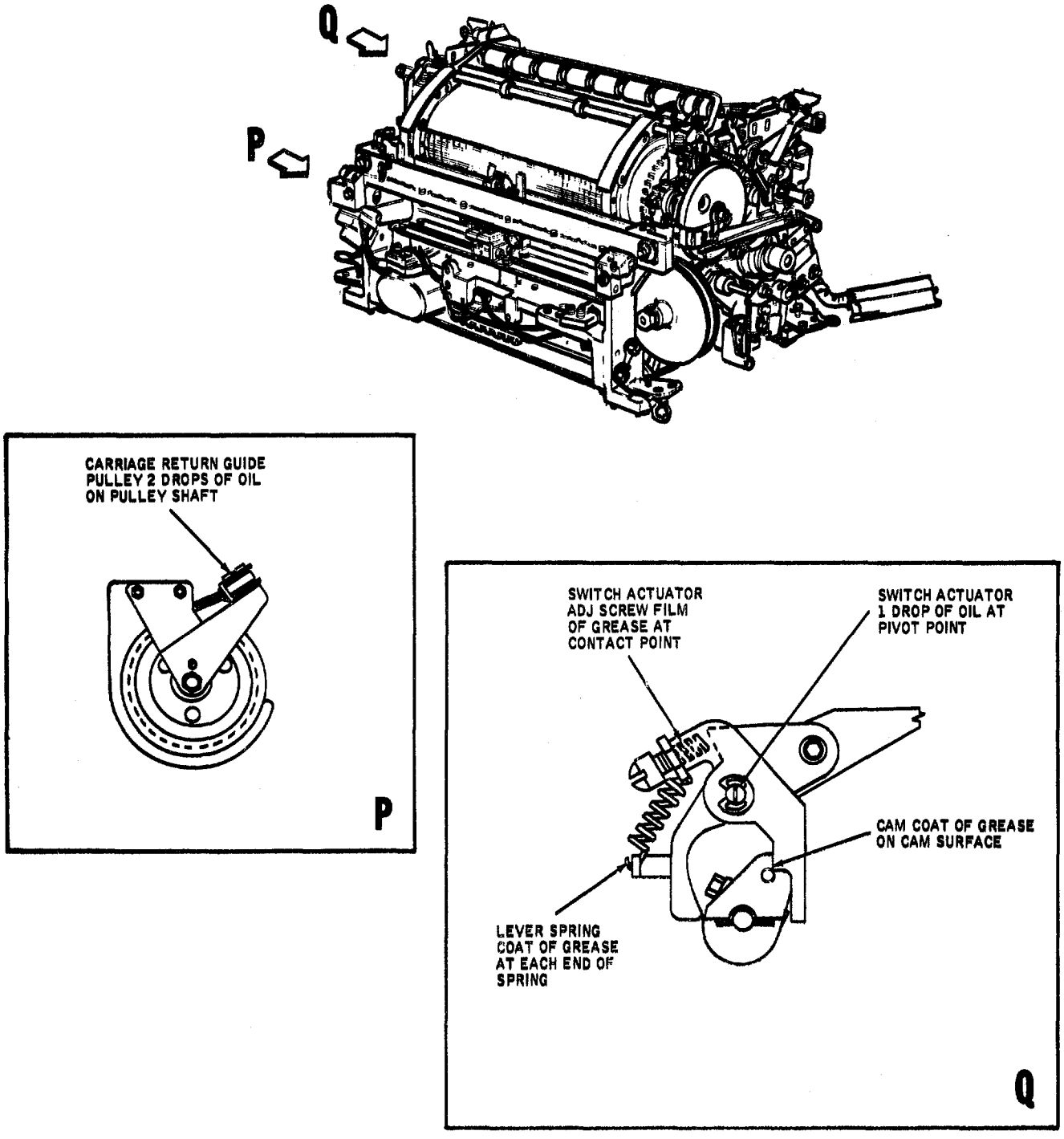
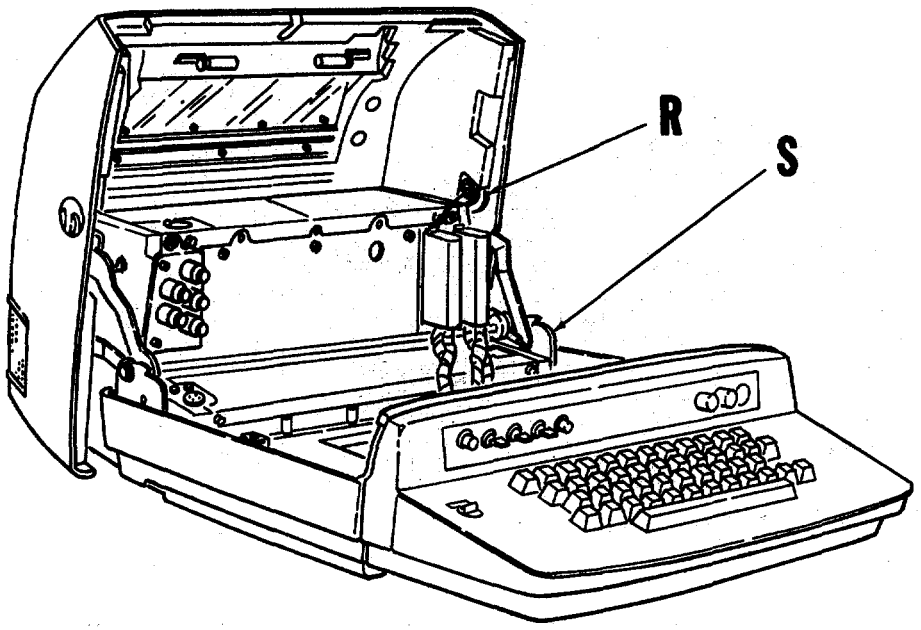
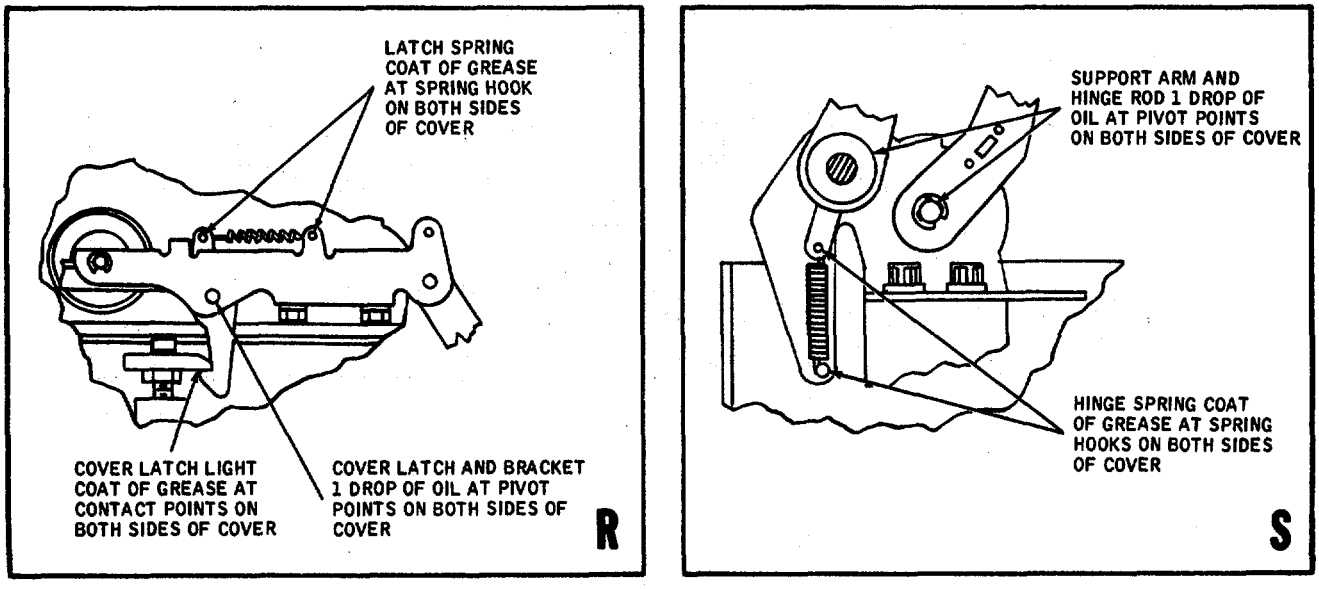


Figure 5-2. Quarterly Lubrication Chart (Sheet 5 of 6)





MS 196346

Figure 5-2. Quarterly Lubrication Chart (Sheet 6 of 6)

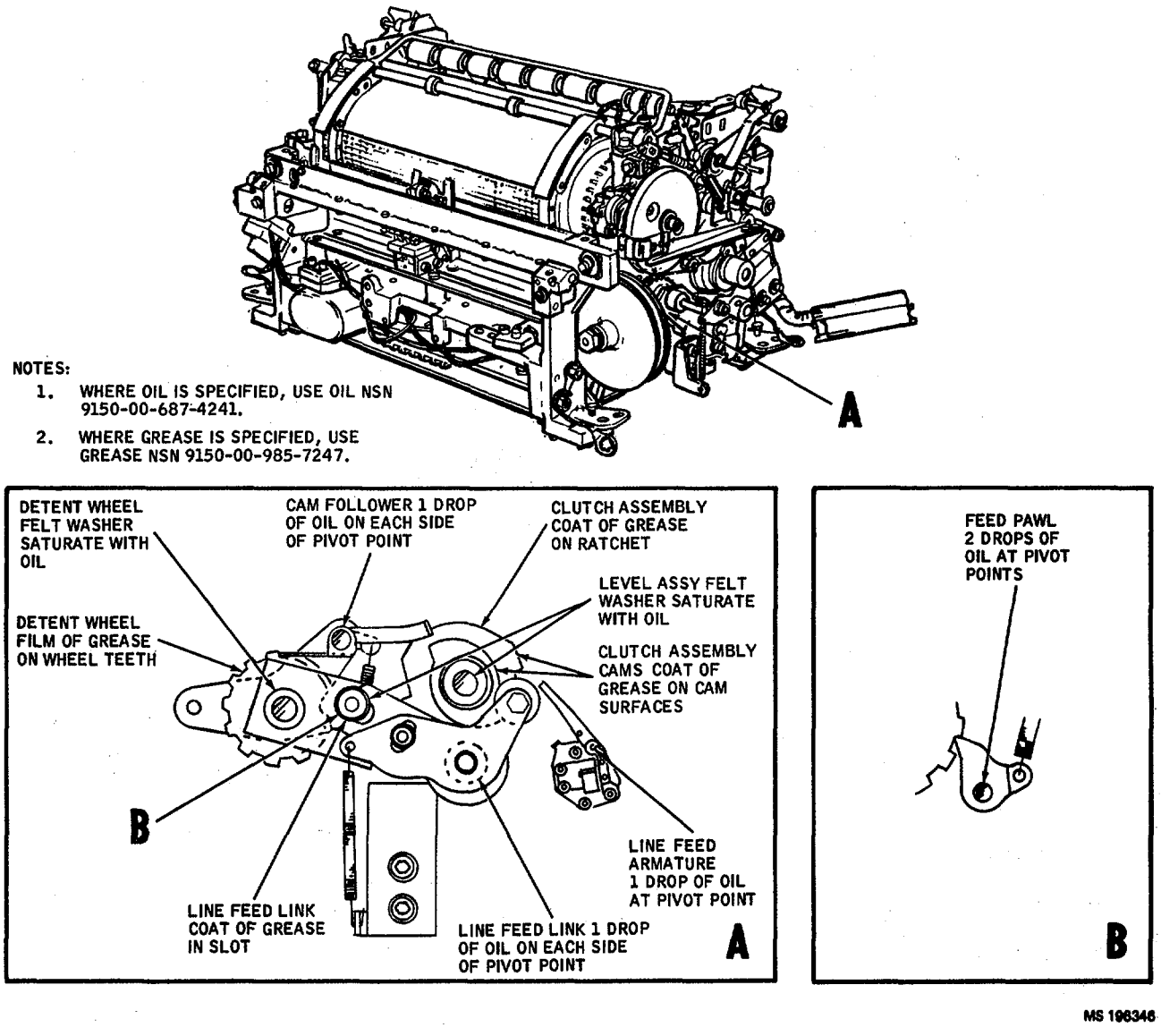


Figure 5-3. Semiannual Lubrication Chart

Section III. TROUBLE SHOOTING

5-8. **General** When troubleshooting, use a systematic approach. Consider trouble as occurring In either the power distribution system electronic or mechanical functions. Power distribution troubles may be In the de power supply, the ac input circuits, or the so source outlet.

5-9. Troubleshooting Procedures. Table 5-4 lists the most common printer set failures together with the probable cause of the trouble and the corrective action to be taken. Both electrical and mechanical troubles are listed. As an aid to troubleshooting, references are given in the probable trouble column to the applicable theory of operation paragraph. Although several probable causes are given for most troubled, all of these may not occur at the same time. Determine which cause applies to the particular situation being investigated. Where reference is made to a circuit card, always check the mating pins on the circuit card and card cage for evidence of corrosion. Parenthetical references to figures and paragraphs indicate the locations of adustment and repair procedures. If trouble is determined to be cabling or wiring, only Interconnecting cable (7) figure 5.17 or cable (5) figure 5-19 may be replaced at organizational maintenance. If the indicated corrective action does not restore the equipment to normal operation, report the deficiency to general support maintenance personnel.

Table 5-4. Organizational Maintenance Troubleshooting Chart

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
1	No printer mechanical or electrical operation	Failure of power source.	Check that power cable to connected.
			Check that power circuit breaker is ON.
			Check ac power fuses Fl and F2 (para 3-18).
		Failure of dc power.	Check fuses F3, F4 and F5 (para 8-13).
2	Motor does not start manually or automatically	Motor control circuit failure (para 4-22).	Check +12v fuse F4 (para 3 13).
			Check motor start switch (table 3-1, fig. 5-21).
			Replace P95 ready/busy receive logic circuit card (para 5-27).
3	Motor starts manually but not automatically	Timing and synchronization circuit failure (para 4-28).	Check cable connections to interface equipment.
			Check ON-LINE/PRINTER switch (table 3-1, fig. 5-21).
			Replace P97 transmit moding logic circuit card (para 5-27).
			Replace P98 EIA interface logic circuit card (para 5-27).
		Motor control circuit failure (para 4-22).	Replace P95 ready/busy receive logic circuit card (para 5-27).

Table 5-4. Organizational Maintenance Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
4	Motor does not stop after approximately 90 seconds of non-use	Motor control circuit failure (para 4-22).	Replace P95 ready/busy receive logic circuit card (para 5-27).
		Drum position control circuit failure (para 4-17).	Replace P96 printer control logic circuit card (para 5-27).
5	Rumbling sound when motor starts	Shipping screws not loosened.	Check shipping screws (para 2-5 steps e and f).
		Drive belt loose.	Adjust drive belt tension (para 5-11).
6	Motor overheats or is under speed	Power distribution mechanism (drive train) out of adjustment (para 4-6).	Check motor clamp adjustment (para 5-12). Aline drive belt pulleys (para 5-13).
7	No ribbon feed or ribbon reverse	Inking ribbon mechanism failure (para 4-9).	Adjust ribbon reverse eccentric pins (para 5-20).
8	Light type character density	Inking ribbon worn out.	Replace inking ribbon (para 3-12).
		Printing mechanism dirty.	Clean and lubricate hammer block (para 5-6f).
		Paper trough out of adjustment.	Adjust paper trough clearance (para 5-15).
9	Smudged type characters	Printing mechanism dirty.	Clean and lubricate hammer block (para 5-6f).
		Print drum dirty.	Clean print drum (para 5-7).
10	Partial printing of characters either vertically or horizontally	Timing and synchronization circuit or printing mechanism out of adjustment.	Refer equipment to general support for maintenance.
11	Ribbon does not lift for printing either on-line or off-line	Ribbon lift circuit failure (para 4-21).	Replace P95 ready/busy receive logic circuit card (para 5-27).
		Timing and synchronization circuit failure (para 4-23).	Replace P96 printer control logic circuit card (para 5-27). Replace P97 transmit moding logic circuit card (para 5-27).
		Keyboard circuit failure (para 4-14).	Replace P100 ASCII keyboard control circuit card (para 5-30). Replace P102 communications keyboard (para 5-29).
12	Ribbon does not lift for printing a received message (only)	Timing and synchronization circuit failure (para 4-23).	Replace P95 ready/busy receive logic circuit card (para 5-27). Replace P98 EIA interface logic circuit card (para 5-27).

Table 5-4. Organizational Maintenance Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
13	No print hammer action - either on line or off-line	Print hammer control, timing and synchronization, drum position control, or print data decode circuit failure (para 4-18, 4-23, 4-17, or 4-16).	Replace printer control logic circuit card (para 5-27).
		Send/receive logic circuit failure (para 4-15).	Replace P95 ready/busy receive logic circuit card (para 5-27). Replace P97 transmit moding logic circuit card (para 5-27).
14	No print hammer action off-line (only)	Send/receive logic circuit failure (para 4-15).	Check INHIBIT switch (para 5-32). Check ON LINE-PRINTER switch (fig. 5-21). Replace P97 transmit moding logic circuit card (para 5-27).
		Keyboard circuit failure (para 4-14).	Replace P100 ASCII keyboard control circuit card (para 5-30). Replace P102 communications keyboard (para 5-29).
15,	No print hammer action from a received message (only)	Send/receive logic failure (para 4-15).	Check ON-LINE PRINTER switch (table 3-1, fig. 5-21). Replace P98 EIA interface logic circuit card (para 5-27).
16	No transmission of print data	Send/receive logic or keyboard circuit failure (para 4-14 or 4-15	Check ON-LINE PRINTER switch (table 3-1, fig. 5-21). Check REQ SEND switch S4 (fig. 5-21). Check cable connections to interface equipment. Replace P98 EIA interface logic circuit card (para 5-27).
17	Incorrect print character selection	Keyboard circuit failure (para 4-14).	Replace P102 communications keyboard (para 5-29). Replace P100 ASCII keyboard control circuit card (para 5-30).
		Send/receive logic failure (para 4-15).	Replace P97 transmit moding logic circuit card (para 5-27). Replace P95 ready/busy receive logic circuit card (para 5-27).
		Print data decode, drum position control, or print hammer control circuit failure (para 4-16, 4-17, or 4-18).	Replace P96 printer control logic circuit card (para 5-27).
		Main clock or index clock out of adjustment.	Refer equipment to general support for maintenance.

Table 5-4. Organizational Maintenance Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
18	Carriage does not space	Line space, print data decode, timing and synchronization or print hammer control circuit failure (para 4-19, 4-16, 4-23, or 4-18).	Replace P96 printer control logic circuit card (para 5 27).
		Printing mechanism failure	Refer equipment to general support for maintenance.
19	Carriage skips spaces	Printing mechanism out of adjustment.	Refer equipment to general support for maintenance.
20	Paper does not feed manually (para 3-2)	Pressure selector in wrong slot or automatically	Check that pressure selector is in proper slot or not latched. Check that pressure finger levers are latched (para 3-2).
		Line feed circuit failure (para 4-20).	Replace P96 printer control logic circuit card (para 5-27).
21	Paper does not feed manually) (only	Line feed, print data decode, or print hammer control circuit failure (para 4-20, 4-16, or 4-18).	Check LF switch (table 3-1, fig.5-21). Replace P96 printer control logic circuit card (para 5-27).
		If paper feeds from LF switch action but not from keyboard LINE FEED key; print data decode, send/receive logic or keyboard circuit failure (para 4-16, 4-15 or 4-14).	Replace P102 communications keyboard (para 5-29). Replace P100 ASCII keyboard control circuit card (para 5-30). Replace P96 printer control logic (para 5-27). Replace P97 transmit moding logic (para 5-27). Replace P95 ready/busy receive logic circuit card (para 5-27).
22	CLEAR SEND indicator does not light when REQ SEND is pressed	Send/receive logic or keyboard circuit failure (para 4-14 or 4-15).	Check REQ SEND switch S4 (fig. 5-21). Check CLEAR SEND indicator DS5 and lamp driver Al (fig. 5-21). Check cable connectors to interface equipment.
23	Paper does not feed automatically	Line feed circuit failure - (para 4-19). Right hand margin switch or printing mechanism out of adjustment.	Replace P96 printer control logic circuit (para 5-27). Refer equipment to general support for maintenance.

Table 5-4. Organizational Maintenance Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
24	Paper bunches up or tears	Pressure selector in wrong slot.	Check that pressure selector is in correct slot (table 3-2).
		Front or rear paper guides out of adjustment.	Adjust front and/or rear paper guide(s) (para 5-16 and 5-17).
		Paper trough out of adjustment.	Adjust paper trough (para 5-15).
		Paper tension bar or paper guide rollers out of adjustment.	Adjust paper tension bar and/or paper guide rollers (para 5-18 and 5-19).
		Paper pressure fingers too loose or tight or not aligned with paper drive friction ring.	Refer equipment to general support for maintenance.
25	Excessive paper roll endplay	Right-hand plate leaf spring out of adjustment.	Adjust right-hand plate leaf spring (para 5-14).
26	Paper roll does not stay in mounting	Paper latches not spring loaded.	Replace latch spring(s) (para 5-35).
27	Carriage does not return to left-hand margin manually or automatically	Carriage return circuit failure (para 4-8).	Replace P96 printer control logic circuit card (para 5-27).
		Printing mechanism mechanical failure.	Refer equipment to general support for maintenance.
28	Carriage does not return to left-hand margin manually (only)	Carriage return circuit failure (para 4-19).	Check CR switch (table 3-1, fig. 5-21).
		If carriage returns from CR switch action but not from keyboard RETURN key action; print data decode, send/ receive logic, or keyboard circuit failure (para 4-16, 4-15, or 4-14).	Replace P102 communications keyboard (para 5-29).
			Replace P100 ASCII keyboard control circuit card (para 5-30).
			Replace P96 printer control logic circuit card (para 5-27).
			Replace P97 transmit moding logic circuit card (para 5-27).
			Replace P95 ready/busy receive logic (para 5-27).
29	Carriage does not return automatically when commanded by interface equipment	Send/receive logic failure (para 4-15).	Check ON-LINE PRINTER switch (table 3-1, fig. 5-21).
			Replace P98 EIA interface logic circuit card (para 5-27).
			Replace P95 ready/busy receive logic circuit card (para 5-27).
30	72 characters per line cannot be printed	Printing mechanism out of adjustment.	Refer equipment to general support for maintenance.
31	Cover release knob binds	Cover release knob out of adjustment.	Adjust cover release knob clearance (para 5-21).

Table 5-4. Organizational Maintenance Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
82	Cover does not latch	Latch block out of adjustment or latch spring defective.	Adjust latch block (para 5.22). Replace latch spring (para 5-86).
88	Cover binds	Cover hinge rod or bracket out of adjustment.	Adjust cover hinge rod and bracket (para 5- 28).
84	No paper out alarm when paper supply is low or out.	Alarm circuit failure (para 4.24).	Replace PAPER OUT lamp DS4. Refer equipment to general support for maintenance.
85	Paper out alarm sounds with adequate paper supply.	Low paper alarm switch out of adjustment	Refer equipment to general support for maintenance.

Section IV. ADJUSTMENTS

5-10. General. This section describes organizational maintenance adjustment procedures and tolerance requirements for the printer. When making specific adjustments, check and, if necessary, perform all related adjustments. If the adjustments do not restore the printer to normal operation, refer the equipment to general support maintenance.

5-11. Drive Belt Tension Adjustment (fig. 5-4).

a *Requirement.* The drive belt must be as loose as possible without slipping when the motor is turned on.

b. *Adjustment.* To adjust drive belt tension, proceed as follows:

NOTE

If motor is not clamped tightly, refer to paragraph 5-12 and tighten motor clamps.

(1) Loosen the idler mounting screw.
(2) Place drive belt on power shaft pulley, tooth on tooth.
(3) Position idler snug against drive belt and tighten screw.

CAUTION

The idler must not touch the motor drive pulley.

(4) Engage belt on pulley and turn motor on to check requirement.

5-12. Motor Clamp Adjustment (fig. 6-6).

a. *Requirement.* The clamps must hold the motor from turning when the motor stops or starts. The clamps must not cause the motor to bind lose speed). There must be a 3/32- to 1/8-inch clearance between the clamps.

b. *Adjustment*

(1) Remove the printer chassis from the printer case (para 5-34).
(2) Position nut and screw to obtain clearance requirement between motor clamps.
(3) Operate unit and check binding requirement.
(4) Position nut and screw as necessary to meet requirements.
(5) Adjust drive belt tension (para 5-11).
(6) Install printer chassis in printer case (para 5-34).

5-13. Drive Belt Alinement (fig. 5-6).

a. *Requirements*

(1) The motor pulley, power shaft pulley and print drum pulley must be in line with the carriage return pulley (visual check).

(2) The driving belt must fully engage the power shaft pulley and carriage return pulley and ride properly in the flanged pulleys when the printer is operating.

b. *Adjustment*

(1) Loosen the two motor pulley setscrews.
(2) Position the motor pulley to meet requirement 1; tighten the two setscrews in the pulley.
(3) Loosen the two print drum pulley setscrews.
(4) Position the print drum pulley to meet requirement 1; tighten the two setscrews.
(5) Reposition the pulleys, if necessary, to meet requirement 2.
(6) Recheck the requirements.

5-14. Paper Shaft End Play Adjustment (fig. 5-7).

a *Requirement.* With the paper shaft removed from the printer, there must be a clearance of 1/16 to 1/ 8 inch between the spring and the printer frame.

b. *Adjustment.* To eliminate paper shaft end play, proceed as follows:

(1) Remove paper shaft from printer frame.
(2) At spring contact point with printer frame, form spring to obtain a clearance of 1/16 to 1/8 inch.
(3) Replace paper shaft.

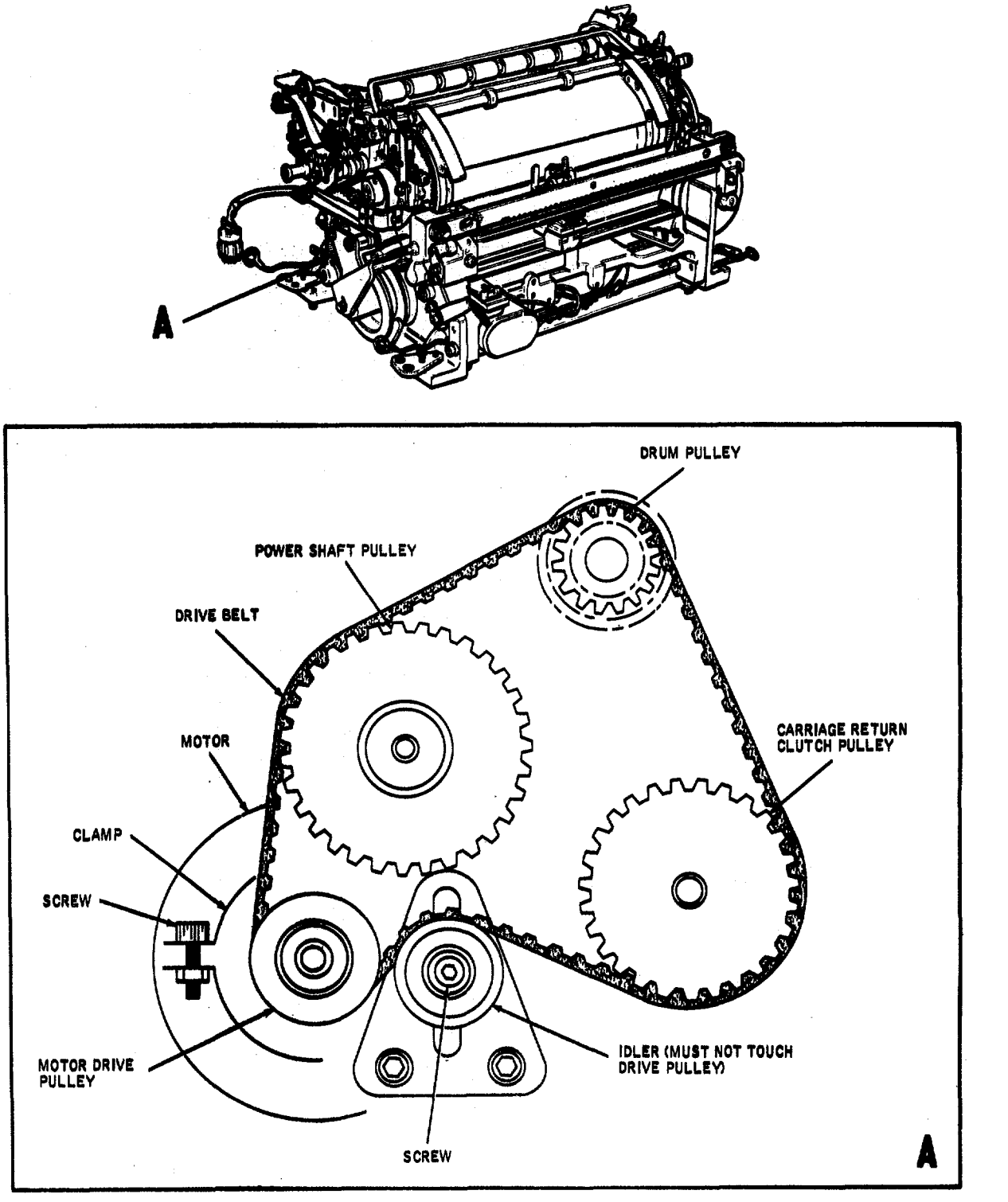


Figure 5-4. Drive Belt Tension Adjustment

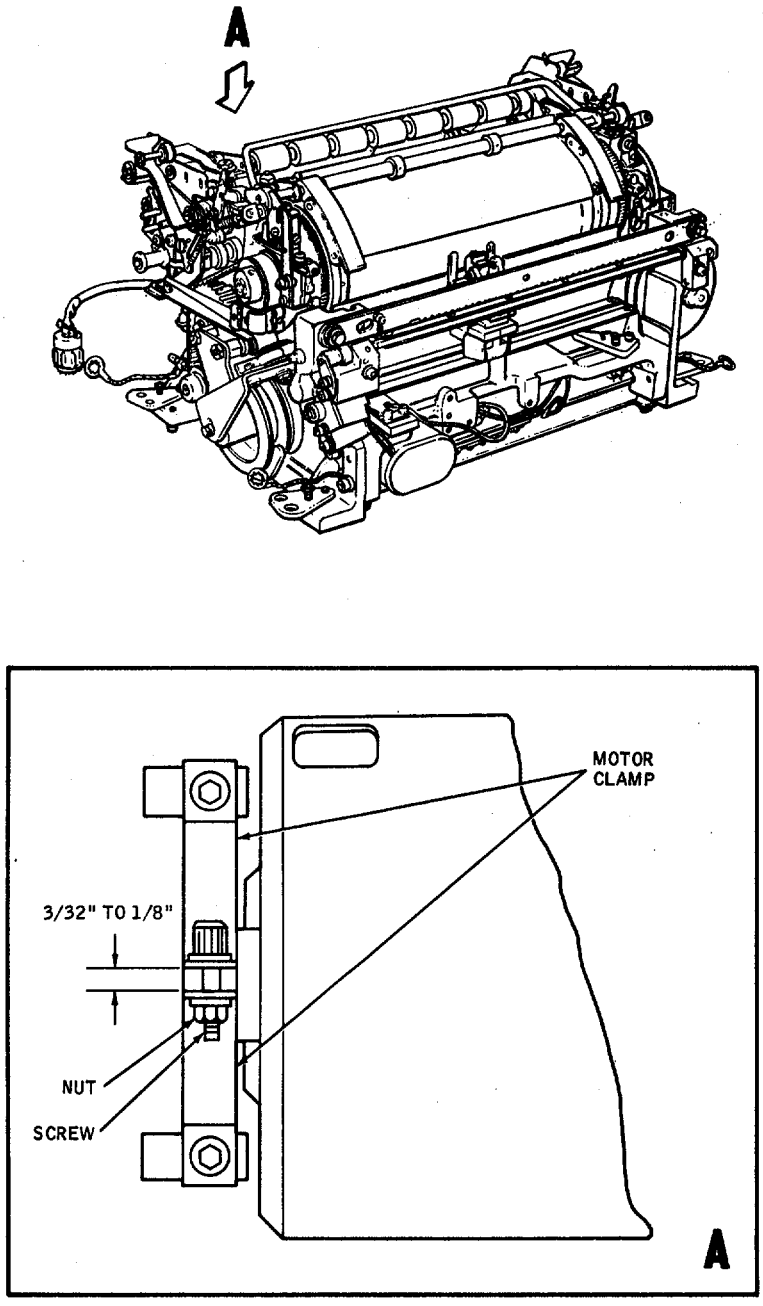


Figure 5-5. Motor Clump Adjustment

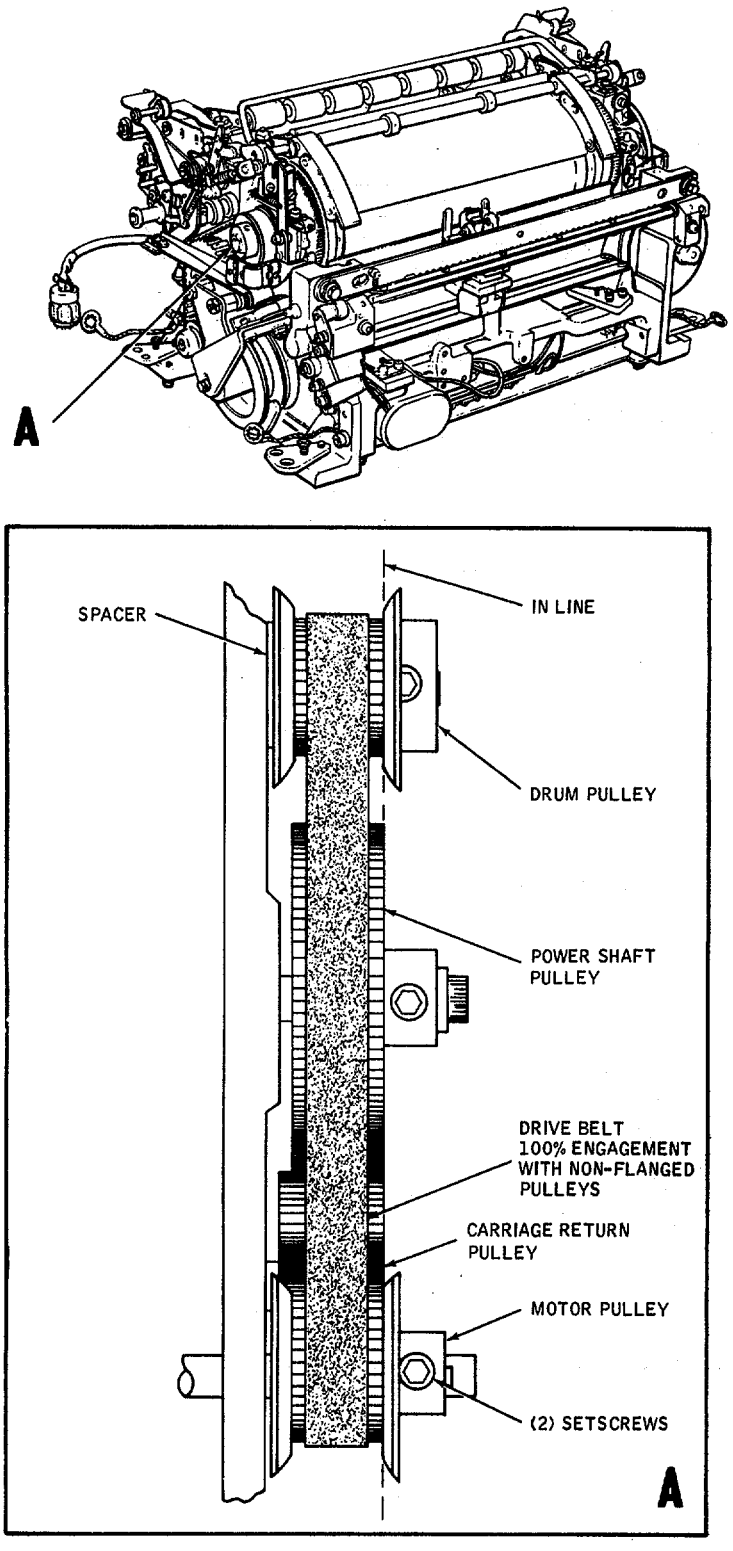
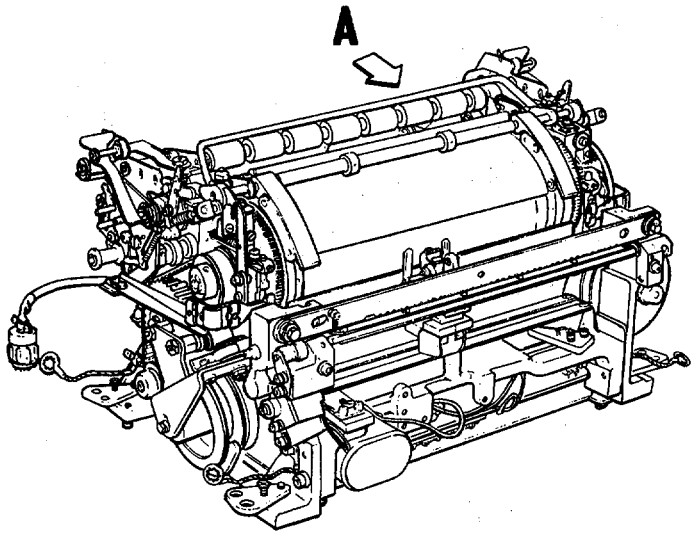


Figure 5-6. Drive Belt Alinement



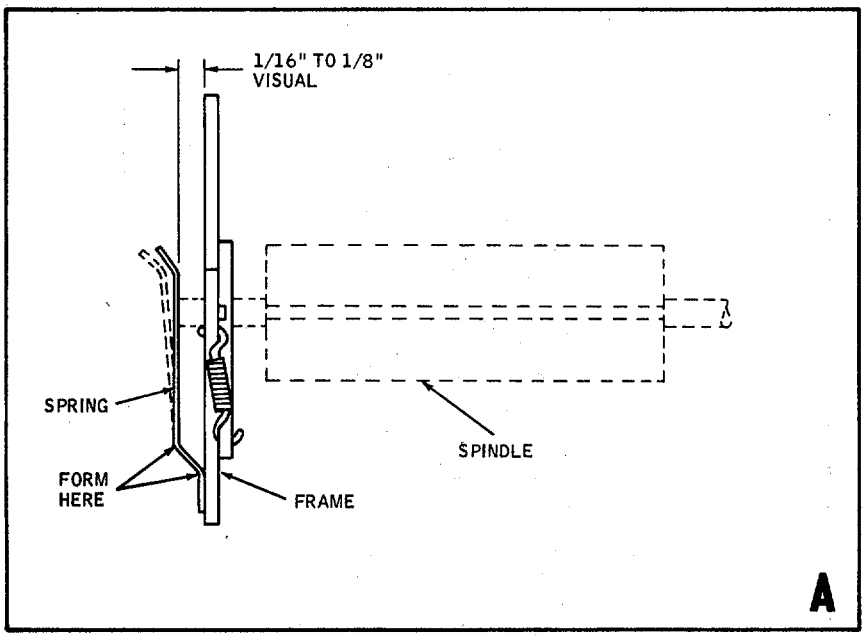


Figure 5-7. Paper Shaft End Play Adjustment

5-15. Paper Trough Clearance Adjustment (fig. 5-8).

a. *Requirement*. There should be a 0.005- to 0.015-inch clearance between the front inside edge of the paper trough and the right and left-hand paper feed wheel assemblies. The paper trough must not touch the feed wheel assemblies or the print drum.

b. *Adjustment*. To adjust the paper trough clearance, proceed as follows:

(1) Adjust the setscrew on each side of the printer frame to obtain a clearance of 0.005 to 0.015 inch clearance with paper feed wheel assemblies.

(2) Spin test the print drum and observe that the paper trough does not touch the print drum.

5-16. Front Paper Plate Lateral Adjustment (fig.5.9).

a. *Requirement.* When the right or left sprocket wheel is held toward the paper guide plate, there must be a minimum of 0.002 inch between the sprocket pins and the paper guide plate.

b *Adjustment.* To laterally adjust the front paper guide plate, proceed as follows:

(1) Loosen the setscrews in the three collars.

(2) Position the front paper guide plate laterally until a minimum clearance of 0.002 inch is obtained from the right- and left-hand sprocket pins.

(3) Tighten the collar setscrews.

NOTE

If front paper guide plate does not conform with the curvature of the sprocket wheels or the lateral adjustment cannot be made, refer equipment to General Support Maintenance.

5-17. Rear Paper Guide Assembly Adjustment (fig. 5-10).

a. *Requirement*. The paper must remain in contact with each feed wheel rubber ring and its pressure finger roller contacting surface.

NOTE

If pressure finger rollers are not positioned properly to make full contact with the feed wheel rubber rings, refer equipment to General Support Maintenance.

b. *Adjustment.* To adjust rear paper guide assembly, proceed as follows:

(1) Back out paper until it is clear of rear paper guide assembly.

(2) Check that paper guide on right side of guide plate is aligned with the stenciled line on the guide plates. If the paper guide is aligned with the stenciled line, proceed to step (3). If the paper guide is not aligned, loosen the paper guide attaching screw and align the paper guide with the stenciled line.

(3) Install paper and check the requirement. If the requirement is not met, note the direction and distance that the paper is off.

(4) Back out paper until it is clear of rear paper guide assembly.

NOTE

The guide plate is spring loaded and will slide to the right when the collar setscrew is loosened. To keep guide plate from sliding, retain with slight finger pressure.

(5) Loosen the collar setscrew and slide the guide plate in the direction and distance noted in step (3); tighten the setscrew.

(6) Install paper and recheck the requirement. If the requirement is not met, repeat steps (3) through (6).

5-18. Paper Tension Bar Adjustment (fig. 5-11).

a. Require*me*nt

(1) The setscrew should extend 3/4 inch +1/32 inch above the left-hand bracket.

(2) The tension bar spring should be compressed to 5/32 inch + 1/32 inch between the two flat washers.

b. *Adjustment.* To adjust paper tension bar, proceed as follows:

(1) Loosen the hexagonal nut.

(2) Turn the setscrew to meet requirement (1) and tighten the nut.

(3) Turn the lock nut to compress the spring to meet requirement (2).

(4) Repeat the adjustment on the right-hand side.

NOTE

One flat washer is not used on the right-hand side because the cam follower guide bracket is installed on the right-hand bracket, and the hexagonal nut locks against the guide bracket.

(5) Check alinement of paper guide rollers and paper tension bar (para 5-19). Aline paper guide rollers, if necessary.

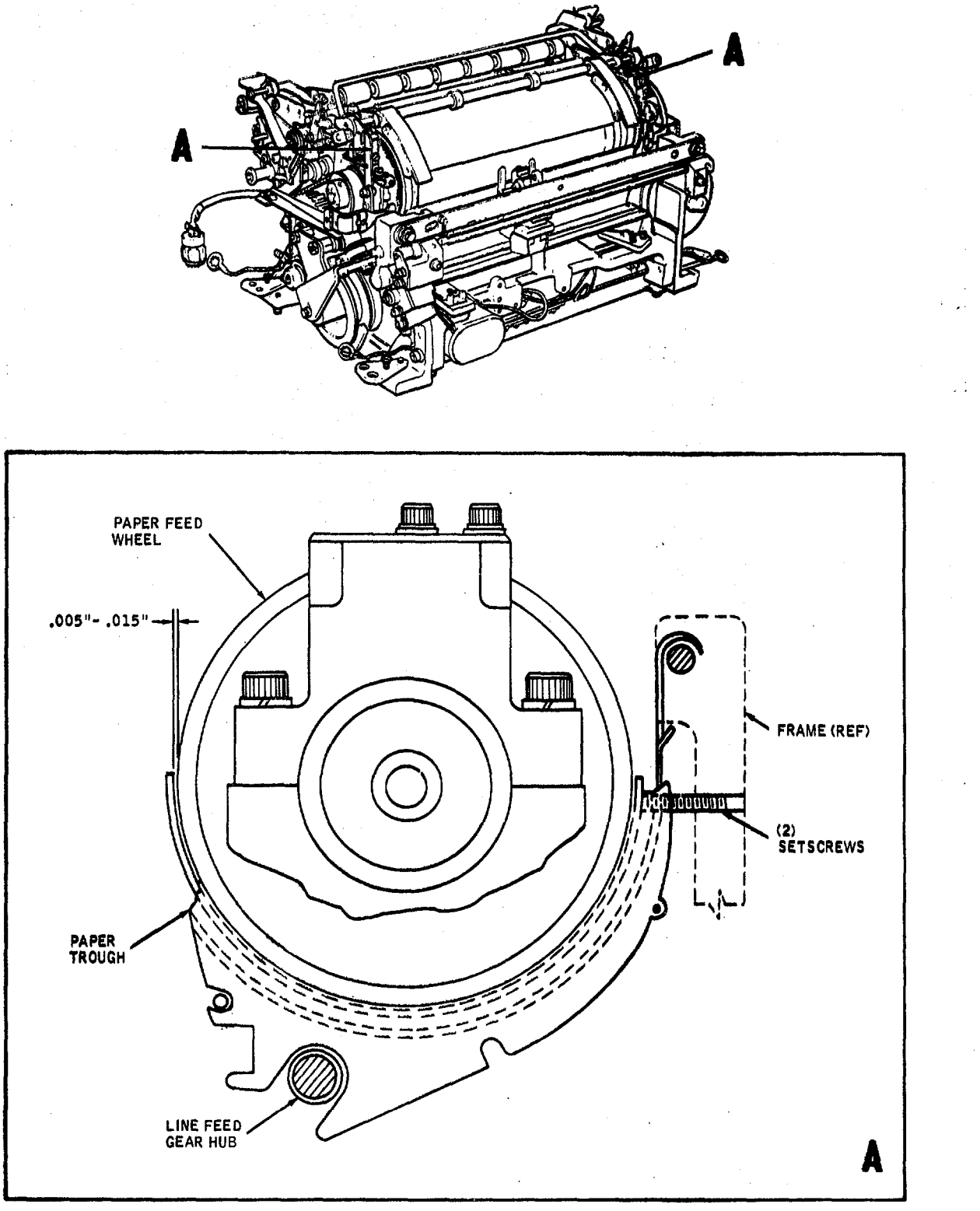


Figure 5-8. Paper Trough Clearance Adjustment

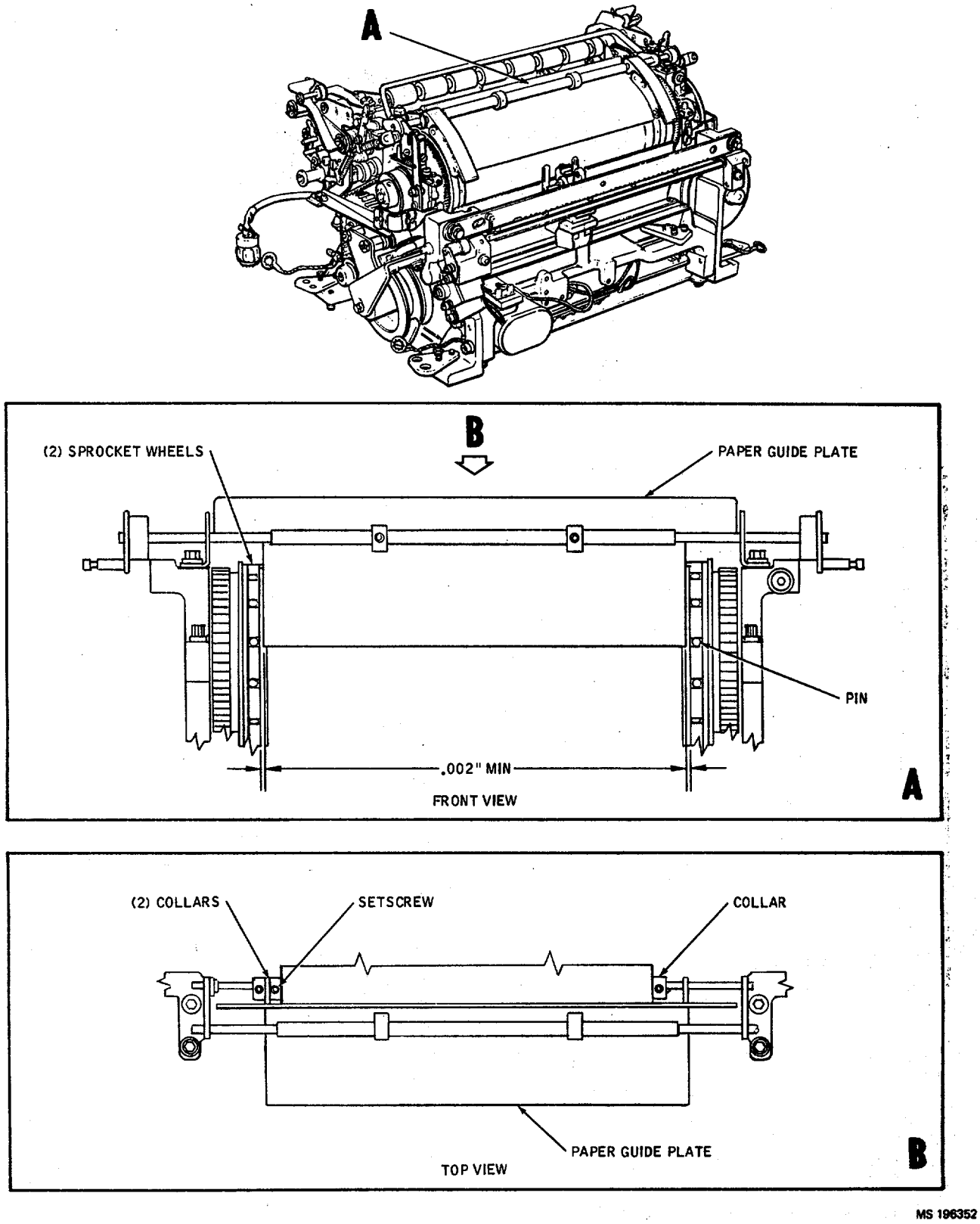


Figure 5-9. Front Paper Plate Lateral Adjustment

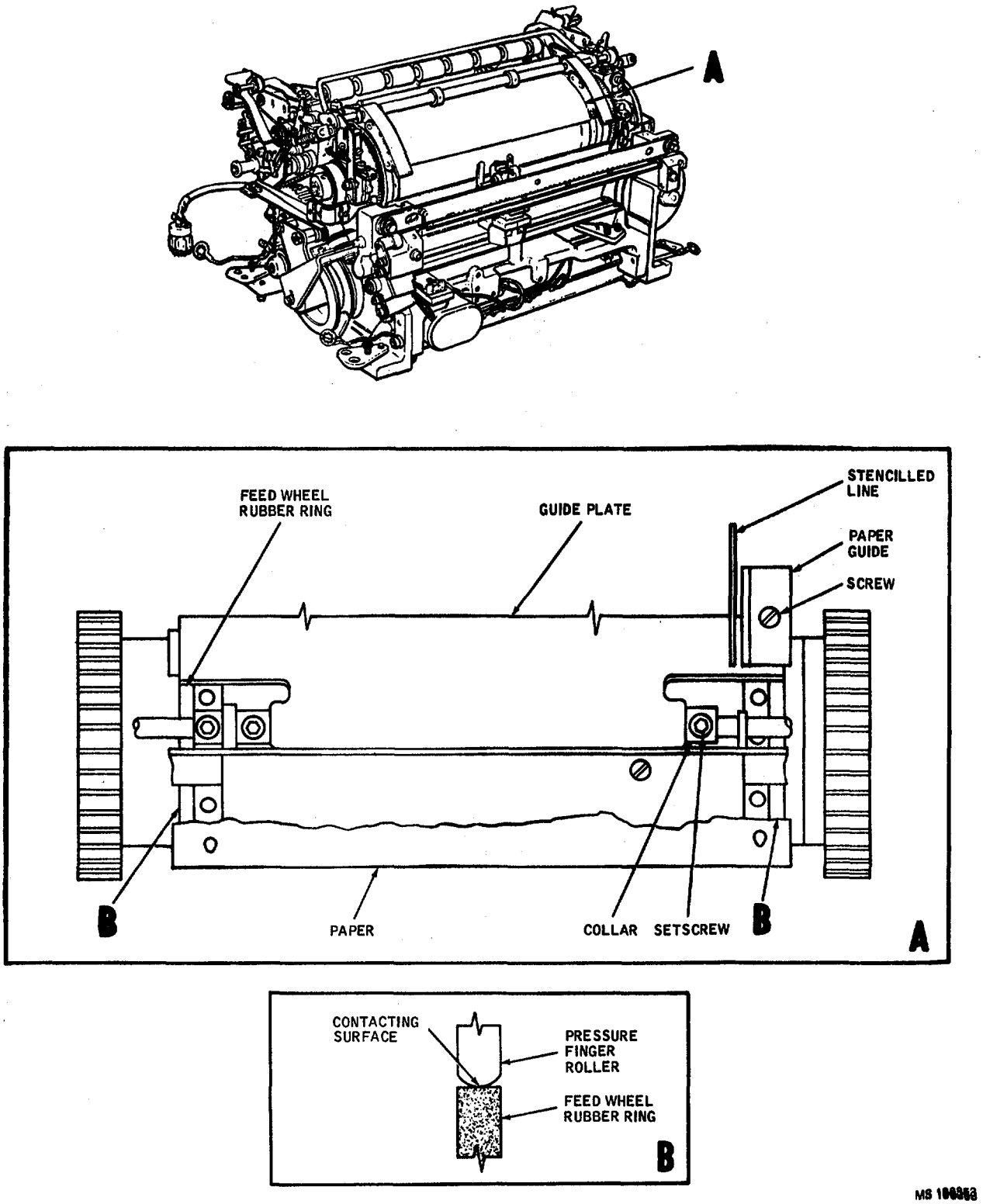
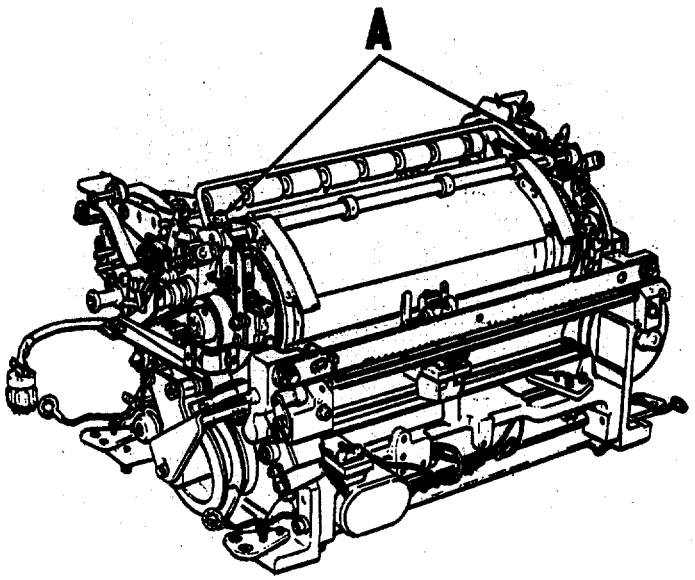


Figure 5-10. Rear Paper Guide Assembly Adjustment



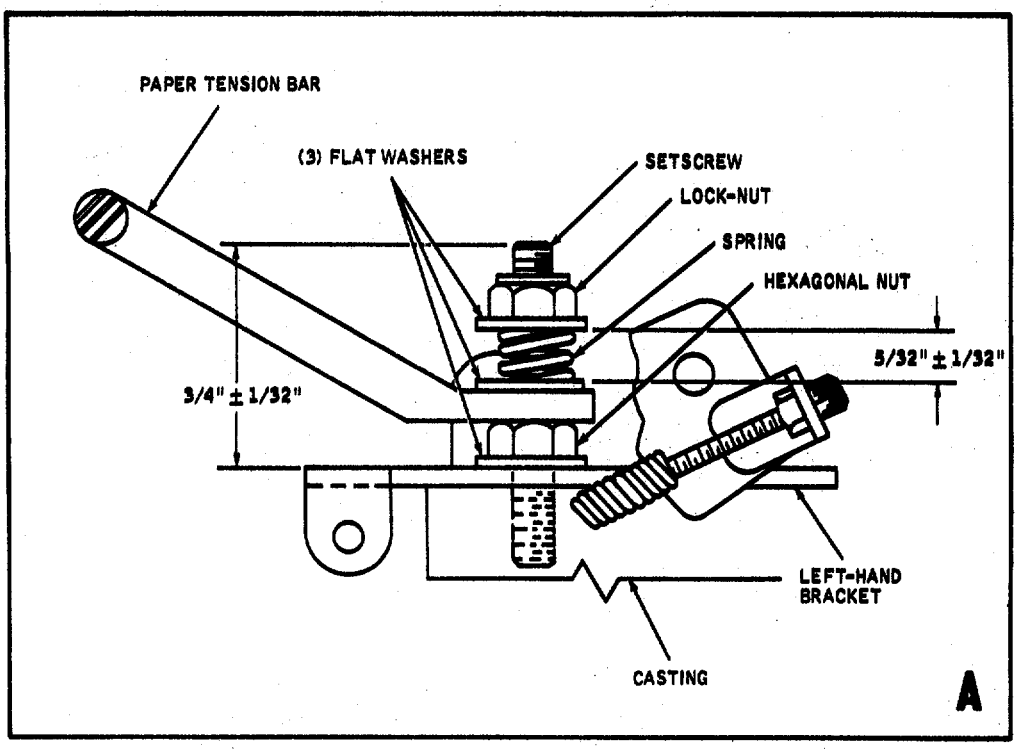


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Figure 5-11. Paper Tension Bar Adjustment

5-19. Paper Tension Bar and Guide Roller Alignment (fig. 5-12).

a. *Requirement* The outer paper guide roller on each side of printer should have a 75 percent minimum contact with the paper tension bar without altering the normal position of the bar.

NOTE

Check adjustment of the paper tension bar prior to performing this alignment. Refer to paragraph 5-18.

b. .Alignment To aline the guide rollers with the paper tension bar, proceed as follows:

(1) Loosen the slotted head screw that secures the ribbon feed assembly to the printer frame.
(2) Loosen the hex head screw that secures the inner plate to the printer frame.
(3) Position the ribbon feed assembly so that the paper guide rollers contact the paper tension bar, but do not move it.
(4) Tighten the inner plate and ribbon feed assembly mounting screws.
(5) Repeat steps (1) through (4) on the opposite side of the printer, if necessary, to meet the requirement.
(6) Recheck the requirement.

5-20. Ribbon Reverse Lever Adjustment (fig. 5-13).

a. *Requirement*. When either dog assembly is engaged with the teeth on its associated ribbon spool shaft assembly there should be a 0.002 to 0.010-inch clearance between the eccentric pin and the associated dog assembly.

b. Check, To check the ribbon reverse lever adjustment, proceed as follows:

(1) Set POWER switch to OFF.
(2) Determine which ribbon shaft assembly is being driven.
(3) Manually turn power train (either at a drive pulley or at the motor blower) until a dog tooth is opposite the eccentric pin.
(4) Check requirement with a wire feeler gage. If necessary adjust eccentric pin for proper clearance.
(5) Disengage the eccentric pin from the dog assembly of the driven ribbon shaft by lightly lifting up the ribbon retainer.
(6) Lightly depress sensing arm of the ribbon shaft assembly to be checked to engage eccentric pin with dog assembly.
(7) Slide ribbon feed drive shaft toward ribbon shaft assembly to be checked.
(8) Repeat steps (3) and (4) for second ribbon shaft assembly.

c. *Adjustment* To adjust ribbon reverse lever, proceed as follows:

(1) Loosen nut securing the eccentric pin.
(2) Hold the reverse lever away from the dog assembly.
(3) Position the eccentric pin in the direction of maximum eccentricity and then position the eccentric pin to meet the requirement and tighten the nut.

5-21. Printer Cover Release Knob Adjustment (fig. 5-14).

a. *Requirement* The cover release knob must rotate without binding and must be flush with the, inside of the cover + 1/32 inch.

b. Adjustment To adjust the cover release knob, proceed as follows:

(1) Loosen the two bracket screws and positic the bracket to meet the requirement.
(2) Tighten the two bracket screws.
(3) If necessary, repeat procedure for the opposite side.

5-22. Printer Cover Latch Adjustment (fig. 5-15).

a. *Requirement,* The latch block must retain the latch lever when the cover is in the closed position.

b. *Adjustment* To adjust the cover latch, proceed as follows:

(1) Remove the screw and lockwasher securing the latch block and remove the latch block.
(2) Raise or lower the stud as required.
(3) Install the latch block and secure with crew and lockwasher.
(4) Recheck the requirement. Repeat adjustment, if necessary
(5) If necessary, repeat procedure for the opposite side.

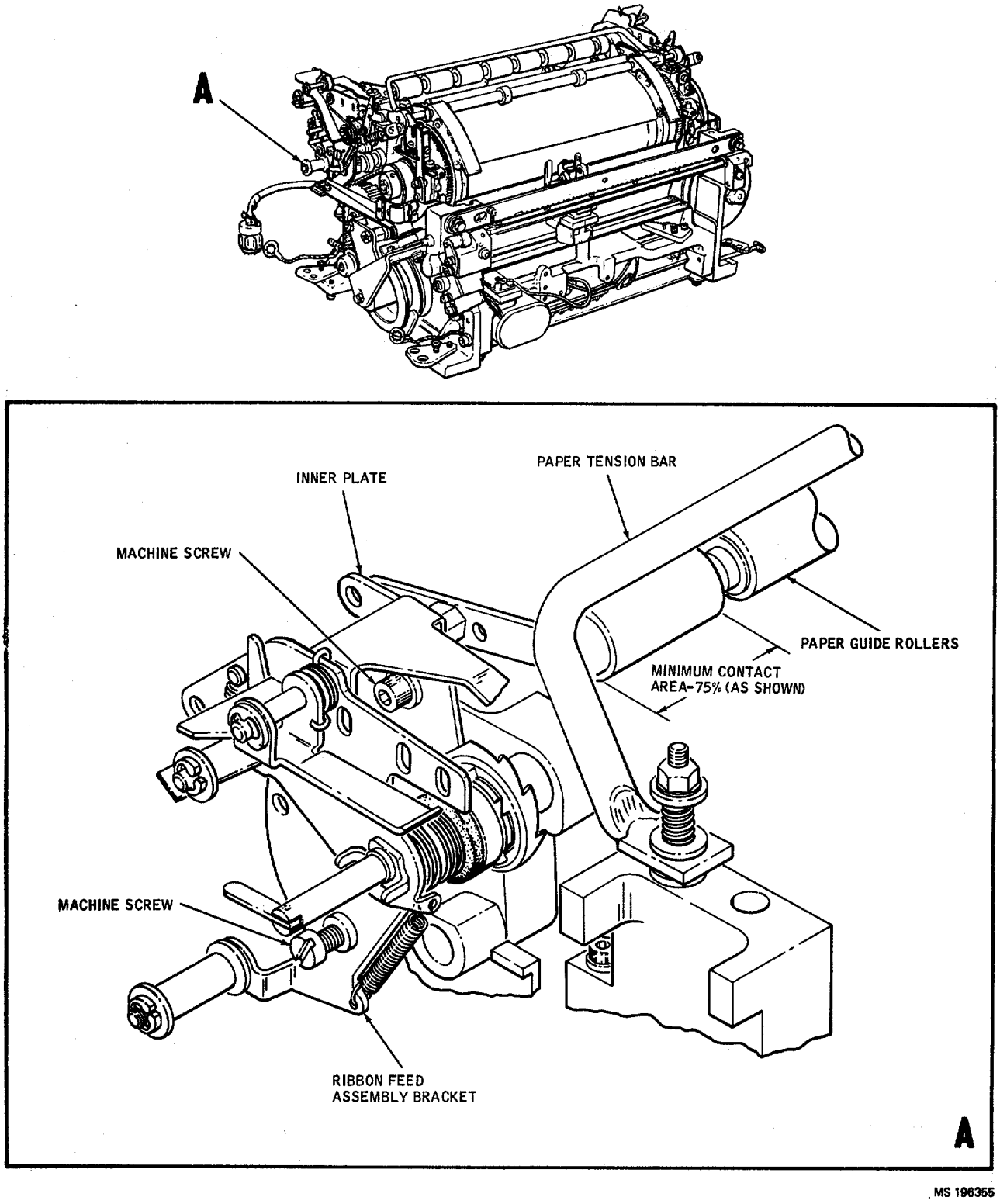


Figure 5-12. Paper Tension Bar and Paper Guide Roller Alinement

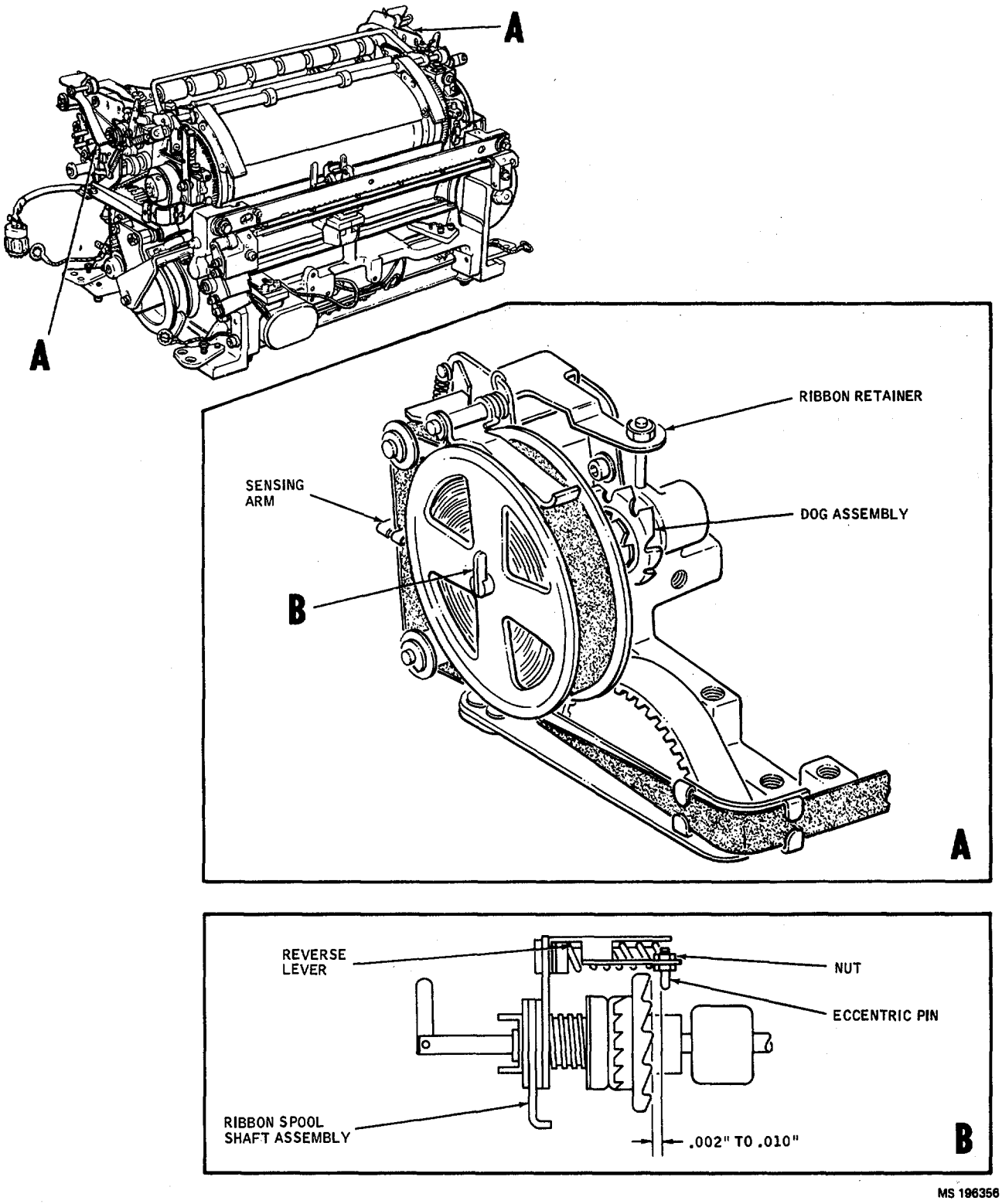


Figure 5-13. Ribbon Reverse Lever Adjustment

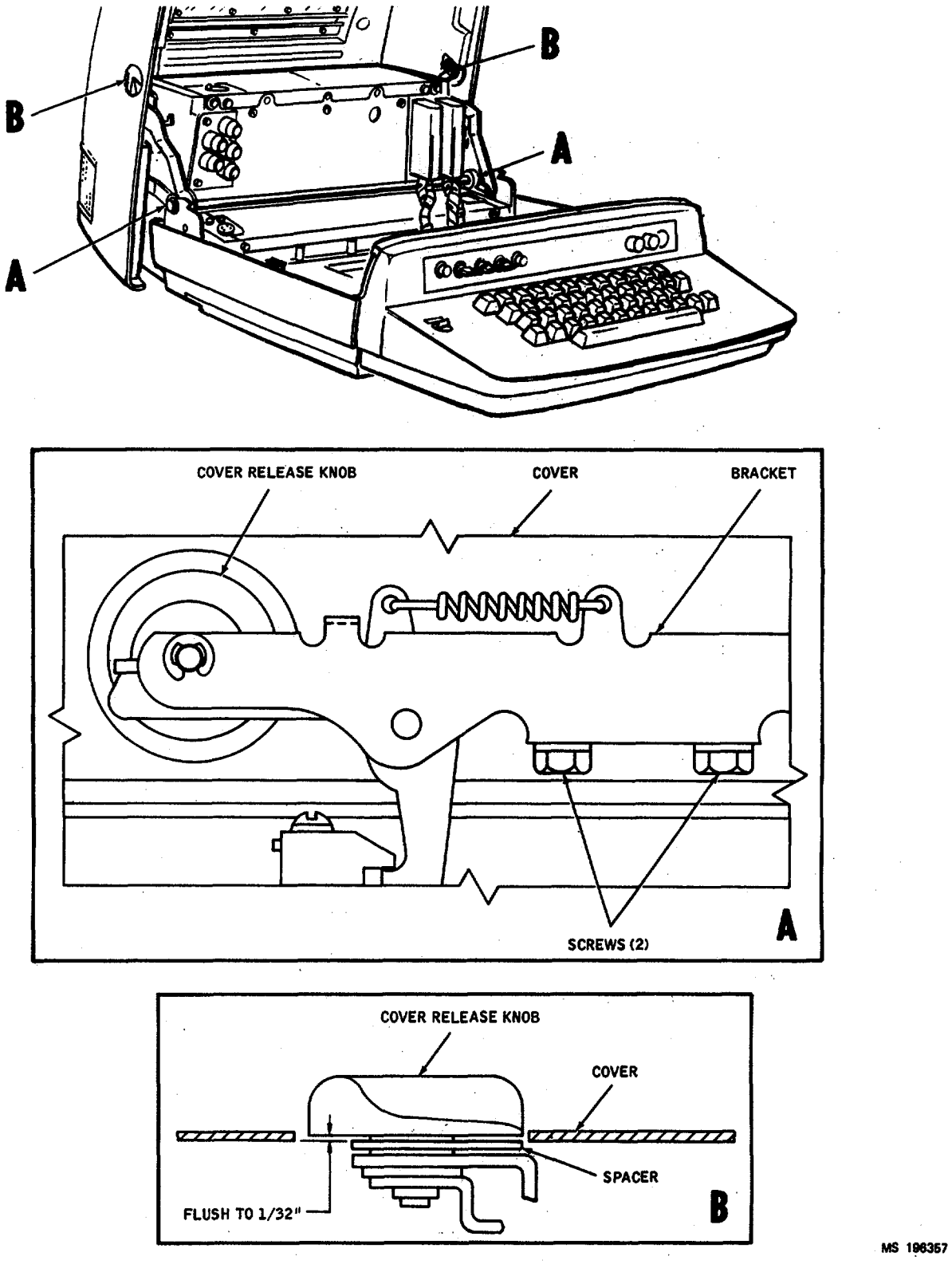


Figure 5-14. Printer Cover Release Knob Adjustment

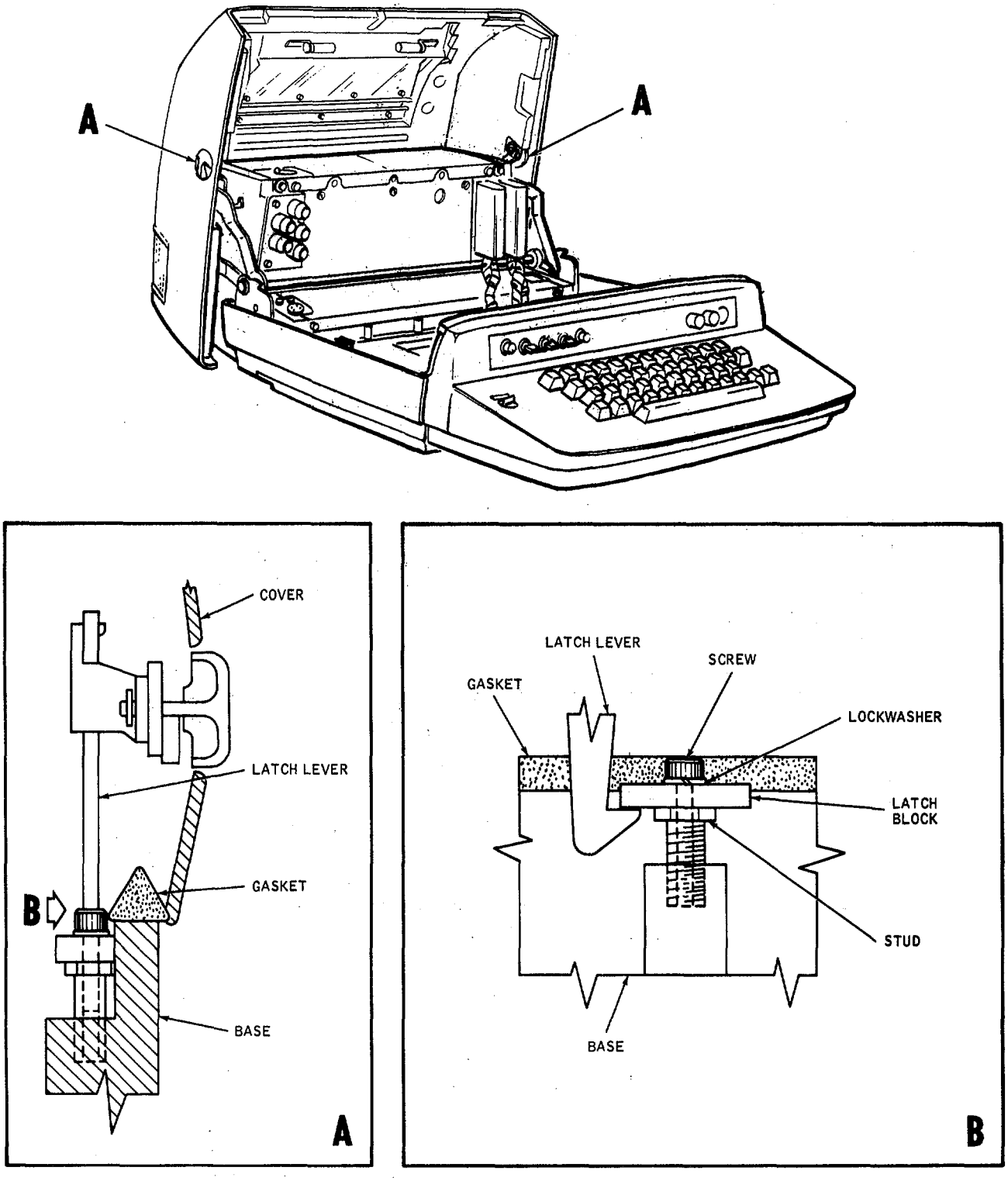


Figure 5-15. Printer Cover Latch Adjustment

5-23. Printer Cover Hinge Rod and Bracket Adjustment (fig. 6-16).

a. Requirement

(1) There should be 0.002 to 0.010 inch clearance between the hinge bracket and the support arm bracket.

(2) The rear of the printer cover should be centered over the electronic unit within 1/16 inch. The front of the cover should be centered on the keyboard base within 1/16 inch.

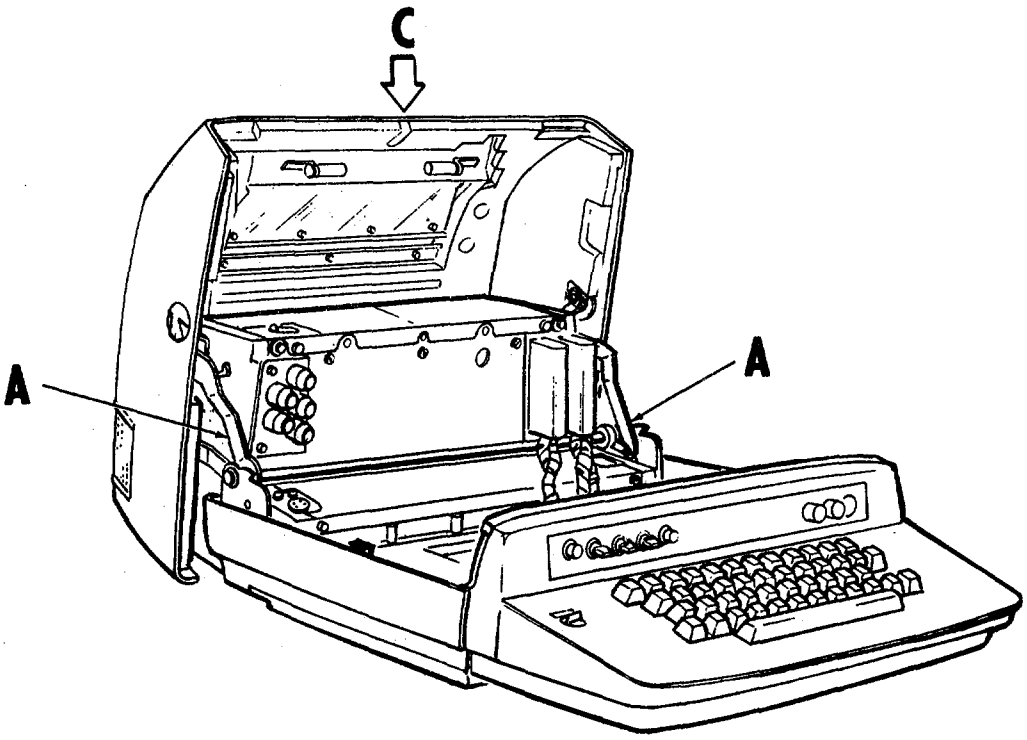
b. Adjustment. To adjust printer cover hinge rod and bracket, proceed as follows:

(1) Remove printer chassis from printer case (para 5-34).
(2) Partially lower printer cover to gain access to the rear (top) setscrews on the support arm collar. With a 3/32-inch hex screwdriver, loosen the setscrews.
(3) Raise the printer cover to the full open position.
(4) Loosen the remaining (front) setscrews on the support arm collars.
(5) Loosen the four support arm bracket screws.

NOTE

If right-rear support arm bracket screw cannot be addressed, remove screw securing copy lamp cable connector and disconnect connector.

(6) Position the hinge brackets against the retaining rings and tighten the front setscrews on the support arm collars friction tight.
(7) Position the support arm brackets to meet requirement (1) and tighten the setscrews.
(8) Partially lower printer cover to gain access to the top setscrews on the support arm collars and tighten the setscrews.
(9) Raise the printer cover to the full open position.
(10) Tighten the front support arm bracket screws friction tight. Do not tighten the rear screws.
(11) Lower the printer cover, but do not latch.
(12) Position the printer cover to meet requirement (2).
(13) Carefully lift the printer cover so as not to disturb the printer cover position.
(14) Tighten the two front support arm bracket screws and then the rear screws.
(15) Recheck requirement (2). If necessary, loosen the support arm bracket screws and reposition the printer cover until requirement (2) is met.
(16) If disconnected, reconnect copy lamp cable connector.
(17) Install printer chassis in printer case (para 5-34).



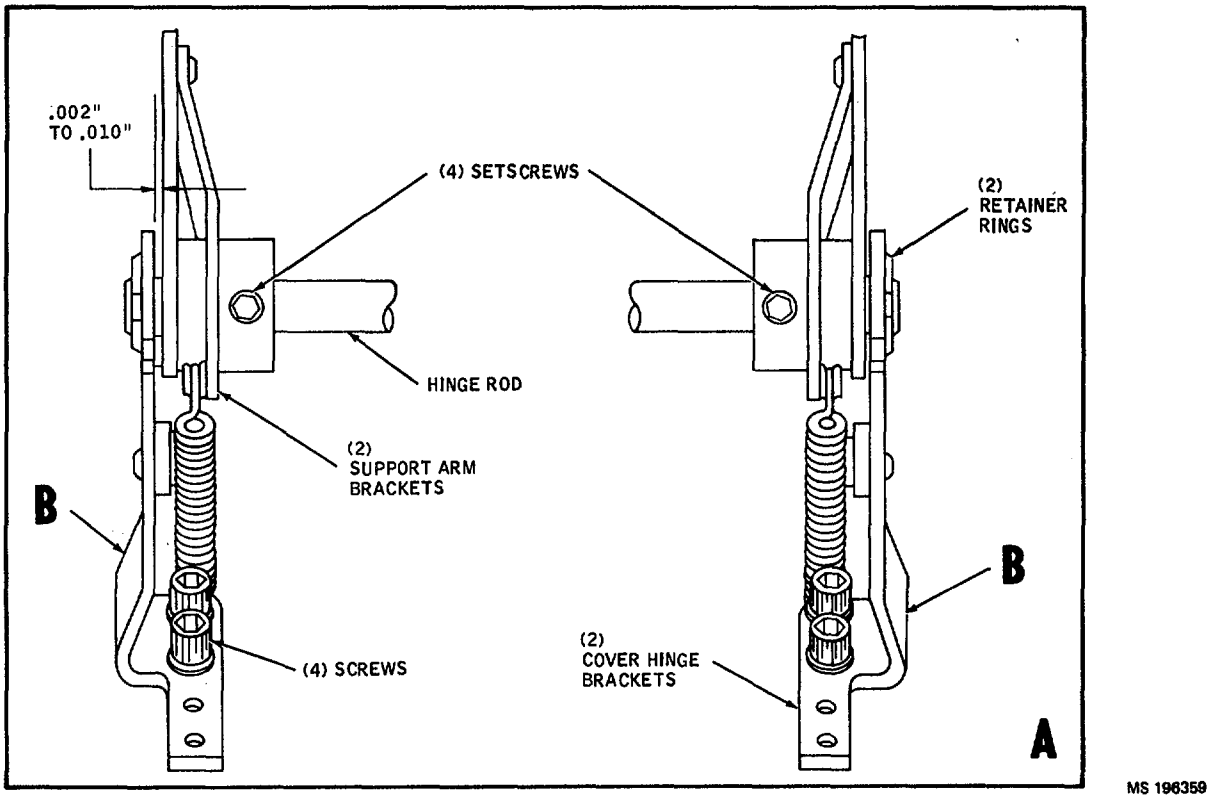


Figure 5-16. Printer Cover Hinge Rod and Bracket Adjustment (Sheet 1 of 2)

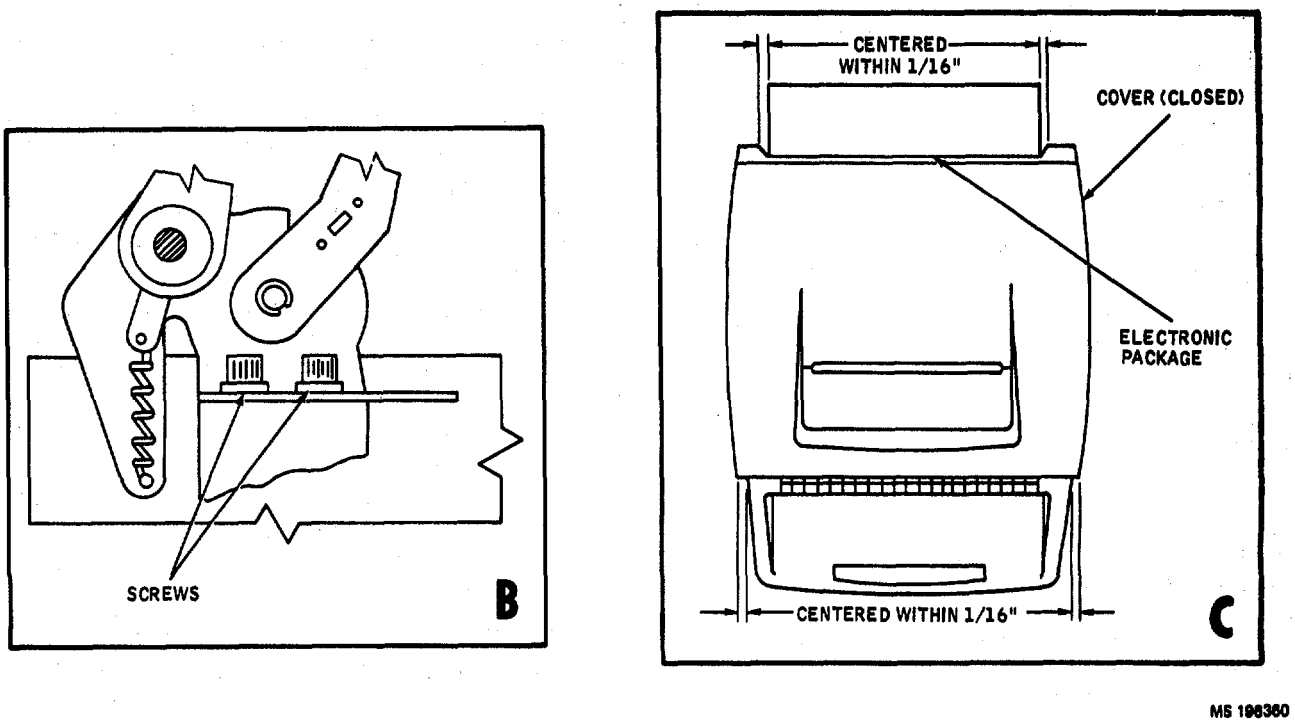


Figure 5-16. Printer Cover Hinge Rod and Bracket Adjustment (Sheet 2 of 2)

Section V. REMOVAL AND REPLACEMENT PROCEDURES

5-24. General.

a. This section contains removal and replacement procedures of assemblies and components authorized for replacement at organizational maintenance.

b. Except in extreme emergency, all repairs should be made by personnel thoroughly trained in teletypewriter maintenance. Equipment operating with minor faults may fail completely as the result of efforts by inexperienced personnel to correct apparently simple defects.

c. Follow the inspection, cleaning, and lubrication instructions given in paragraphs 5-3 through 5-7.

5-25. General Removal and Replacement Procedures.

a. Re*mov*al

(1) Disconnect the power and signal line connections to the printer.

(2) Open the dust cover, and remove the inking ribbon and paper from the printer.

(3) The printer chassis may be removed from the base for lubrication or other maintenance (para 5-34).

(4) The keyboard may be removed from the base for lubrication or other maintenance (para 5-28).

b. *Replacement*

(1) Replace all worn or broken parts that cause malfunctioning of the printer, and adjust them in accordance with the directions in the appropriate paragraph in Section IV of this chapter. 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 printer.

(2) Tighten all screws, nuts, and bolts. Coat all steel screws with anti-seize compound before installing in aluminum or magnesium alloy castings.

(3) When installing parts on shafts using setscrews, make sure the setscrew seats in the flat on the shaft.

(4) Some bent and distorted parts may be restored to shape and reused provided no cracks result from straightening or hardened surfaces have not been softened by repairs.

(5) If the locking edges of lockwashers are rounded, install new lockwashers. Replace screws or nuts that have damaged heads or threads.

5-26. Removal and Replacement of Printer Mounting Plate Components (fig. 5-17).'

a. *Remova*l To remove printer mounting plate components, proceed as follows:

(1) Loosen captive screws attaching connector P1 (6) to teletypewriter (1) connector J2 and disconnect connectors.

(2) Place a piece of cardboard (or other type of soft material) on work bench. Invert keyboard printer assembly and carefully place on cardboard.

(3) Remove two screws (2), flat washers (4), and lockwashers (3) and remove base plate assembly from teletypewriter (1). Invert teletypewriter.

(4) Remove four screws (16) and remove enclosure (15) (with cable assembly attached) from keyboard printer base (17).

(5) Remove four screws (8) attaching connector Jl (6) to enclosure (15). Remove ring nut (9) from enclosure.

(6) Remove four screws (11), flat washers (12), and nuts (13) securing plate (10) to enclosure and remove cable assembly (7), grommet (14), and plate (10) from enclosure.

b. *Replacement* To replace printer mounting plate components, proceed as follows:

(1) Orient cable connector Jl in mounting position on enclosure with connector keyway in a vertical position. Secure connector to enclosure with ring nut (9) and four screws (8).

(2) Install grommet (14) on cable assembly (7).

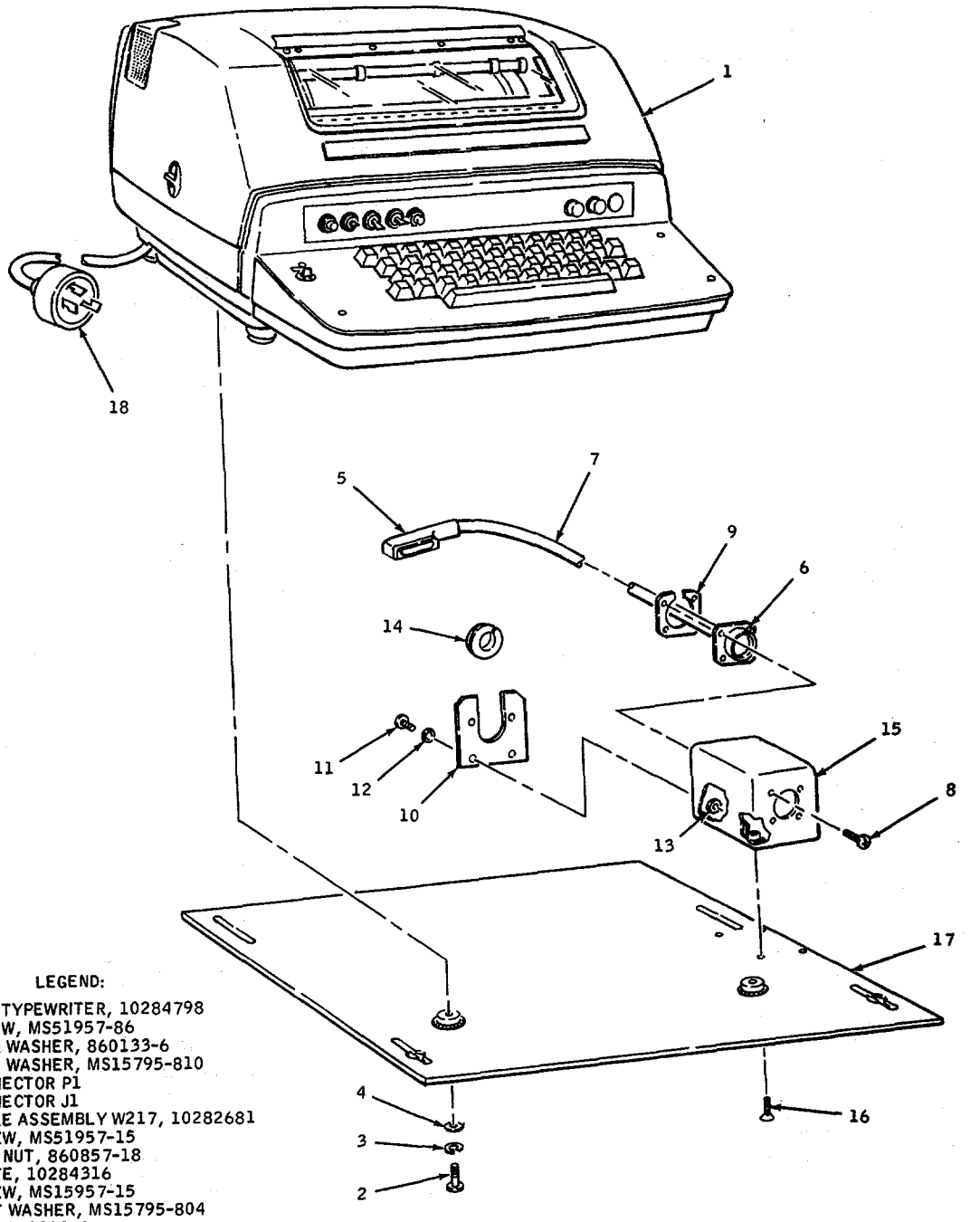
(3) Slide grommet into cutout on enclosure (15). Retain grommet and cable assembly with plate (10),four screws (11), flat washers (12) and nuts (13).

(4) Install enclosure and cable assembly on keyboard printer base (17) and secure with four screws (16).

(5) Place a piece of cardboard (or other type of soft material) on work bench. Invert teletypewriter (1) and carefully place on cardboard.

(6) Place base plate assembly on teletypewriter so that mounting holes aline. Secure components together with two screws (2), lockwashers (3), and flat washers (4). Invert teletypewriter.

(7) Connect connector P1 (5) to teletypewriter connector J2 and secure with captive screws.



LEGEND:

1. TELETYPEWRITER, 10284798
2. SCREW, MS51957-86
3. LOCK WASHER, 860133-6
4. FLAT WASHER, MS15795-810
5. CONNECTOR P1
6. CONNECTOR J1
7. CABLE ASSEMBLY W217, 10282681
8. SCREW, MS51957-15
9. RING NUT, 860857-18
10. PLATE, 10284316
11. SCREW, MS15957-15
12. FLAT WASHER, MS15795-804
13. NUT, 860292-4
14. GROMMET, MS35490-37
15. ENCLOSURE, 10284315
16. SCREW, MS24694C6
17. KEYBOARD PRINTER BASE, 10284261
18. CONNECTOR UP103M

Figure 5-17. Printer Mounting Plate Components, Exploded View

5-27. Removal and Replacement of Card Cage Circuit Cards (fig. 5-18).

a. Removal To remove card cage circuit cards, proceed as follows:

(1) Set POWER switch to OFF.

(2) Loosen captive screws on rear cover and remove rear cover.

(3) Open printer cover by turning knobs on either side of printer cover. Lift cover until the cover latch locks the cover in the half open position. Release the latch on the left-hand support arm and lift cover to full open position.

(4) Loosen the three screws along the front edge of the top cover and remove top cover.

(5) Close printer cover.

(6) Remove applicable circuit card (s).

b. *Replacement.* To replace card cage circuit cards, proceed as follows:

CAUTION

The circuit cards are installed in the card cage with the component side toward the front of the printer. Reversal of the circuit card or placing the circuit card in the wrong slot will result in damage to the printer.

(1) Insert circuit card in its proper slot with the component side toward the front of the printer. Press circuit card firmly into place.

(2) Tip rear edge of top cover over top rear edge of printer case. Press down on front edge of top cover to seat in position. Secure top cover with three screws.

(3) Close printer cover.

(4) Tip lower edge of rear cover over bottom rear edge of printer case. Press forward on top edge of rear cover and secure with two captive screws.

(5) If applicable, set POWER switch to ON.

5-28. Removal and Replacement of Keyboard Assembly (fig. 5-19).

a. *Removal* To remove keyboard assembly, proceed as follows:

(1) Set POWER switch to OFF.

(2) Remove four screws (2) attaching keyboard plate (1) to keyboard base (21) and remove keyboard plate.

CAUTION

On some units, the keyboard assembly and its associated interconnecting cabling are connected by wires to the printer base. To avoid straining interconnecting wiring, separate keyboard assembly from printer base only enough to gain access to wire connections.

NOTE

Disregard steps (4) and (5) if all interconnecting wiring between keyboard and printer base is connected through connectors J10 and PIO.

(3) Loosen two setscrews (3) and carefully separate keyboard assembly from printer base.

(4) Tag and disconnect wires connected to connector P100 (7) pins H and J.

(5) Cut ties of wires disconnected in step (4) along cable assembly (5).

(6) Unclip and. disconnect connector J10 from P10 (6) and remove assembly of cable assembly and keyboard assembly from printer base.

NOTE

To remove cable assembly from keyboard assembly, refer to para 5-31.

b. *Replacement*. To replace keyboard assembly, proceed as follows:

(1) Install cable assembly (7) on keyboard assembly, if removed (para 5-31b).

(2) Check that keyboard assembly mounting pins on printer case are tight. Tighten if necessary.

(3) Seat dampener (4) on keyboard assembly so that dampener will not be pinched between printer case and keyboard assembly.

(4) If keyboard plate (1) is installed on keyboard assembly, remove by removing four attaching screws (2).

(5) If applicable, connect wires (disconnected in step a (4) above) to connector P100 pins H and J.

(6) If applicable, spot tie wires of step (5) to cable assembly (7).

(7) Check that connectors P100 (7) and P102 (8) are properly seated on mating connectors.

(8) Connect connector P10 (6) to mating connector J10 on printer case and retain with connector clips.

(9) Mount Keyboard assembly on printer case mounting pins and secure with two setscrews (3).

(10) Install keyboard plate (1) on keyboard assembly and secure with four screws (2).
(11) Close printer cover.
(12) If applicable, set POWER switch to ON.

5-29. Removal and Replacement of Communications Keyboard (fig. 5-19).

a. Rem*oval* To remove communications keyboard, proceed as follows:

(1) Set POVWER switch to OFF.
(2) Remove four screws (2) attaching keyboard plate (1) to keyboard base (21) and remove keyboard plate.
(3) Open printer cover and disconnect connector P102 (8) from communications keyboard (10).
(4) Clear dampener (4) from communications keyboard.
(5) Remove four screws (11), lockwashers (12), and flat washers (13) and remove communications keyboard (10).

b. Replac*ement* To replace communications keyboard, proceed as follows: .

(1) Install communications keyboard (10) in mounting position on keyboard base (21). Attach communications keyboard with four screws (11), lock-washers (12), and flat washers (13). Tighten screw only enough to retain communications keyboard.

(2) Temporarily install keyboard plate (1) on keyboard assembly. Observe that mounting screw holes are alined and that the keyboard keys do not bind against the keyboard plate. If necessary, reposition communications keyboard to obtain proper mounting alinement.

