

37 KEYBOARD SEND-RECEIVE (KSR) TELETYPEWRITER SET
REMOVAL AND REPLACEMENT OF COMPONENTS

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1. GENERAL

1.01 This section provides removal and replacement of component information for the 37 Keyboard Send-Receive (KSR) Teletypewriter Set (Figure 1).

1.02 Photographs and line drawings are used to identify the mechanisms and specific parts mentioned in the procedures. Refer to the appropriate parts section for illustrations and part numbers of parts and assemblies.

1.03 References in the procedures to left or right, up or down, top or bottom, etc, refer to the unit viewed with the keytops and controls facing the front (Figure 1).

1.04 Most maintenance, lubrication, and adjustments can be accomplished after a component has been removed with no further disassembly. If possible, disassembly should be confined to subassemblies which do not require adjustment, or which can be removed without disturbing adjustments. When reassembling the subassemblies, all requirements for adjustments, clearances, and spring tensions must be observed.

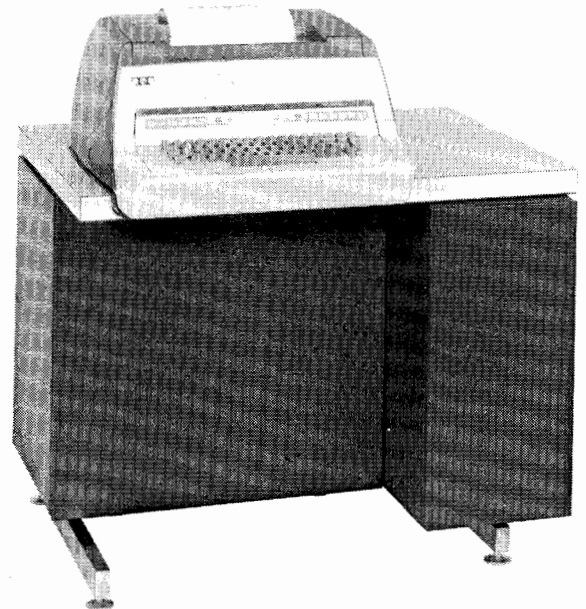


Figure 1 - 37 KSR Teletypewriter Set

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1.05 Refer to maintenance tools Section 570-005-800 for information on the tools necessary to perform the removal and replacement of component parts.

1.06 Use maintenance pad TP124828 to protect furniture and floor coverings from oil, grease, and dirt during removal and replacement of components.