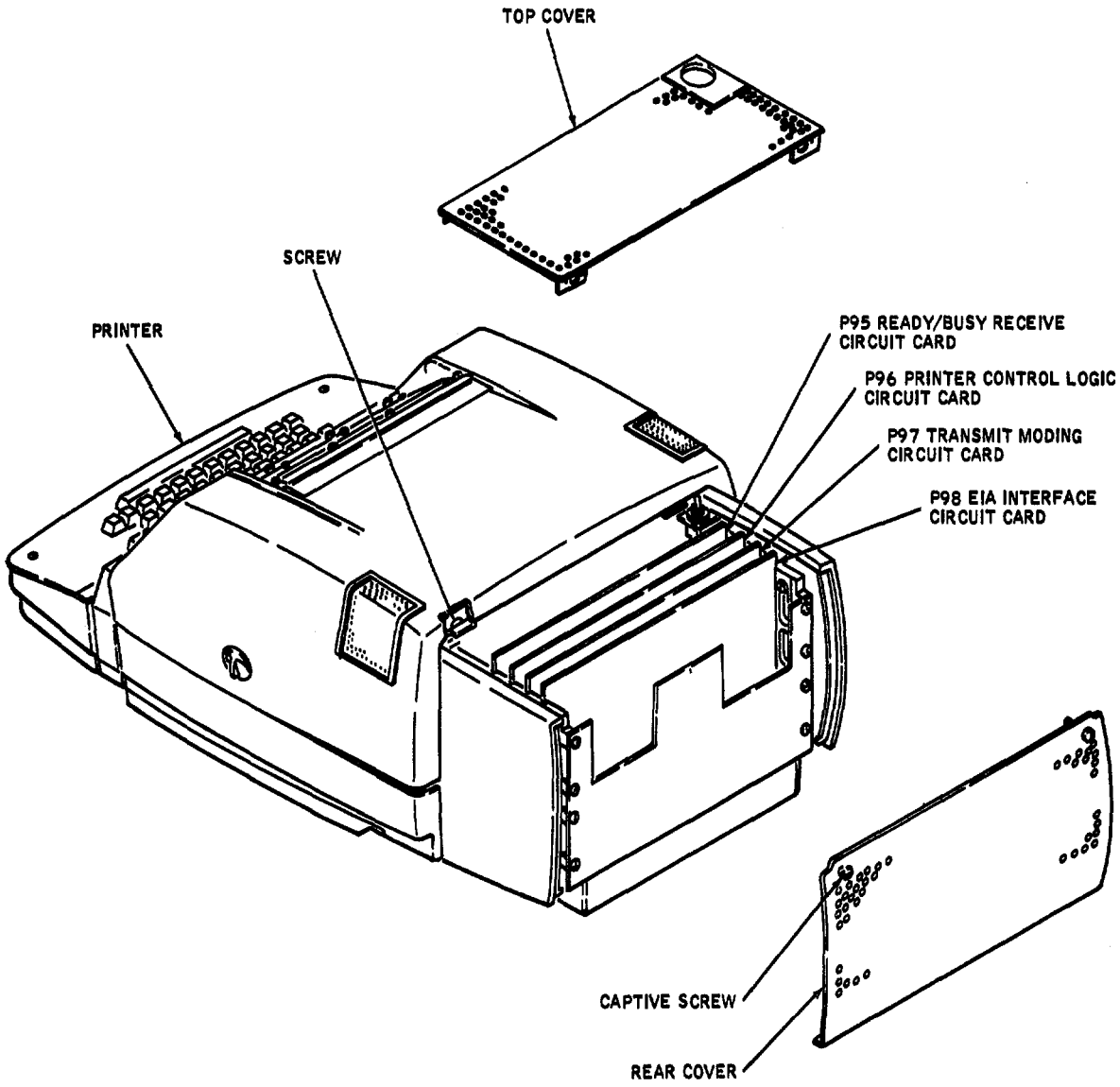


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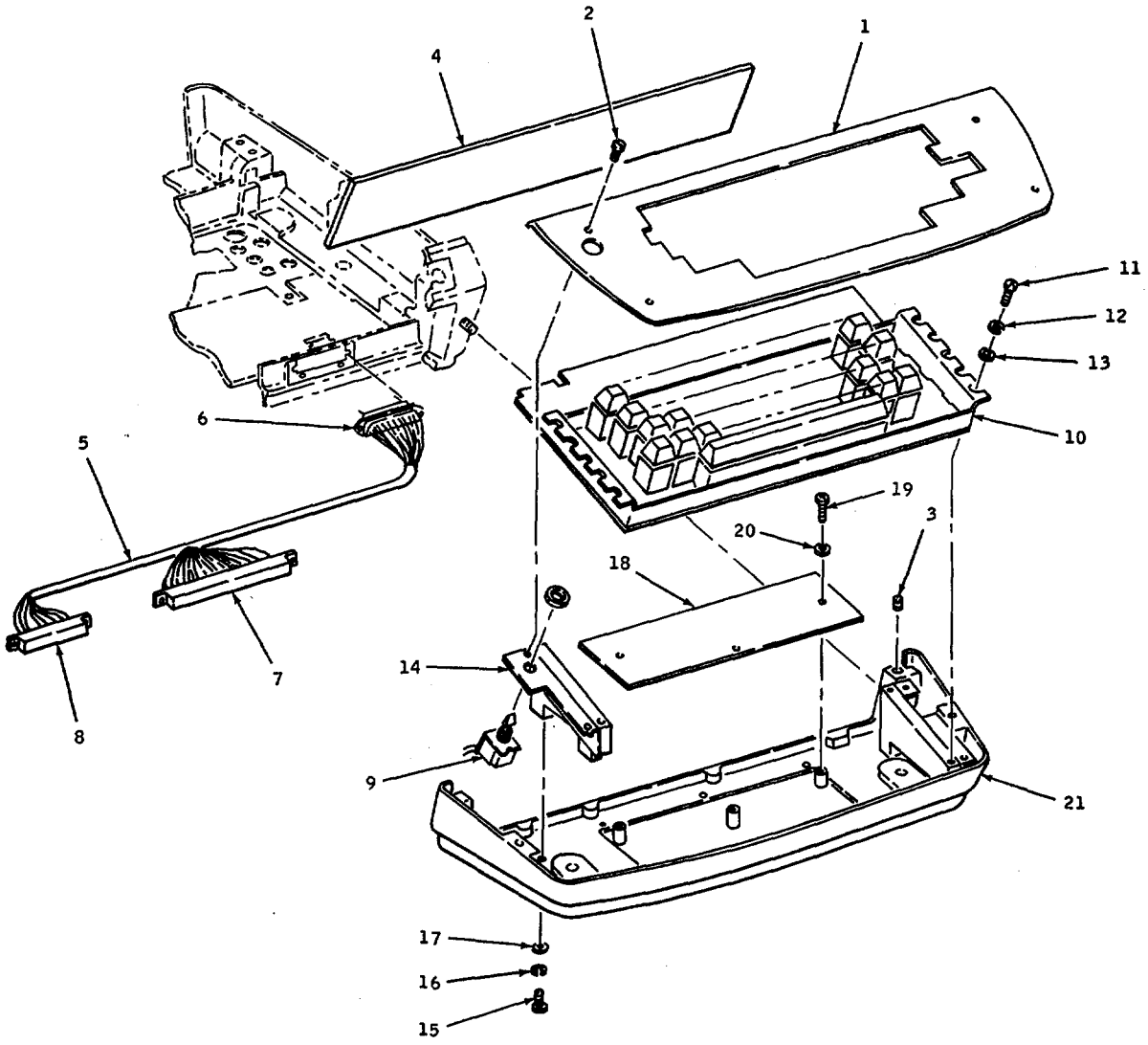
Figure 5-18. Card Cage Circuit Card Location



LEGEND:

1. KEYBOARD PLATE, 73410
2. SCREW, 12374
3. SETSCREW, 10223
4. DAMPENER, 73361
5. CABLE ASSEMBLY, 73392A
6. CONNECTOR P10
7. CONNECTOR P100
8. CONNECTOR P102
9. SWITCH, 20185
10. COMMUNICATIONS KEYBOARD, 74248A
11. SCREW, 12357
12. LOCK WASHER, 10415
13. FLAT WASHER, 10459
14. BRACKET ASSEMBLY
15. SCREW, 12357
16. LOCK WASHER, 10415
17. FLAT WASHER, 10472
18. ASCII KEYBOARD CONTROL CIRCUIT CARD, 74204A
19. SCREW, 12154
20. FLAT WASHER, MS27183-3
21. KEYBOARD BASE, 73344

MS 196363

Figure 5-19. Keyboard Assembly, Exploded View

(3) Remove keyboard cover and tighten communications keyboard attaching screws. 'Recheck the alinement of step (2).

(4) Install dampener (4) on rear edge of communications keyboard.

(5) Connect connector P102 (8) to communication keyboard etched connector.

(6) Install keyboard cover and secure with four screws (2).

(7) Close printer cover.

(8) If applicable, set POWER switch to ON.

5-30. Removal and Replacement of ASCII Keyboard Control Circuit Card (fig. 5-19).

a. *Removal* To remove ASCII keyboard control circuit card, proceed as follows:

(1) Set POWER switch to OFF.

(2) Remove communications keyboard .(para *5-29*a).

(3) Remove three screws (19) and flat washers (20) securing ASCII keyboard control circuit card (18). Do not remove circuit card at this time.

(4) Carefully lift circuit card from mounting and press off connector P100 (7).

(5) Clear dampener (4) from circuit card and remove circuit card.

b. *Replacement* To replace ASCII keyboard control circuit card, proceed as follows:

CAUTION

The ASCII keyboard control circuit card is in stalled in the keyboard base with the component side up. Reversal of the circuit card will result in damage to the equipment.

(1) With the component side up, locate ASCII keyboard control circuit card (18) close to its mounting position and install dampener (4) on connector edge of circuit card.

(2) Using care not to strain cable assembly (5) wires, connect connector P100 (7) to the etched connector on the circuit card.

(3) Locate circuit card on keyboard base mounting standoffs and secure with three screws (19) and flat washers (20).

(4) Install communications keyboard (para 5-29b).

5-31. Removal and Replacement of Keyboard Assembly Interconnecting Cable Assembly (fig. 5-19).

a. *Removal* To remove keyboard interconnecting cable assembly, proceed as follows:

(1) Remove keyboard assembly (para 5-28a).

(2) Remove communications keyboard (para 5-29a).

CAUTION

To avoid straining wires connected to INHIBIT switch (9), do not disconnect connector P100 (7) from ASCII keyboard control circuit card (18) at this time.

(3) Remove bracket assembly (14) by removing two, screws (15),. lockwashers (16), and flat washers (17).

(4) Disconnect both wires connected to INHIBIT switch (9).

(5) Disconnect connector P100 (7) from ASCII keyboard control circuit card to free cable assembly (5).

NOTE

Cable assembly (5) and INHIBIT switch (9) are supplied as separate parts. If either part (or parts) is to be replaced they will have to be ordered separately and assembled prior to installation.

b. Replace*me*nt. To replace keyboard interconnecting cable assembly, proceed as follows:

(1) Solder cable assembly (5) black and red/white wires to INHIBIT switch (9) terminals.

CAUTION

Do not reverse the cable connection to ASCII keyboard control circuit card (18) as equipment damage will result.

NOTE

The proper orientation for connector P100 (7) is; the connector placarding "P100" is up and the connector end with most all the wire connections is located to your right when viewed from a position with the circuit card etched connector facing away from you.

(2) Connect connector P100 (7) to ASCII keyboard control circuit card (18).

3) Slip bracket mounted switch (9) through lower slit in dampener (4).

NOTE

The lower slit in dampener (4) is the slit approximately 1/2 inch from the dampener edge.

(4) Install bracket assembly (14) on keyboard base (21) and secure with two screws (15), lockwashers (16), and flat washer (17).

(5) Slip connector P10 (6) through lower slit in dampener and slide dampener onto connector edge of ASCII keyboard control circuit card.

(6) Install communications keyboard (para 5-29b).

(7) Install keyboard assembly (para 5-28b).

5-32. Removal and Replacement of INHIBIT Switch (fig. G-19).

a. *Removal*. To remove INHIBIT switch, proceed as follows:

(1) Remove communications keyboard (para 5-29a).

(2) Remove bracket assembly (14) by removing two screws (15), lockwashers (16), and flat washers (17).

(3) Disconnect both wires connected to INHIBIT switch (9).

(4) Remove INHIBIT switch from bracket assembly by removing switch retaining nut.

b. *Replacement.* To replace INHIBIT switch, proceed as follows:

(1) Solder cable assembly (5) black and red/white wires to INHIBIT switch (9) terminals.

(2) Adjust the locking nut on switch collar so that when the switch is installed, the retaining nut will be fully threaded on the switch collar without excessive protrusion.

CAUTION

When installing switch, do not overtighten switch retaining nut as damage will result to the plastic threads on the switch collars.

(3) Install switch on bracket assembly (14) so that when the switch toggle is in the up position, the switch is closed. Secure switch to bracket assembly with switch retaining nut.

(4) Install bracket assembly on keyboard base (21) and secure with two screws (15), lockwashers (16), and flat washers (17).

(5) Install communications keyboard (para 5-29b).

5-33. Removal and Replacement of Mode Panel Switches and Indicators (fig. 5-20).

a. Removal To remove mode panel switches and indicators, proceed as follows:

(1) Set POWER switch to OFF.

(2) Open printer cover by turning knobs on either side of printer cover and lift cover until the cover latch locks the cover in the half open position. Release the latch on the left-hand support arm and lift cover to full open position.

(3) Loosen two setscrews (16) and carefully swing mode panel and keyboard assembly way from printer case to gain access to switches and indicators.

(4) Unsolder wires connected to defective components.

NOTE

The CLEAR SEND indicator lampholder (10) request to send circuit boards (8) and lamp driver circuit board (9) are not replaceable at organizational maintenance level.

(5) For switches, remove retaining nut and remove switch from rear of mode control panel.

NOTE

Toggle switch (4) and capacitors (5) are not supplied as an assembly. If replacement is necessary, order parts separately.

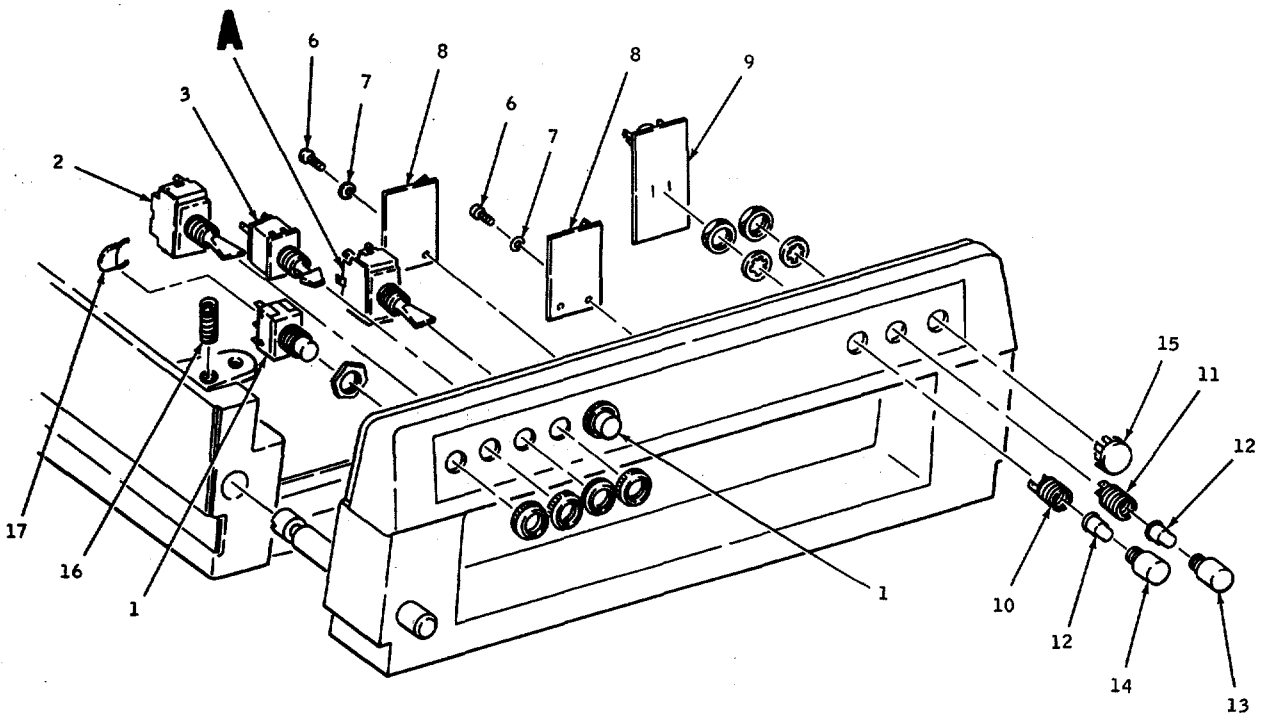
(6) For lampholder, remove retaining nut and washer and remove lampholder from front of mode control panel.

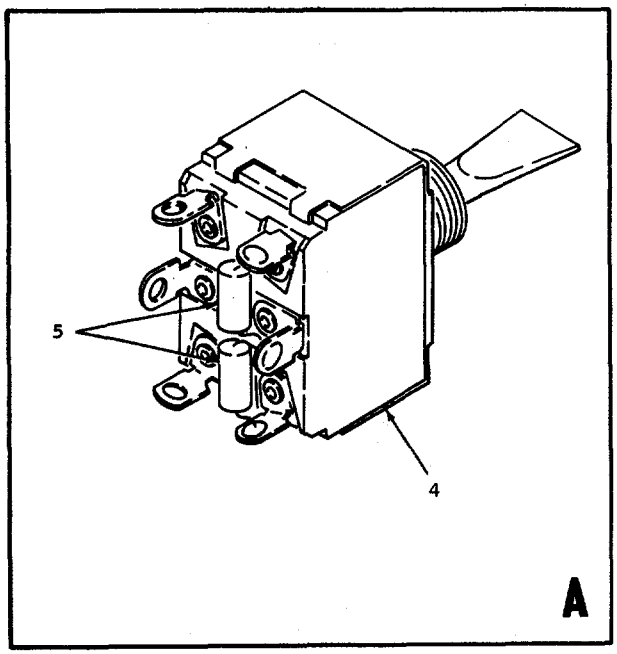
NOTE

Lampholders are not supplied with lens and lamps. If replacement is necessary, order parts separately.

b. Replacement To replace mode panel switches and indicators, proceed as follows:

(1) For lampholder, install replacement lampholder from front of mode control panel and secure with nut and washer supplied.





LEGEND:

1. PUSH SWITCH, 20184
2. TOGGLE SWITCH, 20187
3. TOGGLE SWITCH, 20185
4. TOGGLE SWITCH, 24553
5. CAPACITOR, M39014-05-2310
6. SCREW
7. FLAT WASHER
8. REQUEST TO SEND CIRCUIT BOARD, 74247A (NOT REPLACEABLE AT ORGANIZATIONAL MAINTENANCE LEVEL)
9. LAMP DRIVER CIRCUIT BOARD, 74118A (NOT REPLACEABLE AT ORGANIZATIONAL MAINTENANCE LEVEL)
10. LAMPHOLDER, LH73-1 (NOT REPLACEABLE AT ORGANIZATIONAL MAINTENANCE LEVEL)
11. LAMPHOLDER, LH73-1
12. LAMP, 24400
13. LIGHT LENS, LC29RT2
14. LIGHT LENS, LC29GT2
15. PLUG BUTTON
16. SETSCREW, 11160
17. CAPACITOR, 5HKD50

MS 196364

Figure 5-20 Mode Control Panel Parts Location

(2) For switches, adjust the locking nut on switch collar so that when the switch is installed, the retaining nut will be fully threaded on the switch collar without excessive protrusion.

NOTE

The toggle switches are not key coded and therefore may be installed inverted. Refer to figure 5-21 for proper orientation of toggle switches.

(3) For switches, refer to figure 5-21 and install switch with switch terminals oriented as shown. Secure switch with retaining nut.

(4) Refer to fig. 5-21 and connect wires to switches and indicators.

(5) Install lamp and lens in lampholder.

(6) Reinstall mode panel and keyboard assembly on printer case mounting pins and secure with two setscrews (16).

(7) Close printer cover.

(8) If applicable, set POWER switch to ON.

5-34. Removal and Replacement of Printer Chassis (fig. 5-22).

a. Removal. To remove printer chassis, proceed as follows:

(1) Open printer cover.

(2) Unlatch clips to connector P7 and disconnect connector.

(3) Turn hood of connector P5 to unlock and disconnect connector.

(4) If installed, remove paper roll.

CAUTION

Place printer chassis on a flat clear surface on its four frame feet. Laying the printer chassis on any surface other than its four frame feet will result in damage to components.

(5) Remove four screws, lockwashers, and flat washers securing printer chassis to the printer base and remove printer chassis.

b. Replacement. To replace printer chassis, proceed as follows:

(1) Check security of wiring harness and alarm located in the printer base. Correct any defects prior to installing printer chassis.

(2) Install printer chassis in printer base. Make certain that the four printer base guide pins align with the guide pin holes in the mounting plates on the printer chassis.

(3) Install four printer chassis attaching screws and lockwashers so that the ground strap lugs will be between the lockwasher and mounting plate.

(4) Connect connector P5 to connector J5. Twist connector hood to lock connector.

(5) Connect connector P7 to connector J7. Latch connector with connector clips.

(6) Reinstall paper roll.

(7) Close printer cover.

5-35. Removal and Replacement of Paper Shaft and Latching Components (fig. 5-23).

a. Removal. To remove paper shaft and latching components, proceed as follows:

(1) Set POWER switch to OFF.

(2) Open printer cover by turning knobs on either side of printer cover and lift cover until the cover latch locks the cover in the half open position. Release the latch on the left-hand support arm and lift cover to full open position.

WARNING

The paper shaft latch spring is loaded to 17 ounces. Protect eyes when removing spring.

(3) Remove paper shaft and latching components as shown in fig. 5-23.

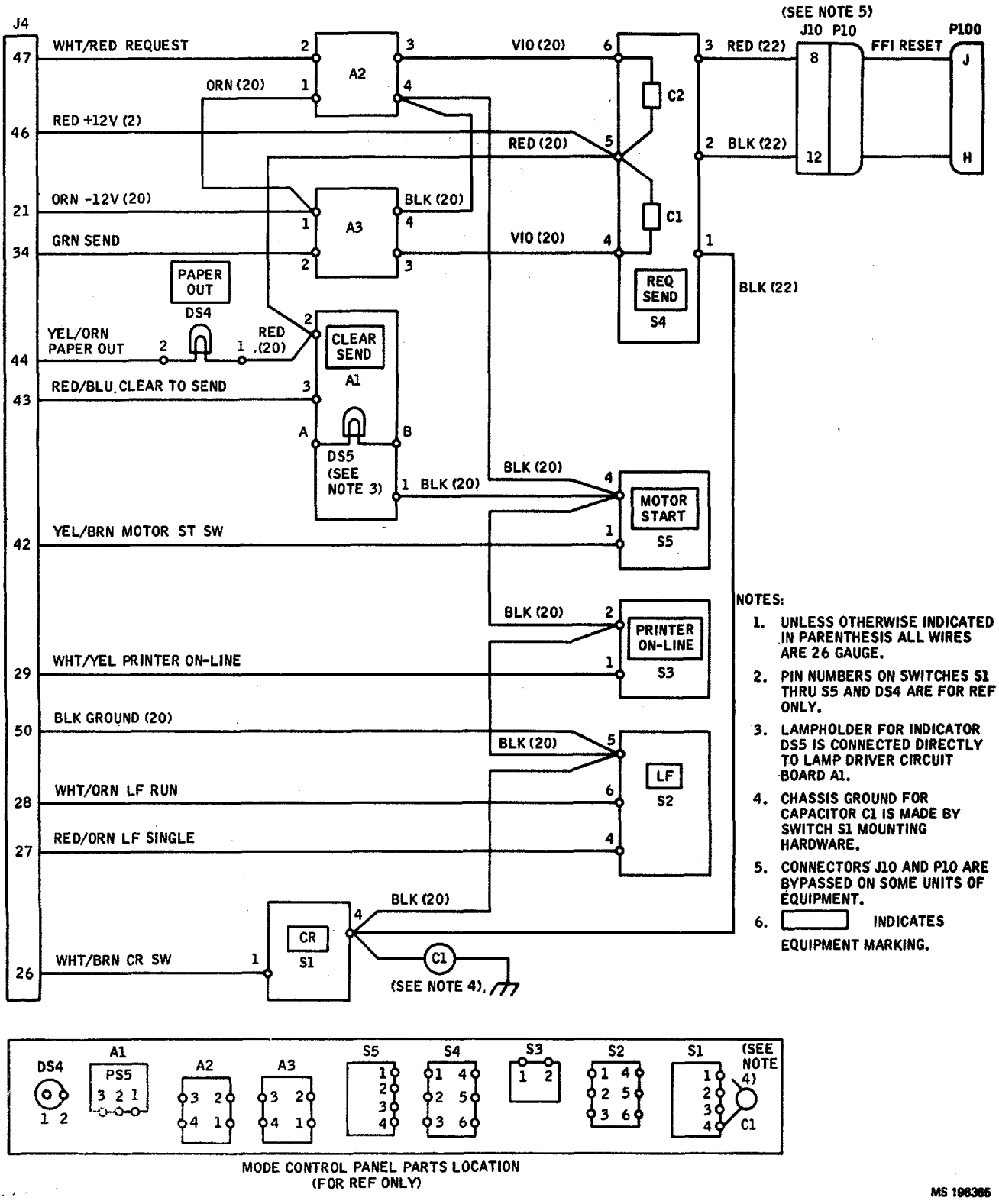


Figure 5-21. Mode Control Panel, Wiring Diagram

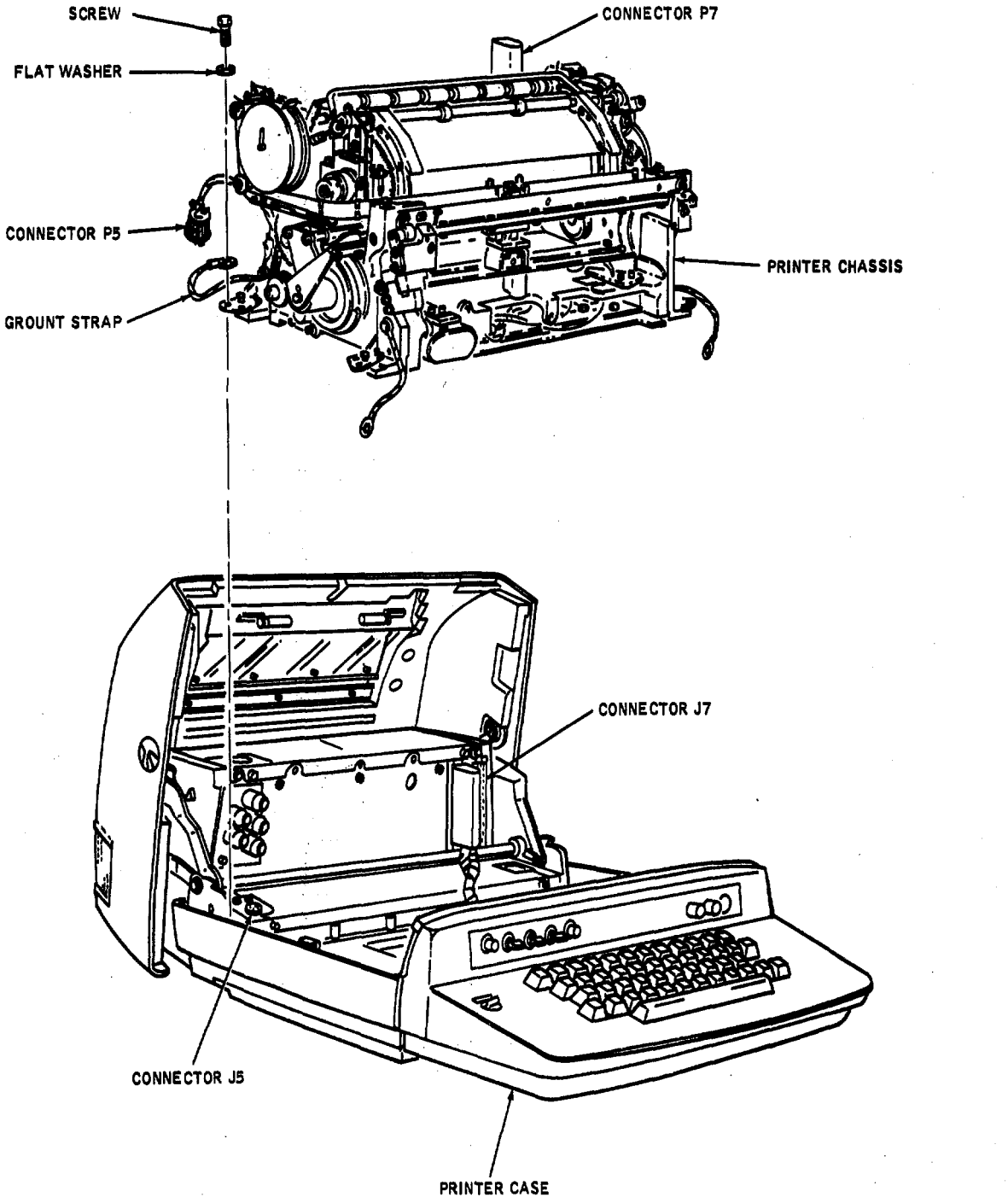


Figure 5-22. Printer Chassis Removal and Replacement

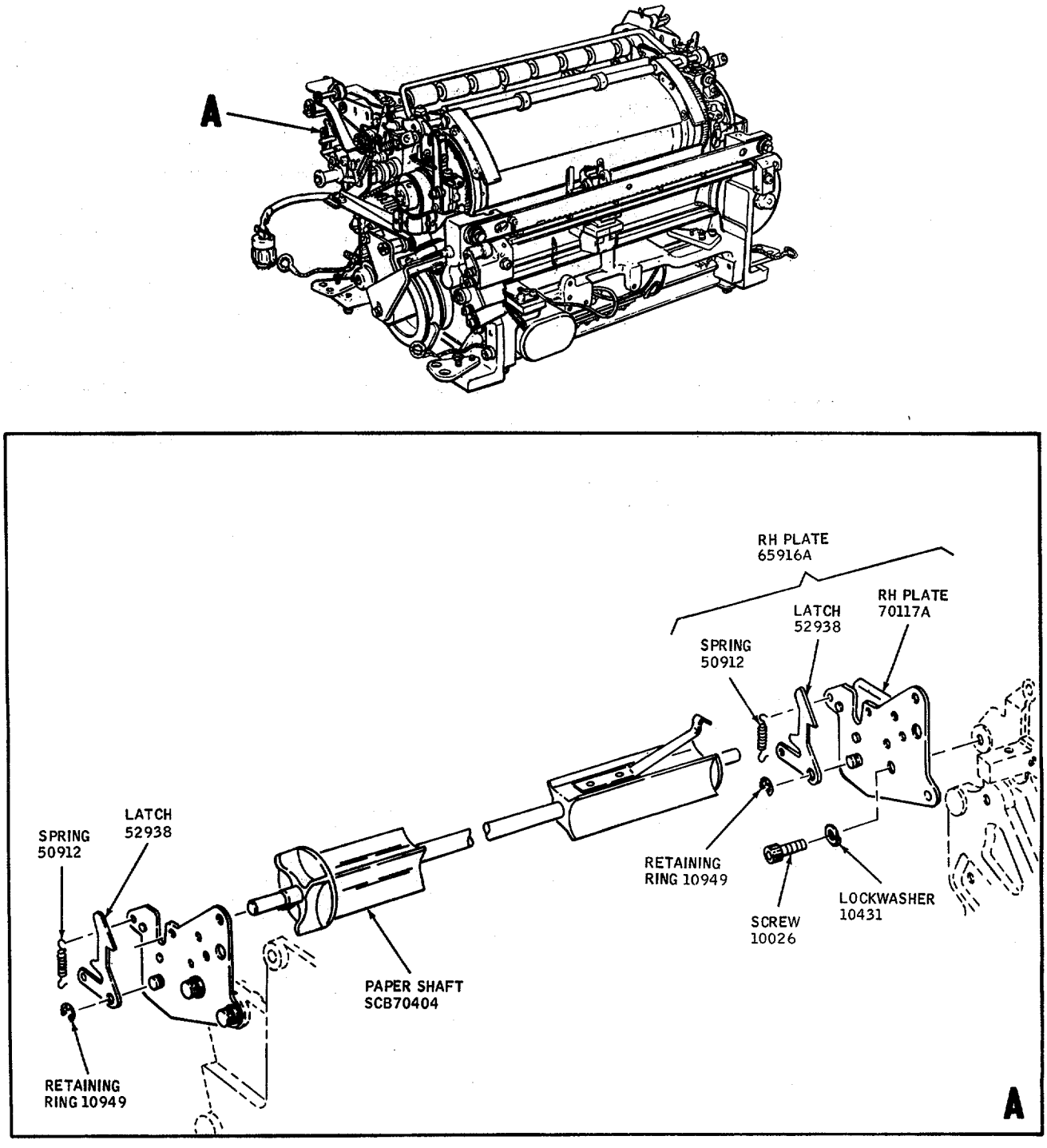


Figure 5-23. Paper Shaft and Latching Components Removal and Replacement

b. Replacement. To replace paper shaft and latching components, proceed as follows:

WARNING

The paper shaft latch spring is loaded to 17 ounces. Protect eyes when installing spring.

(1) Replace paper shaft and latching components as shown in fig. 5-23.
(2) Close printer cover.
(3) If applicable, set POWER switch to ON.

5-36. Removal and Replacement of Cover Latch Spring (fig. 5-24).

a. Removal. To remove cover latch spring, proceed as follows:

WARNING

The cover latch spring, when installed, is loaded to 30 ounces. Protect eyes when removing spring.

(1) Set POWER switch to OFF.
(2) Open printer cover by turning knobs on either side of printer cover and lift cover until the cover latch locks the cover in the half open position.
(3) Using spring hook, remove defective spring.

b. Replacement. To replace cover latch spring, proceed as follows:

WARNING

The cover latch spring, when installed, is loaded to 30 ounces. Protect eyes when installing spring.

(1) Hook one end of the replacement latch spring to the bracket spring hook hole. Address hole from between the bracket and the cover.
(2) Using a spring hook, hook other end of latch spring to the cover latch. Address hole from the interior side of the cover.
(3) Apply a light coat of grease (NSN 9150-00-985-7247) to the spring hooks.
(4) Close printer cover.
(5) If applicable, set POWER switch to ON.

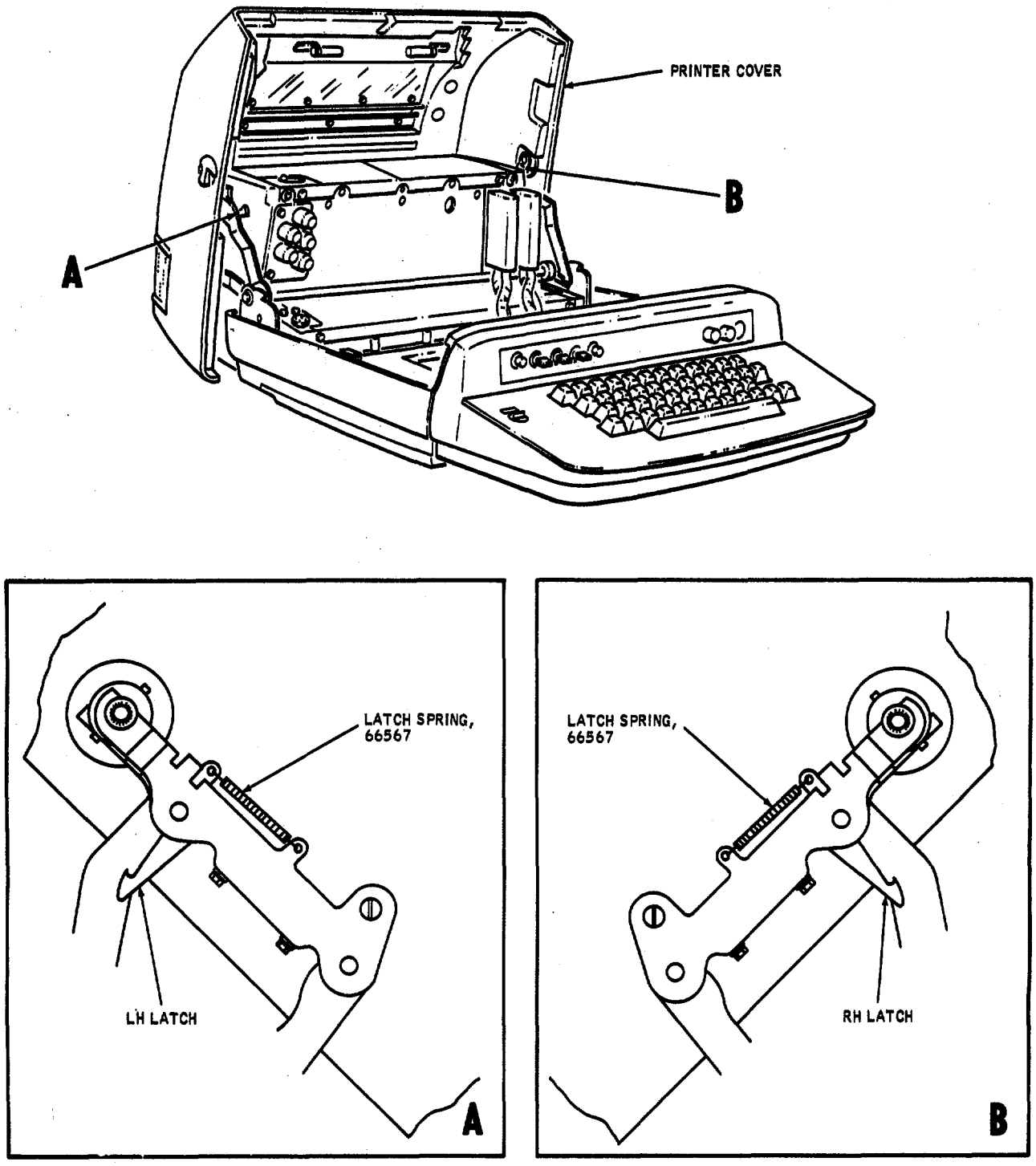


Figure 5-24. Cover Latch Spring, Parts Location

CHAPTER 6

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

6-1. Scope of General Support Maintenance. General support maintenance includes all corrective maintenance and testing procedures assigned to general support maintenance personnel. The maintenance procedures described in the operators maintenance chapter (Chapter 3) and the organizational maintenance chapter (Chapter 5) are also a part of general support maintenance. The general support maintenance duties are listed below, together with a reference to the paragraph covering the specific maintenance function. Repair of components beyond that authorized for general support maintenance should be reported to depot maintenance for corrective action.

a. Test procedures (para 6-3).
b. Troubleshooting (para 6-5).
c. Adjustments (para 6-7 thru 6-15).
d. Removal and replacement of components (para 6-16 thru 6-28).

6-2. Tools, Test Equipment, and Materials. Tools, test equipment, and materials used for general support maintenance are as follows:

NOTE

Refer to Appendix B for the fabrication details of the printer maintenance frame, the modified circuit card extenders, and the patch cables required but not supplied.

a. Printer tool kit TE-50-B NSN 5180-00-356-4602. (Reference SC 5180-90-CL-N01)
b. Printer maintenance frame.
c. Circuit card extender 74142 (82423).
d. Circuit card extender 74142 (82423) modified to disable keyboard to printer circuit path.
e. Circuit card extender 74142 (82423) modified to reroute keyboard data to printer via transmit and receive circuit paths.
f. Lubricants and cleaning compounds (para 5-2).
g. Patch cable (for patching connector J4 to P4).
h. Patch cable (for patching connector J5 to P5).
i. Patch cable (for patching connector J7 to P7).
j. Patch cable (for patching connector J10 to P10).
k. Multimeter, Simpson Model 269-3, or equivalent.
l. Oscilloscope, portable, Tektronix Model 465, or equivalent.
m. Electric soldering outfit TL-705/L NSN 3439-00-853-8760.
n. Orangewood stick NSN 5120-00-293-2081.
o. Oval-body hand oiler NSN 4930-00-273-8934.

Section II. TEST PROCEDURES

6-3. General. This section provides test procedures for use by general support maintenance personnel to determine whether the repaired printer is satisfactory for return to the using personnel. The test procedures are also to be used for incoming inspection of the printer to determine what maintenance action is required to restore the equipment to a serviceable condition.

6-4. Test Procedures. General support test procedures consist of a physical inspection and test (table 6-1), an operational test (table 6-2), and functional circuit tests (tables 6-3 thru 6- 10) of the printer.

a. *Physical Ins*pection and *Test* The physical inspection and test of table 6-1 determines the physical integrity and completeness of the printer. This inspection and test must be performed before power is applied to the equipment to determine equipment troubles on incoming inspection and after any corrective maintenance. Correct any troubles found as a result of physical inspection and test the printer before performing the operational test of table 6-2 or the functional tests of tables 6-3 thru 6-10.

b. *Operational Test.* The operational test of table 6-2 verifies the overall performance of the printer and is performed after the physical inspection and test of table 6-1.

c. *Functional Circuit Tests.* The functional circuit tests are normally performed during the course of troubleshooting. If the equipment passes the physical inspection and test and the operational test, these tests are not necessary to perform.

Table 6-1. Physical Inspection and. Test

Step no.	Test Procedure	Normal indication
1	Inspect all switches for binding, freedom of movement, and positive action	Switches operate freely without binding.
2	Inspect all cables, plugs and connectors for wear, damage, and cleanliness	Cables, plugs, and connectors are not worn or damaged and are free from corrosion.
3	Open and close dust cover and check for smooth operation.	Dust cover opens and closes freely. Latching parts operate smoothly without binding.
4	Inspect printer for loose or missing components and screws.	All components and screws are tight and none are missing.
5	Inspect component board and circuit cards for cleanliness, signs of damage or overheating	Component boards are clean, undamaged and there are no signs of overheating.
6	Inspect motor for signs of overheating.	No evidence of overheating as indicated by discoloration or odor of burnt insulation.
7	Check fuses and lamp for proper value and electrical condition.	Fuses and lamps are of proper value and are in good electrical condition.
8	Inspect drive and carriage assembly belts for signs of fraying or deterioration.	Belts are free of cracks and frays, dirt and contaminants and are pliable.
9	Slide carriage assembly back and forth along carriage shaft.	Spring tension pulls carriage assembly to right margin.
	NOTE	Carriage assembly slides smoothly without binding.
	To release carriage assembly, press down on space armature.	Carriage assembly has to be pulled to left margin.
		Distance between print hammers and print drum does not vary from one margin to the other.

*Table 6-1. Physical Ins*pection and *Test*
-Continued

Step no	Test procedure	Normal indication
9 (cont)		Print hammers travel in a line parallel to a line of print drum characters. Carriage return belt does not bind or bunch up in either direction of carriage assembly travel. When space armature is released when carriage assembly is in any position on carriage shaft, the carriage does not slip With the carriage assembly at the left margin, the print hammers fully cover the first two columns of print drum characters.
10	Press down on ribbon lift armature.	The ribbon bail does not bind at the shaft pivot point, at the ribbon guide on the carriage assembly or against the bail stops located on the print drum bearing caps. The inking ribbon is slightly above the print hammers.
11	Position a row of print drum characters to a sprocket pin on a paper feed wheel.	The print drum characters aline to the corresponding sprocket pin on the opposite side of the printer.
12	While pressing forward on line feed armature, rotate power train manually.	Both paper feed wheels advance approximately 1/6 - inch at a time.
13	Check engagement of dog on ribbon drive shaft with dog on ribbon feed assembly. **NOTE** Engagement of dogs will be on onepide or the other of the printer, not both.	Dog teeth are engaged 50 percent minimum.
14	Check clearance of dog on drive shaft with reverse lever eccentric pin on driven side of printer. Rotate power train manually and observe that dog teeth do not touch eccentric pin.	Dog teeth do not touch eccentric pin.
15	Lift ribbon retainer lever on driven side of printer.	Ribbon reverse lever lifts eccentric pin clear of dog on drive shaft.
16	Trip ribbon reverse lever on opposite ribbon feed assembly by pushing down slightly.	Ribbon reverse lever drops.
17	Rotate drive train manually until ribbon drive shaft has rotated approximately 60 to 90 degrees.	Ribbon drive shaft slides to other side of printer to engage dog teeth 50 percent minimum.
18	Repeat steps 14 through 17 to check the engagement of the dogs in the opposite direction.	Same as steps 14 through 17.

Table 6-2. Operational Test

Preliminary procedures.

a. Perform physical inspection and test of printer (table 6-1).
b. Install inking ribbon (par. 3-12).
c. Install roll paper (par. 3-11).
d. Connect printer power cable connector to 115 vac, 60 Hz ± 3 Hz power source.
e. Set ON LINE-PRINTER switch to PRINTER.
f. Set INHIBIT switch to the enable keyboard position (down).

Step no.	Test procedure	Normal indication
1	Set POWER switch to ON.	Motor starts and after 90 seconds of non-use stops. Audio alarm sounds and PAPER OUT indicator lights momentarily. While motor is running, inking ribbon will feed continuously. When ribbon spool is empty, ribbon will automatically reverse direction. **NOTE** Spurious noise from a motor start operation may cause a line feed and/or carriage shift action.
2	Press and release MOTOR START switch.	Motor starts.
3	Allow motor to stop then press keyboard space bar.	Motor starts.
4	Set ON LINE-PRINTER switch to ON LINE. Allow motor to stop then press keyboard space bar.	No print action.
5	SET ON LINE-PRINTER SWITCH TO PRINTER. Press and release MOTOR START switch. Press down and release LF switch.	Paper advances one line.
6	Raise LF switch	Paper advances until switch is released.
7	Press keyboard LINEFEED switch.	Paper advances one space.
8	Press and release keyboard space bar several times.	Carriage assembly advances every other time space bar is operated.
9	Press and release mode panel CR switch.	Carriage assembly returns to left margin.
10	Press and release keyboard space bar several times.	Same as step 8.
11	Press and release keyboard RETURN key.	Carriage assembly returns to left margin and paper advances one space.
12	Press and release keyboard space bar until carriage assembly reaches the right margin.	When carriage assembly reaches the right margin, the carriage assembly automatically returns to the left margin and paper advances one space.
13	Press and release a character key. Enter two characters.	Characters printed are of constant density and are printed entirely. Carriage assembly advances once for each to characters entered.

Table 6-2. Operational Test
-Continued

Step no.	Test procedure	Normal indication
		NOTE If paper is heavily embossed or if characters are cut off, aline print hammers before proceeding with test. Refer to paragraph 6-10o and 6-10p.
14	Type a full set of keyboard characters.	Characters printed are as entered on keyboard. Observe same performance standard as step 13.
15	Return carriage assembly by pressing RETURN key or CR switch. Press and release keyboard keys until carriage assembly automatically returns to left margin.	When 72 characters are entered carriage assembly automatically returns to left margin and paper advances one line

Table 6-3. Send/Receive Logic Circuit Test

Preliminary procedures.

a. Perform physical inspection and test of printer (table 6-1).
b. Modify a RS-232 plug by looping back the following signal lines (see table 6-12 for J2 pin assignments):

(1) Receive D1 (J2-1) to transmit D1 (J2-35).
(2) Receive D2 (J2-2) to transmit D2 (J2-37).
(3) Receive D3 (J2-3) to transmit D3 (J2-39).
(4) Receive D4 (J2-4) to transmit D4 (J2-41).
(5) Receive D5 (J2-5) to transmit D5 (J2-47).
(6) Receive D6 (J2-6) to transmit D6 (J2-45).
(7) Receive Strobe (J2-43) to transmit Strobe (J2-7).

c. Install modified RS-232 plug in J2 Input/Output connector in rear of printer.
d. Install inking ribbon (para 3-12).
e. Install roll paper (para 3-11).
f. Connect printer power cable connector to 115 vac, 60 Hz + 3 Hz power source.
g. Set ON LINE-PRINTER switch to ON LINE.
h. Set INHIBIT switch to enable keyboard position (down).
i. Set POWER switch to ON.

Step no.	Test procedures	Normal indication
1	Type a full set of keyboard characters. **NOTE** If motor is off press MOTOR START switch.	Characters printed are as entered on keyboard.
2	Press and release keyboard RETURN key.	Carriage returns to left margin and paper advances one line.
3	Press and release keyboard LINE FEED switch.	Paper advances one line.
4	Allow motor to stop, then press character key on keyboard.	No printer action.
5	Set POWER switch to OFF.	None.

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Table 6-4. HintHammer Control Oirctdt Test

Preliminary procedures.

a. Remove printer chassis from printer base and install in maintenance frame (para 6-18b).
b. Perform physical inspection and test of printer (table 6-1).
c. Remove base frame cover (4, fig. 6-66) from printer chassis.
d. Connect patch cable between logic. module and power supply connector J7 and printer chassis connector 7 (fig. B-3).
e. Connect patch cable between logic module and power supply connector J5 and printer chassis connector P5 (fig. B-4).
f. connect printer power cable connector to 115 vac, 60 Hz±8 Hz power source.
g. Set oscilloscope controls as follows:

(1) VOLTS/DIV to 1.
(2) TIME/DIV to 0.2 MS.
(3) COUPLING to DC.
(4) TRIG MODE to NORM.
(5) SOURCE to NORM.
(6) SLOPE to +.

h. Install paper roll (para 3-11).
i. Install inking ribbon (para 3-12).
j Set POWER switch to ON.
k Set ON LINE-PRINTER switch to PRINTER.
l. Set INHIBIT switch to the enable keyboard position (down).

NOTE

After completion of test(s) and maintenance of printer, reinstall base frame cover on printer chassis and printer chassis in printer base.

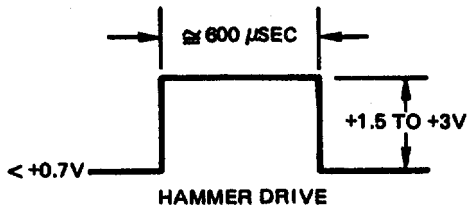
Step no.	Test procedure	Normal indication
1	Connect oscilloscope ground lead to terminal 21, 22, or 23 on TB11 printer driver board and vertical probe to terminal B. (See fig. 6-67 and 6-68.) Press and release a character key. Repeat as necessary to maintain a trace in oscilloscope.	
2	Disconnect vertical probe from terminal B and reconnect to terminal F. Press and release a character key. Repeat as necessary to maintain a trace in oscilloscope.	Same as step 1.

Table 6-4. Print Hammer Control Circuit Test -Continued

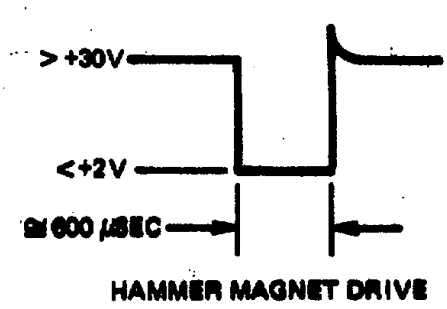
Step no.	Test procedure	Normal indication
3	Set oscilloscope VOLTS/DIV control to 10. Disconnect vertical probe from terminal F and reconnect to terminal C. (See fig. 667 and 668.) Press and release a character key. Repeat as necessary to maintain a trace in oscilloscope.	
4	Disconnect vertical probe from terminal C and reconnect to terminal D. (See fig. 6-67 and 6-68.) Press and release a character key. Repeat as necessary to maintain a trace in oscilloscope.	Same as step 3

Table 6-5. Line Space and Carriage Return Circuit Test

Preliminary procedures.

a. Remove printer chassis from printer base and install in maintenance frame (para 6-18b).
b Perform physical inspection and test of printer (table 6-1).
c. Remove base frame cover (4, fig. 6-66) from printer chassis.
d. Connect patch cable between logic module and power supply connector J7 and printer chassis connector P7 (jig. B-9).
e. Connect patch cable between logic module and power supply connector J5 and printer chassis connector P5 (fig. B-4).
f. Connect printer power cable connector to 115 vac, 60 Hz :3 Hz power source.
g. Set oscilloscope controls as follows:
(1) VOLTS/DIV to 5.
(2) TIME/DIV to 50 MS.
(3) COUPLING to DC.
(4) TRIG MODE to NORM.
(5) SOURCE to NORM.
(6) SLOPE to +.

NOTE

After completion of test(s) and maintenance of printer, reinstall base frame cover on printer chassis and printer chassis in printer base.

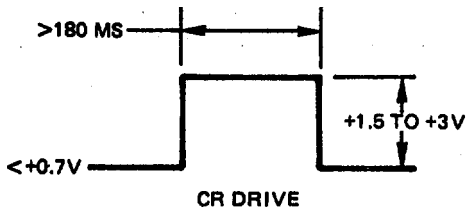
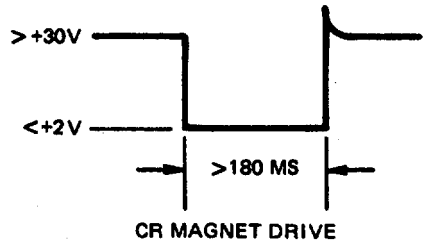
Step no.	Test procedure	Normal indication
1	Connect ohmmeter across terminals of left-hand margin reed switch.	Reed switch closes when carriage assembly is moved to left margin and opens when the carriage assembly is shifted to the right.
2	Connect ohmmeter across terminals of right-hand margin reed switch.	Reed switch closes when carriage assembly is moved to the right margin and opens when the carriage assembly is shifted to the left.
3	Set POWER switch to ON. Connect oscilloscope ground lead to terminal 21, 22, or 23 on TB11 printer driver board and vertical probe to terminal G. (See fig. 6-67 and 6-68.) Press and release CR switch on mode panel. Repeat as necessary to maintain trace on oscilloscope.	
4	Set oscilloscope VOLT/DIV control to 10. Disconnect vertical probe from terminal G and reconnect to terminal 8. Press and release CR switch on mode panel. Repeat as necessary to maintain trace on oscilloscope.	

Table 6-5. Line Space and Carriage Return Circuit Test -Continue

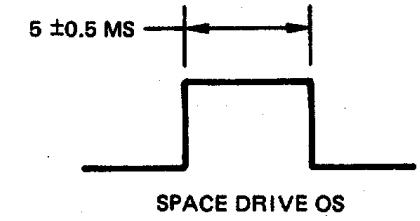
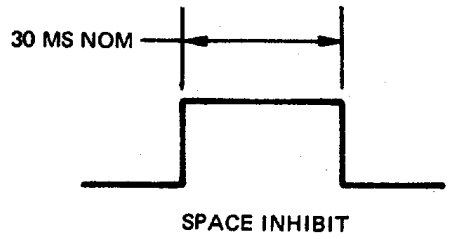
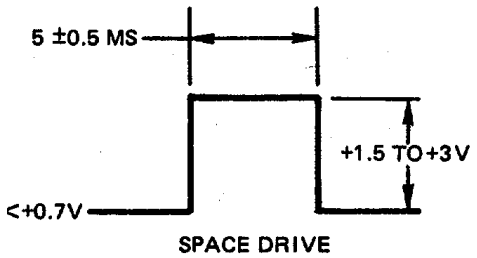
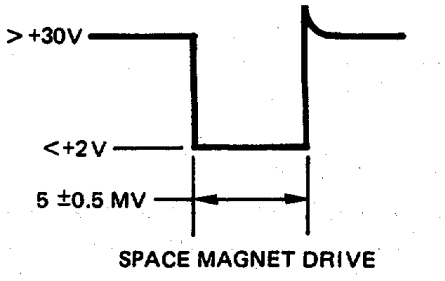
Step no.	Test procedure	Normal indication
5	Disconnect oscilloscope test leads from TB11. Set oscilloscope VOLTS/DIV control to 5V. Set oscilloscope TIME/DIV to 1 MS. Connect oscilloscope ground lead to test point Y on P96 printer control logic circuit card vertical probe to test point AS. (See fig. 4-17 and 6-50.) Press and release space bar on keyboard. Repeat as necessary to maintain trace on oscilloscope.	
6	Set oscilloscope TIME/DIV control to 10 MS Disconnect vertical probe from test point AS and reconnect to test point AU. (See fig. 4-17 and 6-50.) Press and release space bar on keyboard. Repeat as necessary to maintain trace on oscilloscope.	
7	Disconnect oscilloscope test leads from P96 Set oscilloscope TIME/DIV to 1 MS. Connect oscilloscope ground lead to terminal 21, 22, or 23 on TB11 printer driver board and vertical probe to terminal E. (See fig. 6-67 and 6-68.)	
8	Set oscilloscope VOLT/DIV control to 10. Disconnect vertical probe from terminal E and reconnect to terminal 9. Press and release space bar on keyboard. Repeat as necessary to maintain trace on oscilloscope.	

Table 6-6. Line Feed Circuit Test

Preliminary procedures.

a. Remove printer chassis from printer base and install in maintenance frame (para 6-18b).
b. Perform physical inspection and test of printer (table 6-1).
c. Remove base frame cover (4, fig. 6-66) from printer chassis.
d. Connect patch cable between logic module and power supply connector J7 and printer chassis connector P7 (fig. B-3).
e. Connect patch cable between logic module and power supply connector J5 and printer chassis connector P5 (fig. B-4).
f. Connect printer power cable connector to 115 vac, 60 Hz ± 3 Hz power source.
g. Set oscilloscope controls as follows:
(1) VOLTS/DIV to 1.
(2) TIME/DIV to 10 MS.
(3) COUPLING to DC.
(4) TRIG MODE to NORM.
(5) SOURCE to NORM.
(6) SLOPE to +.

NOTE

After completion of test(s) and maintenance of printer, reinstall base frame cover on printer chassis and printer chassis in printer base.

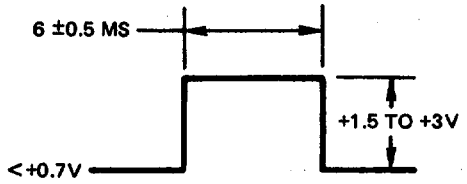
Step no.	Test procedure	Normal indication
1	If installed, remove paper roll. Set POWER switch to ON.	Audio alarm sounds and PAPER OUT indicator lights.
2	Slowly push down on roll paper low paper arm. Insert a piece of paper between paper tension bar and paper roller at the paper out sensing arm.	Audio alarm stops sounding and PAPER OUT light extinguishes when low paper arm is approximately 1/4 inch away from paper shaft.
3	While pressing down on low paper arm, remove paper installed in step 2.	Audio alarm sounds and PAPER out indicator lights.
4	With oscilloscope controls set as indicated in preliminary procedures, step g, connect ground lead to terminal 21, 22, or 23 on TB11 printer driver board and vertical probe to terminal H. (See fig. 6-67 and 6-68.)	 LINE FEED DRIVE One line feed operation for every operation of LF switch.

Table 6-6. Line Feed Circuit Test
-Continued

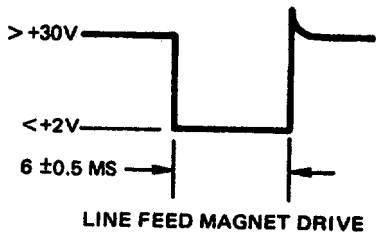
Step no.	Test procedure	Normal indication
	CAUTION Do not use repeated line feed position (up) of LF switch as prolonged use may damage the line feed clutch and magnet. Press down on mode control panel LF switch. Repeat as necessary to maintain trace on oscilloscope.	
5	Set oscilloscope VOLTS/DIV control to 10	
	Disconnect vertical probe from terminal H and connect to terminal 7. (See fig. 6-67 and 6-68.)	One line feed operation for every operation of LF switch.
	CAUTION Do not use repeated line feed position (up) of LF switch as prolonged use may damage the line feed clutch and magnet. Press down on mode control panel LF switch. Repeat as necessary to maintain trace on oscilloscope.	

Table 6-7. Ribbon Lift Circuit Test

Preliminary procedures.

a. Remove printer chassis from printer base and install in maintenance frame (para 6-18b).
b. Perform physical inspection and test of printer (table 6-1).
c. Remove base frame cover (4, fig. 6-66) from printer chassis.
d. Connect patch cable between logic module and power supply connector J7 and printer chassis connector P7 (fig. B-3).
e. Connect patch cable between logic module and power supply connector J5 and printer chassis connector P5 (fig. B-4).
f. Connect printer power cable connector to 115 vac, 60 Hz ±3 Hz power source.
g. Set oscilloscope controls as follows:
   (1) VOLTS/DIV to 1.
   (2) TIME/DIV to 50 MS.
   (3) COUPLING to DC.
   (4) TRIG MODE to NORM.
   (5) SOURCE to NORM.
   (6) SLOPE to +.
h. Install paper roll (para 3-11).
i. Install inking ribbon (para 3-12).
j. Set POWER switch to ON.
k. Set ON LINE-PRINTER switch to PRINTER.
1. Set INHIBIT switch to the enable keyboard position (down).

NOTE

After completion of test(s) and maintenance of printer, reinstall base frame cover on printer chassis and printer chassis in printer base.

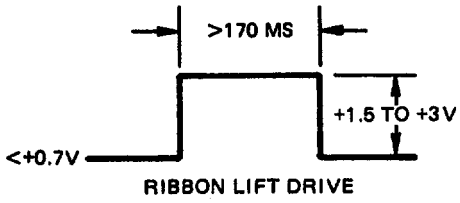
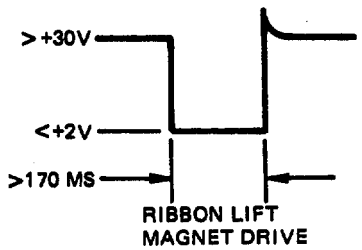
Step no.	Test procedure	Normal indication
1	Connect oscilloscope ground lead to terminal 21, 22, or 23 on TBI1 printer driver board and vertical probe to terminal T. (See fig. 6-67 and 6 68.) Press and release a character key. Repeat as necessary to maintain a trace on the oscilloscope.	
2	Set oscilloscope VOLTS/DIV control to 10. Disconnect vertical lead from terminal T and connect to terminal 11. (See fig. 6-67 and 6-68.)	

Table 6-8. Motor Control Circuit Teat

Preliminary procedures.

a. Remove printer chassis from printer base and install in maintenance frame (para 6-18b).
b. Perform physical inspection and test of printer (table 61).
c. Remove base frame cover (4, fig. 6-66) from printer chassis.
d. Connect patch cable between logic module and power supply connector J7 and printer chassis connector P7 (fig. B-3).
e. Connect patch cable between logic module and power supply connector J5 and printer chassis connector P5 (fig. B-4).
f. Connect printer power cable connector to 115 vac, 60 Hz ±:3 Hz power source.

NOTE

After completion of test(s) and maintenance of printer, reinstall base frame cover on printer chassis and printer chassis in printer base.

Step no.	Test procedure	Normal indication
1	Set POWER switch to ON.	Motor starts and after 90 ± 3:a seconds of non-use stops.
2	Press MOTOR START switch.	Motor runs freely without binding or rumbling noise. Motor turns counter-clockwise as viewed from left side of printer chassis. Same as step 1.
3	Set up volt meter to measure 5 vdc and connect ground lead to terminal 21,22, or 23 on TBL printer driver board assembly and test lead to terminal S. (See fig. 6-67 and 6-68.) Make voltage measurement with motor on and then off.	Less than +0.7 vdc with motor on. +1 .5 to +3.0 vdc with motor off. +12 vdc norm with motor on.
4	Set up volt meter to measure 12 vdc and connect ground lead to terminal 21, 22 or 23 on TB11printer driver board assembly and test lead to terminal R. (See fig. 6-67 and 6-68.) Make voltage measurement with motor on and then off.	Less than 0.5 vdc With motor oft

Table 6-9. Timing and Synchronization Circuit Test

Preliminary procedures.

a. Perform physical inspection and test of printer (table 6-1).
b. Remove top cover from printer.
c. Connect printer power cable connector to 115 vac, 60 Hz ±3 Hz power source.
d. Set oscilloscope controls as follows:
   (1) Channel 1 VOLTS/DIV to 1.
   (2) TIME/DIV to 5 MS.
   (3) COUPLING to DC.
   (4) TRIG MODE to NORM.
   (5) SOURCE to CH1
   (6) SLOPE to +.
e. Set POWER switch to ON.

NOTE

After completion of test(s) and maintenance of printer, reinstall top cover.

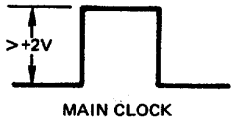
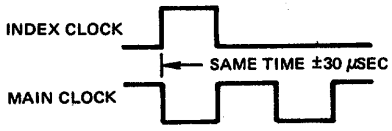
Step no.	Test procedure	Normal indication
1	Connect oscilloscope ground lead to test point Y on P96 printer control logic circuit and channel 1 vertical probe to test point X. (See fig. 4-15 and 6-50.)	
2	Disconnect channel 1 vertical probe from test point X and reconnect to test point U. (See fig. 4-15 and 6-50.)	
3	On oscilloscope set channel 2 VOLTS/DIV control to 1. Connect channel 2 vertical probe to test point X. (See fig. 4-15 and 6-50.) **NOTE** If leading edge of index clock cannot be observed, set oscilloscope SOURCE control to CH 2 and SLOPE control to −.	

Table 6-10. Power Supply Test

Preliminary procedures.

a. Refer to figure 6-69 and remove logic box cover.
b. Refer to figure 6-69 and remove top cover.
c. Connect printer power cable connector to 115 vac, 60 Hz ±3 Hz power source.
d. Set POWER switch to ON.

NOTE

After test(s) and maintenance of printer, reinstall covers removed in steps a and b above.

Step no.	Test procedure	Normal indication
1	Set up volt meter to measure 6 vac and connect ground lead to terminal 4 of TB9 and test lead to terminal 10.	6.3 vac norm.
2	Set up volt meter to measure 6 vdc and connect ground lead to terminal 4 of TB9 and test lead to terminal 7.	+5 vdc norm.
3	Set up volt meter to measure 12 vdc and connect ground lead to terminal 4 of TB9 and test lead to terminal 3.	+12 vdc norm.
4	Set up volt meter to measure 12 vdc and connect test lead to terminal 4 of TB9 and ground lead to terminal 9.	-12 vdc norm.
5	Set up volt meter to measure 36 vdc and connect ground lead to terminal 4 of TB9 and test lead to terminal 1.	+36 vdc norm.
6	Set up volt meter to measure 6 vdc and make the following circuit card voltage measurements:	
	a. On circuit card P95, ground lead to TPB and test lead to TPH	+5 vdc norm.
	b. On circuit card P96, ground lead to TPY and test lead to TPZ	+5 vdc norm.
	c. On circuit card P97, ground lead to TPY and test lead to TPZ	+5 vdc norm.
	d. On circuit card P98, ground lead to TPY and test lead to TPZ	+5 vdc norm.
7	Set up volt meter to measure 12 vdc and make the following circuit card voltage measurements:	
	a. On circuit card P98, ground lead to TPY and test lead to TPM.	+12 vdc norm.
	b. On circuit card P98, test lead to TPY and ground lead to TPR.	-12 vdc norm.
8	Set up volt meter to measure 36 vdc and connect ground lead terminal 21, 22 or 23 of TB10 on printer driver board assembly and test lead to terminal J or 1 through 6.	+36 vdc norm.
9	Set up volt meter to measure 12 vdc and connect ground lead to terminal 1 of lamp driver circuit board (A1, fig. 5-21) and test lead to terminal 2.	+12 vdc norm.
10	Connect volt meter test lead to terminal 1 of lamp driver circuit board A1 and ground lead to request to send circuit board (A2, fig. 5-21).	-12 vdc norm.

Section III. TROUBLESHOOTING

6-5. General. When troubleshooting, use a systematic approach. Consider trouble as occurring in either the power distribution system (for example, affecting both transmit and receive sections), transmitter section or the receive section. Power distribution troubles may be in the dc power supply, the ac input circuits, or the ac source outlet.

6-6. Troubleshooting Procedures. Table 6-11 lists the most common printer set failures together with the probable cause of the trouble and the corrective action to be taken. Both electrical and mechanical troubles are listed. The trouble symptoms are listed in the general order that troubles would be observed when checking the printer in accordance with the procedures of table 6-2. As an aid to troubleshooting, references are given in the probable trouble column to the applicable theory of operation paragraph. Although several probable causes are given for most troubles, all of these may not occur at the same time. Determine which cause applies to the particular situation being investigated. Where reference is made to a circuit card, always check the mating pins on the circuit card and card cage for evidence of corrosion. Parenthetical references to figures and paragraphs indicate the locations of adjustment and repair procedures. If trouble is determined to be cabling or wiring, refer to the signal flow diagrams of Chapter 4 and to the printer wire list of table 6-12.

Table 6-11. General Support Troubleshooting Chart

Step no	Trouble symptom	Probable trouble	Check and corrective measures
1	No printer mechanical or electrical operation.	Failure of power source	Check that power cable is connected. Check that power circuit breaker is ON Check ac power fuses F1 and F2 (para 3-13).
		Failure of dc power.	Check fuses F3, F4 and F5 (para 3-13 Perform power supply test (table 6-10 Replace P101 power supply regulator circuit card (para 6-26b (2)). Replace power supply (para 6-26a).
2	Motor does not start manually or automatically.	Motor control circuit failure (para 4-22).	Check +12v fuse F3 (para 3-13). Check motor start switch (table 3-1, fig. 5-21). Replace P95 ready/busy receive logic circuit card (para 5-27). Perform motor control circuit test (table 6-8). Check capacitor C8 fig. 6-68). Check filter FL8 (fig. 6-68). Replace motor B1 (para 6-19a).

Table 6-11. General Support Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
3	Motor starts manually but not automatically.	Timing and synchronization circuit failure (para 4-23).	Check cable connections to interface equipment. Check ON LINE-PRINTER switch (table 3-1, fig. 5-21 Replace P97 transmit moding logic circuit card (para 5-27). Replace P98 EIA interface logic circuit card (para 5-27).
		Motor control circuit failure(para 4-22).	Replace P95 ready/busy receive logic circuit card (para 5-27). Check +12v fuse F4 (para 3-13).
4	Motor does not stop after approximately 90 seconds of non-use.	Motor control circuit failure para 4-22).	Replace P95 ready/busy receive (logic circuit card (para 5-27). Perform motor control circuit test. Replace relay K1 (para 6-25b).
		Drum position control circuit failure (para 4-17).	Replace P96 printer control logic circuit card (para 5-27).
5	Rumbling sound when motor starts.	Shipping screws not loosened.	Check shipping screws (para 2-5 steps e and f).
		Drive belt loose.	Adjust drive belt tension (para 5-11).
		Power distribution mechanism(drive train) out of adjustment(para 4-6).	Check power distribution mechanism adjustments (para 6-8).
6	Motor overheats or is under speed.	Power distribution mechanism(drive train) out of adjustment(para 4-6).	Check motor clamp adjustment (para 5-12). Aline drive belt pulleys (para 5-13). Check power distribution mechanism adjustments (para 6-8). Replace motor BI (6-19a).
7	No ribbon feed or ribbon reverse.	Inking ribbon mechanism failure(para 4-9).	Adjust ribbon reverse eccentric pins (para 5-20). Check ribbon feed detent plunger and driving clutch adjustment (para 6-11b).
8	Light type character density.	Inking ribbon worn out.	Replace inking ribbon (para 3-12).
		Printing mechanism dirty.	Clean and lubricate hammer block (para 5-6f).
		Printing mechanism out of adjustment.	Check print hammer block alinement (para 6-10o).
		Paper trough out of adjustment.	Adjust paper trough clearance (para 5-15).

Table 6-11. General Support Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
9	Over embossing of type characters.	Printing mechanism out of adjustment.	Aline print hammer block (para 6-10o).
10	Smudged type characters	Printing mechanism dirty.	Clean and lubricate hammer block (para 5-6f).
		Print drum dirty.	Clean print drum (para 5-7).
11	Partial printing of characters horizontally.	Timing and synchronization circuit or printing mechanism out of adjustment.	Check character phasing adjustment (para 6-13c).
			Check print hammer magnet clearance and impact adjustment (para 6-10p).
12	Partial printing of characters vertically.	Printing mechanism out of adjustment.	Adjust space pawl and rack (para 6-10j).
13	Ribbon does not lift for printing either on-line or off-line.	Ribbon lift circuit failure (para 4-21).	Replace P95 ready/busy receive logic circuit card (para 5-27).
		Timing and synchronization circuit failure (para 4-23).	Replace P96 printer control logic circuit card (para 5-27).
			Replace P97 transmit moding logic circuit card (para 5-27).
		Keyboard circuit failure (para 414).	Replace P100 ASC11 keyboard control circuit card (para 5-30).
			Replace P102 communications keyboard (para 5-29).
14	Ribbon does not lift for printing a received message (only).	Timing and synchronization circuit failure (para 4-23).	Replace P95 ready/busy receive logic circuit card (para 5-27).
			Replace P98 EIA interface logic circuit card (para 5-27).
15	No print hammer action either on-line or off-line.	Print hammer control, timing and synchronization, drum position control, or print data decode circuit failure (para 4-18, 4-23, 4-17, or 4-16).	Replace printer control logic circuit card (para 5-27).
		Send/receive logic circuit failure(para 4-15).	Replace P95 ready/busy receive logic circuit card (para 5-27).
			Replace P97 transmit moding logic circuit card (para 5-27).
		Print hammer control circuit failure.	Perform print hammer control circuit test (table 6-4).
16	No print hammer action off-line only).	Send/receive logic circuit failure (para 4-15).	Check INHIBIT switch (para 5-32).
			Check ON LINE-PRINTER switch (fig. 5-21).
			Replace P97 transmit moding logic circuit card (para 5-27).

Table 6-11. General Support Troubleshooting Chart - Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
16 (cont)		Keyboard circuit failure (para 4-14).	Replace P100 ASCII keyboard control circuit card (para 5-30). Replace P102 communications keyboard (para 5-29).
17	No print hammer action from a received message (only).	Send/receive logic failure (para4-15).	Check ON-LINE PRINTER switch (table 3-1, fig. 5-21). Replace P98 EIA interface logic circuit card (para 5-27). Perform send/receive logic circuit test (table 6-3).
18	No transmission of print data.	Send/receive logic failure (para4-15).	Check ON LINE-PRINTER switch (table 3-1, fig. 5-21). Check cable connections to interface equipment. Replace P98 EIA interface logic circuit card (para 5-27). Perform send/receive logic circuit test (table 6-3).
19	CLEAR SEND indicator does not light when REQ SEND switch is pressed. **NOTE** CLEAR SEND indicator will not light if printer is not connected to interface equipment	Send/receive logic or keyboard circuit failure (para 4-14 or 4-15).	Check CLEAR SEND indicator DS5 circuit (fig. 5-21 and 4-13). Check REQ SEND switch circuit(fig. 5-21 and 4-12). Check cable connections to interface equipment.
20	Incorrect print character selection.	Keyboard circuit failure (para 4-14).	Replace P102 communications keyboard (para 5-29). Replace P100 ASCII keyboard control circuit card (para 5-30).
		Send/receive logic failure (para4-15).	Replace P97 transmit moding logic circuit card (para 5-27). Replace P95 ready/busy receive logic circuit card (para 5-27).
		Print data decode, drum position control, or print hammer control circuit failure (para 4-16, 4-17, or 4-18).	Replace P96 printer control logic circuit card (para 5-27).
		Main clock or index clock out of adjustment.	Check positioning and clearance of main clock (para 6-13d). Check positioning and pulse alinement of index clock (para 6-13b). Adjust print character phasing (para 6-13c).

Table 6-11. General Support Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
21	Carriage does not space.	Line space, print data decode, timing and synchronization or print hammer control circuit failure (para 4-19, 4-16, 4-28, or4-18).	Replace P96 printer control logic circuit card (para 5-27). Perform line space and carriage return circuit test (table 6-5).
		Printing mechanism out of adjustment.	Check space bail positioning adjustment (para 6-10i). Check space pawl and rack clearance adjustment (para 6-10j). Check space magnet, space pawl stop plate, and space pawl adjustment (para 6-10k).
22	Carriage skips spaces.	Printing mechanism out of adjustment.	Check space bail positioning adjustment (para 6-10i). Check space pawl and rack clearance adjustment (para 6-10j). Check space magnet, space pawl stop plate, and space pawl adjustment (para 6-10k).
28	Paper does not feed manually or automatically.	Pressure selector in wrong slot or not latched.	Check that pressure selector is in proper slot (para 3-2). Check that pressure finger levers are latched (para 3-2).
		Line feed circuit failure (para 4-20).	Replace P96 printer control logic circuit card (para 5-27). Perform line feed circuit test (table 6-6). Check line feed bracket adjustment (para 6-9m). Check line feed clutch magnet adjustment (para 6-9n).
24	Paper does not feed manually (only).	Line feed, print data decode, or print hammer control circuit failure (para 4-20, 4-16, or 4-18).	Check LF switch (table 3-1, fig. 5-21). Replace P96 printer control logic circuit card (para 5-27).
		If paper feeds from LF switch action but not from keyboard LINE FEED key; print data decode, send/receive logic or keyboard circuit failure (para 4-16, 4-15or 4-14).	Replace P102 communications keyboard (para 5-29). Replace P100 ASCII keyboard control circuit card (para 5-30). Replace P96 printer control logic (para 5-27).

Table 6-11. General Support Troubleshooting Chart -Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
24 (cont)			Replace P97 transmit moding logic (para 5-27). Replace P95 ready/busy receive logic circuit card (para 5-27).
25	Paper does not feed automatically.	Line feed circuit failure (para 4-20).-	Replace P96 printer control logic circuit card (para 5-27).
		Right hand margin switch or printing mechanism out of adjustment.	Check reed switch clearance adjustment (para 6-14a). Check carriage return reed switch adjustment (para 6-14c).
26	Erratic line spacing.	Line feed mechanism out of adjustment.	Check paper feed detent adjustment (para 6-9o). Check line feed detent wheel adjustment (para 6-9p).
27	Paper bunches up or tears.	Pressure selector in wrong slot.	Check that pressure selector is in correct slot (table 3-2).
		Front or rear paper guides out of adjustment.	Adjust front and/or rear paper guide(s) (para 5-16 and 5-17).
		Paper trough out of adjustment.	Adjust paper tension bar and/or paper
		Paper tension bar or paper guide rollers out of adjustment.	Adjust paper tension bar and/or paper guide rollers (para 5-18 and 5-19).
		Paper pressure fingers too loose or tight or not alined with paper drive friction ring.	Check paper pressure finger positioning adjustment (para 6-9d). Check paper pressure finger spring tension (para 6-9f).
28	Excessive paper roll endplay.	Right-hand plate leaf spring out of adjustment.	Adjust right-hand plate leaf spring (para 5-14).
29	Paper roll does not stay in mounting.	Paper latches not spring loaded.	Replace latch spring(s) (para 5-35).
30	Carriage does not return to left-hard margin manually or automatically.	Carriage return circuit failure(para 4-8).	Replace P96 printer control logic circuit card (para 5-27). Perform line space and carriage return circuit test (table 6-5).
		Printing mechanism mechanical failure.	Check return armature and clutch pulley adjustment (para 6-lOe). Check for over tension of carriage feed drum (para 6-10 g).

Table 6-11. General Support 7roubkehooting Chart
-Continued

Step no.	Trouble symptom	Probable trouble	Check and corrective measures
30		If carriage returns from CR switch action but not from keyboard RETURN key action; print data decode, send/receive logic, or keyboard circuit failure (para 4016, 4-15, 4-14).	Replace P102 communications keyboard (para5-29). Replace P100 ASCII keyboard control circuit card (para 5-30). Replace P96 printer control logic circuit card (para 5-27). Replace P97 transmit moding logic circuit card para 5-27). Replace P95 ready/busy receive logic (para 5-27)
31	Carriage does not return automatically when commanded by interface equipment.	Send/receive logic failure (para 4-15).	Check ON LINE-PRINTER switch (table 3-1, fig 5-21). Replace P98 EIA interface logic circuit card (para 5-27). Replace P95 ready/busy receive logic circuit card (para 5-27).
32	Carriage does not return to left-hand margin manually (only).	Carriage return circuit failure (para 4-19).	Check CR switch (table 3-1, fig. 5-21).
33	72 characters per line cannot be printed.	Printing mechanism out of adjustment.	Check carriage shaft positioning adjustment (para 6-101). Check space pawl and rack clearance adjustment (para 6-10j). Check reed switch clearance adjustment (para 6-14a). Check carriage return reed switch adjustment (para 6-14c). Check left-hand margin reed switch adjustment (para 6-14b).
34	No paper-out alarm when paper supply is low or out.	Low paper alarm switch out of adjustment.	Adjust low paper alarm switch (para 6-9q).
35	With adequate paper supply, paper out alarm sounds.	Low paper alarm switch out of adjustment.	Adjust low paper alarm switch (para 6-9q).
36	Cover release knob binds.	Cover release knob out of adjustment.	Adjust cover release knob clearance (para 5-21).
37	Cover does not latch.	Latch block out of adjustment or latch spring defective.	Adjust latch block (para 5-22). Replace latch spring (para 5-36).
38	Cover binds.	Cover hinge rod or bracket out of adjustment.	Adjust cover hinge rod and bracket (para 5-23).

Section IV. ADJUSTMENTS

6-7. General. This section provides adjustment procedures and tolerance requirements for the printer and supplements those adjustment procedures for organizational maintenance provided in Chapter 5, Section IV. The procedures are categorized by mechanical and electrical functions. Where adjustments are interrelated, references are given to the related adjustments. If necessary, perform the related adjustments.

6-8. Power Distribution Mechanism Adjustments.

a. Motor Blower Adjustment (fig. 6-1)

(1) Requirement The clearance between the blower and motor mounting bracket must be 1/82- to 1/ Winch.

(2) Adjusts To adjust motor blower, proceed as follows:

(a) Loosen blower setscrews.

(b) Position blower to meet requirement; tighten setscrews.

(c) Recheck requirement.

b. *Power Shaft End Play Adjustment (fig. 6-2)*

(*1) Requirement.* The power shaft should have no end play.

NOTE

Do not mistake ball bearing movement for shaft end play.

(2) *Adjustment.* To eliminate power shaft end play, proceed as follows:

(a) Loosen machine screw in end of shaft.

(b) Loosen two setscrews in hub of power shaft pulley.

(c) Aline setscrews with flats on shaft.

(d) Tighten machine screw (removes end play) and two setscrews.

(e) Check clearance of power shaft bearing sleeve and ribbon feed lever (para 6-8c). Adjust if necessary.

c. Power Shaft Bearing Sleeve and Ribbon Feed Lever Clearance Adjustment (fig. 6-3)

NOTE

Perform related adjustment described in paragraph 6-8b before performing this adjustment.

(1) *Requirements.*

(a) The ribbon feed lever spacer must be 0.005 to 0.010 inch from the frame when the spacer is against the external sleeve and the external sleeve is against the internal sleeve.

(b) There must be a minimum of 0.001-inch clearance between each side of the ribbon feed lever and guide bracket when the lever is in the raised position.

(2) *Adjustment.* To adjust power shaft bearing sleeve and ribbon feed lever, proceed as follows:

(a) Loosen four cam and sleeve setscrews.

(b) Hold spacer against external sleeve and external sleeve against internal sleeve.

(c) Hold power shaft toward drive belt side of unit. Position sleeves to meet requirement (1) (a) above. Tighten internal sleeve setscrews.

(d) Move ratchet and cam assembly against spacer and tighten setscrews.

NOTE

Make sure the ribbon feed lever is on the cam.

(e) Loosen two guide bracket machine screws.

(f) Position guide bracket to meet requirement (1) (b) above.

(g) Tighten two guide bracket machine screws.

(h) Recheck requirements.

(i) Check adjustment of line feed clutch bearing sleeve (para 6-9k). Adjust if necessary.

6-9. Paper Handling Mechanism Adjustment.

a. Paper *Trough Positioning Adjustme*nt fig.*6-.4)*

(1) *Requirement.* The left edge of the paper trough should be 17/64 ±1/64-inch from the center of the feed pins.

(2) *Adjustments*. To adjust paper trough position, proceed as follows:

(a) Loosen setscrew on right-hand frame.

(b) Position trough to meet requirement; tighten setscrew.

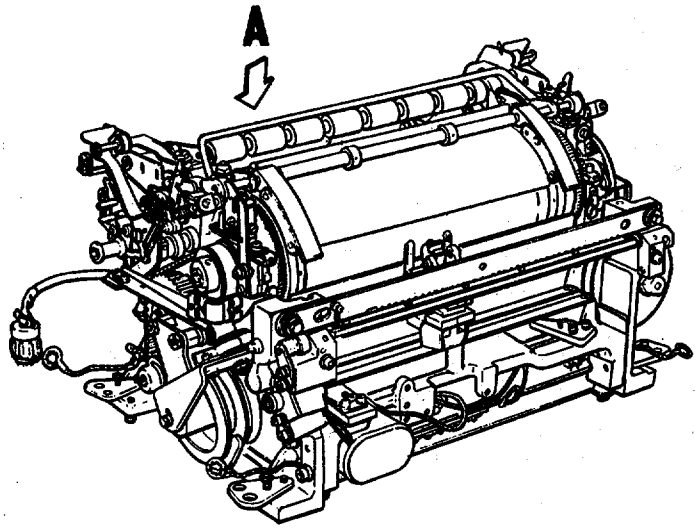
(c) Recheck requirement.

b. *Front Paper Guide Assembly Adjustment (fig 6-5)*

NOTE

Check right-hand feed wheel adjustment described in paragraph G10b before performing this adjustment. Adjust if necessary.

(1) *Requirements*. The paper guide plate must be back as far as possible and be flat with the curvature of the sprocket wheels.



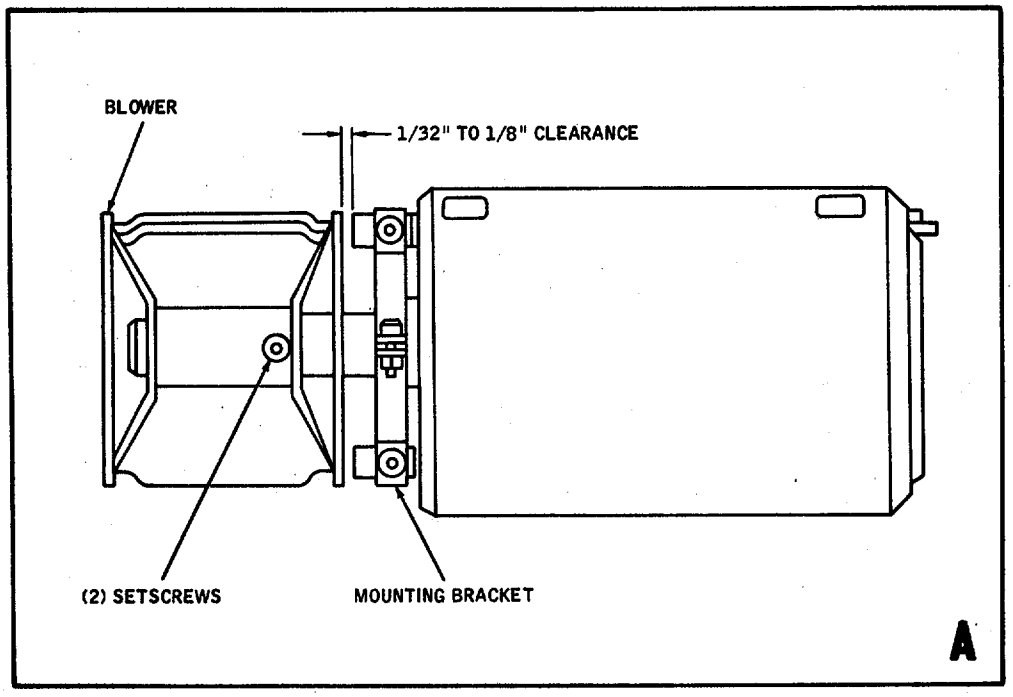
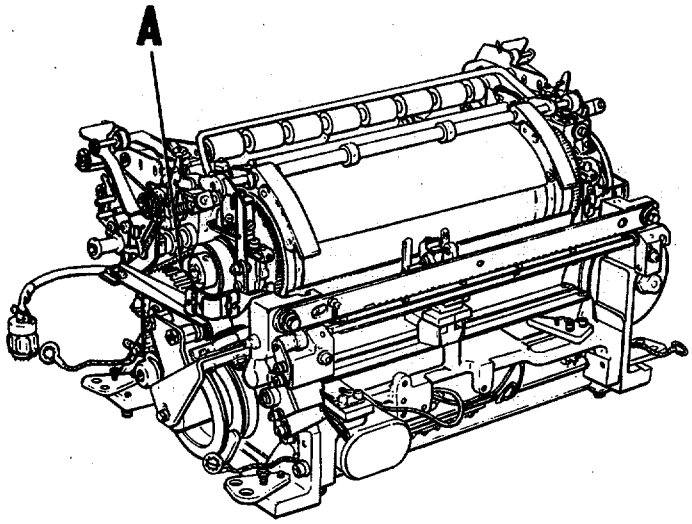


Figure 6-1 Motor Blower Adjustment



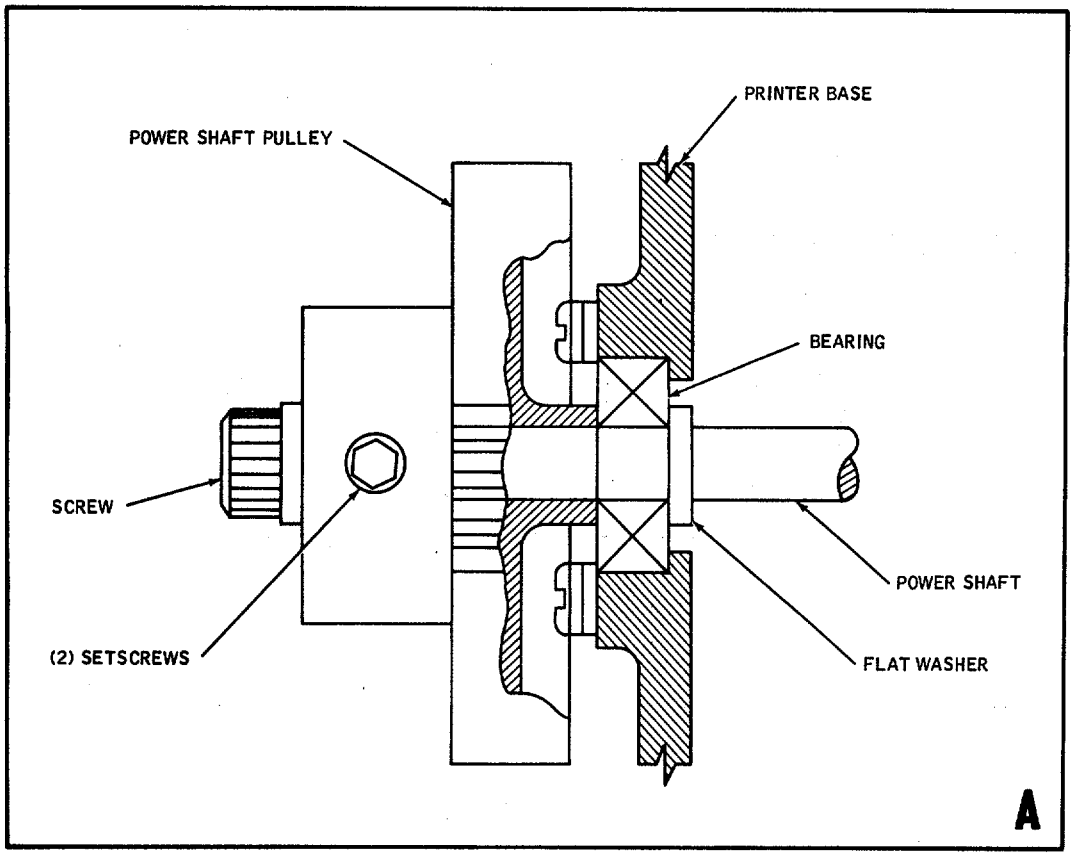


Figure 6-2. Power Shaft End Play Adjustment

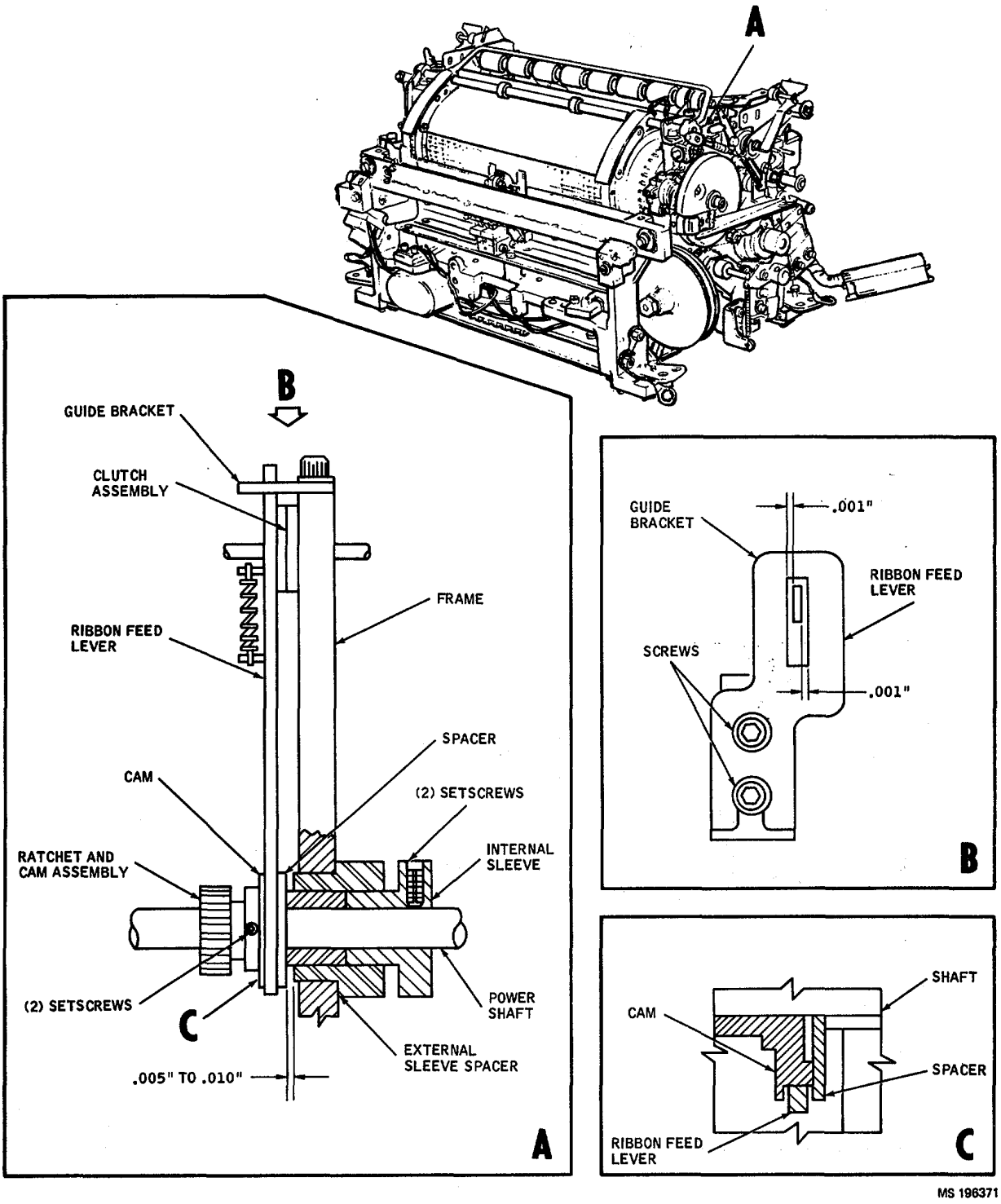


Figure 6-3. Power Shaft Bearing Sleeve and Ribbon Feed Lever Clearance Adjustment

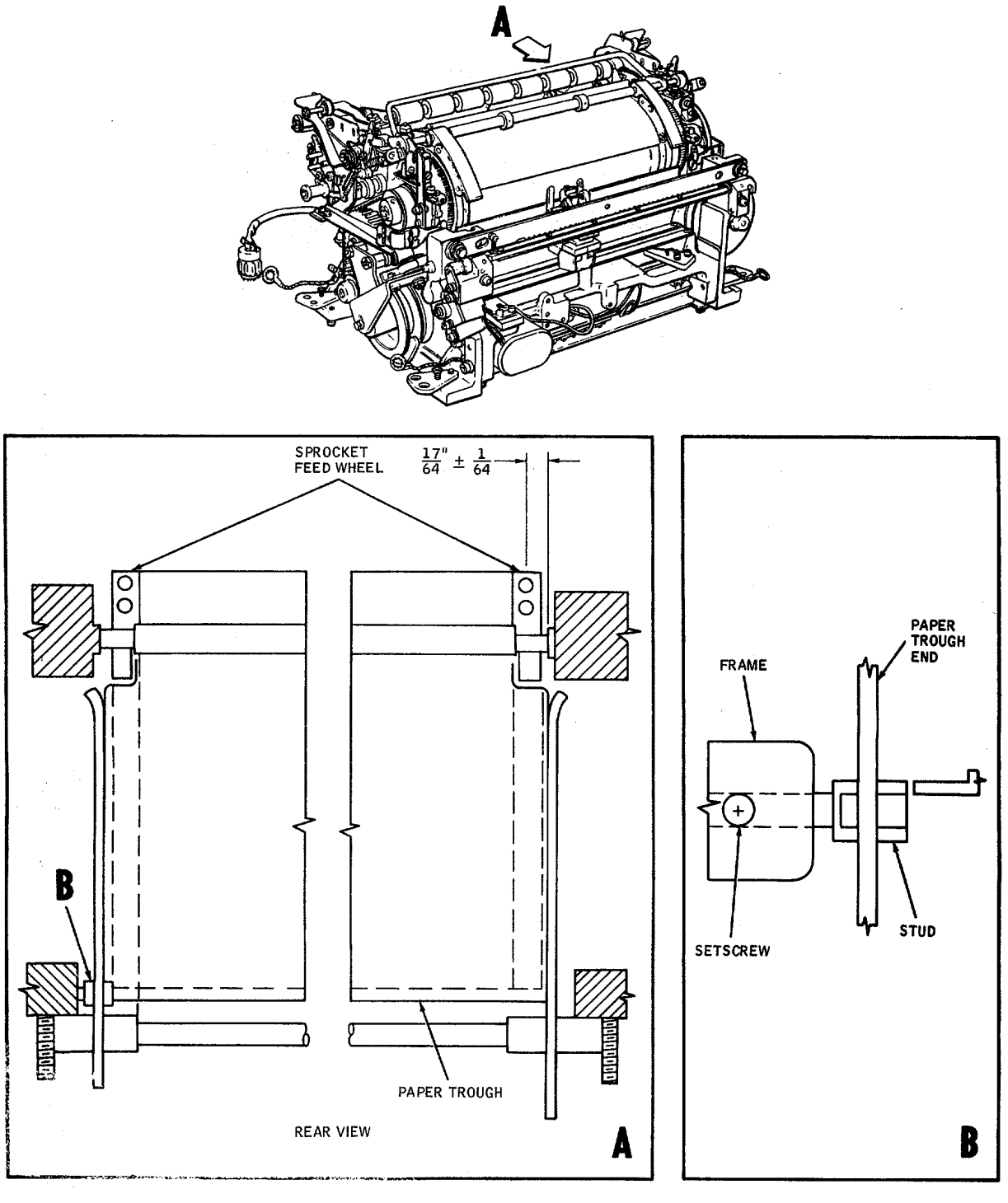


Figure 6-4. Paper Trough Positioning Adjustment

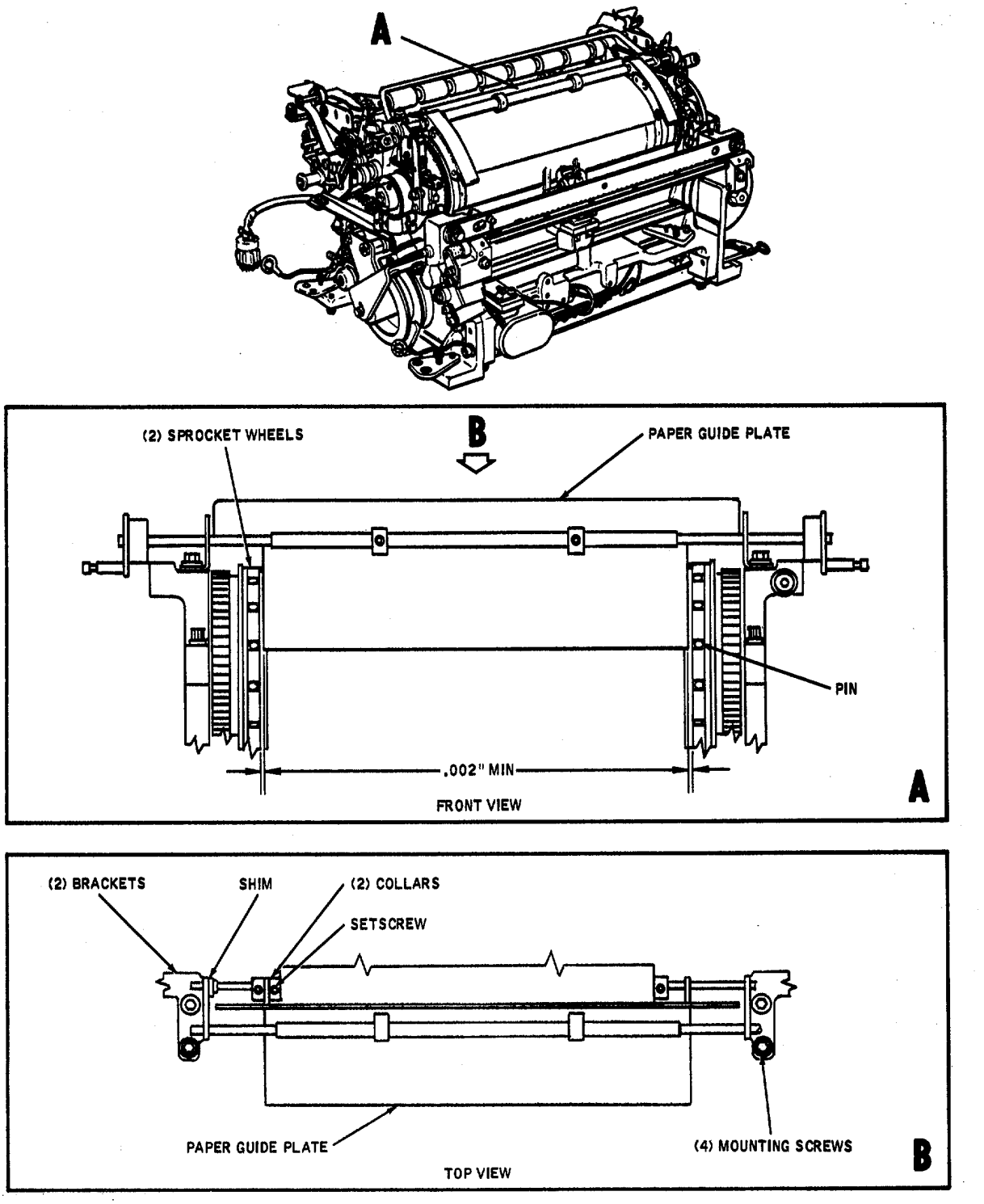


Figure 6-5. Front Paper Guide Assembly Adjustment

(2) *Adjustment* To adjust front paper guide, proceed as follows:
(a) Loosen left and right bracket mounting screws.
(b) Position brackets to meet requirement; tighten mounting screws.
(c) Check adjustment of front paper plate (para 5-16). Adjust if necessary.

c. *Paper Pressure Finger Lever and Latch Clearance Adjustment (fig. 6-6)*
(1) *Requirements*
(a) The clearance between the latch lever and the mounting bracket must be 0.002- to 0.007-inch.
(b) The clearance between the latch and the stop plate must be 0.002- to 0.007-inch.
(2) Adj*ust*ment. To adjust paper pressure finger lever and latch proceed as follows:
(a) Disconnect latch springs.
(b) Adjust stop nuts until requirements are met.
(c) Install springs.
(d) Perform adjustment steps (a), (b), and (c) on opposite lever latch.

d. *Paper Pressure Fingers Positioning Adjustment (fig. 6-7)*

CAUTION

The pressure finger latches must be unlatched when performing this adjustment or the pressure fingers may be damaged.

NOTE

Check front paper guide adjustment described in paragraph 6-9b before performing this adjustment. Adjust if necessary.

(1) *Requirements*
(a) The center of the pressure finger roller must ride within the center half of the rubber ring.
(b) The sprocket pins must not hit the sides of the fingers when the pins are extended.
(*2) Adjustment.* To position paper pressure fingers, proceed as follows:
(a) Loosen setscrew in each finger assembly.
(b) Position finger assemblies to meet requirements; tighten setscrews on shaft flats.
(c) Recheck requirements.
(d) Check tension of paper pressure spring (para 6-9f). Adjust if necessary.

e. *Paper Pressure Adjustment (fig. 6-8)*
(*1) Requirements*
(a) The pressure selector lever should be in the right-hand slot in the comb (for friction feed operation) and the rounded end of the lever should seat against the low part of the left-hand arm assembly.
(b) When the pressure selector lever is in the "friction feed operation" position, the edge of the deflector assembly should rest against both ends of the paper trough assembly (1-inch minimum at each side).
(2) A*djustme*nt. To adjust paper pressure, proceed as follows:
(a) Loosen setscrew in cam assembly.
(b) Position cam assembly to meet requirement (a).
(c) Loosen machine screw securing pressure selector lever to deflector assembly.
(d) Position lever to meet requirement (b); tighten machine screw.
(e) Recheck requirements.
(f) Check tension of paper pressure spring (para 6-9f). Adjust if necessary.

f. Paper *Pressure Finger Spring Tension Adjustment (fig. 6-9)*
(1) *Requirements* . The tension on the paper pressure fingers when the levers are in the unlatched position should be 3 to 5 ounces with no more than 1/2-ounce difference between each finger.
(2) Adjustment. To adjust paper pressure spring tension, proceed as follows:
(a) Loosen locknut(s).
(b) Adjust screw (s) to meet requirement.
(c) Tighten locknut(s).
(d) Recheck requirement.

g. *Sprocket Feed Pin Adjustment (fig 6-10)*
(1) *Requirements*
(a) The sprocket pins in the left- and right-hand feed wheel assemblies should be retracted for friction feed operation and extended for sprocket feed operation.
(b) The left- and right-hand levers should be in the latched position for friction feed operation and in the unlatched position for sprocket feed operation.
(2) Adjustment. To adjust sprocket feed pin, proceed as follows:
(a) While holding left-hand feed wheel assembly from turning, insert screwdriver or similar instrument into notch in feed selector cam.

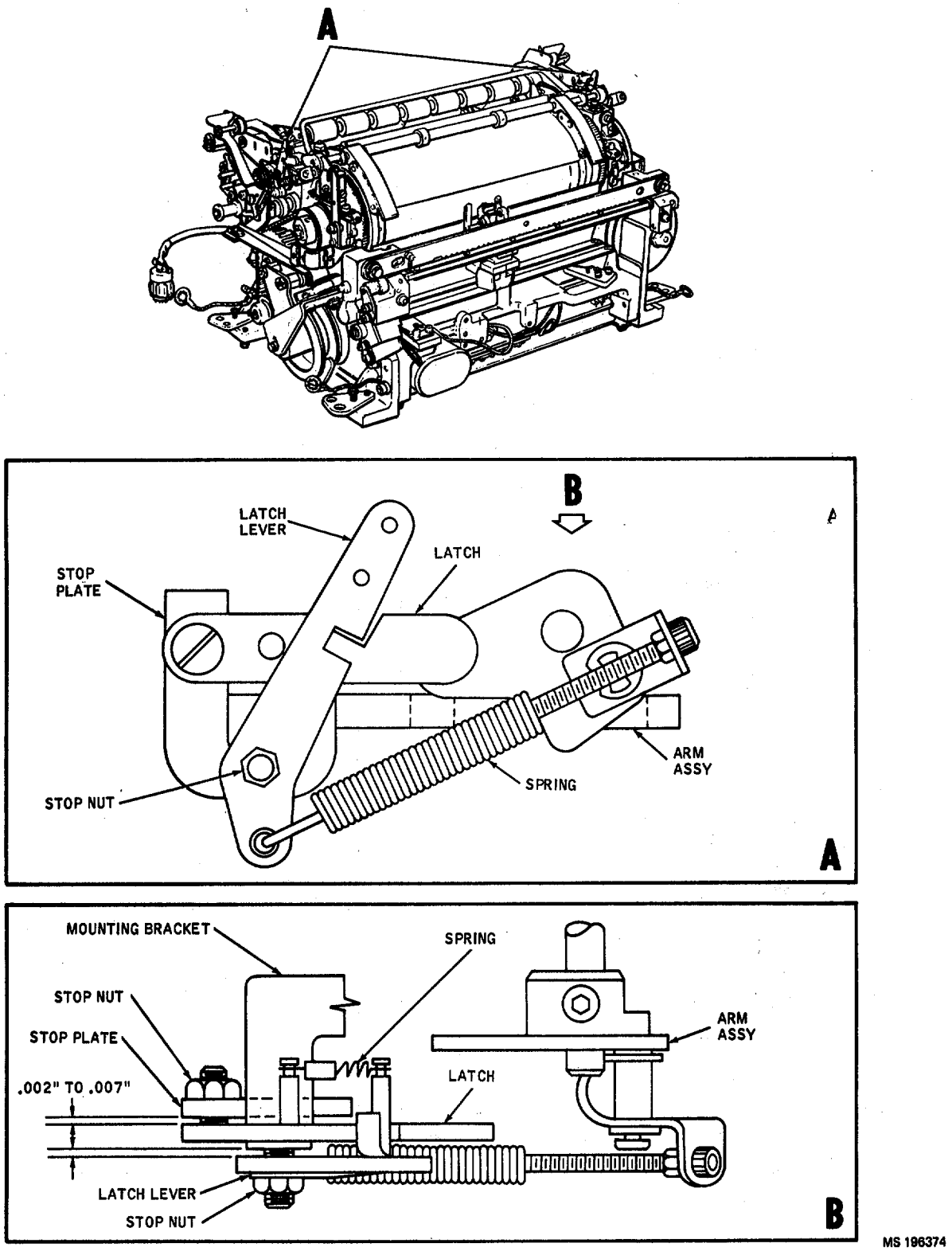


Figure 6-6. Paper Pressure Finger Lever and Latch Clearance Adjustment

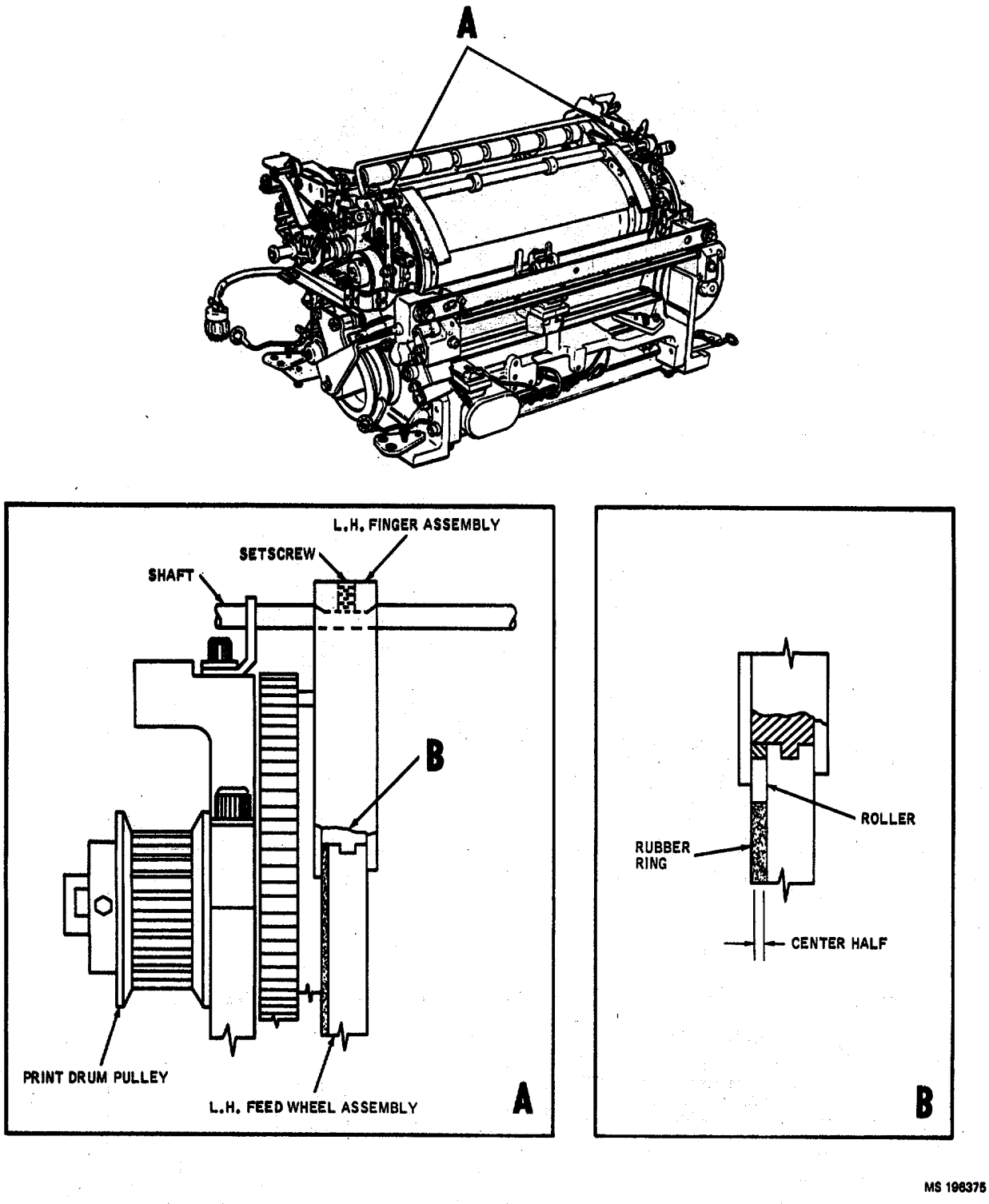


Figure 6-7. Paper Pressure Finger Positioning Adjustment

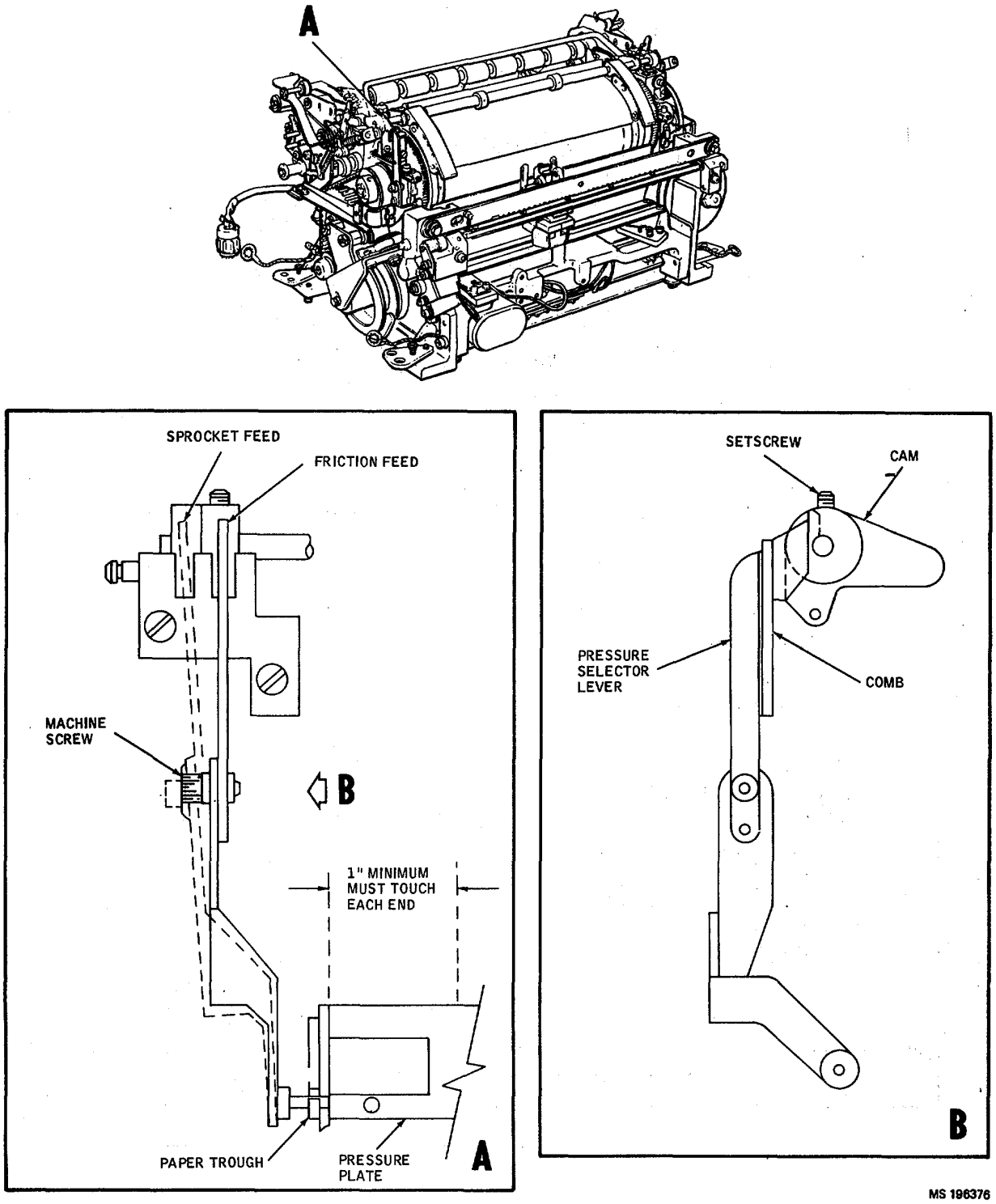
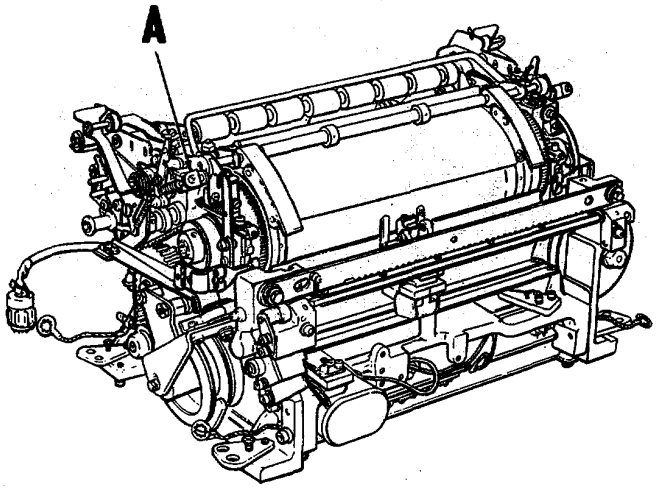


Figure 6-8. Paper Pressure Adjustment



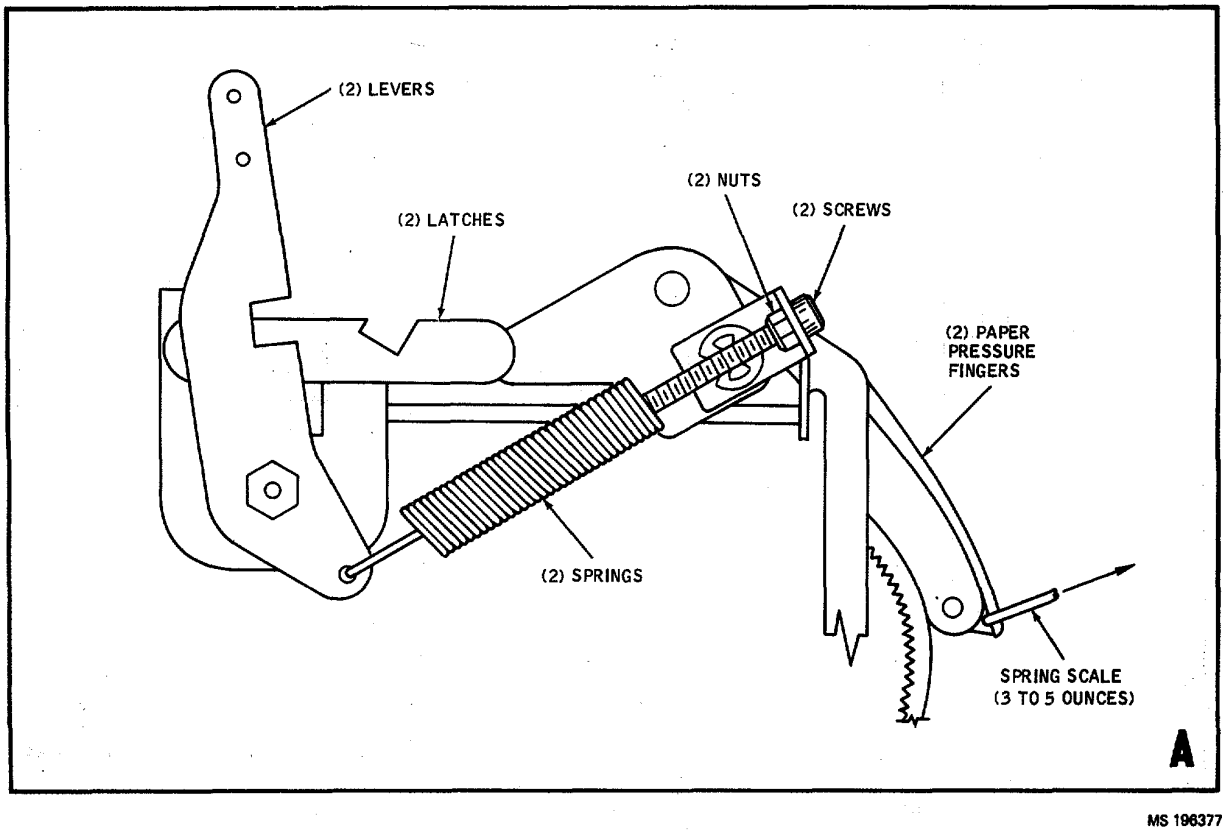


Figure 6-9. Paper Pressure Spring Tension Adjustment

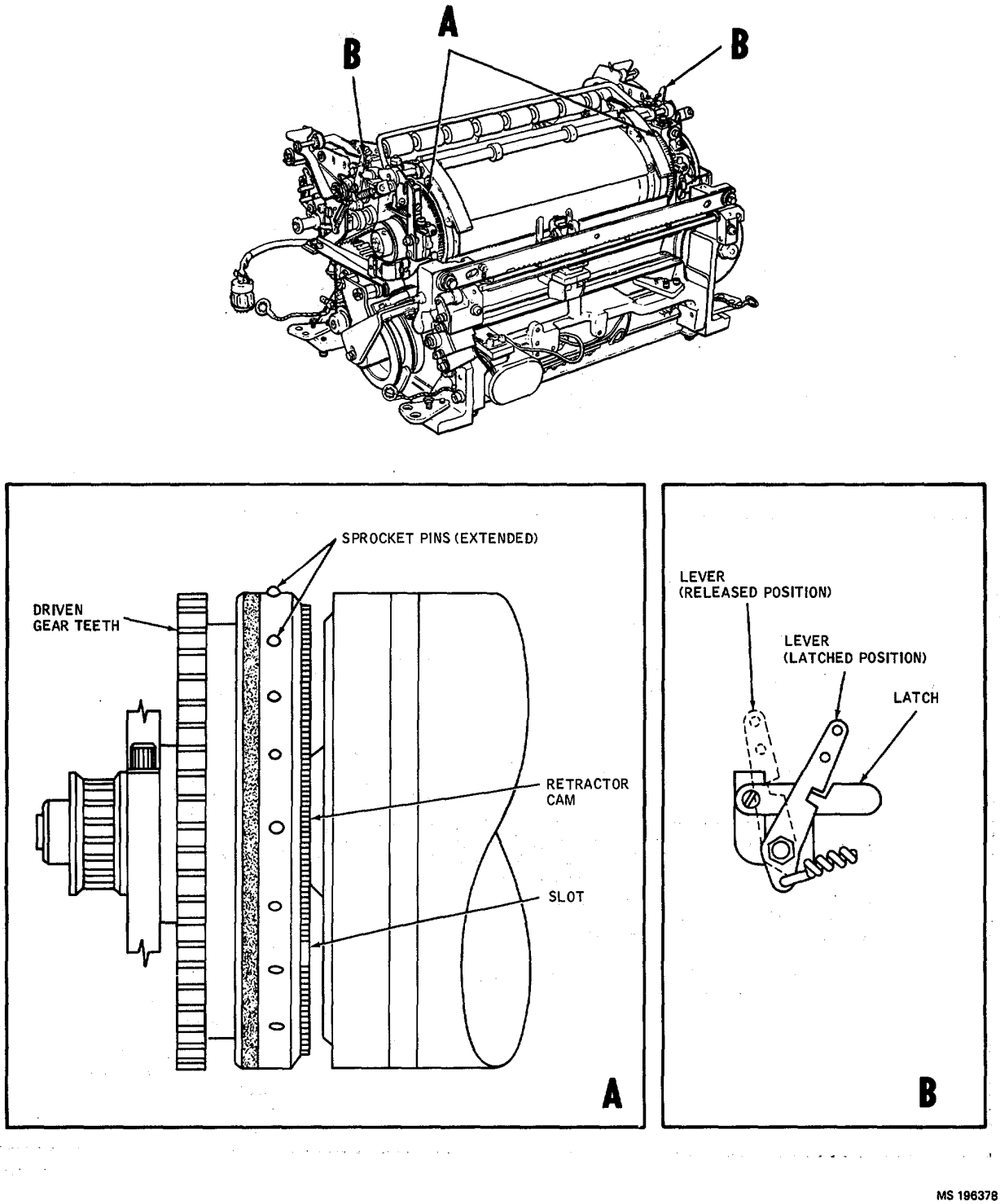


Figure 6-10. Sprocket Feed Pin Adjustment

(b) Move cam up toward rear of machine to retract sprocket pins for friction feed operation. Move cam down toward front of machine for sprocket feed operation to meet requirement (a).
(c) Repeat steps (a) and (b) above for right-hand feed wheel assembly.
(d) Position left- and right-hand levers to meet requirement (b).

h. *Paper Drive Shaft and Drive Gear Alinement (fig 6-11)*

(*1) Requirements*

(a) The drive gears must be at least 90 percent alined with the driven gears.

NOTE

Requirements (b) and (c) are listed separately for simplicity, but are obtained at the same time by the' same adjustment. Also, once these requirements have been met, they can only be checked by reperforming the adjustment.

(b) The drive shaft bearings must be alined for free shaft rotation.
(c) The drive gears must engage the driven gears at least 50 percent, but must not bind.

(2) *Adjustment.* To adjust paper drive shaft and drive gear, proceed as follows:
(a) Loosen two setscrews; remove collar retaining line feed cam follower (fig. 6-13).
(b) Loosen two setscrews; remove collar retaining line feed. lever to line feed shaft (fig. 6-15).
(c) Disconnect line feed cam follower spring (fig. 6-19).
(d) Remove line feed lever and line feed cam follower from their respective shafts at the same time.
(e) Loosen bearing plate and drive gear bracket screws.
(f) Move line feed shaft away from the driven gears.
(g) Loosen two setscrews in each drive gear.

CAUTION

The driven gear teeth may be broken if a tool is used to rotate them. Use fingers to rotate the driven gear. Do not force the drive gear teeth against the drive gears when performing this adjustment.,

(h) Position each drive gear to meet requirement (a); tighten setscrews.
(i)Lift paper pressure fingers away from paper feed wheels; remove paper if present.
(j) The objectives of the following adjustment steps are to satisfy requirements (b) and (c).
(k)' Raise left 'drive gear (drive belt side) to obtain engagement requirement (c); tighten drive gear bracket screws friction tight.
(1) Raise right drive gear to obtain engagement requirement. Tighten bearing plate screws just enough to retain plate in position but not so tight that plate cannot be moved to obtain shaft alinement.
(m) Rotate end of line feed shaft manually; "feel" resistance required to turn shaft.
(n) Continue rotating shaft while moving bearing plate up, down, back and forth within limits of screw holes. There will be one plate position where shaft can be rotated with the least resistance than all other plate positions. This one position is the point where both shaft bearings are alined to satisfy requirement (b). In some cases it may be necessary to "shift" both shaft bearings to find the "alined" position.
(o) Once bearing position is found, tighten drive gear bracket and bearing plate screws.
(p) Recheck engagement requirement (c).
(q) If gear engagement is less than 50 percent, shaft bearings must be repositioned to obtain minimum gear engagement and most importantly, shaft bearing alinement.
(r) Reinstall line feed cam follower and line feed lever on their respective shafts.
(s) Reinstall respective shaft collars.
(t) Adjust cam follower collar (para 6-9j).
(u) Adjust lever collar (para 6-91).
(v) Reconnect cam follower spring.

i. *Sprocket Pin Alinement (fig. 6-12)*

(1) *Requirement*. A line established through a right feed pin and a corresponding left pin must be parallel to the top of a row of characters on the drum within 1/64-inch.

(*2) Adjustment.* To aline sprocket pins, proceed as follows:
(a) Position line feed cam follower on low part of cam.
(b) Turn driven gears by hand and loosen right driven gear screws.
(c) Position line feed mechanism in stop position.

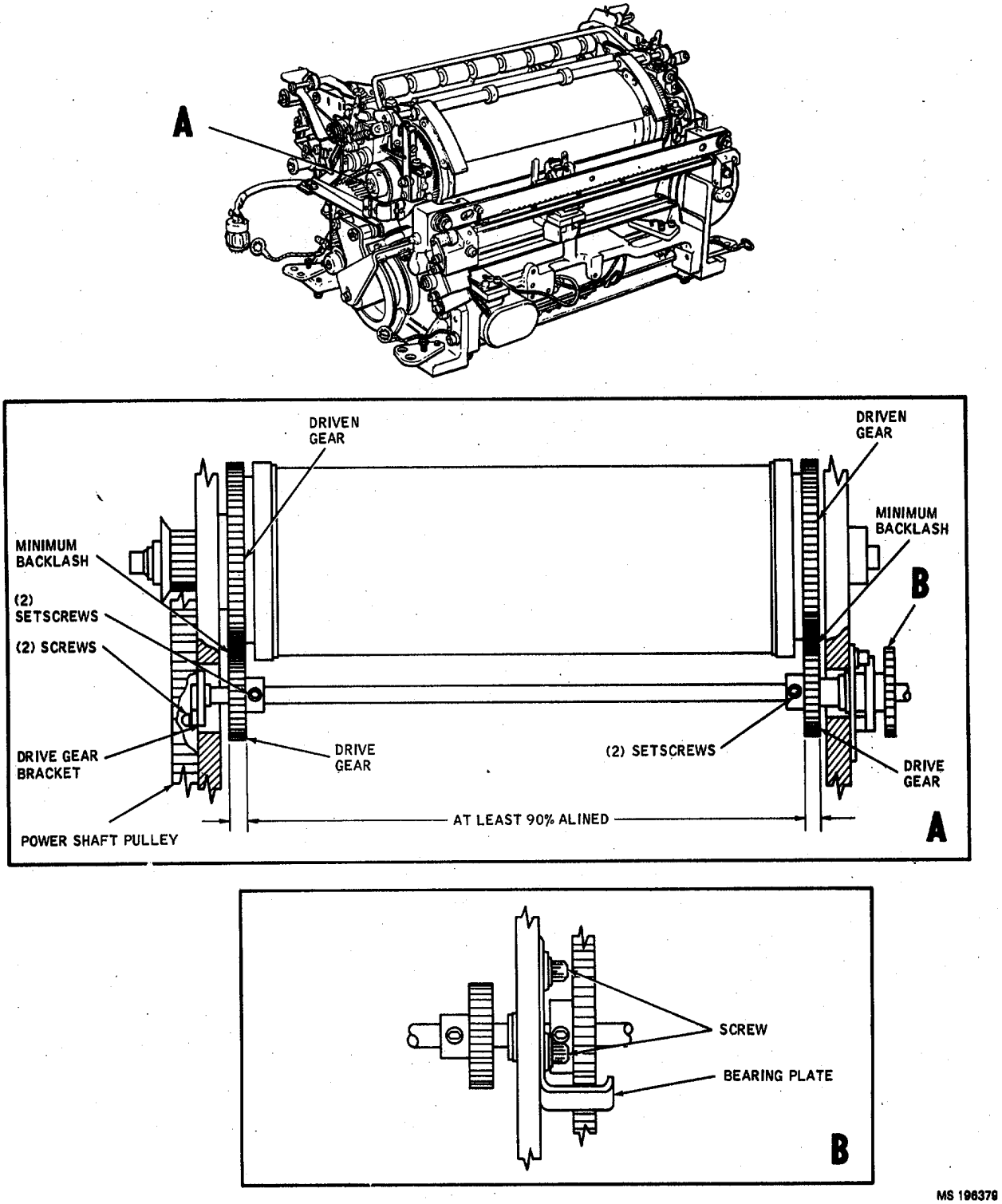
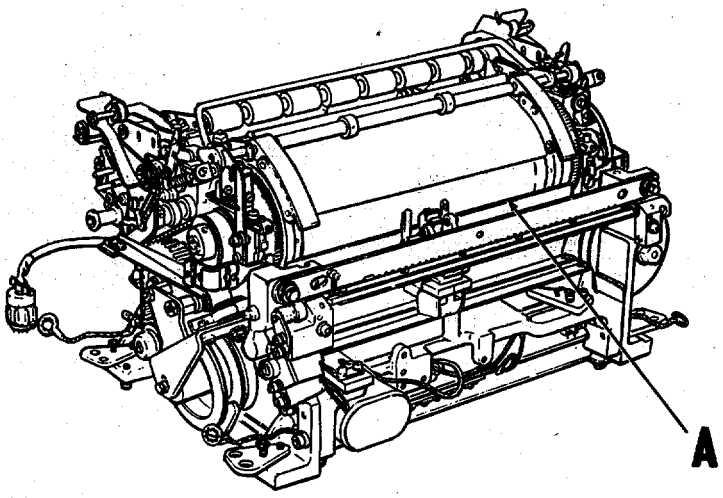


Figure 6-11. Paper Drive Shaft and Drive Gear Alignment



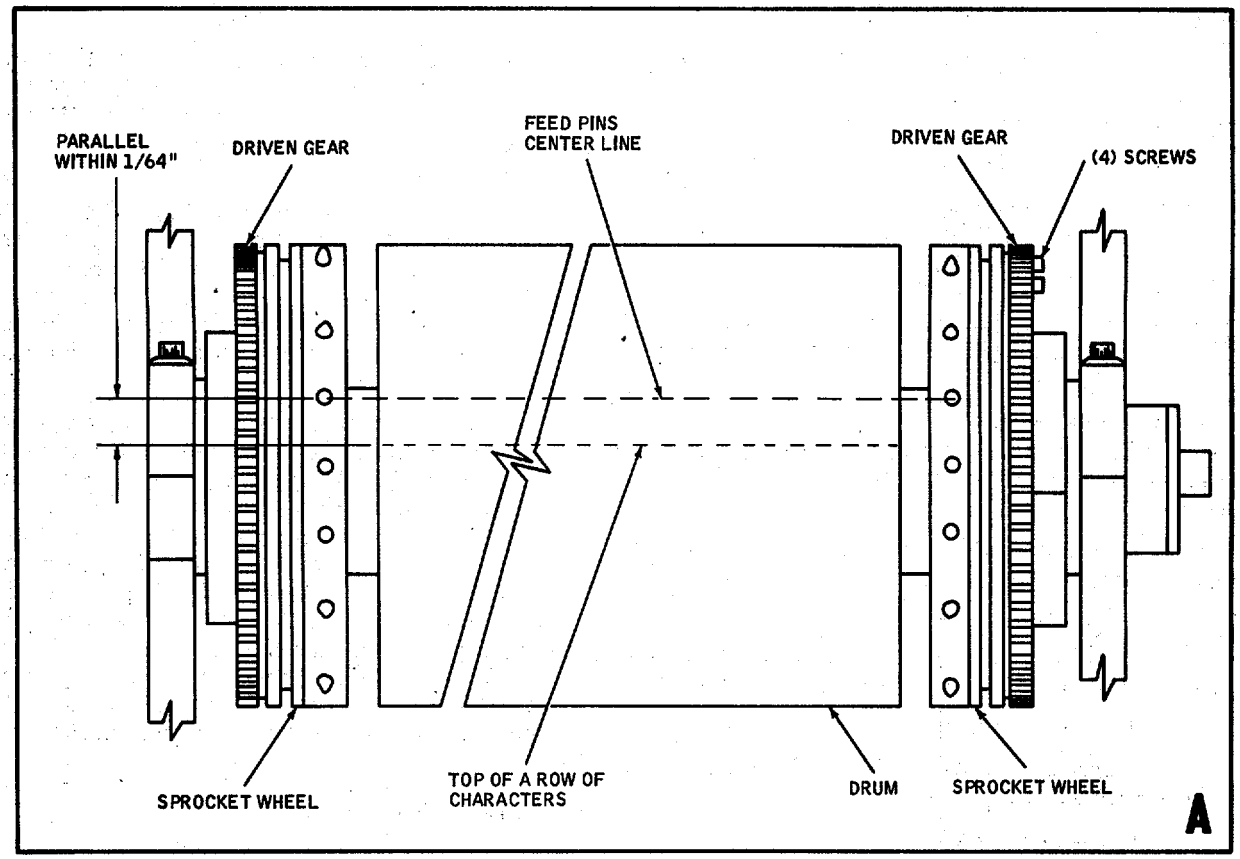


Figure 6-12. Sprocket Pin Alinement

CAUTION

The driven gear teeth may be broken very easily. Do not use any hard object or excessive pressure to hold the driven gear from turning when performing this adjustment. Hold the driven gear by hand to prevent pressure from being applied to the driven gear teeth when loosening or tightening screws or turning the sprocket wheel

(d) Hold right driven gear from turning and position sprocket wheel to meet requirement.

(e) Tighten screws.

(f) Recheck requirement after selecting line feed with machine under power.

j. Line Feed Cam Follower End Play Adjustment (fig. 6-13)

(1) *Requirement.* The cam follower must have 0.005- to 0.010-inch end play.

(2) *Adjustment.* To adjust line feed cam follower, proceed as follows:

(a) Loosen two collar setscrews.

(b) Position collar to meet requirement; tighten setscrews.

(c) Recheck requirement.

k. Line Feed Clutch Bearing Sleeve Adjustments. (fig. 6-14)

NOTE

Check that the power shaft has no end play before performing this adjustment (para 6-8b). Adjust if necessary.

(1) *Requirement*. The shoulder of the bearing sleeve must touch but not depress the bearing seal when the clutch assembly is against the ratchet and cam assembly.

(2) *Adjustmen*t. To adjust line feed clutch bear-in, proceed as follows:

(a) Loosen two sleeve setscrews.

(b) Hold clutch assembly against ratchet and cam assembly; position sleeve to meet requirement.

(c) Tighten setscrews.

l. *Paper Feed Shaft and Line Feed Lever End Play Adjustment (fig. 6-15)*

(1) *Requirements*

(a) The line feed shaft must have 0.001- to0.005-inch end play.

(b) The line feed lever must have 0.001- to0.005-inch end play. TM 9-1430-656-14-1

(2) *Adjustment.* To adjust paper feed shaft and line feed lever, proceed as follows:

(a) Loosen setscrews holding both detent wheel and collar.

(b) Hold shaft so that retainer ring and spacer are against bearing plate.

(c) Position detent wheel to meet requirement

(a) tighten detent wheel setscrews.

(d) Position collar to meet requirement (b); tighten collar setscrews.

(e) Recheck requirements.

m. *Line Feed Bracket Adjustment fig. 6-16)*

(1) *Requirements*

(a) The armature, when energized, must clear the stop plate by 0.005- to 0.010-inch.

(b) The line feed clutch pawls must not engage the ratchet until the leading edge of the stop plate has moved past the face of the armature a distance equal to one-half the armature thickness.

(2) *Method of checking*

(a) Hold armature in the energized position. Manually rotate power shaft until a high portion of the stop plate is under armature. Measure clearance between high portion of stop. plate and armature with feeler gages.

(b) Move armature to the energized position. Rotate power shaft approximately 90 degrees. Insert a thin screwdriver or similar object between the lower surface of the armature and stop plate. Turn power shaft until stop plate is against armature, clutch pawls are disengaged from the ratchet, and the clutch has detented.

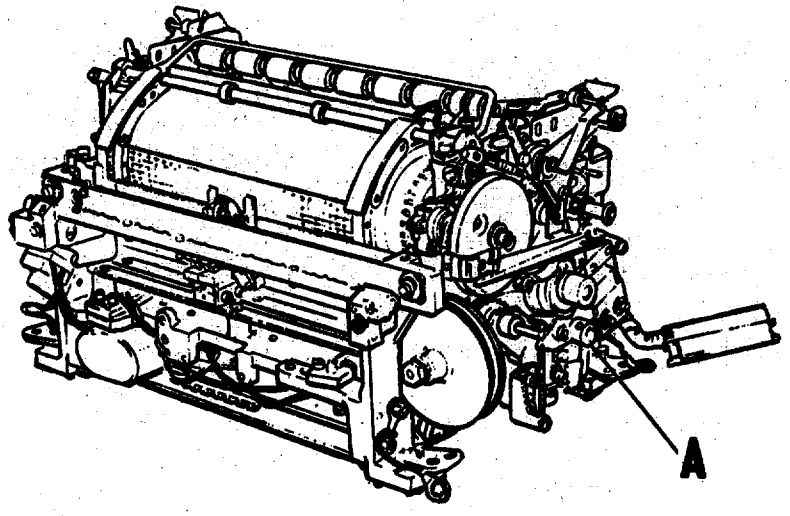
(c) Control position of stop plate to determine pawl/ratchet clearance. Move armature to the energized position but hold stop plate from moving with a screwdriver. Slowly release screwdriver to allow leading edge of stop plate to move past the face of the armature while manually turning the power shaft. A position is reached where the leading edge of the stop plate has moved past the face of the armature, and where the clutch pawls will start dragging on the ratchet. This can be felt while turning the power shaft. The dragging must occur after the stop plate leading edge has passed one-half the armature thickness.

(3) *Adjustment.* To adjust line feed bracket, proceed as follows.

(a) Loosen two bracket screws.

(b) Hold armature in energized position; move bracket to meet requirement (a).

(c) Tighten screws friction tight.



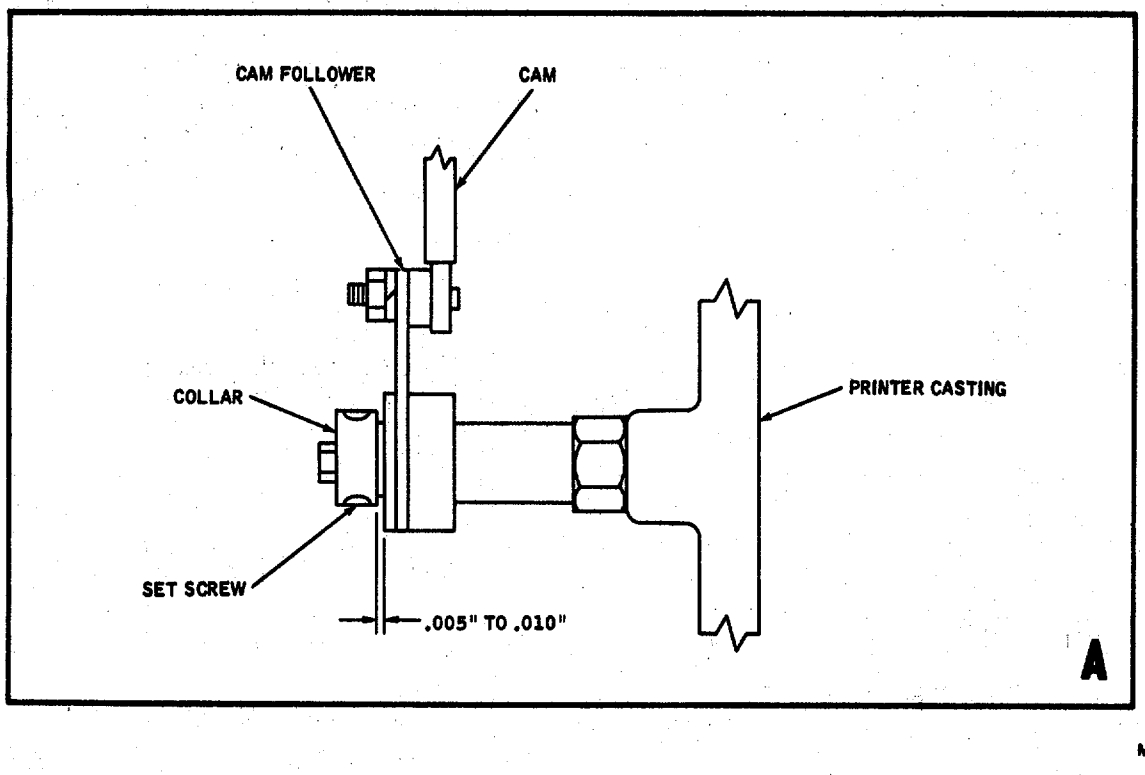
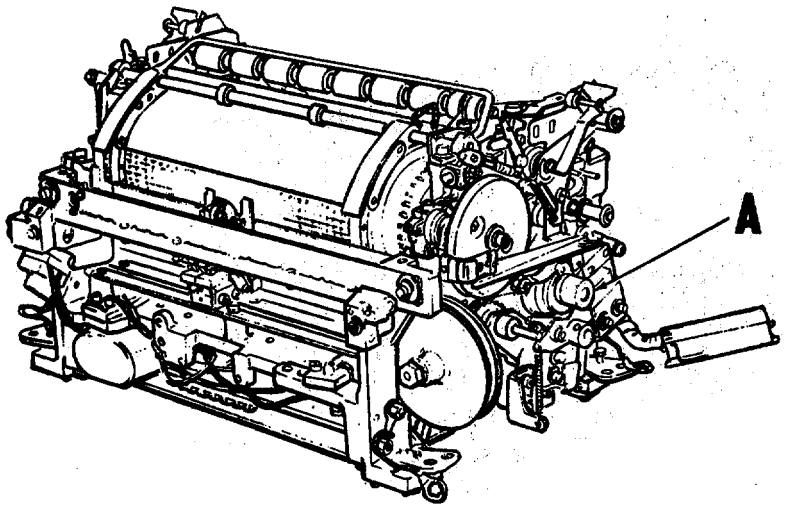


Figure 6-13. Line Feed Cam Follower End Play Adjustment



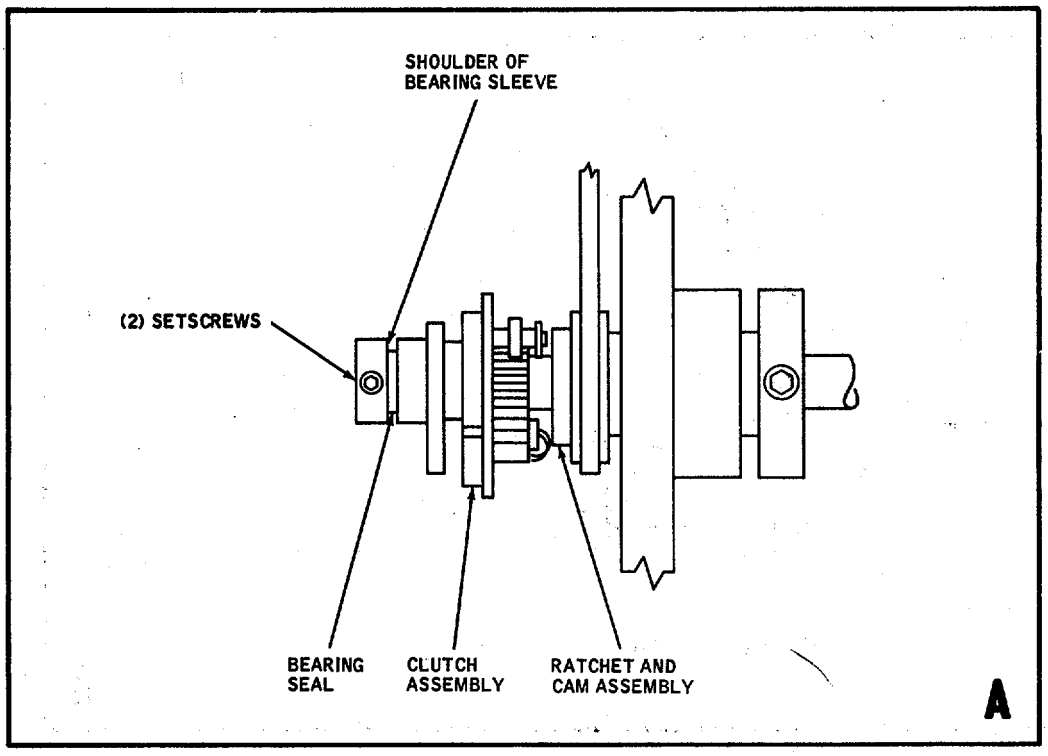
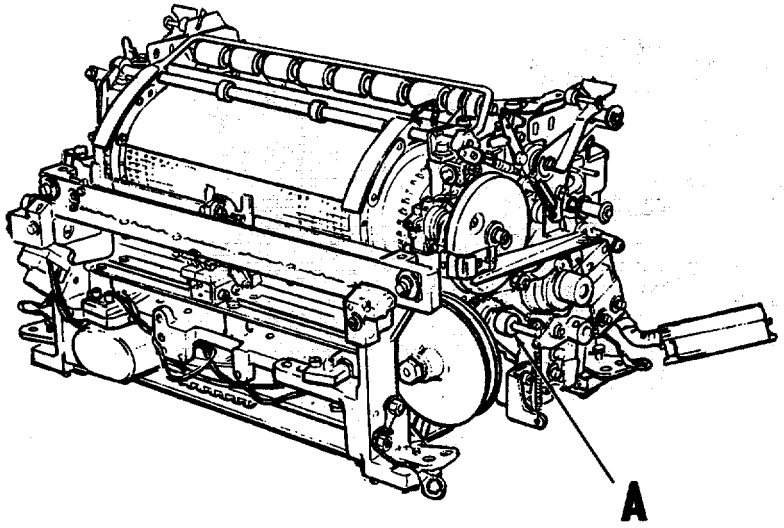


Figure 6-14. Line Feed Clutch Bearing Sleeve Adjustment



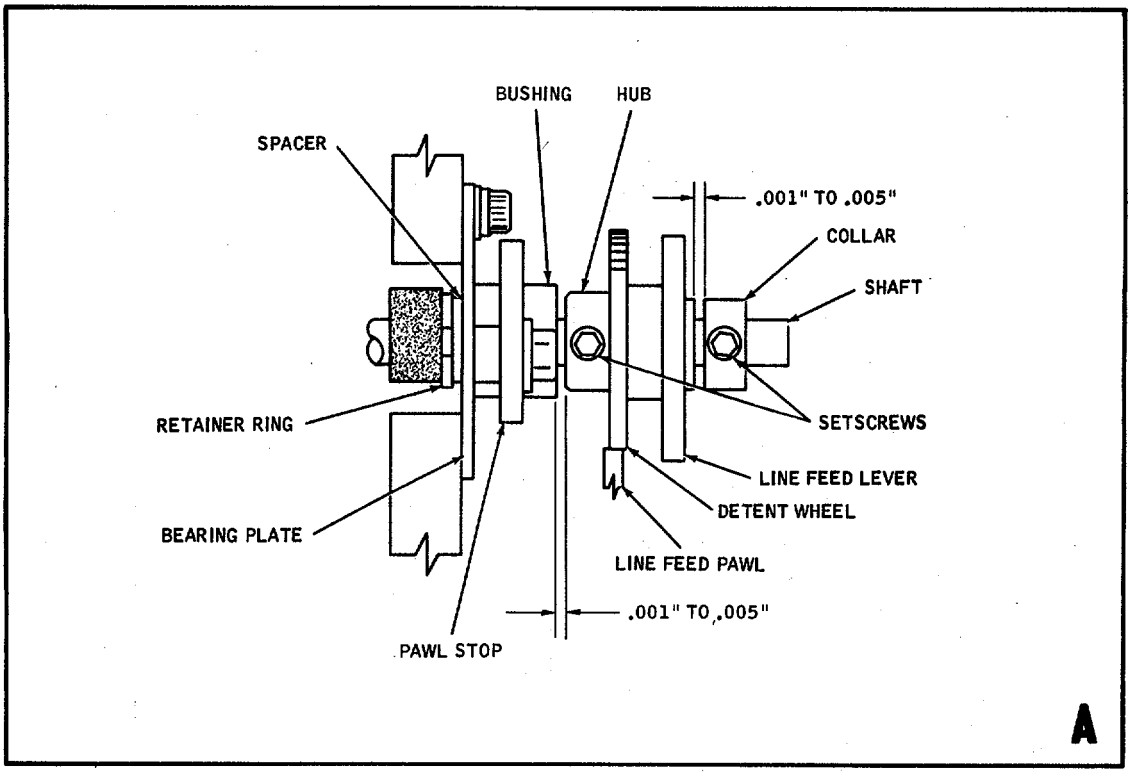


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Figure 6-15. Paper Feed Shaft and Line Feed Lever End Play Adjustment

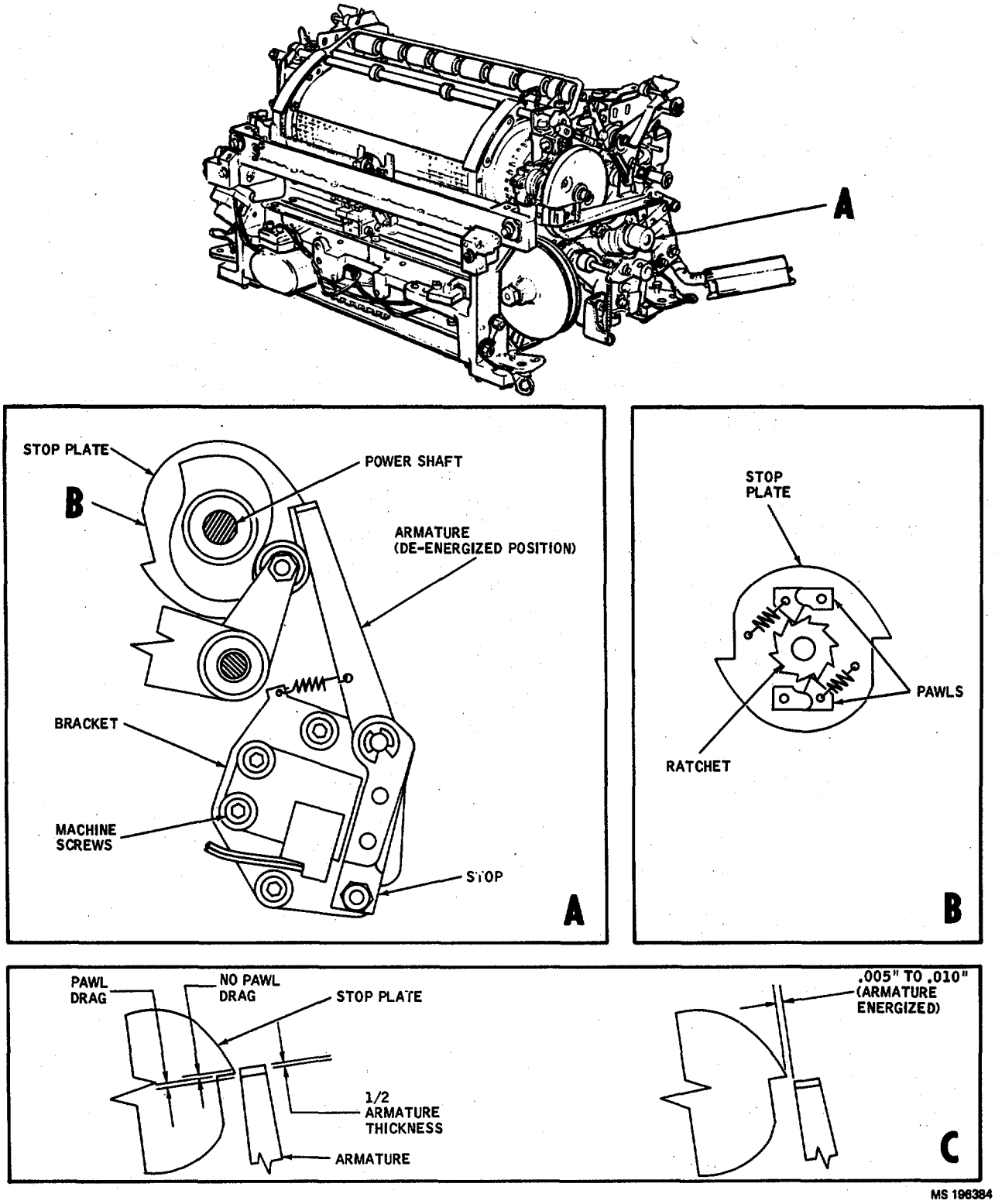


Figure 6-16. Line Feed Bracket Adjustment

(d) Check requirement (b) as described in method of checking (2).
(e) Move bracket up or down to meet requirement (b).
(f) Recheck requirement (a).
(g) Tighten screws and recheck both requirements.

n. *Line Feed Clutch Magnet Adjustment (fig.. 6-17)*

NOTE

Adjust line feed bracket before performing this adjustment (para 6-9m).

(1) *Requirements*

(a) There must be 0.004- to 0.010-inch clearance between the pole faces and the armature, when the armature is in the energized position against the stop.

(b) A clearance of 0.002- to 0.005-inch must be maintained between the nut and the armature.

(2) *Adjustment.* To adjust line feed clutch magnet, proceed as follows:

(a) Loosen two mounting screws that secure line feed magnet.
(b) Loosen self-locking hexagonal nut on armature stop.
(c) Hold armature against stop.
(d) Position magnet to meet requirement (a); tighten two mounting screws.
(e) Position self-locking hexagonal nut to meet requirement (b).
(f) Recheck requirements.

o. *Paper Feed Detent Lever Positioning Adjustment (fig. 6-18)*

(1) *Requirement*. There must be 0.004 to 0.010 inch clearance between the cam and detent when the detent is opposite the high part of the cam, and fully seated in a notch of the detent wheel.

(2) Adjustment To adjust paper feed detent lever, proceed as follows:

(a) Position high part of line feed cam under detent.
(b) Loosen screw (or stud).
(c) Position detent plate to meet requirement and tighten screw (or stud).
(d) Recheck requirement on both cam sides.

NOTE

Do not confuse movement of lever on pivot post as the required clearance. Lever must pivot (rock) on post.

p. *Line Feed Detent Wheel Adjustment (fig. 6-19)*

NOTE

Adjust paper feed detent lever before performing this adjustment (para 6-9o).

(1) *Requirement*. The detent wheel must be rotated one tooth for each line feed operation and detent must engage a detent wheel notch as required by adjustment described in paragraph 6-9o.

(2) *Adjustment.* The adjustment slot in the line feed cam follower is long enough to permit operating the feed pawl in either of two positions. Both positions will provide proper detent wheel movement, however the pawl must be adjusted to operate in the lower position to prevent overstressing the cam follower spring. Besides damaging the spring, overstressing also over- loads the line feed clutch mechanism. To adjust line feed detent wheel, proceed as follows:

(a) Loosen screw securing link to cam follower.
(b) Position cam follower roller in low part of cam.
(c) Loosen line feed bracket screws.
(d) Position bracket to its highest position; tighten screws.
(e) Position link at lowest end of slot in cam follower.
(f) Hold cam follower on low part of cam and reposition link to obtain approximately one-half detent wheel tooth pawl pretravel. Tighten link screw friction tight.
(g) Manually rotate cam and compare detent wheel movement to detent wheel registration.

NOTE

When the line feed system is rotated by hand for one line feed operation, the detent must "rock" in the detent wheel notch when the operation is completed. If not, decrease the pawl pretravel if the detent catches on the leading tooth; increase the pretravel if the detent binds on the trailing tooth.

(h) Apply power to the motor and manually hold the line feed armature in the energized position.

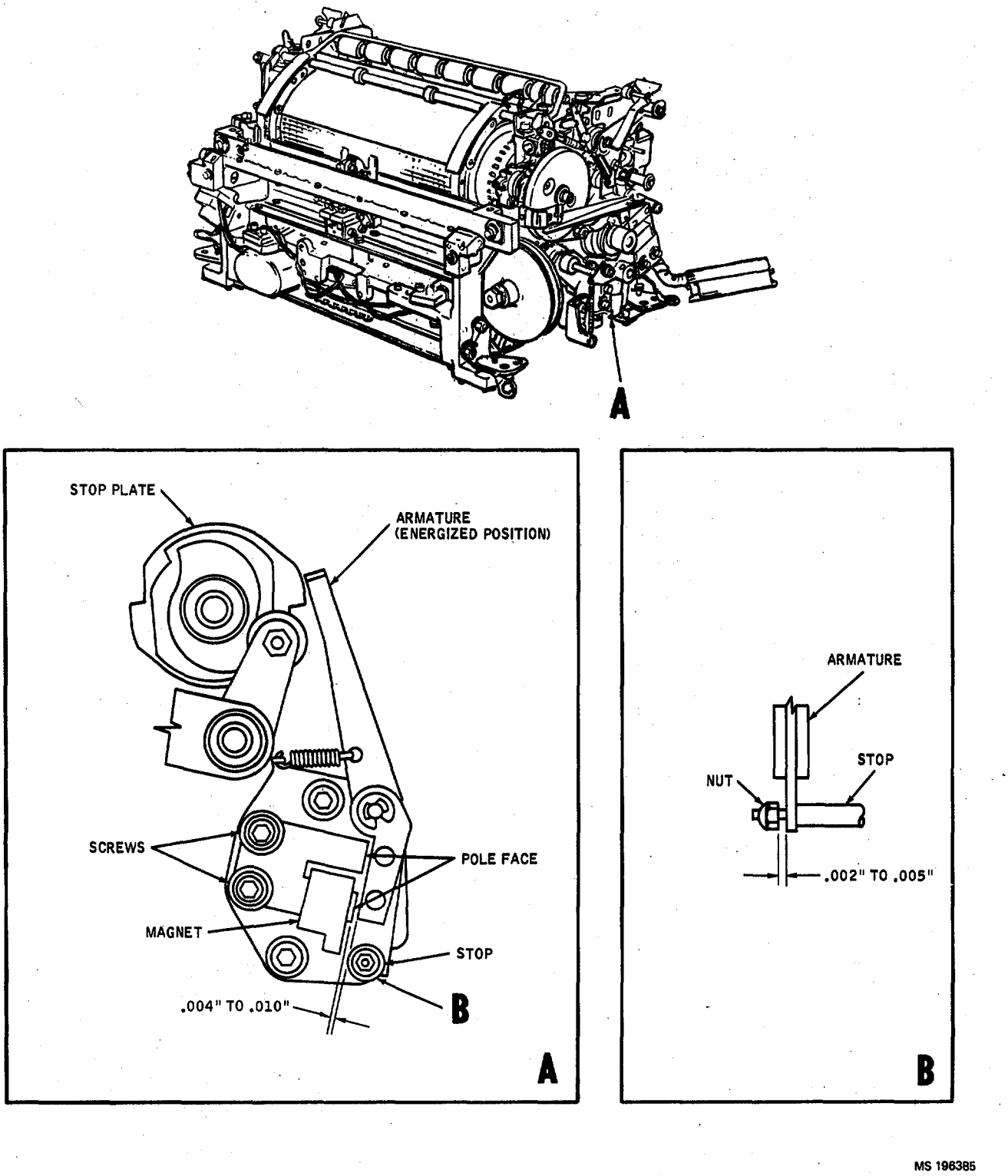


Figure 6-17. Line Feed Clutch Magnet Adjustment

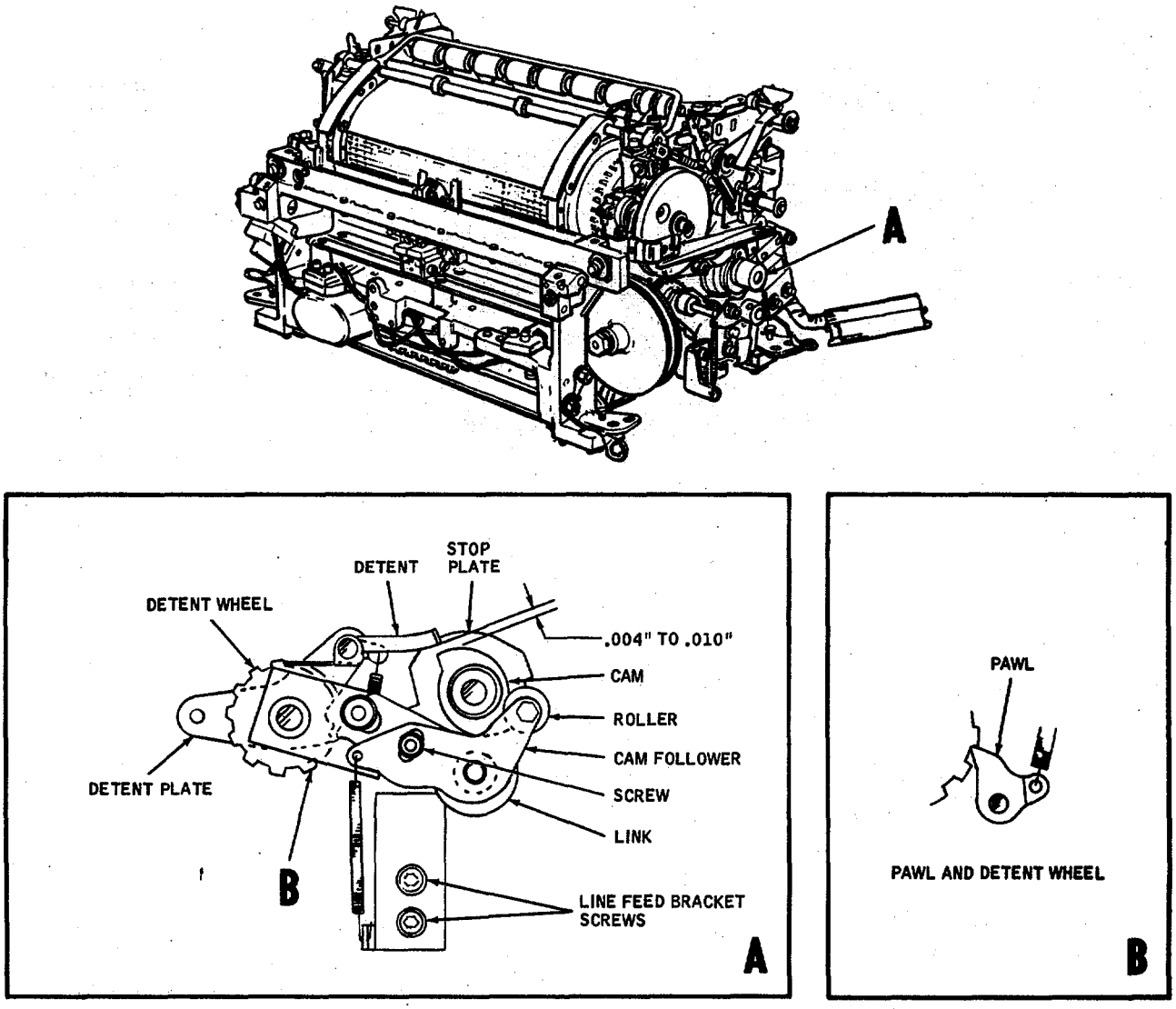


Figure 6-18. Paper Feed Detent Lever Positioning Adjustment

(i) Observe the detent wheel movement; it must be smooth. Smooth operation is defined as the detent wheel teeth appearing to remain stationary during operation.

(j) Increase pawl pretravel only to point where detent wheel just starts smooth movement. Check detent "rocking" as stated in above note.

q. *Low Paper Alarm Switch Adjustment (fig. 6-20)*

(1) *Requirements*

(a) *Rolled Paper*

1. The alarm switch should close when the switch arm stud reaches a point 1/8- to 1/32-inch away from the large diameter of an empty paper spindle.

2. The switch should remain closed when the spindle is removed from the printer.

(b) *Fanfold Paper*. The alarm switch should be open when paper is present between the paper guide roller and the paper out lever, and closed when the paper is removed.

NOTE

To check the fanfold paper requirement, remove the paper roll and spindle to permit the low paper arm to rest against its stop. Then reinstall the empty spindle on the unit.

(2) *Adjustment.* To adjust low paper alarm switch, proceed as follows: .

(a) Loosen eccentric stud mounting nut.

(b) Position eccentric stud to its normal direction of maximum eccentricity; tighten nut.

(c) Loosen lockout on switch actuator and back out adjusting screw to prevent its interference with cam follower.

(d) Loosen switch mounting screws and position alarm switch as far forward as possible.

(e) Loosen cam follower mounting screw.

(f) Hold cam follower on high lobe of its cam.

(g) Position paper out lever so that lever sensing arm is visually level with outside diameter of paper guide roller; tighten cam follower mounting screw.

(h) Insert a piece of paper between paper out lever sensing arm and paper guide to facilitate adjusting switch arm mechanism.

(i) Loosen switch arm clamping screw.

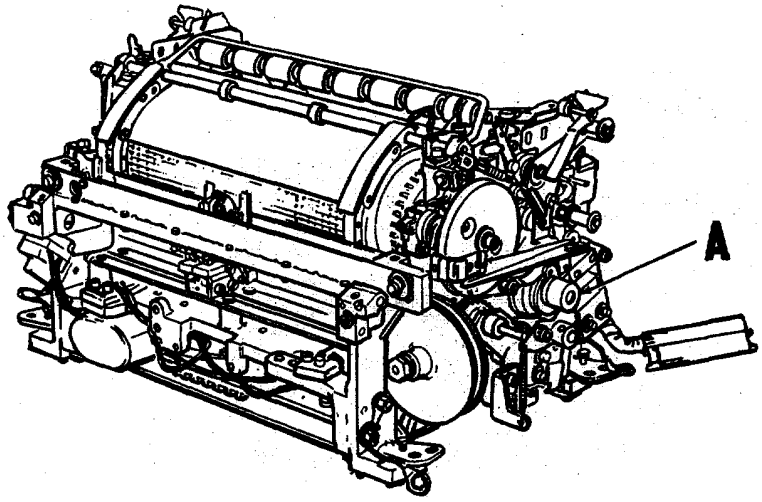
(j) Hold cam against plate and position switch arm on shaft to obtain 0.001to 0.010-inch clearance between arm and plate. Tighten the clamp screw friction tight.

(k) Move switch arm until pin on cam engages point of switch actuator when arm roller is 1/8- to 1/32-inch away from large diameter of empty paper spindle. Tighten clamp screw.

(l) Position alarm switch on plate until it just closes when switch arm roller is 1/16-inch away from spindle; tighten mounting screws.

(m) Remove paper spindle to permit switch arm to rest against its stop. Cam pin should seat in switch actuator cutout.

(n) Reinstall empty paper spindle. Cam spin should remain in switch actuator cutout.



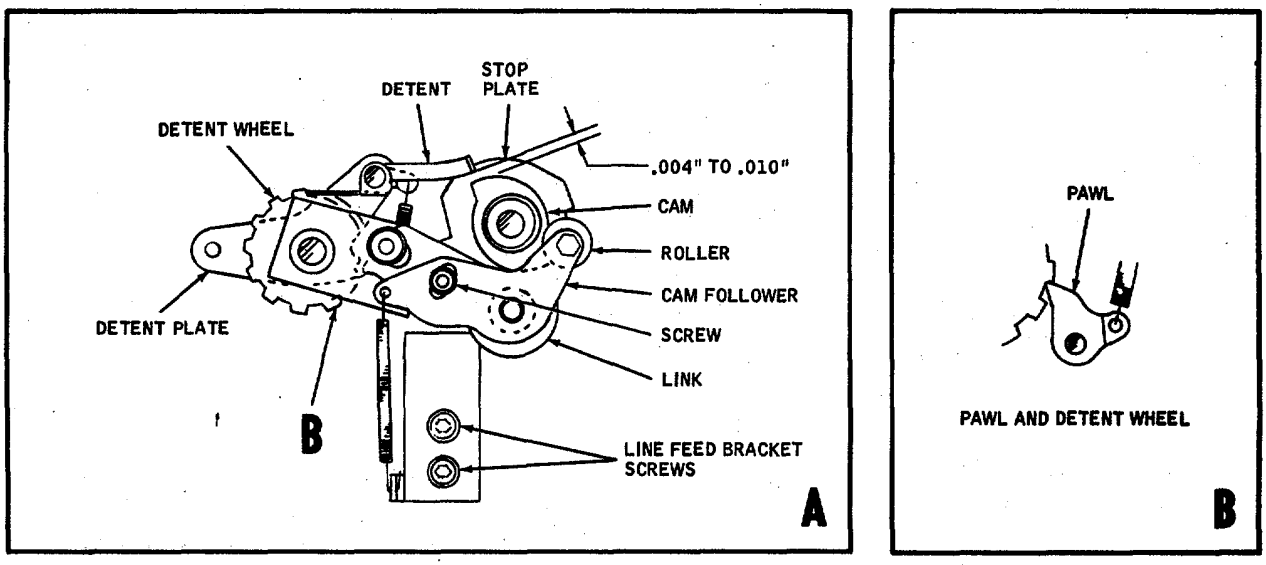
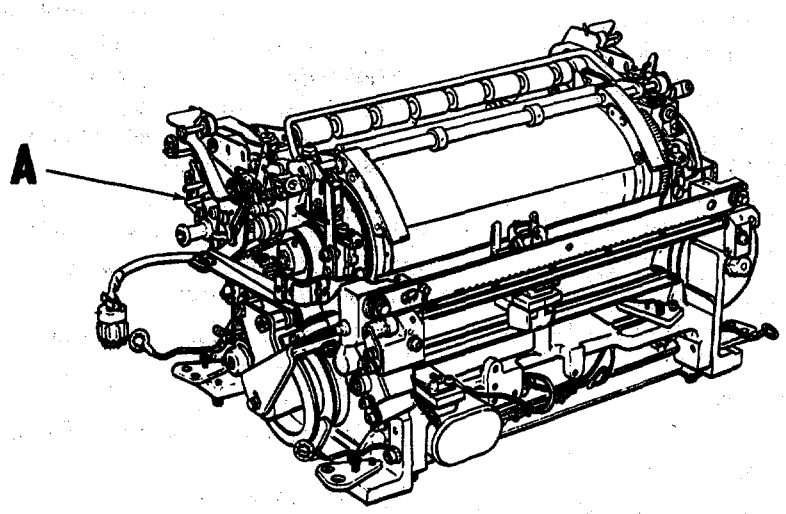


Figure 6-19. Line feed Detent Wheel Adjustment



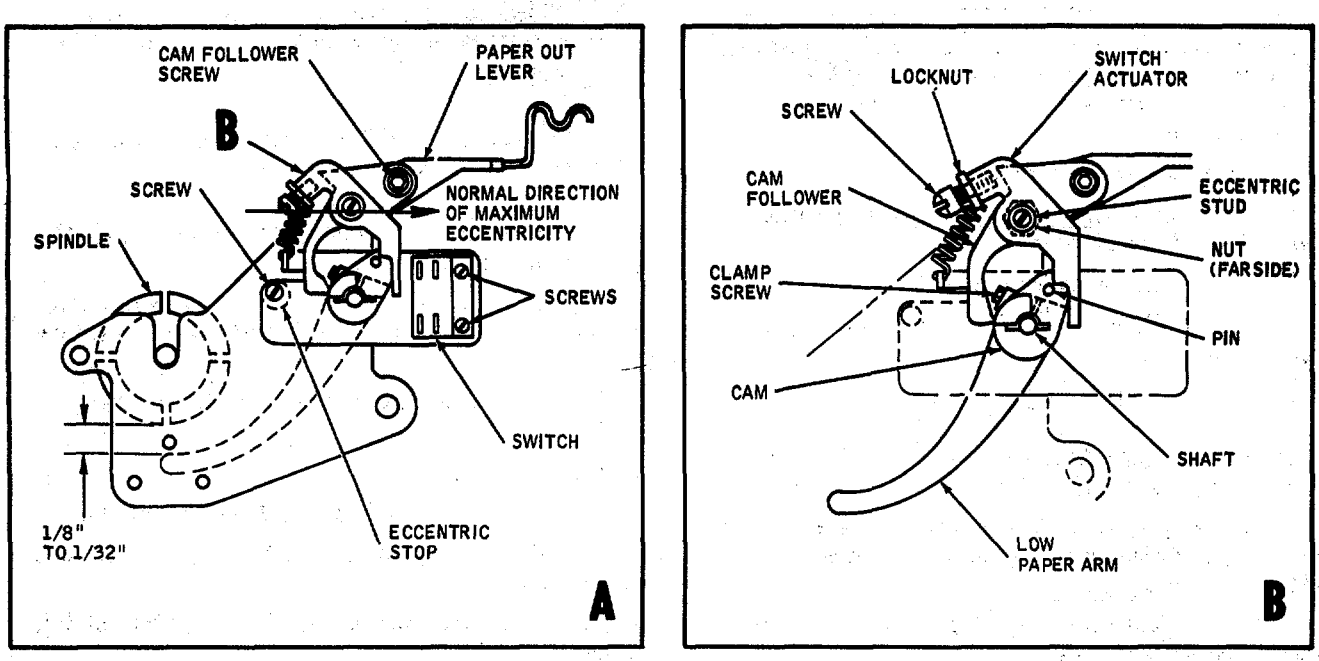


Figure 6-20. Low Paper Alarm Switch Adjustment

NOTE

The cam pin may move into the switch actuator cutout when the switch arm roller is against the paper spindle after sensing a low paper position. This is permissible.

(o) With a piece of paper still in place between lever and guide rollers, turn adjusting screw until all switch actuator play is taken up; tighten locknut.

(p) Recheck requirements.

6-10. Printing Mechanism Adjustments.

a. *Left-Hand Feed Wheel Positioning Adjustment-(fig.. 6-21)*

(1) *Requirement*. The left sprocket pins center- line must be 17/64 +0 -1/64-inch from the edge of the first print wheel when the feed wheel end play is taken up towards the drum.

(2) *Adjustment* To adjust left-hand feed wheel, proceed as follows:

(a) Remove print drum (para 6-21h).

(b) Loosen pulley setscrews; remove pulley.

(c) Remove left-hand feed wheel and bearing housing assembly. Install or remove shims 50347 and/or 70139 (25 and 26, fig. 6-59) to meet requirement.

CAUTION'

Locate the driven gears carefully when replacing the feed wheel and bearing housing assembly. Turn the gears by hand. Do not use a tool or force the gears.

(d) Recheck requirement.

(e) Check right-hand feed wheel positioning (para 6-10b). Adjust if necessary.

(f) Install print drum (para 6-21h).

b. *Right Hand Feed Wheel Positioning Adjustment* (*fig.. 6-22*)

NOTE

Adjust left-hand feed wheel before performing this adjustment (para 6-10a).

(1) *Requirement.* The dimension between the center of the right and left sprocket pins must be 8 + 1/64-inches apart.

(2) *Adjustment*. To adjust right-hand feed wheel, proceed as follows:

(a) Remove print drum (para 6-21h).

(b) Hold print drum toward left driven gear. Add or remove shims 66065 or 66066 (48 and 44, fig: 6- 59) between right bearing and print drum to meet requirement.

CAUTION

Locate the line feed drive and driven gears carefully to ensure proper engagement. Turn the driven gears by hand. Do not use a tool or force the gears. Excessive pressure may fracture or break the gears.

(c) Position print drum in unit with locating pins in place and line feed gears properly meshed.

(d) Hold print drum and right bearing toward left; tighten bearing caps.

(e) Recheck requirement.

(f) Install print drum (para 6-21h).

c. Carriage Return Belt Positioning Adjustment (fig. 6-23)

(1) *Requirements*

(a) The carriage return belt must be threaded with the glossy side on the surface of the spindle and the mat side on the surface of the carriage return pulley.

(b) The spindle must be positioned to guide the belt on the carriage return pulley.

(c) The guide belt bracket must be concentric to the curvature of the spindle and 1/32 +t1/64-inch from the belt.

(2) *Adjustment*. To position the carriage return belt, proceed as follows:

(a) Remove screws, lockwashers, and flat washers on each end of belt.

(b) Position mat side down and install lock- washer, flat washer, screw, and belt in carriage return pulley.

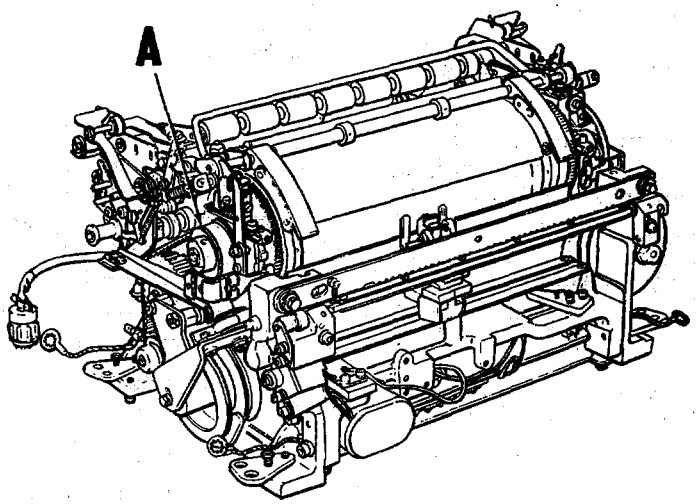
(c) Thread belt around spindle to carriage.

(d) Install belt, flat washer, lockwasher, and screw in carriage. (e) Loosen spindle nut and bracket screw.

(f) Position spindle to meet requirement (b); tighten nut.

(g) Position bracket to meet requirement (c); tighten screw.

(h) Recheck requirements.



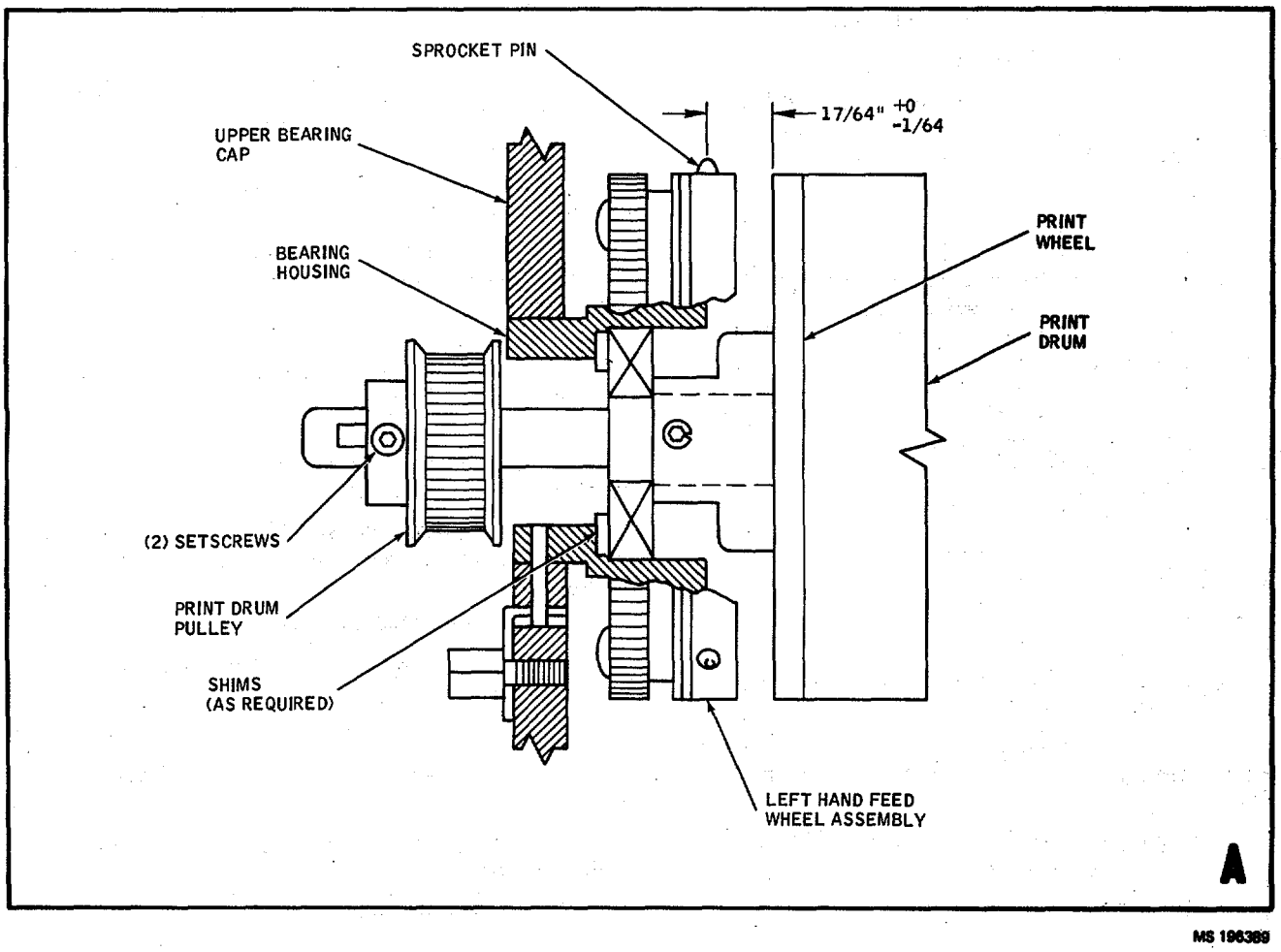


Figure 6-21. Left-Hand Feed Wheel Positioning Adjustment

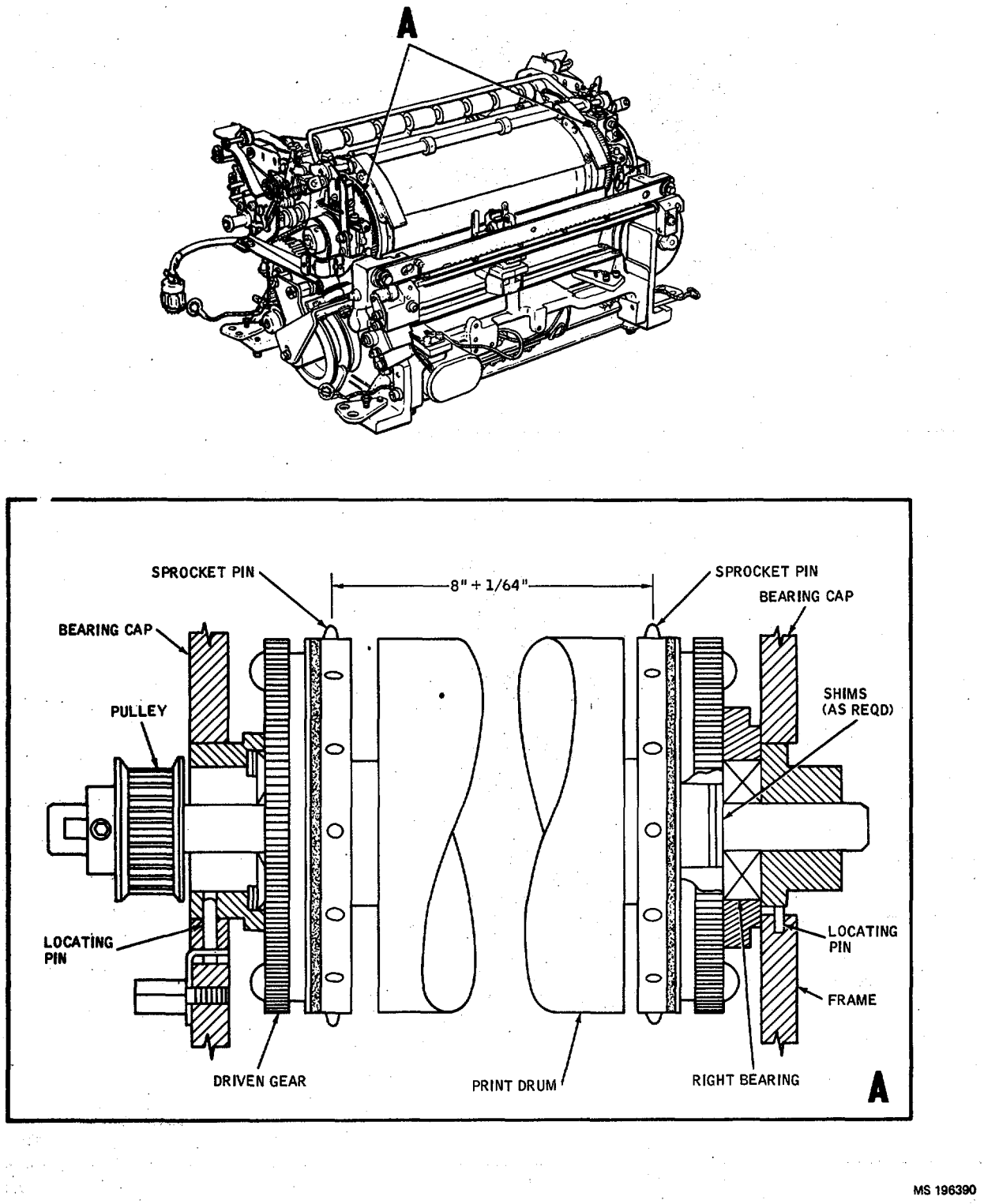
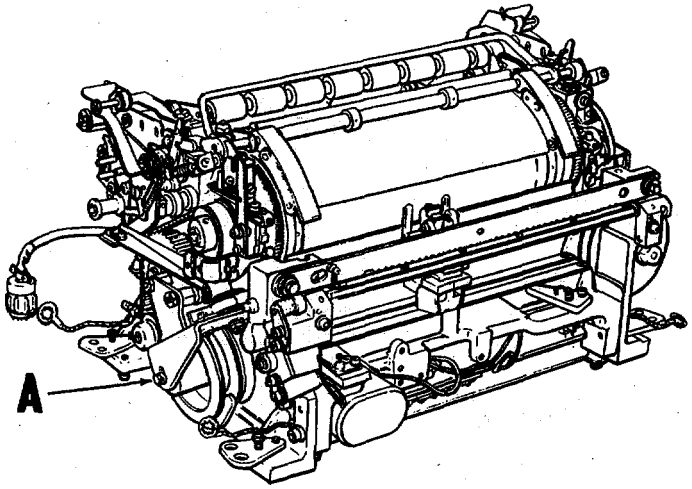


Figure 6-22. Right-Hand Feed Wheel Positioning Adjustment



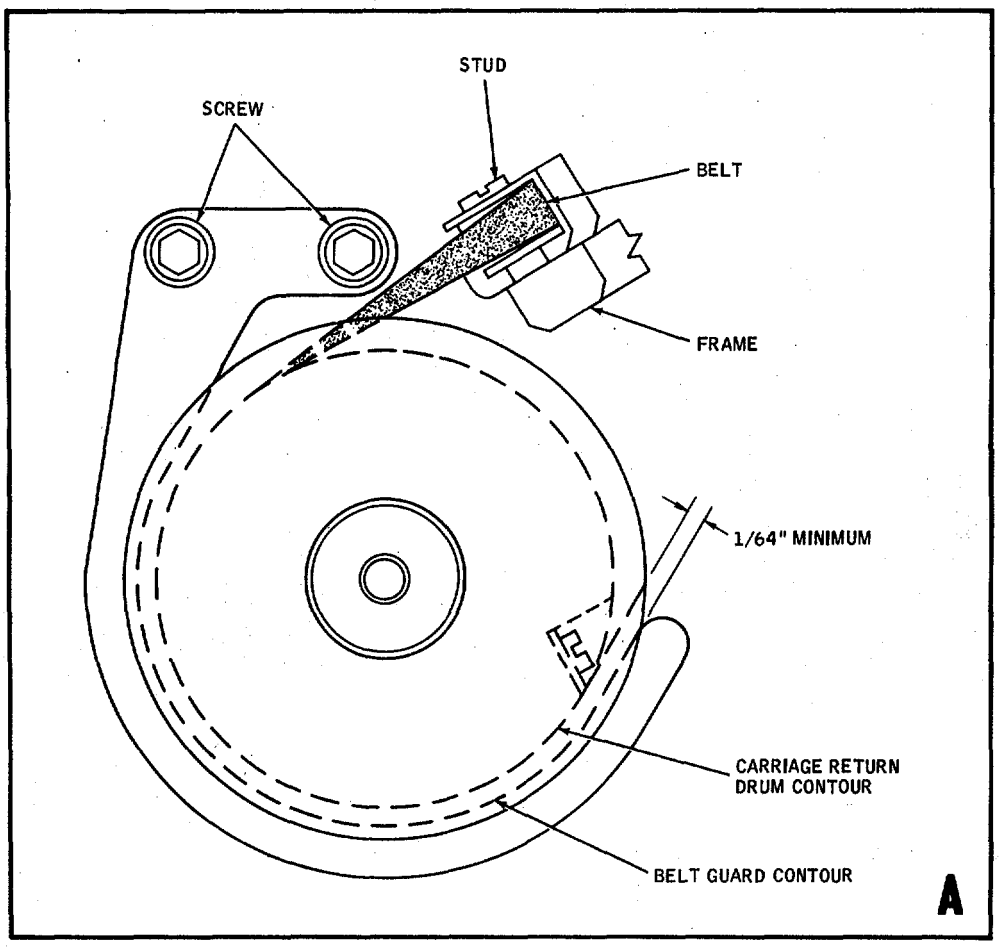


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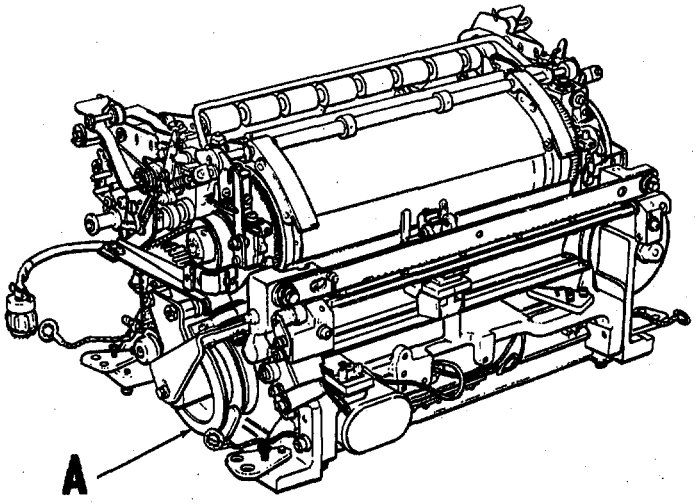
Figure 6-23. Carriage Return Belt Positioning Adjustment



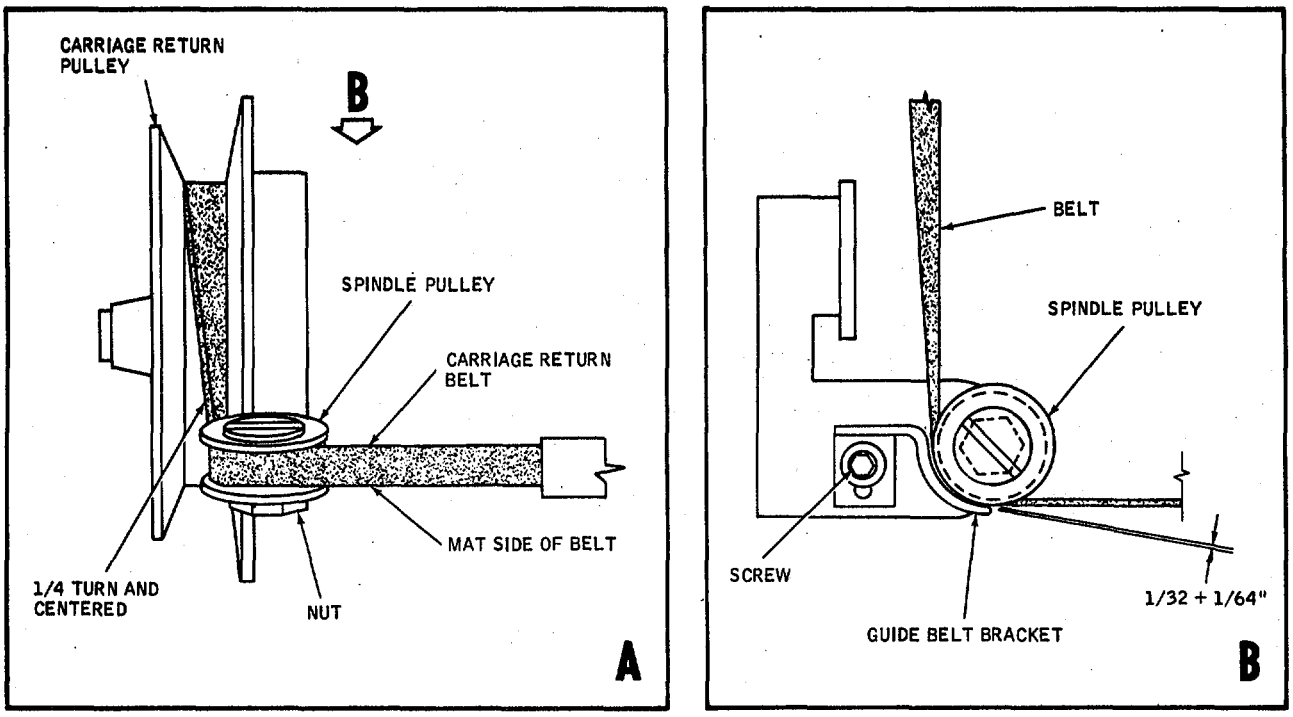


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Figure 6-24. Carriage Return Belt Guard Adjustment

d. *Carriage Return Belt Guard Adjustment (fig. 6-24)*

NOTE

Check adjustment of carriage return belt de- scribed in paragraph 6-10c before performing this adjustment. Adjust if necessary.

(1) *Requirement.* The contour of the belt guard must match the contour of the carriage return pulley and clear the belt by a minimum of 1/64-inch regardless of the carriage position.

(2) *Adjustment*. To adjust carriage return belt guard, proceed as follows:

(a) Loosen guard screws.

(b) Position carriage so screw (fastening end of belt to pulley) is opposite closet point near end of guard (as shown).

(c) Insert a 1/64-inch shim gage between edge of screw and guard. Press front edge of guard against gage; tighten screws.

(d) Remove gage and check for binds by moving carriage manually in both directions.

e. *Carriage Return Armature and Clutch Pulley Clearance Adjustment fig. 6-25)*

(1) *Requirement.* The clearance between the clutch armature and clutch pulley must be 0.015- to 0.020-inch when the armature is deenergized.

NOTE

The clearance between the clutch armature and clutch pulley cannot be measured due to inaccessibility of the parts concerned. Therefore, the adjustment can only be made by sense of feel or by observing if clutch pulley jumps or chatters when one of the three "armature buttons" is pressed. The clearance is less than 0.015-inch if the pulley chatters. The clearance is more than 0.020-inch if the carriage is sluggish or fails during a carriage return function.

(2) *Adjustment*. To adjust carriage return armature and clutch pulley, proceed as follows:

(a) Remove two nuts, lockwashers, hex screw, and support bracket assembly.

(b) Remove two hex nuts, cover screw, lock- washer, and cover.

(c) Remove spring.

(d) Loosen two collar setscrews; remove collar.

(e) Remove belt guard and carriage return pulley assembly.

(f) Remove spacer and felt from clutch pulley.

(g) Add or remove 0.005 i0.0005 inch I washers 70786 (67, fig. 6-53) to meet requirement.

(h) Install felt and spacer in clutch pulley.

(i) Install carriage return pulley assembly.

(j) Hold clutch pulley and rotate carriage return pulley to check requirement. Shim as necessary to meet requirement.

(k) Remove carriage return pulley and aline belt guard with assembled pulley. Install pulley on shaft and belt guard on two standoffs.

(l) Install collar.

(m) Install two hex nuts.

(n) Install spring and cover.

(o) Install support bracket assembly.

(p) Adjust carriage return clutch pulley (para 6-1Of).

(q) Recheck requirement.

f. *Carriage Return Clutch Pulley Adjustment (fig. 6-26)*

NOTE

Check carriage return armature and clutch pulley clearance adjustment described in par- agraph 6-lOe before performing this adjustment. Adjust if necessary.

(1) *Requirements*

(a) The carriage return pulley must have 0.002- to 0.005-inch end play.

(b) The spring must be wound 1-1/2 to 2-1/2 turns counterclockwise when the carriage is at the left-hand margin. The end of the spring must not be between the spring cover and the support bracket.

(c) The collar screw for the carriage return torsion spring must fit into the hole of the support bracket without touching the bracket.

(2) *Adjustment*. To adjust carriage return clutch pulley, proceed as follows:

(a) Remove support bracket.

(b) Remove collar screws.

(c) Remove cover and spring.

(d) Position carriage at left margin.

(e) Loosen collar setscrews.

(f) Position collar so screw hole alines with screw hole in bracket and to meet requirement (a).

(g) Tighten setscrews.

(h) Install spring and cover.

(i) Install bracket.

(i) Rotate cover counterclockwise 1-1/2 turns; aline cover hole with nearest hole in collar.