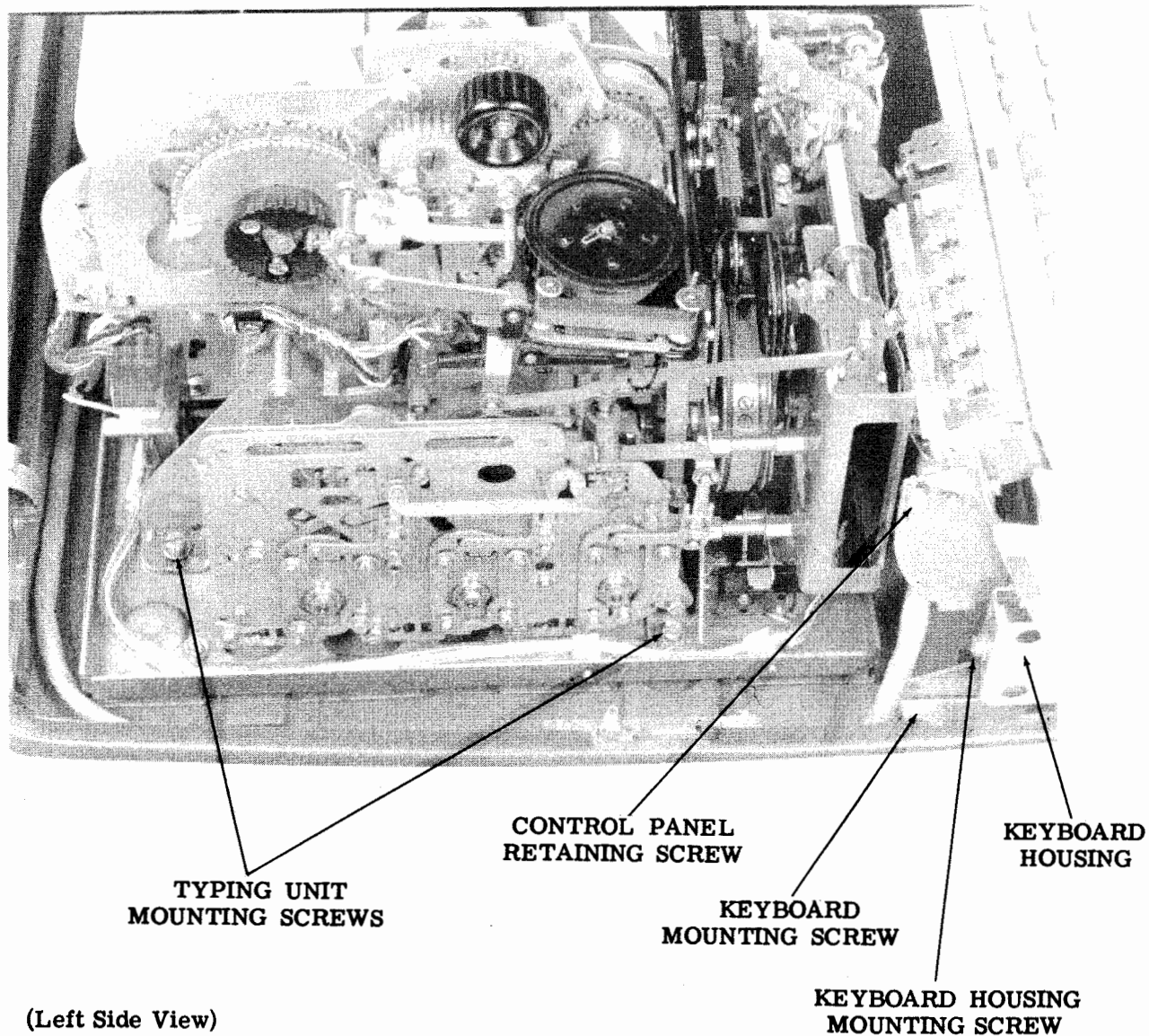


Figure 2 - Typing Unit and Control Panel

1.07 The loss of retaining rings and springs should be avoided during disassembly by holding the items with one hand while it is released with the other. Springs should not be stretched or distorted more than is necessary for removal or their effective spring tension may be altered.

CAUTION: REMOVE POWER BEFORE DISASSEMBLING THE SET.

2. REMOVAL AND REPLACEMENT OF COMPONENTS

TYPING UNIT

2.01 To remove the typing unit from the base, proceed as follows (Figures 2 through 4).

- (1) Depress the cover latches on both sides of the typing unit cover and tilt the cover back until it rests on the table.