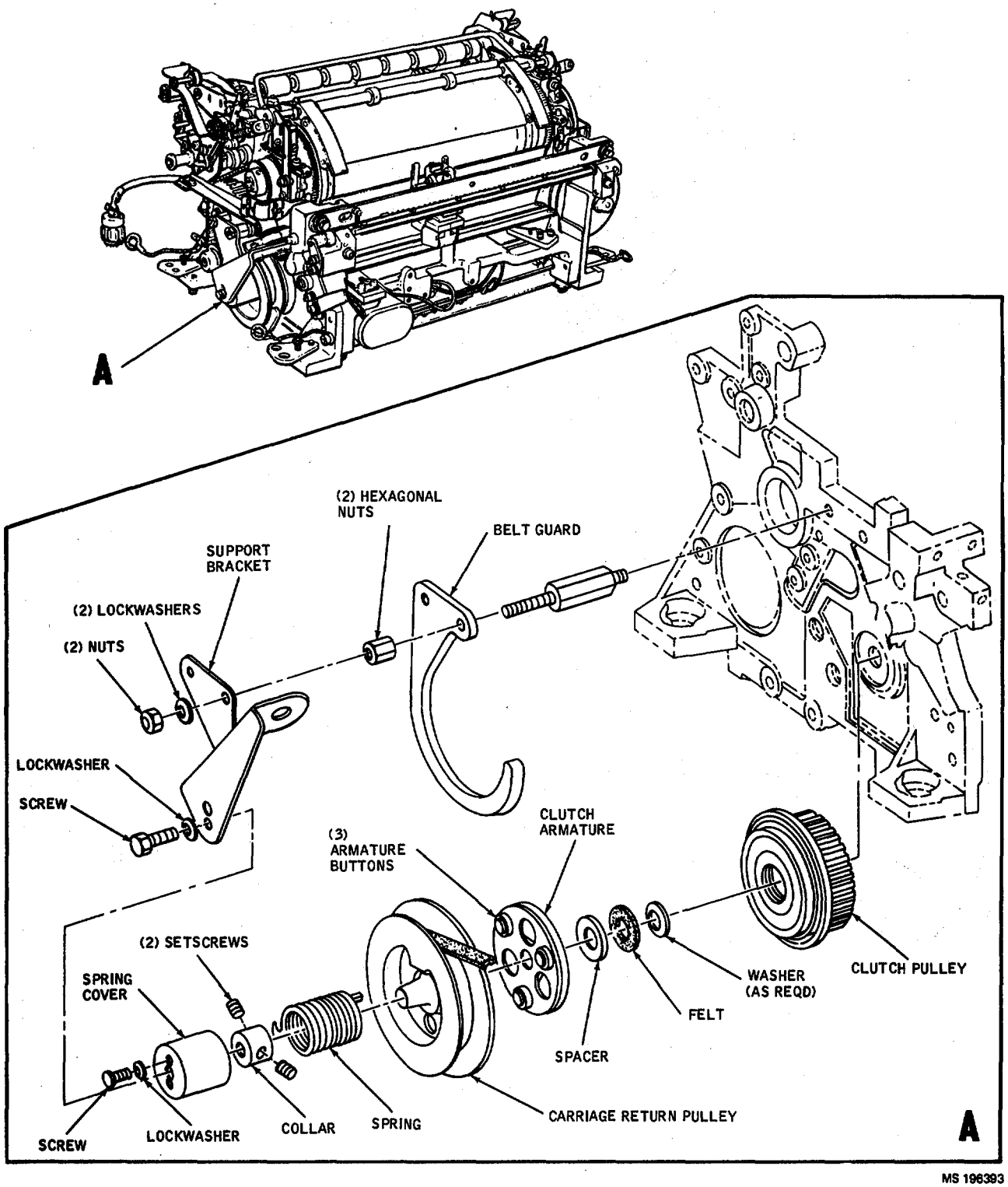


Figure 6-25. Carriage Return Armature and Clutch Pulley Clearance Adjustment

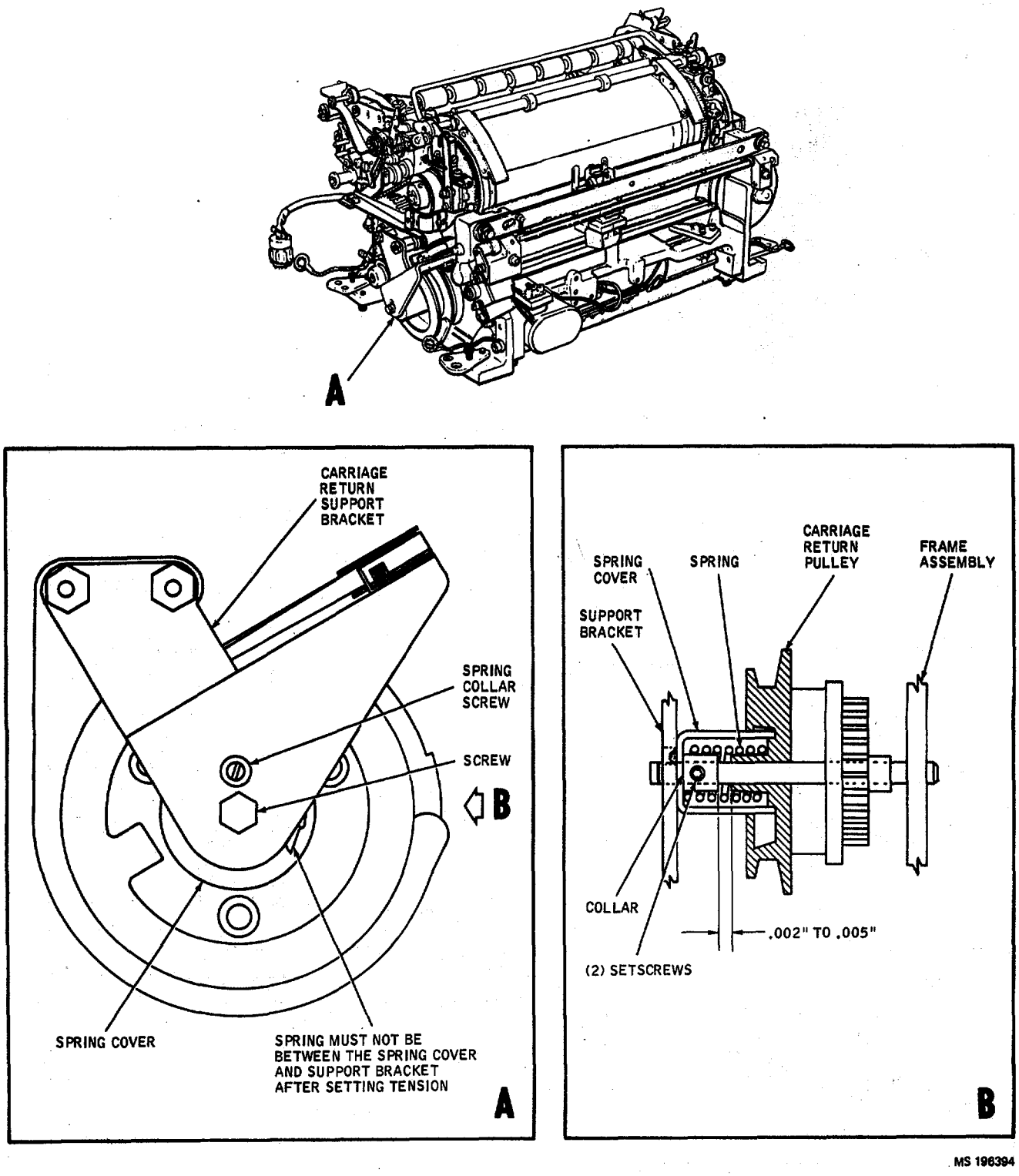


Figure 6-26. Carriage Return Clutch Pulley Adjustment

NOTE

Due to variations in parts, it may be necessary to wind the spring a maximum of one turn more to meet requirement (b).

(k) Install and tighten screw.

(l) Recheck requirements.

g. Carriage Feed Drum Tension Adjustment (fig.6-27)

(1) *Requirement* There must be 27 to 30 ounces of tension on the carriage feed spring when the carriage is alined to print the 72nd character.

(2) *Adjustment.* To adjust carriage feed drum tension, proceed as follows:

CAUTION

An overtightened carriage feed spring will result in shortening the life of the spring and cause excessive wear on the space pawl.

(a) Position carriage to aline print hammer with 72nd character.

(b) Hold adjusting collar from turning; loosen nut far enough to disengage hole in drum from half perforation in mounting bracket.

(c) Rotate collar to meet requirement.

(d) Aline closest hole with half perforation; tighten nut.

(e) Recheck requirement.

h. Space Armature Clearance Adjustment (fig.6-28)

(1) *Requirement.* The armature must have 0.001- to 0.010-inch end play.

(2) *Adjustment.* To adjust space armature clearance, proceed as follows:

(a) Loosen space armature assembly setscrew.

(b) Position armature to meet requirement; tighten setscrew.

(c) Recheck requirement.

(d) Check adjustment of space bail described in paragraph 6-10i. Adjust if necessary.

i. Space Bail Positioning Adjustment (fig. 6-29)

(1) *Requirements*

(a) With the carriage in the right and then the left margin, the space pawl lever must be against the pin on the carriage. The bail must be on the roller when the armature is in the deenergized position against the eccentric.

(b) The bail must have 0.002- to 0.010-inch end play without binding.

(2) *Adjustment*, To adjust space bail, proceed as follows:

NOTE

The bail mounting block must be seated and tight against the casting before performing this adjustment.

(a) Position carriage in left margin.

(b) Loosen armature eccentric setscrew.

(c) Position eccentric in direction of maximum eccentricity, then to meet requirement (a).

(d) Tighten setscrew.

(e) Move carriage to right margin.

(f) Loosen bail eccentric setscrew.

(g) Position eccentric to normal direction of eccentricity, then to meet requirements (a) and (b).

(h) Tighten setscrew.

(i) Recheck requirements.

(j) Check adjustment of space pawl and rack (para 6-lOj). Adjust if necessary.

(k) Check adjustment of space magnet, space pawl stop plate, and space pawl (para 6-10k). Adjust if necessary.

(l) Check adjustment of carriage shaft (para 6-10l). Adjust if necessary.

j. Space Pawl and Rack Clearance Adjustment (fig. 6-30)

NOTE

Check space bail positioning adjustment described in paragraph 6-lOi before performing this adjustment. Adjust if necessary.

(1) *Requirements*

(a) There must be 50 to 75 percent engagement with the space pawl and rack when the space armature is in the deenergized position (visual check).

(b) The print hammers must completely cover the characters on the drum when the pawl is engaged with the space rack at three carriage positions: left margin, center of drum, and right margin.

(2) *Adjustment*

(a) Loosen two eccentric guide screws.

(b) Position eccentrics to meet requirement (a).

(c) Move rack to right or left to meet requirement (b); tighten eccentric guide screws.

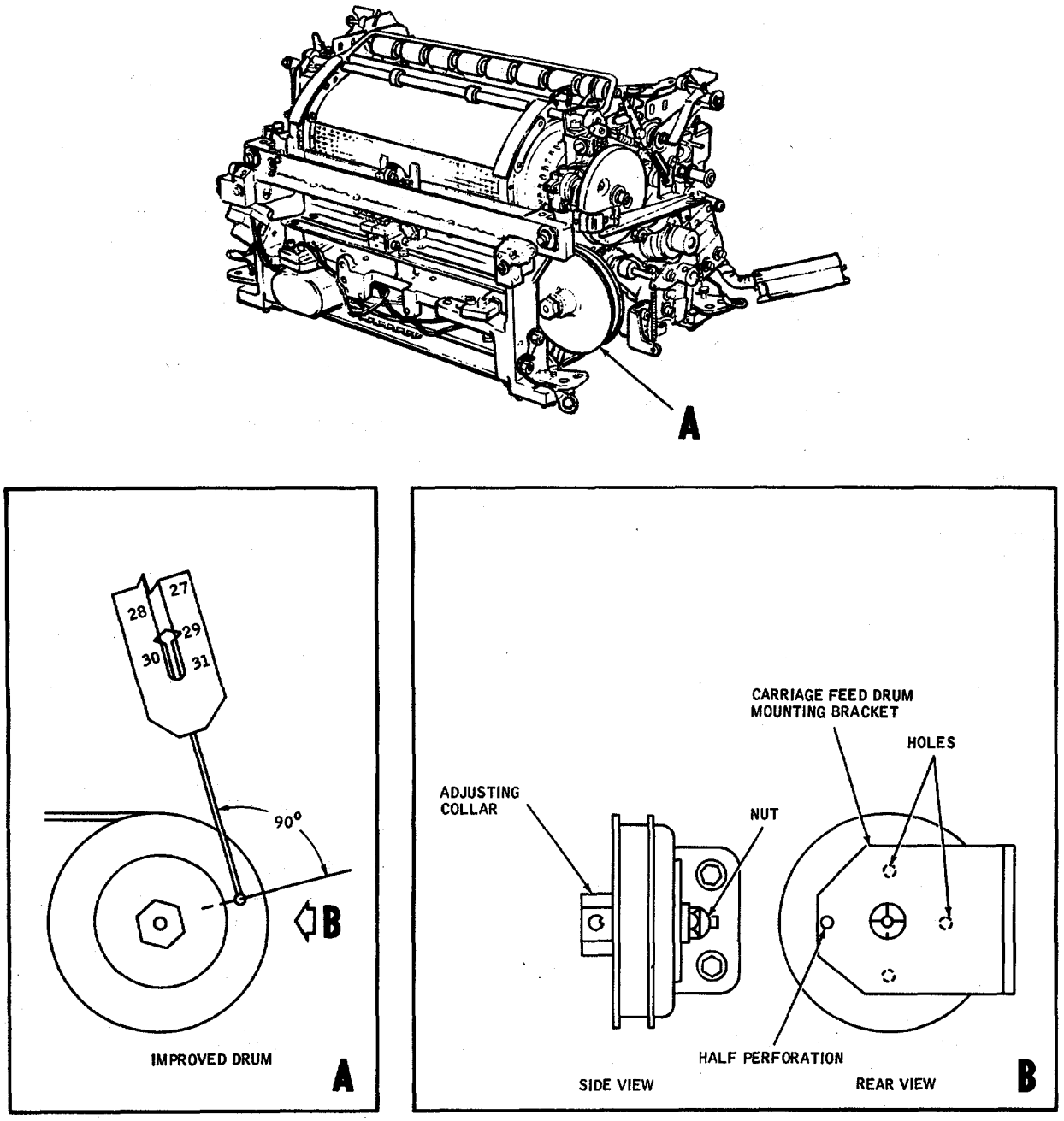


Figure 6-27. Carriage Feed Drum Tension Adjustment

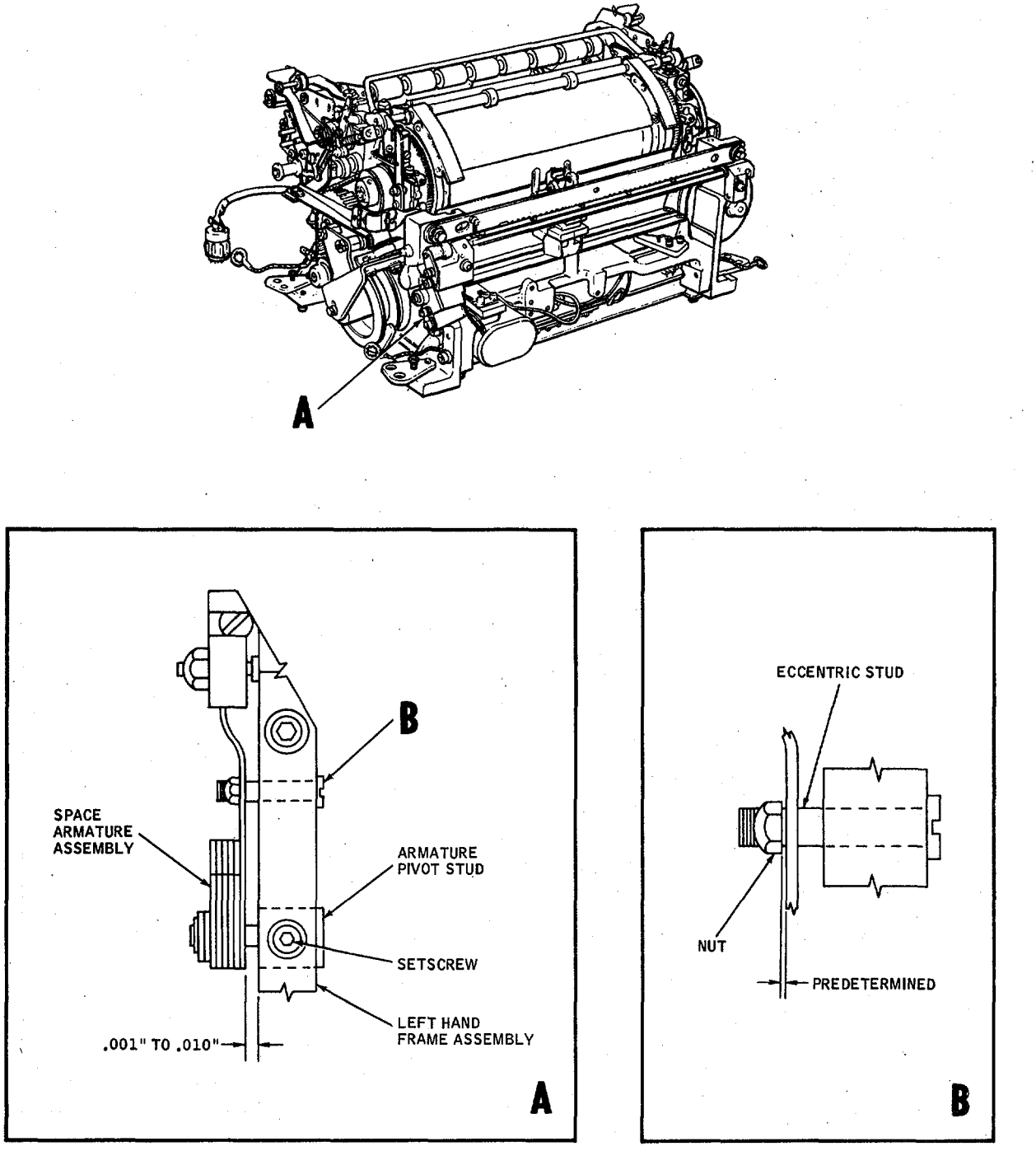


Figure 6-28. Space Armature Adjustment

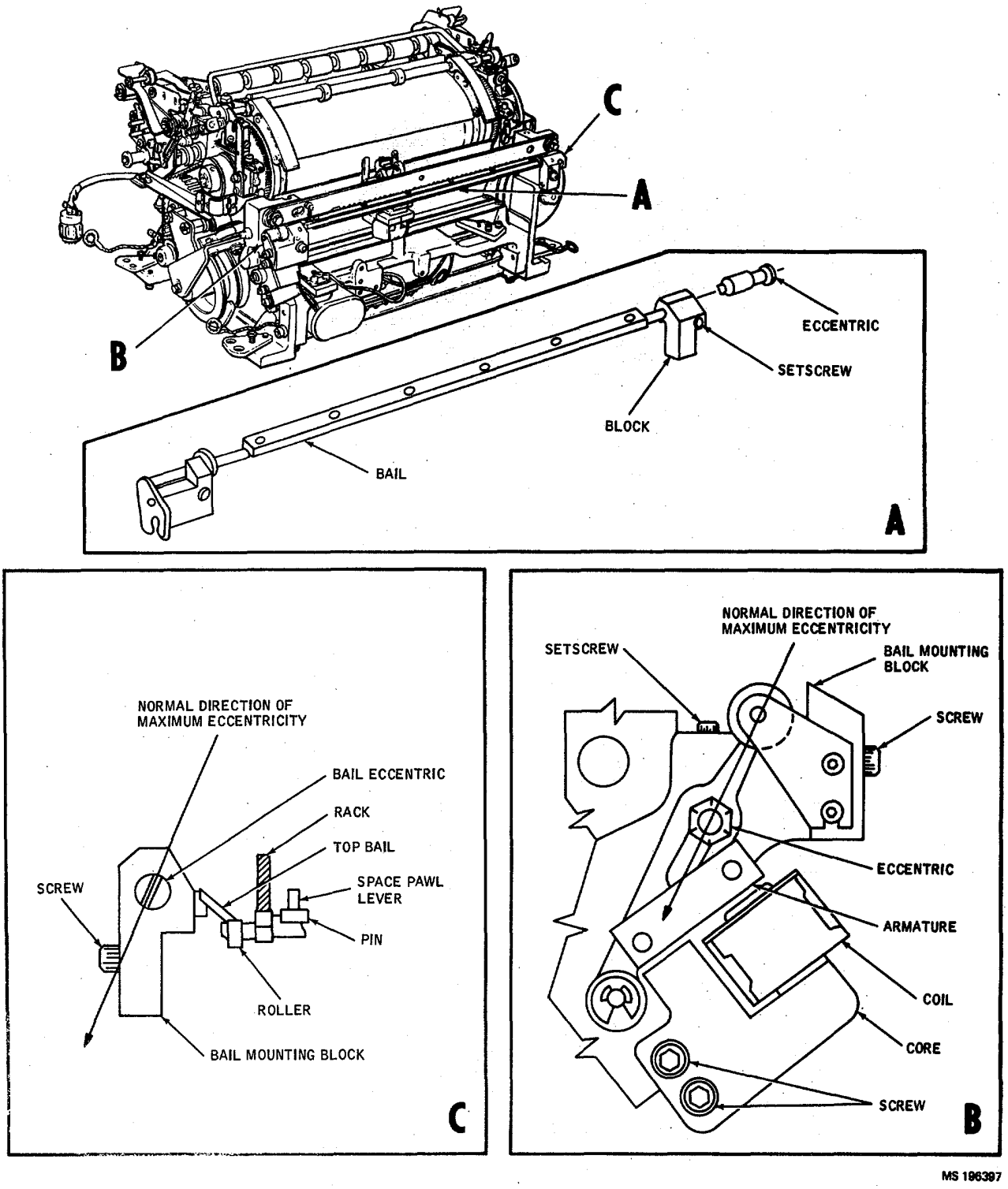


Figure 6-29 Space Bail Positioning Adjustment

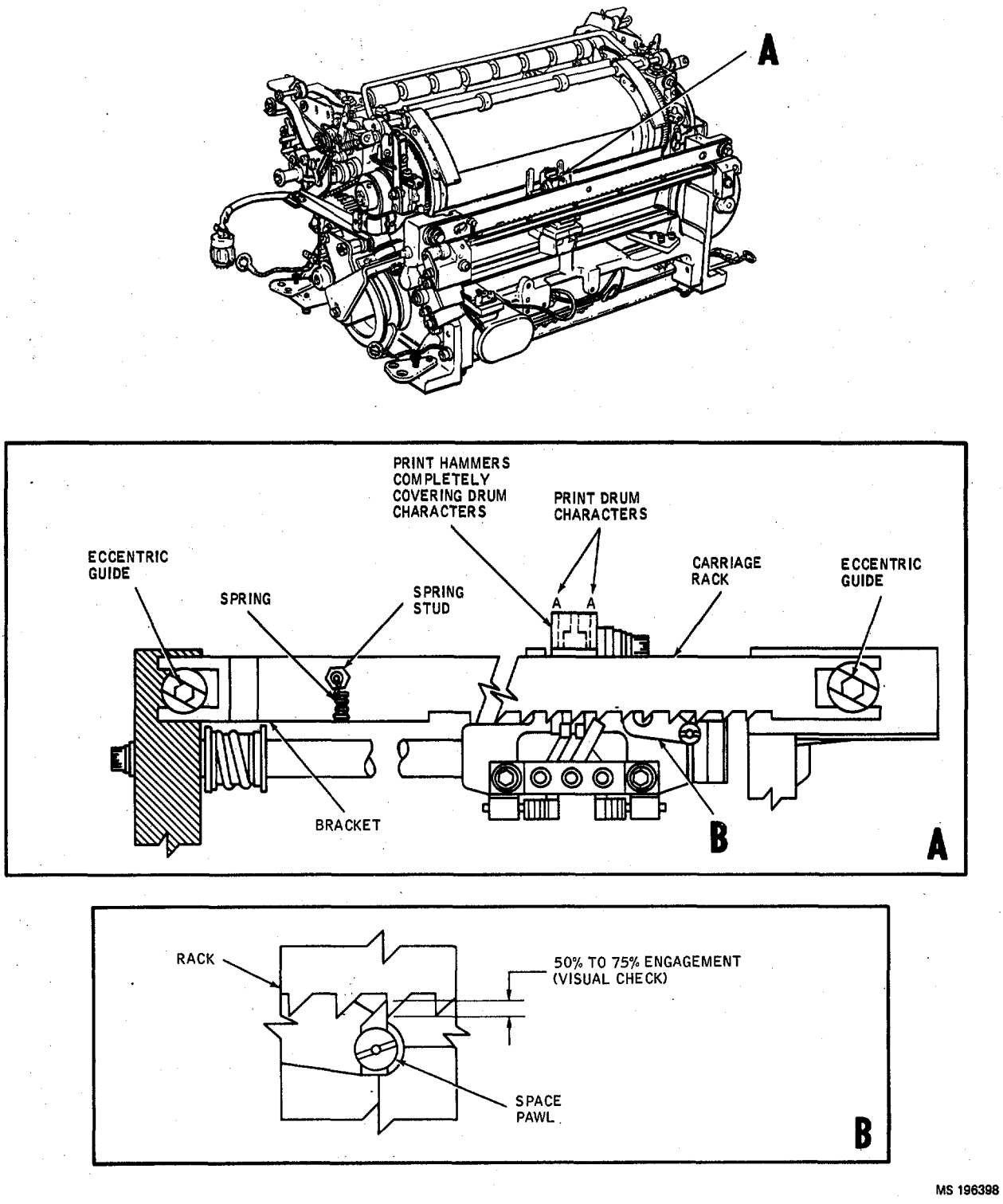


Figure 6-30. Space Pawl and Rack Clearance Adjustment

(d) Recheck requirement.

(e) Check adjustment of space magnet, space pawl stop, and space pawl (para 6-10k). Adjust if necessary.

k. Space Magnet, Space Pawl Stop Plate, and Space Pawl Clearance Adjustment (fig. 6-31)

NOTE

Check space pawl and rack clearance adjustment described in paragraph 6-10j before performing this adjustment. Adjust if necessary.

(1) *Requirements*

(a) There must be 0.005- to 0.015-inch clearance between the space pawl and the teeth on the space rack when the armature is in the energized position and the right print hammer is alined with:

1. The 20th character.
2. The 60th character.

(b) There must be no clearance between the armature and the core pole faces when the magnet coil is energized.

(c) With the armature in the energized position, the pawl must clear the stop plate by 0.001- to 0.006-inch when the right print hammer is alined with:

1. The 20th character.
2. The 60th character.

(d) There must be a minimum of 0.00l-inch clearance between the armature hub and the magnet core.

(2) *Adjustment* To adjust space magnet, space pawl stop plate, and space pawl, proceed as follows:

(a) Loosen two pawl stop plate mounting screws.
(b) Move stop plate away from pawl.
(c) Aline right print hammer with 20th character.
(d) Loosen space magnet core screws.
(e) Energize space magnet.
(f) Move space armature and core (together) to meet 0.005- to 0.015-inch clearance requirement.
(g) Tighten core screws and deenergize magnet.
(h) Recheck requirements (b) and (d).
(i) Hold armature against core; position stop plate to meet requirement (c).
(j) Tighten stop plate screws.
(k) Move carriage so right hammer alines with 60th character.
(l) With armature held against coil, loosen right rack eccentric guide screw (fig. 6-30).
(m) Position rack eccentric to meet requirements (a) and (b).
(n) Tighten rack eccentric guide screw.
(o) Recheck requirements.
(p) Check adjustment of carriage shaft (para 6-10l). Adjust if necessary.

I. Carriage Shaft Positioning Adjustment (fig. 6-32)

NOTE

Check space magnet, space pawl stop plate, and space pawl adjustment described in paragraph 6-10k before performing this adjustment. Adjust if necessary.

(1) *Requirement.* The left margin spring washer must be 0.010- to 0.015-inch away from the printer casting.

(2) *Adjustment* To adjust carriage shaft, proceed as follows:

(a) Loosen setscrews securing carriage shaft.
(b) Position carriage shaft to meet requirement.
(c) Tighten carriage shaft setscrews.
(d) Recheck requirement.

m. Carriage Guide Rail Adjustment (fig. 6-33)

(1) *Requirement.* The clearance of any point between the guide and rail must be 0.002- to 0.010-inch when the carriage is held towards the rear of the unit.

(2) *Adjustment* To adjust carriage guide rail, proceed as follows:

(a) Loosen center screw on front carriage rail.
(b) Position guide opposite center screw.
(c) Position center of front rail to meet requirement; tighten screw.
(d) Repeat adjustment at left and right ends of rails.,
(e) Recheck requirements.
(f) Check lateral adjustment of print drum (para 6-10q). Adjust if necessary.

n. Space Pawl Shaft End Play Adjustment (fig. 6-34)

NOTE

This adjustment should be performed only when the space pawl assembly is replaced.

(1) *Requirement.* The space pawl shaft must have 0.001 - to 0.005-inch end play.

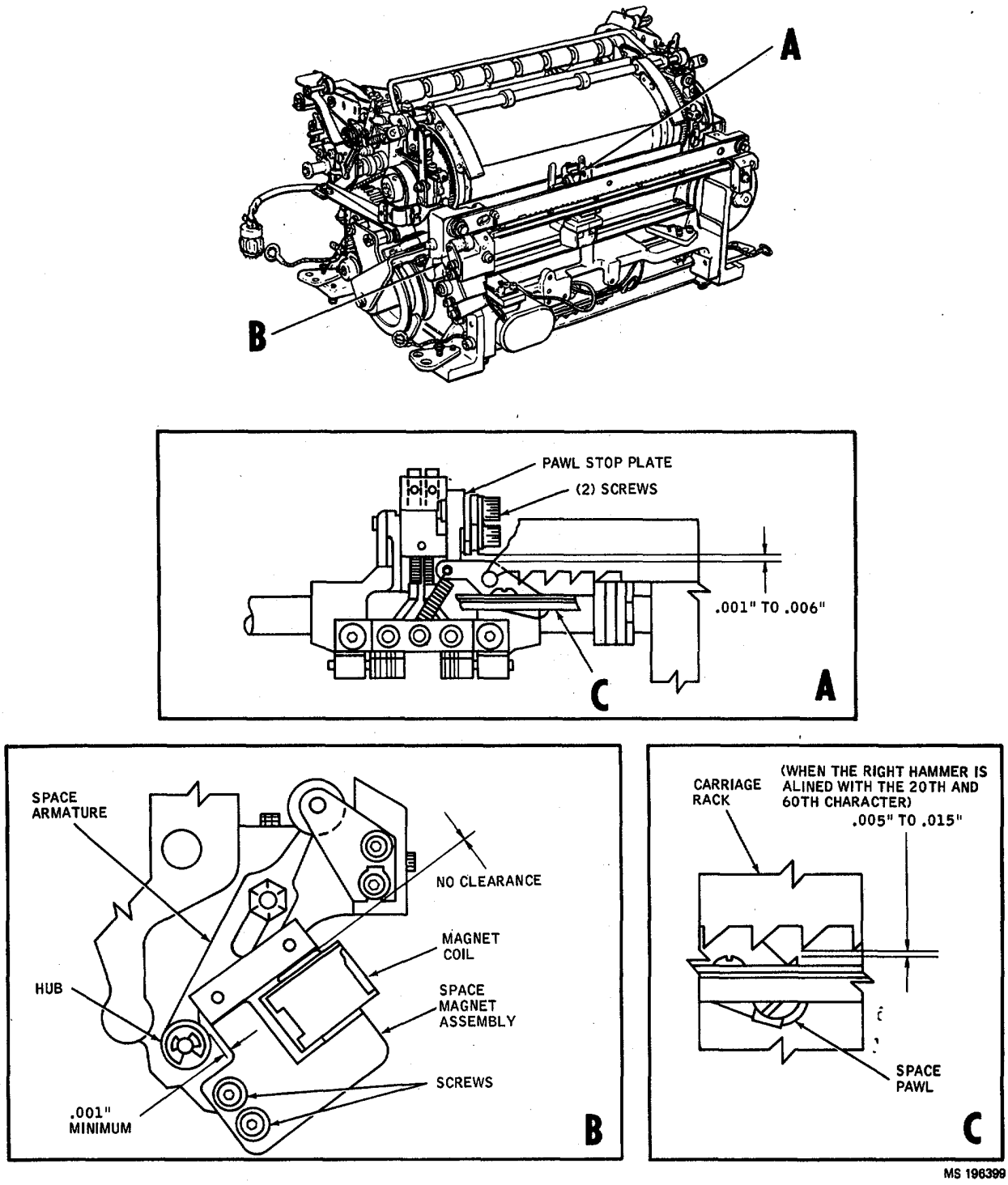


Figure 6-31. Space Magnet, Space Pawl Stop Plate, and Space Pawl Clearance Adjustment

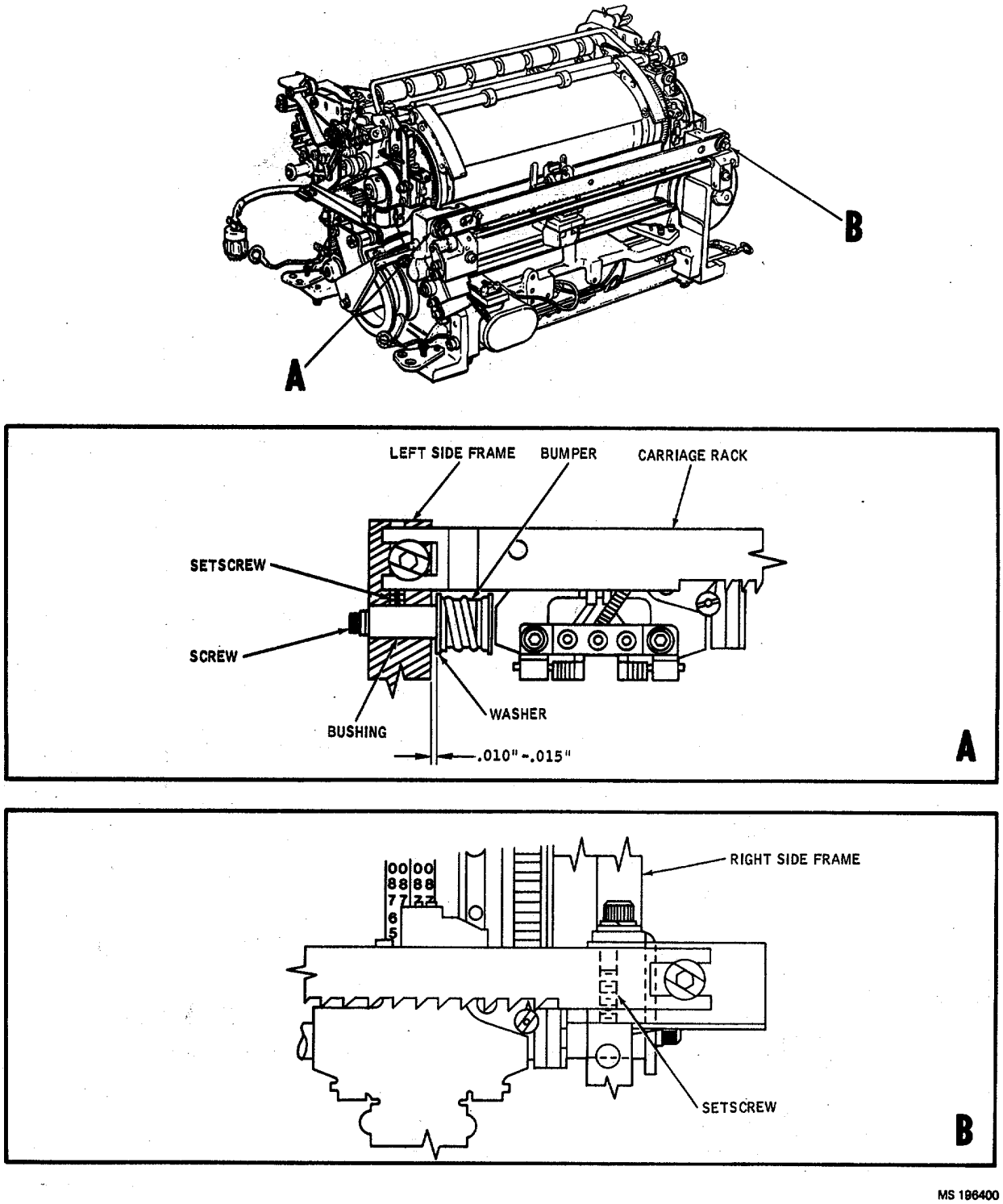


Figure 6-32. Carriage Shaft Positioning Adjustment

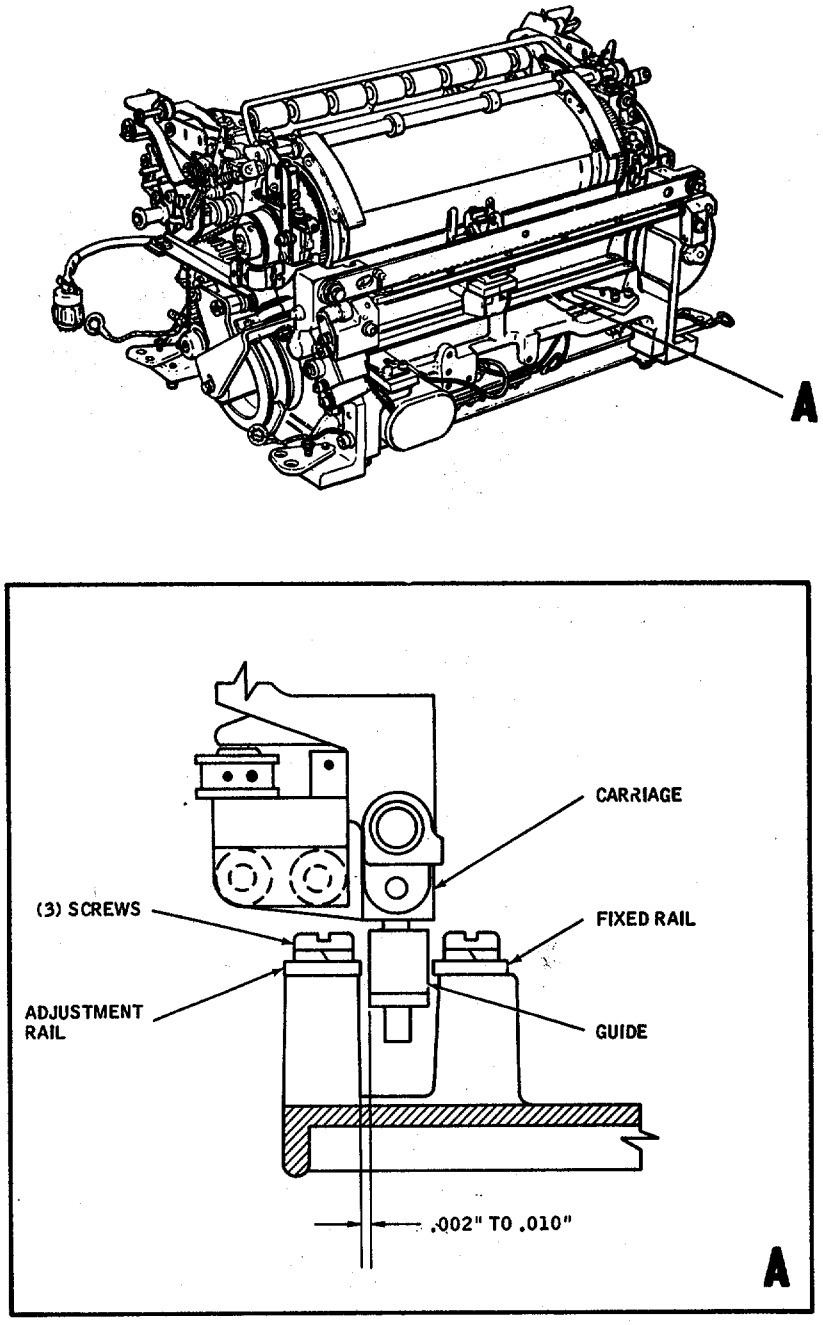


Figure 6-33. Carriage Guide Rail Adjustment

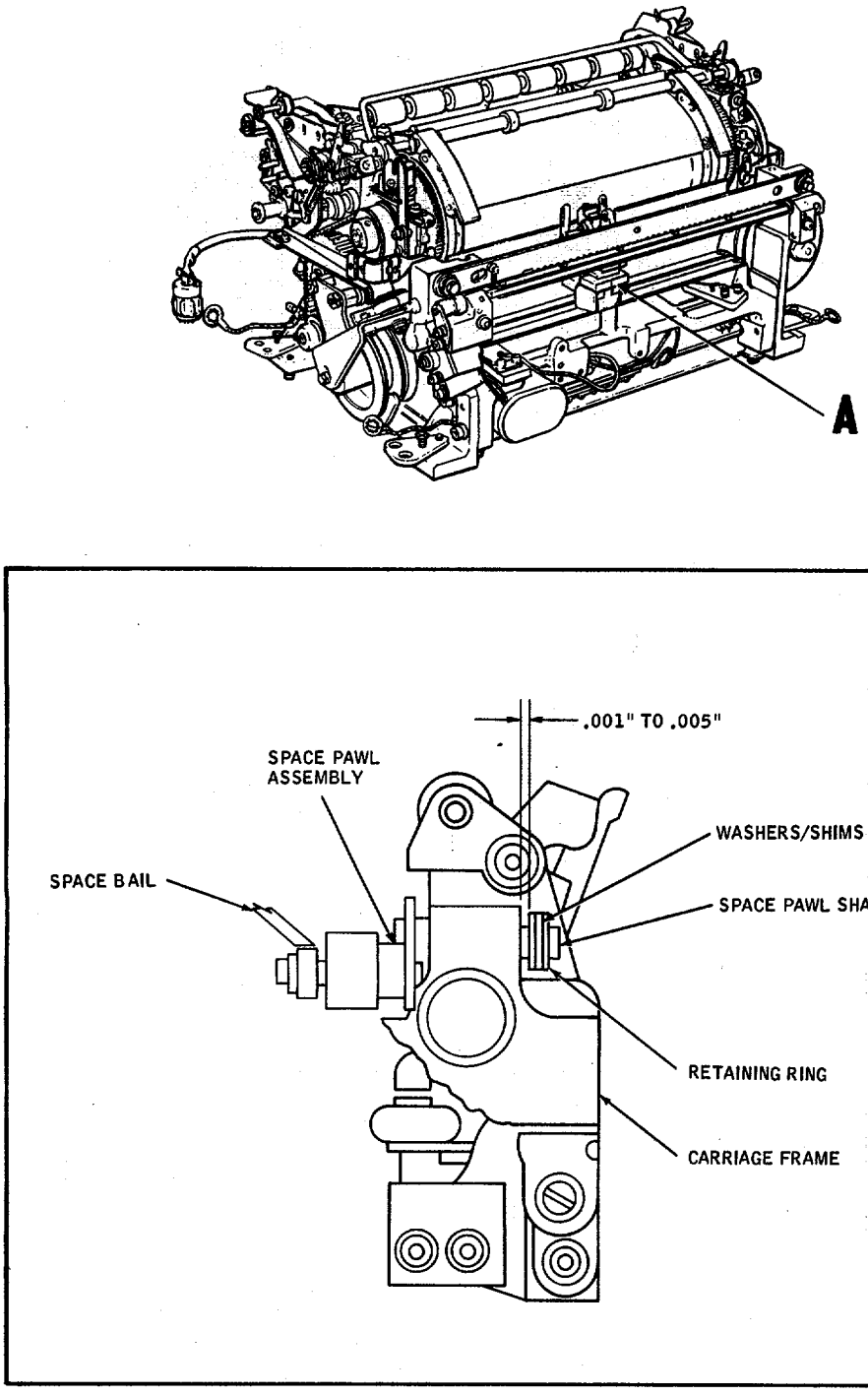


Figure 6-34. Space Pawl Shaft End Play Adjustment

(2) *Adjustment.* To adjust space pawl shaft, proceed as follows:

(a) Remove retainer ring and insert shims 65657 (7, fig. 6-58) to meet requirement. (Ensure that shims do not touch casting.)

(b) Replace retainer ring.

o. Print Hammer Block Alinement (fig. 6-35)

NOTE

This adjustment specification must be performed each time the copy thickness is changed.

Check main clock clearance (para 6-13a) and index clock positioning (para 6-13b) adjustments before performing this adjustment. Adjust if necessary.

(1) *Requirement.* Any character must be printed with equal density from top to bottom.

(2) *Adjustment.* To adjust print hammer block, proceed as follows:

(a) Install paper and ribbon.

(b) Loosen print hammer magnet screws.

(c) Lower magnet.

(d) Set power switch to ON.

CAUTION

Do not force the hammer against the paper or the drum. Forcing may result in damage to the print hammer.

(e) Push armature down until hammer forces paper lightly against drum.

(f) Observe smudge produced on paper. If smudge is light on top or bottom, loosen hammer block screw. Leave friction tight.

(g) Hold block so that block setscrew is against block screw.

(h) Turn block setscrew in if smudge is light at top or turn out if smudge is light at bottom.

(i) Adjust until a smudge produced is of equal density from top to bottom.

(j) Tighten hammer block screw; recheck requirement.

(k) Set power switch to OFF.

(l) Check print hammer magnet clearance (para 6-10p). Adjust if necessary.

p. Print Hammer Magnet Clearance and Print Hammer Impact Adjustment (fig. 6-36)

NOTE

Check print hammer block alinement described in paragraph 6-lOo before performing this adjustment. Adjust if necessary.

(1) *Requirements*

(a) The clearance between a character on the drum and the hammer face should be 0.025-inch when the armature is held against the magnet core.

(b) The contacting surfaces of the armature must be flush with the core when the armature is held in the energized position.

(c) The magnet core must be against the pin.

(d) The clearance between the front portion of the core and the armature must be 0.009-inch when the armature is deenergized.

(e) The hammer and armature, when moving to the rest position, must contact their respective setscrew stops at the same time.

(2) *Adjustment.* To adjust print hammer magnet clearance, proceed as follows:

(a) Back out hammer setscrew.

(b) Loosen two magnet core retaining screws.

(c) Position armature setscrew against armature; position magnet to meet requirement (a).

(d) Position magnet core to meet requirements (b) and (c); tighten two magnet core retaining screws.

(e) Position armature setscrew to meet requirement (d).

(f) Position hammer setscrew to meet requirement (e).

(g) Repeat procedure for other print hammer and magnet.

(3) *Print hammer impact check.* To check the print hammer impact, proceed as follows:

(a) Press on armature until armature contacts pole of print magnet. Check that there is a minimum clearance of 0.010-inch between a character on the drum and the print hammer. Repeat check for second hammer. If check fails, repeat adjustment procedure.

(b) Install inking ribbon and paper in printer.

(c) Set POWER switch to ON.

(d) Type a number of characters. Each character should be printed entirely, should be of constant density and should be in parallel alinement with the other characters (fig. 6-36, detail c). If check fails, repeat adjustment procedure. If adjustment cannot be accomplished, refer to paragraph 6-13c and adjust character phasing.

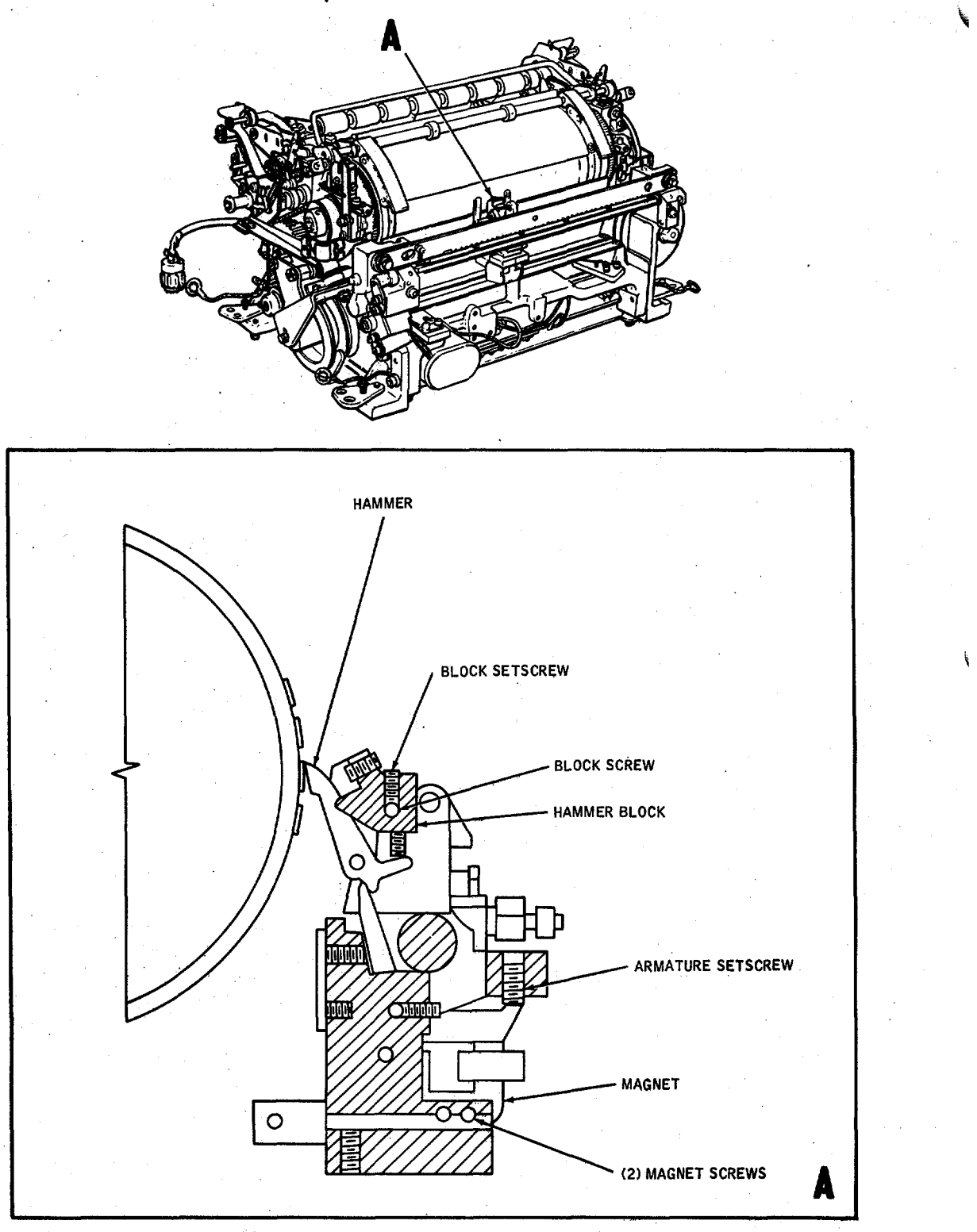


Figure 6-35. Print Hammer Block Alinement

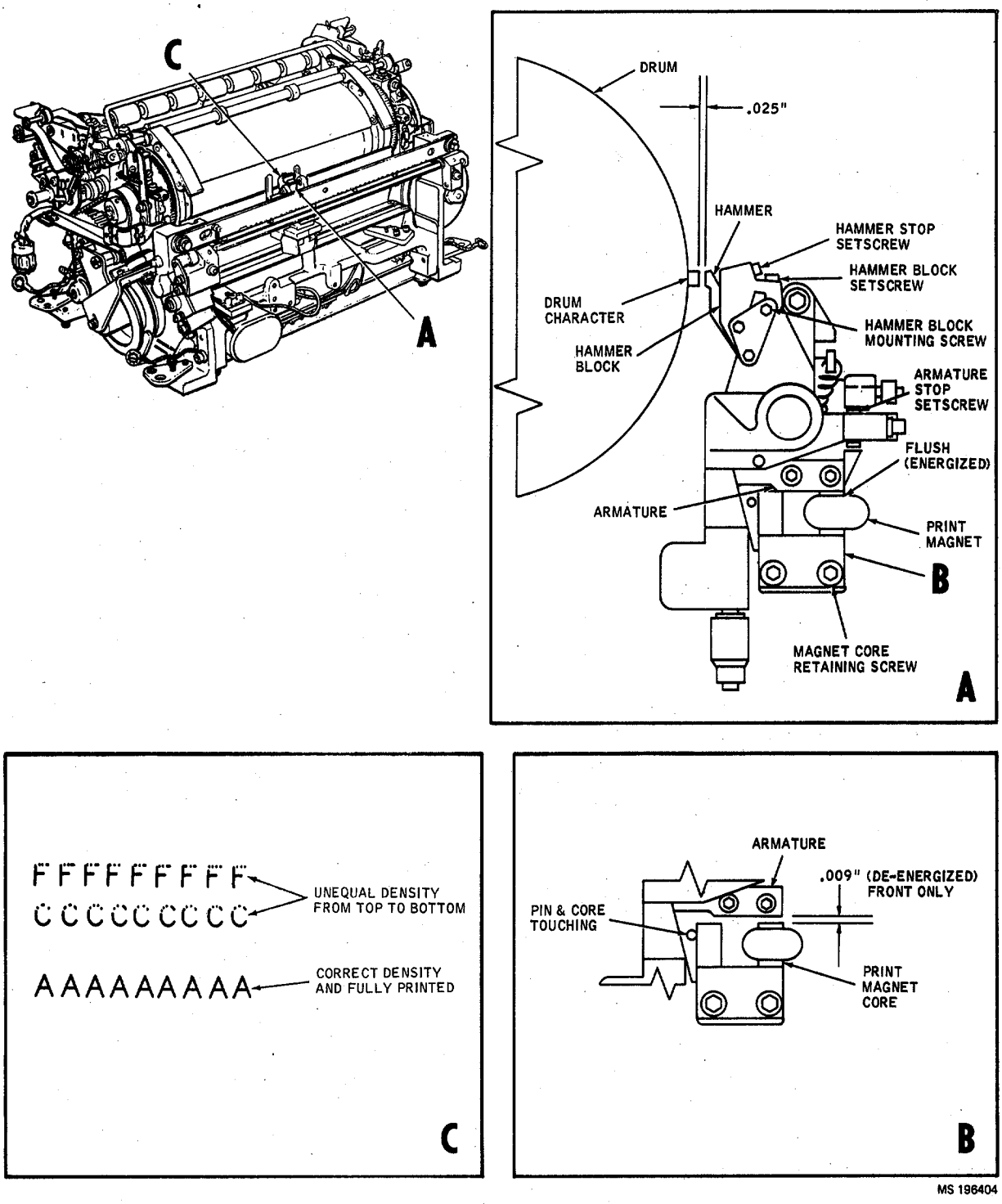


Figure 6-36. Print Hammer Magnet Clearance Adjustment

q. Print Drum Lateral Adjustment (fig. 6-37)

NOTE

Check carriage guide rail adjustment described in paragraph 6-l0m before performing this adjustment. Adjust if necessary.

(1) *Requirement.* The clearance between the print hammers and the print drum must be the same when the carriage is in the left and right margins.

(2) *Adjustment* To adjust print drum laterally, proceed as follows:

(a) Check requirement with carriage at right margin.
(b) Move carriage to left margin.
(c) Remove all tension from drive belt.
(d) Loosen left bearing cap screws.
(e) Loosen carriage return support bracket or belt guard screws.
(f) Loosen two pin bracket mounting studs.

NOTE

Do not remove any shims, when present, under the pin bracket.

(g) Position drum to meet requirement; tighten studs.
(h) Recheck requirement.
(i) Tighten bearing cap screws.
(j) Tighten support bracket screws.
(k) Adjust drive belt tension (para 5-11).

r. Print Drum Vertical Alinement (fig. 6-38)

(1) *Requirement.* The print drum shaft must be parallel to the carriage shaft.

NOTE

The requirement can be checked by moving the carriage from one margin to the other and observing the clearance between the print hammer and row of characters.

(2) *Adjustment*

(a) Loosen left bearing cap screws.
(b) Add or remove shims 67588 (0.002 inch) or 67587 (0.005 inch) as required, between lower bearing U cap and casting. (See 20 and 21, fig 6-59.)
(c) Tighten screws.
(d) Recheck requirements.

6-11. Inking Ribbon Mechanism Adjustments.

a. Ribbon Rever8e Latch End Play Adjustment (fig. 6-39)

(1) *Requirement* The blocking lever must have 0.001- to 0.010-inch end play.

(2) *Adjustment*

(a) Remove two retainer rings and ribbon roller.
(b) Add or remove shims 55948 and/or 55949 (16, fig. 6-62 and 6-63), as required, to meet requirement.
(c) Replace ribbon roller and retainer rings.
(d) Recheck requirements.

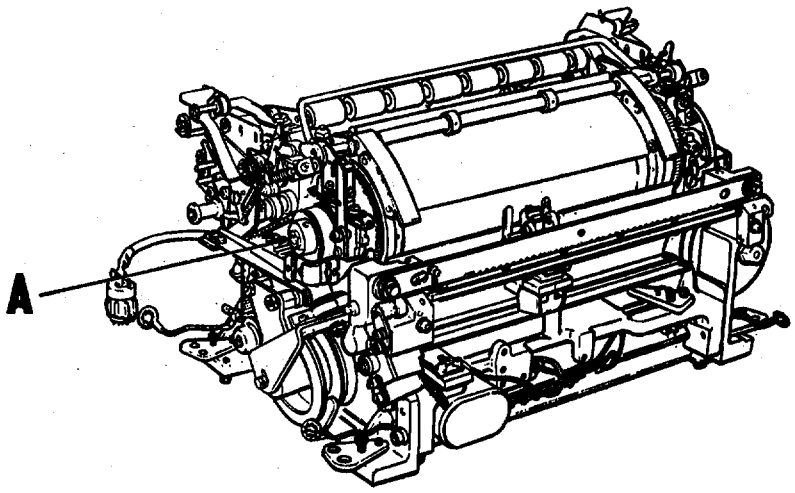
b. Ribbon Feed Detent Plunger and Driving Clutch Positioning Adjustment (fig. 6-40)

(1) *Requirements*

(a) The detent plunger should be positioned inward as far as possible.
(b) When either dog assembly is engaged with its associated ribbon spool shaft, it must have a minimum of 50 percent engagement.
(c) When either driving clutch members are engaged tooth-on-tooth, the opposite clutch members must have a minimum clearance of 0.002-inch.

(2) *Adjustment* To adjust ribbon feed detent plunger and driving clutch, proceed as follows:

(a) Disconnect ribbon feed clutch spring.
(b) Loosen setscrews in left dog assembly; loosen setscrew securing detent plunger in right-hand frame.
(c) Move detent in all the way; tighten detent setscrew.
(d) Reconnect ribbon feed clutch spring.
(e) Detent shaft to left.
(f) Position driving clutch to meet requirement (b); tighten setscrews.
(g) Add shim 56546 (21, fig. 6-62 and 6-63) behind left driving fork if unable to meet requirement (e).
(h) Check ribbon reverse lever adjustment (para 5-20). Adjust if necessary.



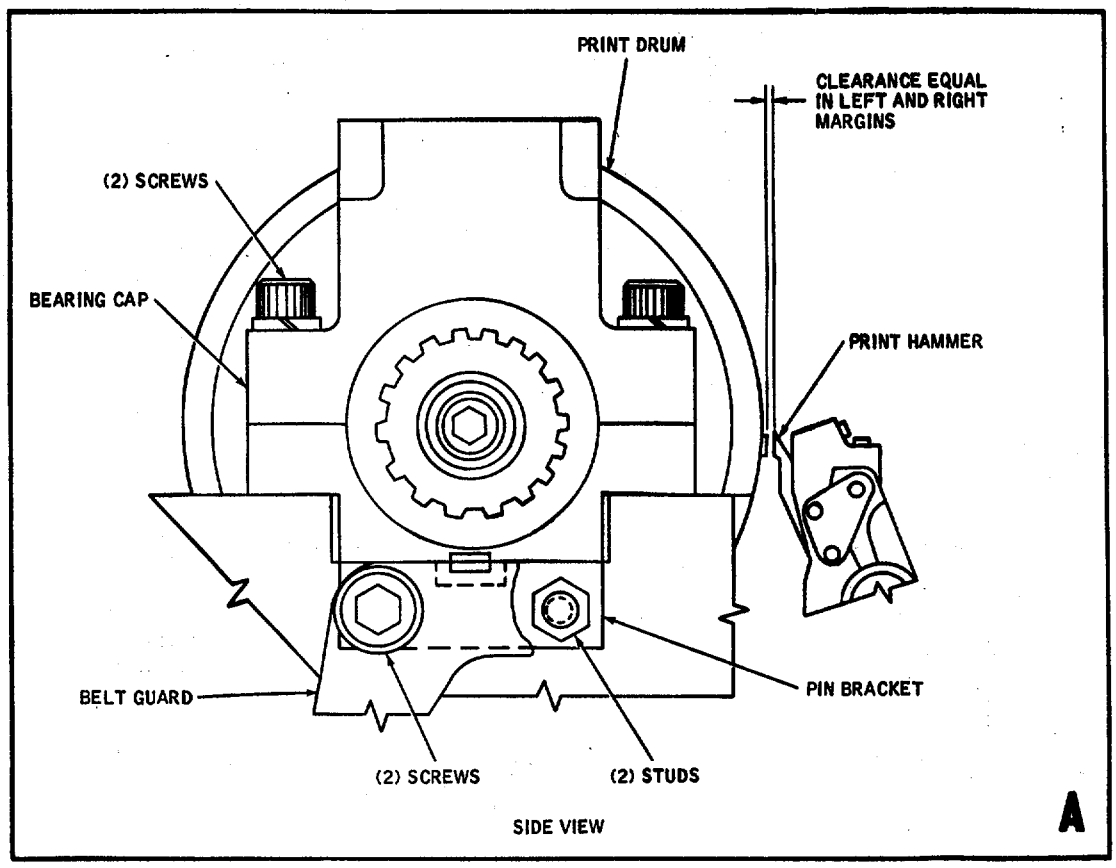


Figure 6-37. Print Drum Lateral Adjustment

6-12. Ribbon Lift Mechanism Adjustments.

a. Ribbon Lift Shaft End Play and Positioning Adjustment (fig. 6-41)

(1) *Requirements*

(a) The left shaft must have 0.010- to 0.030-inch end play.

(b) The ribbon, when installed, must be in line plus or minus 1/64-inch with a row of characters on the drum.

(2) Adjustment To adjust ribbon lift shaft, proceed as follows:

(a) Loosen two collar setscrews located on left

NOTE

It may be necessary to remove the left-hand ribbon feed assembly to gain access to the collar setscrews. Refer to paragraph 6-22a to remove left-hand ribbon feed assembly.

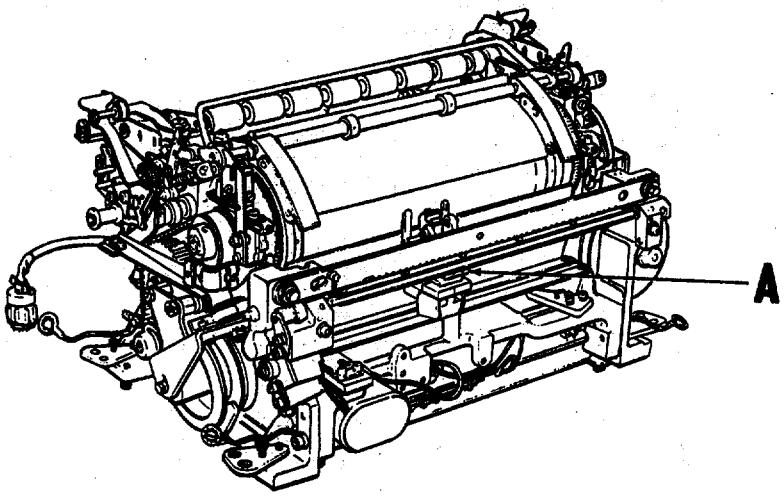
(b) Bias ribbon lift shaft to left to remove all end play; position collar to meet requirement (a).

(c) Tighten collar setscrews.

(d) Loosen clamp bracket screw.

(e) Position left lift arm to meet requirement (b).

(f) Tighten clamp bracket screw.



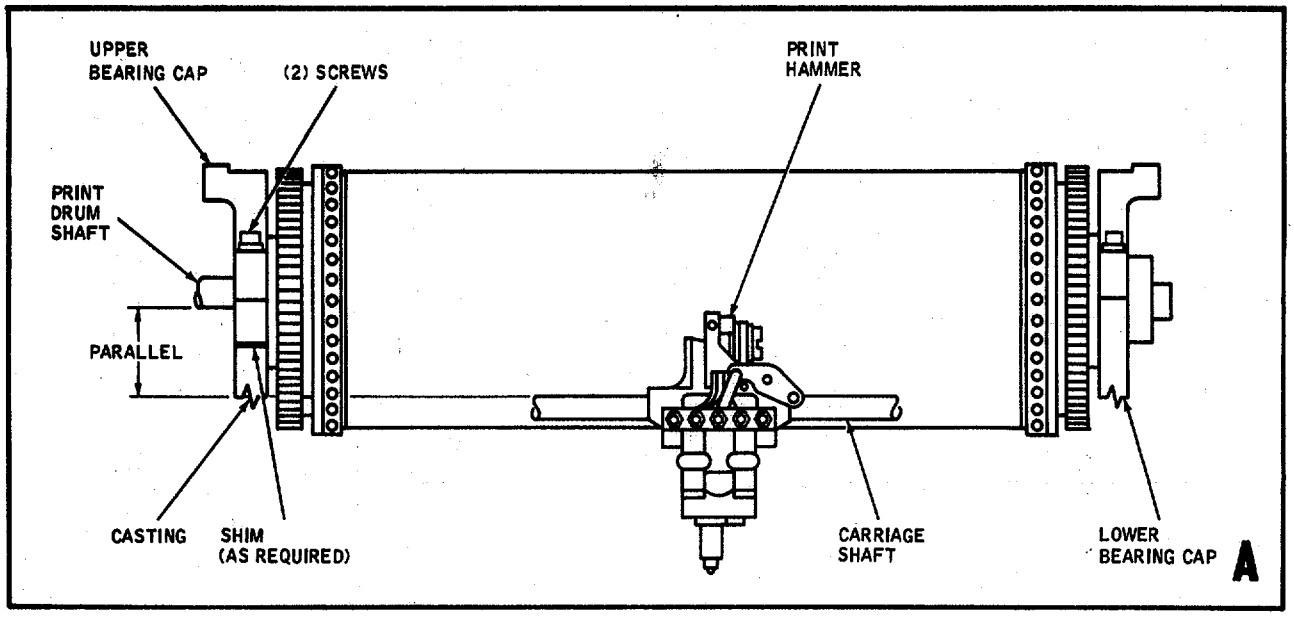


Figure 6-38. Print Drum Vertical Alinement

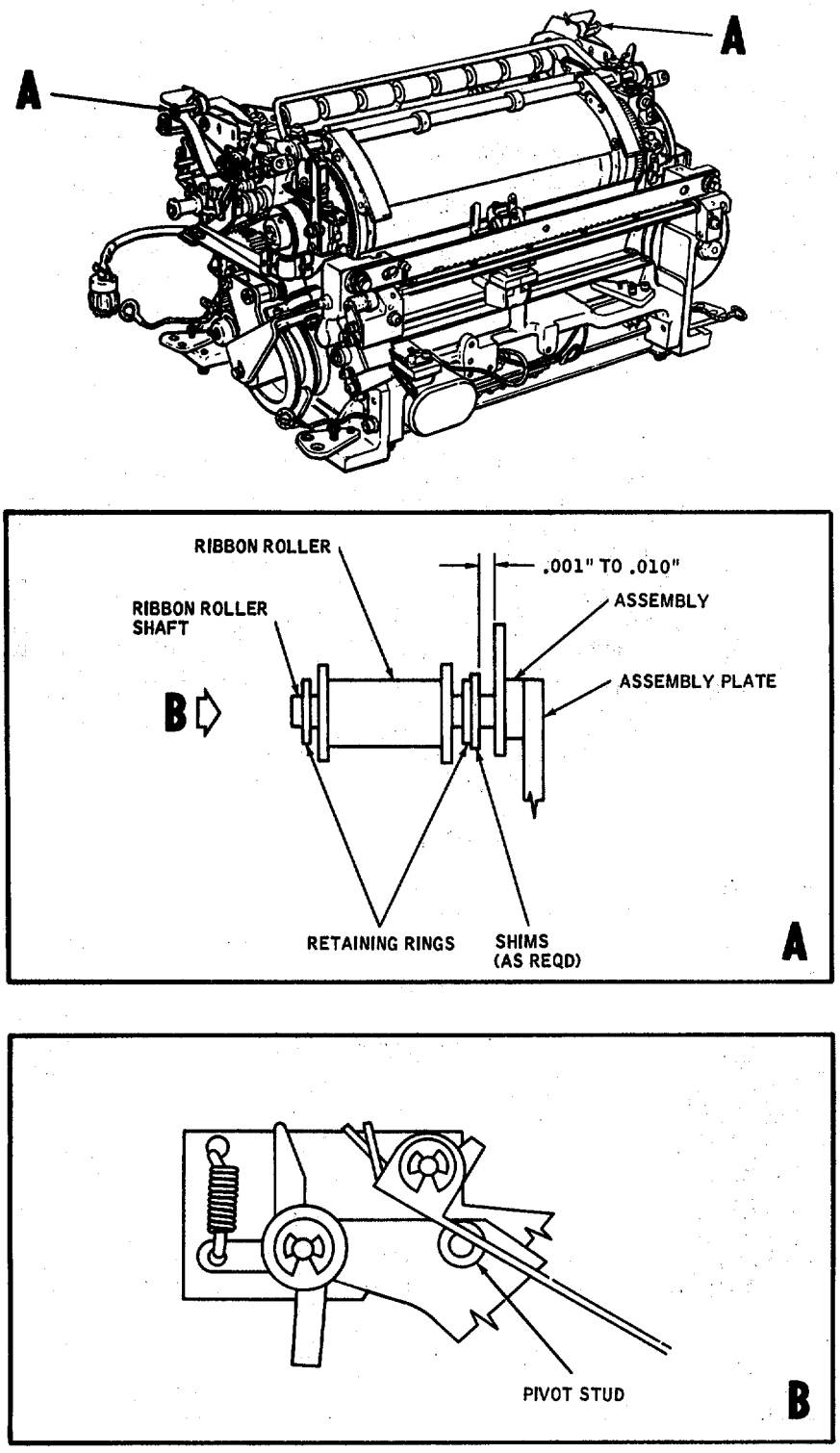


Figure 6-39. Ribbon Reverse Latch End Play Adjustment

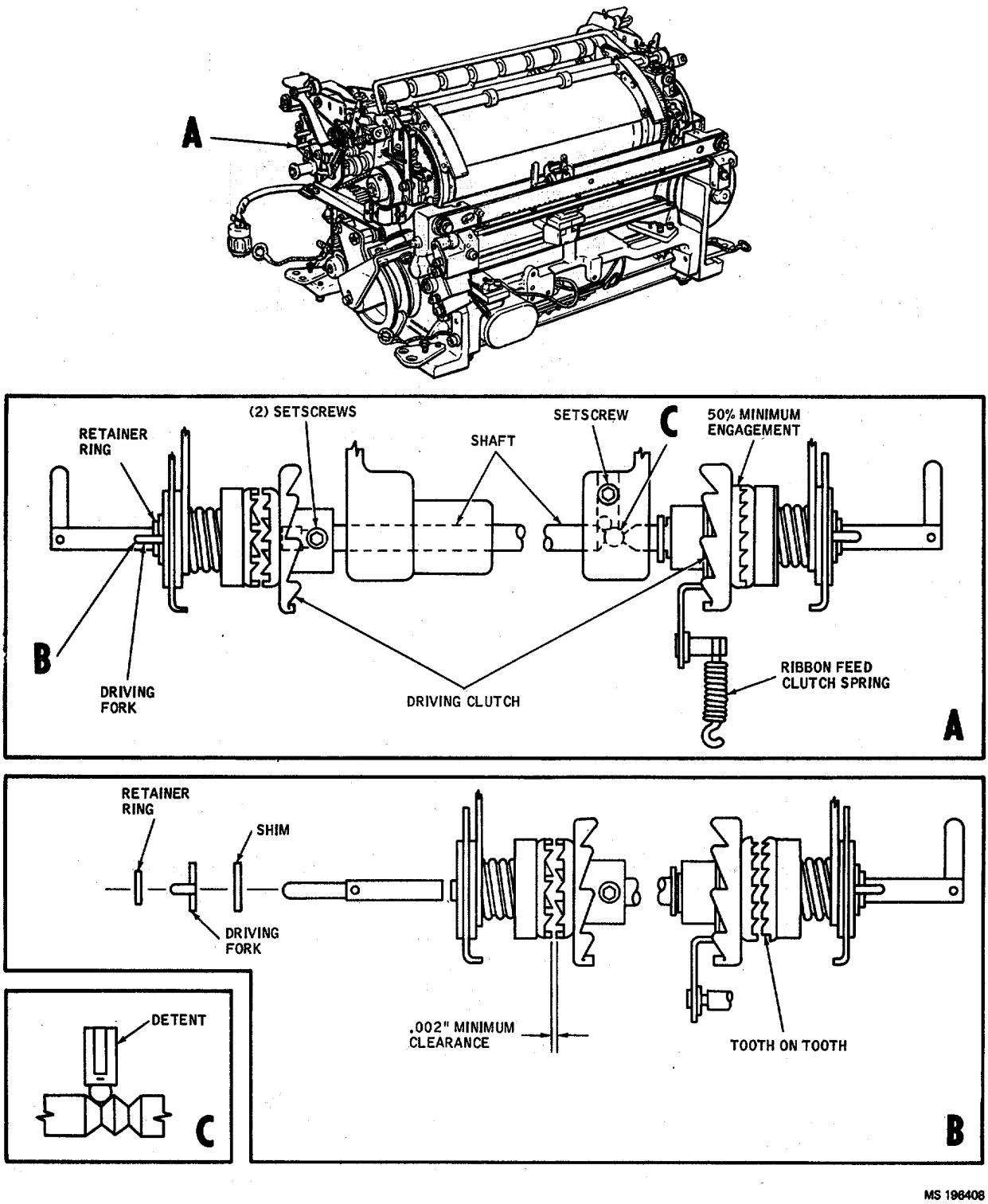


Figure 6-40. Ribbon Feed Detent Plunger and Driving Clutch Positioning Adjustment

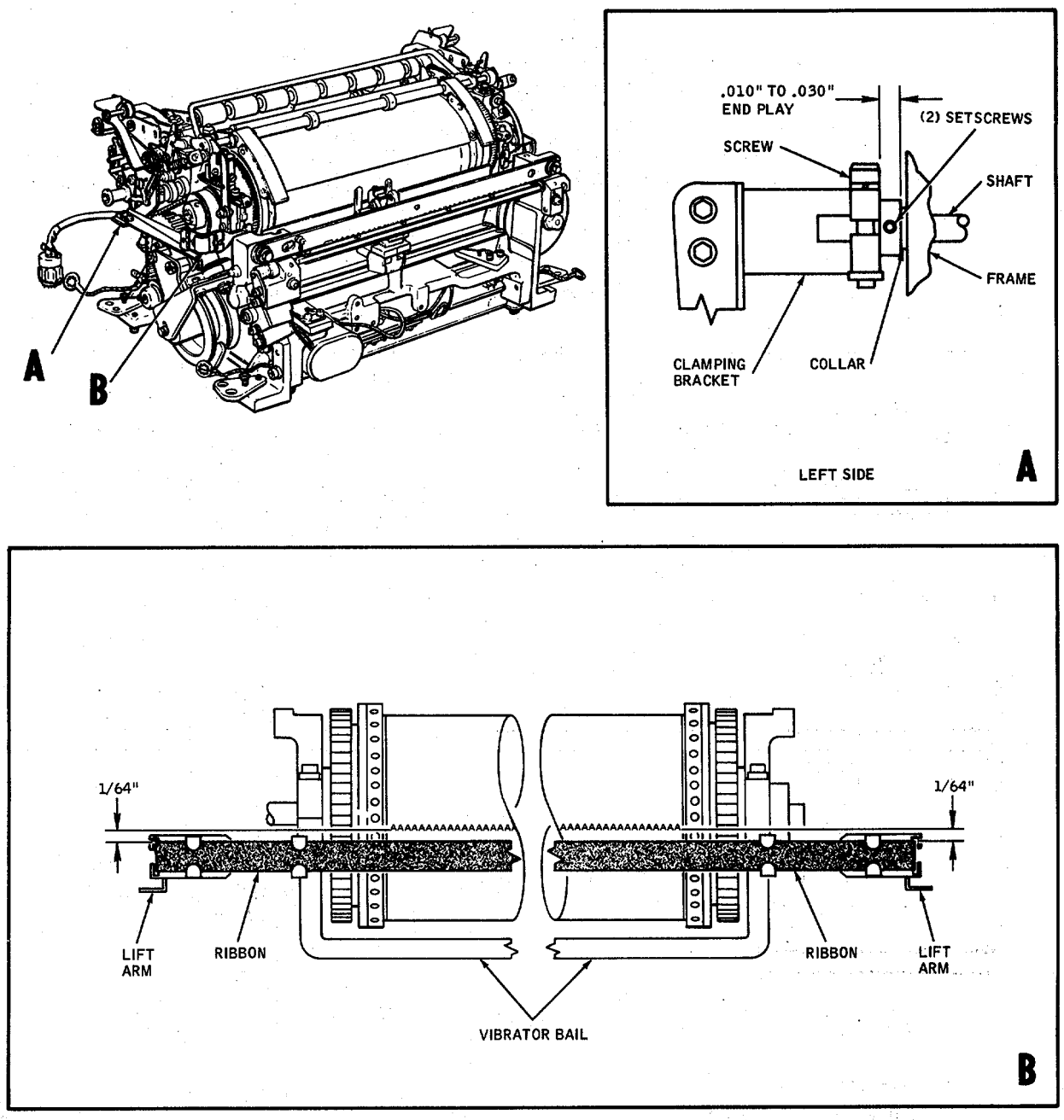


Figure 6-41. Ribbon Lift Shaft End Play and Positioning Adjustment

(g) Recheck requirements.
(h) If removed, install left-hand ribbon feed assembly (para 6-22a).
(i) Check adjustment of ribbon lift arm (para 6-12b). Adjust if necessary.

b. Ribbon Lift Arm Positioning Adjustment (fig. 6-42)

NOTE

Check ribbon lift shaft end play and positioning adjustment described in paragraph 6-12a before performing this adjustment. Adjust if. necessary.

(1) *Requirements*

(a) The ribbon vibrator bail must be centered on the machine.
(b) The bail must not bind in the ribbon guide on the carriage.
(c) The ribbon must ride through the outer ribbon guide on the bail without "bunching up" or folding over.

(2) *Adjustment* To adjust ribbon lift arm, proceed as follows:

(a) Loosen screws securing bail to lift arms.
(b) Position bail so the top edge is parallel to top edge of each lift arm; tighten screws.
(c) Loosen two screws in each lift arm.
(d) Position lift arms to meet requirement (a); tighten only one screw in each arm friction tight.
(e) While maintaining requirement (a), reposition lift arms to remove any bow from bail; meet requirement (b).

NOTE

Check the alinement of the bail in the ribbon guide as the carriage is moved throughout its travel with the bail in both the raised and lowered position. The normal position of the bail is to ride towards the rear of the ribbon guide when in the rest or lowered position, and towards' the carriage when in the operated or raised position.

(f) Tighten lift arm screws; recheck requirements (a) and (b).
(g) Readjust as necessary.
(h) Install ribbon in machine.
(i) Turn motor on; observe movement of ribbon through outer guides on each side of bail.
(j) Ribbon should ride through outer guides without "bunching up" or folding over when lift arms are in raised or lowered position.
(k) If necessary, reposition bail on each lift arm but do not lose requirement (b).

c. Ribbon Lift Mechanism Adjustment (fig. 6-43)

(1) *Requirements*

(a) The top half of the ribbon must be centered ±1/32-inch on the print hammer when the ribbon lift armature is against the core on the coil side.
(b) There must be a 0.002-inch minimum clearance between the cutout in the bail stops and the vibrator bail bumpers to prevent the bumpers from binding, but the bumpers must engage at least 50 percent of the lower stop of the bail stops.
(c) The top edge of the ribbon must be 1/32- to 1/16-inch above the bottom edge of the print hammer (last row of printed characters visible) when the bracket is against the setscrew and the vibrator bail bumper is down against the bail stops.

(2) *Adjustment* To adjust ribbon lift mechanism, proceed as follows:

(a) Loosen two bail stop setscrews to permit bail stops to move during this adjustment. The setscrews will be tightened later.
(b) Loosen core mounting screws.
(c) Back out core adjusting screw until magnet is as low as possible.
(d) Hold bracket against setscrew.
(e) Turn setscrew until ribbon is in position specified in requirement (a).
(f) Turn core adjusting screw in until both core faces contact armature.
(g) Tighten core screws.
(h) To obtain requirement (b), tighten bail stop setscrews; loosen bail stop mounting screw.
(i) Hold mounting plate so face of cutout in bail stop is parallel to bumper; position mounting plate to meet requirement.
(j) Tighten bail stop mounting screws.
(k) Repeat steps (h), (i), and (j).
(l) To obtain requirement (c), loosen bail stop setscrew.
(m) Hold bracket against setscrew; turn setscrew until ribbon is 1/32- to 1/16-inch above bottom of print hammer.
(n) Hold bracket against setscrew; position bail stop so vibrator bail bumpers rest on lower step of bail stops.
(o) Tighten setscrew.

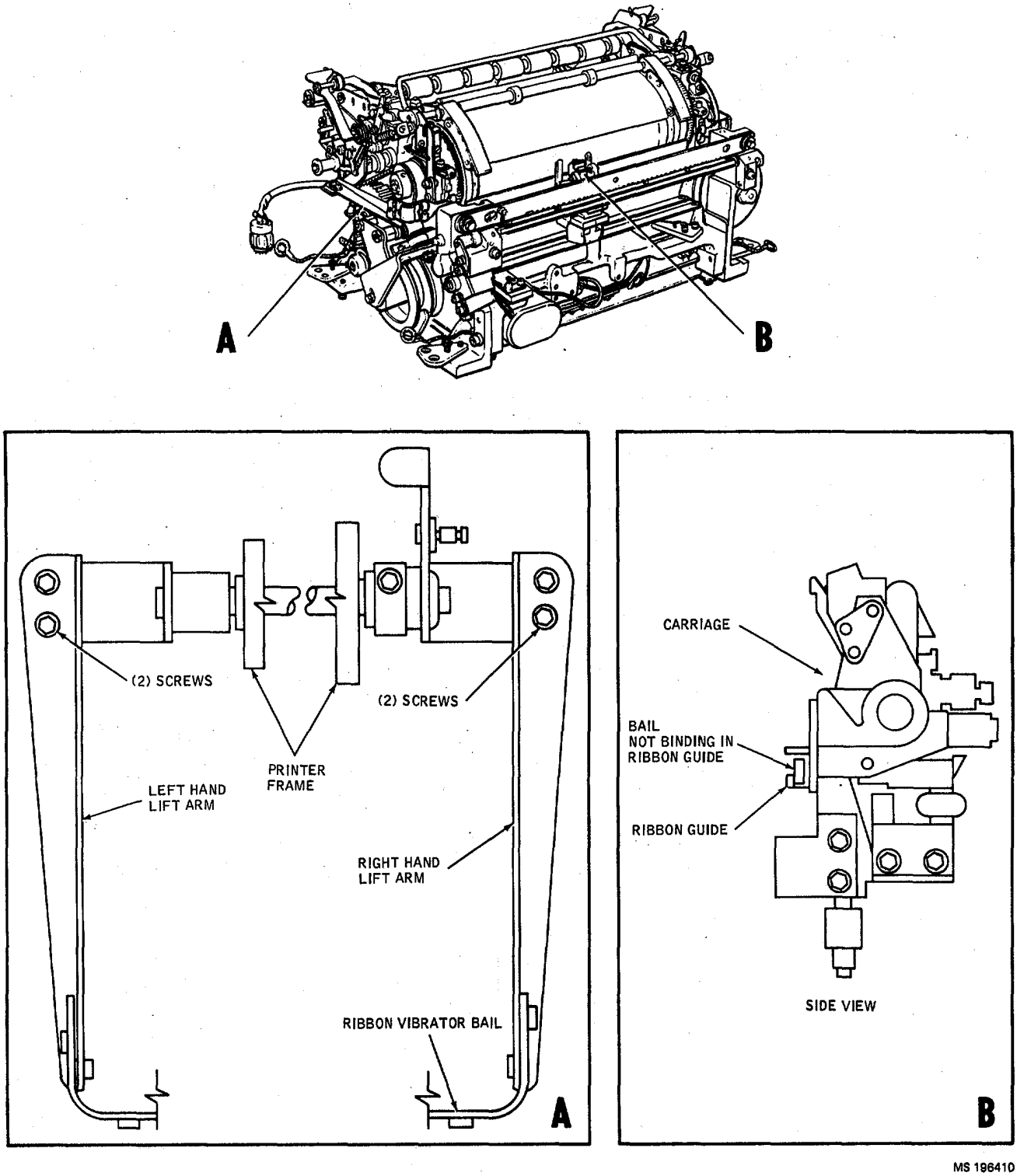


Figure 6-42. Ribbon Lift Arm Positioning Adjustment

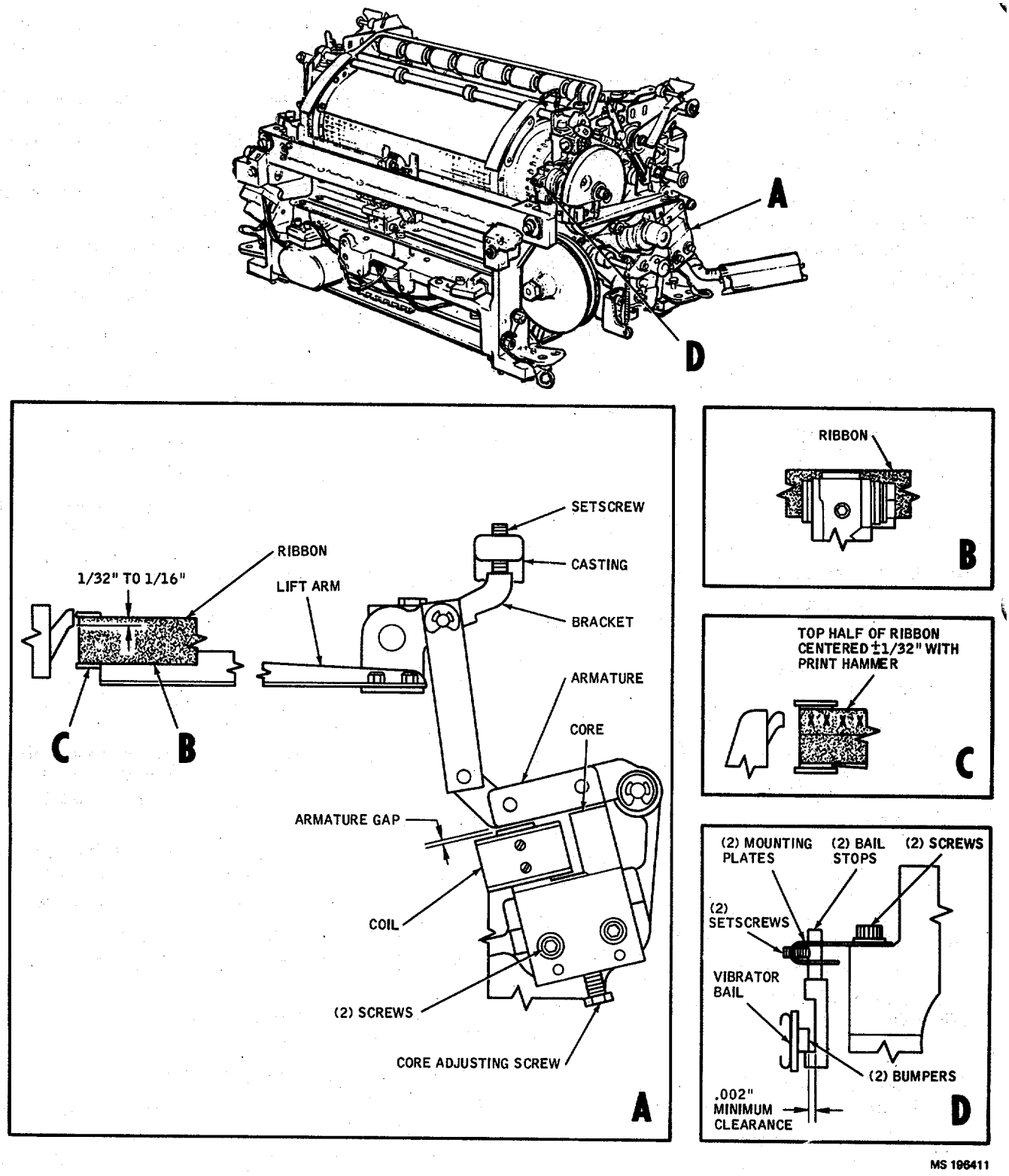


Figure 6-43. Ribbon Lift Mechanism Adjustment

(p) Repeat steps (m), (n), and (o) for other bail stops.
(q) Check adjustment of ribbon arm (para 6-12b). Adjust if necessary.

6-13. Timing Mechanism Adjustments.

a. *Main Clock Clearance and Positioning Adjustment (fig. 6-44)*

(*1) Requirements*

(a) The amplitude of the main clock output pulse must be 2.0 volts minimum.
(b) The minimum clearance between the main clock pole and the face of the clock wheel must be 0.004-inch.

(2) *Adjustment.* To adjust main clock, proceed as follows:

(a) Set oscilloscope controls as follows:
1. VOLTS/DIV to 1. 2. TIME/DIV to 5 MS. 3. TRIG MODE to NORM.
(b) Connect oscilloscope ground lead to test point Y of P96 printer control logic circuit card.
(c) Connect oscilloscope input lead to test point X of P96 printer control logic circuit card.
(d) Loosen main clock clamping screw.
(e) Aline clock pole with scribed line.
(f) Laterally adjust main clock to meet requirement (b).
(g) Turn equipment on; leave in idle condition.

CAUTION

When tightening the clamping screw that holds the clock coil in place, use only light pressure to clamp the coil. Overtightening may result in damage to the coil.

(h) Position clock to meet requirements; tighten clamping screw.
(i) Recheck requirements.

b. *Index Clock Positioning and Pulse Alinement (fig. 6-45)*

NOTE

Adjust main clock as described in paragraph 6-13a before performing this alinement.

(1) *Requirements*

(a) The index clock plug must be flush to within 0.010-inch above clock wheel face.
(b) The amplitude of the index clock output pulse must be 1.2 volts minimum.
(c) The minimum clearance allowed between the index clock plug and the index clock pole must be 0.004-inch.
(d) The positive transition of the index clock pulse must occur at the same time as the negative transition of the main clock pulse. Tolerance: plus or minus 30 microseconds.

(2) *Adjustment.* To aline index clock, proceed as follows:

(a) Remove index plate mounting screw.
(b) Add or remove shims 54643 (0.010-inch) between index plate and clock wheel to meet requirement (a). (See 35, fig. 6-59.)
(c) Reinstall and tighten mounting screw.
(d) Set oscilloscope control as follows:
1. VOLTS/DIV to 1. 2. TIME/DIV to 2 MS. 3. TRIG MODE to NORM.
(e) Connect oscilloscope ground lead to test point Y of P96 printer control logic circuit card.
(f) Connect oscilloscope input lead to pin U of P96 printer control logic circuit card.
(g) Loosen index clock clamping screw.
(h) Aline clock pole with scribed line on timing plate.

CAUTION

When tightening the clamping screw that holds the clock coil in place, use only light pressure to clamp the coil. Overtightening may result in damage to the coil.

(i) Position clock to meet requirements (b) and (c); tighten clamping screw.
(j) Disconnect scope lead from test point U; reconnect to test point M.
(k) Set oscilloscope controls as follows:
1. VOLTS/DIV to 5. 2. TIME/DIV to 50 μsec. 3. SOURCE to EXT. 4. TRIGGERING LEVEL to +.
(l) Connect oscilloscope trigger lead to test point X.
(m) Turn equipment on; leave in the idle condition.

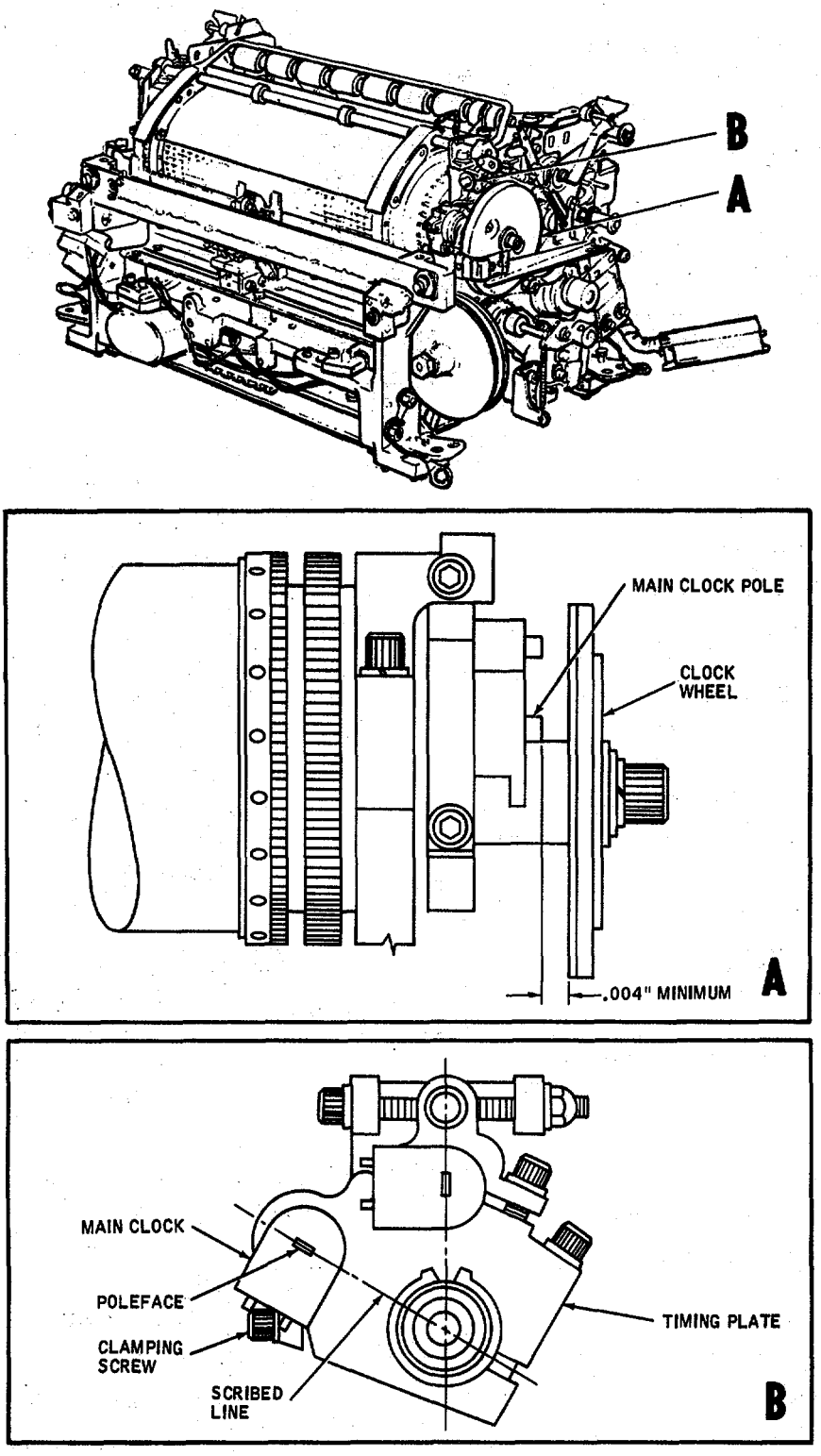


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Figure 6-44. Main Clock Clearance and Positioning Adjustment

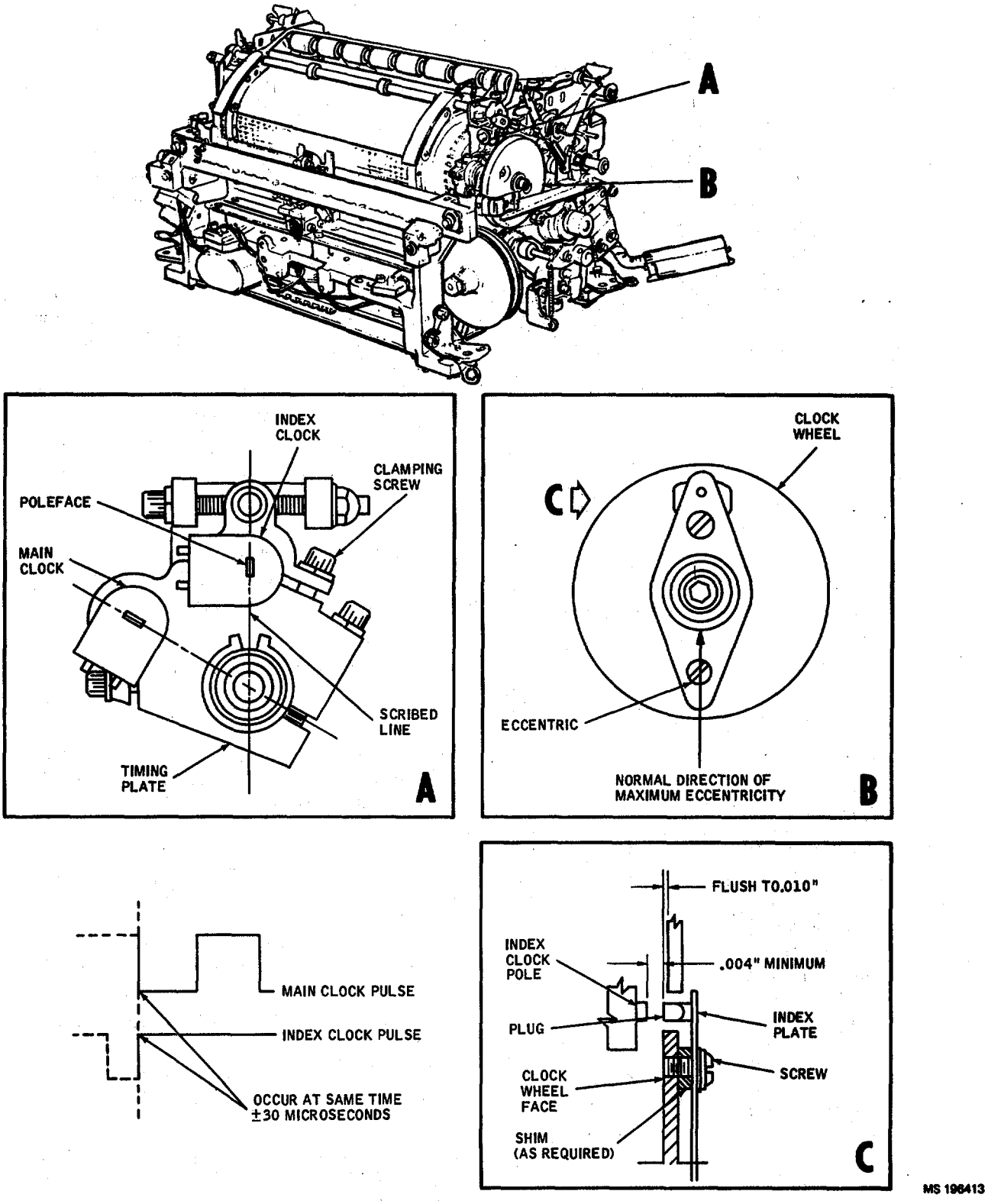

Figure 6-45. Index Clock Positioning and pulse Alinement

(n) On oscilloscope, measure requirement (d). If requirement is not met, proceed with steps (o) thru (r).
(o) Turn equipment off.
(p) Loosen index plate mounting screw.
(q) Rotate eccentric until negative transition is alined with centerline on oscilloscope plus or minus 30 microseconds.
(r) Tighten index plate mounting screw.
(s) Recheck steps (m) thru (r) until requirement (d) is met.

c. *Character Phasing Adjustment (fig. 6-46)*

NOTE

Check clearance and impact of print hammer described in paragraph 6-10p before performing this adjustment. Adjust if necessary.

(*1*) *Requirements*
(a) There must be no perceptible end play of the adjusting screw in its casting.
(b) The characters must be clearly printed on the paper without being cut off at the top or bottom.

(2) *Adjustment*. To adjust character phasing, proceed as follows:
(a) Adjust screw nut in casting to meet requirement (a) for snug fit.
(b) Loosen timing plate setscrew.
(c) While receiving a test message, turn adjusting screw clockwise to correct character top cutoff; turn adjusting screw counterclockwise to correct character bottom cutoff.
(d) Tighten timing plate setscrew.

NOTE

If character cutoff on top or bottom occurs at the left end of the print drum, check related adjustment as described in paragraph 6-10q. The left end of the drum is not the same distance away from the hammer as the right end.

6-14. Line Space and Carriage Return Circuit Adjustments.

a. *Reed Switch Clearance Adjustment (fig. 6-47)*

(1) *Requirement.* The clearance between the carriage magnet and the reed switches should be 0.015-to 0.030-inch for proper operation.

(2) *Adjustment*. To adjust reed switch clearances, proceed as follows:
(a) Position carriage permanent magnet over the higher of the two reed switches; loosen the setscrew in the carriage frame.
(b) Position magnet to meet requirement; tighten setscrew.
(c) Position magnet over other switch; check for a switch actuation with an ohmmeter.

b. *Left-Hand Margin Reed Switch Adjustment (fig. 6-48)*

NOTE

Check reed switch clearance adjustment as described in paragraph 6-14a before performing this adjustment. Adjust if necessary.

(1) *Requirements*
(a) The left-hand margin switch must close before the crown of the space pawl and first rack tooth are in line. The switch must remain closed during left margin overtravel.
(b) The switch must be open when the carriage is one space from the left-hand margin.

(*2*) *Adjustment.* To adjust left-hand margin reed switch, proceed as follows:
(a) Connect an ohmmeter directly across switch.
(b) Loosen switch mounting screws.
(c) Position switch to meet requirements (a) and (b); tighten mounting screws.
(d) Recheck requirements.

c. *Carriage Return Reed Switch Adjustment (fig. 6-49)*

NOTE

Check reed switch clearance adjustment as described in paragraph 6-14a before performing this adjustment. Adjust if necessary.

(*1*) *Requirements*
(a) The carriage return reed switch must be open when the right-hand hammer is in the 70^{th} character position.
(b) The carriage return reed switch must be closed when the right-hand hammer is in the 72nd character position.

(*2*) *Adjustment* To adjust carriage return reed switch, proceed as follows:
(a) Place carriage in 70th character position.
(b) Connect ohmmeter across carriage return reed switch.
(c) If switch is closed, loosen switch screws and shift switch to right until switch opens; tighten screws.
(d) Place carriage in 72nd character position.

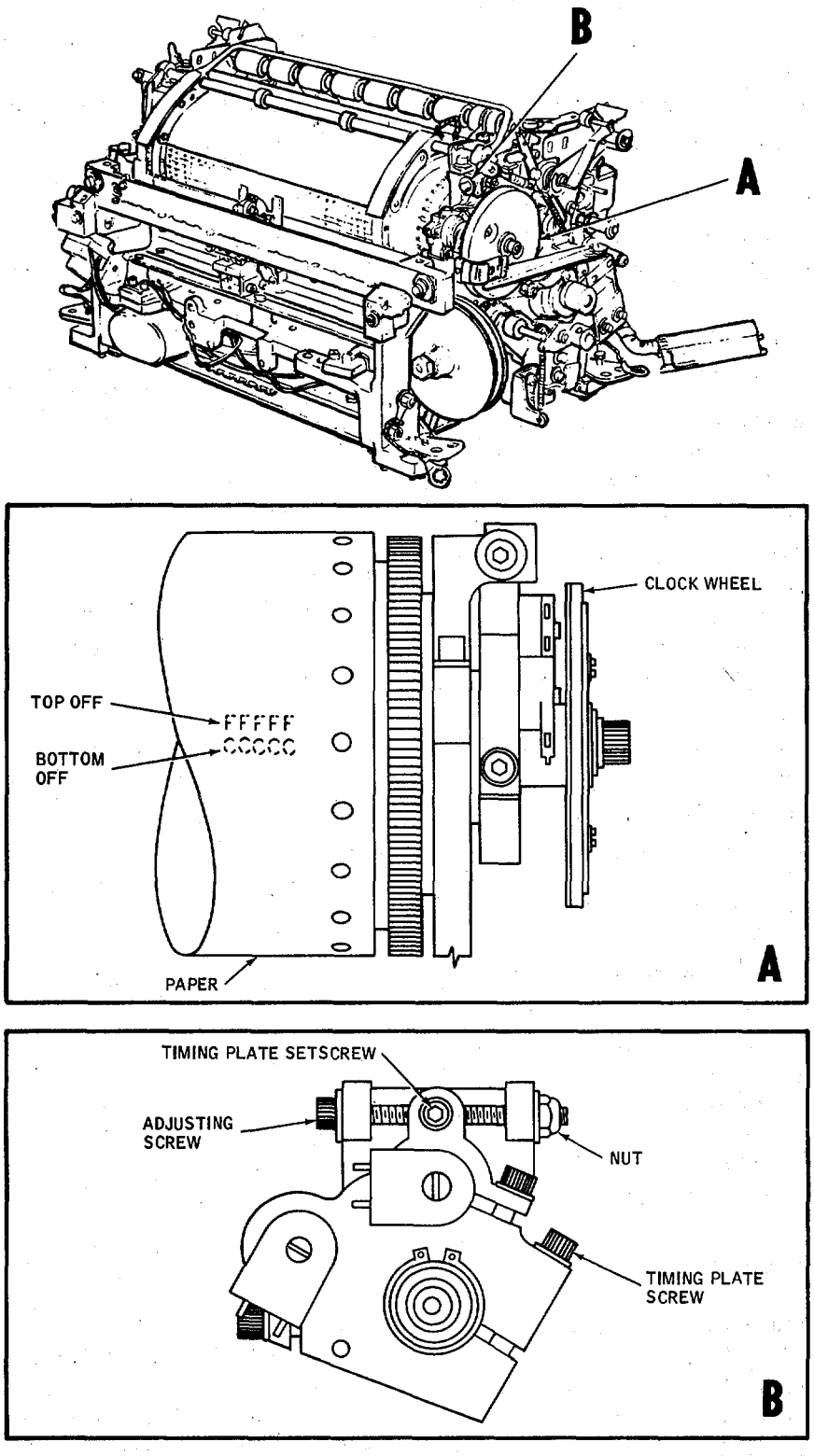

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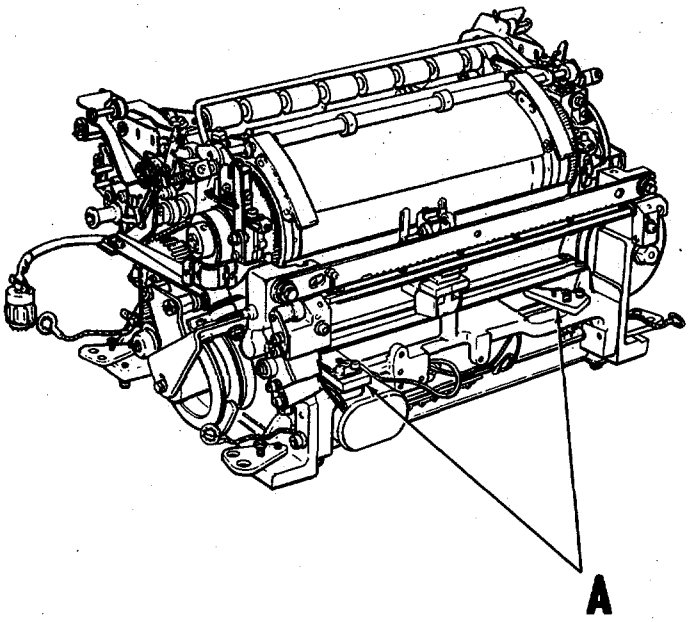
Figure 6-46. Print Character Phasing Adjustment



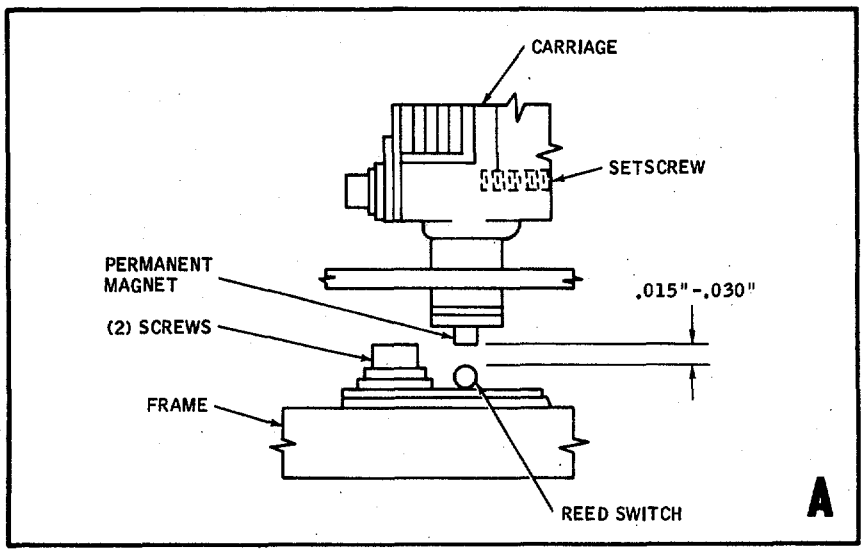


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Figure 6-47. Reed Switch Clearance Adjustment

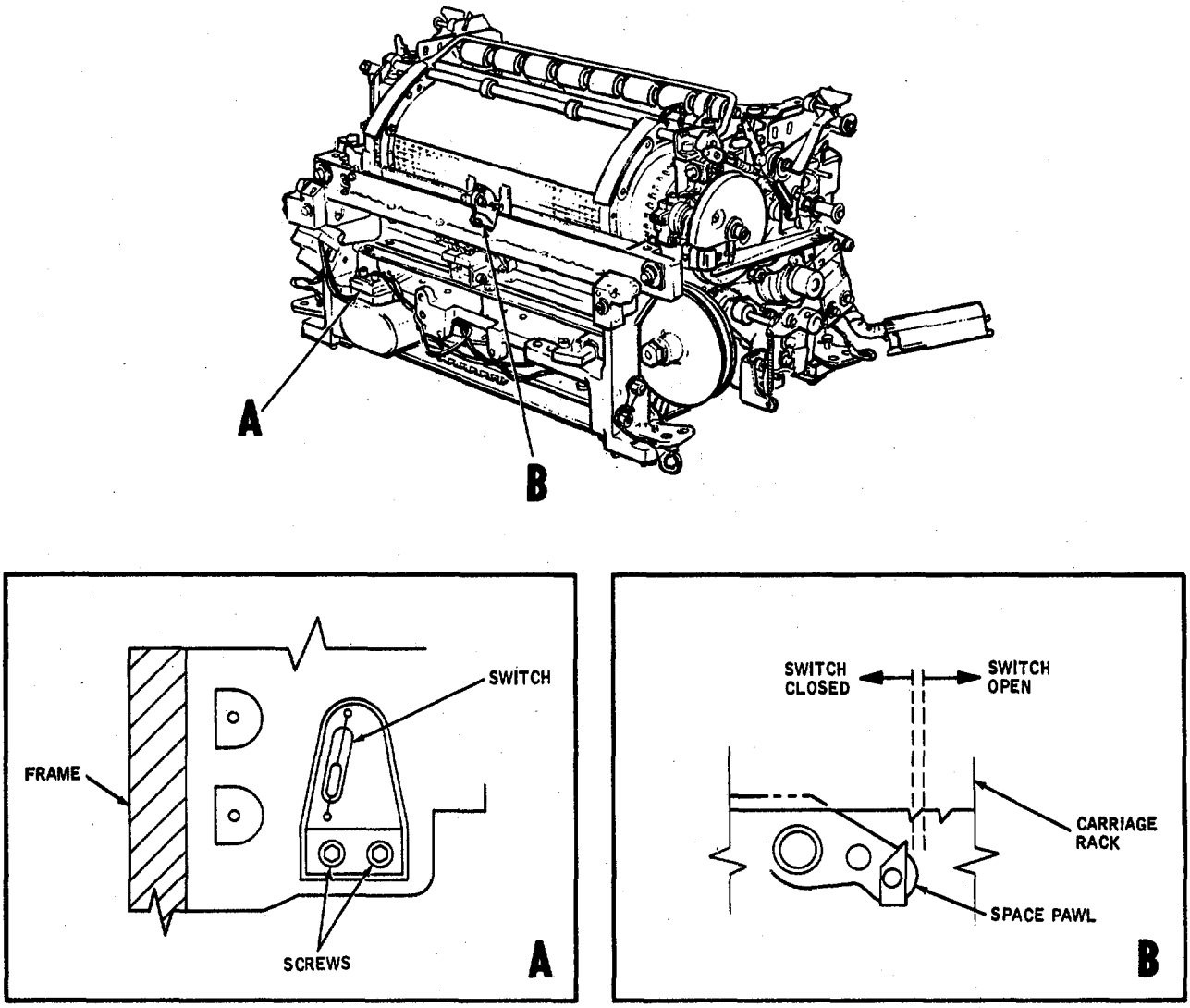

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Figure 6-48. Left-Hand Margin Reed Switch Adjustment

(e) Connect ohmmeter across carriage return reed switch.
(f) If switch is open, loosen switch screws; reposition switch until switch closes.
(g) Recheck requirements.

d. *Line Space and Carriage Return Circuit Alinement (fig. 6-50)*

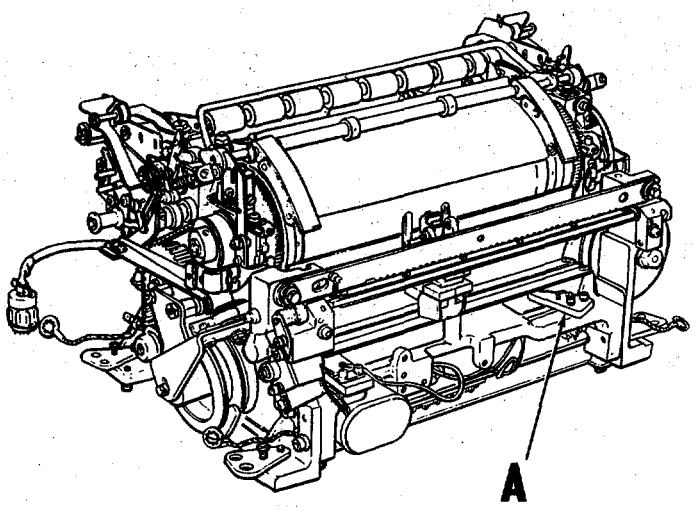
(*1*) *Requirements*

(a) The pulse width of the space drive pulse must be 5 milliseconds.
(b) The pulse width of the space inhibit pulse must be 30 milliseconds.

(2) *Alinement*. To aline the line space and carriage return circuit, proceed as follows:

(a) Set oscilloscope controls as follows:
1. VOLTS/DIV to 5.
2. TIME/DIV to 1.
3. COUPLING to DC.
4. TRIG MODE to NORM.
5. SOURCE to NORM.
6. SLOPE to +.

(b) Connect oscilloscope ground lead to test point Y on P96 printer control logic circuit card.



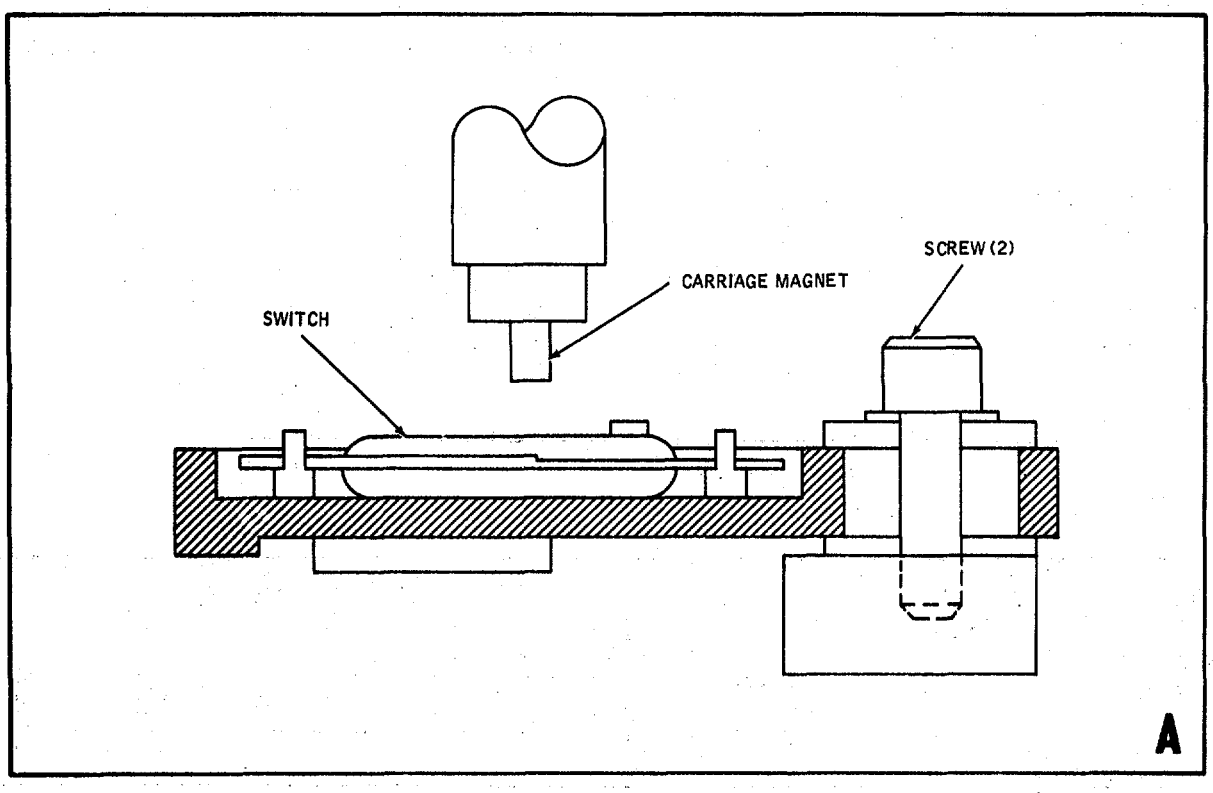


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Figure 6-49. Carriage Return Reed Switch Adjustment

(c) Connect oscilloscope vertical probe to test point AS on P96 printer control logic circuit card.
(d) Repeatedly operate space bar on keyboard to maintain trace on oscilloscope.
(e) Observe pulse width of space drive pulse. Adjust R7 as necessary to meet requirement (a).
(f) Connect oscilloscope vertical probe to test point AU on P96 printer control logic circuit card.
(g) Set oscilloscope TIME/DIV control to 10MS.
(h) Repeatedly operate space bar on keyboard to maintain trace on oscilloscope.
(i) Observe pulse width of space inhibit pulse. Adjust R6 as necessary to meet requirement (b).

6-15. Line Feed Circuit Adjustment.

a. *Requirement* The pulse width of the line feed inhibit pulse width must be 49 ± 0.5 milliseconds.
b. *Adjustment* To adjust line feed inhibit pulse width, proceed as follows:
(1) Set oscilloscope controls as follows:
(a) VOLTS/DIV to 5.
(h) TIME/DIV to 10MS.
(c) COUPLING to DC.
(d) TRIG MODE to NORM.
(e) SOURCE to NORM.
(f) SLOPE to +.

(2) Connect oscilloscope ground lead to test point Y on P96 printer control logic circuit card (fig.-50).
(3) Connect oscilloscope vertical probe to test point AP on P96 printer control logic circuit card.

CAUTION

Do not use repeated line feed position (up) of LF switch. Prolonged use may damage the line feed clutch and magnet.

(4) Press down on mode control panel LF switch. Repeat as necessary to maintain trace on oscilloscope.
(5) Observe pulse width of line feed inhibit pulse. Adjust R8 as necessary to meet the requirement.

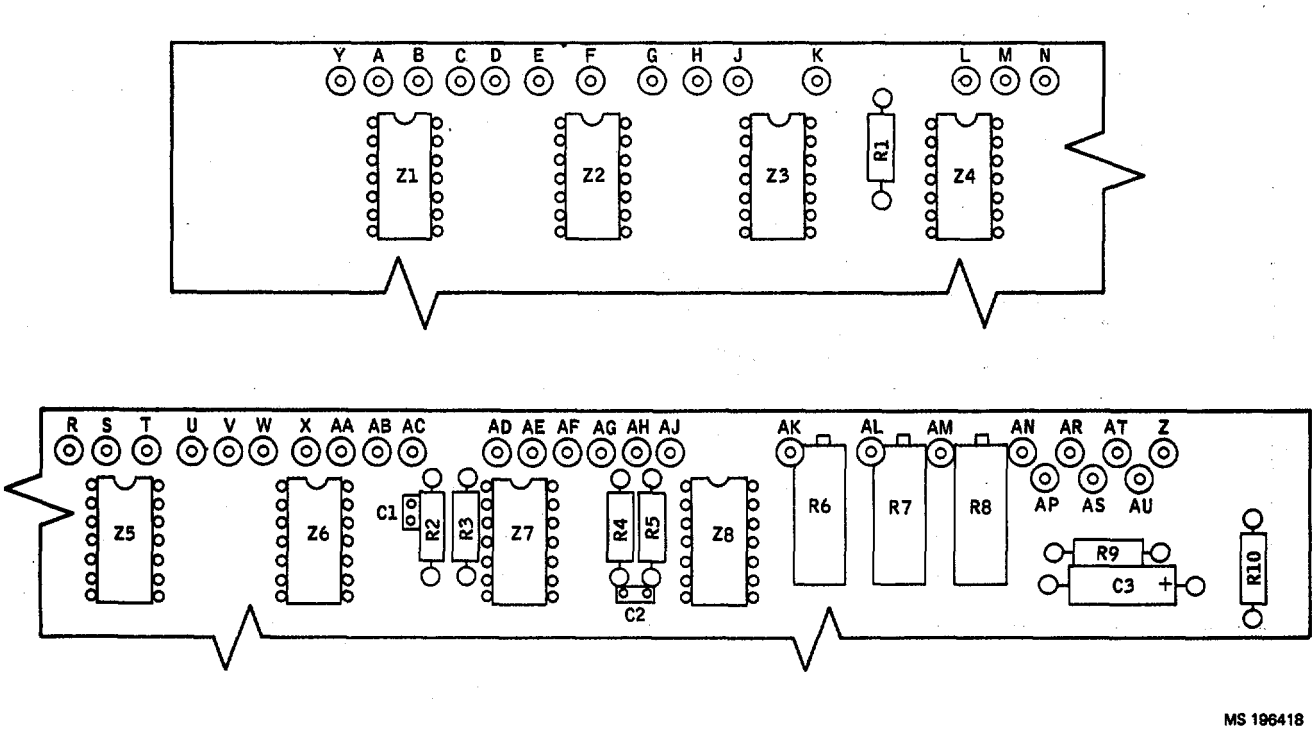

Figure 6-50. P96 Printer Control Logic Circuit Card Adjustment and Test Point Location

Section V. REMOVAL AND REPLACEMENT PROCEDURES

6-16. Scope. This section provides removal and replacement procedures for components of the printer that are the responsibility of general support maintenance personnel. The removal and replacement procedures of Chapter 5, Section V are also a part of general support maintenance.

6-17. General Removal and Replacement Procedures. The removal and replacement procedures of this section are grouped by mechanical functions. When removing and replacing components of the printer, follow the general guidelines of paragraph 5-25 and the following:

a. Do not disassemble the printer more than is necessary to effect repair.
b. If possible, have replacement parts available before removing parts that are to be replaced.
c. Avoid extended periods of time between removal and replacement.
d. Place parts in parts organizer drawers or trays in the order in which they are removed in order to avoid losses and to facilitate parts identification during replacement procedures.
e. Perform all alinement and adjustment procedures referenced in the replacement procedures.
f. Perform physical inspection and test of table 6-1 and operational test of table 6-2 after completing replacement procedures.

6-18. Removal and Replacement of Major Assemblies. These removal and replacement procedures are subdivided so as to minimize disassembly beyond that necessary to effect repair. Determine which assembly or assemblies require removal and perform only those procedures necessary to remove and replace the assembly.

a. *Removal and Replacement of Keyboard Assembly.* Refer to para 5-28 for removal and replacement of keyboard assembly.

b. *Removal and Replacement of Printer Chassis Assembly (fig. 6-51)*

(1) *Removal* To remove printer chassis assembly, proceed as follows:

(a) Open cover assembly (26).
(b) Unlatch clips to connectors P4 (16) and P7 (4); disconnect connectors.
(c) Disconnect connector P5 (6).
(d) Remove paper roll from printer chassis assembly, if installed.

CAUTION

Place printer chassis assembly on a flat clear surface on its four frame feet. Laying printer chassis assembly on any surface other than its four frame feet will result in damage to components.

(e) Remove four screws (8) and lockwashers (9) securing printer chassis assembly (11) to printer base assembly (27). Remove printer chassis assembly from printer base assembly.

(f) If maintenance is to be performed on printer chassis assembly while it is inverted or on its side, install printer chassis assembly in a maintenance frame. These procedures are given in steps (g) and (h) below.

(g) Install printer chassis assembly in maintenance frame (fig. B-6) so that front carriage feet are mounted on maintenance frame brackets closest to outside of maintenance frame (fig. 6-52).

(h) Secure printer chassis assembly to maintenance frame with four screws, lockwashers, flat washers, and nuts.

(2) *Replacement* Prior to replacement of the printer chassis assembly, perform all necessary maintenance checks and services of Chapter 5, Section II and test and adjustment procedures of Chapter 6, Section IV. To replace printer chassis assembly, proceed as follows:

(a) Remove printer chassis assembly (if installed) from maintenance frame by removing four attaching screws, lockwashers, flat washers, and nuts.

(b) Check security of wiring harness and alarm located in printer base assembly. Correct any defects prior to installing printer chassis assembly.

(c) Connect connector P4 (16) of printer base assembly to connector J4 (17), if disconnected.

(d) Install printer chassis assembly (11) in printer base assembly (27). Make certain that the four guide pins in printer base assembly aline with proper hole in mounting plates on printer chassis assembly.

(e) Install four printer chassis attaching screws (8) and lockwashers (9) so that ground lead lugs (10) will be between mounting plates and lockwashers.

(f) Connect connector P7 (4) to connector J7 (5).
(g) Connect connector P5 (6) to connector J5 (7).

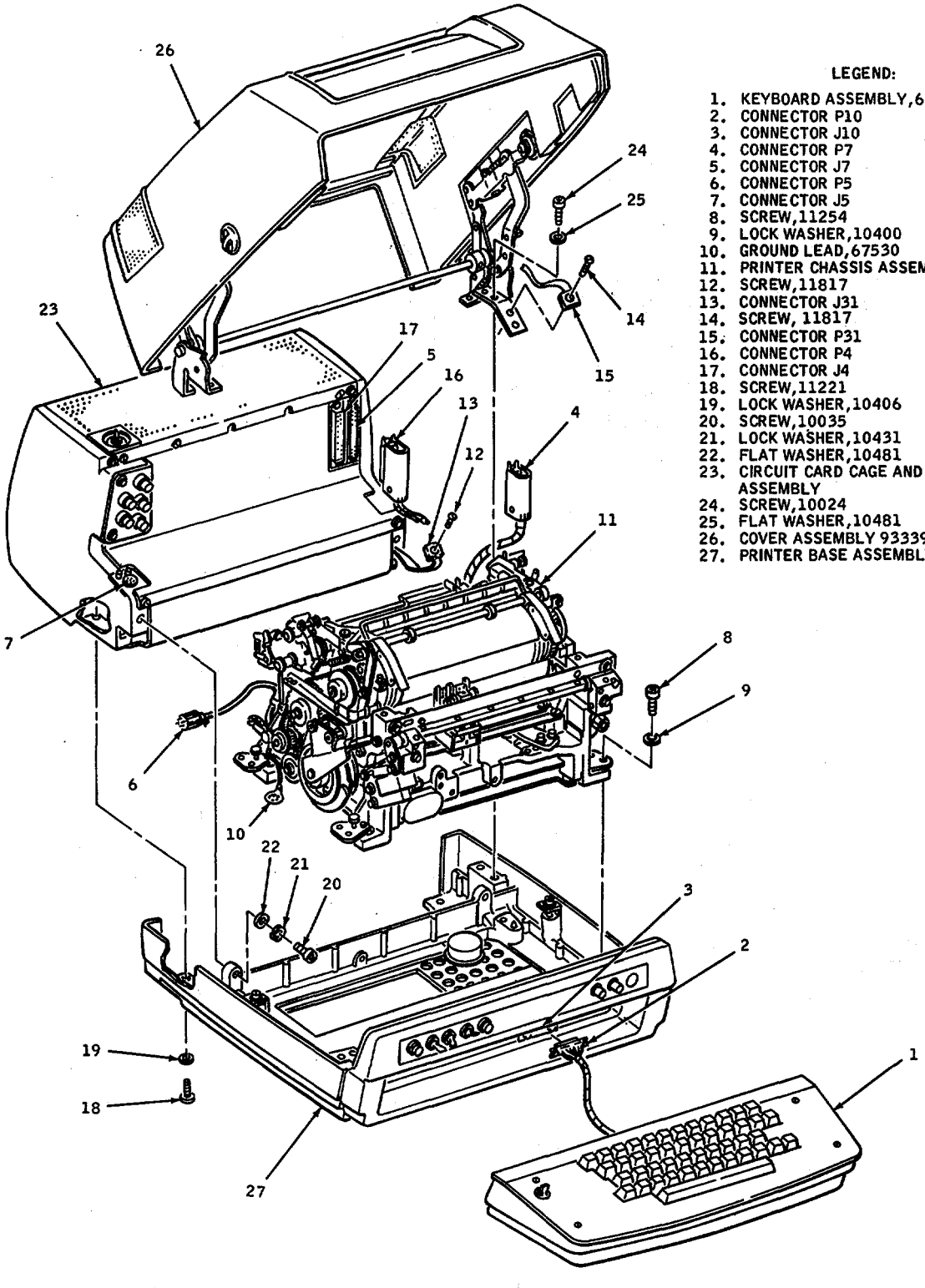

Figure 6-51. Teletypewriter, Exploded View

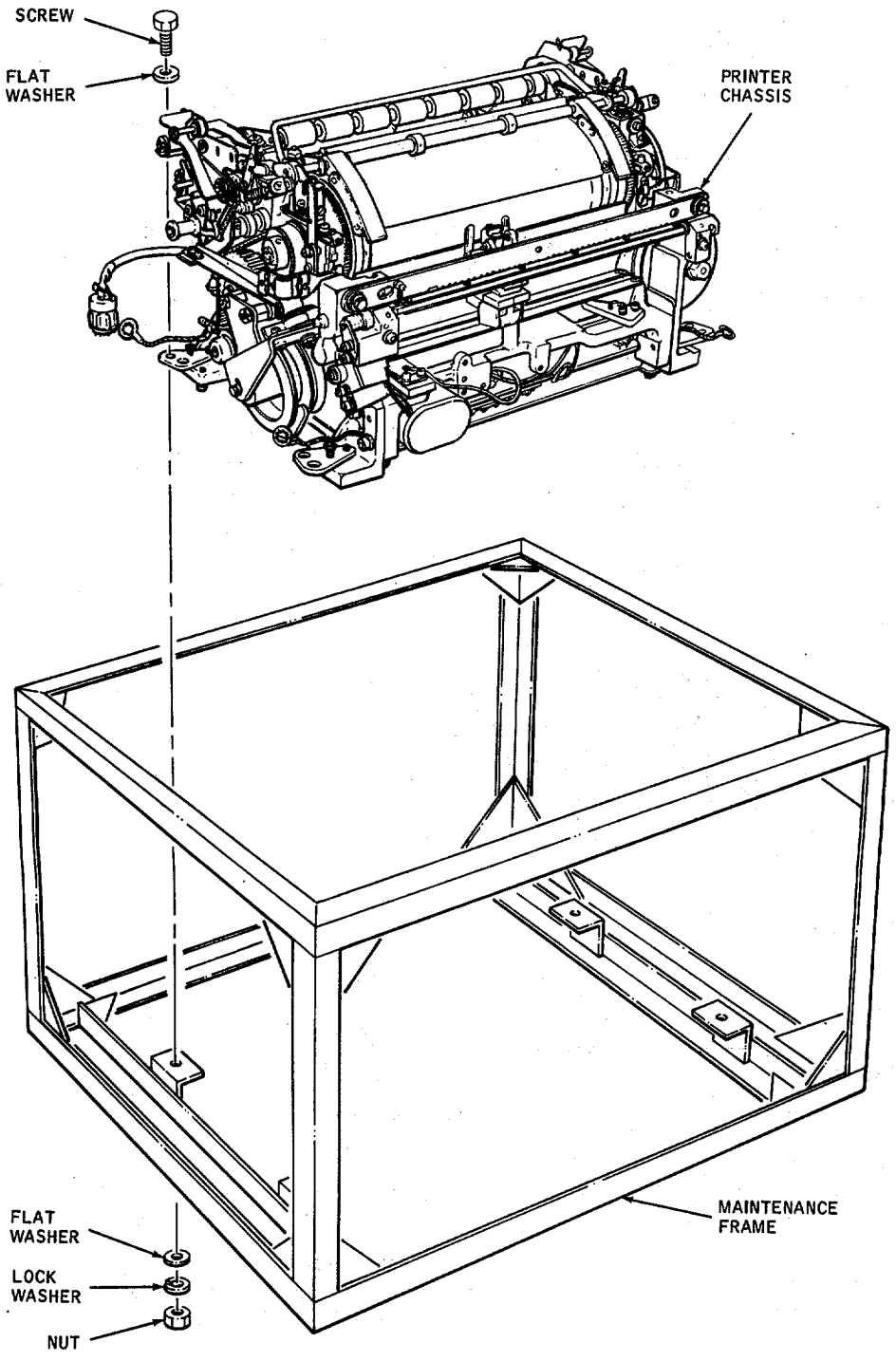

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Figure 6-52. Printer Chassis Maintenance Frame Installation

c. *Removal and Replacement of Circuit Card Cage and Power Supply Assembly (fig. 6-51)*

(1) *Removal* To remove circuit card cage and power supply assembly, proceed as follows:

NOTE

The circuit card cage and power supply assembly are not spared as an assembly. Refer to Repair Parts and Special Tools List TM 9-1430-655-24P and to the exploded view for the printer base assembly (fig. 6-69) for the assembly and piece part make-up of the circuit card cage and power supply assembly. Although it is not necessary to remove the printer chassis assembly (11) to remove the circuit card cage and power supply assembly, the equipment is easier to handle with the printer chassis removed. (Refer to paragraph 6-18b for removal of the printer chassis assembly.)

(a) Open cover assembly (26).

(b) Unlatch clips to connectors P4 (16) and P7 (4); disconnect connectors.

(c) Disconnect connector P5 (6).

(d) Remove screws (12 and 14); disconnect connector P31 (15) from connector J31 (13).

(e) If space permits, carefully push connector J31 (13) and attaching wires into circuit card cage and power supply assembly (23).

(f) Close cover assembly (26) and invert teletypewriter.

(g) Remove two hex head screws (18) and external tooth lockwashers (19) from printer base assembly (27).

(h) Invert teletypewriter and open cover assembly.

(i) Remove two screws (20), lockwashers (21), and flat washers (22) securing circuit card cage and power supply assembly to printer base assembly.

CAUTION

If connector J31 (13) and attaching wires are not clear of cover assembly mounting bracket and power supply assembly, damage will result to power supply.

(j) If connector J31 and attaching wires are trapped, lift rear of circuit card cage and power supply assembly and clear them.

(k) Lift *rear* of circuit card cage and power supply assembly; pull out and away from printer base assembly.

(2) *Replacement* To replace circuit card cage and power supply assembly, proceed as follows:

(a) Open cover assembly (26).

(b) Position circuit card cage and power supply assembly (23) in its approximate mounting position on printer base assembly. Insert connector J31 (13) into printer base assembly between cover assembly hinge rod and printer base.

(c) Tilt rear of circuit card cage and power supply assembly up and slide into mounting position in printer base assembly.

(d) Secure front of circuit card cage and power supply assembly to printer base assembly with two screws (20), lockwashers (21), and flat washers (22).

(e) Close printer cover assembly and invert teletypewriter.

(f) Secure rear base of circuit card and power supply assembly to printer base assembly with two screws (18) and lockwashers (19).

(g) Invert teletypewriter and open cover assembly.

(h) Connect connector J31 (13) to connector P31 (15).

(i) Secure connectors J31 and P31 to mounting bracket on cover assembly with screws (12) and (14).

(j) Connect connector P7 (4) to connector J7 (5). Retain connectors with connector latches.

(k) Connect connector P4 (16) to connector J4 (17). Retain connector with connector latches.

(l) Connect connector P5 (6) to connector J5 (7).

(m) If removed, install printer chassis assembly (11) in printer base assembly (27) (para 6-18b).

(n) Close printer cover.

d. *Removal and Replacement of Cover Assembly (fig. 6-51)*

(1) *Removal* To remove cover assembly, proceed as follows:

(a) Open cover assembly (26).

(b) Remove screws (12) and (14); disconnect connector P31 (15) from connector J31 (13).

(c) While supporting cover assembly, remove four screws (24) and flat washers (25). Remove cover assembly from printer base assembly.

(2) *Replacement* To replace cover assembly, proceed as follows:

(a) Thread copy lamp cable through vertical slot in cover assembly mounting bracket so that cable, when secured, will be to the inside of mounting bracket.

(b) Locate cover assembly (26) in mounting position on printer base assembly (27); secure with four screws (24) and flat washers (25). Tighten screws only enough to obtain snug fit.

NOTE

The screws securing the cover assembly are tightened during the cover adjustment procedures referenced in step (d).

(c) Connect connector P31 (15) to connector J31 (13); secure to mounting bracket with screws (14) and (12).

(d) Refer to paragraphs 5-21, 5-22, and 5-23 and adjust cover bracket, cover release knob, and cover latch.

6-19. Removal and Replacement of Power Distribution Mechanism Components. For removal and replacement purposes, the power distribution mechanism consists of motor assembly Bl, the drive belt, and the carriage return mechanism. The power shaft is also a part of the power distribution mechanism. However, for the purposes of repair, the power shaft is covered under the removal and replacement procedure for the paper handling mechanism in that removal of some paper handling mechanism components are required in order to gain access to the power shaft (para 6-20).

a. *Removal and Replacement of Motor Assembly Bl ft. 6-53)*

(1) *Removal* To remove motor assembly B1, proceed as follows:

(a) Remove printer chassis assembly from printer base assembly and install in maintenance frame (para 6-18b).

(b) Release tension on drive belt by loosening bearing assembly screw (1).

(c) Remove screw and lockwasher securing ground lead (19) to printer chassis assembly.

(d) Invert printer chassis assembly.

(e) Remove 'base frame cover (4, fig. 6-66) by removing four attaching screws (1, fig. 6-66), lock-washer (2, fig. 6-66), and flat washers (3, fig. 6-66).

(f) At terminal board TB3 (35, fig. 6-66), loosen screw, at terminals 1, 5, and 6; remove motor leads. Clear motor lead-s from any obstruction on printer chassis assembly.

(g) Place printer chassis assembly front down on work bench.

(h) Loosen two screws (13, fig. 6-53) on motor clamp (12) to release clamp compression on motor assembly (16).

(i) Remove four clamp screws (9), lock-washers (10), and flat washers (11); remove clamps (12).

(j) Carefully pull motor assembly (16) out of printer chassis assembly mounting.

NOTE

Motor assembly (16) is not spared with blower (22) or pulley (25). If motor assembly is to be replaced, these components will have to be removed and reinstalled on the replacement motor assembly.

(*2) Replacement* To replace motor assembly, proceed as follows:

(a) Install blower (22) and pulley (25) on motor assembly (16) shaft. Tighten setscrews only enough to retain parts as these components must be alined after the motor assembly is installed in the printer chassis assembly.

(b) Place motor assembly in mounting position on printer chassis assembly. Observe that collars on motor end bells aline with motor mounting brackets. If alinement is required, perform step (c). If alinement is not required, proceed to step (d).

(c) Note the degree of misalinement. Remove motor assembly from printer chassis assembly. Adjust motor mounting bracket (30) to meet requirements of step (b).

(d) Rotate motor assembly in mounting so that wire leads will reach terminals 1, 5, and 6 on terminal board TB3.

(e) Observe that ground lead will reach attaching screw on printer chassis assembly. Reposition ground lead on motor assembly, if required.

(f) After requirements of steps (d) and (e) are met, secure motor assembly to carriage chassis assembly with clamps (12), screws (9), lockwashers (10), and flat washers (11). Tighten screws (13) to obtain firm clamping action. Spin-test motor shaft; observe that there is no binding. If shaft binds, reposition motor assembly in mounting.

NOTE

With clamps tight, there should be a 3/32- to 1/8 inch clearance between clamp segments. Refer to adjustment procedures (para 5-12) to adjust clamps for proper clearance.

(g) Connect motor leads to terminal board TB3 as follows: red lead to terminal 6, blue lead to terminal 5, and yellow lead to terminal 1.

(h) Connect motor ground lead (19) to printer chassis assembly.

(i) Install base frame cover (4, fig. 6-66) on bottom of printer chassis assembly and secure with four screws (1, fig. 6-66), lockwashers (2, fig. 6-66), and flat washers (3, fig. 6-66).

(j) Loosen setscrews on pulley (25, fig. 6-53) and visually aline' pulley with rest of power train pulleys; tighten setscrews.

(k) Loosen setscrews on blower (22) and position blower on motor shaft so that there will be a 1/32- to 1/8-inch clearance between the blower and motor mounting bracket; tighten setscrews. Spin-test blower; observe that there is no binding.

(l) Place drive belt (23) on all power train pulleys so that teeth on drive belt engage teeth on each of the drive train pulleys.

(m) Take up belt slack by adjusting idler pulley bearing assembly (3). Tighten belt only enough to prevent belt slippage.

(n) Remove printer chassis from maintenance frame and install in printer base assembly (para 6-18b).

b. *Removal and Replacement of Drive Belt (fig. 6-53)*

(1) *Removal* To remove drive belt, proceed as follows:

(a) Release tension on drive belt by loosening bearing assembly screw (1).

(b) Remove tension on carriage return belt by sliding carriage assembly (79, fig. 6-57) to its mid-travel position on carriage shaft.

NOTE

If carriage assembly is to the left margin, hold carriage assembly and press space magnet armature (10, fig. 6-57). While pressing armature, slide carriage assembly into position and then release armature.

(c) Remove screw (31, fig. 6-53) and lock-washer (32).

(d) Remove two nuts (33) and lockwashers (34).

(e) Carefully remove support bracket (42) from standoff studs and swing forward.

(f) Remove two shims (35) and nuts (36).

NOTE

If nuts are stiff to turn, use a second wrench to support standoff (38) when loosening and removing nuts (36).

(g) Remove screw (54) and lockwasher (55) securing cover assembly (56) to bushing (58) and remove cover assembly and carriage return spring (59).

(h) Loosen setscrews (57) on bushing (58) and remove bushing from magnet assembly (69) shaft.

(i) Remove retaining plate (37) from stand-offs and pulley assembly (60) (with carriage return belt attached) from magnet assembly.

(j) Remove drive belt (23) from printer chassis assembly.

NOTE

If there is not sufficient space between printer chassis assembly frame and housing assembly (68) to permit removal of drive belt, temporarily remove retaining ring (64) and slide housing assembly out enough to remove drive belt.

(2) *Replacement* To replace drive belt, proceed as follows:

(a) Install drive belt (23) on drive train pulleys.

NOTE

If there is not sufficient space between printer chassis frame and housing assembly (68) to permit installation of drive belt, temporarily remove retaining ring (64) and slide housing out enough to install drive belt.

(b) Place pulley assembly (60) on magnet assembly (69) shaft.

(c) Loop retaining plate (37) hooked shaped end over pulley assembly and install on two standoffs (38). Secure retaining plate with two nuts (36).

(d) Refer to paragraph 6-10e and check carriage return armature and clutch pulley clearance. Adjust if necessary.

(e) Temporarily install bashing (58) and retain with two setscrews (57).

(f) Refer to paragraph 6-10f and check carriage return clutch pulley. Adjust if necessary.

NOTE

Carriage return spring (59), cover assembly (56), and support bracket (42) are reinstalled during the check and adjustment of step (f) above.

(g) Refer to paragraph 6-10c and check carriage return belt clearance. Adjust if necessary.

(h) Observe that drive belt (23) is on power train pulleys so that the teeth on the drive belt engage the teeth on each of the drive train pulleys.

(i) Take up belt slack by adjusting idler pulley bearing assembly (3). Tighten belt only enough to prevent belt slippage.

LEGEND:

1. SCREW, 10011
2. LOCK WASHER, 10426
3. BEARING ASSEMBLY, 66988A
4. NUT PLATE, 52073
5. SCREW, 10026
6. LOCK WASHER, 10431
7. FLAT WASHER, 10473
8. MOUNTING PLATE, 71431
9. SCREW, 10024
10. LOCK WASHER, 10431
11. FLAT WASHER, 10473
12. MOTOR CLAMP, 65666
13. SCREW, 10010 -
14. FLAT WASHER, 10454
15. NUT, 10841
16. MOTOR ASSEMBLY, 70325A
17. MOTOR, 67905
18. LOCK WASHER, 824637-6
19. GROUND LEAD, 70876A
20. LUG, 20614
21. LUG, YAEIBZ2
22. BLOWER, 71719A
23. DRIVE BELT, 65925
24. SETSCREW, 10203
25. PULLEY, 65541
26. SCREW, 10397
7. LOCK WASHER, 10431
28. FLAT WASHER, 10473
29. PLATE, 71689
30. MOTOR MOUNTING BRACKET, 65653A
31. SCREW, 11206
32. LOCK WASHER, 10429
33. NUT, 10515
34. LOCK WASHER, 10426
35. SHIM, 56398
36. NUT, 71289
37. RETAINING PLATE, 71298
38. STANDOFF, 71290
39. ARMATURE ASSEMBLY, 71286A
40. CLUTCH ARMATURE SPRING, 71294
41. SPRING RETAINER, 71292
42. SUPPORT BRACKET, 71284
43. BELT GUIDE, 71285
44. FLAT WASHER, 10459
45. LOCK WASHER, 10421
46. SCREW, 10004
47. STUD ASSEMBLY, 71291A
48. PULLEY ASSEMBLY, 71295A
49. FLAT WASHER, 71924
50. NUT, 10507
51. LOCK WASHER, 10430
52. FLAT WASHER, 10454
53. NUT PLATE, 71299A
54. SCREW, 10350
55. LOCK WASHER, 10435
56. COVER ASSEMBLY, 71297A
57. SETSCREW, 10203
58. BUSHING, 66024
59. CARRIAGE RETURN SPRING, 71293
60. PULLEY ASSEMBLY, 71249A
61. SCREW, 11708
62. FLAT WASHER, MS27183-3
63. CARRIAGE RETURN BELT, 70218A
64. RETAINING RING, 10965
65. SPACER, 70790
66. FELT WASHER, 61670
67. FLAT WASHER, 70786
68. HOUSING ASSEMBLY, 69040A
69. MAGNET ASSEMBLY, 69081A
70. SETSCREW, 10204

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Figure 6-53. Power Distribution Mechanism, Exploded View (Sheet 1 of 3)

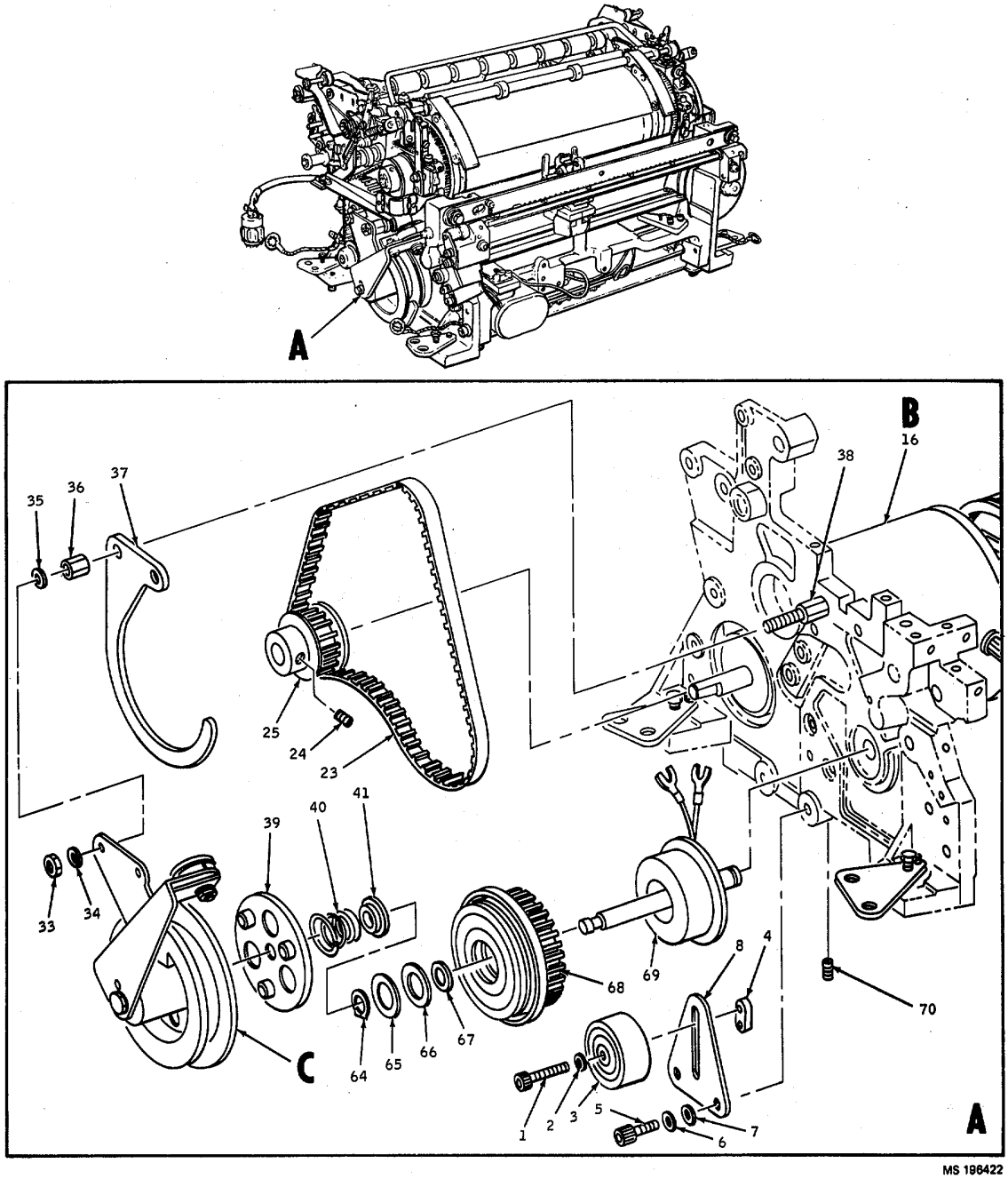


Figure 6-53. Power Distribution Mechanism, Exploded View (Sheet 2 of 3)

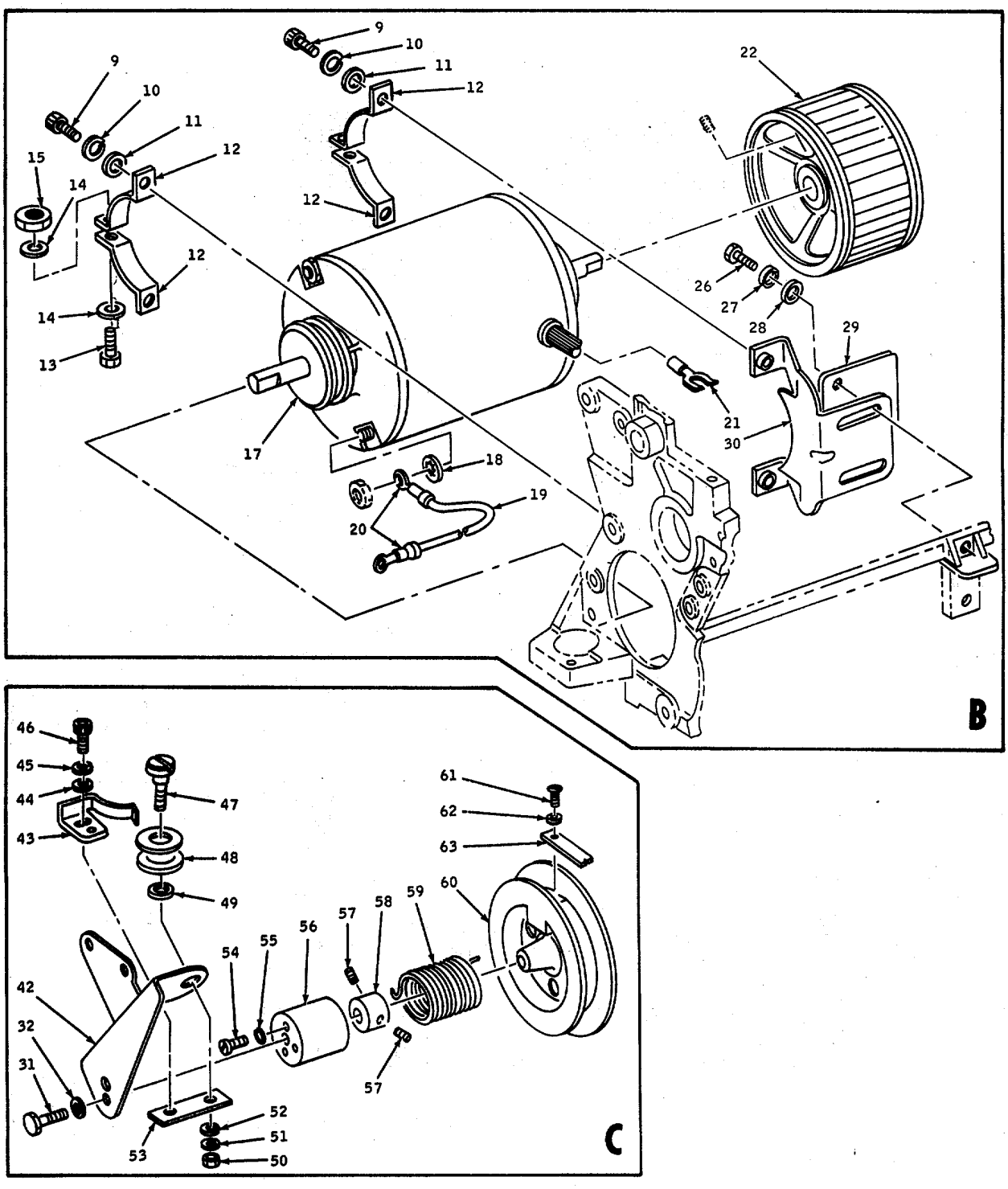


Figure 6-53. Power Distribution Mechanism, Exploded View (Sheet 3 of 3)

c. *Removal and Replacement of Carriage Return Clutch and Magnet Assembly (fig. 6-53)*

(1) *Removal*. To remove carriage return clutch and magnet assembly, proceed as follows:

(a) Remove printer chassis assembly from printer base and install in maintenance frame (para. 6-18b)

(b) Release tension on drive belt by loosening bearing assembly screw (1).

(c) Remove tension on carriage return belt by sliding carriage assembly (79, fig. 6-57) to its mid-travel position on the carriage shaft.

NOTE: If carriage assembly is to the left margin, hold carriage assembly and depress space magnet armature. While depressing armature slide carriage assembly into position and then release armature.

(d) Remove screw (31) and lockwasher (32).

(e) Remove two nuts (33) and lockwasher (34)

(f) Carefully remove support bracket (42)from standoff studs and swing forward.

(g) Remove two shims (35) and nuts (36).

NOTE: If nuts are stiff to turn, use a second wrench to back and support standoff (38) when loosening and removing nuts (36).

(h) Remove screw (54) and lockwasher (55) securing cover assembly (56) to bushing (58) and remove cover assembly and carriage return spring (59).

(i) Loosen setscrews (57) on bushing (58) and remove bushing from magnet assembly (69) shaft.

(j) Remove retaining plate (37) from standoffs and pulley assembly (60) (with carriage return belt attached) from magnet assembly.

(k) Remove armature assembly (39), clutch armature spring (40), and spring retainer (41) from magnet assembly shaft (69).

(l) Remove retaining ring (64) and remove spacer (65), felt washer (66), flat washer (67), and housing assembly (68) from magnet assembly (69).

(m) Invert printer chassis assembly and remove base frame cover (4, fig. 6-66) by removing four screws (1, fig. 6-66), lockwashers (2, fig. 6-66) and flat washers (3, fig. 6-66).

(n) Disconnect magnet assembly violet wire from terminal 2 on printer driver board assembly (9,fig. 6-66) and white wire from terminal 8.

(o) Carefully pull wires toward magnet assembly until they are clear of other wires and mechanical parts.

(p) Loosen setscrew (70) and remove magnet assembly (69) from printer chassis assembly.

(2) Replacement To replace carriage return clutch and magnet assembly, proceed as follows:

(a) Refer to table 6-13 and check compression of clutch armature spring (40) and torsion of carriage return spring (59). Replace any defective spring.

(b) Install magnet assembly (69) stud in mounting hole in printer chassis assembly. Rotate magnet assembly until wires will not chafe on carriage frame and will reach their connecting terminals on printer driver board assembly (9, fig. 6-66). Tighten magnet assembly attaching setscrew (70) securely.

CAUTION

The setscrew (70) securing magnet assembly(69) must hold the magnet assembly securely. If magnet assembly twists during a carriage return operation of the teleprinter, severe electrical and mechanical damage will result to printer.

(c) Grasp magnet assembly and firmly twist cw and ccw. Tighten setscrew further if any armature assembly turning is observed.

(d) Lay magnet assembly wires to their connecting terminals on printer driver board assembly. Connect violet wire to terminal 2 and white wire to terminal 8.

(e) Refer to paragraph 5-7 and clean loose components.

(f) Inspect felt washer (66) for oil and dirt contamination. Replace if necessary.

NOTE: Felt washer (66) is not to be lubricated.

(g) Apply a light film of general lubricating oil (NSN 9150-00-687-4241) to carriage return spring (59) and to bushings of pulley assembly (60) and housing assembly (68). Wipe off excessive oil.

(h) Install drive belt (23).

(i) Install housing assembly (68), flat washer(67), felt washer (66), and spacer (65) on magnet assembly (69) shaft. Retain parts with retaining ring (64).

(j) Install spring retainer (41), clutch armature spring (40), and armature assembly (39) on magnet assembly shaft.

(k) Place pulley assembly (60) on magnet assembly (69) shaft.

(l) Loop retaining plate (37) hooked shaped end over pulley assembly and install on two standoffs (38). Secure retaining plate with two nuts (36).
(m) Refer to paragraph 6-lOe and check carriage return armature and clutch pulley clearance. Adjust if necessary.
(n) Temporarily install bushing (58) and retain with two setscrews (57).
(o) Refer to paragraph 6-10f and check carriage return clutch pulley. Adjust if necessary.

NOTE: Carriage return spring (59), cover assembly(56) and support bracket (42) are reinstalled during the check and adjustment of step (o) above.

(p) Refer to paragraph 6-lOc and check carriage return belt clearance. Adjust if necessary.
(q) Observe that drive belt (23) is on power train pulleys so that the teeth on the drive belt engage the teeth on each of the drive train pulleys.
(r) Take up belt slack by adjusting idler pulley bearing assembly (3). Tighten belt only enough to prevent belt slippage.
(s) Remove carriage chassis assembly from maintenance frame and install in printer base (para. 6-18b).

6-20. Removal, Replacement, and Repair of Paper Handling Mechanism Components. The paper handling mechanism consists of two functional mechanisms: a paper pressure mechanism and a line feed mechanism. Also included with the paper handling mechanism is the paper trough assembly and related deflectors and plates and the power shaft. The procedures for removal and replacement of paper pressure mechanism and line feed mechanism components are subdivided so as to minimize disassembly beyond that necessary to effect repair. Determine which part or parts require replacement and perform only those procedures necessary to replace the defective parts.

NOTE: The paper guide rollers and low paper alarm assembly are a part of the paper handling mechanism. However, for the purposes of repair, these components are covered under the removal and replacement procedures for the inking ribbon mechanism in that partial removal of the inking ribbon mechanism components is required for access.

a. *Removal and Replacement of Paper Pressure Mechanism (fig. 6-54)*

(1) *Removal.* To remove paper pressure mechanism components, proceed as follows:
(a) Remove two nuts (1) from setscrews (6)and remove two flat washers (2), tension bar springs(3), and flat washers (4).
(b) Remove paper tension bar from setscrews(6).

LEGEND:
1. NUT, 10500
2. FLAT WASHER, 10472
3. TENSION BAR SPRING, 56091
4. FLAT WASHER, 10472
5. PAPER TENSION BAR, 72100
6. SETSCREW, 10239
7. NUT, 10512
8. FLAT WASHER, 10472
9. SCREW, 11500
10. LOCK WASHER, MS35333-71
11. FLAT WASHER, 10450
12. CAM FOLLOWER GUIDE BRACKET, 71304
13. GUIDE ASSEMBLY, 73420A
14. ADJUSTING LEVER SPRING ASSEMBLY, 72075A
15. SCREW, 10071
16. NUT, MS35649-245
17. INSERT, 11179
18. ADJUSTING LEVER SPRING, 70781
19. ADJUSTING LEVER, 72076
20. RETAINING RING, 11103
21. FLAT WASHER, 51408
22. LATCH SPRING, 70321 MS 196424

Figure 6-54. Paper Pressure Mechanism) Exploded View (Sheet 1 of 2)

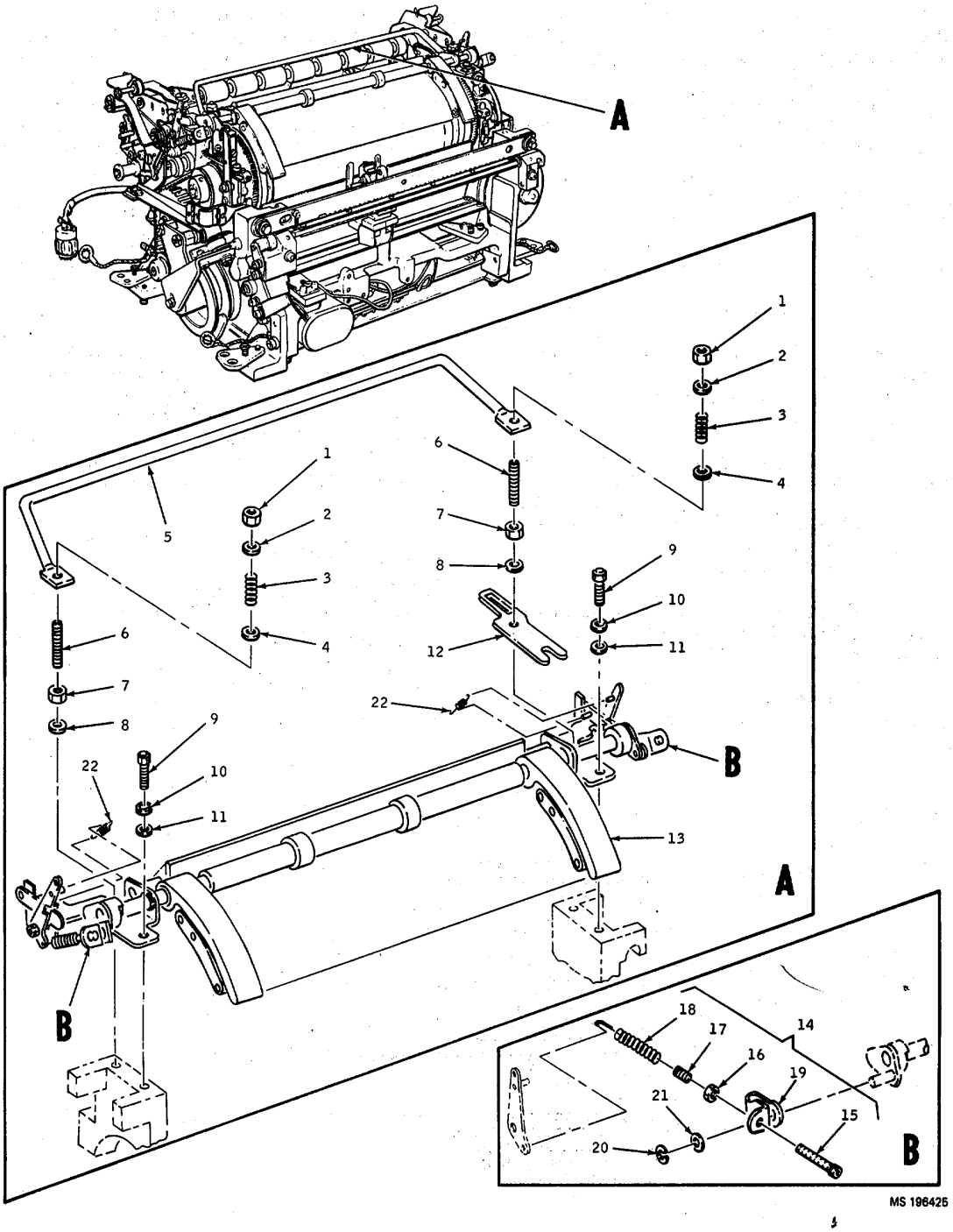


Figure 6-54. Paper Pressure Mechanism, Exploded View (Sheet 2 of 2)

(c) Remove two nuts (7) and flat washers (8) from setscrews (6).
(d) Remove two screws (9), lockwashers (10),and flat washers (11) securing guide assembly (13) to printer chassis assembly.
(e) Remove cam follower guide bracket (12) from right side setscrew (6).
(f) Remove guide assembly (13) from printer chassis assembly.

NOTE: Guide assembly (13) is not spared with adjusting lever spring assemblies (14). If guide assembly is to be replaced, the adjusting lever spring assemblies will have to be removed and reinstalled on the replacement guide assembly. To remove adjusting lever spring assemblies perform steps (g) and (h).

(g) Loosen nut (16) and back out screw (15).Remove adjusting lever spring (18).
(h) Remove retaining ring (20) and remove flat washer (21) and adjusting lever (19).

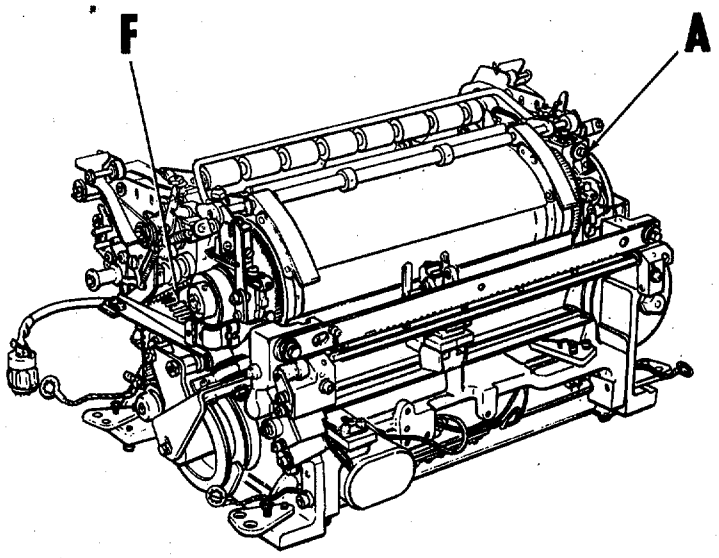
NOTE: To keep components of adjusting lever spring assembly (14) from becoming separated, reassemble screw (15), nut (16), insert (17) (if removed), adjusting lever spring (18), and adjusting lever (19).

(2) *Replacement.* To replace pressure mechanism components, proceed as follows:
(a) Install adjusting lever (19) on guide assembly (13) shaft and retain with flat washer (21) and retaining ring (20).
(b) Screw insert (17) into open end of adjusting lever spring (18), if removed during disassembly.
(c) Install hook end of adjusting lever spring in guide assembly lever eye.
(d) Thread screw (15) onto nut (16) through adjusting lever hole and into adjusting lever spring insert. Tighten screw (15) enough to obtain three to five ounces of spring tension on pressure finger. Lock screw with nut (16).
(e) Repeat steps (a) through (d) for second adjusting lever spring assembly (14). Adjust spring tension of second adjusting lever spring assembly to within 1/2 ounce of the other.
(f) Install guide assembly (13) on printer chassis assembly.
(g) Check that setscrews (6) extend 3/4 inch±1/32 inch above guide assembly mounting brackets. Adjust as necessary.
(h) Install cam follower guide bracket (12) in mounting position on right side of printer chassis assembly.
(i) Retain cam follow guide bracket and guide assembly with nut (7) and with screw (9), lockwasher (10), and flat washer (11). Tighten screw and nut only enough to retain parts.
(j) Retain left side of guide assembly with flat washer (8) and nut (7) and with screw (9), lockwasher (10) and flat washer (11). Tighten screw and nut to obtain snug fit.
(k) Position cam follower guide bracket in mounting to obtain a 0.001 inch clearance between each side of cam follower (92, fig. 6-55). Tighten attaching screws and nuts on both sides of guide assembly.
(l) Install paper tension bar (5) on printer chassis assembly followed by flat washers (4) tension bar springs (3), and flat washers (2) on both sides of paper tension bar.
(m) Thread nuts (1) onto setscrews (6). Turn nuts to compress tension bar springs to 5/32 inch ± 1/32inch.

b. *Removal and Replacement of Line Feed Magnet Assembly L5 (fig. 6-55)*
(1) *Removal*. To remove line feed magnet assembly L5, proceed as follows:
(a) Remove printer chassis assembly from printer base assembly and install in maintenance frame(para. 6-18b).
(b) Invert printer chassis assembly.
(c) Remove base frame cover (4, fig. 6-66) by removing four attaching screws (1, fig. 6-66), lock-washers (2, fig. 6-66), and flat washers (3, fig. 6-66).
(d) Disconnect magnet assembly L5 (4) violet wire from terminal 1 on printer driver board assembly (9, fig. 6-66) and white/violet wire from terminal 7. Clear magnet assembly leads from any obstruction on printer chassis assembly.
(e) Remove two screws (1), lockwashers (2),and flat washers (3) and remove magnet assembly L5 and spacers (5).

NOTE: If removal or repair of armature assembly (9) is to be performed, remove from printer chassis assembly at this time.

(2) *Replacement* To replace magnet assemblyL5, proceed as follows:
(a) Place a spacer (5) between magnet assembly L5 (4) and armature assembly (9). Secure armature assembly with screw (1), lockwasher (2), and flat washer (3). Tighten screw to obtain snug fit. Repeat procedure for second mounting screw and washer.



LEGEND:

1. SCREW, 10041
2. LOCK WASHER, 10429
3. FLAT WASHER, 10450
4. MAGNET ASSEMBLY L5, 66272A
5. SPACER, 65813
6. SCREW, 10009
7. LOCK WASHER, 10430
8. FLAT WASHER, 10463
9. ARMATURE ASSEMBLY, 68267A
10. RETAINING RING, 10960
11. LINE FEED ARMATURE SPRING, 65662
12. NUT, 10523
13. LINE FEED ARMATURE, 65640A
14. MOUNTING PLATE, 68365A
15. SCREW, 10009
16. LOCK WASHER, 10430
17. FLAT WASHER, 10467
18. CAM FOLLOWER SPRING, 72932
19. SPRING BRACKET, 72941
20. NUT, 10825
21. LOCK WASHER, 10431
22. FLAT WASHER, 10473
23. LINE FEED LINK AND DETENT LEVER ASSEMBLY, 72937A
24. SCREW, 10032
25. LOCK WASHER, 10430
26. FLAT WASHER, 50827
27. SETSCREW, 10209
28. COLLAR, 50209
29. NUT, 10513
30. LOCK WASHER, 10429
31. PIVOT STUD, 65712
32. BEARING, 10755
33. SPACER, 65959
34. LINK ASSEMBLY, 67338A
35. LINK, 67340
36. FLAT WASHER, 51552
37. SPACER, 56107
38. PIVOT STUD, 65674
39. SET SCREW, 10209
40. COLLAR, 50209
41. RETAINING RING, 12949
42. FELT WASHER, 66195
43. ROLLER, 65667
44. RETAINING RING, 12969
45. PAWL, 72933A
46. FEED PAWL SPRING, 65934
47. LEVER ASSEMBLY, 67339A
48. .FELT WASHER, 66193
49. SETSCREW, 10210
50. DETENT WHEEL, 72931
51. SCREW, 11235
52. LOCK WASHER, 10430
53. FLAT WASHER, 50827
54. SPACER, 67345
55. CAM FOLLOWER SPRING, 53139
56. RETAINING RING, 12949
57. CAM FOLLOWER, 72930
58. PLATE ASSEMBLY, 72934A
59. SCREW, 10009
60. LOCK WASHER, 10430
61. FLAT WASHER, 50827
62. PLATE ASSEMBLY, 67343A
63. SPACER, 65676MS 196426
64. RETAINING RING, 10957
65. FELT WASHER, 66194
66. RETAINING RING, 10957
67. SETSCREW, 10209
68. DRIVING GEAR, 67351A
69. PAPER FEED SHAFT, 67353
70. SCREW, 11250
71. LOCK WASHER, 10426
72. FLAT WASHER, 10463
73. BRACKET, 65919
74. BEARING, 10769
75. SCREW, 10004
76. LOCK WASHER, 10429
77. FLAT WASHER, 10450
78. SETSCREW, 10210
79. PULLEY, 72130
80. SCREW, 12393
81. LOCK WASHER, 10429
82. FLAT WASHER, 10450
83. BEARING, 10756
84. SPACER, 65534
85. POWER SHAFT, 65672
86. SETSCREW, 10209
87. SLEEVE, 71836
88. SETSCREW, 10209
89. LINE FEED CLUTCH ASSEMBLY, 72938A
90. SETSCREW, 10203
91. RATCHET ASSEMBL-, 72131A
92. CAM FOLLOWER, 71305A
93. SPACER, 72137
94. SPACER 72134
95. RIBBON FEED CLUTCH SPRING, 71327
96. GUIDE ASSEMBLY, 72115A

Figure 6-55. Paper Feed Mechanism and Power Shaft, Exploded View (Sheet 1 of 3)

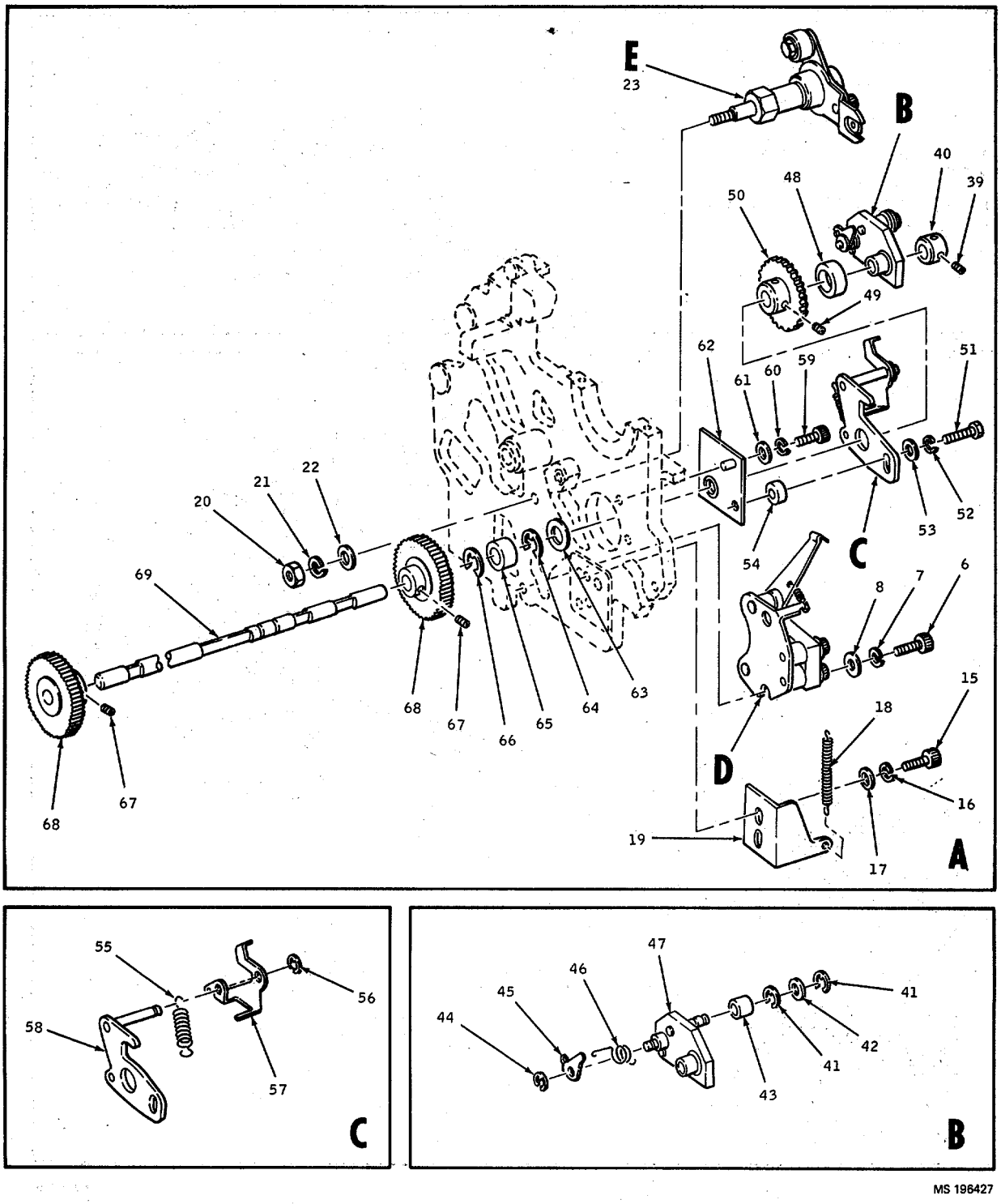


Figure 6-55. Paper Feed Mechanism and Power Shaft, Exploded View (Sheet 2 of 3)

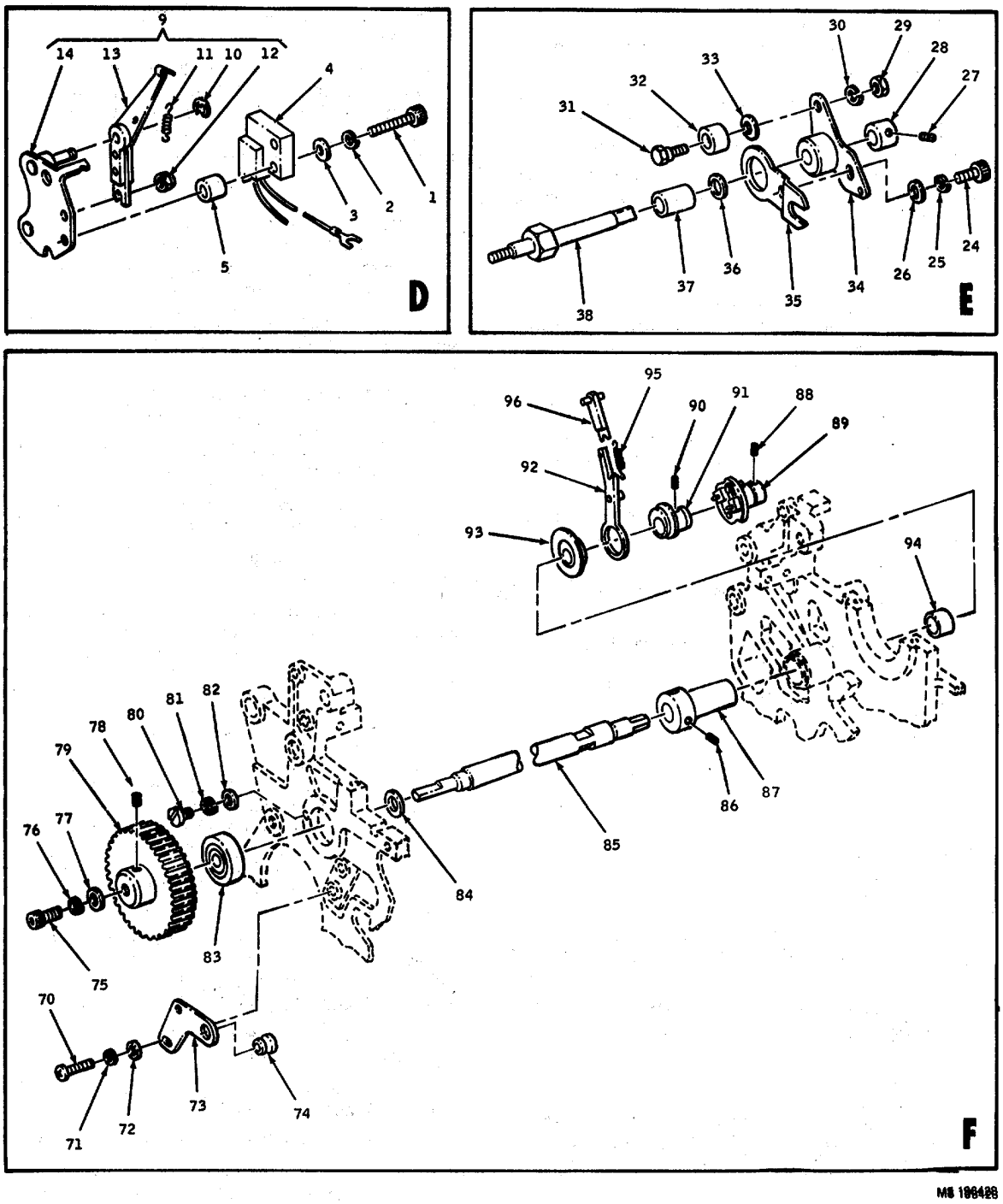


Figure 6-55. Paper Feed Mechanism and Power Shaft, Exploded View (Sheet 3 of 3)

NOTE: With armature assembly installed on printer chassis assembly, it is easier to install upper screw first.

(b) Thread magnet assembly wires through printer chassis frame and over to connecting terminals on printer driver board assembly (9, fig. 6-66).

(c) Connect violet wire to terminal 1 on printer driver board assembly and white/violet wire to terminal 7. Lay wires clear of moving parts.

(d) Refer to paragraph 6-9m and check linefeed bracket adjustment. Adjust if necessary.

(e) Adjust magnet assembly to obtain a pole to armature clearance of 0.004-to 0.010-inch as measured at the magnet coil pole face. Tighten the magnet assembly retaining screws (1).

NOTE: If armature assembly was replaced or repaired, refer to paragraph 6-9n and adjust armature stop nut clearance.

(f) Remove printer chassis from maintenance frame and install in printer base. Refer to paragraph 6-18b.

c. *Removal and Replacement of Line Feed Link and Detent Lever (fig. 6-55)*

(1) *Removal.* To remove line feed link and de-tent lever, proceed as follows:

NOTE: If pivot stud (38) is not to be replaced, repair of line feed link and detent lever assembly (23) may be accomplished without removing the entire assembly.

(a) Remove printer chassis assembly from printer base and install in maintenance frame (para. 6-18b).

(b) Remove cam follower spring (18).

(c) Remove two retaining rings (41) from lever assembly (47) and remove felt washer (42) and roller (43).

(d) Remove nut (20), lockwasher (21), and flat washer (22) and remove line feed link and detent lever assembly (23).

NOTE: To access nut (20), it may be necessary to move cable assembly (10, fig. 6-66). To move cable, loosen cable clamps (66, fig. 6-66) securing cable.

(2) *Replacement.* To replace line feed link and detent lever, proceed as follows

(a) Remove two retaining rings (41) from lever assembly (47) and remove felt washer (42) and roller (43).

(b) Install line feed link and detent lever assembly (23) in mounting hole in printer chassis assembly so that bearing (32) is positioned to roll on line feed clutch assembly cam (89) and the cutout on link (35) captures the stud on lever assembly (47).

NOTE: If cam lobe is not positioned properly to permit easy installation of line feed link and detent lever assembly, rotate power shaft until the cam is in the dwell position.

(c) Secure line feed link and detent lever assembly with nut (20), lockwasher (21), and flat washer(22).

(d) Install roller (43), retaining rings (41), and felt washer (42) on lever assembly (47).

(e) Connect cam follower spring (18) between spring bracket (19) and link (35).

(f) Refer to paragraph 5-6 and lubricate linefeed pawl and linkage and line feed cam and ratchet.

(g) Refer to paragraph 6-9j and 6-9p and adjust line feed cam.

(h) Remove carriage chassis from maintenance frame and install in printer base (para. 6-18b).

d. *Repair of Line Feed Link and Detent Lever (fig. 6-55)*

NOTE: If pivot stud, (38) is not to be replaced, repair of line feed link and detent lever assembly may be accomplished without removing the entire assembly. Refer to paragraph c above for removal and replacement procedures.

(1) *Disassembly.* To disassemble the line feed link and detent lever, proceed as follows:

(a) If line feed link and detent lever is to be repaired in place, remove cam follower spring (18).Remove two retaining rings (41) and remove felt washer (42) and roller (43) from lever assembly (47).

(b) Loosen setscrews (27) and remove collar(28) from pivot stud (38).

(c) Remove assembly of bearing (32) link assembly (34) and link (35) from pivot stud.

(d) Remove flat washer (36) and spacer (37)from pivot stud.

(e) Remove link (35) from link assembly (34)by removing screw (24), lockwasher (25), and flat washer (26).

(f) Remove roller from link assembly by removing nut (29), lockwasher (30), and pivot stud (31).

(2) *Reassembly.* To reassemble line feed link and detent lever, proceed as follows:

(a) Preassemble bearing (32) on link assembly (34) by placing spacer (33) and bearing on inside link assembly. Retain parts with pivot stud (31), lockwasher (30), and nut (29).

(b) Preassemble link (35) on link assembly. Retain link with screw (24), lockwasher (25), and flat washer (26).

(c) Install spacer (37) and flat washer (36) on pivot stud (38).

(d) Install assembly of link assembly (34), link(35) and bearing (32) on pivot stud.

NOTE: If line feed link and detent lever is being repaired while installed on printer chassis assembly, refer to paragraph 6-20c(2) and perform steps (a), (b), and (d). After installation, perform step (e) below.

(e) Install collar (28) on pivot stud. Set end play of line feed cam to 0.005- to 0.010-inch and tighten setscrews (27).

NOTE: If line feed link and detent lever is repaired while installed on carriage chassis assembly, perform steps (d), (e), and (f) of paragraph 6-20c (2).

(f) Connect cam follower spring (18) between link assembly (34) and spring bracket (19).

e. *Removal and Replacement of Feed Pawl Bail and Detent Cam Follower (fig. 6-55)*

NOTE: Components of the feed pawl bail assembly are shown in detail B. Components of the detent cam follower are shown in detail C. Neither the feed pawl bail assembly nor the detent cam follower is spared as an assembly. If replacement is necessary, order all parts shown in detail B or C separately, or as required to effect repair.

(1) *Removal.* To remove feed pawl bail assembly, proceed as follows:

(a) Remove assembly of bearing (32), link assembly (34) and link (35) from pivot stud (38). Refer to paragraph 6-20d(1) above, steps (a), (b), and (c).

(b) Loosen setscrews (39) and remove collar(40).

(c) Remove feed pawl bail (detail B) and felt washer (48).

NOTE: Disassemble feed pawl bail only enough to effect repair.

(d) Loosen setscrews (49) and remove detent wheel (50).

(e) Remove slotted hex-head screw (51), lockwasher (52), flat washer (53), and spacer (54) and remove detent cam follower (detail C).

NOTE: Disassemble detent cam follower only enough to effect repair.

(2) *Replacement.* To replace feed pawl bail and detent cam follower, proceed as follows:

(a) Refer to paragraph 6-9h and check alignment of paper feed shaft and drive gears. Adjust if necessary.

(b) Install detent cam follower (detail C) on paper feed shaft so that follower arm rests on cam.

(c) Place spacer (54) between detent cam follower and plate assembly (62) and retain parts with screw (51), lockwasher (52) and flat washer (53).Tighten screw snug tight

(d) Install detent wheel (50) on paper feed shaft with shoulder toward printer chassis. Position detent wheel on paper feed shaft so that wheel is between plate assembly (58) and detent arm of cam follower (57). Observe that there is no binding of detent wheel. Tighten setscrews (49).

NOTE: If detent wheel does not clear detent arm of cam follower, rotate power shaft until cam follower is in dwell position.

(e) Install felt washer (48) and feed pawl bail (detail B) on paper feed shaft. Position feed pawl bail so that pawl (45) fully engages a tooth in the detent wheel. Retain parts with collar (40). Tighten setscrews (39).

(f) Remove two retaining rings (41) from lever assembly (47) and remove felt washer (42) and roller (43), if installed.

(g) Install assembly of bearing (32), link assembly (34), and link (35) on pivot stud (38), so that bearing (32) is positioned to roll on line feed clutch assembly cam (89) and the cutout on link (35) captures the stud on lever assembly (47).

NOTE: If cam lobe is not positioned properly to permit easy installation of line feed link and detent lever assembly, rotate power shaft until the cam is in the dwell position.

(h) Install roller (43), retaining rings (41), and felt washer (42) on lever assembly (47).
(i) Connect cam follower spring (18) between spring bracket (19) and link assembly (34).
(j) Refer to paragraph 5-6 and lubricate line feed pawl and linkage and line feed cam and ratchet.
(k) Refer to paragraph 6-9j and 6-9p and adjust line feed cam.

f. *Removal and Replacement of Paper Feed Shaft Drive Train Components (fig. 6-55)*

NOTE: Removal of paper feed shaft drive train components requires major disassembly of carriage chassis assembly components to gain access to parts. Determine that parts replacement is absolutely required before attempting removal procedures. If repair is limited to replacement of either right or left side bearings, refer to paragraphs 6-20gand 6-20h.

(1) *Removal.* To remove paper feed drive train components, proceed as follows:
(a) Remove carriage chassis assembly from printer base and install in maintenance frame (para. 6-18b).
(b) Remove paper pressure mechanism (para. 6-20a).
(c) Remove print drum and timing mechanism(para. 6-21h).
(d) Remove paper trough assembly (para. 6-20h).
(e) Remove feed pawl bail and detent cam follower (para. 6-20e).
(f) Remove right side paper shaft bearing(para. 6-20g).
(g) Loosen setscrews (67) on both driving gears (68).
(h) Slide paper feed shaft (69) out through right side of carriage chassis assembly. While sliding paper feed shaft out of chassis, remove driving gears (68).
(i) Remove left side paper shaft bearing (para. 6-20h).

NOTE: While paper feed shaft drive train components are removed, inspect, clean and lubricate component of the carriage chassis assembly not accessible with drive train components installed. Refer to Chapter 5, Section II.

(2) *Replacement.* To replace paper feed drive train components, proceed as follows:
(a) Install left side paper shaft bearing (para. 6-20h).
(b) Install felt washer (65) on paper feed shaft (69) and retain with retaining rings (64 and 66). Do not lubricate felt washer at this time.
(c) Insert paper feed shaft (69) into printer chassis from right side of frame.
(d) Install both driving gears (68) on paper feed shaft. Orient driving wheels so that the wheel collars will face to the inside of the printer chassis assembly. Do not tighten driving wheel setscrews.
(e) Apply a light film of lubricating oil (NSN9150-00-687-4241) to bore of bearing (74).
(f) Insert left end of paper feed shaft into bearing bore.
(g) Saturate felt washer (65) with lubricating oil (NSN 9150-00-687-4241).
(h) Install spacer (63) on right side of paper feed shaft.
(i) Install right side paper shaft bearing (para. 6-20g).
(j) Laterally position driving gears (68) on paper feed shaft so that they will engage print drum gears. Do not tighten setscrews.
(k) Temporarily place print drum in printer chassis assembly. Laterally reposition driving gears to align at least 90 percent with print drum gears.
(l) Remove print drum and tighten both driving gear setscrews.

NOTE: The lateral adjustment of the driving gears will have to be rechecked after final installation of the print drum.

(m) Install paper trough assembly (para. 6-20h).
(n) Install print drum and timing mechanism(para. 6-21h).
(o) Install paper pressure mechanism (para6-20a).
(p) Install feed pawl bail and detent cam follower (para. 6-20e).

NOTE: The procedure for installing the feed pawl bail and detent cam follower includes procedures for installing the line feed link and detent lever.

(q) Remove printer chassis assembly from maintenance frame and install in printer base (para6-18b).

g. Removal and Replacement of Right Hand Paper Feed Shaft Bearing (fig. 6-55)

(1) *Removal.* To remove right hand paper feed shaft bearing, proceed as follows:

(a) Remove feed pawl bail and detent cam follower (para. 6-20e).

(b) Remove screw (59), lockwasher (60) and flat washer (61) attaching plate assembly (62) to printer. chassis assembly.

CAUTION

Press plate assembly (62) off of line feed shaft. Do not jerk plate assembly to break bearing friction lock on line feed shaft as damage to the timing plate will result.

(c) Press plate assembly (62) away from printer chassis assembly enough to clear carriage feed drum mounting bracket.

(d) Rotate plate assembly counterclockwise until the right side of plate assembly is up.

(e) Observe that plate assembly will clear timing plate and remove plate assembly from line feed shaft.

NOTE: The bearing in plate assembly (62) is not spared as a separate part. If replacement is required, replace entire plate assembly.

(2) *Replacement.* To replace right hand linefeed shaft bearing, proceed as follows:

(a) Saturate felt washer (65) with lubricating oil (NSN 9150-00-687-4241).

(b) Install plate assembly (62) on line feed shaft. Rotate plate assembly so that right side of plate assembly is up.

(c) While observing clearance between plate assembly and timing plate, press plate assembly to a position between the timing plate and printer chassis frame.

(d) Rotate plate assembly clockwise to its mounting position (approximately 90 degrees) and press into place.

(e) Install screw (59), lockwasher (60), and flat washer (61). Tighten screw only enough to retain plate assembly.

(f) Install detent cam follower (detail C) on paper feed shaft so that follower arm rests on cam.

(g) Place spacer (54) between detent cam follower and plate assembly and retain parts with screw (51), lockwasher (52), and flat washer (53). Tighten screw only enough to retain parts.(h) Align driving gears (para. 6-9h).

(i) Install assembly of bearing (32), link assembly (34), and link (35) on pivot stud (38). Refer to paragraph 6-20e(2), steps (g) through (k).

h. *Removal and Replacement of Left Hand Paper Feed Shaft Bearing (fig. 6-55)*

(1) *Removal.* To remove left hand paper feed shaft bearing, proceed as follows:

(a) Release tension on drive belt by loosening bearing assembly screw (1, fig. 6-53).

(b) Remove screw (75), lockwasher (76), and flat washer (77) from power shaft (85).

(c) Loosen setscrews (78) and remove pulley (79).

(d) Remove two screws (70), lockwashers (71), and flat washers (72) securing bracket (73) to printer chassis assembly.

(e) Carefully remove bracket (73) and bearing from paper feed shaft (69).

(2) *Replacement.* To replace left hand paper feed shaft bearing, proceed as follows:

(a) Press replacement bearing (74) into mounting hole in bracket (73) as shown in figure 6-55.

(b) Apply a light film of lubricating oil (NSN U9150-00-687-4241) to bore of bearing

(c) Install assembly of bearing and bracket on paper feed shaft (69).

(d) Secure assembly of bearing bracket to printer chassis assembly with two screws (70), lockwashers (71), and flat washers (72). Tighten screws snug tight

(e) Align driving gears (para. 6-9h).

(f) Install pulley (79) on power shaft. Align setscrews with shaft flats. Do not tighten setscrews.

(g) Install screw (75), lockwasher (76), and flat washer (77) on end of power shaft. Tighten screw enough to remove shaft end play.

NOTE: Do not mistake bearing movement with shaft end play.

(h) Tighten setscrews (78).
(i) Loop drive belt around drive train. Observe that drive belt teeth engage the teeth on each of the drive train pulleys.
(j) Take up belt slack by adjusting idler pulley bearing (3, fig. 6-53). Tighten belt only enough to prevent belt slippage.

i. *Removal and Replacement of Line Feed Clutch Assembly and Ratchet Assembly (fig. 6-55)*

(1) *Removal.* To remove line feed clutch assembly and ratchet assembly, proceed as follows:
(a) Remove printer chassis assembly from printer base and install maintenance frame (para. 6-18b).
(b) Remove feed pawl bail and detent cam follower (para. 6-20e).
(c) Loosen setscrews (88) and remove line feed clutch assembly (89) from power shaft (85).
(d) Loosen setscrews (90) and remove ratchet assembly (91) from power shaft.

NOTE: While line feed clutch assembly and ratchet assembly are removed from power shaft, inspect, clean, and lubricate line feed clutch assembly, ratchet assembly, and cam follower (92). Refer to Chapter 5, Section II.

(2) *Replacement.* To replace line feed clutch assembly and ratchet assembly, proceed as follows:
(a) Preassemble line feed clutch assembly (89) and ratchet assembly (91).
(b) Turn line feed clutch assembly on ratchet assembly so that setscrews on both assemblies area lined with one another and install assembly on power shaft.

NOTE: If line feed clutch assembly stop plate does not clear armature assembly (9), press pole side of armature assembly to lift cam follower side to obtain necessary clearance.

(c) Insert cam of ratchet assembly into base of cam follower (92).
(d) While holding line feed clutch assembly and ratchet assembly to prevent rotation, rotate power shaft to align shaft flats with line feed clutch assembly and ratchet assembly
(e) Laterally position line feed clutch assembly and ratchet assembly on power shaft to obtain snug fit (without binding) with cam follower. Tighten one setscrew only on line feed clutch and on ratchet assembly.
(f) Align bearing sleeve and ribbon feed lever (para. 6-8c).
(g) Tighten both line feed clutch and ratchet assembly setscrews
(h) Install feed pawl bail and detent cam follower (para. 6-20c).
(i) Adjust line feed bracket (para. 6-9m).
(j) Remove printer chassis assembly from maintenance frame and install in printer base (para. 6-18b).

j. *Removal and Replacement of Power Shaft (fig. 6-55)*

(1) *Removal.* To remove power shaft, proceed as follows:
a) Remove printer chassis from printer base and install in maintenance frame (para. 6-18b).
(b) Remove line feed clutch assembly and ratchet assembly (para. 6-20i).
(c) Release tension on drive belt by loosening bearing assembly screw (1, fig. 6-53).
(d) Remove screw (75), lockwasher (76), and flat washer (77) from power shaft (85).
(e) Loosen setscrews (78) and remove pulley (79).
(f) Remove bearing retaining screws (80), lockwashers (81), and flat washer (82).

NOTE: If cam follower (92) or guide assembly (96) are to be replaced, perform steps (g), (h), and (i). If only removal of the power shaft is required, proceed to step (j).

(g) Remove ribbon feed clutch spring (95) connected between guide assembly (96) and cam follower (92).
(h) Loosen screw (9, fig. 6-54) and nut (7, fig.6-54) securing cam follower guide bracket (12, fig.6-54).
(i) Disengage pin of guide assembly (96, fig. 6-55) from ribbon feed clutch assembly (45, fig. 6-61) and remove guide assembly and can follower from printer chassis assembly
(j) Loosen setscrews (86) securing sleeve (87) to power shaft.
(k) Press power shaft out through left side of printer chassis assembly.

(l) Remove bearing (83), spacer (84), and sleeve (87) from power shaft.
(m) Remove spacers (93 and 94) from right side of printer chassis frame.

(2) *Replacement.* To replace power shaft, proceed as follows:

NOTE: If cam follower (92) and guide assembly (96) were removed, perform steps (a), (b), and (c). If they were not removed, proceed to step (d).

(a) Apply a film of grease (NSN 9150-00-985-7247) to contacting surfaces of guide assembly (96) and cam follower (92).
(b) Install guide assembly (96) on cam follower (92) so that the pin on the guide assembly is in the crouch of the cam follower and the cut out captures the cam assembly spring post.
(c) Connect ribbon feed clutch spring (95) between pin on guide assembly and spring post on cam assembly.
(d) Coat pivot hole of ribbon feed clutch assembly (45, fig. 6-61) with grease (NSN 9150-00-985-7247).
(e) Insert lever of cam follower in guide bracket (12, fig. 6-54) and carefully insert pin of guide assembly (96) into pivot hole of ribbon feed clutch assembly (45, fig. 6-61).
(f) Install spacer (84) and bearing (83) on power shaft (85).
(g) Install spacer (94) and sleeve (87) in mounting hole on right side of printer chassis assembly frame.
(h) Apply a light film of grease (NSN 9150-00-985-7247) to bore of bearing and spacer.
(i) Install power shaft in printer chassis assembly from left side. Push shaft through bore in sleeve (87) and partially out through right side of printer chassis assembly frame.
(j) Apply a coat of grease (NSN 9150-00-985-7247) to spacer (93) and install spacer on power shaft.
(k) Apply a coat of grease (NSN 9150-00-985-7247) on contacting surfaces of cam follower (92) and install cam follower on power shaft.
(l) Rotate power shaft on sleeve (87) to align shaft flats with sleeve setscrews.
(m) While pressing on spacer (93) to retain parts, press on bearing (83) to complete lateral installation of power shaft.
(n) Secure bearing to printer chassis assembly frame with screws (80), lockwashers (81), and flat washers (82).
(o) Install pulley (79) on power shaft. Align setscrews with shaft flats. Do not tighten setscrews.
(p) Install screw (75), lockwasher (76), and flat washer (77) on end of power shaft. Tighten screw enough to remove shaft end play.

NOTE: Do not mistake bearing movement with shaft end play.

(q) Tighten setscrews (78).
(r) Tighten setscrews (86).
(s) Loop drive belt around drive train. Observe that drive belt teeth engage the teeth on each of the drive train pulleys.
(t) Take up belt slack by adjusting idler pulley bearing (3, fig. 6-53). Tighten belt only enough to prevent belt slippage.
(u) Install line feed clutch assembly and ratchet assembly (para. 6-20i).
(v) Remove printer chassis assembly from maintenance frame, and install in printer base (para. 6-18b).

k. *Removal and Replacement of Paper Trough and Deflectors (fig. 6-56)*

(1) *Removal*. To remove paper trough and deflectors, proceed as follows:

(a) Remove printer chassis assembly from printer base and install in maintenance frame (para. 6-18b).
(b) Remove paper pressure mechanism (para. 6-20a).
(c) Remove print drum and timing mechanism (para. 6-21h).
(d) Free ground lead (8) by removing screw (6), lockwasher (7) and flat washer (9).
(e) Disconnect pressure selector spring (1).
(f) Disconnect both trough assembly springs (17) and remove assembly of paper trough assembly (35) and deflector assembly (42).
(g) Separate paper trough assembly from deflector assembly by disconnecting deflector assembly springs (43).
(h) Remove screws (27 and 29) and lockwashers (28 and 30) securing connectors P27 and J27 to carriage plate assembly (48). Disconnect connectors.
(i) Unclamp carriage assembly cable (18, fig. 658) by removing screw (31), flat washer (32), and lockwasher (34).
(j) Remove carriage plate (48) from carriage chassis assembly by removing screws (18 and 23), lockwashers (19 and 24), and flat washers (20 and 25).

NOTE: While paper trough and deflectors are removed, inspect, clean, and lubricate components of carriage chassis assembly not accessible with components installed. Refer to Chapter 5, Section II.

(2) *Replacement* To replace paper trough and deflectors, proceed as follows:

(a) Install carriage plate assembly (48) in carriage chassis assembly and secure left side with screw (23), lockwasher (24), and flat washer (25).

(b) Clip cable clamp (21) on wires of connector P27 and place clamp in mounting position on right hand bracket (22). Secure cable clamp and right side of carriage plate assembly to carriage chassis assembly with screw (18), lockwasher (19), and flat washer (20).

(c) Clip cable clamp (33) to carriage assembly cable (18, fig. 6-58). Place flat washer (32) on screw (31) in insert into screw hole in cable clamp. Place cable ground lead lug and lockwasher (34) on screw (31) and install component on carriage plate assembly.

(d) Install ground lead (8) on paper trough assembly (35) so that the ground lead runs toward the center and is parallel to top of the paper trough. Attach ground lead with screw (16), lockwashers (14 and 15),and nut (13).

(e) Preassemble deflector assembly (42) and paper trough assembly (35). Retain parts by installing two deflector assembly springs (43).

(f) Install a trough assembly spring (17) on each side of paper trough assembly.

(g) Install assembly of deflector assembly and paper trough assembly in printer chassis assembly. Observe that rim of paper trough assembly is located in the slot of stud (47) and in both nylon bearings (44).

(h) Connect trough assembly spring ends to right hand bracket (22) and left hand bracket (26).

(i) Connect ground lead (8) to printer chassis assembly frame with screw (6), lockwasher (7), and flat washer (9).

(j) Connect pressure selector spring (1) between pressure selector lever (41) and stud (2).

(k) Install print drum and timing mechanism (para. 6-21h).

(l) Install paper pressure mechanism (para. 6-20a).

(m) Adjust paper trough assembly (para. 5-15).

(n) Adjust paper pressure mechanism (para. 6-9e).

(o) Remove printer chassis assembly from maintenance frame and install in printer base (para. 6-18b).

LEGEND:

1. PRESSURE SELECTOR SPRING, 69500
2. STUD, 50649
3. SCREW, 12375
4. LOCK WASHER, 10432
5. COMB, 69425
6. SCREW, 10092
7. LOCK WASHER, 10404
8. GROUND LEAD, 70719A
9. FLAT WASHER, 10454
10. SCREW, 10399
11. LOCK WASHER, 10430
12. FLAT WASHER, 10454
13. NUT, 10536
14. LOCK WASHER, 10433
15. LOCK WASHER, 12408
16. SCREW, 12144
17. TROUGH ASSEMBLY SPRING, 69597
18. SCREW, 10004
19. LOCK WASHER, 10429
20. FLAT WASHER, 10450
21. CABLE CLAMP, 20558
22. RIGHT HAND BRACKET, 69442
23. SCREW, 10003
24. LOCK-WASHER, 10429
25. FLAT WASHER, 10450
26. LEFT HAND BRACKET, 69433
27. SCREW, 12140
28. LOCK WASHER, 10433
29. SCREW, 12140
30. LOCK WASHER, 10433
31. SCREW, 12109
32. FLAT WASHER, 10450
33. CABLE CLAMP, 20558
34. LOCK WASHER, 10408
35. PAPER TROUGH ASSEMBLY, 68370A
36. STUD, 68361
37. RETAINING RING, 10949
38. SCREW, 10058
39. LOCK WASHER, 10432
40. FLAT WASHER, MS27183-3
41. PRESSURE SELECTOR LEVER, 69438A
42. DEFLECTOR ASSEMBLY, 73166A
43 DEFLECTOR ASSEMBLY SPRING, 69499
44. NYLON BEARING, 10772
45. SETSCREW, 11261
46. SETSCREW 10220
47. STUD, 66189
48. CARRIAGE PLATE ASSEMBLY, 69507A

Figure 6-56. Paper Trough and Deflectors, Exploded View (Sheet 1 of 2)

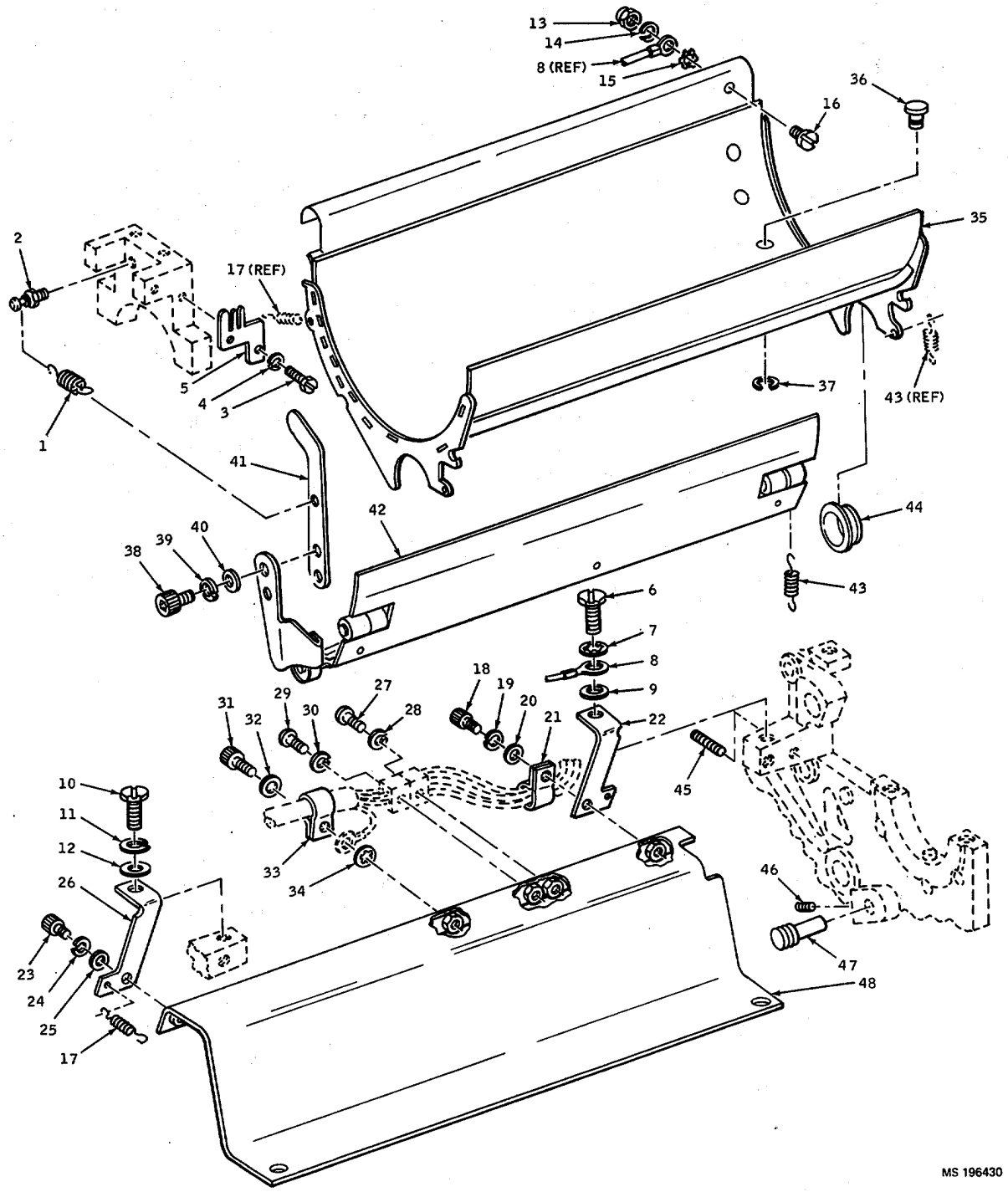


Figure 6-56. Paper Trough and Deflectors, Exploded View (Sheet 2 of 2)

6-21 Removal, Replacement, and Repair of Printing Mechanism Components. The printing mechanism consists of three functional mechanisms in addition to the print drum: a carriage feed mechanism, a carriage mechanism, and a carriage return mechanism. The carriage feed mechanism consists of the space magnet, carriage feed drum, the space bail shaft and carriage rack, and the carriage. The carriage mechanism consists of the print hammers and actuating magnets. Although the carriage return mechanism is a part of the printing mechanism, removal, replacement, and repair is covered under procedures for the power distribution mechanism components in that removal of some power mechanism components is required to gain access to the carriage return mechanism. Refer to paragraph 6-19c for removal and replacement of carriage return mechanism components.

a. *Removal and Replacement of Space Magnet L3 and Armature (fig. 6-57)*

(1) *Removal.* To remove space magnet L3 and armature, proceed as follows:

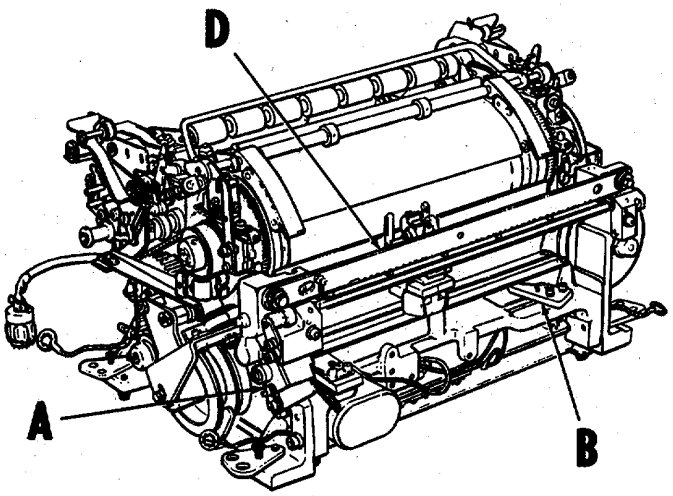
(a) Remove printer chassis assembly from printer base assembly and install in maintenance frame(para. 6-18b).
(b) Invert carriage chassis assembly.
(c) Remove base frame cover (4, fig. 6-66) by removing four attaching screws (1, fig. 6-66), lock-washers (2, fig. 6-66), and flat washers (3, fig. 6-66).
(d) Disconnect magnet assembly L3 (4) violet wire from terminal 3 on printer driver board assembly (9, fig. 6-66) and violet/blue wire from terminal 9. Clear magnet assembly leads from any obstruction on printer chassis assembly.
(e) Remove two screws (1), lockwashers (2),and flat washers (3) and remove magnet assembly L3.
(f) Remove nut (8) and flat washer (9).
(g) Remove retaining ring (5), felt washer (6),and retaining ring (7) and remove armature assembly(10) from printer chassis assembly.
(h) To remove pivot stud (12), loosen setscrew (13) and remove pivot stud and flat washer (11).
(i) To remove eccentric stud (14), loosen setscrew (15) and remove eccentric stud.

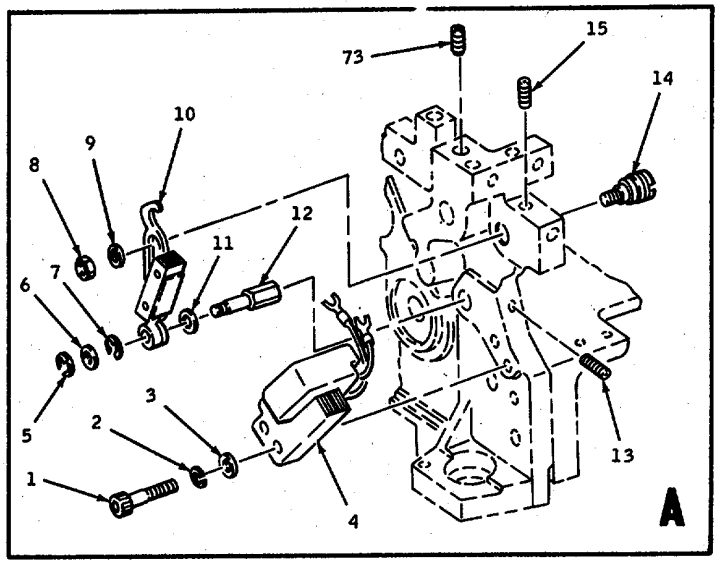
(2) *Replacement.* To replace space magnet L3 and armature assembly, proceed as follows:

(a) If removed, install eccentric stud (14) in printer chassis assembly mounting hole. Press eccentric stud firmly into mounting hole and secure with setscrew (15).
(b) If removed, install pivot stud (12) in printer chassis assembly mounting hole. Rotate pivot stud until stud flat is toward setscrew (13) and tighten setscrew.
(c) Place flat washer (11) on pivot stud.
(d) Apply a light film of grease (NSN 9150- 100-985-7247) to shoulders of pivot stud and eccentric stud.
(e) Install armature assembly (10) on pivot stud and eccentric stud so that the tab on the armature assembly engages the slot in the space bail shaft assembly (63) collar.
(f) Install flat washer (9) and nut (8) on eccentric stud.
(g) Install retaining ring (7), felt washer (6),and retaining ring (5) on pivot stud.
(h) Check that clearance between armature assembly and printer chassis frame is between 0.001-and 0.010-inch, as measured at pivot stud (12). If necessary, loosen setscrew (13) and laterally adjust pivot stud to obtain necessary clearance. Tighten setscrew.
(i) Install magnet assembly L3 (4) on printer chassis frame and secure with screw (1), lockwasher (2), and flat washer (3). Tighten screws snug tight.
(j) Thread magnet assembly wires through printer chassis frame and over to connecting terminals on printer board assembly (9, fig. 6-66).
(k) Connect violet wire to terminal 3 on printer driver board assembly and violet/blue wire to terminal 9. Lay wires clear of moving parts.
(l) Check positioning and end play of space bail. Adjust if necessary (para. 6-10i).
(m) Check space pawl and rack clearance. Adjust if necessary (para. 6-10j).
(n) Adjust space magnet L3 for proper pole contact with the armature assembly (para. 6-10k).
(o) Check positioning of carriage shaft. Adjust if necessary (para. 6-10l).
(p) Saturate felt washer (6) with lubricating oil (NSN 9150-00-687-4241).
(q) Install base frame cover (4, fig. 6-66) on bottom of printer chassis assembly and secure with four screws (1, fig. 6-66), lockwashers (2, fig. 6-66), and flat washers (3, fig. 6-66).
(r) Remove printer chassis assembly from maintenance frame and install in printer base assembly (para. 6-18b).

LEGEND:

1. SCREW, 10034
2. LOCK WASHER, 10429
3. FLAT WASHER, 10450
4. MAGNET ASSEMBLY L3, 68905A
5. RETAINING RING, 12960
6. FELT WASHER, 66003
7. RETAINING RING, 12960
8. NUT, 11627
9. FLAT WASHER, 52988
10. ARMATURE ASSEMBLY, 66001A
11. FLAT WASHER, 65684
12. PIVOT STUD, 66004
13. SETSCREW, 10206
14. ECCENTRIC STUD, 66002
15. SETSCREW, 11255
16. SCREW, 10006
17. LOCK WASHER, 10429
18. PLATE, 68386
19. LEFT-HAND MARGIN REED SWITCH S21, 73260A
20. SHIM, 68210
21. RIGHT-HAND MARGIN REED SWITCH S19, 73418A
22. SCREW, 12375
23. LOCK WASHER, 10432
24. FLAT WASHER, MS27183-3
25. SCREW, 10050
26. LOCK WASHER, 10432
27. FLAT WASHER, MS27183-3
28. CARRIAGE FEED BELT, 65648
29. SCREW, 10009
30. LOCK WASHER, 10430
31. FLAT WASHER, 10467
32. CARRIAGE FEED DRUM ASSEMBLY, 68275A
33. SETSCREW, 10204
34. COLLAR, 68851A
35. FELT WASHER, 61467
36. DRUM, 68852A
37. CARRIAGE FEED DRUM SPRING, 68870
38. DRUM AND SHAFT ASSEMBLY, 68854A
39. BRACKET, 68859
40. FLAT WASHER, 10480
41. NUT, 10549
42. SCREW, 11236
43. LOCK WASHER, 10432
44. FLAT WASHER, 65619
45. CARRIAGE RETURN BELT, 70218
46. SPACE BAIL SPRING, 70351
47. ANCHOR POST, 50649
48. LOCK WASHER, 10421
49. SCREW, 11204
50. LOCK WASHER, 10429
51. ECCENTRIC GUIDE, 68421
52. SPACER, 72628
53. CARRIAGE RACK, 68420
54. SPACER, 68426
55. SCREW, 10004
56. LOCK WASHER, 10429
57. FLAT WASHER, 10459
58. PLATE ASSEMBLY, 71280A
59. FELT WASHER, 61681 (7 REQUIRED)
60. SETSCREW, 10202
61. PIVOT BEARING, 71260
62. FELT WASHER, 61681 (2 REQUIRED)
63. SPACE BAIL SHAFT ASSEMBLY, 71270A
64. BAIL SHAFT FELT, 71279
65. SCREW, 10010
66. LOCK WASHER, 10430
67. FLAT WASHER, 10467
68. MOUNTING BLOCK ASSEMBLY, 71517A
69. SCREW, 10010
70. LOCK WASHER, 10430
71. FLAT WASHER, 10467
72. RIGHT-HAND BLOCK ASSEMBLY, 71515A





73. SETSCREW, 10210
74. SCREW, 10050
75. LOCK WASHER, 10432
76. FLAT WASHER, 65619
77. RETAINING RING, 235251A031
78. SPECIAL WASHERS, 65996 (2 REQUIRED)
79. CARRIAGE ASSEMBLY, 68285A
80. SPECIAL WASHER, 67944
81. BUMPER, 67941
82. CARRIAGE SHAFT SPRING, 67808
83. FLAT WASHER, 67943
84. BUSHING, 67942
85. CARRIAGE SHAFT, 67806
86. SCREW, 12357
87. LOCK WASHER, 12403
88. CARRIAGE GUIDE RAIL, 67881
89. SCREW, 12357
90. LOCK WASHER, 12403
91. CARRIAGE GUIDE RAIL, 65649

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Figure 6-57. Printing Mechanism, Exploded View (Sheet 1 of 3)

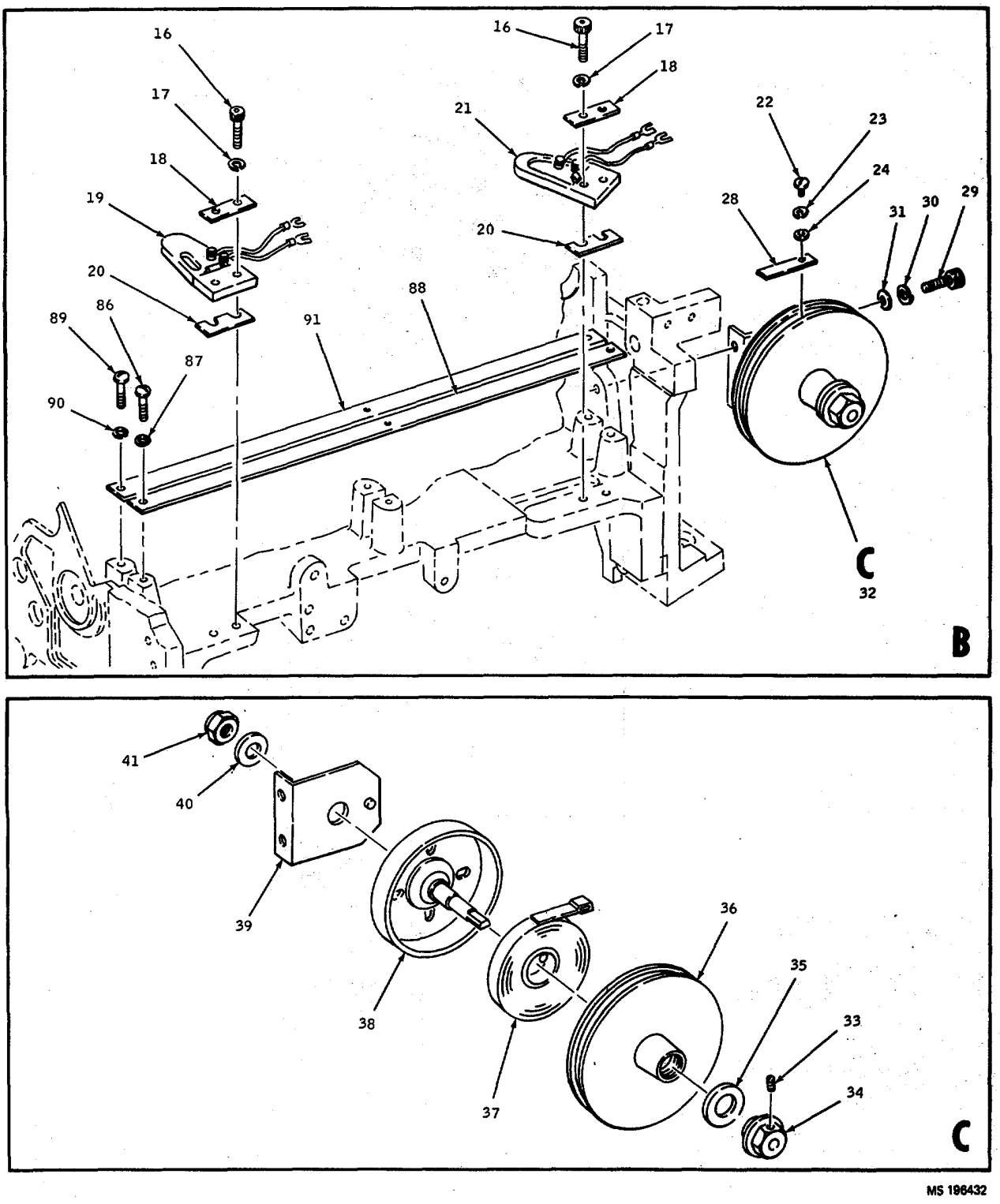


Figure 6-57. Printing Mechanism, Exploded View (Sheet 2 of 3)

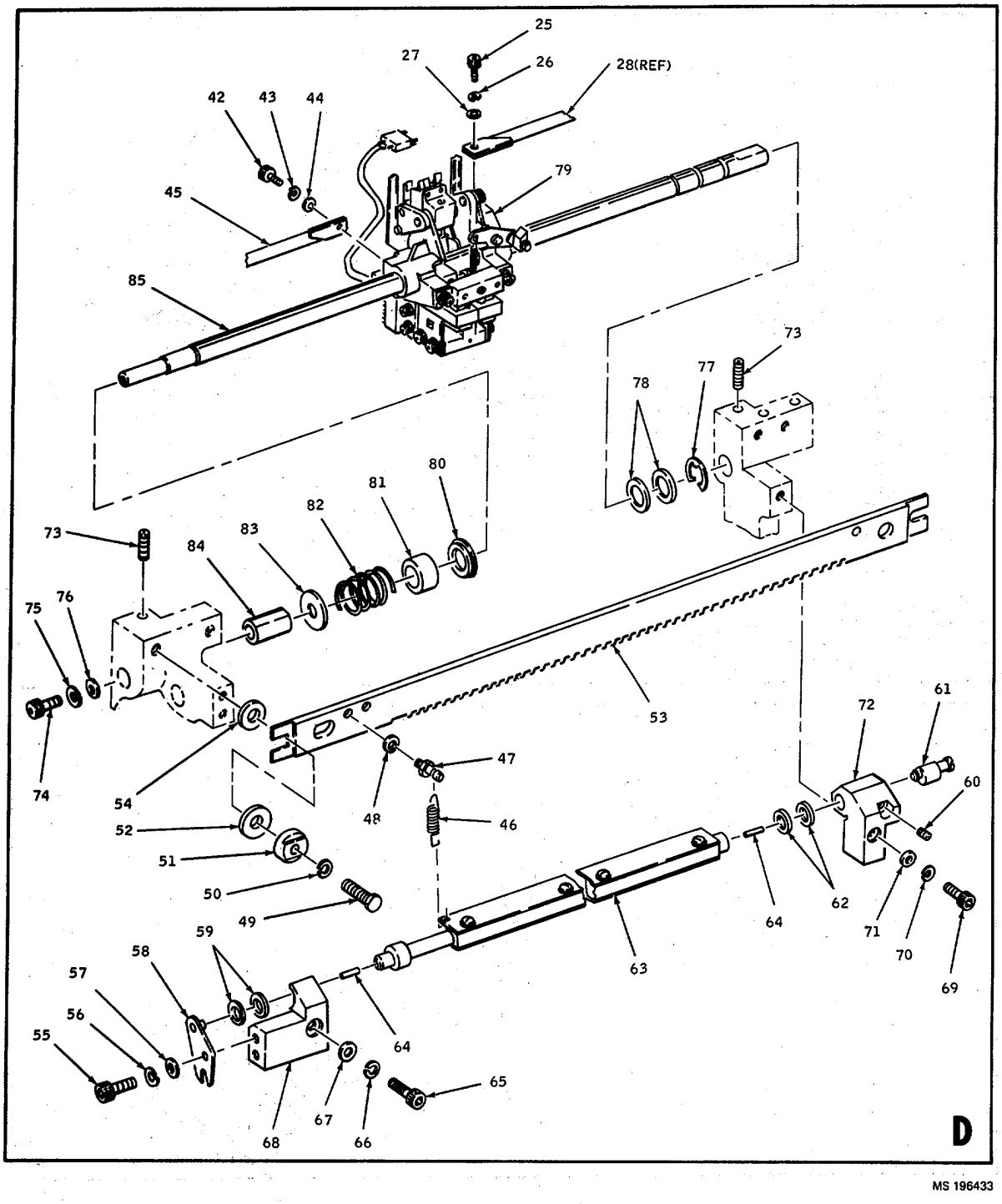


Figure 6-57. Printing Mechanism, Exploded View (Sheet 3 of 3)

b. *Removal and Replacement of Reed Switch Assemblies (fig. 6-57)*

(1) *Removal.* To remove reed switch assemblies, proceed as follows:

NOTE: These removal procedures are applicable to both reed switch assemblies S19 (RH margin) and S21 (LH margin).

(a) Remove printer chassis assembly from printer base assembly and install in maintenance frame (para. 6-18b).
(b) Remove tension of feed belt by sliding carriage assembly (79) to its right-hand margin stop.
(c) Invert printer chassis assembly.
(d) Remove base frame cover (4, fig. 6-66) by removing four attaching screws (1, fig. 6-66), lockwashers (2, fig. 6-66) and flat washers (3, fig. 6-66).
(e) For left-hand margin reed switch S21 (19), disconnect red wire from terminal 18 on printer driver board assembly (9, fig. 6-66) and white/red wire from terminal 21. For right-hand margin reed switch S19 (21), disconnect blue wire from terminal 20 on printer driver board assembly and white/black wire from terminal 23. Clear wire leads from any obstruction on printer chassis assembly.
(f) Remove two screws (16) and lockwashers (17) and remove applicable reed switch assembly plate (18), and shims (20) from printer chassis assembly.

(2) *Replacement.* To replace reed switch assemblies, proceed as follows:

(a) Check replacement reed switch for proper operation as follows:
1. Connect multimeter, set to measure ohms, across reed switch assembly wire leads.
2. Using plastic shims, build up shims to a thickness of 0.030-inch.
3. Place shims on top of the reed switch assembly and place the assembly under the magnetic pole of carriage assembly (79).
4. With 0.030-inch clearance, observe that the reed switch actuates, as indicated by a continuity reading on the multimeter.

CAUTION

If the magnet on the carriage assembly does not clear the reed switch assemblies, damage will result to the reed switch assemblies when the carriage assembly is moved from one margin to the other.

(b) Loosen setscrew (34, fig. 6-58) securing stud assembly (magnet) (42, fig. 6-58) to carriage assembly (79). Raise the stud assembly by turning.

NOTE: The stud assembly will be adjusted for proper clearance with the reed switch assemblies after the reed switch assemblies are installed.

(c) Place shim (20) under reed switch assembly (19 or 21, as applicable) and plate (18) on top of reed switch assembly. Install components in printer chassis assembly and secure with two screws (16) and lockwashers (17). Tighten screws only snug tight.
(d) Position the carriage assembly magnet over the higher of the two reed switch assemblies.
(e) Loosen setscrew (34, fig. 6-58) securing stud assembly (42, fig. 6-58) and lower stud assembly to obtain a clearance of 0.015-to 0.030-inch. Tighten setscrew.

NOTE: Because of tolerance buildups with the second reed switch assembly, it is better to adjust the stud assembly to a clearance closer to 0.015-inch.

(f) With a multimeter recheck operation of the reed switch.
(g) Position the carriage assembly magnet over the second reed switch assembly. Observe that the clearance does not exceed 0.030-inch.
(h) With a multimeter recheck operation of the second reed switch.
(i) Adjust the left-hand margin reed switch assembly (para. 6-14b).
(j) Adjust the right-hand margin reed switch assembly (para. 6-14c).
(k) Thread reed switch assembly wires through printer chassis assembly to the connecting terminals on the printer driver board assembly (9, fig. 6-66).
(l) For left-hand margin reed switch, connect red wire to terminal 18 on printer driver board assembly and white/red wire to terminal 21. For right-hand margin reed switch, connect blue wire to terminal 20 on printer driver board assembly and white/black wire to terminal 23.

(m) Install base frame cover (4, fig. 6-66) on bottom of printer chassis assembly and secure with four screws (1, fig. 6-66), lockwashers (2, fig. 6-66), and flat washers (3, fig. 6-66).

(n) Remove printer chassis assembly from maintenance frame and install in printer base assembly (para 6-18b).

c. *Remov*al and Replac*em*ent of *Carriage Feed Drum (fig. 6-57)*

(1) Removal. To remove carriage feed drum, proceed as follows:

(a) Remove printer chassis assembly from printer base assembly and install in maintenance frame (para 6-18b).

WARNING

The carriage feed drum is spring loaded to approximately two inch-pounds of pull. When removing carriage feed belt, hold carriage feed drum firmly to prevent spring from unloading prematurely and throwing the belt attaching hardware.

(b) While holding carriage feed drum (32) firmly, remove screw (22), lockwasher (23), and flat washer (24) to disconnect carriage feed belt (28).

(c) Using fingers as a brake, slowly release spring load on carriage feed drum.

(d) Remove two screws (29), lockwashers (30), and flat washers (31) securing carriage feed drum to printer chassis assembly and remove carriage feed drum.

NOTE

While carriage feed drum is removed, inspect carriage feed and return belts for cracks, frays, and other surface damage. Check especially at screw holes and at contact points with other components. Replace belts if necessary.

(2) Replac*em*ent. To replace carriage feed drum proceed as follows:

(a) Install carriage feed drum (32) in mounting position on printer chassis assembly and secure with two screws (29), lockwashers (30), and flat washers (31).

(b) Move carriage assembly to approximately 1/4 to 1/2 the distance to the left margin.

(c) Run carriage feed belt through the belt race on the right side of the printer chassis assembly frame.

WARNING

The following step will load the carriage feed drum to approximately two inch-pounds of pull. Hold carriage feed drum firmly when loading spring and attaching carriage feed belt.

NOTE

Have 64 oz. spring scale, small-slot screwdriver, screw (22), lockwasher (23), and flat washer (24) available before performing the following step. Refer also to paragraph 6-10g.

(d) Using fingers as a brake, load spring by turning drum (36) counterclockwise (as viewed from front) until the spring is loaded to approximately 2 inch-pounds and the belt screw hole is in position to attach the carriage feed belt.

(e) Attach carriage feed belt to drum using screw (22), lockwasher (28), and flat washer (24). Before securely tightening screw, aline belt with drum groove. Tighten screw while holding belt in alinement.

(f) Adjust carriage feed drum tension to 27 to 30 inch ounces (para 6-10g).

(g) Remove printer chassis assembly from maintenance frame and install in printer base (para 6-18b).

d. Repair *of Carriage Feed Drum (fig. 6-57)*

(1) Dis*ass*embly. To disassemble carriage feed drum proceed as follows:

WARNING

The carriage feed drum spring is a coil type spring. Use caution when removing spring to avoid being struck if the spring uncoils.

(a) Loosen setscrews (33) securing collar (34) to the shaft of drum and shaft assembly (38) and remove collar and felt washer (35).

NOTE

The spring should remain coiled in the drum. If spring starts to pull away from drum, use a small screwdriver to keep it in place when removing drum from drum and shaft assembly.

(b) Carefully separate drum (36) from drum and shaft assembly.

(c) Remove spring (37) from drum.

(d) Remove nut (41) and flat washer (40) and separate drum and shaft assembly from bracket (39).

(2) Reassembly. To reassemble carriage feed drum, proceed as follows:

(a) Install drum and shaft assembly (38) on bracket (39) and secure with nut (41) and flat washer (40).

(b) Apply a film of lubricating oil (NSN 9150 5 00-687-4241) to carriage feed drum spring (37).

(c) Install spring in drum (36).

(d) Wind spring in drum enough to install assembly on drum and shaft assembly. Install drum and spring assembly on drum and shaft assembly.

(e) Install felt washer (35) on shoulder of collar (34).

(f) Install collar on drum and shaft assembly with felt washer toward drum. Press collar on shaft so that there is minimum drum end play without binding. Tighten setscrews (33).

e. *Removal and Replacement of Space Bail Shaft Assembly and Carriage Rack (fig. 6-57)*

NOTE

Removal of either the space bail shaft assembly or the carriage rack will affect the character spacing alinement of the printing mechanism function. Limit parts removal to only those parts that require repair or replacement to minimize realinement.

The space bail shaft assembly and the carriage rack may be removed separately without removing the other component.

(1) Removal To remove space bail shaft assembly and carriage rack, proceed as follows:

(a) Slide carriage assembly (79) to its right hand margin stop.

(b) Disconnect space bail spring (46).

(c) Remove two screws (49), lockwashers (50), eccentric guides (51), and spacers (52) and remove carriage rack (53) and spacers (54) from printer chassis assembly.

(d) Remove two screws (55), lockwashers (56), and flat washers (57) and remove plate assembly (58).

(e) Slide space bail shaft assembly (63) left to disengage with pivot bearing (61) and remove space bail shaft assembly from printer chassis assembly.

(f) Remove felt washers (59 and 62) and bail shaft felts (64) from space bail shaft assembly

(g) To remove pivot bearing (61), loosen setscrew (60) and remove pivot bearing from printer chassis assembly.

(h) To remove mounting block assembly (68) remove screw (65), lockwasher (66) and flat washer (67) and remove mounting block assembly from printer chassis assembly.

(i) To remove right hand block assembly (72), remove screw (69), lockwasher (70), and flat washer (71) and remove right-hand block assembly from printer chassis assembly.

(2) Replacement To replace space bail shaft assembly and carriage rack, proceed as follows:

(a) If removed, install right-hand block assembly (72) on printer chassis assembly and secure with screw (69), lockwasher (70), and flat washer (71).

(b) If removed, install mounting block assembly (68) on printer chassis assembly and secure with screw (65), lockwasher (66), and flat washer (67).

(c) Place lockwasher (50) on screw (49) followed by eccentric guide (51) and spacers (52 and 54). Thread screw into screw hole in left side of printer chassis assembly.

(d) Apply a light film of grease (NSN 9150-00-985-7247) to space bail shaft assembly (63) and carriage rack (53).

(e) Place lockwasher (50) on second screw (49) followed by eccentric guide (51) and spacer (52).

(f) Install carriage rack (53) on printer chassis assembly so that the cut out on the carriage rack captures the shoulder on left side eccentric guide.

(g) Place spacer (52) over mounting hole in right side of printer chassis assembly and move carriage rack into mounting position. Install screw (49) and related component in screw hole to retain carriage rack. Do not tighten screws at this time as they will be tightened during adjustment of the carriage rack.

(h) If removed, install pivot bearing (61) in right-hand block assembly. Tighten setscrew only snug tight.

(i) Place a space bail felt (64) in both ends of space bail shaft assembly.

(j) Place two felt washers (62) on right end of space bail shaft assembly.

(k) Place seven felt washers (59) on left end of space bail shaft assembly.

(l) Saturate felts identified in steps (i), (j), and (k) with lubricating oil (NSN 9150-00-687-4241).

(m) Install space bail assembly in printer chassis assembly so that the channel in the space bail assembly traps the pawl bearing on the carriage assembly and the cutout in the collar engages the space armature tab.

(n) Retain space bail assembly with plate assembly (58) and two screws (55), lockwashers (56), and flat washers (57).

(o) If removed, install anchor post (47) and lockwasher (48) on carriage rack.

(p) Loop open end of space bail spring (46) through hole in upper left edge of space bail shaft assembly so that the spring end hooks the edge of the space bail shaft assembly.

(q) Connect other end of spring to anchor post.

(r) Apply a small dab of grease (NSN 9150-00-985-7247) to both ends of spring.

(s) Check adjustment of space bail. Adjust if necessary (para 6-10i).

(t) Adjust space pawl and rack clearance (para 6-10j).

(u) Adjust space magnet, space pawl stop plate, and space pawl clearance (para 6-10k).

f. Removal and Replacement of Carriage Assembly ({fig. 6-58).

(1) Removal. To remove carriage assembly, proceed as follows:

(a) Remove printer chassis assembly from printer base assembly and install in maintenance frame (para 6-18b).

WARNING

The carriage feed drum is spring loaded to approximately two inch-pounds of pull. When removing carriage feed belt, hold carriage feed drum firmly to prevent spring from unloading prematurely and throwing the belt attaching hardware.

(b) While holding carriage feed drum (32) firmly, remove screw (25), lockwasher (26), and flat washer (27) to disconnect carriage feed belt (28) from carriage assembly (79).

(c) Using fingers as a brake, slowly release spring load on carriage feed drum.

(d) Remove screw (42), lockwasher (43), and flat washer (44) and disconnect carriage return belt (45).

(e) Unclamp carriage assembly cable from carriage plate assembly by removing screw (31, fig. 6-56), flat washer (32, fig. 6-56), and lockwasher (34, fig. 6-56). Remove clamp (33, fig. 6-56).

(f) Remove screw (29, fig. 6-56) and lockwasher (30, fig. 6-56) and disconnect connector J27 from connector P27.

(g) Remove space bail shaft assembly (63) and carriage rack (53) (para 6-21e).

(h) Remove three screws (86) and lockwashers (87) and remove carriage guide rail (88).

(i) Free ribbon vibrator bail (24, fig. 6-56) from lifting arms by removing screws (20 and 22, fig. 6-65) and nuts (21 and 23, fig. 6-65).

CAUTION

The ribbon vibrator bail is trapped by a lip on the carriage assembly ribbon guide. Do not attempt to disengage ribbon guide until carriage assembly is removed from carriage shaft.

(j) Remove retaining ring (77) from carriage shaft (85).

(k) Remove screw (74, lockwasher (75), and flat washer (76) from left end of carriage shaft.

(l) Loosen two setscrews (73) securing carriage shaft.

(m) While sliding carriage shaft out of carriage chassis assembly right side, remove bushing (84), flat washer (83), carriage spring (82), bumper (81), special washer (80), carriage assembly (79) and special washers (78).

(n) Axially rotate carriage assembly and separate carriage assembly from ribbon vibrator bail.

NOTE

While carriage assembly is removed, inspect, clean, and lubricate carriage assembly. Refer to Chapter 5, Section II. If repair of carriage assembly is required, refer to paragraph 6-21g. Inspect carriage feed and return belts for cracks, frays and other surface damage. Check especially at screw holes and at contact points with other components. Replace belts if necessary.

(2) Replacement. To replace carriage assembly, proceed as follows:

(a) Slide carriage shaft (85) partially into the right side of the printer chassis assembly (approximately 3 or 4 inches).

NOTE

The left end of the carriage shaft is the end with the shoulder.

(b) Install the special washers (78) on-carriage shaft.

(c) Locate ribbon vibrator bail (*24,* fig. 6-65) in carriage assembly (79) ribbon guide lip.

(d) Orient carriage assembly and ribbon vibrator bail in printer chassis assembly so that the ribbon vibrator bail can be attached to its lifting arms and the carriage chassis can be installed on the carriage shaft.

NOTE

The carriage shaft has four flats and four rounds. When installing carriage assembly, rotate the carriage shaft so that the rounds are axially in the vertical and horizontal planes and the flat on the right end of the carriage shaft is up.

Avoid lateral or axial motion of the carriage assembly when installing carriage shaft, as the ribbon vibrator bail may become disengaged from the carriage assembly ribbon guide.

(e) Insert carriage shaft through bore in carriage assembly and over to a position approximately one or two inches away from the printer chassis assembly frame.

(f) Apply a coat of grease (FSN 9150-985- 7247) to the bore of bushing (84).

(g) Install special washer (80), bumper (81), carriage shaft spring (82), flat washer (83), and bushing (84) on carriage shaft and complete installation of carriage shaft in printer chassis assembly.

(h) Install screw (74), lockwasher (75), and flat washer (76) in left end of carriage shaft.

(i) Tighten setscrews (73) only enough to retain carriage shaft.

(j)) Observe that ribbon vibrator bail is still engaged with carriage assembly ribbon guide. Attach ribbon vibrator bail to lifting arms with screws (20 and 22, fig. 6-65) and nuts (21 and 23, fig. 6-65).

(k) Slide carriage assembly and special washers along carriage shaft until components are clear of the left most retaining ring slot on the carriage shaft. Install retaining ring (77) on carriage shaft.

(l) Clip cable clamp (33, fig. 6-56) to carriage assembly cable. Place flat washer (32, fig. 6-65) on screw (31, fig. *6-65)* and insert into screw hole in cable clamp. Place cable ground lead lug and lockwasher (34, fig. 65) on screw (31, fig. *6*-65) and install components on carriage plate assembly (48, fig. 6-65).

(m) Connect connector J27 to connector P27.

(n) Secure connector J27 to carriage plate assembly with screw (29, fig. 6-56) and lockwasher (30, fig. 6-56).

(o) Position the carriage assembly stud (42, fig. 6-58) over the higher of the two reed switch assemblies (19 or 21).

(p) Loosen setscrew securing stud assembly and adjust stud assembly by turning to obtain a clearance of 0.015- to 0.030-inch. Tighten setscrew.

NOTE

Because of tolerance buildups with the second reed switch assembly, it is better to adjust the stud assembly to a clearance closer to 0.015 inch.

(q) Position the carriage assembly stud over the second reed switch assembly. Observe that the clearance does not exceed 0.030 inch.

(r) Install carriage guide rail (88) on printer chassis assembly and secure with three screws (86) and lockwashers (87). Tighten screws only snug tight. (8) Adjust carriage guide rail to obtain a clearance between carriage guide rail and carriage assembly stud of 0.002 to 0.010 for the entire length of the carriage guide rail. Tighten screws (86).

(t) Apply a light film of grease (NSN 9150-00-985-7247) to carriage guide rails (88 and 91).

(u) Apply a light film of oil (FSN 9150-687-4241) to surface of carriage shaft and one drop of oil to carriage shaft shoulder.

(v) Install space bail shaft and carriage rack assembly (para 6-21e).

(w) Check space pawl and rack clearance. Adjust if necessary (para 6-lOj).

(x) Check space magnet, space pawl stop plate and space pawl clearance. Adjust if necessary (para 6- 10k).

(y) Loosen setscrews (73) securing the carriage shaft.

(z) Adjust screw (74) to obtain a clearance of 0.010- to 0.015-inch between flat washer (83) and carriage chassis frame. Tighten setscrews (73).

(aa) Attach carriage return belt (45) to carriage assembly using screw (42), lockwasher (43), and flat washer (44).

(ab) Move carriage assembly to approximately 1/4 to 112 the distance to the left margin.

(ac) Run carriage feed belt through the belt race on the right side of the printer chassis assembly frame.

WARNING

The following step will load the carriage feed drum to approximately two inch-pounds of pull. Hold carriage feed drum firmly when loading spring and attaching carriage feed belt.

NOTE

Have 64 oz. spring scale, small slot screwdriver, screw (22), lockwasher (23), and flat washer (24) available before performing the following step.

(ad) Using fingers as a brake, load spring by turning drum (36) counterclockwise (as viewed from front) until the spring is loaded to approximately 2 inch-pounds and the belt screw hole is in position to attach the carriage feed belt.

(ae) Attach carriage feed belt to drum using screw (22), lockwasher (23), and flat washer (24). Before securely tightening screw, aline belt with drum groove. Tighten screw while holding belt in alinement.

(af) Adjust carriage feed drum tension to 27 to 30 inch ounces (para 6-10g).

(ag) Check that carriage return belt guide (43, fig. 6-53) is not in contact with carriage return belt. If necessary, loosen screw (46, fig. 6-53) and adjust belt guide.

(ah) Adjust carriage return belt tension (para 6-10f).

(ai) Aline print hammer block (para 6-l0o).

(aj) Adjust clearance of print hammer magnets (para 6-10p).

(ak) Remove printer chassis assembly from maintenance frame and install in printer base (para 6-18b).

g. *Repair of Carriage Assembly*. These carriage assembly repair procedures are subdivided so as to minimize disassembly beyond that necessary to effect repair. Determine which part or parts require replacement and perform only those procedures necessary to replace the defective parts.

(1) *Removal and replacement print hammer magnets (fig. 6-58)*

(a) *Removal*. To remove print hammer magnets, proceed as follows:

NOTE

These removal procedures are applicable to both print hammer magnet assemblies (40 and 41).

1. Remove carriage assembly from printer chassis assembly (para 6-21f).
2. Disconnect applicable print hammer magnet wires.
3. Loosen two screws (30) and lockwashers (31) to release pressure plate (32) and magnet pressure plate (33) securing magnet assembly.
4. Remove magnet assembly.

(b) Replacement To replace print hammer magnets, proceed as follows:

NOTE

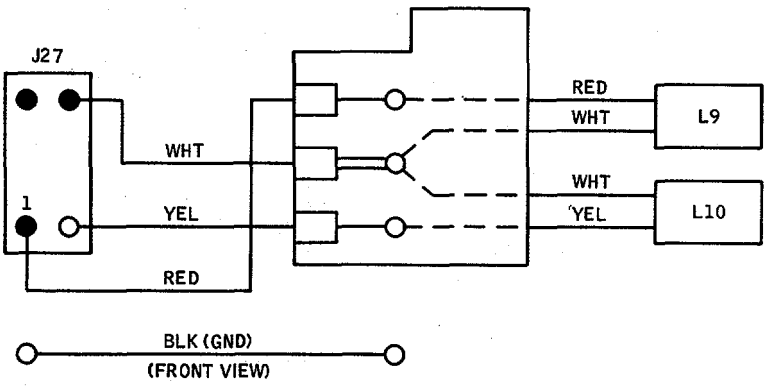
These replacement procedures are applicable to both print hammer magnet assemblies (40 and 41).

1. Install magnet pressure plate (33) and pressure plate (32) on carriage frame assembly (50) as shown in figure 6-58. Retain parts with two screws (30) and lockwashers (31). Thread screws into carriage frame assembly only enough to retain parts.
2. Install magnet assembly (40 or 41) in carriage frame assembly.
3. Press magnet assembly into carriage frame assembly so that the magnet core contacts the carriage frame assembly stop pin. Tighten the retaining screws.
4. Depress armature assembly (35 or 36, as applicable) and observe that the contacting surfaces of the armature and magnet are flush. If contact surfaces are not flush, slightly loosen the magnet retaining screws and position magnet in mounting magnet until contact surfaces are flush and magnet core is in contact with stop pin. Tighten retaining screws.
5. Connect magnet wires to applicable terminals on terminal board (48) as shown on figure 6-58.
6. Adjust armature stop setscrew (25) to obtain a clearance of 0.009 inch between armature and magnet as measured from the contacting surface front.
7. Install carriage assembly in printer chassis (para 6-21f).

(2) *Removal and replacement of pawl assembly fig. 6-58)*

(a) *Removal.* To remove pawl assembly, proceed as follows:

1. Remove carriage assembly from printer chassis (para 6-21f).
2. Remove space pawl spring (24).
3. Remove retaining ring (5) from pawl assembly (23) shaft and remove pawl assembly spacer (6) and shim (7) from carriage frame assembly (50).



WIRING DIAGRAM

LEGEND:

1. SEPARATOR, 70975
2. VIBRATOR GUIDE, 68977
3. SCREW, 11815
4. RIBBON GUIDE, 69453
5. RETAINING RING, 10960
6. SPACER, 65656
7. SHIM, 65657
8. HAMMER BLOCK ASSEMBLY, 68286A
9. PRINT HAMMER COMPRESSION SPRING, 67947
10. PAWL STOP PLATE, 65883
11. FLAT WASHER, MS27183-3
12. LOCK WASHER, 10432
13. SCREW, 10058
14. LOCK WASHER, 10432
15. SCREW, 10062
16. LOCK WASHER 12408
17. SCREW, 12375
18. CABLE ASSEMBLY, 67830A
19. TERMINAL LUG, 23628
20. CABLE 69001A
21. PIN, 68911
22. CONNECTOR, 23260
23. PAWL ASSEMBLY 70260A
24. SPACE PAWL SPRING, 65845
25. SETSCREW, 11167
26. MOUNTING BLOCK, 71937A
27. FLAT WASHER, MS27183-3
28. LOCK WASHER, 10432
29. SCREW, 10057
30. SCREW, 10050
31. LOCK WASHER, 10432
32. PRESSURE PLATE, 69518
33. MAGNET PRESSURE PLATE, 72645
34. SETSCREW, 10235
35. ARMATURE ASSEMBLY (LH), 67683A
36. ARMATURE ASSEMBLY (RH), 67688A
37. FLAT WASHER, 70707
38. FLAT WASHER, 65664
39. FLAT WASHER, 70706
40. MAGNET ASSEMBLY L10 (RH), 69519A
41. MAGNET ASSEMBLY L9 (LH), 69513A
42. STUD ASSEMBLY (MAGNET) 68978A
43. CARRIAGE GUIDE ROLLER, 65732
44.- SETSCREW, 11256
45. SCREW, 10050
46. LOCK WASHER, 10432
47. PLATE ASSEMBLY, 68473A
48. TERMINAL BOARD, 68471A
49. ARMATURE SHAFT, 67723
50. CARRIAGE FRAME ASSEMBLY, 68287A
51. SETSCREW, 10200
52. NUT PLATE, 67680A
53. HAMMER STOP SETSCREW
54. HAMMER BLOCK SETSCREW

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Figure 6-58. Carriage Assembly, Exploded View (Sheet 1 of 2)

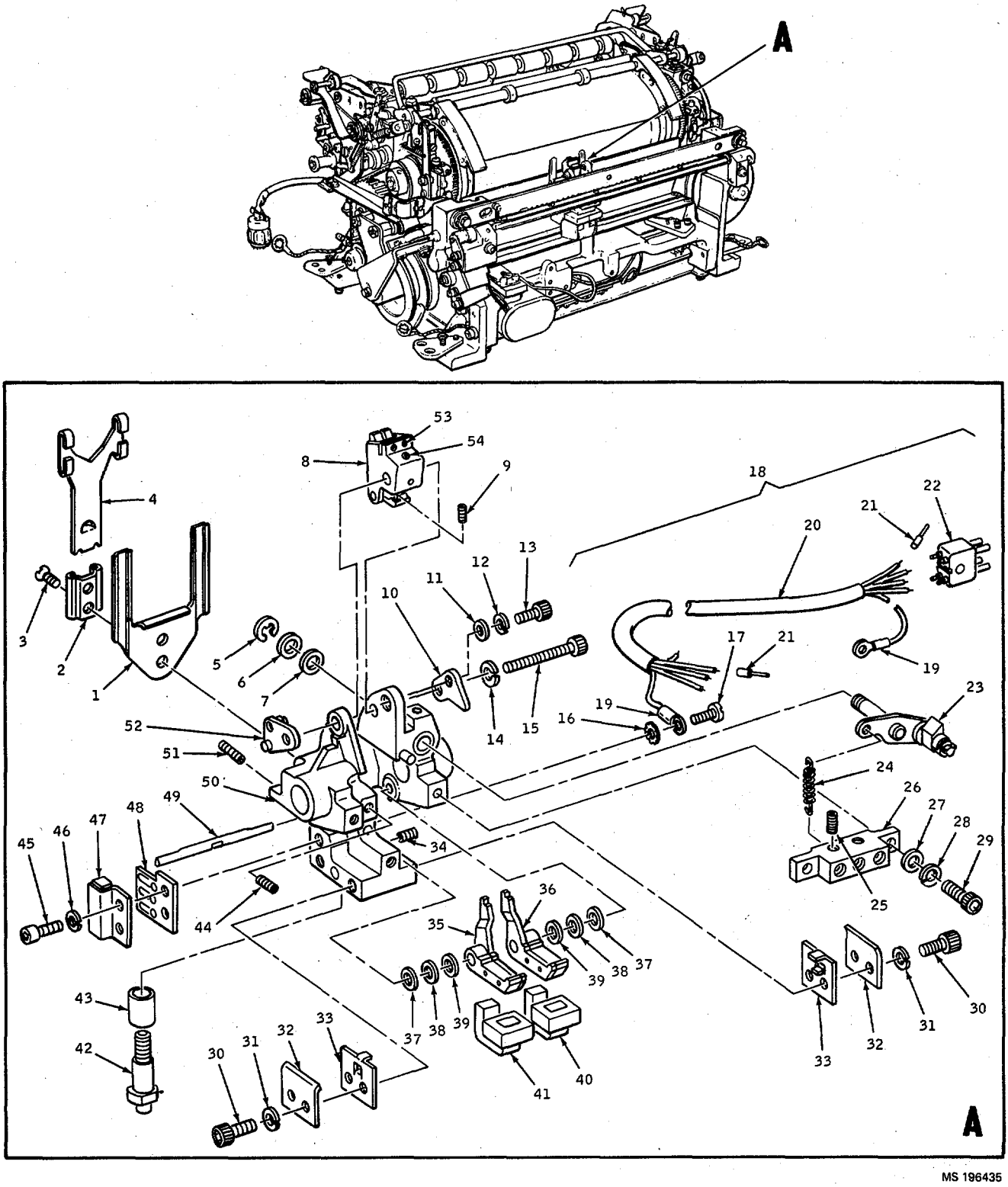

Figure 6-58. Carriage Assembly, Exploded View (Sheet 2 of 2)

(b) *Replacement.* To replace pawl assembly, proceed as follows:

1. Apply a light film of general lubricating oil (NSN 9150-00-687-4241) to pawl assembly (23) shaft.
2. Install pawl assembly (23) in mounting hole on carriage frame assembly (50).
3. Place a shim (7) and spacer (6) on pawl assembly shaft. Retain parts with retaining ring (5).
4. Observe that pawl assembly rotates freely and that shaft end play is between 0.001-and 0.005-inch. Add or remove shims (7) to obtain proper end play.
5. Check space pawl spring (24) tension (table 6-13). Replace spring if spring requirements are not met.
6. Install space pawl spring between pawl assembly pivot arm and mounting block (26).
7. Install carriage assembly in printer chassis (para 6-21f).

(3) *Removal and replacement of print hammer armature assemblies*

(a) *Removal.* To remove print hammer armature assemblies, proceed as follows:

1. Remove carriage assembly from printer chassis (para 6-21f).
2. Remove space pawl spring (24).
3. Remove mounting block (26) by removing two screws (29), flat washers (27), and lockwashers (28).
4. Loosen setscrew (44) and two setscrews (51) retaining armature shaft (49).
5. While sliding armature shaft (49) out of carriage frame assembly (50), remove flat washers (37, 38, and 39) and armature assemblies (35 and 36) from carriage frame assembly.

(b) *Replacement.* To replace print hammer armature assemblies, proceed as follows:

NOTE

Replacement of armature assemblies (35 and 36) will require adjustments to print hammer block assembly (8). Except for preliminary adjustments performed during reassembly, these adjustments are performed after final assembly and lubrication of the printer.

1. While inserting armature shaft (49) in carriage frame assembly, install washers (37, 38, and 39) and armature assemblies (35 and 36) on armature shaft as shown in figure 6-58. When installing armature assemblies on shaft, orient armature assembly contact points so that they will be to the rear of the hammers on hammer block assembly (8).
2. Rotate armature shaft so that the shaft flats face the retaining setscrews. Tighten setscrew (44) and two setscrews (51).
3. Apply a drop of special lubricating oil type 15383 (82423) to the armature pivot points and the contact points with hammer block hammers.
4. Apply a very thin coat of grease (NSN 9150-00-986-7247) on armature assembly where armature contacts setscrew (25).
5. Install mounting block (26) on carriage frame assembly (50) and secure with two screws (29), lockwashers (28), and flat washers (27).
6. Check space pawl spring (24) tension (table 6-13). Replace spring if spring requirements are not met.
7. Connect space pawl spring (24) between pawl assembly (23) and mounting block (26).
8. Depress armature assemblies (35 and 36) and observe that the contacting surfaces of the armatures and magnets are flush. If contact surfaces are not flush, slightly loosen the applicable magnet retaining screws (30) and position magnet in mounting until contact surfaces are flush and magnet core is in contact with stop pin. Tighten retaining screws.
9. Adjust armature stop setscrew (25) to obtain a clearance of 0.009-inch between armature and magnet as measured from the contacting surface front.
10. Install carriage assembly in printer chassis (para 6-21f).

(4) Removal and *replacement of* hammer block assembly (fig. *6-58)*

(a) *Removal.* To remove hammer block assembly, proceed as follows:

1. Loosen hammer block setscrew (54) three turns minimum.

NOTE

Do not loosen hammer stop setscrews (53) as print hammer adjustments will be affected.

2. Remove hammer block assembly (8) by removing screw (15), lockwasher (14), and nut plate (52).

NOTE

If hammer block is to be reinstalled perform step 3 below.

3. Refer to cleaning instructions (para 5-7) and clean hammer block assembly.

(b) *Replacement.* To replace hammer block assembly, proceed as follows:

NOTE

Replacement of hammer block assembly (8) with a new hammer block assembly will require adjustment beyond those provided in these replacement procedures. These adjustments are to be performed after final assembly of the printer. As access to armature assemblies (35 and 36) is restricted when the hammer block assembly is installed, clean and lubricate armature assemblies prior to Installing the hammer block assembly.

1. Apply one drop of special lubricating oil type 15383 (82423) to the armature assembly pivot points, the hammer block assembly hammer pivot points, and the contacting surfaces of the hammer block assembly and armature assembly.
2. Reinstall hammer block assembly (8) in carriage frame assembly (50).
3. Locate nut plate (52) and hammer block assembly and carriage frame assembly as shown in figure 6-58. Retain parts with screw (15) and lockwasher (14). Tighten the screw only enough to retain parts, and loose enough to permit the hammer block assembly to be moved in the carriage frame assembly.
4. Pivot the hammer block assembly to its maximum rear position (toward print drum).
5. Slowly pivot the hammer block assembly forward until the print hammers just start to move due to contacting the armature assemblies.
6. Move the hammer block assembly rearward until the print hammers just touch the armature assemblies without moving the hammers. Tighten retaining screw (15).
7. If a new hammer block has been installed adjust hammer block (para 6-10o) and hammer magnets (para 6-10p).

*(*5) *Removal and replacement of stud assembly (fig. 6-58)*

(a) *Removal.* To remove stud assembly, proceed as follows:

1. Remove printer chassis assembly from printer base assembly and install in maintenance frame (para 6-18b).
2. Loosen setscrew (34) and remove assembly of stud assembly (42) and carriage guide roller (48).
3. Separate stud assembly from carriage guide roller.

NOTE

Stud assembly (42) is magnetic, therefore, do not place it in an area where it can be contaminated by metal fragments.

(b) Replacement To replace stud assembly proceed as follows:

1. Preassemble stud assembly (42) and carriage guide roller (48).
2. Apply one drop of general purpose oil NSN 9150-00-687-4241 to contacting surfaces of stud assembly and carriage guide roller.

CAUTION

Insert stud assembly (42) fully into mounting hole in carriage frame assembly (*50*). Excessive protrusion may result in damage to left and right hand margin reed switches prior to final adjustment of the printer.

3. Insert assembly of stud assembly and carriage guide roller fully into mounting hole in carriage frame assembly (*50*). Retain parts with setscrew (34).
4. Adjust stud clearance and reed switches (para 6-14a, 6-14b, and 6-14c).
5. Remove printer chassis assembly from maintenance frame and install in printer base assembly (para 6-18b).

h. *Removal and Replacement of Print Drum (fig.6-59)*

NOTE

Removal of the print drum requires major disassembly of the printer chassis and extensive adjustments during and after replacement. Determine that parts replacement is absolutely required before attempting removal procedures.

(1) *Removal*. To remove print drum, proceed as follows:

(a) Remove tension on drive belt (23, fig. 6-53) by loosening bearing assembly attaching screw (1, fig. 6-53).

(b) Remove drive belt from print drum pulley (22).

NOTE

If drive belt tension is too tight, preventing removal of drive belt from pulley, loosen setscrews (24, fig. 6-53) securing motor pulley (25, fig. 6-3) and remove pulley from motor.

(c) Remove paper pressure mechanism (para 6-20a).

(d) Remove right-hand ribbon feed assembly (para 6-22b).

WARNING

Pressure selector spring (1, fig. 6-56) is loaded to 11 inch-ounces. Protect eyes when removing spring.

(e) Remove pressure selector spring (1, fig. 6- 56).

(f) Remove timing plate assembly from printer chassis (para 6-21i).

NOTE

If screw (10) can be addressed with a hex head wrench, proceed to step (i). If screw (10) cannot be addressed, perform steps (g) and (h).

(g) Rotate power shaft until cam follower (92, fig. 6-55) is at its maximum upward travel.

(h) With a blunt tool, carefully push in on tab of ribbon feed clutch assembly (45, fig. 6-61) until it just clears the pin on guide assembly (96, fig. 6-55). When the pin clears, pull cam follower (92, fig. 6-*55)* forward until the ribbon feed clutch assembly is free of the guide assembly.

(i) Remove screws (1), (3), (10), and (12) from printer chassis and remove bearing caps (9) and (18).

LEGEND:

1. SCREW, 10037
2. LOCK WASHER, 10430
3. SCREW, 10096
4. LOCK WASHER, 10430
5. FLAT WASHER, 10467
6. NUT PLATE, 67964
7. SETSCREW, 10204
8. STUD, 67965
9. BEARING CAP(P/0 FRAME ASSEMBLY)
10. SCREW, 10063
11. LOCK WASHER, 10430
12. SCREW, 10067
13. LOCK WASHER, 10430
14. FLAT WASHER, 10467
15. NUT PLATE, 67964
16. SETSCREW, 10204
17. STUD, 67965
18. BEARING CAP (P/O FRAME ASSEMBLY)
19. LOWER BEARING CAP(P/O FRAME ASSEMBLY)
20. SHIM (0.005 IN. TK), 67587
21. SHIM (0.002 IN. TK), 67588
22. PULLEY, 67640A
23. SETSCREW, 10209
24. LEFT-HAND SPROCKET WHEEL ASSEMBLY, 73196A
25. SPACER, 70139
26 SPACER, 50347
27. SCREW, 10024
28. LOCK WASHER, 10431
29. FLAT WASHER, 58456
30. TIMING DISK COVER, 66631
31. SCREW, 12335
32. LOCK WASHER, 10432
33. FLAT WASHER, 52988
34. ADJUSTING PLATE, 65941A
35. FLAT WASHER, 54643
36. ECCENTRIC STUD, 66352
37. TIMING DISK, 66240A
38. RETAINING RING, 11161
39. TIMING PLATE ASSEMBLY,68288A
40. PREFORMED PACKING, 65989
41. RIGHT-HAND SPROCKET WHEEL ASSEMBLY, 73200A
42. SPACER, 66064
43. SHIM, 66065
44. SHIM, 66066,
45. TYPEWHEEL ASSEMBLY, 70120

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Figure 6-59. Print Drum and Timing Mechanism Exploded View (Sheet 1 of 2)

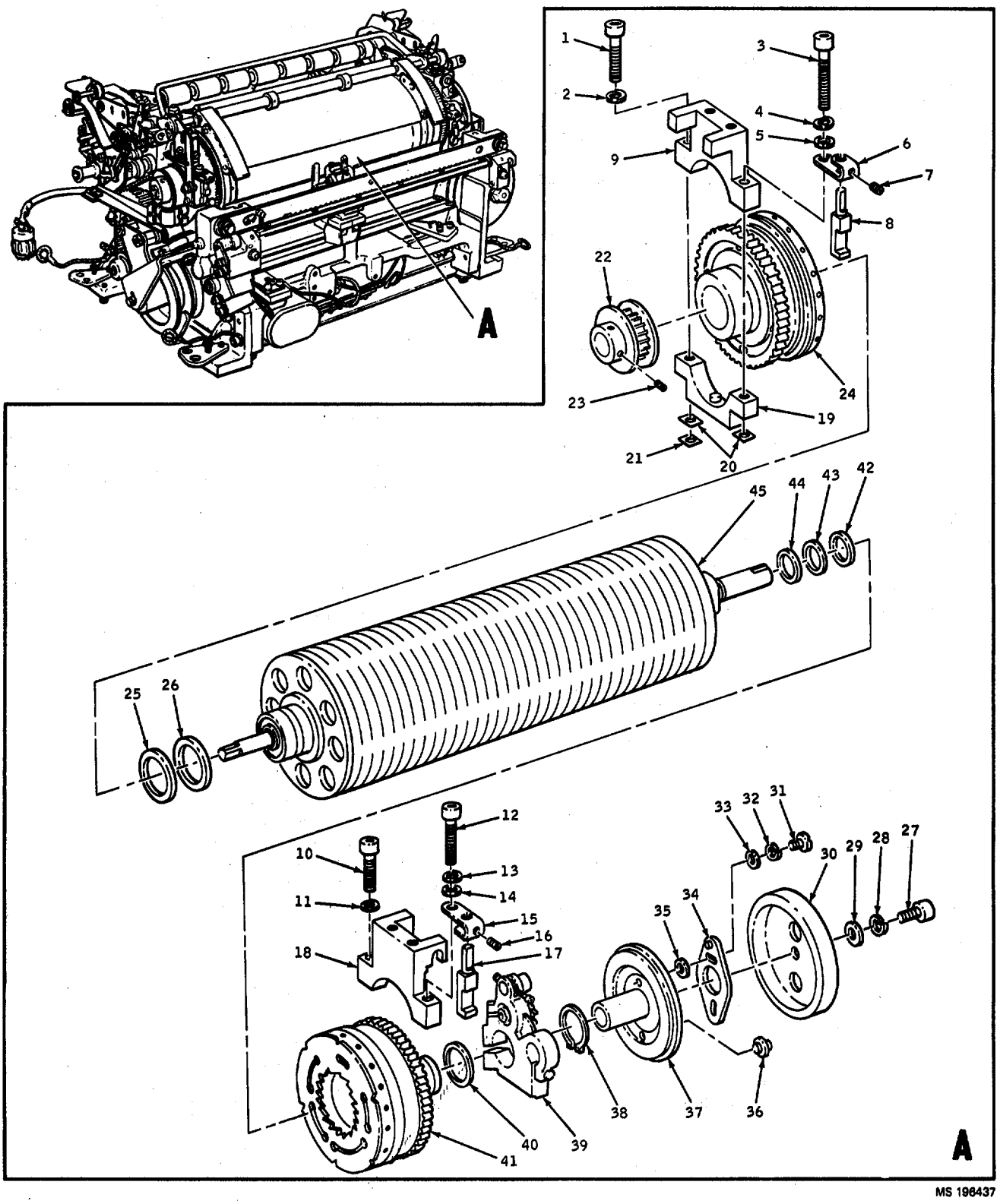


Figure 6-59. Print Drum and Timing Mechanism, Exploded View (Sheet 2 of 2)

(j) Remove studs (8) and (17).

(k) Carefully lift assembly of typewheel assembly (45), left-hand sprocket wheel assembly (24), and right-hand sprocket wheel assembly (41) out of printer frame.

(1) Remove preformed packing (40) right- hand sprocket wheel assembly (41) spacer (42), and shims (43) and (44) from right side of typewheel assembly (45).

(m) Loosen setscrews (23) and remove left-hand sprocket wheel assembly (24) and spacers (25) and (26) from left side of typewheel assembly.

NOTE

While the print drum is removed, inspect, clean and lubricate components of the printer chassis not accessible with print drum installed. Refer to Chapter 5, Section II.

(2) Replacement. To replace print drum, proceed as follows:

(a) Inspect right- and left-hand sprocket wheel assemblies (24) and (41) to make certain that sprocket pins extend and retract.

(b) Install spacers (25) and (26) on left side of typewheel assembly (45) followed by left-hand sprocket wheel assembly (24).

(c) While pressing left-hand sprocket wheel assembly against the typewheel assembly, measure the clearance between left edge of the typewheel assembly and the center of a sprocket pin (refer to para 6-10a). The clearance should be 17/64 +0 -1/64 inch. Add or remove spacers (26) to obtain proper clearance.

(d) Temporarily remove left-hand sprocket wheel assembly and apply a light film of grease (NSN 9150-00-985-7247) to bearing and spacer facing surfaces.

(e) Install pulley (22) on left side of typewheel assembly. Tighten setscrew (23) only enough to retain part.

(f) Install shims (44) and (43), spacer (42), and right-hand sprocket wheel assembly (41) on left side of typewheel assembly.

(g) While pressing left-hand and right-hand sprocket wheel assemblies against the typewheel assembly 77 measure the distance between the centers of a left- and right-hand sprocket pin (refer to para 6-10b). The distance should be 8 +1/64-0-inches. Add or remove shims (43) and (44) to obtain proper distance.

(h) Temporarily remove right-hand sprocket wheel assembly and apply a light film of grease (NSN 9150-00-985-7247) to bearing, shim, and spacer facing surfaces.

(i) If not installed, install lower bearing cap (19) on printer chassis.

(j) Install assembly of typewheel assembly and sprocket wheel assemblies in printer chassis.

(k) Install right-hand bearing cap (18) and secure with screws (10) and (12), flat washer (14), and lockwashers (11) and (13). Do not install stud (17) at this time. (1) Install left-hand bearing cap (9) and secure with screws (1) and (3), flat washer (5), and lockwashers (2) and (4). Do not install stud (8) at this time.

(m) Perform print drum vertical alinement (para 6-10r).

(n) Perform print drum lateral alinement (para 6-10q).

(o) Perform sprocket pin alinement (para 6- 91).

(p) Perform sprocket wheel assembly gear and backlash alinement (para 6-9h).

(q) Loosen screws (3) and (12) and assembly of stud (8) nut plate (6) and setscrew (7) and assembly of stud (17) nut plate (15) and setscrew (16) on bearing blocks. Tighten screws (3) and (12).

(r) Install belt on drive pullies.

NOTE

If motor pulley (25, fig. 6-53) was removed, install on motor drive shaft at this time.

(s) Aline drive belt (para 5-13).

(t) Adjust drive belt tension (para 5-11).

(u) With a blunt tool, carefully push in on tab of ribbon feed clutch assembly (45, fig. 6-61) until it just clears the pin on guide assembly (96, fig. 6-55). When the pin clears, rotate the power shaft until the pin is opposite the hole on the ribbon feed clutch assembly tab. Release pressure to engage tab.

(v) Install right-hand ribbon feed assembly (para 6-22b).

(w) Install paper pressure mechanism (para 6-20a).

(x) Check print hammer alinement. Aline if necessary (para 6-10o).

(y) Check print hammer magnet clearance. Adjust if necessary (para 6-10p).

(z) Check print impact. Adjust if necessary (para 6-10p).

(aa) Install timing plate assembly (39) (para 6-21i).

(ab) Perform ribbon lift mechanism alinement (para 6-12c).

i. *Removal and Replacement of Timing Plate Assembly (fig. 6-60)*

(1) *Removal*. To remove timing plate assembly, proceed as follows:

(a) Slide carriage assembly (79, fig. 6-57) to left margin of printer.

(b) Remove two screws (25, fig. 6-65), lock- washers (26, fig. 6-65), and flat washers (27, fig. 6-65).

(c) Remove nut (21, fig. 6-65) and screw (20, fig. 6-65) and remove right-hand lift arm (28, fig. 6-65).

(d) Remove screw (27), lockwasher (28), and flat washer (29) and remove timing disk cover (30).

(e) Slide timing disk (37) off print drum shaft.

(f) Remove retaining ring (38).

NOTE

Do not perform steps (g) and (h) if timing plate assembly (39) is just being removed in order to remove print drum assembly.

(g) Remove screw (7, fig. 6-60) and remove cover (8, fig. 6-60) from timing plate assembly.

(h) Tag and disconnect wires to bobbin assemblies (11 and 14, fig. 6-60). After wires are disconnected reinstall cover (8, fig. 6-60) to prevent loss of parts.

(i) Loosen setscrew (4, fig. 6-60).

(j) Remove screw (1, fig. 6-60), nut (2, fig. 6-60) and flat washer (3, fig. 6-60) and remove timing plate assembly (39) from shoulder of right-hand sprocket wheel assembly (41). Reinstall screw, nut, and flat washer on timing plate assembly to prevent loss of parts.

(*2) Replacement.* To replace timing plate assembly, proceed as follows:

(a) If not installed, install preformed packing (40) on shoulder of right-hand sprocket wheel assembly (41).

(b) Loosen setscrew (4, fig. 6-60) and remove screw (1, fig. 6-60), nut (2, fig. 6-60), and flat washer (3, fig. 6-60) from timing plate assembly (39).

(c) Install timing plate assembly on shoulder of right-hand sprocket wheel assembly and retain with retaining ring (38).

(d) If necessary, clear adjusting nut pad (5, fig. 6-60) from the threaded hole in adjustable nut (6, fig. 6-60). 6

(e) Orient timing plate assembly so that the adjustable nut is centered within the bearing cap.

(f) Thread screw (1, fig. 6-60) through adjustable nut and cutouts in bearing cap.

(g) Install flat washer (3, fig. 6-60) and nut (2, fig. 6-60) on screw. Tighten nut only enough to remove screw end play.

(h) Remove screw (7, fig. 6-60) and remove cover (8, fig. 6-60) from timing plate assembly.

(i) Solder wires to bobbin assemblies (11 and 14, fig. 6-60). Remove wire tags.

(j) Dress Wires into channel of timing plate assembly and install cover (8, fig. 6-60). Secure cover with screw (7, fig. 6-60).

(k) Dress wires along right-side of printer chassis so that wires are clear of moving parts.

(l) Check that the bobbin pole faces are aligned with the scribed lines on the timing plate assembly. If the bobbin pole faces are not alined with the scribed lines, loosen the clamping screws and aline. Tighten clamping screws.

(m) If not assembled, assemble adjusting plate (34, fig. 6-59) to timing disk (37) as follows:

1. Install eccentric stud (36) in bore of timing disk (37).

2. Place a flat washer (35) over the threaded hole in the timing disk and install adjusting plate (34) on timing disk. Retain parts with screw (31), lockwasher (32) and flat washer (33).

(n) Check that the pole on adjusting plate (34) is flush to the poles on timing disk (37) or within 0.010 inch. Add or remove shim (35), as required, until poles are flush or within 0.010 inch.

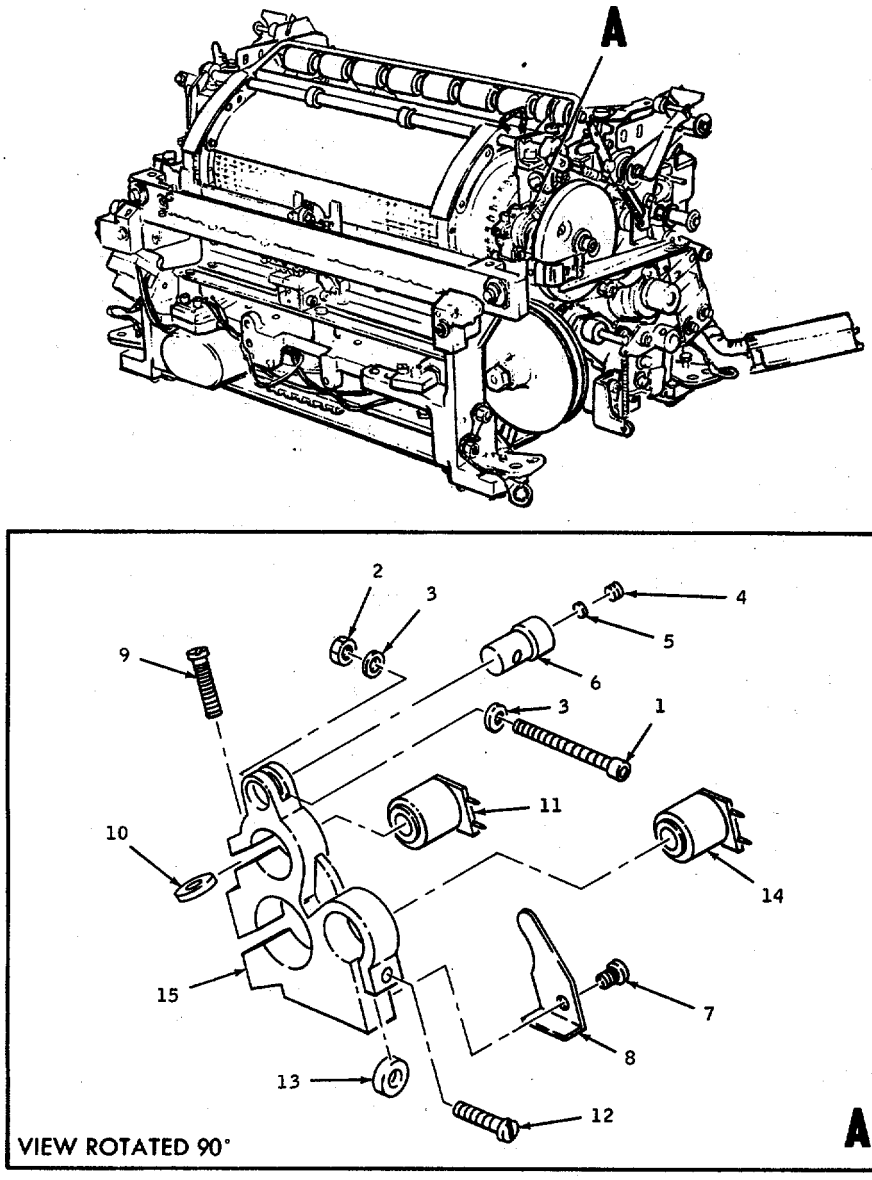
(o) Temporarily install timing disk on printer drum axle.

(p) Check that poles of bobbin (11, fig. 6-60) and the pole on adjusting plate (34) have a minimum clearance of 0.004 inch. If poles do not have a minimum clearance of 0.004 inch, loosen clamping screw of bobbin and laterally position bobbin. Check that bobbin pole face is alined (step 1) and then tighten clamping screw.

NOTE

The bobbin poles are magnetized. In measuring pole clearances, do not confuse magnetic attraction to feeler gage with lack of proper clearance. The pole clearances should be as close as possible to 0.004 inch to assure proper amplitude of clock pulses.

(q) Check that the pole of bobbin (14, fig. 6-60) and the poles on timing disk (37) have a minimum clearance of 0.004 inch. If poles do not have a minimum clearance of 0.004 inch, loosen clamping screw of bobbin and laterally position bobbin. Check that bobbin pole face is alined (step 1) and then tighten clamping screw.



LEGEND:

1. SCREW, 66029
2. NUT, 10500
3. FLAT WASHER (2 REQ), 10477
4. SETSCREW, 11263
5. ADJUSTING NUT PAD, 71537
6. ADJUSTABLE NUT, 65875
7. SCREW, 12335
8. COVER, 68381
9. SCREW, 10005
10. SPACER, 68572
11. BOBBIN ASSEMBLY (INDEX CLOCK L2), 66035A
12. SCREW, 10005
13. SPACER, 68572A
14. BOBBIN ASSEMBLY (MAIN CLOCK L1), 66035A
15. PLATE ASSEMBLY, 68289A

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Figure 6-60. Timing Plate Assembly, Exploded View

(r) Install timing disk cover (30) and secure with screw (27), lockwasher (28), and flat washer (29).

(s) Install right-hand lift arm (28, fig. 6-65) and secure front to ribbon vibrator bail (24, fig. 6-65) with screw (20, fig. 6-65) and nut (21, fig. 6-65).

(t) Secure rear of right-hand lift arm to right-hand bracket assembly (39, fig. 6-65) with two screws (25, fig. 6-65), lockwashers (26, fig. 6-65), and flat washers (27, fig. 6-65).

(u) Adjust the ribbon lift mechanism (para 6- 12c).

(v) Check the output of the main clock bobbin. Adjust amplitude if necessary (para 6-13a).

(w) Aline index clock with main clock (para 6-13b).

(x) Check alinement of print hammer block. Adjust if necessary (para 6-10o).

(y) Check print hammer magnet clearance adjustment. Adjust if necessary (para 6-10p).

(z) Adjust character phasing (para 6-13c).

(aa) Check print hammer magnet impact. Adjust if necessary (para 6-10).

6-22. Removal, Replacement, and Repair of Inking Ribbon Mechanism Components. The inking ribbon mechanism consists of the right- and left-hand ribbon feed assemblies, ribbon feed drive shaft, and ribbon feed clutch. Components of the paper handling mechanism are also included in these removal, replacement and repair procedures in that some attaching hardware is common to the inking ribbon mechanism components. These components are the paper guide rollers and low paper alarm assembly.

a. *Removal and Replacement of Left-Hand Ribbon Feed Assembly (fig. 6-61)*

(1) *Removal.* To remove left-hand ribbon feed assembly, proceed as follows:

(a) If installed remove ribbon spool from left-hand ribbon feed assembly.

(b) Remove screw (19), lockwasher (20) and spacer (21).

(c) While applying a slight pull on the left-hand ribbon feed assembly, unthread pivot stud (13) from left-hand ribbon feed assembly and remove left- hand ribbon feed assembly from printer chassis.

(2) *Replacement*. To replace left-hand' ribbon feed assembly, proceed as follows:

(a) If removed, install spacer (15) on pivot stud (13).

(b) Preinstall screw (19) and lockwasher (20) on left-hand ribbon feed assembly (22).

(c) Install spacer (21) on screw (19) shank.

CAUTION

Read steps (d) through (g) below before continuing with installation procedures. Damage to left-hand ribbon feed assembly (22) roller arm (9), or left-hand inner: plate (35) could result if mounting screw (19) and pivot stud (13) are tightened prematurely.

NOTE

Have slot screwdriver, 3/8-inch open end wrench and spring hook available to perform steps (d) through (g). (d) While holding reverse lever (5, fig. 6-62) level in order to clear spacer (15), orient left-hand ribbon feed assembly in mounting position on printer chassis. Thread screw (19) into printer chassis only enough to capture left-hand ribbon feed assembly.

NOTE

In step (e), the reverse level torsion spring (6, fig. 6-62) must engage the cutout above the upper tab on inner plate (35), the stud mounting the reverse lever must be alined to its mounting hole in inner plate (35), and the reverse lever eccentric pin must be to the inside of dog assembly (42).

(e) While pulling back on reverse lever torsion spring inside hook (with spring hook) and lifting up on reverse lever (in order for eccentric pin to clear dog assembly) position ribbon feed assembly in mounting position. Hook torsion spring in slot in inner plate and release reverse lever. Observe that all the conditions of the above note are met.

NOTE

In steps (f) and (g), use thumb and index finger of one hand to hold ribbon feed assembly and roller arm in place.

(f) While holding ribbon feed assembly in mounting position, press down and slightly inward on paper guide roller so that rear of roller arm (9) is positioned immediately above the upper tab of inner plate (35).

(g) While holding ribbon feed assembly and roller arm in place, thread, pivot stud into ribbon feed assembly. Tighten pivot stud.

(h) Tighten screw (19).

(i) Lubricate ribbon feed assembly and drive components (fig. 5-2).

(j) Aline ribbon reverse lever (para 5-20).

LEGEND:

1. PAPER SHAFT, SCB70404
2. ROLLER ARM SPRING, 50911
3. RETAINING RING, 12949
4. ROLLER ARM SPRING, 50911
5. RETAINING RING, 12949
6. RETAINING RING, 12960
7. ROLLER ARM, 67847A
8. RETAINING RING, 12960
9. ROLLER ARM, 67847A
10. PAPER GUIDE ROLLER, 72505
11. PAPER GUIDE ROLLER, 68335 (7 REQUIRED)
12. PAPER GUIDE ROLLER SHAFT, 65531
13. PIVOT STUD, 66343
14. LOCK WASHER, 10430
15. SPACER, 66348
16. PIVOT STUD, 66343
17. LOCK WASHER, 10430
18. SPACER, 66348
19. SCREW, 12130
20. LOCK WASHER, 10430
21. SPACER, 66348
22. LEFT HAND RIBBON FEED ASSEMBLY, 68279A
23. SCREW, 12130
24. LOCK WASHER, 10430
25. SPACER, 66348
26. RIGHT HAND RIBBON FEED ASSEMBLY, 68276A
27. SCREW, 10024
28. LOCK WASHER, 10431
29. LOW PAPER ALARM ASSEMBLY, 72800A
30. SCREW, 10026
31. LOCK WASHER, 10431
32. RIGHT HAND PLATE ASSEMBLY, 65916A
33. SCREW, 10008
34. LOCK WASHER, 10430
35. LEFT HAND INNER PLATE, 66326
36. SCREW, 10010
37. NUT, 10507
38. LOCK WASHER, 10426
39. FLAT WASHER, 10454
40. RIGHT HAND INNER PLATE, 66325
41. SETSCREW, 10203
42. LEFT HAND DOG ASSEMBLY, 68340A
43. RIGHT HAND DOG ASSEMBLY, 71318A
44. FLAT WASHER, 10454
45. RIBBON FEED CLUTCH ASSEMBLY, 72114A
46. RETAINING RING, 12957
47. RIBBON FEED DRIVE SHAFT, 71301
48. SCREW, 10004
49. LOCK WASHER, 10429
50. FLAT WASHER, 10450
51. CABLE CLAMP, 20558
52. SETSCREW, 10204
53. DETENT ASSEMBLY, 53306A

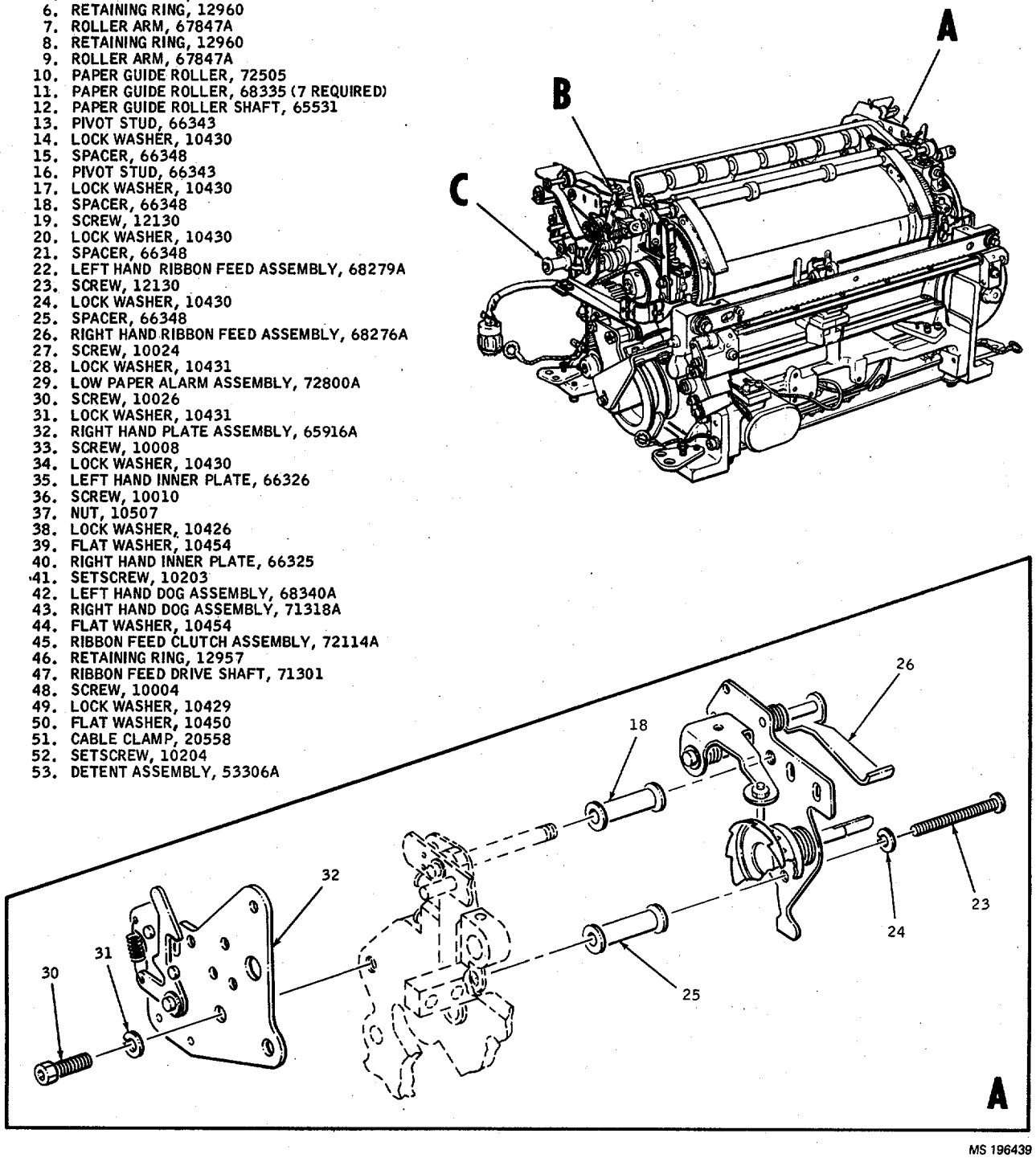


Figure 6-61. Right and Left Ribbon Feed and Low Paper Sensing Mechanisms, Exploded View (Sheet 1 of 3)

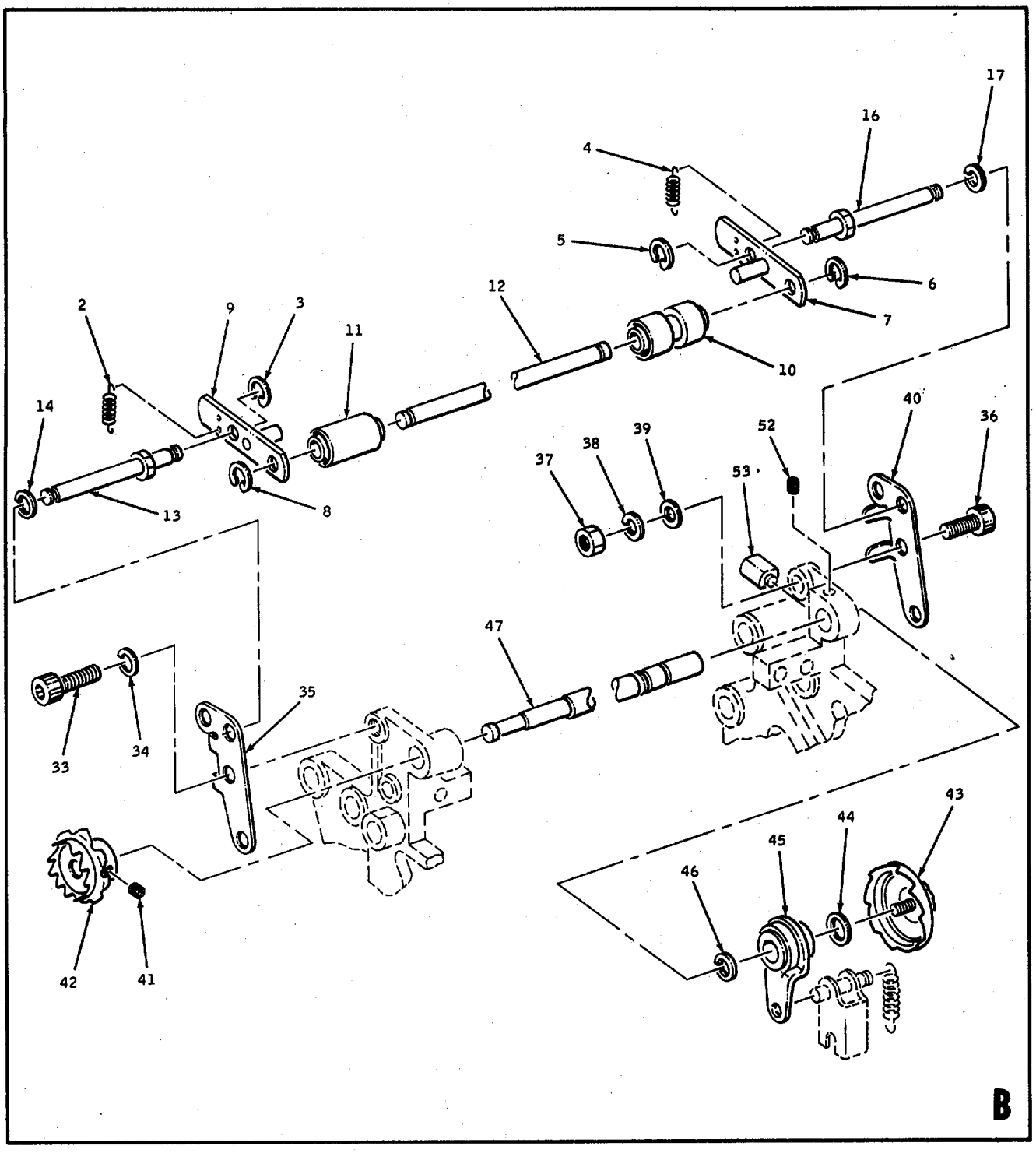


Figure 6-61. Right and Left Ribbon Feed and Low Paper Sensing Mechanisms, Exploded View (Sheet 2 of 3)

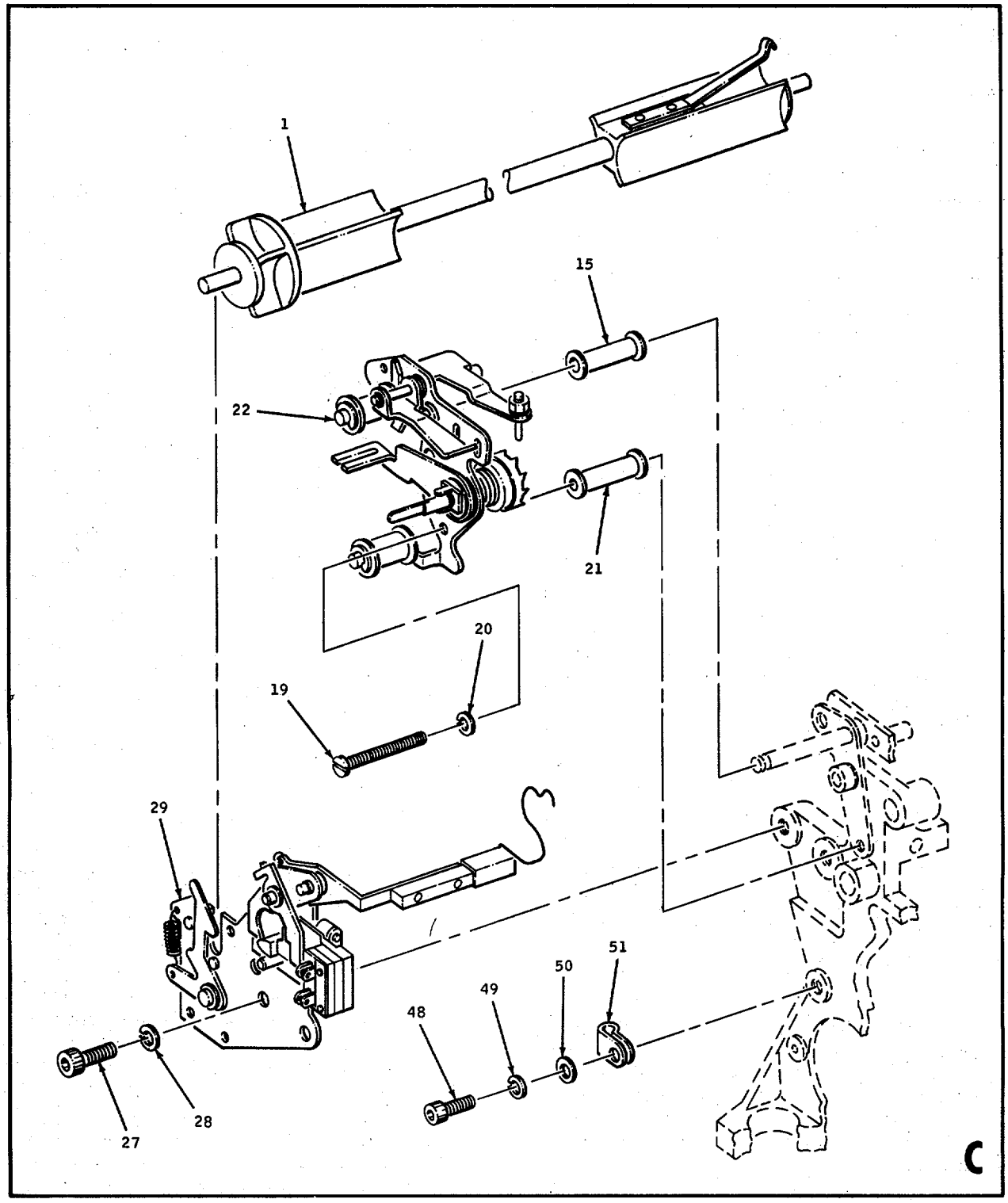


Figure 6-61. Right and Left Ribbon Feed and Low Paper Sensing Mechanisms, Exploded View (Sheet 3 of 3)

b. *Remov*al a*nd Replacement of Right-Hand Ribbon Feed Assembly (fig. 6-61)*

(1) *Removal.* To remove right-hand ribbon feed assembly, proceed as follows:

(a) If installed remove ribbon spool from right-hand ribbon feed assembly.

(b) Remove screw (23), lockwasher (24) and spacer (25).

(c) While applying a slight pull on the right-hand ribbon feed assembly, unthread pivot stud (16) from right-hand ribbon feed assembly and remove right-hand ribbon feed assembly from printer chassis.

(2) *Replacement.* To replace right-hand ribbon feed assembly, proceed as follows:

(a) If removed, install spacer (18) on pivot stud (16).

(b) Install screw (23) and lockwasher (24) on right-hand ribbon feed assembly (26).

(c) Install spacer (25) on screw (23) shank.

CAUTION

Read steps (d) through (g) below before continuing with installation procedures. Damage to right-hand ribbon feed assembly (26) roller arm (7), or right-hand inner plate (40) could result if mounting screw (23) and pivot stud (16) are tightened prematurely.

NOTE

Have slot screwdriver, 3/8-inch open end wrench and spring hook available to perform steps (d) through (g).

(d) While holding reverse lever (5, fig. 6-68) level in order to clear spacer (18), orient right-hand ribbon feed assembly in mounting position on printer chassis. Thread screw (28) into printer chassis only enough to capture right-hand ribbon feed assembly.

NOTE

In step (e), the reverse lever torsion spring (6, fig. 6-63) must engage the cutout above the upper tab on inner plate (40), the stud mounting the reverse lever must be alined to its mounting hole in inner plate (40), and the reverse lever eccentric pin must be to the inside of dog assembly (43).

(e) While pulling back on reverse lever torsion spring inside hook (with spring hook) and lifting up on reverse lever (in order for eccentric pin to clear dog assembly) position ribbon feed assembly in mounting position. Hook torsion spring in slot in inner plate and release reverse lever. Observe that all the conditions of the above note are met.

NOTE

In steps (f and (g), use thumb and index finger of one hand to hold ribbon feed assembly and roller arm in place.

(f) While holding ribbon feed assembly in mounting position, press down and slightly inward on paper guide roller so that rear of roller arm (7) is positioned immediately above the upper tab of inner plate (40).

(g) While holding ribbon feed assembly and roller arm in place, thread pivot stud into ribbon feed assembly. Tighten pivot stud.,

(h) Tighten screw (28).

(i) Lubricate ribbon feed assembly and drive components (fig. 5-2).

(j) Aline ribbon reverse lever (para 5-20).

c. *Repair of Left-Hand and Right-Hand Ribbon Feed Mechanism (fig. 6-62 and 6-3).* These repair procedures apply equally to both the left-hand and the right-hand ribbon feed mechanisms. When repairing the left-hand ribbon feed mechanism, refer to figure 6-62. When repairing the right-hand ribbon feed mechanism, refer to figure 6-68. Removal and replacement procedures are given for those parts that are not obvious. Refer to figure 6-62 or 6-63, as applicable, for removal and replacement of parts that are obvious. Inspect for damage and proper operation prior to repair and after repair procedures are complete in accordance with paragraph (1) below.

(1) *Inspection and test of ribbon feed mechanism*

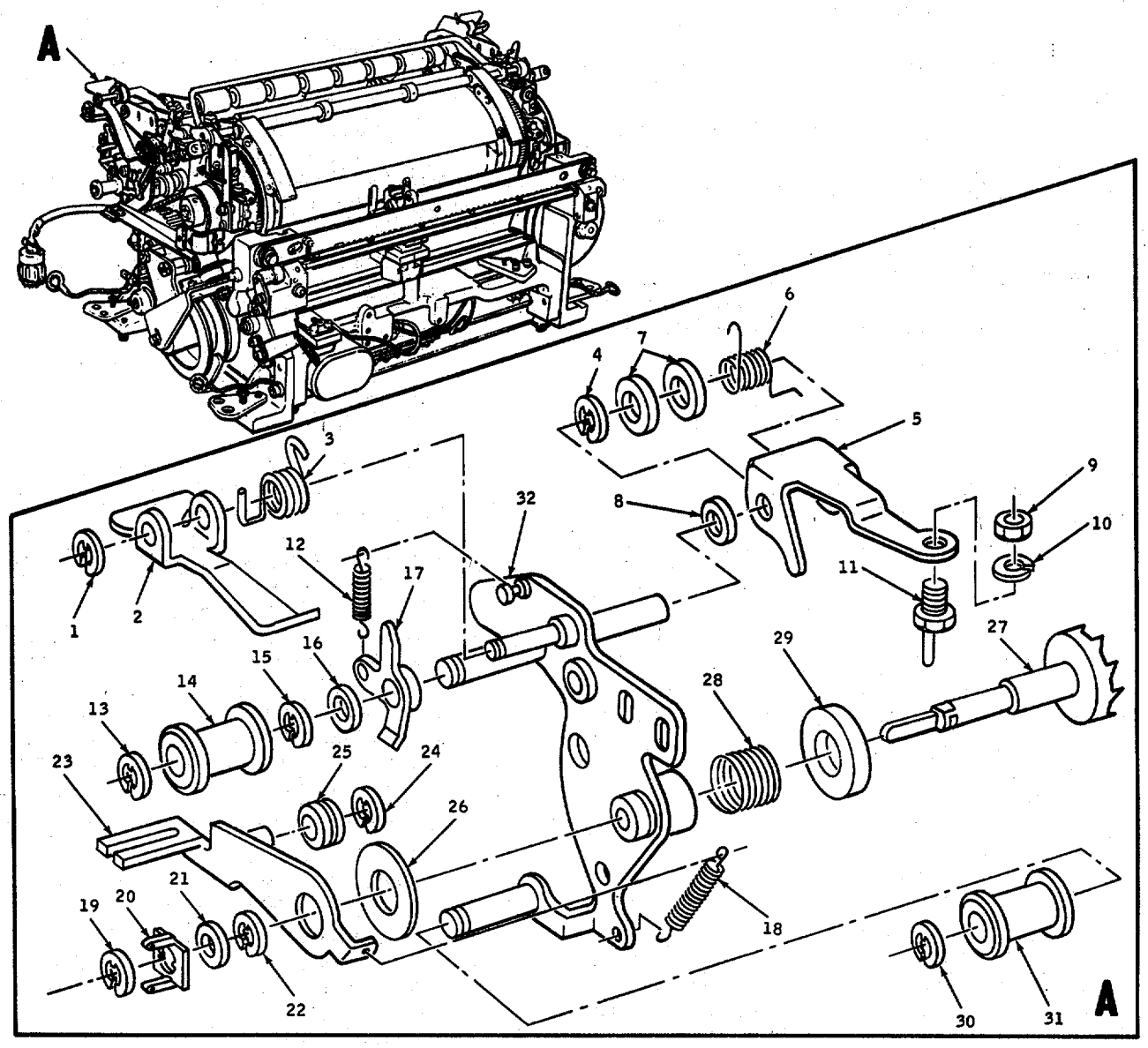
(a) Inspect ribbon feed mechanism for completeness and physical damage to parts.

(b) Lift ribbon retainer (2). Observe that there is a slight amount of torsion in ribbon retainer spring (3) and that the retainer lifts without binding. Release retainer and observe that retainer snaps back to the ribbon spool shaft and that there is still torsion in the retainer spring.

(c) Pull down on sensing arm assembly (28). Observe that the tension of spring (18) is approximately equal through the full travel of the sensing arm, that there is no binding with the plate assembly and that roller (25) follows the roller race of the plate assembly.

(d) If ribbon feed assembly is not installed in printer chassis, pull down on sensing arm assembly (28) and rotate reverse lever (5). Observe that the lever rotates freely and evenly without binding.

(e) If ribbon feed assembly is installed in printer chassis, pull down on sensing arm assembly (23) to trip latch assembly (17). Lift up on reverse levee (4 and observe that lever lifts without binding. Observe also that reverse lever spring (6) applies a very slight amount of torsion to the lever.



LEGEND:

1. RETAINING RING, 10969
2. RIBBON RETAINER, 68434
3. LH RIBBON RETAINER SPRING, 67974
4. RETAINING RING, 10949
5. LH REVERSE LEVER, 66315
6. LH REVERSE LEVER SPRING, 66461
7. FELT WASHERS (2 REQ), 61474
8. FLAT WASHER, 50827
9. NUT, 10512
10. LOCK WASHER, 10429
11. ECCENTRIC PIN, 66344
12. LATCH ASSEMBLY SPRING, 52213
13. RETAINING RING, 10949
14. ROLLER, 66314
15. RETAINING RING, 10949
16. SHIM, 55948 AND/OR 55949 (AS REQUIRED)
17. LH LATCH ASSES,68226A
18. SENSING ARM ASSBLY SPRING, 66432
19. RETAINING RING, 10960
20. RIBBON SPOOL DISK DRIVE, 66304
21. FLAT WASHER, 56546
22. RETAINING RING, MS3215-1031
23. LH SENSING ARM ASSEMBLY, 66351
24. RETAINING RING, 10949
25. ROLLER, 66455
26. FLAT WASHER, 66347
27. LH RIBBON SPOOL SHAFT ASSEMBLY, 68333A
28. RIBBON SPOOL SHAFT ASSEMBLY SPRING, 66434
29. FELT WASHER, 61668
30. RETAINING RING, 10949
31. ROLLER, 66314
32. LH PLATE ASSEMBLY, 68280A

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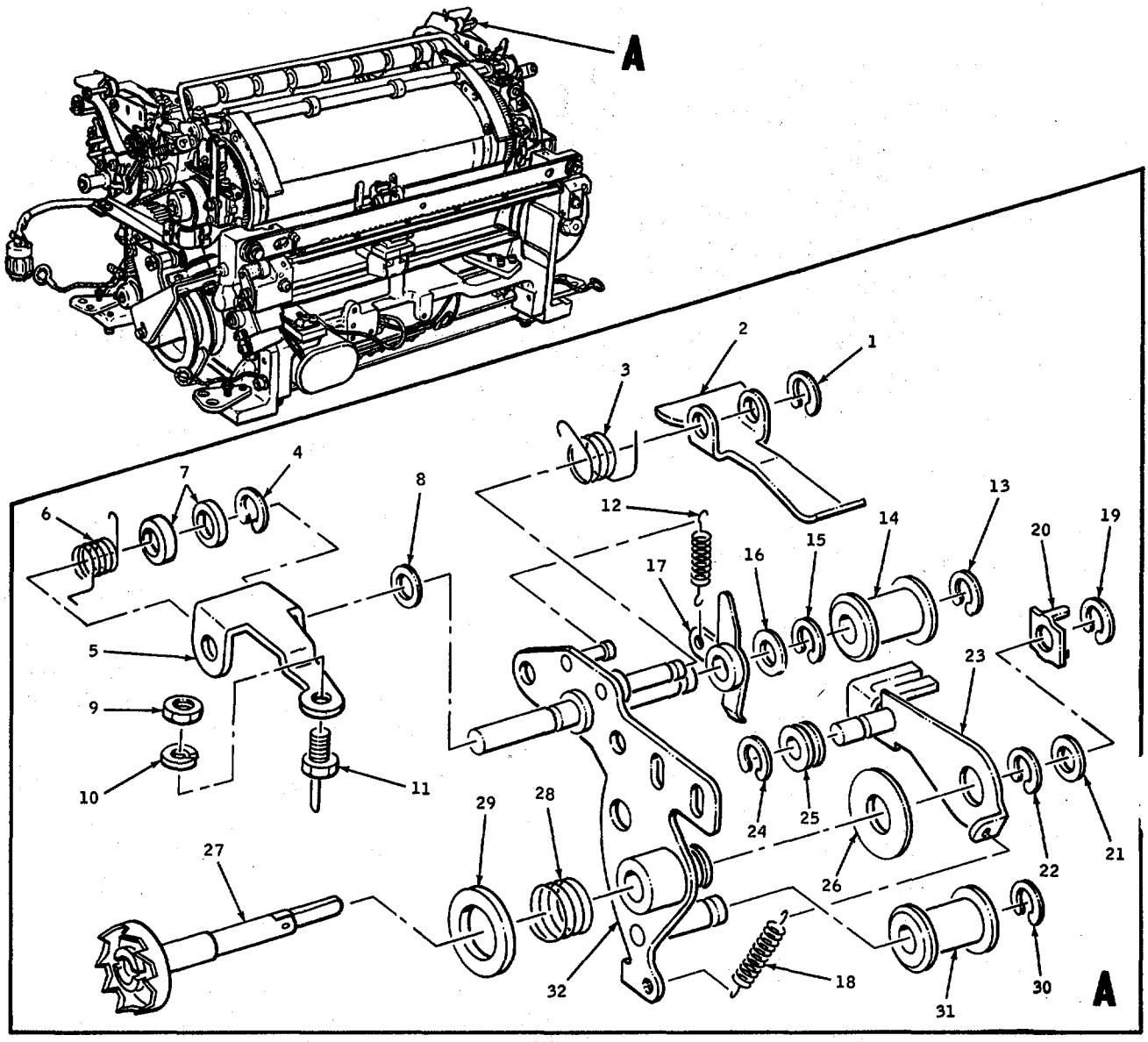
Figure 6-62. Left-Hand Ribbon Feed Assembly, Exploded View



LEGEND:

1. RETAINING RING, 10969
2. RIBBON RETAINER, 68434
3. RH RIBBON RETAINER SPRING, 67973
4. RETAINING RING, 10949
5. RH REVERSE LEVER, 66316
6. RH REVERSE LEVER SPRING, 66460
7. FELT WASHER (2 REQ), 61474
8. FLAT WASHER, 50827
9. NUT, 10512
10. LOCK WASHER, 10429
11. ECCENTRIC PIN, 66344
12. LATCH ASSEMBLY SPRING, 52213
13. RETAINING RING, 10949
14. ROLLER, 66314
15. RETAINING RING, 10949
16. SHIM, 55948 AND/OR 55949 (AS REQUIRED)
17. RH LATCH ASSEMBLY, 68225
18. SENSING ARM ASSEMBLY SPRING, 66432
19. RETAINING RING, 10960
20. RIBBON SPOOL DISK DRIVE, 66304
21. FLAT WASHER, 56546
22. RETAINING RING, MS3215-1031
23. RH SENSING ARM ASSEMBLY, 66350A
24. RETAINING RING, 10949
25. ROLLER, 66455
26. FLAT WASHER, 66347
27. RH RIBBON SPOOL SHAFT ASSEMBLY, 68277A
28. RIBBON SPOOL SHAFT ASSEMBLY SPRING, 66434
29. FELT WASHER, 61668
30. RETAINING RING, 10949
31. ROLLER, 66314
32. RH PLATE ASSEMBLY, 68414A

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Figure 6-63. Right Hand Ribbon Feed Assembly, Exploded View

(f) With ribbon feed assembly upright, pull down on sensing arm assembly (23). Observe that the tab on latch assembly (17) contacts the front ribbon guide on sensing arm. Observe that the end of eccentric pin (11) is located below the teeth on ribbon spool shaft assembly (27).

NOTE

If ribbon feed assembly is removed from printer chassis, it may be necessary to rotate reverse lever (5) to position the eccentric pin opposite the ribbon spool shaft assembly.

(g) Lift up on ribbon retainer (2). Observe that the latch trips and that sensing arm assembly (23) lifts reverse lever (5) enough that the end of eccentric pin (11) clears the teeth on ribbon spool shaft assembly (27).

(h) From the dog side of ribbon spool shaft assembly (27), push in on shaft and rotate. Observe that the shaft rotates freely and without binding. Release shaft and observe that compression spring (28) pushes the shaft back to its normal position.

(2) *Removal and replacement of ribbon retainer components*

(a) *Removal*. To remove ribbon retainer components, proceed as follows:

1. Remove retaining ring (1).
2. Pull up on end of spring (3) hooked to plate assembly (32) and remove ribbons retainer (2) and spring (3).

(b) *Replacement.* To replace ribbon retainer components, proceed as follows:

1. Hook square hook end of spring (3) around inner tab of ribbon retainer (2).
2. Install assembly of ribbon retainer and spring on mounting stud of plate assembly (32).
3. Lift hook end of spring and hook to top edge of plate assembly.
4. Install retaining ring (1).

(3) *Removal and replacement of reverse lever components*

(a) *Removal.* To remove reverse lever components, proceed as follows:

1. Slide felt washers (7) away from inside tab of reverse lever (5) and remove retaining ring (4).
2. Remove spring (6), reverse lever (5), two felt washers (7), and flat washer (8) from stud on plate assembly (32).

(b) *Replacement*. To replace reverse lever components, proceed as follows:

1. Install flat washer (8) on stud of plate assembly (32).
2. Locate inside tab of reverse lever (5) on stud and insert stud approximately half way between inside and outside tabs of reverse lever.
3. Install two felt washers (7) on stud.
4. Orient spring (6) between outside tab of reverse lever and stud so that the square hook end hooks the outside tab and the loop end points to the rear of the reverse lever. Complete installation of reverse lever on stud.
5. Install retaining ring (4) on stud between inside tab of reverse lever and inside felt washer (7).

(4) *Removal and replacement of sensing arm and spool shaft components*

(a) *Removal.* To remove sensing arm and spool shaft assembly components, proceed as follows:

1. Remove retaining ring (19) and remove ribbon spool disk drive (20), flat washer (21), ribbon spool shaft assembly (27), felt washer (29) and spring (28).
2. Remove spring (18).
3. Remove retaining ring (22) and remove sensing arm assembly (23) and flat washer (26).

(b) *Replacement.* To replace sensing arm assembly and spool shaft assembly components, process follows:

1. Install flat washer (26) and sensing arm assembly (23) on stud of plate assembly (32). Retain parts with retaining ring (22).
2. Install spring (18) between eye on sensing arm assembly and lower eye on plate assembly.
3. Install felt washer (29) and spring (28) on ribbon spool shaft assembly (27).
4. While lifting up on ribbon retainer, insert shaft end of spool shaft assembly through bushing on plate assembly. Orient felt washer so that it does not get pinched between dog on spool shaft assembly and bushing.
5. Press in on spool shaft assembly so that the shaft end protrudes to its full extent and install flat washer (21) and ribbon spool disk drive (20). Retain parts with retaining ring (19).

d. *Removal and Replacement of Low Paper Alarm Assembly (fig. 6-61)*

(1) *Removal*. To remove low paper alarm assembly, proceed as follows:

(a) Remove left-hand ribbon feed assembly (para 6-22a).
(b) Disconnect wires to switch (5, fig. 6-64).
(c) Remove two screws (27) and lockwashers (28) to free low paper alarm assembly from printer chassis.
(d) Carefully remove low paper alarm assembly from printer chassis.

(2) *Replacement.* To replace low paper alarm assembly, proceed as follows:

(a) Carefully orient low paper alarm assembly (29), in the printer chassis so that paper sensing arm (21, fig. 6-64) is between paper tension bar (5, fig. 6-54) and the shoulders of the' first two paper guide rollers (11) (from the left) on paper guide roller shaft (12).
(b) Secure the low paper alarm assembly to the printer chassis with two screws (27) and lock- washers (28).
(c) Connect wires to switch (5, fig. 6-64). Refer to figure 6-64 switch wiring diagram for wire connections.
(d) Lubricate low paper alarm assembly (para 5-6).
(e) Adjust low paper alarm assembly (para 6-9).
(f) Install left-hand ribbon feed assembly (para 6-22a).

e. *Repair of Low Paper Alarm Assembly (fig. 6- 64).* The repair procedures for the low paper alarm assembly are divided into removal and replacement of low (roll) paper lever mechanism components and removal and replacement of paper out mechanism components. For removal and replacement of components that are obvious, refer to figure 6-64.

NOTE

If the low paper alarm assembly is repaired while installed in the printer chassis, the low paper alarm assembly must be readjusted if any component in the switch actuating chain is disturbed. Refer to paragraph 6-9q for adjustment of the low paper alarm assembly.

(1) *Low paper lever mechanism components, removal and replacement (Fig. 6-64)*

(a) *Removal.* To remove the low paper lever mechanism components, proceed as follows:

CAUTION

Do not twist arm assembly (29) to remove or loosen it from shaft assembly (31). A twisting action will result in damage to cam (31) and switch actuating lever components.

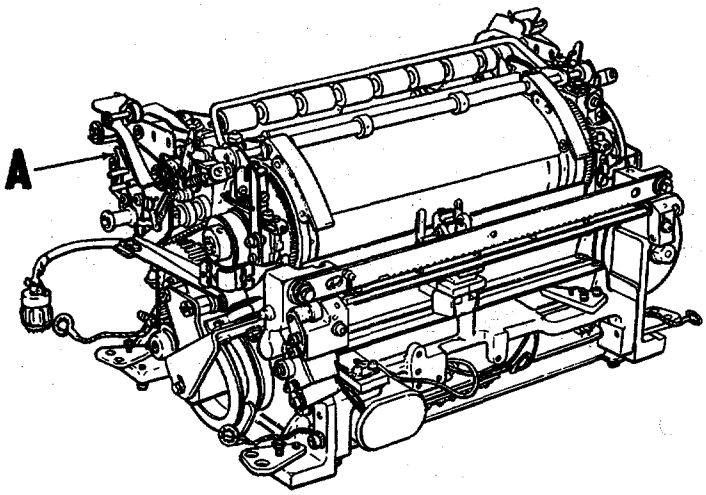
1. Loosen screw (26) and carefully pull arm assembly (2*9)* approximately 1/8-inch away from plate assembly (86).

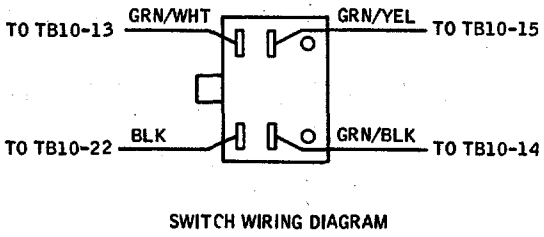
2. Unhook one end of spring (80) and complete removal of arm assembly. S. Remove spring (30) from either arm assembly or plate assembly.

LEGEND

1. SCREW, 12139
2. LOCK WASHER, 10433
3. SPACER PLATE, 60609
4. NUT PLATE, 66188
5. SWITCH, 20145
6. RETAINING RING, 10960
7. SWITCH ACTUATOR, 70346
8. SCREW, 10347
9. NUT, 10536
10. LEVER SPRING, 70348
11. NUT, M535649-284
12. LOCK WASHER, 10430
13. FLAT WASHER, 10467
14. SCREW, 10043
15. LOCK WASHER, 10432
16. FLAT WASHER, MS27183-3
17. SPACER, 70330
18. CAM FOLLOWER, 70347
19. LEVER ASSEMBLY, 70343A
20. RETAINING RING, 10981
21. PAPER SENSING ARM, 73221A
22. ECCENTRIC STUD, 70329
23. LATCH SPRING, 50912
24. RETAINING RING, 10949
25. LATCH, 52938
26. SCREW, 10006
27. FLAT WASHER, 68132
28. NUT PLATE, 50174
29. ARM ASSEMBLY, 70335A
30. ARM SPRING, 70349
31. SHAFT ASSEMBLY, 70331A
32. CAM, 70333A
33. SCREW, 12109
34. LOCK WASHER, 10432
35. BUSHING, 71852
36. PLATE ASSEMBLY, 70338A

Figure 6-64. Low Paper Alarm Assembly, Exploded View (Sheet 1 of 2)





SWITCH WIRING DIAGRAM

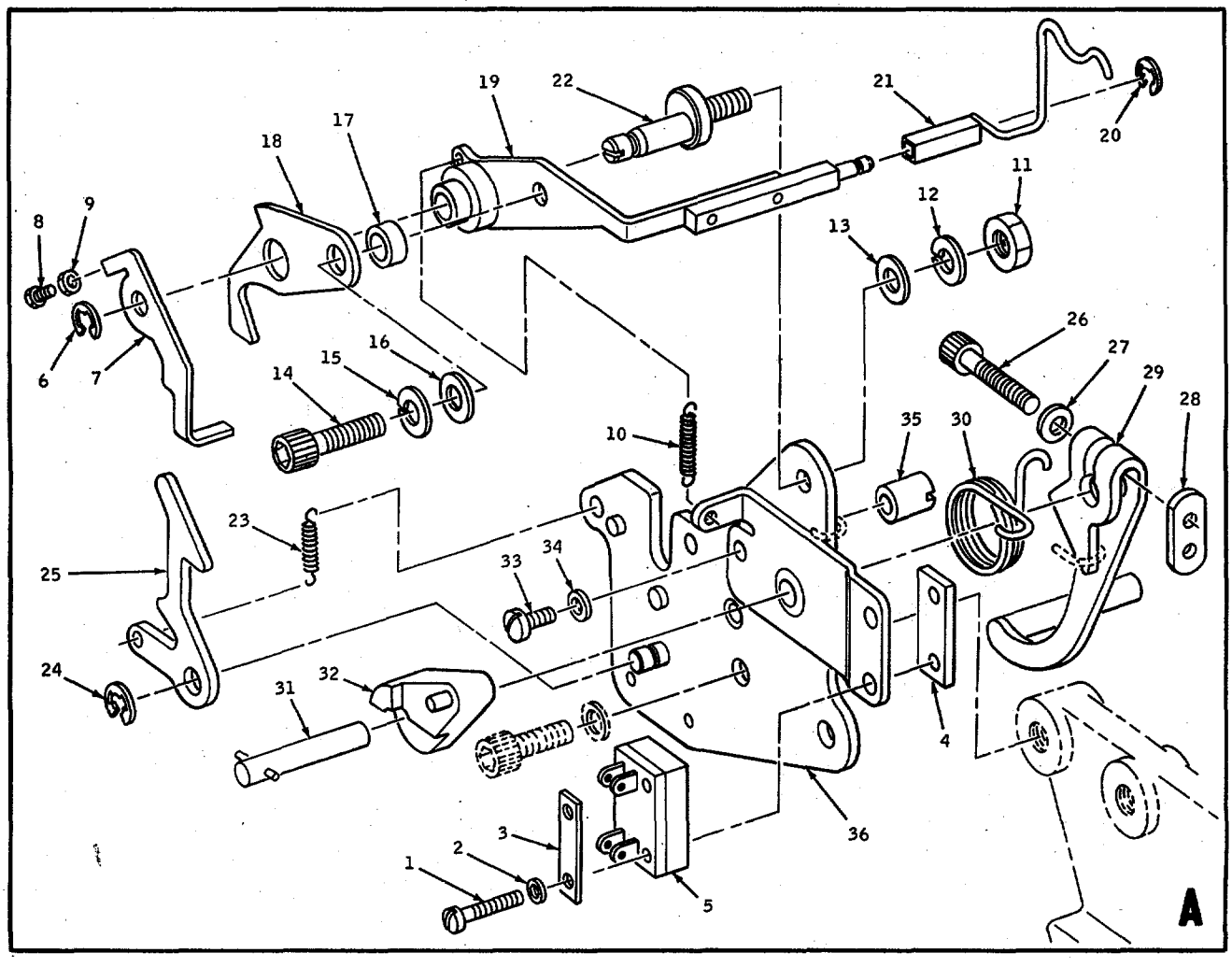


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Figure 6-64. Low Paper Alarm Assembly, Exploded View (Sheet 2 of 2)

4. Remove shaft assembly (31) and cam (32) from plate assembly.

(b) *Replacement.* To replace low paper lever mechanism components, proceed as follows:

1. Loosen two screws (1) securing switch (5) to plate assembly (36) and slide switch forward on plate assembly. Tighten screws.

2. Insert shaft assembly (31) through cam (32) and into bushing in plate assembly.

3. Install spring (80) on plate assembly bushing so that the spring hook hooks the upper edge of the plate assembly mounting bracket at the junction of the bracket and plate.

NOTE

The spring hooks must coil off the top of the plate assembly bushing.

4. If not installed, install screw (26), flat washer (27), and nut plate (28) on arm assembly (29). Tighten screw only enough to retain parts.

5. While pressing in on shaft assembly (31), install arm assembly (29) on end of shaft assembly. Locate arm assembly so that the inside tab is forward of bushing (35). Do not tighten screw (26).

6. With a spring hook, pull loose end of spring (30) over the top of the plate assembly bushing and hook end of spring to the forward edge of the arm assembly tab.

7. While retaining arm assembly against the plate assembly bushing and arm assembly tab against bushing (35), rotate shaft assembly (31) so that the pin on cam (32) is above the actuator on switch (5). Tighten screw (26).

NOTE

The orientation of cam (32) above the actuator on switch (5) is only a preliminary adjustment. If the low paper alarm assembly is installed on the printer chassis, refer to paragraph 6-9q and adjust the low paper alarm assembly. If the low paper alarm assembly is not installed, no further adjustments are required.

(2) *Paper out mechanism components, removal and replacement (Fiig. 6-64)*

(a) *Removal.* To remove paper out mechanism components, proceed as follows:

1. Remove spring (10).

NOTE

The paper out mechanism components (index no. 6 through 9 and 14 through *22)* may be removed from the plate assembly as an assembly or disassembled part by part while installed on the plate assembly. Step (2) below removes the paper out mechanism components as an assembly and steps 3 and 4 provide for removal of parts (other than those that are obvious).

2. While bucking eccentric stud (22) with a slot screwdriver, remove nut (11), lockwasher (12), and flat washer (13) and remove paper out mechanism components (index no. 6 through 9 and 14 through 22).

3. Remove retaining ring (6) and remove switch actuator (7) and assembly of cam follower (18) and lever assembly (19) from eccentric stud.'

(b) *Replacement*. To replace paper out mechanism components, proceed as follows:

1. Locate cam follower (18) on bushing of lever assembly (19). Place spacer (17) between cam follower and lever assembly and secure cam follower to lever assembly with screw (14), lockwasher (15), and flat washer (16).

2. Install assembly of cam follower and lever assembly on eccentric stud (22).

3. Install switch actuator (7) on eccentric stud and secure parts with retaining ring (6).

4. If paper out mechanism components were removed as an assembly, install paper out mechanism component assembly of steps 1, 2, and 3 above on plate assembly (36) and secure with nut (11), lock-washer (12) and flat washer (13).

5. Connect spring (10) between tab on lever assembly and eye on the switch mounting bracket tab.

NOTE

If the low paper alarm assembly is installed on the printer chassis, refer to paragraph 6-9q and adjust the low paper alarm assembly. If the low paper alarm assembly is not installed, no further adjustments are required.

f. *Removal and Replacement of Ribbon Feed Drive Shaft (fig. 6-61)*

(1) *Removal.* To remove ribbon feed drive shaft, proceed as follows:

(a) Remove left-hand ribbon feed assembly (para 6-22a).

(b) Remove right-hand ribbon feed assembly (para 6-22b).

(c) While holding left-hand dog assembly (42) with your fingers twist right-hand dog assembly (43) (with fingers) counterclockwise until it is unthreaded from ribbon feed drive shaft (47).

NOTE

Steps (d) and (e) provide for release of ribbon feed clutch assembly (45) from the pin on guide assembly (96, fig. 6-55).

(d) Rotate power shaft until cam follower (92, fig. 6-55) is at its maximum upward travel.

(e)With a blunt tool, carefully push in on tab of ribbon feed clutch assembly (45) until it just clears the pin on guide assembly (96, fig. 6-55). When the pin clears, rotate the power shaft until the ribbon feed clutch assembly is free of the guide assembly.

(f) Remove ribbon feed clutch assembly from ribbon feed drive shaft.

(g) Loosen setscrew (52) and back detent assembly (53) away from ribbon feed drive shaft enough to eliminate detent action. Tighten setscrew (52) to avoid loss of detent assembly.

(h) Remove retaining ring (46).

(i) Slide ribbon feed drive shaft out of printer chassis from left side.

(j) If necessary, loosen setscrews (41) on left-hand dog assembly (42) and remove dog assembly from ribbon feed drive shaft.

(2) *Replacement.* To replace ribbon feed drive shaft, proceed as follows:

(a) If removed, install left-hand dog assembly (42) on left end of ribbon feed drive shaft (47). Secure with setscrew (41).

(b) Apply a light film of grease (NSN 9150-| 00-086-7247) to the bores of the printer chassis ribbon feed drive shaft bushings.

(e) Install ribbon feed drive shaft in printer chassis from left side.

(d) Install retaining ring (46) on ribbon feed drive shaft.

(e) Rotate power shaft until cam follower (92, fig. 6-55) is at its maximum downward travel.

(f) Install ribbon feed clutch assembly (45) on ribbon feed drive shaft.

(g) With a blunt tool, carefully push in on ribbon feed clutch assembly tab until it just clears the pin on guide assembly (96, fig. 6-55). When the pin clears, rotate the power shaft until the pin is opposite the hole on the ribbon feed clutch assembly tab. Release pressure to engage pin.

(h) Install flat washer (44) on threaded stud of right-hand dog assembly (43) and thread dog assembly on to right end of ribbon feed drive shaft. Tighten dog assembly finger tight.

(i) Install right-hand ribbon feed assembly (para 6-22b).

(j) Install left-hand ribbon feed assembly (para 6-22a).

(k) Lubricate inking ribbon mechanism components (para 5-6).

(l) Adjust ribbon feed detent plunger and driving clutch (para 6-lib).

(m) Adjust ribbon reverse levers (para 5-20).

(n) Check clearance between ribbon feed lever and guide bracket (para 6-8c). Adjust if necessary.

g. *Removal and Replacement of Paper Guide Rollers (Fig. 6-61)*

(1) *Removal.* To remove paper guide rollers, proceed as follows:

WARNING

Roller arm springs (2) and (4) are loaded to 40-inch ounces. Protect eyes when removing springs.

NOTE

The following steps provide for removal of roller arms (7 and *9)* as well as paper guide rollers (10 and 11). If only the rollers are to be replaced, proceed to step (d).

(a) Remove roller arm springs (2 and 4).

(b) Remove retaining rings (3 and 5) securing roller arms (7 and *9)* to pivot studs (13 and 16).

(c) Carefully clear one of the roller arms from a pivot stud and remove assembly of paper guide roller components from printer chassis.

(d) Remove either retaining ring (6) or (8) and slide paper guide roller shaft (12) out of roller arms removing paper guide roller (10) and seven paper guide rollers (11) in the process.

(2) Replacement To replace paper guide rollers, proceed as follows:

(a) Install retaining ring (8) on paper guide roller shaft.

(b) Install roller arm (9) seven paper guide rollers (11), one paper guide roller (10) and roller arm (7) on paper guide roller shaft. Retain parts with retaining ring (6).

(c) If removed from printer chassis, install assembly of paper guide roller in printer chassis on pivot studs (13) and (16). Retain assembly with retaining rings (3) and (5).

WARNING

When installing roller arm springs (2) and (4), protect eyes.

(d) Install roller arm spring (2) between eye in tab of left-hand inner plate (36) and eye in roller arm (9).
(e) Install roller arm spring (4) between eye in tab of right-hand inner plate (40) and eye in roller arm (7).
(f) Adjust paper tension bar and paper guide rollers (para 5-19).

6-23. Removal and Replacement of Ribbon Lift Mechanism Components. The ribbon lift mechanism consists of the ribbon lift magnet, armature, shaft, arms and vibrator bail.

a. *Removal and Replacement of Ribbon Lift Magnet (fig. 6-65)*

(1) *Removal.* To remove ribbon lift magnet, proceed as follows:

(a) Remove printer chassis from printer base and install in maintenance frame (para 6-18b).

(b) Invert printer chassis and remove base frame cover (4, fig. 6-66) by removing four screws (1, fig. 6-66), lockwashers (2, fig. 6-66), and flat washers (3, fig. 6-66).

(c) Disconnect magnet yellow/white wire from terminal 11 on printer driver board assembly (9, fig. 6-66) and violet wire from terminal *5.*

(d) Carefully pull wires toward magnet until they are clear of other wires and mechanical parts.

(e) Remove two screws (1), lockwashers (2), and flat washers (2) securing plate (4) and remove magnet (6).

(2) *Replacement.* To replace ribbon lift magnet, proceed as follows:

(a) Insert magnet wires through casting on right side of printer chassis opposite magnet mounting and locate magnet (5) in mounting position.

NOTE

If magnet does riot fit between armature (15) and adjusting screw (6), back out screw until magnet fits in mounting.

(b) Install plate (4) and secure with two screws (1), lockwashers (2), and flat washers (3). Tighten screws only snug tight.

(c) Thread magnet wire over to connecting terminals on printer driver board assembly (9, fig. 6- 66).

(d) Connect violet wire to terminal 5 on printer driver board assembly and yellow/white wire to terminal 11. Lay wires clear of moving parts.

(e) Install base frame cover (4, fig. 6-66) and secure with four screws (1, fig. 6-66), lockwashers (2, fig. 6-66), and flat washers (8, fig, 6-66).

*(*f) Adjust ribbon lift magnet and mechanism (para 6-12c).

NOTE

The screws securing the magnet are tightened during the adjustment of the ribbon lift mechanism.

(g) Remove printer chassis from maintenance frame and Install in printer base (para 6-18b).

b. *Removal and replacement of Ribbon Lift Armature (fig. 6-65)*

(1) *Removal*. To remove ribbon lift armature, proceed as follows:

(a) Remove right-hand ribbon feed assembly (para 6-22b).

(b) Remove retaining ring (7) attaching link assembly (13) to right-hand bracket assembly (39) and felt washer (10).

(c) Remove retaining ring (8) and flat washer (9) and remove assembly of armature (15) and link assembly (13).

(d) Remove retaining ring (11) and separate link (18) flat washer (12) and felt washer (14) from armature.

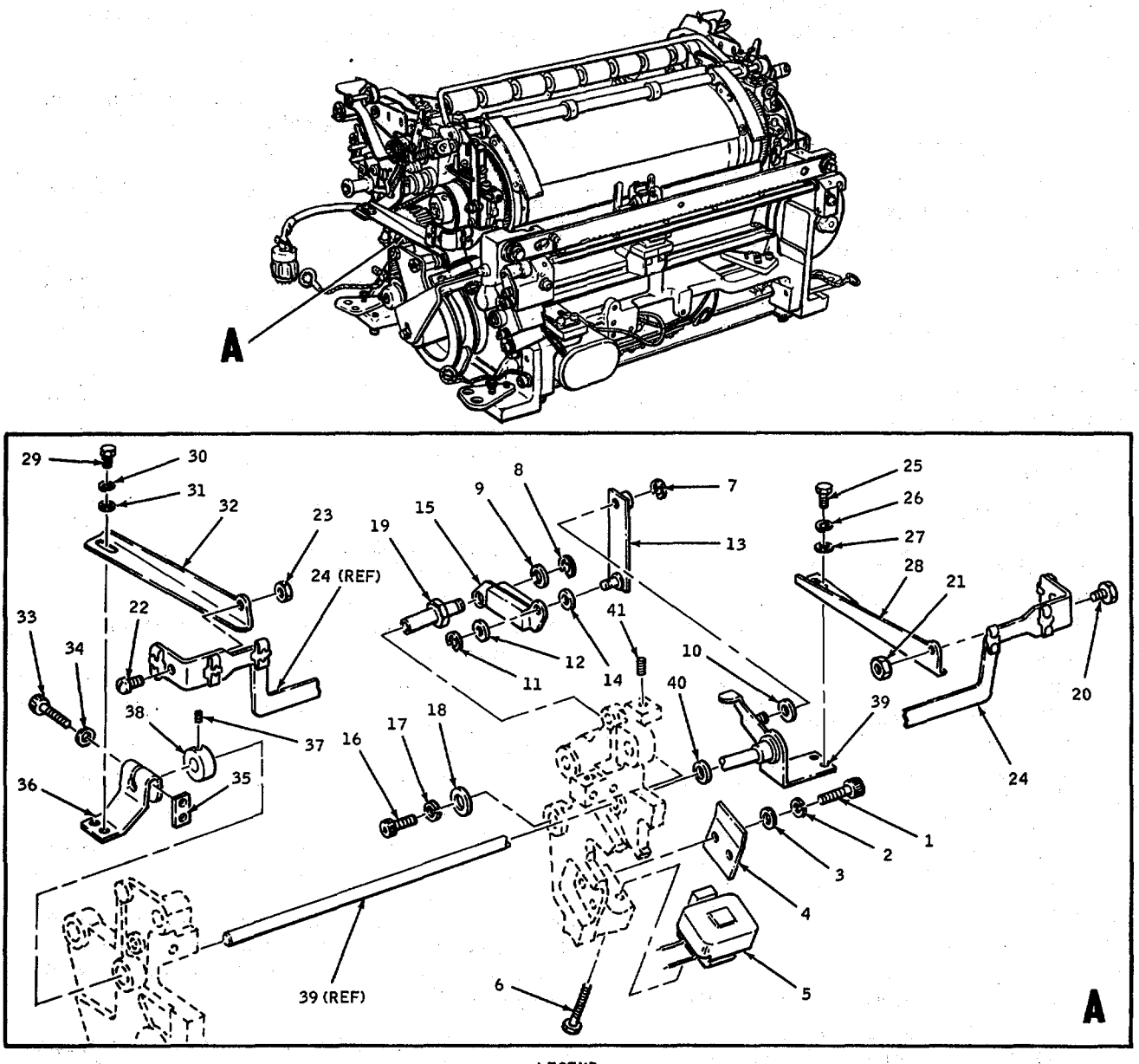
(2) *Replacement.* To replace ribbon lift armature, proceed as follows:

(a) Install felt washer (14) on stud of link assembly (18) followed by armature (15), and flat washer (12). Retain parts with retaining ring (11).

(b) Place felt washer (10) on stud right-hand bracket assembly (39). (c) Install assembly armature (15) and link assembly (13) on stud of right-hand bracket assembly (89) and pivot stud (19).

(d) Secure link assembly to right-hand bracket stud with retaining ring (7).

(e) Secure armature to pivot stud with flat washer (9) and retaining ring (8).



LEGEND:

1. SCREW, 10004
2. LOCK WASHER, 10421
3. FLAT WASHER, 10450
4. PLATE, 65812
5. RIBBON LIFT MAGNET, 73850A
6. SCREW, 11235
7. RETAINING RING, 12969
8. RETAINING RING, 12949
9. FLAT WASHER, 50315
10. FELT WASHER, 61486
11. RETAINING RING, 12969
12. FLAT WASHER, 50320
13. LINK ASSEMBLY, 68468A
14. FELT WASHER, 55251
15. RIBBON LIFT ARMATURE, 65964A
16. SCREW, 10008
17. LOCK WASHER, 10426
18. FLAT WASHER, 10463
19. PIVOT STUD, 65809
20. SCREW, 11823
21. NUT, 10540
22. SCREW, 11823
23. NUT, 10540
24. RIBBON VIBRATOR BAIL, 67832A
25. SCREW, 10086
26. LOCK WASHER, 10432
27. FLAT WASHER, MS27183-3
28. RIGHT-HAND LIFT ARM, 65806
29. SCREW, 10086
30. LOCK WASHER, 10432
31. FLAT WASHER, MS27183-3
32. LEFT-HAND LIFT ARM, 65807
33. SCREW, 10041
34. FLAT WASHER, 68132
35. NUT PLATE, 50174
36. LEFT-HAND BRACKET, 72763
37. SETSCREW, 10234
38. COLLAR, 50209
39. RIGHT-HAND BRACKET ASSEMBLY, 71419A
40. SPACER, 66409
41. SETSCREW, 10226

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Figure 6-65. Ribbon Life Mechanism, Exploded View

(f) Install right-hand ribbon feed assembly L (para 6-22b).
(g) Lubricate armature and link pivot points (fig. 5-2, detail G).
(h) Adjust ribbon lift mechanism (para 6-12c).

c. *Removal and Replacement of Ribbon Lift Vibrator Bail D. 6-65).* The ribbon lift vibrator bail (24) is trapped by a lip on the carriage assembly ribbon guide (4, fig. 6-58). In order to remove the ribbon lift vibrator bail, the carriage assembly must be removed. To remove carriage assembly and thus the ribbon lift vibrator bail, refer to paragraph 6-21f. Replacement procedures are also given in paragraph 6-21f.

d. *Removal and Replacement of Ribbon Lift Shaft D. 6-65)*

(1) *Removal.* To remove ribbon lift shaft, proceed as follows:
(a) Remove left-hand ribbon feed assembly (para 6-22a).
(b) Remove right-hand ribbon feed assembly (para 6-22b).
(c) Remove screw (20) and nut (21) securing right-hand lift arm (28) to ribbon vibrator bail (24).
(d) Remove two screws (25), lockwashers (26), and flat washers (27) securing right-hand lift arm to right-hand bracket assembly (39) and remove lift arm,
(e) Remove screw (22) and nut (23) securing left-hand lift arm (32) to ribbon vibrator bail (24).
(f) Remove two screws (29), lockwashers (30), and flat washers (31) securing left-hand lift arm to left-hand bracket (36).
(g) Loosen screw (33) and remove left-hand bracket (36).
(h) Loosen two sets crews (37) and remove collar (38).
(i) Remove assembly of link (13) and armature (15) from right-hand bracket assembly (39) (para 6-23b).
(j) Carefully slide right-hand bracket assembly out of printer chassis from the right. Remove spacer (40) from shaft.

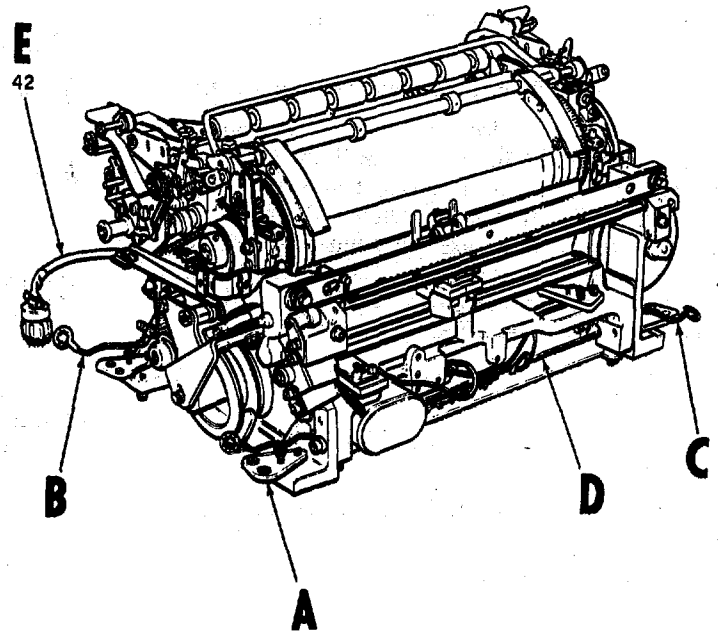
(2) *Replacement.* To replace ribbon lift shaft, proceed as follows:
(a) Apply a light film of grease (FSN 9150-985-7247) to the shaft bores in the printer chassis casting.
(b) Install spacer (40) on shaft of right-hand bracket assembly (39) and install assembly in printer chassis from right to left.
(c) Install collar (38) on left end of right-hand bracket assembly shaft.
(d) Bias the shaft to the left to remove all shaft end play and position the collar to obtain a 0.010 to 0.030 inch clearance with the shaft bushing (reference para 6-12a). Tighten collar setscrews (37).
(e) Install left-hand bracket (36) on shaft and secure with screw (33), flat washer (34), and nut plate (35).
(f) Install left-hand lift arm (32) on left-handbracket and secure with two screws (29), lockwashers (30), and flat washers (31). Tighten screws snug tight.
(g) Install right-hand lift arm (28) on right-hand bracket assembly and secure with two screws (25), lockwashers (26), and flat washers (27). Tighten screws snug tight.
(h) Attach left side of ribbon vibrator bail (24) to left-hand lift arm (32) with screw (22) and nut (23). Tighten screw snug tight.
(i) Attach right side of ribbon vibrator bail (24) to right-hand lift arm (28) with screw (20) and nut (21). Tighten screw snug tight.
(j) Adjust ribbon lift mechanism (para 6-12a, 6-12b, and 6-12c).
(k) Install left-hand ribbon feed assembly (para 6-22a).
(l) Install right-hand ribbon feed assembly (para 6-22b).

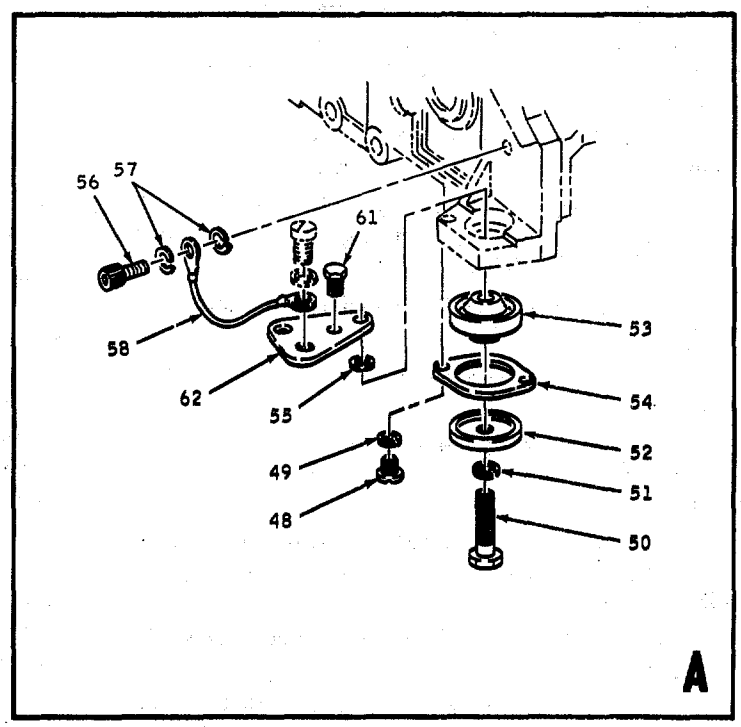
6-24. Removal and Replacement of Timing Mechanism Components. Removal and replacement procedures for timing mechanism components are given in paragraph 6-21i.

6-25. Removal and Replacement of Printer Chassis Electrical and Base Mounting Components. This paragraph provides removal and replacement procedures for miscellaneous components of the printer chassis.

a. *Removal and Replacement of Printer Driver Assembly (fig. 6-66).* Printer driver assembly (8) consists of either printer driver board assembly (9 or 9A) and cable assembly (10). These procedures provide for removal and replacement of the complete printer driver assembly but may be adapted for removal of either the cable assembly or either printer driver board assembly. The initial steps provide for freeing the cable assembly from other components of the printer chassis and the final steps provide for removal of either printer driver board assembly 9 or 9A.

LEGEND:
1. SCREW, 12393
2. LOCK WASHER, 10429
3. FLAT WASHER, 68132
4. BASE FRAME COVER, 71283A
5. SCREW, 10467
6. LOCK WASHER, 10430
7. FLAT WASHER, 100 09
8. PRINTER DRIVER ASSEMBLY, 74119A
9. PRINTER DRIVER BOARD ASSEMBLY, 73261A
9A. PRINTER DRIVER BOARD ASSEMBLY, 76447A
76447-A-0OO1 (SEE NOTE)
10. CABLE ASSEMBLY, 73262A
11. SCREW, 12335
12. LATCH, 23252
13, NUT, 56182
14. LOCK WASHER, 10432
15. SCREW, 12108
16. NUT, 10551
17. CLAMP, 66491
18. HOOK, 66470
19. CONNECTOR (P7), 23118
20. CONNECTOR (J27), 23261
21. MALE CONTACT, 23117
22. MALE CONTACT, 21078
23. CONNECTOR,,24622
24. CABLE ASSEMBLY, 73287A
25. NUT, 10500
26. FLAT WASHER, 68132
27. RELAY, 23165
28. DIODE (CR12), JANIN4383
29. TERMINAL LUG, 21065-0002
30. SCREW, 10006
31. LOCK WASHER, 10429
32. FLAT WASHER, 68132
33. MARKER STRIP, 68467
34. FILTER, 23074
35. TERMINAL BOARD, 23631
36. SCREW, 10004
37. LOCK WASHER, 10429
38. CLAMP, 23412
39. CAPACITOR (C8), 23750
40. SCREW,12122
41. LOCK WASHER, 10405
42. CABLE ASSEMBLY, 73262A
43. CONNECTOR (P5), 23148
44. HOOD, CONNECTOR 23135
45. TERMINAL LUG, 21065-0002
46. TERMINAL LUG, M525036-103
47. CABLE ASSEMBLY, 66876A
48. SCREW, 10304
49. LOCK WASHER, 10415
50. SCREW, 11213
51. LOCK WASHER, 10431
52. SPECIAL WASHIER, 68344
53. VIBRATION MOUNT, 65938
54. MOUNTING PLATE, 66252
55. FLAT WASHER, 10473
56. SCREW, 10096
57. LOCK WASHER ,10405
58. GROUND LEAD ,67530
59. SCREW, 10018-0100
60, SCREW, 10327
61, SCREW, 11209
62. MOUNTING PLATE, 68849
63. SCREW, 10U04
64. LOCK WASHER, 10429
65. FLAT WASHER, 10472
66. CABLE CLAMP, 20548





NOTE:
PRINTER DRIVER BOARD ASSEMBLY, 76447-A-0001 IS SUPPLIED WITHOUT CABLE ASSEMBLY, 73262A (INDEX 10) AND IS AN ALTERNATE PART FOR PRINTER DRIVER BOARD ASSEMBLY, 73261A (INDEX 9).

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Figure 6-66. Printer Chassis Electrical and Base Mounting Components, Exploded View (Sheet 1 of 3)

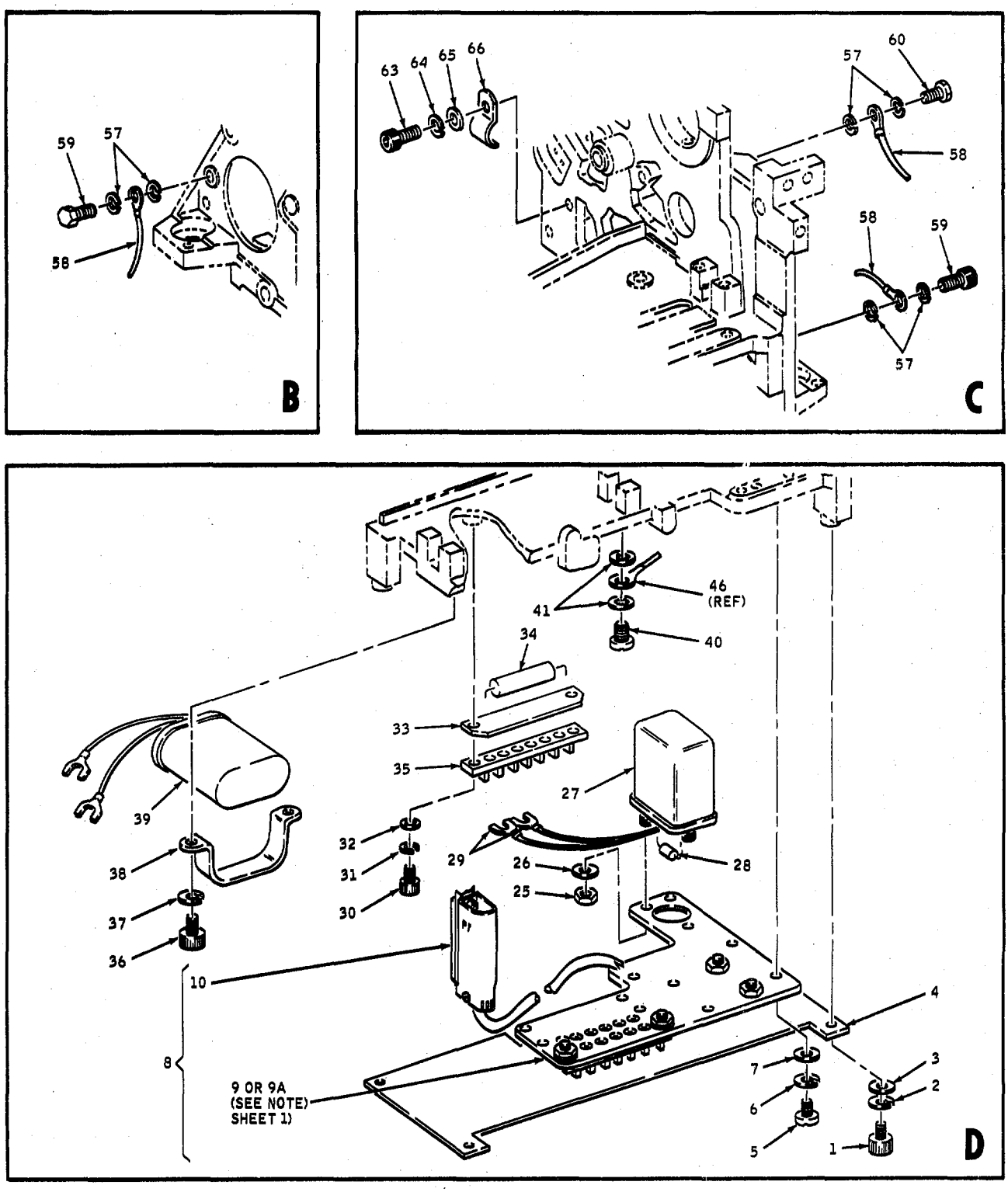


Figure 6-66. Printer Chassis Electrical and Base Mounting Components, Exploded View (Sheet 2 of 3)

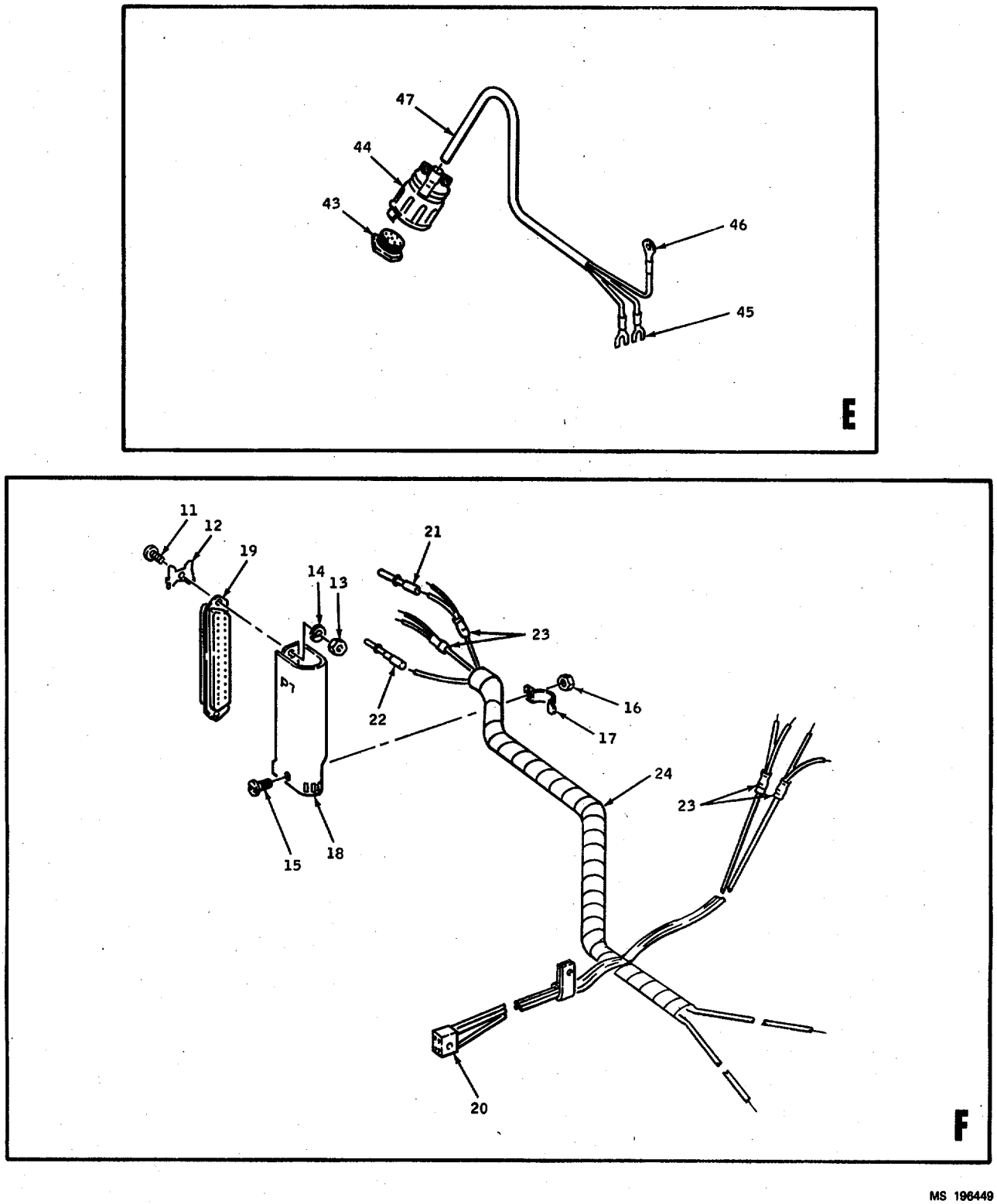


Figure 6-66. Printer Chassis Electrical and Base Mounting Components, Exploded View (Sheet 3 of 3)

(1) *Removal*. To remove printer driver assembly, proceed as follows:

(a) Remove printer chassis from printer base and install in maintenance frame (para 6-18b).

(b) Unclamp branch of cable assembly (10) interconnected to carriage assembly by removing screw (18, fig. 6-56), lockwasher (19, fig. 6-56), flat washer (20, fig. 6-56) and cable clamp (21, fig. 6-56).

(c) Remove screw (27, fig. 6-56) and lock-washer (28, fig. 6-56) and disconnect connector J27from connector P27.

(d) Slide carriage assembly (79, fig. 6-57) to left margin of printer.

(e) Remove right-hand lift arm (28, fig. 6-65) from printer chassis by removing screw (20, fig. 6-65) and nut (21, fig 6-65) and two screws (25, fig. 6-65), lockwashers (26, fig 6-65) and flat washers (27, fig. 6- 65.

(f) Remove timing plate assembly (37, fig. 6-59) from right side of printer drum by removing screw (27, fig. 6-59), lockwasher (28, fig. 6-59) and flat washer (29, fig. 6-59) and removing timing disk cover (30, fig. 6-59) and timing plate assembly.

(g) Remove screw (7, fig. 6-60) and remove cover (8, fig. 6-60).

(h)Disconnect wires connected to bobbin assemblies (11 and 14, fig. 6-60).

(i) Carefully pull wires, disconnected in step

(h) Toward cable harness until they are clear of the printer chassis.

(i) Remove screw (63), lockwasher (64), flat washer (65), and cable clamp (66) to free cable assembly.

(k) Remove four screws (1), lockwashers (2), and flat washers (3) and remove base frame cover (4).

(l) Disconnect relay (27) white/black wire connected to terminal 2 of terminal board TB3 (35) and white wire connected to terminal 4 (fig. 6-68 or 6-68.1).

(m) If printer driver board assembly (9) is being removed, disconnect wires connected to terminals 1, 2, 3, 6, 7, 8, 9,11,18, 20, 21, 22, and 23 of terminal strips (8, fig. 6-67). Tag and unsolder wires connected to eyelets 13,14,15, A, B, C, D, E, F, G, H, J, K, N, R, S, and T (fig. 6-67 and 6-68).

(n) If printer driver board assembly (9A) is being removed, disconnect wires connected to terminals 1, 2, 3, 5, 7, 8, 9, 11, 18, 20, 21, and 23 of terminal strips (4, fig. 6-67.1). Tag and unsolder wires connected to eyelets 13, 14, 15, 16, 17, A, B, C, D, E, F, G, H, J, K, R, S, T, and V (fig. 6-67.1 and 6-68.1).

NOTE

Eyelets R and V on printer driver board assembly (9A) are not marked on board. (See fig. 6- 67.1 and 6-68.1 for locations.)

(o) Remove four screws (5), lockwashers (6), and flat washers (7) and carefully remove printer driver assembly (8) from printer chassis. (p) Using a heat sink to protect diode (28) disconnect wires connected to terminals 1 and 8 of relay (27).

(q) Remove three nuts (25) and flat washers (26) and remove relay (27) from printer driver board assembly.

(*2) Replacement.* To replace printer driver assembly, proceed as follows:

(a) Install relay (27) on printer driver board assembly (9 or 9A) and secure with three nuts (25) and flat washers (26).

(b) Using a heat sink to protect diode (28, fig. 6-66) or diode CR12 (fig. 6-67.1), connect yellow/brown wire connected to terminal R of printer driver board assembly to terminal 1 of relay. Connect red wire connected to pin 42 of connector J7 to terminal 8 of relay (fig. *6-68).* On printer driver board assembly, also connect wire from eyelet V to terminal 8 of relay (fig. 6- 68.1).

(c) Locate either printer driver board assembly (9 or 9A), as applicable, on printer chassis. (See *fig* 6-67 and 6-68for (9), or fig, 6-67.1 and 6-68.1 for (9A)l)

(d) For either printer driver board assembly (9 or 9A), connect the following wires to the terminals specified on terminal strip (8, fig. 6-67 or 4, fig. 6-67.1) as applicable.

To	From	Color	Description
TB10-1	LS-Violet	Violet	+36v
TB10-2	L11-Violet	Violet	+36v
TB10-3	L3-Violet	Violet	+36v
TB10-5	L6-Violet	Violet	+36v
TB10-7	L5-White/ Violet	White/ Violet	Line feed magnet drive
TB10-8	L11White	White	Carriage return magnet drive
TB10-9	L3-Violet/ Blue	Violet/ Blue	Space magnet drive
TB10-11	L6-Yellow/ White	Yellow/ White	Ribbon lift magnet drive
TB10-18	S21-Red	Red	LH margin sw

To	From	Color	Description
TB10-20	S19-Blue	Blue	RH margin sw
TB10-21	S21-White/red	White/Red	Ground
TB10-22	S25-NO	Black	Ground (Not used on 9A)
TB10-23	S19- White/ Black	White/Black	Ground

(e) For either printer driver board assembly (9 or 9A), solder wires to eyelets on board (fig. 6-67 and 6-68, or fig. 6-67.1 and 6-68.1), as applicable.

To (Eyelet)	From	Color	Description
13	S25- NO, P7-29	Green/ White	Paper out (9A), alarm (9)
14	S25- NC	Green/Black	Paper out, not used on (9), option on (9A)
15	S25- NC	Green/ Yellow	Paper out, not used on (9), option on (9A)
16	P7-37		Paper out
17			Circuit ground
A	P7-48	Black	Hammer ground (9A), ground (9)
B	P7-5	Yellow	Print hammer no. 1
C	J27-B	Black/ Yellow	Print hammer no. 1 drive
D	J27-A	Black/ Red	Print hammer no. 2 drive
E	P7-19	Red/White	Space
F	P7-7	Green	Print hammer no. 2
G	P7-13	Gray	Carriage
H	P7-17	Black	Line feed
J	P7-46	Violet	+36V
K	P7-48	Black	Ground
N	P7-29	White	Not used on (9), omitted on (9A)
R	K1-1	Yellow/Green	Motor stop relay
S	P7-21	Brown	Motor stop
T	P7-11	Violet	Ribbon lift
V	K1-8		Motor stop relay drive (9A) only

NOTE

Eyelets R and V on printer driver assembly board (9A) are not marked on board. (See fig. 6- 67.1 and 6-68.1 for location of eyelets.)

(f) Dress wires connected in steps (d) and (e) in printer chassis and secure printer driver assembly to mounting studs with four screws (5), lockwashers (6), and flat washers (7).

(g) Install base frame cover (4) and secure with four screws (1), lockwashers (2), and flat washers (8).

(h) Thread shielded orange and black wires of cable assembly (24) through the web in the printer chassis casting immediately below the power shaft bushing. Route wires over to the timing plate assembly (39, fig. 6-59) by looping them under the power shaft and over the paper feed lever bracket.

(i) Remove screw (7, fig. 6-60) and remove cover (8, fig. 6-60) from timing plate assembly.

(j) Solder black wire to the red dot coded terminal of bobbin assembly (14, fig. 6-60) and shield to second terminal (see fig. 6-68).

(k) Solder orange wire to the red dot coded terminal of bobbin assembly (11, fig. 6-60) and shield to second terminal (fig. 6-68).

(1) Dress wires into channel of timing plate assembly and Install cover (8, fig. 6-60). Secure cover with screw (7, fig. 6-60).

(m) Dress wires along printer chassis so that they are free of moving parts.

(n) Install timing plate assembly (87, fig. 6-59) and timing disk cover (30, fig. 6-59) on right side of printer drum shaft and secure with screw (27, fig. 6-59), lockwasher (28, fig. 6-69), and flat washer (29, fig. 6-59).

(o) Install right-hand lift arm (28, fig. 6-65) and secure front to ribbon lift vibrator bail (24, fig. 6- 65) with screw (20, fig. 6-66) and nut (21, fig. 6-65). Secure rear of lift arm to right-hand bracket assembly (39, fig. 6-65) with two screws (25, fig. 6-65), lock- washers (26, fig. 6-65), and flat washers (27, fig. 6-65).

(p) Adjust ribbon lift mechanism (para 6-12c).

(q) Connect connector J27 (20) to connector P27 and secure to carriage plate assembly (48, fig. 6- 56) with screw (27, fig. 6-56) and lockwasher (28, fig. 6- 56).

(r) Secure wires connecting connector J27 to right side of carriage plate assembly with clamp (21, fig. 6-56), screw (18, fig. 6-56), lockwasher (19, fig. 6- 56), and flat washer (20, fig. 6-56).

LEGEND:

INDEX NO. OR REFERENCE DESIGNATOR	DESCRIPTION
1.	SCREW, MS35214-16
2.	LOCK WASHER, 10408
3.	NUT, MS21044C04
4.	SCREW, 12371
5.	FLAT WASHER, 68132
6.	NUT, 10500
7.	FLAT WASHER, 68132
8.	TERMINAL STRIP, 23631
C1	CAPACITOR, 23751
C2	CAPACITOR, M39003-01-3024
CR1 THRU CR11	DIODE, JAN1N4383
FL1, FL2, FL3, FL5	FILTER, 69444A
Q1, Q2	TRANSISTOR, 24112
Q3 THRU Q8	TRANSISTOR, 24113
R1, R3, R5, R8 R10, R13, R16, R19	RESISTOR, RCR07G222JS
R2, R4	RESISTOR, RC20G3R3JS
R6, R9, R11, R14 R17, R20	RESISTOR, RCR07G101JS
R7, R15, R18, R21	RESISTOR, RCR20G100JS
R22	RESISTOR, RCR20G330JS
R23	RESISTOR, RW58V750

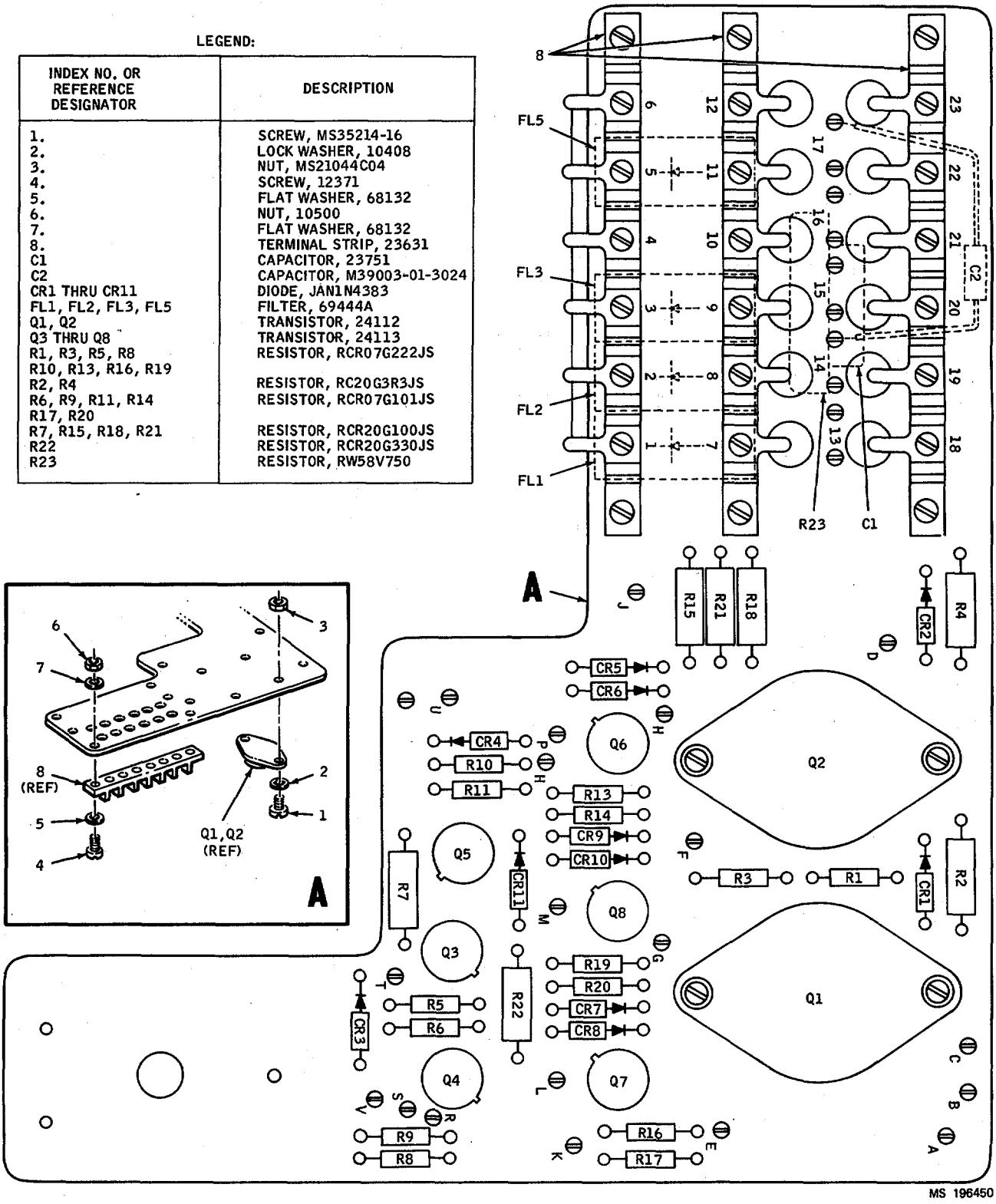


Figure 6-67. Printer Driver Board Assembly (73261A), Parts Location

LEGEND:

INDEX NO. OR REFERENCE DESIGNATOR	DESCRIPTION
1.	SCREW, 12131
2.	LOCKWASHER, 10408
3.	NUT, 10540
4.	TERMINAL STRIP, 28051
C1	CAPACITOR, 23751
C2 THRU C5	CAPACITOR, 23763
CR1 THRU CR3; CR5 THRU CR12	DIODE, JAN 1N4383
CR13 THRU CR16	DIODE, JAN 1N4384
Q1, Q2	TRANSISTOR, 24112
Q3, Q4, Q6, Q7, Q8	TRANSISTOR, 24113
R1, R3, R5, R8, R13, R16,R19	RESISTOR, RCR07G222JS
R2, R4	RESISTOR, RC20GF3R3K
R6, R9, R14, R17, R20	RESISTOR, RCR07G101JS
R7, R15, R18, R21	RESISTOR, RCR20G100JS
R22	RESISTOR, RCR20G330JS
R23	RESISTOR, RW58V750
R24 THRU R27	RESISTOR, RCR07G100JS

NOTE:

EYELETS R AND V ARE NOT MARKED ON BOARD ASSEMBLY.

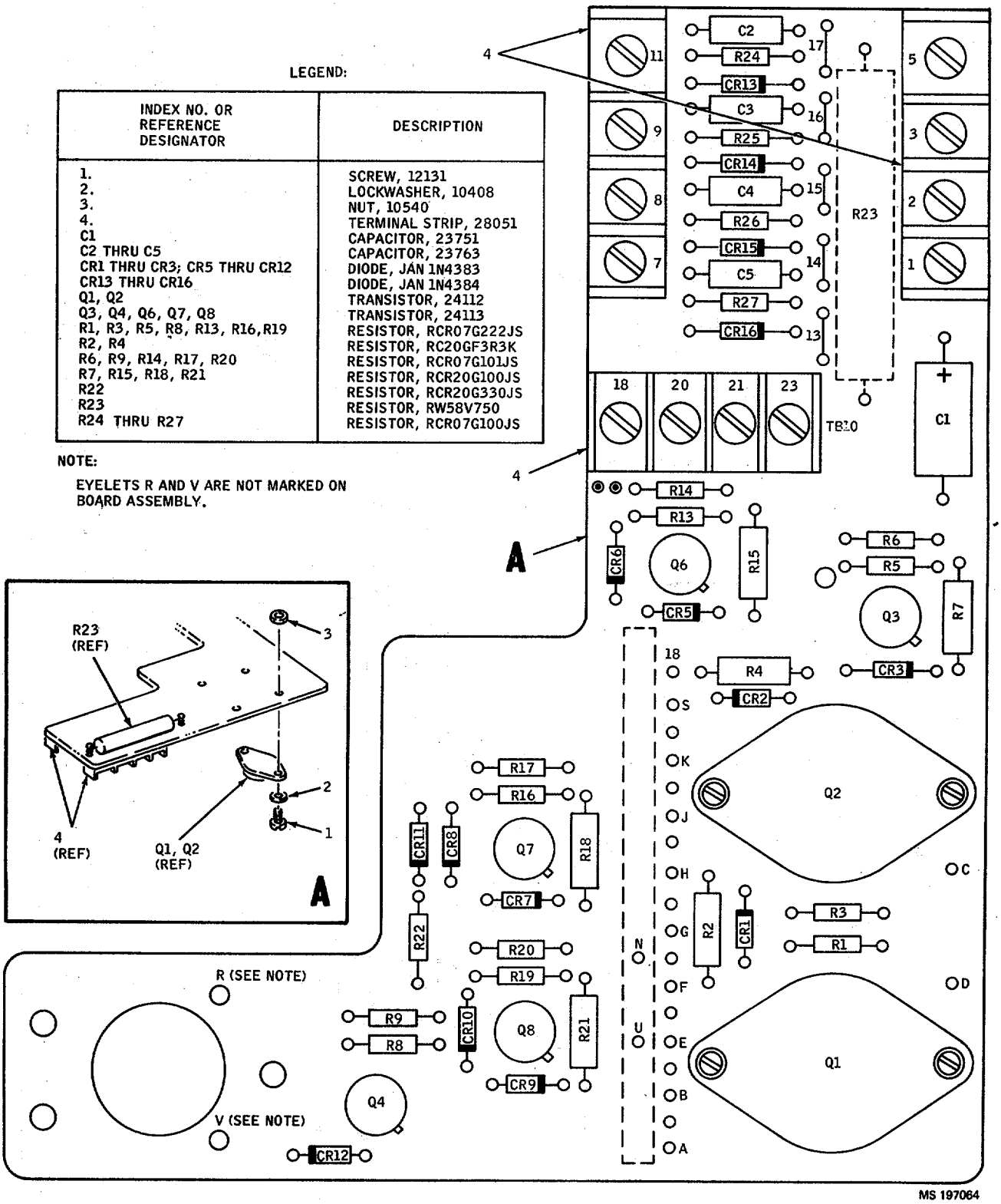


Figure 6-67.1. Printer Driver Board Assembly (76447-A0001), Parts Location

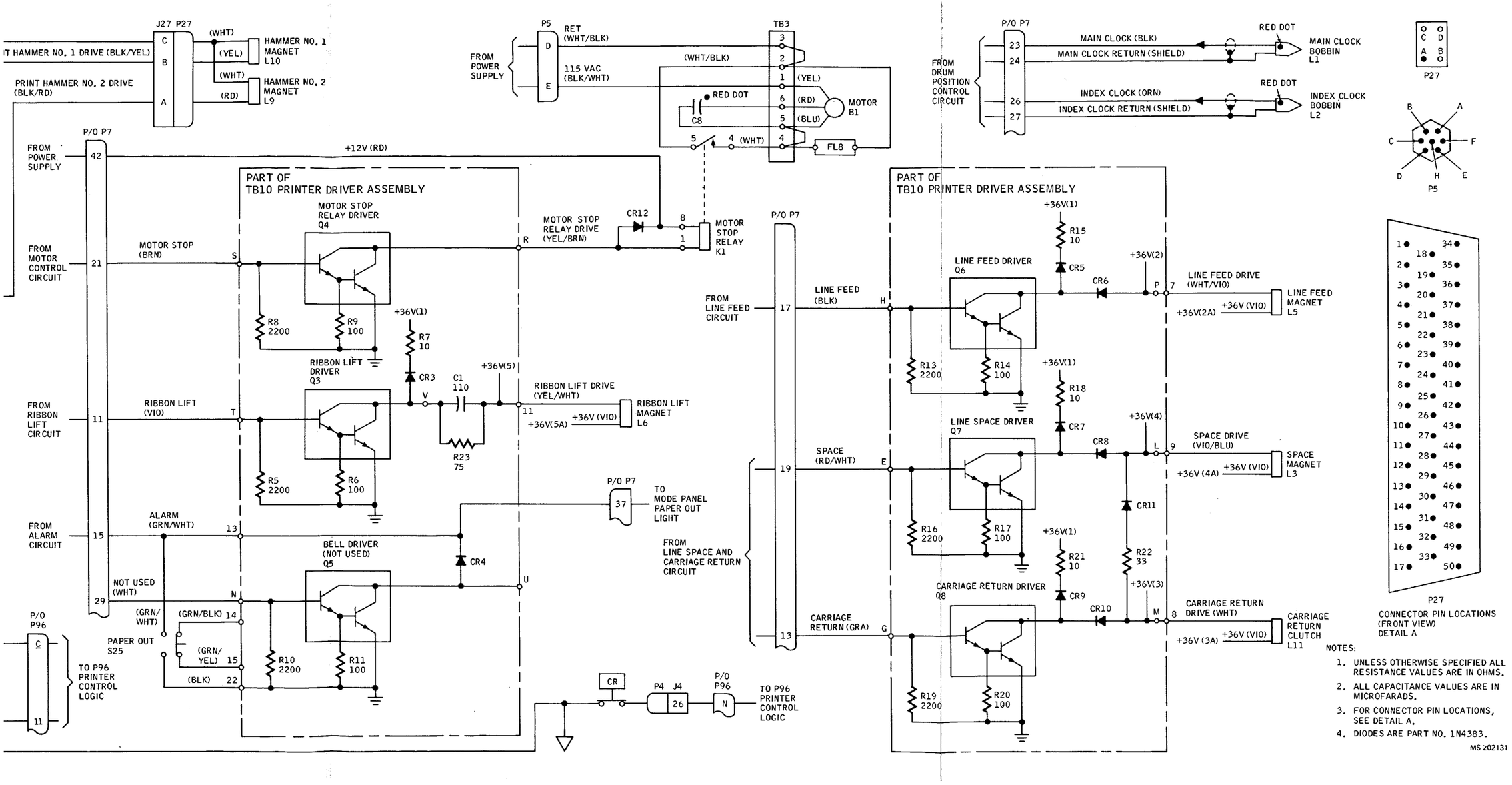
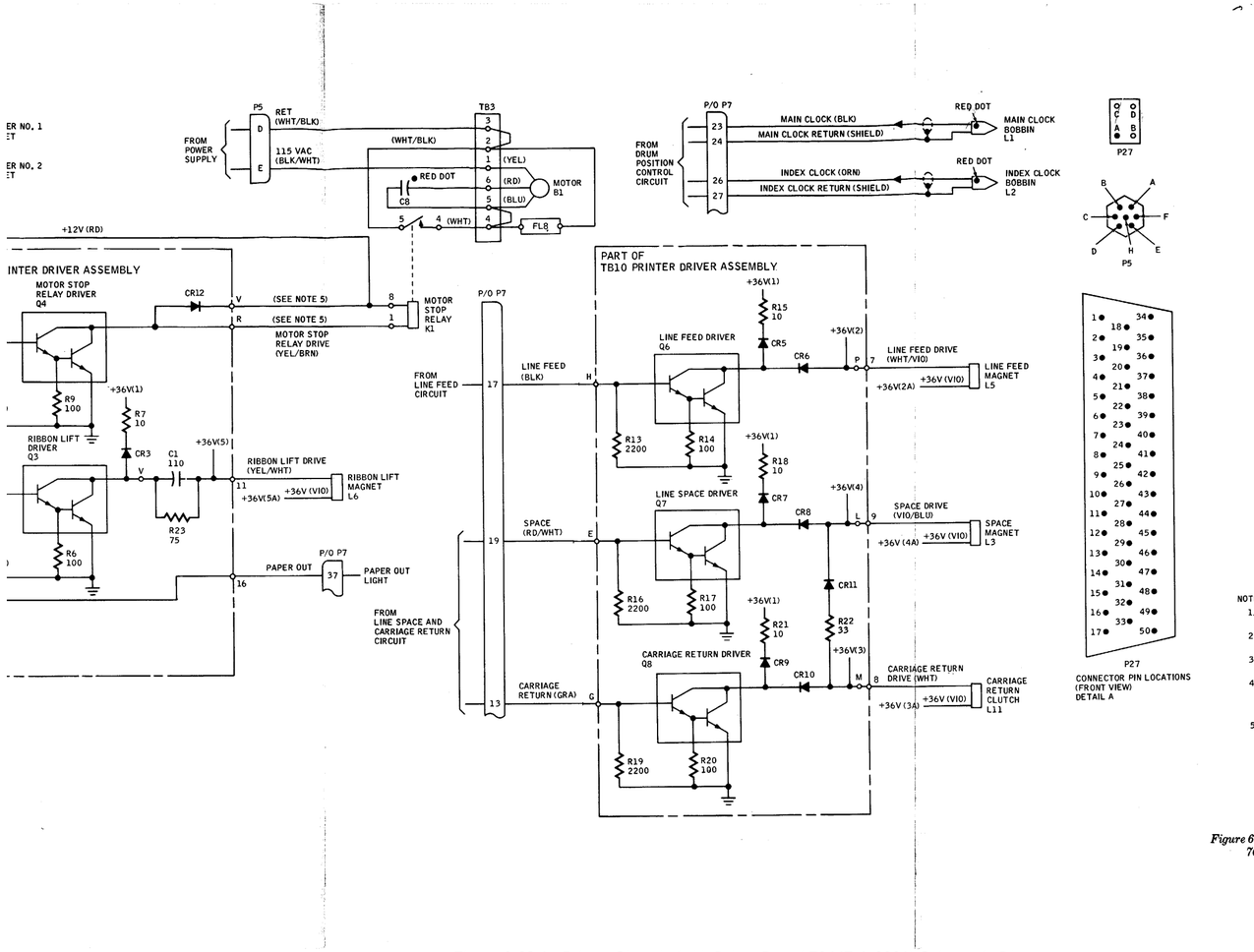


Figure 6-68. Printer Chassis (with Driver Board (73261A) Schematic Diagram

TM 9-1430-656-14-1



NOTES:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. FOR CONNECTOR PIN LOCATIONS, SEE DETAIL A.
4. DIODES CR1 THRU CR3; CR5 THRU CR12 ARE PART NO. IN4383. DIODES CR13 THRU CR16 ARE PART NO. IN4384.
5. EYELETS R AND V ARE NOT MARKED ON BOARD ASSEMBLY.

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Figure 6-68.1 Printer Chassis (with Driver Board 76447-A-0001) Schematic Diagram

Figure 6-68.1 Printer Chassis (with Driver Board 76447-A-0001) Schematic Diagram

(s) Dress wires of cable assembly (10) in printer chassis so that they are clear of moving parts and secure cable assembly to printer chassis with clamp (66), screw (63), lockwasher (64), and flat washer (65).

(t) Remove printer chassis from maintenance frame and install printer base (para 6-18b).

b. *Removal and Replacement of Motor Start Relay (. 6-66)*

(1) *Removal* To remove motor start relay, proceed as follows:

(a) Remove printer chassis from printer base and install in maintenance frame (para 6-18b).

(b) Using a heat sink to protect diode (28), disconnect wires connected to terminals 1 and 8 of relay (27).

(c) Disconnect wires connected to terminals 4 and 5 of relay.

(d) Remove three nuts (25) and flat washers (26) and remove relay from printer driver board assembly.

(2) *Replacement* To replace motor start relay, proceed as follows:

(a) Install relay (27) on printer drive board assembly and secure with three nuts (25) and flatwashers (26).

(b) Connect white/black wire between terminal board TB3-2 and pin 5 of relay. Connect white wire between TB3-4 and pin 4 of relay.

(c) Connect anode side of diode (28) to pin 1 of relay and cathode side to pin 8. Do not solder connections at this time.

(d) Using heat sink to protect diode, connect red wire from connector P7-42 to pin 8 of relay.

(e) Using heat sink to protect diode, connect yellow/brown wire from printer driver board assembly terminal R to pin 1 of relay.

(f) Remove printer chassis from maintenance frame and install in printer base (para 6-18b).

c. *Removal and Replacement of Motor Start Capacitor (fig. 6-66)*

(d) Remove four screws (5), lockwashers (6), and flat washers (7) and lift printer driver board assembly (9) away from printer chassis enough to gain access to capacitor clamp retaining screws.

(e) Remove two screws (36) and lockwashers (37) and remove clamp (38) and capacitor (39).

(2) *Replacement.* To replace motor start capacitor, proceed as follows:

(a) Install capacitor (39) in mounting position on printer chassis and secure with clamp (38) and two screws (36) and lockwashers (37). Do not allow any wires to become pinched between capacitor or clamp.

(b) Locate printer driver board assembly on printer chassis mounting and secure with four screws (5), lockwashers (6), and flat washers (7).

(c) Connect white wire connected to red dot coded terminal of capacitor to terminal 6 of terminal board TB3. Connect second wire of capacitor to terminal 5 of terminal board TB3.

(d) Install base frame cover (4) and secure with four screws (1), lockwashers (2), and flat washers (3).

(e) Remove printer chassis from maintenance frame and install in printer base (para 6-18b).

6-26. Removal and Replacement of Printer Base Assembly Components. The printer base assembly consists of the circuit card cage (logic frame assembly), the printer power supply assembly and printer base covers and castings.

a. *Removal and Replacement of Power Supply Assembly Fig. 6-69)*

(1) *Removal* To remove power supply assembly, proceed as follows:

(a) Remove circuit card cage and power supply assembly (para 6-18c).

(b) Remove two screws (41) and (42) and remove logic box cover (43).

(c) Disconnect wires connected between power supply (46) and terminal board TB9 on logic frame assembly (45).

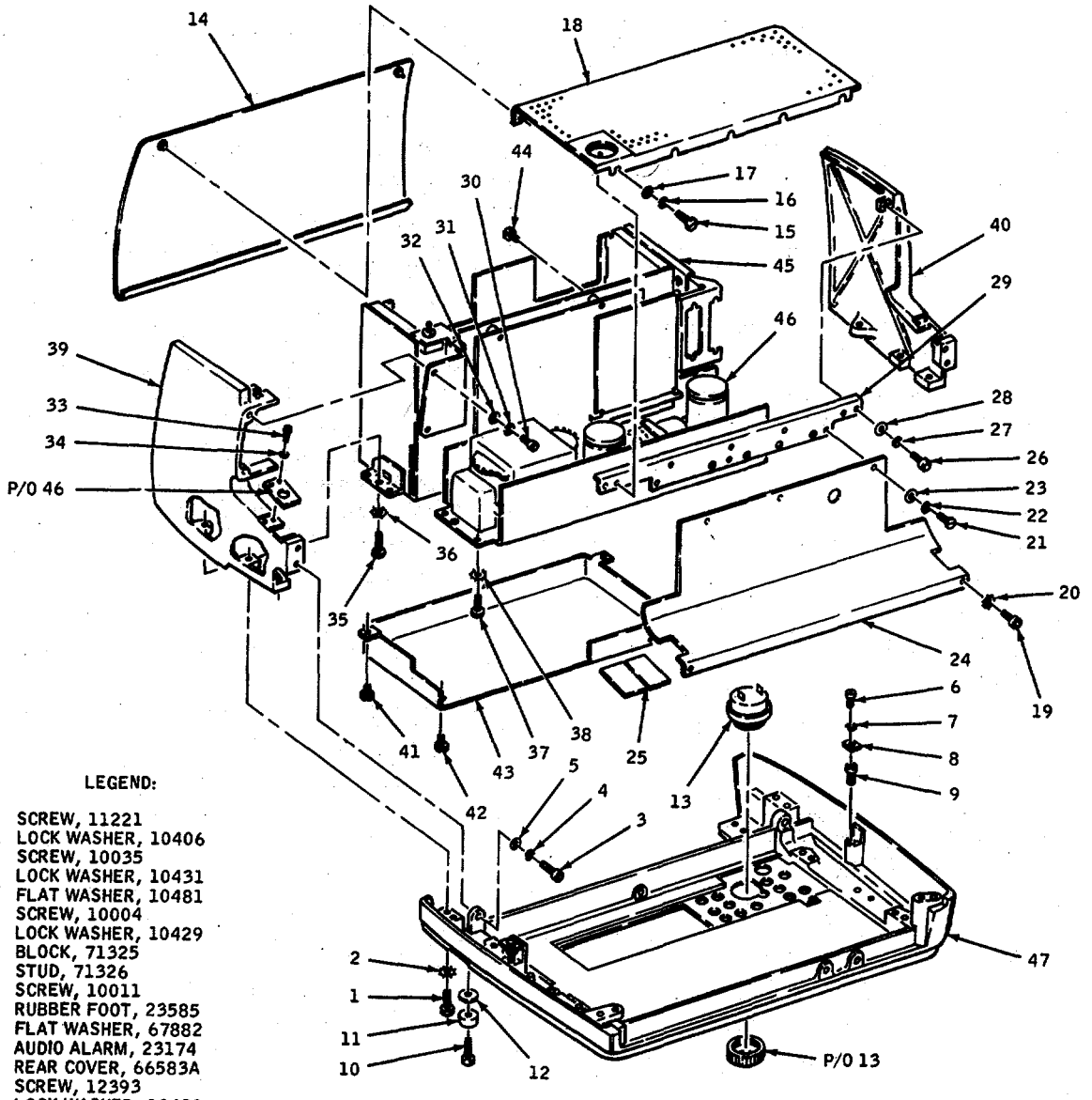
(d) Remove two screws (19) and lockwashers (20) and three screws (21), lockwashers (22), and flat washers (23) and remove power supply cover (24).

(e) Loosen captive screws on rear cover (14) and remove rear cover.

(f) Loosen three screws (15) and remove top cover (18).

(g) Remove two screws (33) and lockwashers (34) to free connector mounting plate.

(h) Remove two screws (30), lockwashers (31), and flat washers (32) to free fuse mounting plate.



LEGEND:

1. SCREW, 11221
2. LOCK WASHER, 10406
3. SCREW, 10035
4. LOCK WASHER, 10431
5. FLAT WASHER, 10481
6. SCREW, 10004
7. LOCK WASHER, 10429
8. BLOCK, 71325
9. STUD, 71326
10. SCREW, 10011
11. RUBBER FOOT, 23585
12. FLAT WASHER, 67882
13. AUDIO ALARM, 23174
14. REAR COVER, 66583A
15. SCREW, 12393
16. LOCK WASHER, 10429
17. FLAT WASHER, 10450
18. TOP COVER, 73389A
19. SCREW, 10055
20. LOCK WASHER, 12403
21. SCREW, 12393
22. LOCK WASHER, 10429
23. FLAT WASHER, 10450
24. POWER SUPPLY COVER, 73317
25. INSULATOR, 60083
26. SCREW, 12393
27. LOCK WASHER, 10429
28. FLAT WASHER, 10450
29. BRACKET ASSEMBLY, 68844
30. SCREW, 10055
31. LOCK WASHER, 10429
32. FLAT WASHER, 10450
33. SCREW, 10003
34. LOCK WASHER, 10429
35. SCREW, 11221
36. LOCK WASHER, 10406
37. SCREW, 10024-01
38. LOCK WASHER, 10405
39. LEFT SIDE COVER, 69085A
40. RIGHT SIDE COVER 69084A
41. SCREW, 12156
42. SCREW, 12106
43. LOGIC BOX COVER, 73398
44. SCREW, 12114
45. LOGIC FRAME ASSEMBLY, 74241
46. POWER SUPPLY ASSEMBLY, 74249
47. BASE ASSEMBLY

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Figure 6-69. Power Supply Assembly Exploded View

(i) Remove two screws (44) securing top of power supply assembly to top of logic frame assembly.

(j) Remove two screws (37) lockwashers (88), screws (1), and lockwashers (2) securing power supply assembly to left side cover (89) and right side cover (40) and remove power supply assembly.

(2) *Replacement* To replace power supply assembly, proceed as follows:

(a) Install power supply assembly (46) in printer case and secure to left side cover (89) and right side cover (40) with two screws (87), lockwashers (88), screws (1) and lockwashers (2).

(b) Secure top edge of power supply assembly to top edge of logic frame assembly with two screws (44).

(c) Locate power supply connector mounting plate in cutout on left side cover and secure with two screws (33) and lockwashers (34).

(d) Locate power supply fuse mounting plate on the left side cover and secure with two screws (30), lockwashers (31), and flat washers (32).

(e) Connect the following wires between TB8 on the power supply assembly and TB9 on the logic frame assembly.

From	To	Description
TB8-1	TB9-7	+5v (blue)
TB8-2	TB9-3	+12v (red)
TB8-8	TB9-1	+36v (violet)
TB8-4	TB9-4	Ground (black)
TB8-5	TB9-9	-12v (orange)
TB8-6	TB9-10	6.8 vac (white/orange)

NOTE

Terminal 6 of terminal board TB8 is located in the slot below the lower of the terminal board mounting screws.

(f) Install logic box cover (48) and secure with two screws (41) and (42).

(g) Install power supply cover and secure with two screws (19) and lockwashers (20) and three screws(21) lockwashers (22), and flat washers (28).

(h) If removed, install printed circuit cards in logic frame assembly (para 5-27b).

(i) Install top cover (18) and secure with three screws (15).

(j) Install rear cover (14) and secure with captive screws

(k) Install circuit card cage and power supply assembly in printer base (para 6-18c**).**

b. *Repair of Power Supply Assembly*. Repair of the printer power supply assembly is limited to replacing the P101 power supply regulator circuit card assembly, the POWER switch, and the fuses and fuseholders (fig. 6-70).

(1) *Removal and replacement of P101 power supply regular circuit card assembly*

(a) *Removal.* Access to the screw securing P101 power supply regulator circuit card assembly (3, fig 6-70) is restricted by power supply cover (24, fig. 6-69). The power supply cover in turn is trapped by the printer cover hinge rod. Therefore, either the printer cover or the circuit card cage and power supply assembly must be removed from the printer base in order to remove the regulator circuit card assembly.

NOTE

A screw access hole is located in the power supply cover. Addressing and removing the screw through this hole may result, in dropping the circuit card attaching screw and flat washer into the power supply chassis and is therefore not recommended.

To remove power supply regulator circuit card assembly, proceed as follows:

1. Either remove circuit card cage and power supply assembly or cover assembly from printer base (para 6-18c or 6-18d).

2. Loosen captive screws on rear cover (14, fig. 6-69) and remove rear cover.

3. Loosen three screws (15, fig. 6-69) and remove top cover (18, fig. 6-69).

4. Remove two screws (19, fig. 6-69) and lockwashers (20, fig. 6-69) and three screws (21, fig. 6-69), lockwashers (28, fig. 6-69), and flat washers (22, fig. 6-69) and remove power supply cover (24, fig. 6-69).

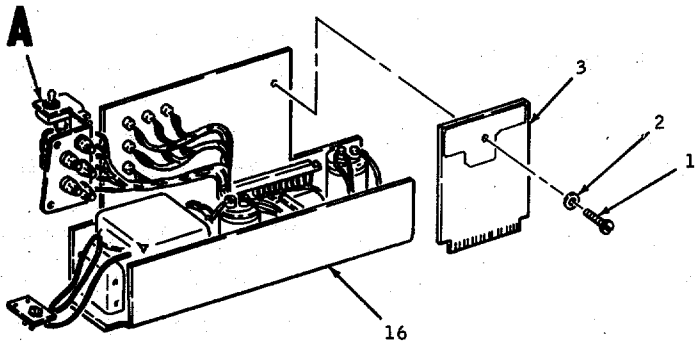
5. Remove screw (1) and flat washer (2) and carefully remove P101 power supply regulator circuit card assembly (8) from power supply

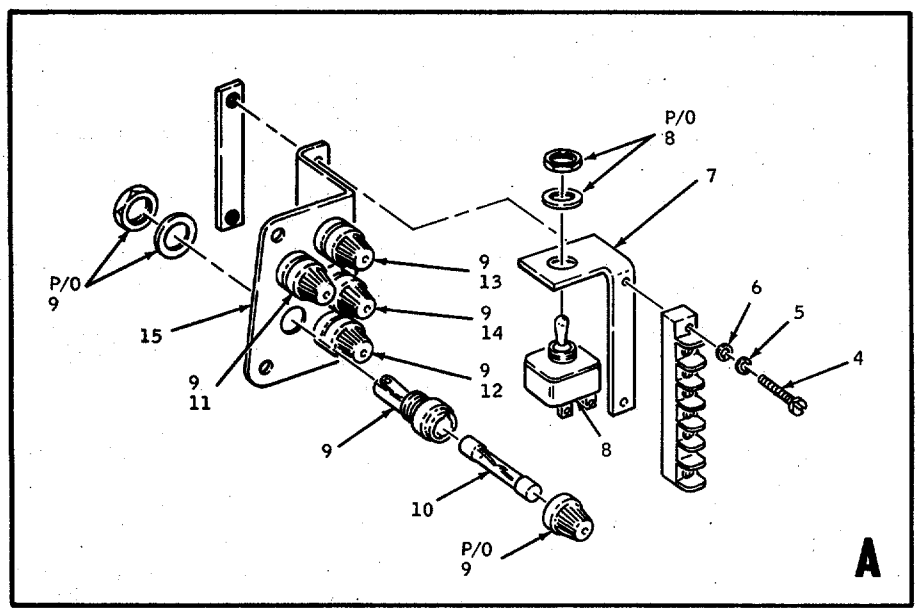
(b) *Replacement* To replace P101 power supply regulator circuit card assembly, proceed as follows:

1. Press P101 power supply regulator circuit card assembly (3) firmly into mating connector on power supply and secure with screw (1) and flat washer (2).

2. Install power supply cover (24, fig. 6-69) and secure with three screws (21, fig. 6-69), lockwashers (22, fig. 6-69), and flat washers (23, fig. 6-69) and two screws (19, fig. 6-69) and lockwashers (20, fig.6-69)

3. Install top cover (18, fig. 6-69) and secure with three screws (15, fig. 6-69).





LEGEND:

1. SCREW, 12375
2. FLAT WASHER, 10457
3. P101 POWER SUPPLY REGULATOR CIRCUIT CARD ASSEMBLY, 73386A
4. SCREW, 12125
5. LOCK WASHER, 10432
6. FLAT WASHER, 10490
7. BRACKET, 73382
8. TOGGLE SWITCH S10, 836K6
9. FUSEHOLDER XDS1 THRU XDS5, 20458
10. FUSE F1, F02B250V2A
11. FUSE F2, F02B250V2A
12. FUSE F3, F02A250V3A
13. FUSE F4, F02A250V5A
14. FUSE F5, F02A250V1/2A
15. BRACKET, 73383A
16. POWER SUPPLY ASSEMBLY

NOTE:

[ ] INDICATES EQUIPMENT MARKING.

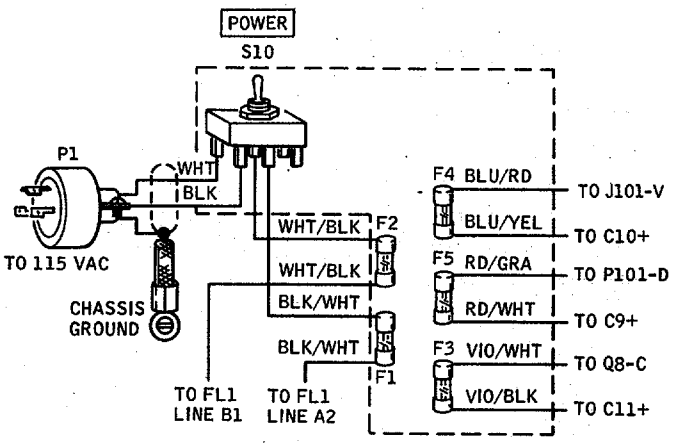


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Figure 6-70. Poser Supply Assembly, Exploded View

4. Install rear cover (14, fig. 6-69) and secure with captive screws.
5. Install either circuit card cage and power supply assembly or cover assembly (para 6-18c or 6-18d).

(2) *Removal and replacement of POWER switch and fuseholders*

(a) *Removal.* To remove POWER switch and fuseholders, proceed as follows:

1. Remove circuit card cage and power supply assembly (para 6-18c).
2. Loosen captive screws on rear cover (14, fig. 6-69) and remove rear cover.
3. Loosen three screws (15, fig. 6-69) and remove top cover (18, fig. 6-69).
4. Remove two screws (30, fig. 6-69), lockwashers (31, fig. 6-69), and flat washers (32, fig. 6-69) to fuseholder mounting bracket (15).
5. Remove two screws (26, fig. 6-69), lockwashers (27, fig. 6-69), and lockwashers (28, fig. 6-69) and two screws (19, fig. 6-69) and lockwashers (20, fig. 6-69) and remove assembly of power supply cover (24, fig. 6-69) and bracket assembly (29, fig. 6-69).
6. Remove screw (37, fig. 6-69), lockwasher (38, fig. 6-69) and screw (35, fig. 6-69) and lockwasher (36, fig. 6-69) securing left side cover (39, fig. 6-69) to circuit card cage and power supply assembly and remove left side cover.
7. Unsolder and disconnect wires to defective switch or fuseholder.
8. Remove nut securing switch or fuseholder and remove switch or fuseholder from bracket.

(b) *Replacement* To remove POWER switch and fuseholders, proceed as follows:

1. Install switch or fuseholder in mounting hole in bracket (7 or 15, as applicable) and secure with nut supplied.
2. Refer to wiring diagram of figure 6-70 and connect wires to switch or fuseholder.
3. Install left side cover (39, fig. 6-69) on circuit card cage and power supply assembly and secure with screw (37, fig. 6-69), lockwasher (38, fig. 6-69), and screw (35, fig. 6-69) and lockwasher (36, fig. 6-69).
4. Locate power supply fuse mounting plate on the left side cover and secure with two screws (30, fig. 6-69), lockwashers (31, fig. 6-69) and flat washers (32, fig. 6-69).
5. Install assembly of power supply cover (24, fig. 6-69) and bracket assembly (29, fig. 6-69) on circuit card cage and power supply assembly and secure with two screws (26, fig. 6-69), lockwashers (27, fig. 6-69) and flat washers (28, fig. 6-69) and two screws (19, fig. 6-69) and lockwashers (20, fig. 6-69).
6. Install top cover (18, fig. 6-69) and secure with three screws (15, fig. 6-69).
7. Install rear cover (14, fig. 6-69) and secure with captive screws.
8. Install circuit card cage and power supply assembly in printer base (para 6-18c).

6-27. Removal and replacement of Mode Control Panel Components. Access and removal and replacement procedures are given in paragraph 5-33 for mode control panel components. In addition to the procedures given in paragraph 5-33, the lamp driver circuit board (9, fig. 5-20 and fig. 6-71), the two request to send circuit boards (8, fig. 5-20 and fig. 6-72), and the CLEAR SEND lampholder (9, fig. 5-20) may be replaced at general support maintenance level. For removal and replacement of these components refer to figure 5-20.

6-28. Removal and Replacement-of Cover Assembly Components.

a. *Removal and Replacement of Hinge Spring fig. 6-73)*

(1) *Removal.* To remove hinge spring, proceed as follows:

(a) Remove cover assembly (para 6-18d).

WARNING

The hinge spring is loaded to 160 ounces. Protect eyes when removing spring

(b) Remove hinge spring (29).

(2) *Replacement* To replace hinge spring, proceed as follows:

WARNING

The hinge spring, when installed is loaded to 160 ounces. Protect eyes when installing spring.

(a) Hook one end of the replacement hinge spring (29) in the slot of the stud on the applicable bracket assembly (42 or 53). Address stud slot from rear of cover assembly.

(b) Hook other end of hinge spring in the slot of the stud on the applicable bracket assembly (43A or 55).

(c) Reinstall cover assembly (para 6-18d).

b. *Removal and Replacement of Cover Release Knob (Fig. 6-73)*

(1) *Removal* To remove cover release knob, proceed as follows:

(a) Open cover assembly to the full open position.

(b) Remove applicable retaining ring (82).

(c) Remove applicable knob (83) and spacer (34).

(2) *Replacement.* To replace cover release knob, proceed as follows:

(a) Place spacer (84) in mounting position between bracket assembly (42 or 58) and latch (40 or 51).

(b) Push back on latch to clear passage for knob (33) stud and install knob in printer cover. Retain knob with retaining ring (32).

(c) Adjust printer cover release knob (para 5-21).

(d) Adjust printer cover latch (para 5-22).

c. *Removal and Replacement of Copy Lamp Cable Assembly (fig. 6-73)*

(1) *Removal*. To remove copy lamp cable assembly, proceed as follows:

(a) Remove cover assembly (para 6-18d).

(b) Disconnect wires to lamp holder XDS1 (5).

(c) Loosen screw (2) to release cable clamp (4) grip on cable assembly and pull cable assembly away from cable clamp.

(d) Remove screw (7) and lock washer (8) to free retainer (9) and remove retainer from cable assembly.

(e) Free connector end of cable assembly by removing screw (12), nut (18), lockwasher (14), and flat washer (15) securing cable clamp (16) to right hand bracket assembly (43A).

(f) Remove two screws (28), lockwasher (24), flat washers (25), screws (26), lockwashers (27), and flat washers (28) securing hinge and latch mechanism to cover assembly.

(g) Carefully pivot hinge and latch mechanism up in order to address clamp hardware securing cable assembly to right-hand bracket assembly (42).

(h) Free cable assembly from cover assembly by removing screw (17), nut (18), lockwasher (19), and flat washer (20).

(i) Remove cable clamps (21) and (16) from cable assembly.

(2) Replacement. To replace lamp cable assembly, proceed as follows:

(a) Place cable clamps (16) and (21) on cable assembly (22) s0 that when the cable clamp mounting 8 tabs are down the loop of the cable clamp will be to your right and the mounting surface (tab) is to your left as viewed from the connector end of the cable assembly.

(b) Position cable clamp (21) on cable assembly so that the cable clamp is located approximately 5-3/ 4 inches from the connector end of the cable assembly conduit.

(c) Carefully lift pivot hinge and latch mechanism up from cover assembly and place cable clamp (21) in mounting position so that the tab is between right-hand mounting bracket (42) and the printer cover. Attach cable clamp to mounting bracket with screw (17), lockwasher (19), flat washer (20), and nut (18). Tighten screw snug tight.

(d) Place pivot hinge and latch mechanism back in mounting on cover assembly.

(e) Orient cable clamp so that cable assembly feeds out of cable clamp at an angle of approximately 45 degrees in respect to the bottom edge of the cover assembly.

(f) Observe that there is still approximately 5 3/4 inches of conduit between the connector end of the conduit and the cable clamp.

(g) While holding cable clamp and cable assembly in position, lift pivot hinge and latch mechanism and tighten cable clamp attaching hardware.

(h) Place pivot hinge and latch mechanism back in mounting on cover assembly and secure with two screws (23), lockwashers (24), flat washers (25), screws (26), lockwashers (27), and flat washers (28).

(i) Slide cable clamp (16) along cable assembly until it is approximately 1/2 inch from the end of the cable assembly conduit.

(j) Place cable clamp (16) in mounting position so' that the tab is between right-hand bracket assembly (43A) and the printer cover. Attach cable clamp to bracket assembly with screw (12), lockwasher (14), flat washer (15), and nut (13).

(k) Push down on pivot hinge and latch mechanism to simulate a closed cover.

(l) Observe that there is no pulling on the conduit or excessive bowing of the cable. Reposition cable assembly as necessary to meet the requirement.

(m) Thread cable assembly through retainer (9) and cable clamp (4).

(n) Tighten screws (10) and (2).

(o) Solder cable assembly orange wire to center terminal of lamp holder (5) and black wire to base terminal.

(p) Install cover assembly on printer base (para 6-18d).

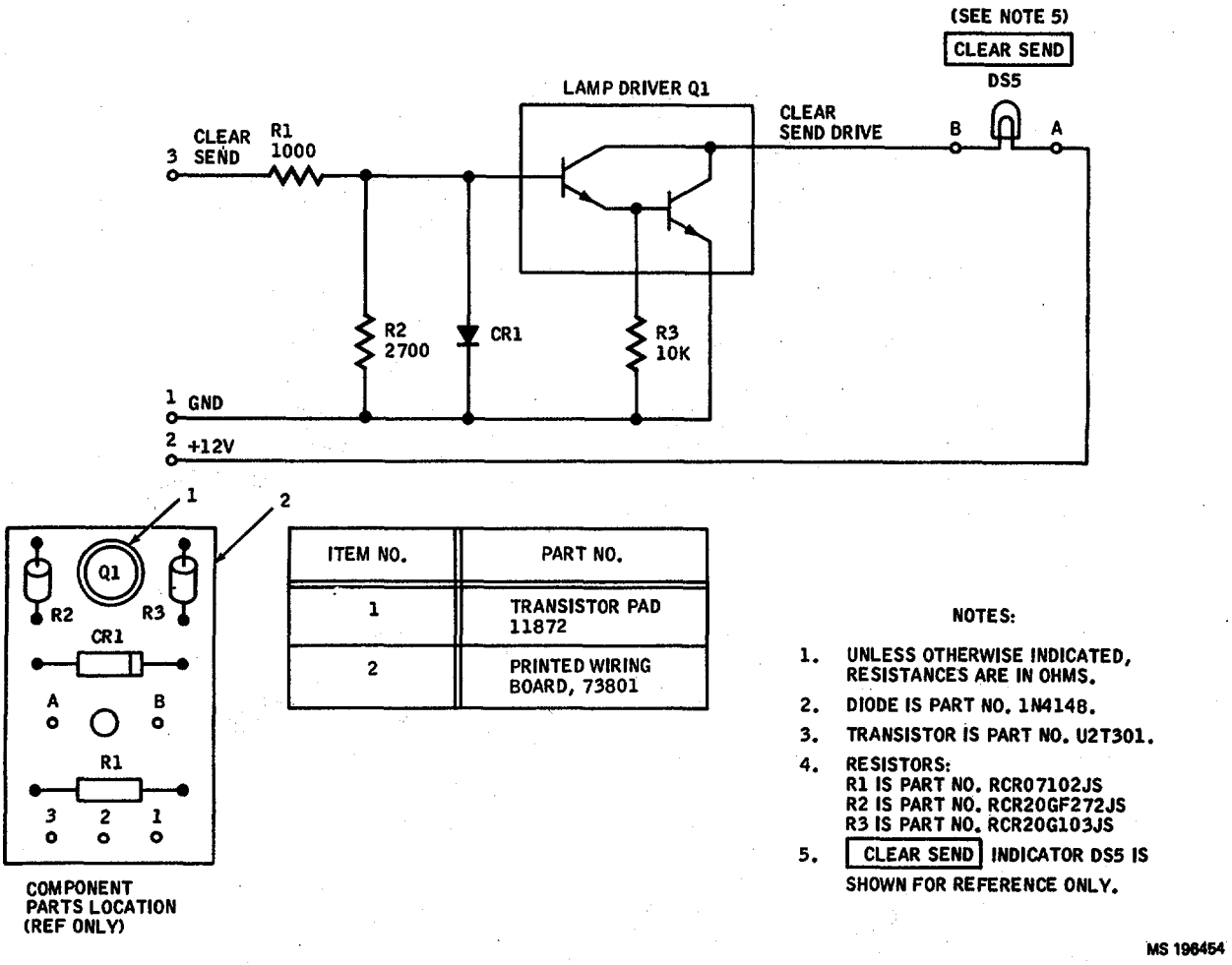


Figure 6-71. Lamp Driver Circuit Board Parts Location and Schematic Diagram

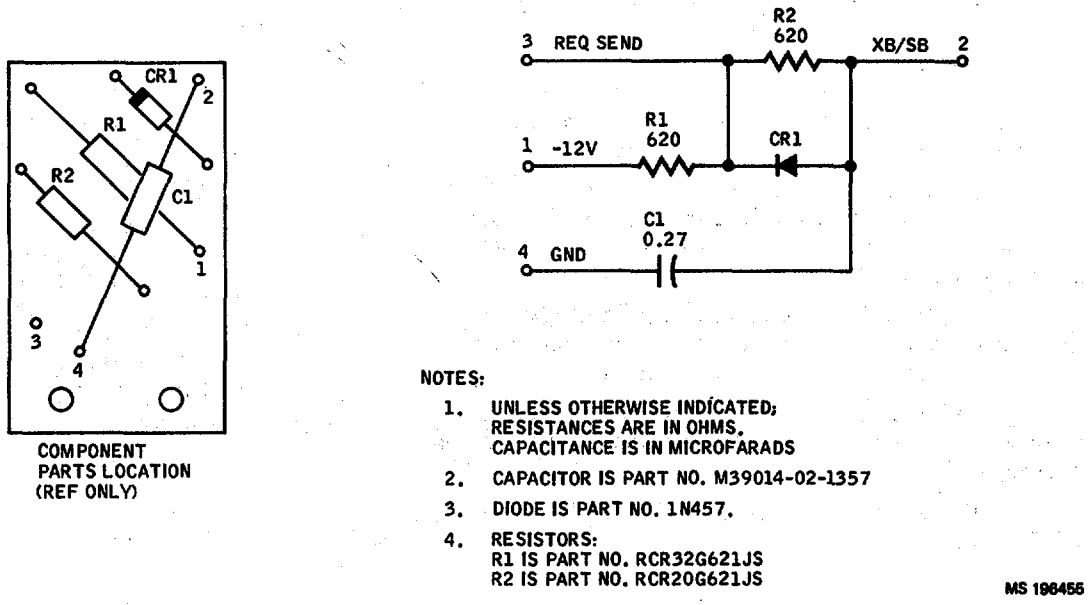
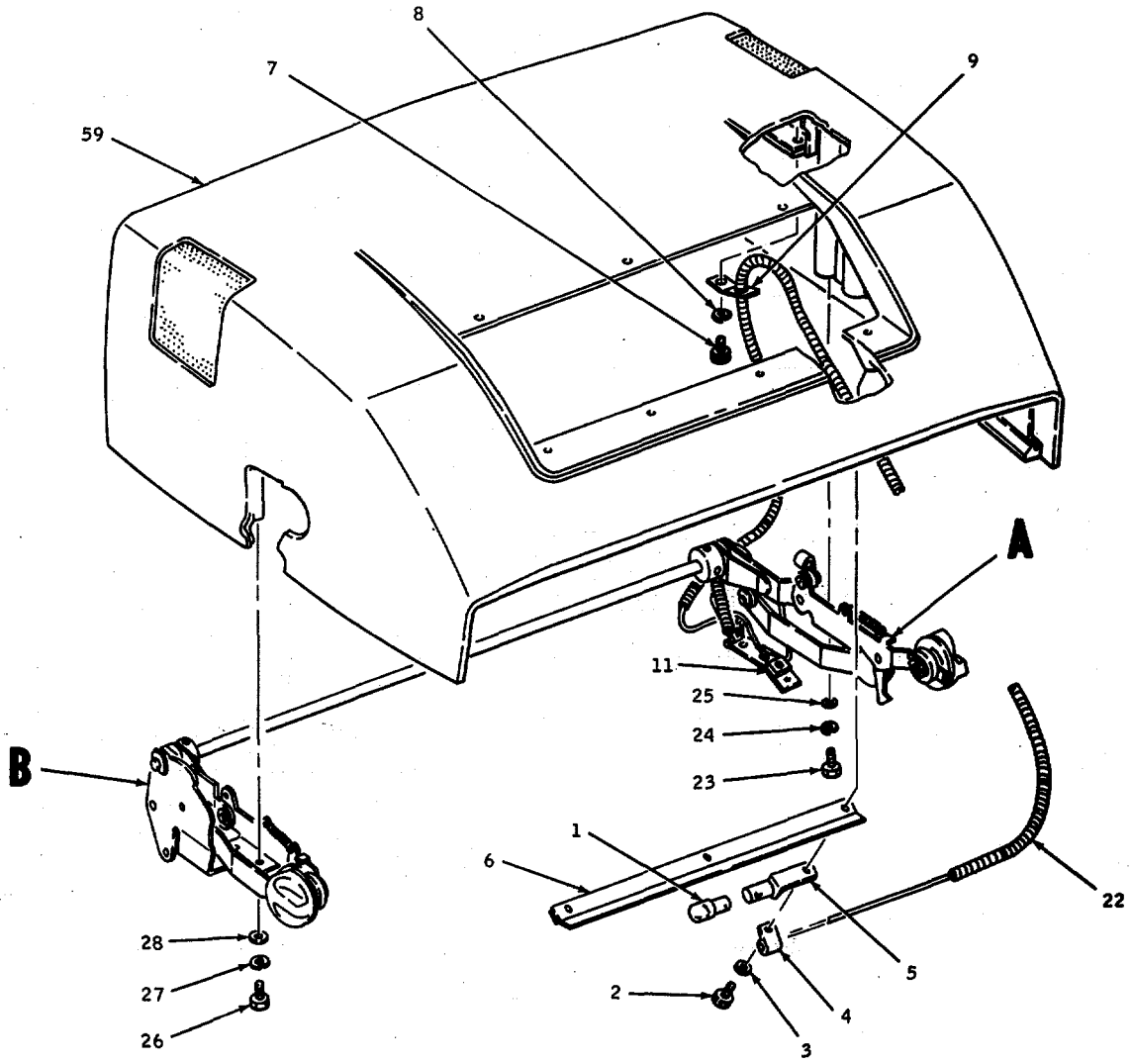


Figure 6-72. Request to Send Circuit Board, Parts Location and Schematic Diagram



LEGEND:

1. LAMP (DS1, DS2), 23274
2. SCREW, 10003
3. LOCK WASHER, 10415
4. CABLE CLAMP, 20517
5. LAMP HOLDER (XDS1, XDS2), 23251
6. BRACKET ASSEMBLY, 70393A
7. SCREW, 1009
8. LOCK WASHER, 10426
9. RETAINER, 70213
10. SCREW, 11817
11. CONNECTOR (P31), 23190
12. SCREW, 12357
13. NUT, 10512
14. LOCK WASHER, 10415
15. FLAT WASHER, 10450
16. CABLE CLAMP, 20517
17. SCREW, 12357
18. NUT, 10512
19. LOCK WASHER, 10415
20. FLAT WASHER, 10450
21. CABLE CLAMP, 20517
22. CABLE ASSEMBLY, 66565A
23. SCREW, 10399
24. LOCK WASHER, 10426
25. FLAT WASHER, 10467
26. SCREW, 10399
27. LOCK WASHER, 10426
28. FLAT WASHER, 10467
29. HINGE SPRING, 66566
30. LATCH SPRING, 66567
31. COVER LATCH SPRING, 68430
32. RETAINING RING, 12949
33. KNOB, 66608
34. SPACER, 67882A
35. RETAINING RING, 12957
36. FLAT WASHER, 59563
37. RETAINING RING, 12957
38. RIGHT-HAND COVER ARM, 68428A
39. FLAT WASHER, 59563
40. RIGHT-HAND LATCH, 66539
41. RETAINING RING, 12957
42. RIGHT-HAND BRACKET ASSEMBLY, 68871A
43. RETAINING RING, 12957
43A. RIGHT-HAND BRACKET ASSEMBLY, 68875A
44. SETSCREW, 10210
45. BRACKET ASSEMBLY, 70393A
46. RETAINING RING, 12957
47. FLAT WASHER, 59563
48. RETAINING RING, 12957
49. LEFT-HAND COVER ARM, 68991A
50. FLAT WASHER, 59563
51. LEFT-HAND LATCH, 68992
52. RETAINING RING, 12957
53. LEFT-HAND BRACKET ASSEMBLY, 68873A
54. RETAINING RING, 12959
55. LEFT-HAND BRACKET ASSEMBLY, 68877A
56. SETSCREW, 10210
57. SUPPORT ARM ASSEMBLY, 66534A
58. HINGE ROD, 68387
59. COVER ASSEMBLY

MS 196456

Figure 6-73. Cover Assembly, Exploded View (Sheet 1 of 2)

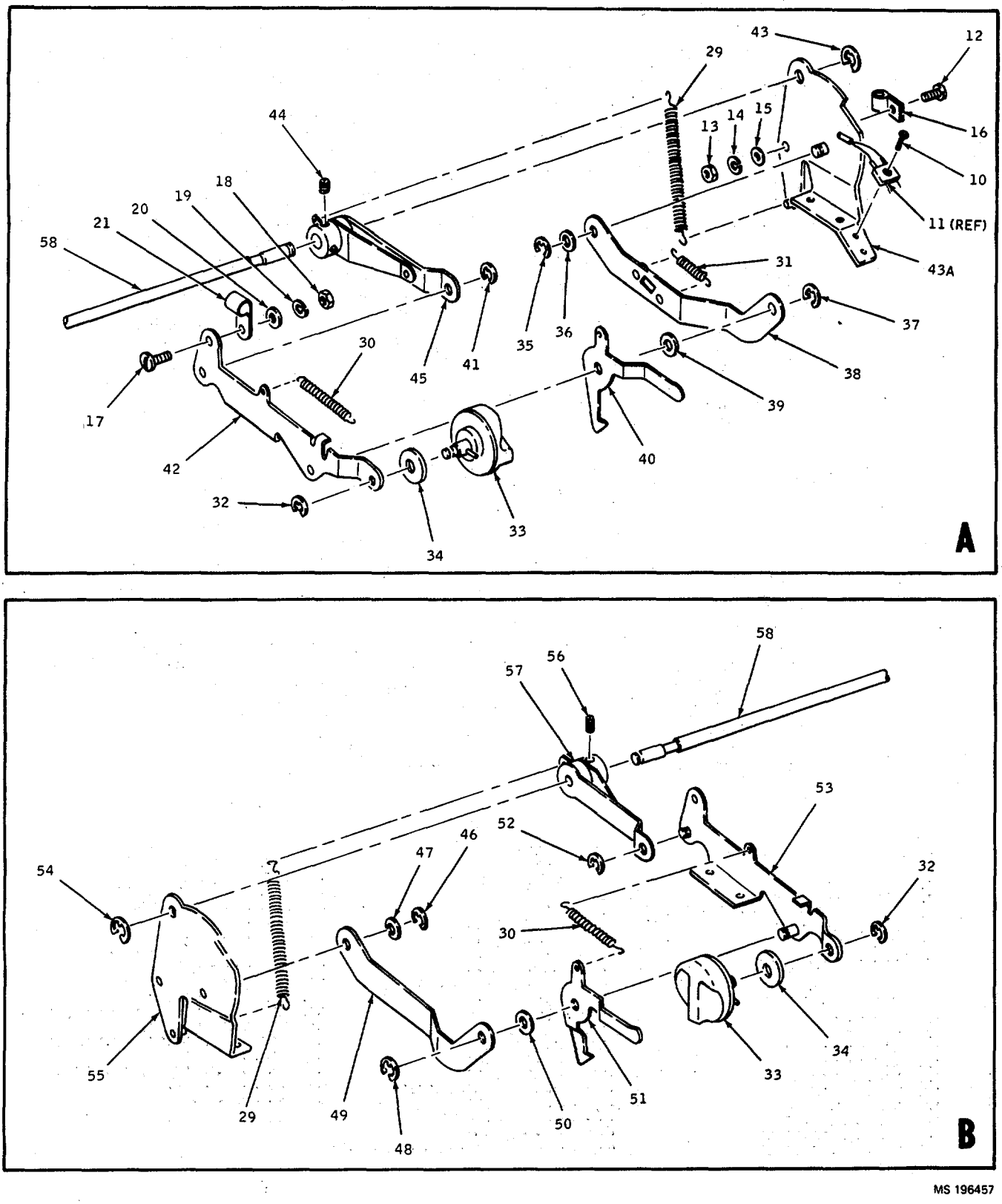


Figure 6-73. Cover Assembly, Exploded View (Sheet 2 of 2)

Section VI. WIRE LISTS AND REFERENCE DATA

6-29. General. This section provides a wire list and spring characteristics of the printer.

6-30. Wire List. The printer wire list (table 6-12) provides an alphanumerical listing of all connectors and components of the printer. The wire list identifies the source termination, color, wire gage, and signal description of wiring. When the termination point of a wire is located in the "to" column, the same wire interconnection may be located in the "from" column in the alphanumerical sequence of the termination found in the 'to" column. Figure 6-74 is a wiring diagram of cable W217 which interconnects the printer with the AN/TSQ-73 system. Figure 6-76 is a wiring diagram which illustrates alternative 72 pin connectors for J75 through J98.

6-31. Spring Characteristics. Tables 6-13 through 6-17 list the characteristics of each spring used in the printer. Figure 6-75 provides an outline drawing of each spring to facilitate identification of springs. The spring data given in the tables is for use in inspecting or repairing the printer to determine when springs are to be replaced.

Table 6-12. Wire List

From	To	Color	Gage	Description
A1-1	S5-NO(2)	Blk	20	Ground
A1-2	S4-Ctr	Red	20	+ 12v
A1-2	DS4-Ctr	Red	20	+ 12v
A1-3	P4-43	Red/blu	26	Clear to send
A1-E1	XDS5-Tab	-	-	Clear to send lt
A1-E2	XDS5-Ctr		-	+ 12v
A2-1	A3-1	Orn	20	-12v
A2-2	P4-47	Wht/red	26	SB request send
A2-3	S6-(NO)	Wht/red	20	Request
A2-4	A3-4	Blk	20	Ground
A2-4	S5-4	Blk	20	Ground
A3-1	A2-1	Orn	20	-12v
A3-1	P4-21	Orn	20	-12v
A3-2	P4-34	Grn	26	Send
A3-3	S4-4-(NO)	Red	20	Request
A3-4	A2-4	Blk	20	Ground
C8-Red dot	TB3-6	Wht	20	115 vac pk shf
C8-Blk	TB3-5	Wht	20	115 vac K2 energize
CR12-AD	K1-1	Pigtail	-	Motor stop relay drive
CR12-CATH	K1-8	Pigtail	-	+ 12v
FL8-(1)	TB3-2	Pigtail	-	115 vac
FL8-(2)	TB3-4	Pigtail	-	115 vac K2 energize
J2-1	J98-a	Vio/blk	26	Receive D1
J2-2	J98-Z	Vio/brn	26	Receive D2
J2-3	J98-Y	Vio/red	26	Receive D3
J2-4	J98-X	Vio/grn	26	Receive D4
J2-5	J98-W	Vio/grn	26	Receive D5
J2-6	J98-V	Vio/blu	26	Receive D6
J2-7	J98-12	Vio/gra	26	Transmit strobe
J2-8	J98-14	Vio/wht	26	Printer ready/busy
J2-9	TB9-6	Blk	20	Signal ground
J2-10	TB9-6	Blk	20	Signal ground
J2-11	E1	Wire braid	-	Chassis ground
J2-21	TB9-9	Orn	20	-12v
J2-24	J4-6	Red/grn	26	Keyboard inhibit
J2-25	TB9-7	Blu	20	+5v
J2-34	TB9-5	Blk	20	Signal ground
J2-35	J98-23	Red/brn	26	Transmit D1

Table 6-12. Wire List
- Continued

From	To	Color	Gage	Description
J2-37	J98-22	Yel/orn	26	Transmit D2
J2-39	J98-21	Yel/blu	26	Transmit D3
J2-40	J4-43	Red/blu	26	Clear to send
J2-41	J98-20	Yel/vio	.26	Transmit D4
J2-43	J98-N	Grn/brn	26	Receive strobe
J2-44	J4-47	Red/wht	26	XB request send
J2-45	J98-18	Grn/orn	26	Transmit D6
J2-46	J4-34	Grn	26	SB request send
J2-47	J98-19	Grn/blu	26	Transmit D5
J4-1	TB9-7	Blu	20	+5v
J4-2	TB9-7	Blu	20	+ 5v
J4-3	TB9-6	Blk	20	Ground
J4-4	TB9-6	Bik	20	Ground
J4-6	J2-24	Red/grn	26	Keyboard inhibit
J4-9	J95-32	Red/blk	26	Fast clock not
J4-12	J97-U	Blu/brn	26	Keyboard Di
J4-13	J97-T	Blu/red	26	Keyboard D2
J4-14	J97-13	Blu/orn	26	Keyboard D3
J4-15	J97-12	Blu/yel	26	Keyboard D4
J4-16	J97-9	Blu/grn	26	Keyboard D5
J4-17	J97-8	Blu/blk	26	Keyboard D6
J4-20	J97-X	Blu/wht	26	Strobe
J4-21	TB9-9	Orn	20	-12v
J4-26	J96-N	Wht/orn	26	Carriage return switch
J4-27	J96-28	Wht/red	26	Line feed single switch
J4-28	J96-e	Wht/orn	26	Line feed run switch
J4-29	J95-N	Wht/yel	26	Printer on-line
J4-34	J2-46	Grn	26	SB request send
J4-42	J95-31	Yel/wht	26	Motor start switch
J4-43	J2-40	Red/blu	26	Clear to send
J4-44	J7-37	Yel/orn	26	Paper out light
J4-45	TB9-3	Red	20	+ 12v
J4-46	TB9-3	Red	20	+ 12v
J4-47	J2-44	Red/wht	26	XB request send
J4-48	J96-1	Yell/blue	26	Audible alarm
J4-50	TB9-4	Blake	18	Ground
J7-1	J96-11	Bran/what	26	Auto carriage return SW

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
J7-3	J96-c	Ron	26	LH margin SW
J7-5	J96-n	Yell	26	Print hammer no. 1
J7-7	J96-j	Grin	26	Print hammer no. 2
J7-11	J95-T	Iv	26	Ribbon lift
J7-13	J96-29	Gar	26	Carriage return drive
J7-17	J96-k	Blake/yell	26	Line feed drive
J7-19	J96-m	Red/what	26	Space drive
J7-21	J95-m	Bran	26	Motor stop
J7-23	J96-T	Blake/what	26	Main clock coil
J7-24	J96-a	Blake	26	Main clock ground
J7-26	J96-X	Ron/bloke	26	Index clock coil
J7-27	J96-W	Blake	26	Index clock ground
J7-29	J961	Yell/blu	26	Audible alarm
J7-37	J4-44	Yell/orn	26	Paper out light
J7-42	TB9-3	Red	20	+12v
J7-44	TB9-2	Vio	18	+36v
J7-46	TB9-2	vio	18	+36v
J7-48	TB9-4	Blk	18	Ground
J7-50	TB9-4	Blk	18	Ground
J10-2	P4-1	Blu	20	+5v
J10-3	P4-2	Blu	20	+5v
J10-5	P4-3	Blk	20	Ground
J10-6	P4-4	Blk	20	Ground
J10-7	P4-7	Vio/blk	26	Not used
J10-8	S4-3	Orn/red	26	FFI reset (1)
J10-8	P4-8	Orn/red	26	Not used
J10-9	P4-6	Blu	26	Keyboard inhibit
J10-11	P411	Red/yell	26	Not used
J10-12	S4-2	Vio	26	FFI reset (2)
J10-12	P4-10	Vio	26	Not used
J10-13	P4-9	Red/blk	26	Fast clock not
J10-14	P4-12	Blu	26	Keyboard Dl
J10-15	P4-13	Blur/red	26	Keyboard D2
J10-16	P414	Blu/orn	26	Keyboard D3
J10-17	P4-15	Blu/yel	26	Keyboard D4
J10-18	P4-16	Blu/grn	26	Keyboard D6
J10-19	P4-17	Blu/blk	26	Keyboard D6

Table 6-12. Wire List
- Continued

From	To	Color	Gage	Description
J10.20	P4-18	Blu/wht	6	Not used
J10.21	P4-19	Blu/vio	6	Not used
J10-22	P4-20	Blu	26	Strobe
J10-23	P4-5	Vio/yel	6	Not used
J87-A	L9-Red	Red	20	Hammer no. 2 drive
J87-B	L10-Yel	Yel	80	Hammer no, 1 drive
J27-D	L9-Wht	Wht	20	+36v
J27-D	L10-Wht	Wht	20	+38v
J95-1	J95-A	Bare	16	Ground
J95-1	J96-A	Bare	--	Ground
J95-2	J96-H	Blu/grn	26	Buffer D6
J95-3	J96-K	Blu/brn	26	Buffer D2
J95-4	J96-F	Blu/vio	26	Buffer D7
J95-5	J96-H	Blu/red	26	Buffer D8
J95-6	J97-J	Gra/grn	26	Printer D6
J95-7	J97-16	Gra/vio	26	Printer D2
J95-9	J97-P	Gra/red	26	Printer D
J95-12	J97-D	Gra/vio	26	Printer strobe
J95-15	J96-6	Orn/blu	*26*	Ready/busy delay
J95-17	J96-2	Orn/wht	26	Latch clock
J95-18.	J98-C	Vio	26	Receive D6
J95-20	J98-4	Orn	26	Receive D3
J95-21	J98-2	Brn	26	Receive D1
J95-22	J96-M	Orn/blk	26	Fast clock
J95-26	J95-d	Red	20	+12v
J95-26	TB9-3	Red	20	+12v
J95-31	J4-42	Yel/wht	26	Motor start switch
J95-32	J4-*9*	Red/blk	26	Fast clock not
J95-33	J96-15	Grn/red	26	Index clock
J95-36	J95-r	Bare	16	+5v
J96-36	TB9-8	Red/yel	16	+6v
J95-A	J95-1	Bare	16	Ground
J95-A	TB9-5	Blk	16	Ground
J95-B	J96-k	Blu/yel	26	Buffer D5
J95-C	J96-L	Blu/blk	26	Buffer DI
J95-D	J96-E	Blu/gra	26	Parity
J95-E	J96-J	Blu/orn	26	Buffer D4

Table 6-12 Wire List
-Continued

From	To	Color	Gage	Description
J95-F	J97-K	Gra/yel	26	Printer D5
J95-H	J98-6	Gra/brn	26	Printer D1
J95-K	J97-N	Gra/orn	26'	Printer D4
J95-N	J97-b	Wht/yel	26	Printer on-line
J95-N	J4-29	Wht/yel	26	Printer on-line
J95-T	J7-11	Vio	26	Ribbon lift
J95-V	J98-B	Blu	26	Receive D5
J95-X	J98-6'	Grn	26	Receive D4
J95-Y	J98-3	Red	26	Receive D2
J95-b	J98-10	Gra	26	Printer ready/busy
J95-d	J95626	Bare	26	+12v
J95-h	J98-6	Gra	26	Receive strobe
J95-m	J7-21	Brn	26	Motor stop
J95-r	J95-36	Bare	26	+5v
J95-r	J96-36	Bare	26	+5v
J96-1	J96-A	Bare	26	Ground
J96-1	J95-A	Bare	26	Ground
J96-6	J95-15	Orn/blu	26	Ready/busy delay
J96-7	J95-B	Blu/yel	26	Buffer D5
J96-8	J95-5	Blu/red	26	Buffer D3
J96-11	J7-1	Brn/wht	26	Auto carriage return sw
J96-15	J95-33	Grn/red	26	Index clock
J96-28	J4-27	Wht/red	26	Line feed single sw
J96-29	J7-13	Gra	26	Carriage return drive
J96-35	J96-P	Pigtail	20	+12v
J96-35	TB9-3	Red	20	+12v
J96-36	J96-r	Bare	16	+5v
J96-36	J95-r	Bare	16	+5v
J96-A	J96-1	Bare	16	Ground
J96-A	J97-1	Bare	16	Ground
J96-E	J95-D	Blu/gra	26	Parity
J96-F	J95-4	Blu/vio	26	Buffer D7
J96-H	J95-2	Blu/grn	26	Buffer D6
J96-J	J95-E	Blu/orn	26	Buffer D4
J96-K	J95-3	Blu/brn	26	Buffer D2
J96-L	J95-C	Blu/blk	26	Buffer Dl
J96-M	J95-22	Orn/blk	26	Fast clock

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
J96-N	J4-26	Wht/brn	26	Carriage return sw
J96-T	J7-23	Blk/wht	26	Main clock coil
J96-W	J7-27	Blk	26	Index clock ground
J96-X	J7-26	Orn/blk	26	Index clock coil
J96-a	J7-24	Blk	26	Main clock ground
J96-c	J7-3	Orn	26	LH margin sw
J96-e	J4-28	Wht/orn	26	Line feed run sw
J96-j	J7-7	Grn	26	Print hammer no. 2
J96-k	J7-17	Blk/yel	26	Line feed drive
J96-1	J4-48	Yel/blu	26	Audible alarm
J96-1	J7-29	Yel/blu	26	Audible alarm
J96-m	J7-19	Red/wht	26	Space drive
J96-n	J7-5	Yel	26	Print hammer no. 1
J96-p	TB9-3	Red	20	+12v
J96-r	J96-36	Bare	16	+5v
J96-r	J97-36	Bare	16	+5v
J97-1	TB9-5	Bare	26	Ground
J97-1	J97-A	Bare	26	Ground
J97-8	J48	Blu/blk	26	Keyboard D6
J97-9	J4-16	Blu/grn	26	Keyboard D5
J97-12	J4-15	Blu/yel	26	Keyboard D4
J97-13	J414	Blu/orn	26	Keyboard D3
J97-16	J95-7	Grn/vio	26	Printer D2
J97-17	J95-H	Gra/brn	26	Printer DI
J97-28	J96-p	Red	20	+1
J97-28	J97-f	Pigtail	20	+12v
J97-32	J98-33	Blu	26	Keyboard D6
J97-33	J98-k	Yel	26	Keyboard D4
J97-34	J98-m	Red	26	Keyboard D2
J97-36	J96-r	Bare	16	+5v
J97-36	J98-36	Bare	16	+5v
J97-A	J97-1	Bare	16	Ground
J97-A	J98-1	Bare	16	Ground
J97-D	J95-12	Gra/vio	26	Printer strobe
J97-J	J95-6	Gra/grn	26	Printer D6
J97-K	J95-F	Gra/yel	26	Printer D6
J97-N	J95-K	Gra/orn	26	Printer D4

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
J97-P	J95-9	Gra/red	26	Printer D3
J97-T	J4-13	Blu/red	26	Keyboard D2
J97-U	J412	Blu/brn	26	Keyboard Dl
J97-X	J4-20	Blu/wht	26	Strobe
J97-a	J98-30	Vio	26	Keyboard strobe not
J9,7-b	J95-n	Wht/yel	26	Printer on-line
J97-b	J98-9	Wht	26	Printer on-line
J97-f	J97-28	Pigtail	20	+12v
J97-1	J98-j	Grn	26	Keyboard D5
J97-m	J98-1	Orn	26	Keyboard D3
J97-n	J98-n	Brn	26	Keyboard Dl
J97-r	J97-36	Bare	16	+5v
J97-r	J9836	Bare	16	+5v
J98-1	J97-A	Bare	16	Ground
J98-1	J98-A	Bare	16	Ground
J98-2	J95-21	Brn	26	Receive Dl
J98-3	J95-Y	Red	26	Receive D2
J98-4	J95-20	Orn	26	Receive D3
J98-5	J95-X	Grn	26	Receive D4
J98-6	J95-h	Gra	26	Receive strobe
J98-8	J98-9	Pigtail	26	Printer on-line
J98-9	J98-8	Pigtail	26	Printer on-line
J98-9	J97-b	Wht	26	Printer on-line
J98-10	J95-b	Gra	26	Printer ready/busy
J98-12	J2-7	Vio/gra	26	Transmit strobe
J98-14	J2-8	Vio/wht	26	Printer ready/busy
J98-18	J2-45	Grn/orn	26	Transmit D6
J98-19	J2-47	Grn/blu	26	Transmit D5
J98-20	J2-41	Yel/vio	26	Transmit D4
J98-21	J2-39	Yel/blu	26	Transmit D3
J98-22	J2-37	Yel/orn	26	Transmit D2
J98-23	J2-35	Red/brn	26	Transmit Dl
J98-25	TB9-9	Orn	20	-12v
J98-25	J98-c	Pigtail	26	-12v
J98-28	TB9-3	Red	20	+12v
J98-28	J98-f	Pigtail	26	+12v
J98-30	J97-a	Vio	26	Keyboard strobe

Table 6-12 Wire List
-Continued

From	To	Color	Gage	Description
J98-33	J97-32	Blu	26	Keyboard D6
J98-36	J97-r	Bare	16	+5v
J98-36	J98-r	Bare	16	+5v
J98-A	J98-1	Bare	16	Ground
J98-B	J95-V	Blu	26	Receive D5
J98-C	J95-18	Vio	26	Receive D6
J98-N	J2-43	Grn/brn	26	Receive strobe
J98-V	J2-6	Vio/blu	26	Receive D6
J98-W	J2-5	Vio/grn	26	Receive D5
J98-X	J2-4	vio/orn	26	Receive D4
J98-Y	J2-3	Vio/red	26	Receive D3
J98-Z	J2-2	Vio/brn	26	Receive D2
J98-a	J2-1	Violblk	26	Receive DI
J98-c	J98-25	Pigtail	20	-12v
J98-f	J98-28	Pigtail	20	+12v
J98-j	J97-1	*Grn*	26	Keyboard D5
J98-k	J97-33	Yel	26	Keyboard D4
J98-1	J97-m	Orn	26	Keyboard DS
J98-m	J97-34	Red	26	Keyboard D2
J98-n	J97-n	Brn	26	Keyboard D1
J98-r	J98-36	Bare	16	+5v
K1-l	CR12-AD	Pigtail	-	Motor stop relay drive
K1-l	TB1O-R	Yel/brn	26	Motor stop relay drive
K1-4	TB3-4	Wht	20	115 vac K2 energized
K1-5	TBD-2	Wht/blk	20	115 vac
K1-8	P7-42	Red	20	+12v
K1-8	CR12-CATH	Pigtail	-	+12v
L1-Red dot	P7-23	Blk (inner)	-	Main clock coil
L1-Blk	P7-24	Shield	-	Main clock ground
L2-Red dot	P7-26	Omn (inner)	-	Index clock coil
L2-Blk	P7-27	Shield	-	Index clock ground
L3-Violblu	TB10-9	Vio/blu	20	Space magnet drive
L3-Vio	TB10-3	Vio	20	+36v
L5-Wht/vio	TB10-7	Wht/vio	20	Line feed magnet drive
L5-Vio	TB10-1	Vio	20	+36v
L6-Yel/wht	TB10-11	Yel/wht	20	Ribbon lift magnet drive
L6-Vio	TB10-5	Vio	20	+36v

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
P4-45	DS3-(+)	Red	20	+12v
P4-46	S4-5- (Ctr)	Red	20	+12v
P4-47	A2-2	Wht/red	26	SB request Bend
P4-48	DS3-(-)	Yel/blu	20	Audible alarm
P4-50	52-5	Blk	20	Ground
P7-1	TB10-20	Brn/wht	26	Auto carriage return 8w
P7-3	TB10-18	Orn	20	LH margin sw
P7-5	TB10-B	Yel	26	Print hammer no. 1
P7-7	TB100-F	Grn	26	Print hammer no. 2
P7-9	TB10-19	Blu	26	Not used
P7-11	TB10-T	Vio	26	Ribbon lift
P7-13	TB10-G	Gra	26	Carriage return drive
P7-15	TB10-N	Wht	26	Not used
P7-17	TB10-H	Blk	26	Line feed drive
P7-19	TB10-E	Red/wht	26	Space drive
P7-21	TB10-6	Brn	26	'Motor stop start
P7-23	L1-Red dot	Blk (inner)	-	Main clock coil
P7-24	L1-Blk	Shield	-	Main clock ground
P7-26	L2-Red dot	Orn (inner)	-	Index clock coil
P7-27	L2-Blk	Shield	-	Index clock ground
P7-29	TB10-18	*Grn*/wht	20	Audible alarm
P7-31	TB10-14	Grn/blk	26	Not used
P7-33	TB10-15	Grn/yel	26	Not used
P7.35	TB10-U	Wht	20	Not used
P7-37	TB10-18	Grn/orn	20	Paper out light
P7-42	K1-8	Red	20	+12v
P7-44	P27-D	vio	20	+86v
P7-46	TB10-J	Vio	20	+86v
P7-48	TB10-A	Blk	20	Ground
P7-50	TB10-K	Blk	20	Ground
P27-A	TB10-D	Red/blk	20	Print hammer no. 2 drive
P27-B	TB10-C	Blk/yel	20	Print hammer no. 1 drive
P27-D	P7-44	Vio	20	+86v
P31-A	XDS1-Case	Blk	20	Ground
P31-B	XDS1-Ctr	Orn	20	6.8 vac
P10-2	P100.25	Blu	26	+5v
P10-3	P102-2	Blu	26	+5v

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
P10-5	P100-1	Blk	26	Ground
P10-6	P102-1	Blk	26	Ground
P10-7*	P100-D	Vio/blk	26	Not used
P10-8*	P100-J	Orn/red	26	FFI reset (1)
P10-8	---	Orn/red	26	Not used
P10-9	P100-AA	Red/vio	26	Keyboard inhibit
P10-11	P100-H	Red/yel	26	Not used
P10-12*	P100-H	Vio	26	FFI reset (2)
P10-12	---	Vio	26	Not used
P10-13	P100-F	Red/blk	26	Fast clock not
P10-14	P100-T	Blu	26	Keyboard DI
P10-15	P100-15	Blu/red	26	Keyboard D2
P10-16	P100-14	Blu/orn	26	Keyboard D3
P10-17	P100-13	Blu/yel	26	Keyboard D4
P10-18	P100-11	Blu/grn	26	Keyboard D5
P10-19	P100-10	Blu/blk	26	Keyboard D6
P10-20	---	Blu/vio	26	Not used
P10-21	---	Blu	26	Not used
P10-22	P100-6	Blu/wht	26	Strobe
P10-23	P100-2	Vio/yel	26	Not used
P100-1	P10-5	Blk	26	Ground
P100-1	P100-A	Bare	26	Ground
P100-2	---	Vio/yel	26	Not used
P100-3	---	Grn/wht	26	Not used
P100-4	P102-12	Wht/yel	26	Keyboard strobe
P100-5	P10-22	Blu/wht	26	Strobe
P100-H*	S4-2- (Ctr)	Vio	26	FFI reset (1)
P100-J*	S4-3- (NO)			
P100-6	---	Yel/gra	26	Not used'
P100-7	P102-9	Yel/vio	26	Keyboard D6
P100-8	P102-10	Yel/blu	26	Keyboard D7
P100-9	---		26	Not used
P100-10	P10-19	Blu/blk	26	KeyboardD6
P100-11	P10-18	Blu/grn	26	Keyboard D5
P100-12	P102-5	Yel/red	26	Keyboard D3
P10013	P10-17	Blu/yel	26	Keyboard D4
P100-14	P10-16	Blu/orn	26	Keyboard D3

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
P100-15	P10-15	Blu/red	26	Keyboard D2
P100-25	P10-2	Blu	26	+5v
P100-25	P100-CC	Bare	26	+5v
P100-A	P100-1	Bare	26	Ground
P100-A	S6- (2)	Blk	26	Ground
P100-A	P100-E	Blk	26	Ground
P100-B	-	Vio	26	Not used
P100-C	-	Grn/blk	26	Not used
P100-D	P10-7	Vio/blk	26	Not used
P100-E	P100-A	Blk	26	Ground
P100-F	P10-13	Red/blk	26	Fast clock not
P100-H*	P10-12	Vio	26	FFI reset (?.)
P100-J*	P10-8	Orn/red	26	FFI reset (1)
P100-K	P102-11	Yel/grn	26	Keyboard D5
P100-M	P102-4	Yel	26	Keyboard D4
P100-N	P102-6	Yel/red	26	Keyboard D2
P100-P	P102-7	Yel/brn	26	Keyboard D1
P100-T	P10-14	Blu/brn	26	Keyboard D1
P100-AA	P10-9	Red/vio	26	Keyboard inhibit
P100-BB	S6-(1)	Red/wht	26	Inhibit switch
P100-CC	P100-25	Bare	26	+5v
P102-1	P10-6	Blk	26	Ground
P102-2	P10-3	Blu	26	+5v
P102-4	P100-M	Yel	26	Keyboard D4
P102-6	P100-12	Yel/brn	26	Keyboard D3
P102-6	P100-N	Yel/red	26	Keyboard D2
P102-7	P100-P	Yel/vio	26	Keyboard D1
P102-8	-		Yel/gra	26 Not used
P102-9	P100-7	Yell/vio	26	Keyboard D6
P102-10	P100-8	Yel/blu	26	Keyboard D7
P102-11	P100-K	Yel/grn	26	Keyboard D5
P102-12	P100-4	Yel/wht	26	Keyboard strobe
P102-H	-		Grn/blk	26 Not used
P102-J	-		Grn/wht	26 Not used
S1-N0(1)	P4-26	Wht/brn	26	Carriage return switch
S1-N0(2)	S2-Ctr	Blk	20	Ground
S2-Tab	P4-27	Red/orn	26	Line feed single switch

See footnote at end of table.

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
S2-Ctr	S1-NO(2)	Blk	20	Ground
S2-Ctr	S3-L	Blk	20	Ground
S2-Bot	P4-28	Wht/orn	26	Line feed run switch
S3-R	P4-29	Wht/yel	26	Printer on line
S3-L	S2-Ctr	Blk	20	Ground
S3-L	S5-N0(2)	Blk	20	Ground
S4-1 (NC)	Chas ground	Blk	20	Chas ground
S4-2(Ctr)*	J10-12	Vio	26	FFI reset (2)
S4-2(Ctr)*	P100-H	Vio	26	FFI reset (2)
S4-3(N0)*	J10-8	Orn/red	26	FFI reset (1)
S4-3(N0)*	P100-J	Orn/red	26	FFI reset (1)
S4-4(NC)	A3-3	Vio	26	Request
S4-4(NC)	S4C1-(2)	Bare	-	Request
S4-5(Ctr)	S4C1-(2)	Bare	-	+12v
S4-5(Ctr)	S4C2-(1)	Bare	-	+12v
S4-5(Ctr)	P4-46	Red	26	+12v
S4-6(N0)	A2-3	Red	20	Send
S4-6(N0)	S4C2- (1)	Bare	-	Send
S4C1-(1)	S4-4(NO)	Bare	-	Send
S4C1-(2)	S4-5(Ctr)	Bare	-	+12v
S4C2-(1)	S4-5(Ctr)	Bare	-	+12v
S4C2-(2)	S4-6(NO)	Bare	-	Request
S5-NO(1)	P4-42	Yel/brn	26	Motor start switch
S5-NO(2)	A1-1	Blk	20	Ground
S5-NO(2)	A3-4	Blk	20	Ground
S5-N0(2)	S3-L	Blk	20	Ground
S6- (1)	P100-BB	Red/wht	26	Inhibit switch
S6- (2)	P100-A	Blk	26	Ground
S25-NC(1)	TB10-14	Grn/blk	-	Not used
S25-NC(2)	TB10-15	Grn/yel	-	Not used
S25-NO(1)	TB10-13	Grn/wht	-	Alarm
S25-NO(2)	TB10-22	Blk	-	Ground
TB3-1	P5-E	Blk/wht	20	115 vac rtn
TB3-1	Bl-yel	Yel	20	115 vac rtn
TB3-2	K1-5	Blk	20	115 vac
TB3-2	FL8-(1)	Pigtail	-	115 vac
TB3-2	TB3-3	Bare	20	115 vac

See footnote at end of table.

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
TB3-3	TB3-2	Bare	20	115vac
TB3-3	P5-D	Wht/blk	20	115 vac
TB3-4	K1-4	Wht/blk	20	115 vac K8 energized
TB3-4	FL8-(2)	Pigtail	---	115 vac K8 energized
TB34	TB3-5	Bare	20	115 vac K8 energized
TB3-5	TB3-4	Bare	20	115 vac K8 energized
TB3-5	C8-Blk	Wht	20	115 vac K8 energized
TB3-5	B1-Blu	Blu	20	115 vac K8 energized
TB3-6	C8-Red dot	Wht	20	115 vac pk shf
TB3-6	B1-Blu	Blu	20	115 vac pk shf
TB9-1	TB8-3	Vio	16	+36v
TB9-1	TB9-2	Pigtail	16	+36v
TB9-1	J7-44	Vio	-18	+36v
TB9-1	J7-46	Vio	18	+36v
TB9-2	TB9-1	Pigtail	16	+36v
TB9-3	TB8-2	Red	16	+12v
TB9-3	J95-26	Red	20	+12v
TB9-3	J4-46	Red	20	+12v
TB9-3	J4-46	Red	20	+12v
TB9-3	J7-42	Red	20	+12v
TB9-3	J98-28	Red	20	+12v
TB9-4	TB8-4	Blk	16	Ground
TB9-4	TB9-5	Bare	16	Ground
TB9-4	J4-60	Blk	18	Ground
TB9-4	J7-48	Blk	18	Ground
TB9-4	J95-1	Blk	16	Ground
TB9-5	TB9-4	Bare	16	Ground
TB9-5	TB9-6	Bare	16	Ground
TB9-5	Nyl conn	Blk	26	Ground
TB9-5	J4-50	Blk	20	Ground
TB9-5	J2-9	Blk	20	Ground
TB9-6	TB9-5	Bare	16	Ground
TB9-6	J2-10	Blk	20	Ground
TB9-6	J2-34	Blk	20	Ground
TB9-6	J7-60	Blk	20	Ground
TB9-7	TB8-1	Blu	16	+5v
TB9-7	TB9-8	Bare	16	+5v

Table 6-12. Wire List
-Continued

From	To	Color	Gage	Description
TB9-7	J4-1	Blu	20	+5v
TB9-7	J4-2	Blu	20	+5v
TB9-8	TB9-7	Bare	16	+5v
TB9-8	Nyl conn	Blu	26	+5v
TB9-8	J2-25	Blu	26	+5v
TB9-8	J95-86	Blu	16	+5v
TB9-9	TB8-5	Orn	16	-12v
TB9-9	J2-21	Orn	20	-12v
TB9-9	J4-21	Orn	20	-12v
TB9-9	J98-25	Orn	20	-12v
TB9-10	TB8-6	Wht/orn	16	6.3 vac (not used)
TB10-1	L5-Vio	Vio	20	+86v
TB10-1	TB10-2	Bare	20	+86v
TB10-1	TB10-J	Grn	20	+86v
TB10-2	TB10-1	Bare	20	+86v
TB10-2	TB10-3	Bare	20	- +86v
TB10-2	L11-Vio	Vio	20	+86v
TB10-8	TB10-2	Bare	20	+86v
TB10-8	L8-Vio	Vio	20	+86v
TB10-8	TB10-4	Bare	20	+86v
TB10-4	TB10-8	Bare	20	+86v
TB10-4	TB10-5	Bare	20	+86v
TB10-5	TB1O-4	Bare	20	+86v
TB10-5	TB10-6	Bare	20	+86v
TB10-5	L6-Vio	vio	20	+Bev
TB10-6	TB10-5	Bare	20	+86v
TB10-7	TB10-P	Grn	20	Line feed magnet drive
TB10-7	L5-Wht/vio	Wht/vio	20	Line feed magnet drive
TB10-8	TB10-M	Grn	20	Carriage return magnet drive
TB10-8	L11-Wht	Wht	20	Carriage return magnet drive
TBI0-9	TB10-L	Grn	20	Space magnet drive
TB10-9	L3-Vio/blu	Vio/blu	20	Space magnet drive
TB10-11	L6-Yel/wht	Yel/wht	20	Ribbon left magnet drive
TB10-13	CRIO-CATH	Grn	20	Alarm
TB10-13	P7-29	Grn/wht	20	Alarm
TB10-18	P7-87	Grn/orn	20	Alarm

Table 6-12, Wire List
- Continued

From	To	Color	Gage	Description
TB10-13	S25-NO	Grn/wht	20	Alarm
TB10-14	P7-31	Grn/blk	26	Not used
TB10-14	S25-	---	---	---
TB10-15	P7-33	Grn/yel	26	Not used
TB10-18	M-8	Orn	20	LH margin sw
TB10-18	S21-red	Red	20	LH margin sw
TB10-19	P7-9	Blu	26	Not used
TB10-20	P7-1	Brn/wht	20	Auto carriage return sw
TB10-20	S19-blu	Blu	20	Auto carriage return sw
TB10-21	TB10-22	Bare	20	Ground
TB10-21	TB10-K	Grn	26	Ground
TB10-21	S21-Wht/red	Wht/red	20	Ground
TB10-22	S21-NO	Blk	20	Ground
TB10-22	S25-NO	Blk	20	Ground
TB10-22	TB1O-23	Bare	20	Ground
TB10-23	TB1O-22	Bare	20	Ground
TB10-23	S19-Wht/blk	Wht/blk	20	Ground
TB10-A	P7-48	Blk	20	Ground
TB10-B	PM-5	Yel	26	Print hammer no. 1
TB10-C	P27-B	Blk/yel	20	Print hammer no. 2 drive
TB10-D	P27-A	Blk/red	20	Print hammer no. 2 drive
TB10-E	P7-19	Red/wht	26	Space drive
TB10-F	P7-7	Grn	26	Print hammer no. 2
TB10-G	P7-13	Gra	26	Carriage return drive
TB10-H	P7-17	Blk	26	Line feed drive
TB10-J	P7-46	Vio	20	+36v
TB10-J	TB10-1	Grn	20	+36v
TB10-K	P7-50	Blk	20	Ground
TB10-K	TB10-21	Grn	20	Ground
TB10-L	TB10-9	Grn	20	Space magnet drive
TB10-M	TB10-8	Grn	20	Carriage return magnet drive
TB10-N	P7-15	Wht	26	Not used
TB10-P	TB10-7	Grn	20	Line feed magnet drive
TB10-R	K1-1	Yel/brn	26	Motor stop relay drive
TB10-S	P7-21	Brn	26	Motor start
TB10-T	P7-11	Vio	26	Ribbon lift

TableB-12. Wire List
-Continued

From	To	Color	Gage	Description
TB10-U	P7-35	Wht	20	Not used
XDS1-Ctr	P31-B	Orn	20	6.3 vac
XDS1-Ctr	XDS2-Ctr	Orn	20	6.3 vac
XDS1-Case	P31-A	Blk		20 Ground
XDS1-Case	XDS2-Case	Blk		20 Ground
XDS2-Ctr	XDS1-Ctr	Orn	20	6.3 vac
XDS2-Case	XDS1-Case	Blk		20 Ground
XDS3-(+)	P445	Red	20	+12v
XDS3- (-)	P448	Yel/blu	20	Audible alarm
XDS4-Tab	P4-44	Yel/orn	26	Paper out light
XDS4-Ctr	A1-2	Red	20	+12v
XDS5-Tab	A1-E1		-	Clear to send It
XDS6-Ctr	A1-E2		-	+12v

*On some units of equipment, wires between S4 and P100 bypass connectors J10 and P1O. See figure 521 for wiring diagram.

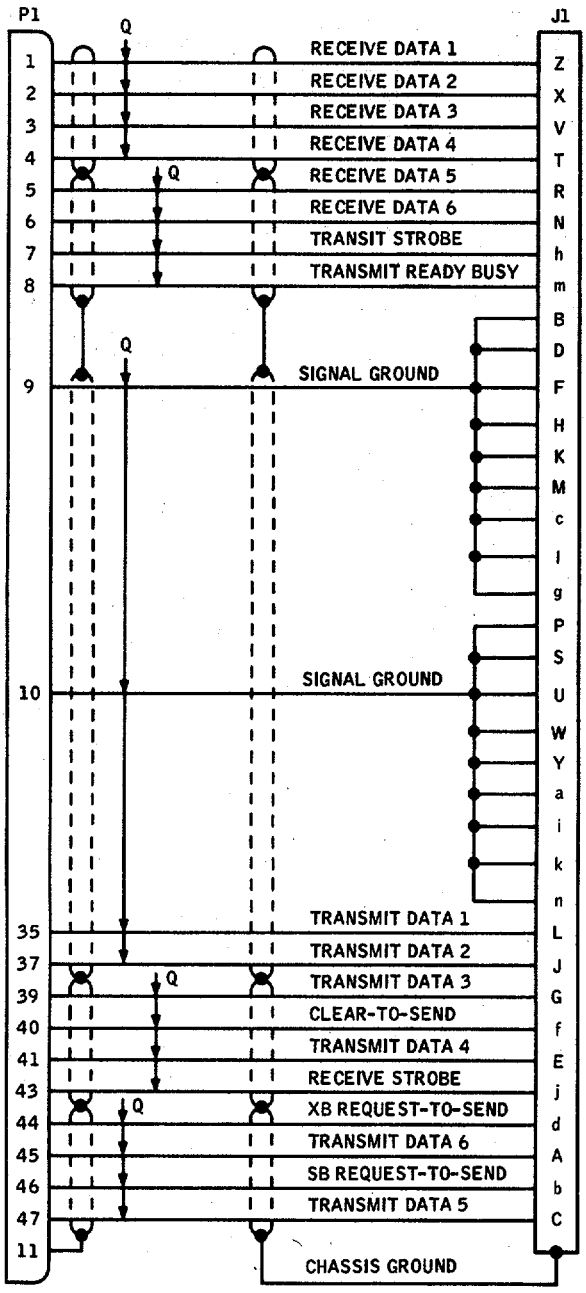


Figure 6-74. Cable W217 Wiring Diagram

Table 6-13. Crossed-End Spring Data

Part no.	Exploded view		Fig. no. 6-74 spring outline letter	Name	A Free length (in.)	B Extended length (in.)	Required tension at extended length (oz.)	C Wire thickness (in.)	D Number of coils	E Outside diameter (in.)
	Fig. no.	Item no.								
50911	6-61	2	A	Roller arm spring	0.781 ±0.015	15/16	40 ±4	0.025 ±0.0005	15 - 3/4	0.2 ±0.005
50912	5-23 6-64	23	A	Latch spring	0.484 ±0.022	21/32	17-1/2 ± 1/2	0.018 ±0.0003	12-3/4	0.156 ±0.004
65662	6-55	11	A	Line feed armature spring	0.460 ±0.016	5/8	14 ±1.4	0.018 ±0.001	8-3/4 ± 1/2	0.178 ±0.005
65845	6-58	24	A	Space pawl spring	0.380 ±0.016	11/16	7 ±0.7	0.012 ±0.001	11 ±1	0.142 ±0.003
69499	6-56	43	A	Paper deflector assy	0.358 ±0.016	1/2	24 ±2.4	0.017 ±0.001	8-3/4 ± 3/4	0.130 ±0.005
69500	6-56	1	A	Pressure selector spring	0.626 ±0.031	1-1/8	11 ±1.1	0.015 ±0.001	24-3/4 ± 1	0.150 ±0.005
70348	6-64	10	A	Low paper alarm lever spring	0.438 ±0.016	41/64	8-1/2 ±0.085	0.015 ±0.001	7-1/2 ± 1/2	0.187 ±0.005

Table 6-14. Parallel-End Spring Data

Part no.	Exploded view		Fig. no. 6-74 spring outline letter	Name	A Free length (in.)	B Extended length (in.)	Required tension at extended length (oz.)	C Wire thickness (in.)	D Number of coils	E Outside diameter (in.)
	Fig. no.	Item no.								
52213	6-62 6-63	12 12	B	Latch assy spring	13/32 ± 1/16	5/8	0.75 ± 0.075	0.008 ± 0.0003	19 ± 1	0.140 ± 0.007
53139	6-55	55	B	Cam follower spring	23/32 ± 1/32	1-1/2	10 ± 1	0.018 ± 0.0003	19 ± 1	0.216 ± 0.005
66432	6-62 6-63	18 18	B	Sensing arm assy spring	0.853 ± 0.031	1-3/4	4-3/4 ± 0.475	0.013 ± 0.001	42 ± 2	0.173 ± 0.005
66566	6-73	29	B	Hinge spring	1.550 ± 0.047	2-1/2	160 ± 16	0.038 ± 0.001	25 ± 1	0.272 ± 0.008
66567	6-73	30	C	Latch spring	1.101 ± 0.047	1-1/4	30 ± 3	0.025 ± 0.001	28 ± 2	0.151 ± 0.005
68430	6-73	31	C	Cover latch spring	0.930 ± 0.031	1.140	3 ± 0.3	0.010 ± 0.001	16 ± 1	0.025 ± 0.005
69597	6-56	17	B	Trough assy spring	0.675 ± 0.031	1.125	24 ± 2.4	0.020 ± 0.001	18-3/4 ± 1	0.180 ± 0.005
70351	6-57	46	D	Space bail spring	0.359 ± 0.016	0.562	4 ± 0.4	0.012 ± 0.001	8-1/4 ± 3/4	0.148 ± 0.005
71327	6-55	95	B	Ribbon feed clutch spring	0.765 ± 0.031	1.218	36 ± 3.6	0.025 ± 0.001	14 ± 3/4	0.254 ± 0.005
72932	6-55	18	B	Cam follower spring	1.495 max	1.938	25 ± 2.5	0.020 ± 0.001	23-1/2 ± 1	0.178 ± 0.005

Table 6-15. Torsion Spring Data

Part no.	Exploded view		Fig. no. 6-74 spring outline letter	Name	A Free length (in.)	B Extended length (in.)	Required tension at extended length (oz.)	C Wire thickness (in.)	D Number of coils	E Inside diameter (in.)
	Fig. no.	Item no.								
65934	6-55	46	D	Feed pawl spring	5/32 ± 1/32	–	--	0.050 ± 0.001	3.9 ± 10%	0.408 ± 0.010
66460	6-63	6	F	R.H. reverse lever spring	11/32 ± 1/64	–	--	0.016 ± 0.001	11 ± 15%	0.243 ± 0.007
66461	6-62	6	G	L.H. reverse lever spring	11/32 ± 1/64	--	--	0.016 ± 0.001	11 ± 15%	0.243 ± 0.007
67973	6-63	3	H	R.H. ribbon retainer spring	7/32	–	–	0.022 ± 0.001	7.9 ± 10%	0.372 ± 0.010
67974	6-62	3	J	L.H. ribbon retainer spring	7/32	–	–	0.022 ± 0.001	7.9 ± 10%	0.372 ± 0.010
70349	6-64	30	K	Switch arm spring	0.103 ± 0.016	--	–	0.021 ± 0.001	2-3/4 ± 8°	0.558 ± 0.015
71293	6-53	59	L	Carriage return spring	0.718 ± 0.015	--	–	0.025 ± 0.001	25.2 ± 20°	0.871 ± 0.015

Table 6-16. Compression Spring Data

Part no.	Exploded view		Fig. no. 6-74 spring outline letter	Name	A Free length (in.)	B Compressed length (in.)	Required tension at compressed length (oz.)	C Wire thickness (in.)	D Number of coils	F Outside diameter (in.)
	Fig. no.	Item no.								
66434	6-62 6-63	28 28	M	Ribbon spool shaft spring	11/32 ± 1/64	5/32 ± 1/64	6 ± 0.6	0.024 ± 0.001	4-3/4 ± 1/2	0.493 ± 0.010
67808	6-57	82	M	Carriage shaft spring	0.906 ± 0.031	0.281	20 ± 2	0.030 ± 0.001	5-3/4 ± 1/2	0.585 ± 0.010
67947	6-58	9	M	Print hammer spring	0.293 ± 0.016	0.187	5.3 ± 10%	0.010 ± 0.001	15 ± 1	0.090 ± 0.003
71294	6-53	40	N	Clutch armature spring	0.381 ± 0.016	0.141 ± 0.015	2 ± 0.2	0.020 ± 0.001	5 ± 1/2	0.5 ± 0.015

Table 6-17. Special Purpose Spring Data

Part no.	Exploded view		Fig. no. 6-74 spring outline letter	Name	A Free length (in.)	B Extended length (in.)	Required tension at extended length (oz.)	C Wire thickness (in.)	D Number of coils	E Outside diameter (in.)
	Fig. no.	Item no.								
70781	6-54	18	P	Adjusting lever spring	0.860 ± 0.031	1.157	176 ± 17.6	0.040 ± 0.001	16 ± 1	0.240 ± 0.005

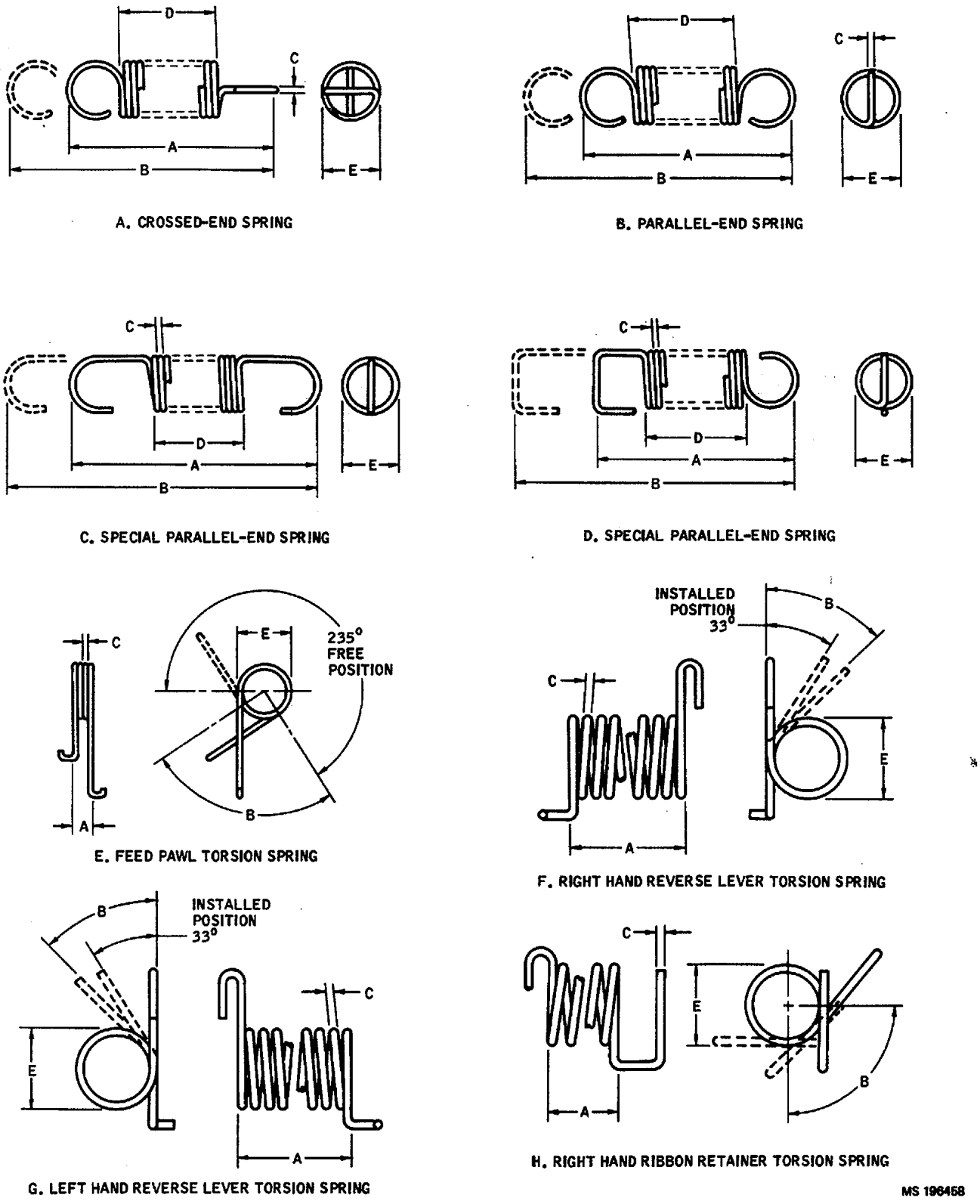
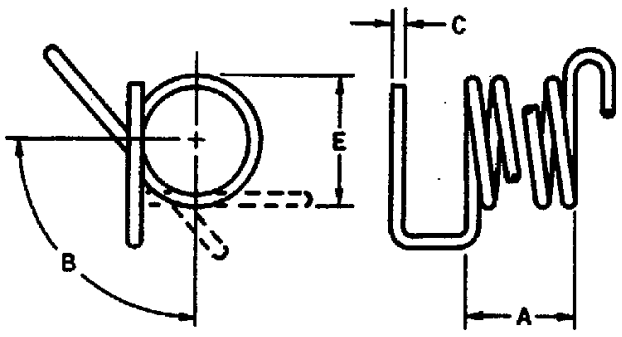
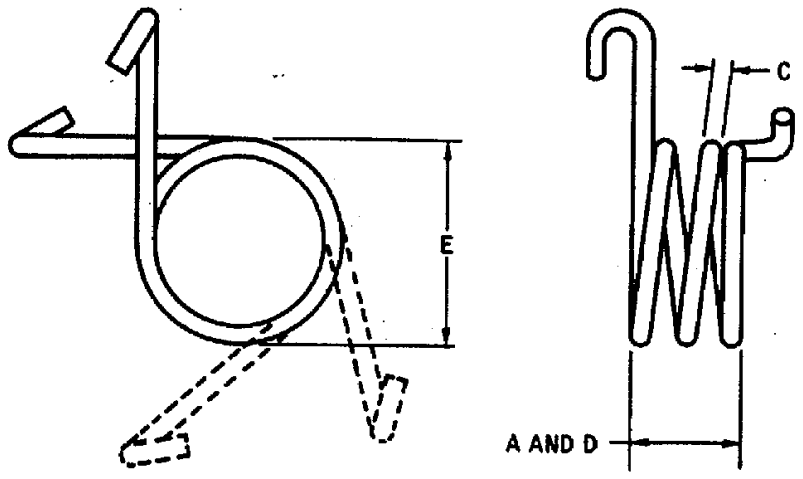


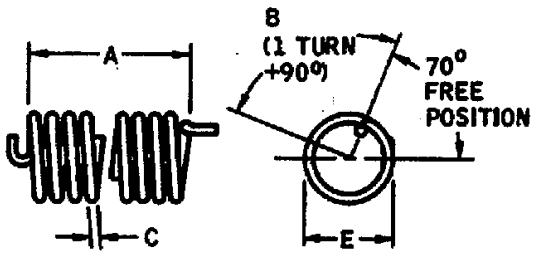
Figure 6-75. Printer Springs, Outline Drawing (Sheet 1 of 2)



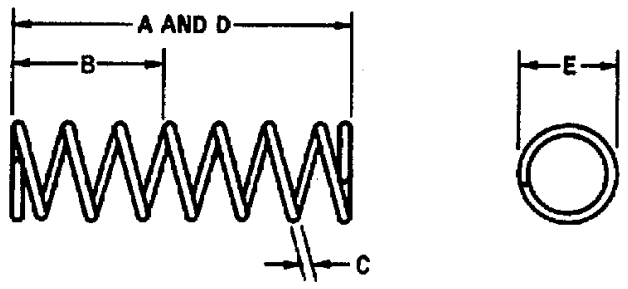
J. LEFT HAND RIBBON RETAINER TORSION SPRING



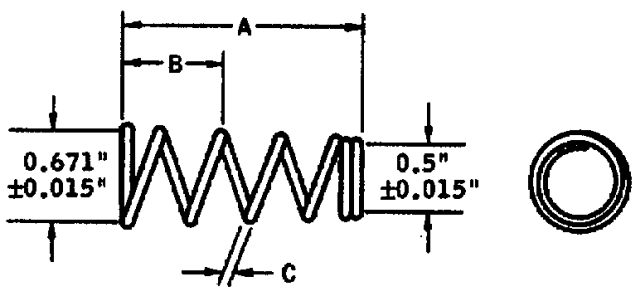
K. SWITCH ARM SPRING



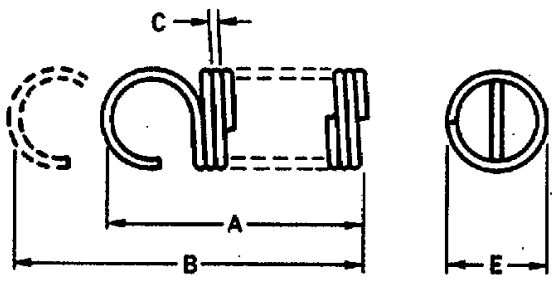
L. CARRIAGE RETURN PULLEY TORSION SPRING



M. CLOSED END COMPRESSION SPRING



N. PULLEY ASSEMBLY ARMATURE CONICAL COMPRESSION SPRING



P. SPECIAL MACHINE LOOP ONE-END SPRING

MS 196459

Figure 6-75. Printer Springs, Outline Drawing (Sheet 2 of 2)

J2

PIN	WIRE COLOR	TO
1	VIO-BLK	8
2	VIO-BRN	8
3	VIO-RED	8
4	VIO-ORN	8
5	VIO-GRN	8
6	VIO-BLU	8
7	VIO-GRA	8
8	VIO-WHT	8
9	### BLK	4
10	### BLK	4
11	BRAID	4
21	### ORN	4
24	RED-GRN	3
25	### BLU	4
34	### BLK	4
35	RED-BRN	8
37	YEL-ORN	8
39	YEL-BLU	8
40	RED-BLU	3
41	YEL-VIO	8
43	GRN-BRN	8
44	RED-WHT	3
45	GRN-ORN	8
46	GRN	3
47	GRN-BLU	8

J7

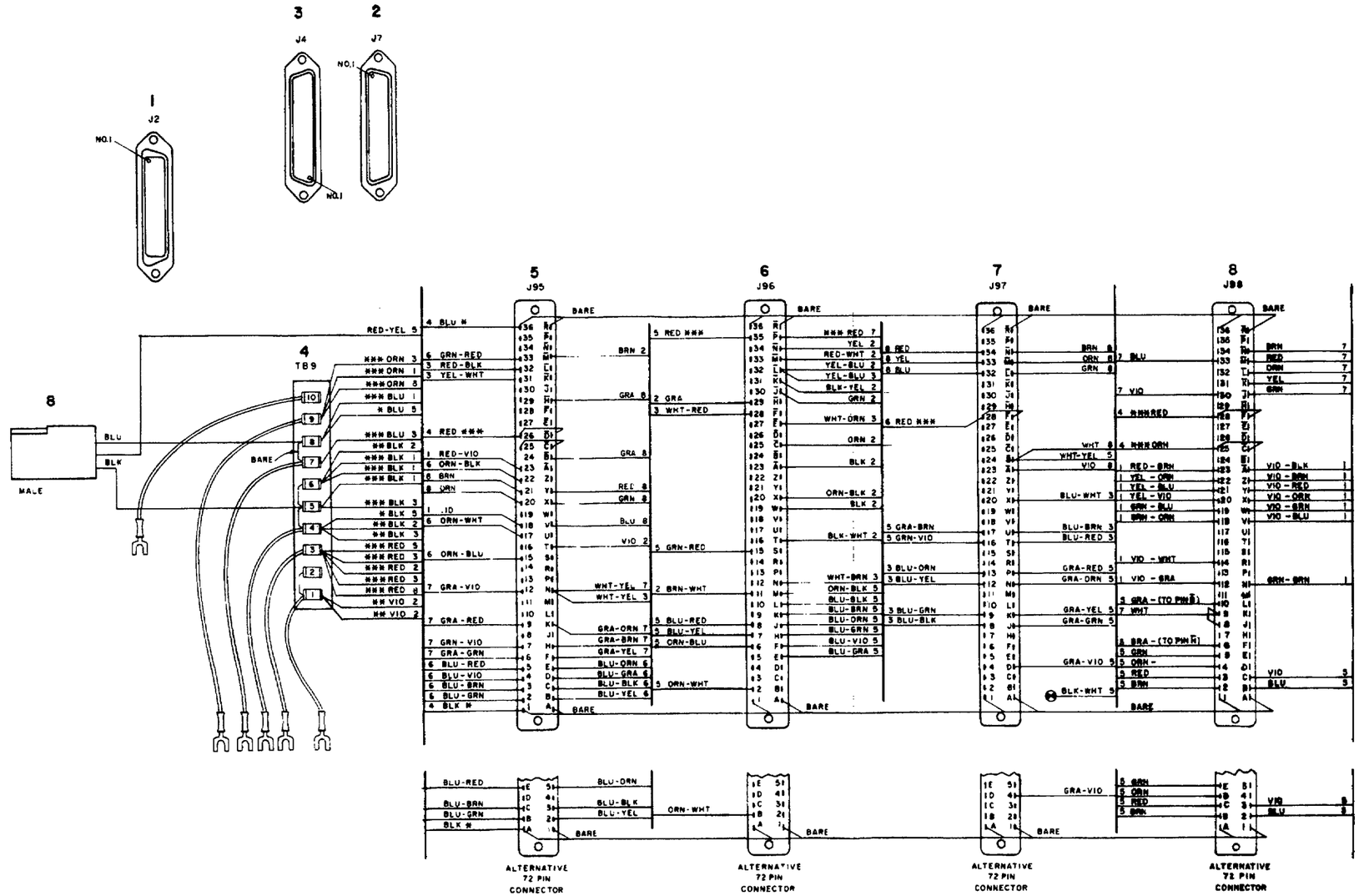
PIN	WIRE COLOR	TO
1	BRN-WHT	6
3	ORN	6
5	YEL	6
7	GRN	6
11	VIO	5
13	GRA	6
17	BLK-YEL	6
19	RED-WHT	6
21	BRN	5
23	BLK-WHT	6
24	BLK	6
26	ORN-BLK	6
27	BLK	6
29	YEL-BLU	6
37	YEL-ORN	3
42	### RED	4
44	## VIO	
45	## VIO	
48	## BLK	6
50	## BLK	6

J4

PIN	WIRE COLOR	TO
1	### BLU	4
2	### BLU	4
3	### BLK	4
4	### BLK	4
6	RED-GRN	1
9	RED-BLK	5
12	BLU-BRN	7
13	BLU-RED	7
14	BLU-ORN	7
15	BLU-YEL	7
16	BLU-GRN	7
17	BLU-BLK	7
20	BLU-WHT	7
21	### ORN	4
26	WHT-BRN	6
27	WHT-RED	6
28	WHT-ORN	6
29	WHT-YEL	5
34	GRN	1
42	YEL-WHT	5
43	RED-BLU	1
44	YEL-ORN	2
45	### RED	4
46	### RED	4
47	RED-WHT	1
48	YEL-BLU	6
50	## BLK	4

NOTES:

1. # INDICATES 16 GAGE WIRE
   ## INDICATES 18 GAGE WIRE
   ### INDICATES 20 GAGE WIRE
   ALL OTHER WIRES ARE 26 GAGE.
2. ⊖ INDICATES WIRES TIED BACK & INSULATED



MS014809

Figure 6-76. Logic module wiring diagram

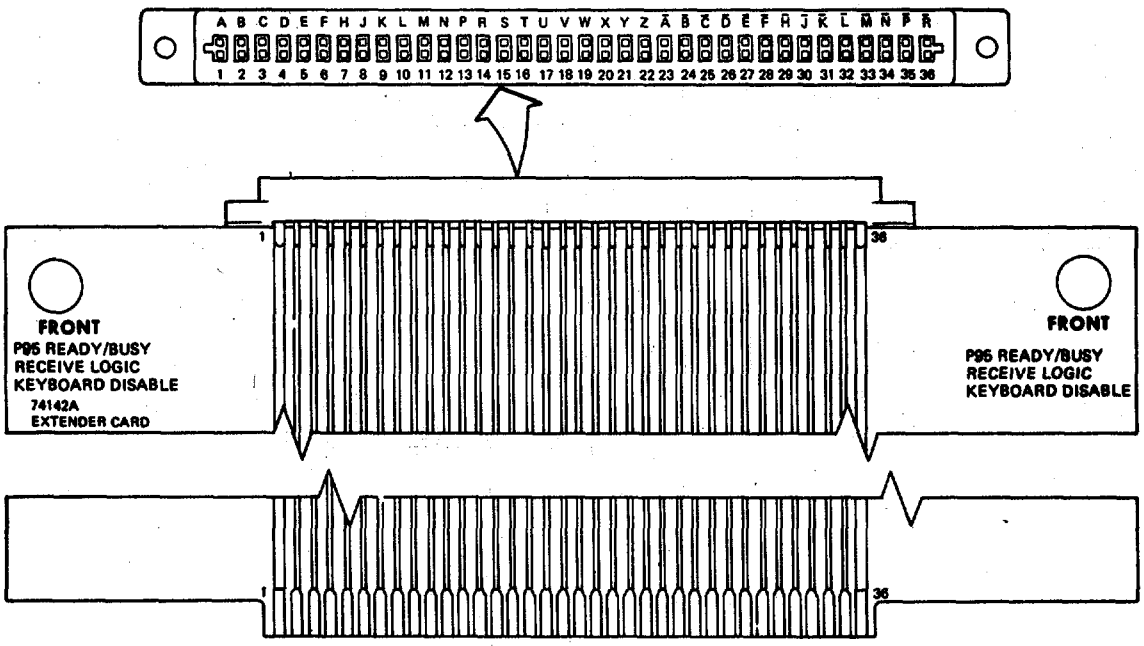
APPENDIX A

LIST OF ABBREVIATIONS

AD	Data subtractor
AN	Gate
ASCII	American standard code for information interchange
BC	Binary counter
CR	Carriage return
EIA	Electronic Industries Association
FC	Fast clock
IN	Inverter
LF	Line feed
LH	Left hand
MS	Milliseconds
MWO	Modification Work Order
OR	Gate
O/S	One shot
RCVR	Receiver
RG	Register
RH	Right hand
SB	Request to send (static state)
ST	Schmidt trigger
TP	Test point
XB	Request to send (request state)

APPENDIX B

FABRICATION DRAWINGS



MATERIALS REQUIRED:

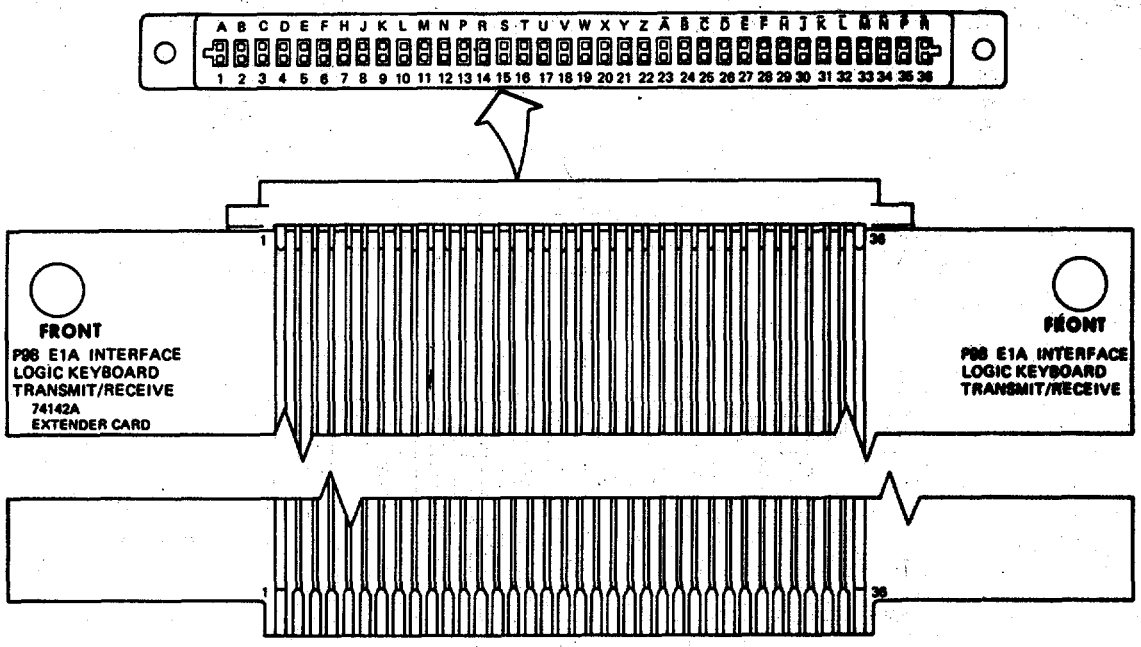
ITEM NO.	DESCRIPTION	PART NO.	QTY
1	EXTENDER CARD	74142A (82423A)	1

FABRICATION INSTRUCTIONS:

1. OPEN ETCHED CIRCUIT PATHS OF CONNECTOR PINS 6, 7, 9, F, H, AND K.
2. MARK CARD IDENTIFICATION AND FRONT AS SHOWN, IN ACCORDANCE WITH MIL-STD-130.

MS 196460

Figure B-1. P95 Ready/Busy Receive Logic Keyboard Disable Patch Card Fabrication Drawing



MATERIALS REQUIRED:

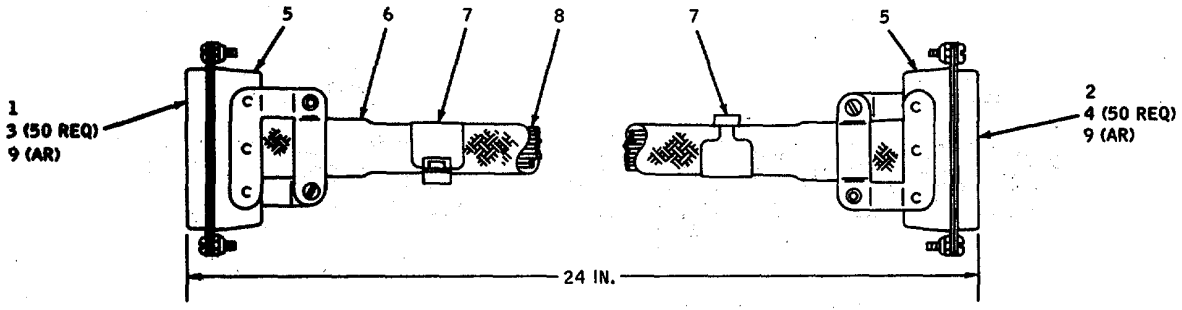
ITEM NO.	DESCRIPTION	PART NO.	QTY
1	EXTENDER CARD	74142A (82423)	1
2	WIRE, 26 GA SOLID	QQ-W-343	6 IN.

FABRICATION INSTRUCTIONS:

1. USING A NO. 55 TO 60 DRILL (0.0520 TO 0.0400 IN.), DRILL A HOLE NEXT TO THE PRINTED WIRING OF CIRCUIT PATHS OF CONNECTOR PINS 18, 19, 20, 21, 22, AND 23.
2. USING UNINSULATED 26 GAGE SOLID WIRE, JUMPER THE FOLLOWING CIRCUIT PATHS: 18 TO V, 19 TO W, 20 TO X, 21 TO Y, 22 TO Z, 23 TO Ā.
3. MARK CARD IDENTIFICATION, AND CARD FRONT AS SHOWN, IN ACCORDANCE WITH MIL-STD-130.

MS 196481

Figure B-2. P98 EIA Interface Logic Keyboard Transmit/Receive Patch Card Fabrication Drawing



MATERIALS REQUIRED:

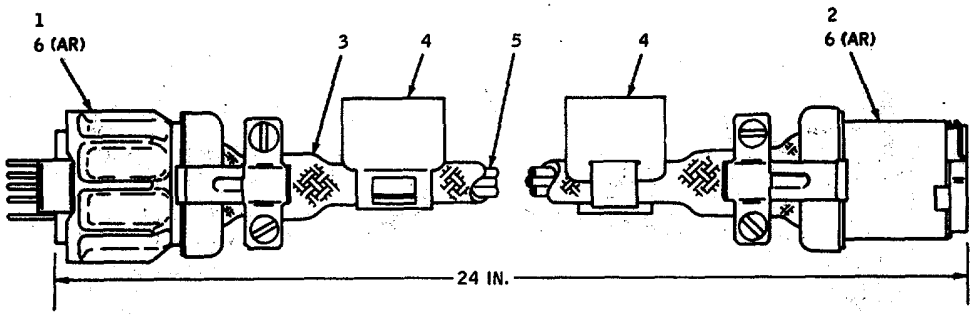
ITEM NO.	DESCRIPTION	PART NO.	QTY
1	50 PIN CONNECTOR PLUG	17-9050-0 (89709)	1
2	50 PIN CONNECTOR RCPT	17-8050-0 (89709)	1
3	PLUG CONTACTS	17-765-02 (89709)	50
4	RCPT CONTACTS	17-764-02 (89709)	50
5	STRAIN RELIEF	17-314-1 (89709)	2
6	SLEEVING, BRAIDED NYLON	891108-0122 (13973)	2 FT
7	STRAP, CABLE ID	MS17822-1-9	2
8	WIRE, 20 GA STRANDED	MIL-W-16878	100 FT
9	SLEEVING, INSULATION	MIL-I-631	AR

FABRICATION INSTRUCTIONS:

1. CUT FIFTY 24 IN. LENGTHS OF WIRE.
2. INSTALL A PIECE OF INSULATION SLEEVING ON EACH END OF WIRE.
3. SOLDER A PLUG CONTACT ON ONE END OF WIRE AND A RECEPTACLE CONTACT ON OTHER.
4. INSERT RECEPTACLE CONTACTS INTO CONNECTOR RECEPTACLE. SLIDE INSULATION SLEEVING OVER CONTACTS.
5. INSTALL A STRAIN RELIEF ON CONNECTOR RECEPTACLE.
6. INSTALL NYLON BRAIDED SLEEVING OVER WIRES.
7. CLAMP WIRES AND NYLON BRAIDED SLEEVING AT CONNECTOR RECEPTACLE END USING STRAIN RELIEF CLAMP.
8. INSERT WIRE THROUGH SECOND STRAIN RELIEF SO THAT STRAIN RELIEF CAN BE ATTACHED TO CONNECTOR PLUG.
9. STARTING WITH PIN 1 INSTALL WIRE CONNECTED TO CONNECTOR RECEPTACLE PIN 1 INTO CONNECTOR PLUG PIN 1. IN CONSECUTIVE ORDER, INSERT REMAINING WIRES PIN-TO-PIN IN CONNECTOR PLUG.
10. SLIDE INSULATION SLEEVING OVER PIN CONTACTS.
11. INSTALL STRAIN RELIEF ON CONNECTOR PLUG.
12. CLAMP WIRES AND NYLON BRAIDED SLEEVING AT CONNECTOR PLUG USING STRAIN RELIEF CLAMP.
13. USING CABLE IDENTIFICATION STRAP, IDENTIFY J4 TO P4 PATCH CABLE CONNECTOR RECEPTACLE END J4 (X) AND CONNECTOR PLUG END P4 (X). FOR J7 TO P7 PATCH CABLE, IDENTIFY CONNECTOR RECEPTACLE END J7 (X) AND CONNECTOR PLUG END P7 (X).

MS 196462

Figure B-3 Connector J4 to P4 to P7 Patch Cable Fabrication Drawing



MATERIALS REQUIRED:

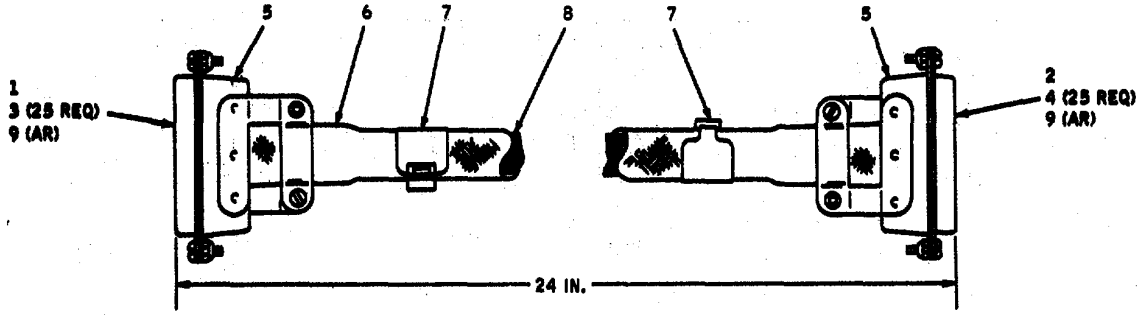
ITEM NO.	DESCRIPTION	PART NO.	QTY
1	CONNECTOR PLUG, 7 PIN	126-195 (89709)	1
2	CONNECTOR RCPT, 7 PIN	126-196 (89709)	1
3	SLEEVING, BRAIDED NYLON	891108-0114 (13973)	2 FT
4	STRAP, CABLE ID	MS17822-1-9	2
5	WIRE, 20 GA STRANDED	MIL-W-16878	6 FT
6	SLEEVING, INSULATION	MIL-I-631	AR

FABRICATION INSTRUCTIONS:

1. CUT THREE 24 IN. LENGTHS OF WIRE.
2. INSTALL A PIECE OF INSULATION SLEEVING ON ONE END OF EACH THREE WIRES.
3. SEPARATE STRAIN RELIEF FROM CONNECTOR PLUG.
4. SOLDER A WIRE TO PINS D, E, AND H OF CONNECTOR PLUG. SLIDE INSULATION SLEEVING OVER CONTACTS.
5. INSTALL NYLON BRAIDED SLEEVING OVER WIRES.
6. INSTALL CONNECTOR PLUG STRAIN RELIEF ON CONNECTOR PLUG.
7. CLAMP WIRES AND NYLON BRAIDED SLEEVING AT CONNECTOR PLUG USING STRAIN RELIEF CLAMP.
8. SEPARATE STRAIN RELIEF FROM CONNECTOR RECEPTACLE.
9. INSERT WIRES THROUGH STRAIN RELIEF SO THAT STRAIN RELIEF CAN BE ATTACHED TO CONNECTOR RECEPTACLE.
10. INSTALL A PIECE OF INSULATION SLEEVING ON WIRE ENDS.
11. SOLDER WIRE CONNECTED TO CONNECTOR PLUG PIN D TO CONNECTOR RECEPTACLE PIN D, PIN E TO PIN E, AND PIN H TO PIN H.
12. SLIDE INSULATION SLEEVING OVER PIN CONTACTS.
13. INSTALL STRAIN RELIEF ON CONNECTOR RECEPTACLE.
14. CLAMP WIRES AND NYLON BRAIDED SLEEVING AT CONNECTOR PLUG USING STRAIN RELIEF CLAMP.
15. USING CABLE IDENTIFICATION STRAP, IDENTIFY J5 TO P5 PATCH CABLE CONNECTOR RECEPTACLE END J5 (X) AND CONNECTOR PLUG END P5 (X).

MS 196463

Figure B-4. Connector J5 to P5 Patch Cable Fabrication Drawing



MATERIALS REQUIRED:

ITEM NO.	DESCRIPTION	PART NO.	QTY
1	CONNECTOR PLUG, 25 PIN	17-9025-0 (89709)	1
2	CONNECTOR RCPT, 25 PIN	17-8025-0 (89709)	1
3	CONTACT, PLUG	17-765-02 (89709)	25
4	CONTACT, PLUG	17-764-02 (89709)	25
5	STRAIN RELIEF	17-314-1 (89709)	2
6	SLEEVING, BRAIDED NYLON	891108-0118 (13793)	2 FT
7	STRAP, CABLE ID	MS17822-1-9	2
8	WIRE, 20 GA STRANDED	MIL-W-76878	50 FT
9	SLEEVING, INSULATION	MIL-I-631	AR

FABRICATION INSTRUCTIONS:

1. CUT TWENTY FIVE 24 IN. LENGTHS OF WIRE.
2. INSTALL A PIECE OF INSULATION SLEEVING ON EACH END OF WIRE.
3. SOLDER A PLUG CONTACT ON ONE END OF WIRE AND A RECEPTACLE CONTACT ON OTHER.
4. INSERT RECEPTACLE CONTACTS INTO CONNECTOR RECEPTACLE. SLIDE INSULATION SLEEVING OVER CONTACTS.
5. INSTALL A STRAIN RELIEF ON CONNECTOR RECEPTACLE.
6. INSTALL NYLON BRAIDED SLEEVING OVER WIRES.
7. CLAMP WIRES AND NYLON BRAIDED SLEEVING AT CONNECTOR RECEPTACLE END USING STRAIN RELIEF CLAMP.
8. INSERT WIRE THROUGH SECOND STRAIN RELIEF SO THAT STRAIN RELIEF CAN BE ATTACHED TO CONNECTOR PLUG.
9. STARTING WITH PIN 1 INSTALL WIRE CONNECTED TO CONNECTOR RECEPTACLE PIN 1 INTO CONNECTOR PLUG PIN 1. IN CONSECUTIVE ORDER, INSERT REMAINING WIRES PIN-TO-PIN IN CONNECTOR PLUG.
10. SLIDE INSULATION SLEEVING OVER PIN CONTACTS.
11. INSTALL STRAIN RELIEF ON CONNECTOR PLUG.
12. CLAMP WIRES AND NYLON BRAIDED SLEEVING AT CONNECTOR PLUG USING STRAIN RELIEF CLAMP.
13. USING CABLE IDENTIFICATION STRAP, IDENTIFY J10 TO P10 PATCH CABLE CONNECTOR RECEPTACLE END J10(X) AND CONNECTOR PLUG END P10 (X).

MS 196464

Figure B-5. Connector J10 to P10 Patch Cable Fabrication Drawing

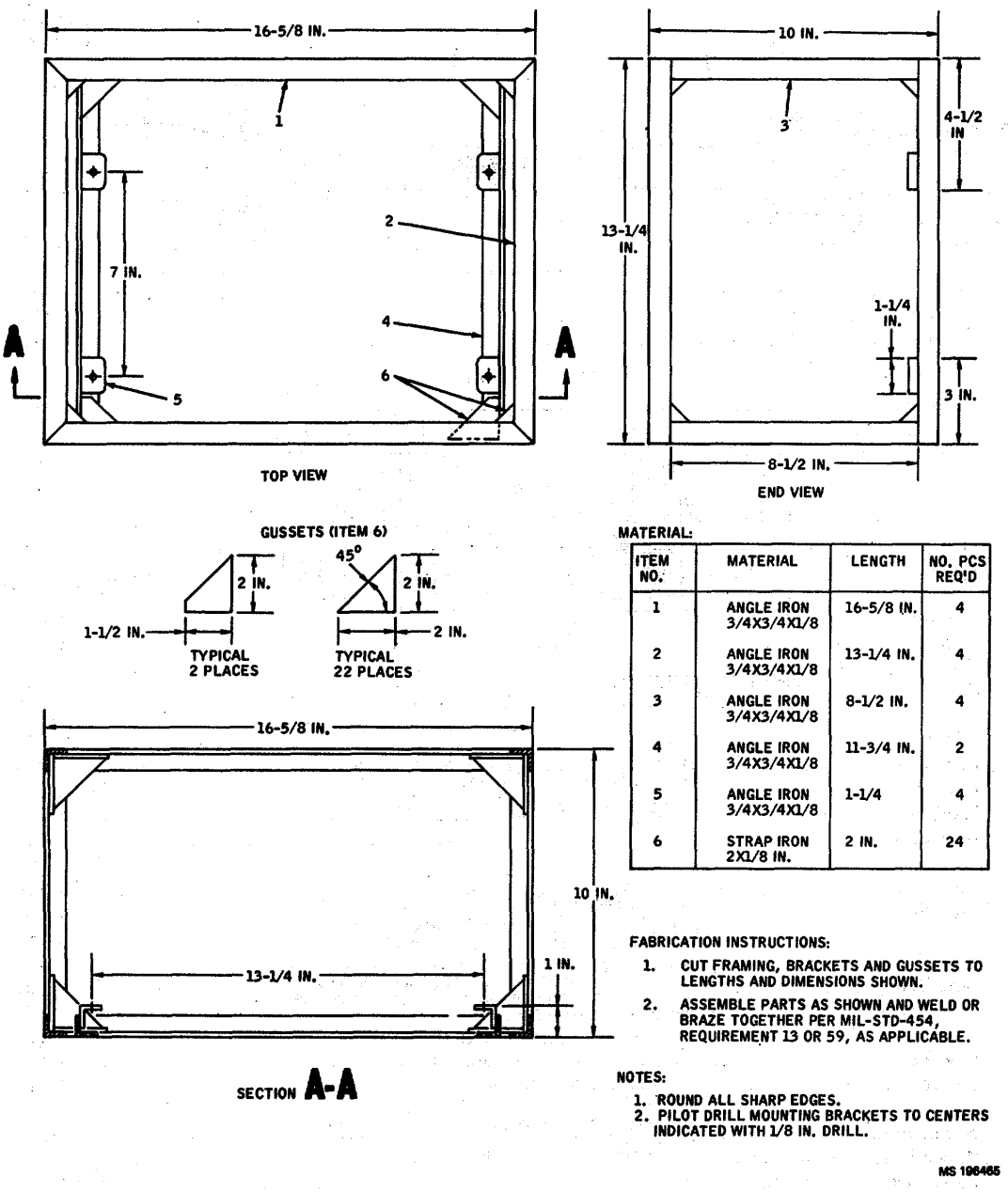


Figure B-6. Printer Maintenance Frame Fabrication Drawing

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