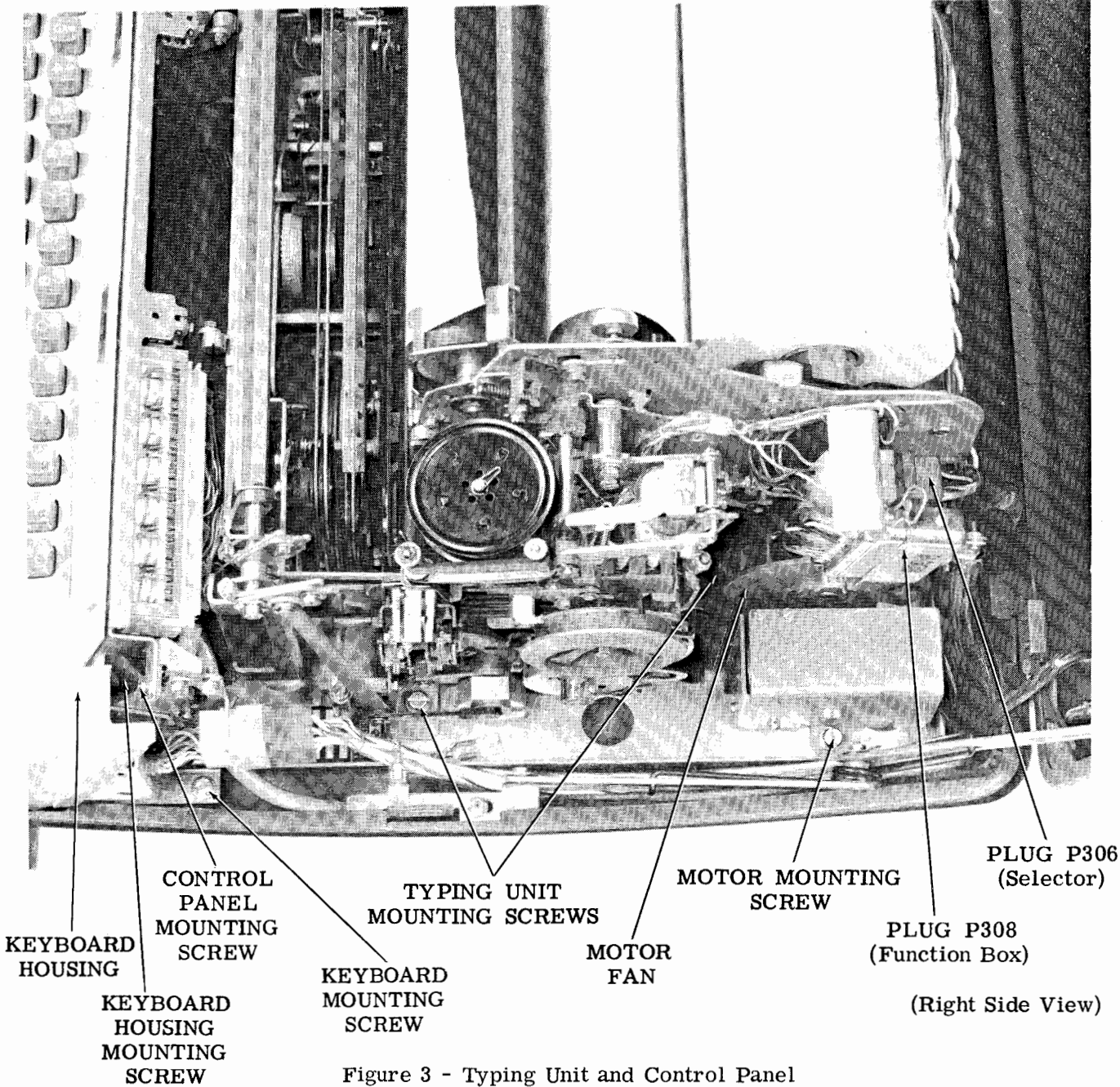


Figure 3 - Typing Unit and Control Panel

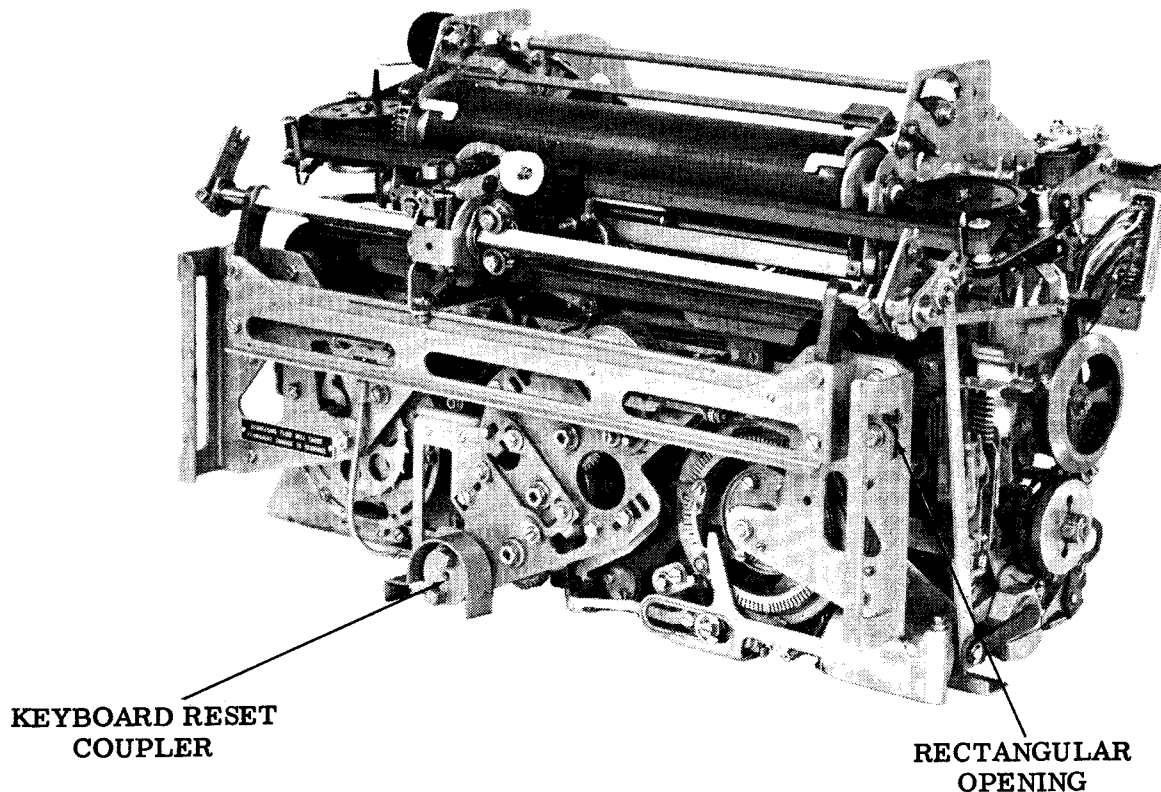


Figure 4 - Typing Unit

- (2) Remove the paper roll from the typing unit.
- (3) Disconnect electrical cable plugs P306 and P308 from the selector and function box connectors at the upper right rear corner of the typing unit.
- (4) Remove four typing unit mounting screws from the feet at the bottom front and rear corners of the left and right sides of the typing unit.

Note: Steps (5) and (6) may be omitted unless the control panel is to be replaced.

- (5) Remove two screws securing the control panel trim plate to the top of the control panel and remove the plate. Be careful not to drop the screws into the base.
- (6) Loosen the control panel retaining screws at the right and left upper rear corners of the control panel. Raise the control panel upward and forward.

- (7) Look straight down along the front plate of the typing unit and locate the keyboard reset coupler. The lug on the coupler must be located at the top facing forward. If it is not in this position, turn the motor fan counterclockwise until alignment is obtained.
- (8) Grasp the typing unit under the curve at the top rear of the left side frame, and in the rectangular opening at the right top corner of the front plate. Lift the typing unit straight up away from the base. Be careful that the keyboard reset coupling guard clears the control panel components. Set the typing unit aside in a protected area.

CAUTION: REMOVE THE TYPING UNIT ONLY IN THE MANNER DESCRIBED IN 2.01(8).

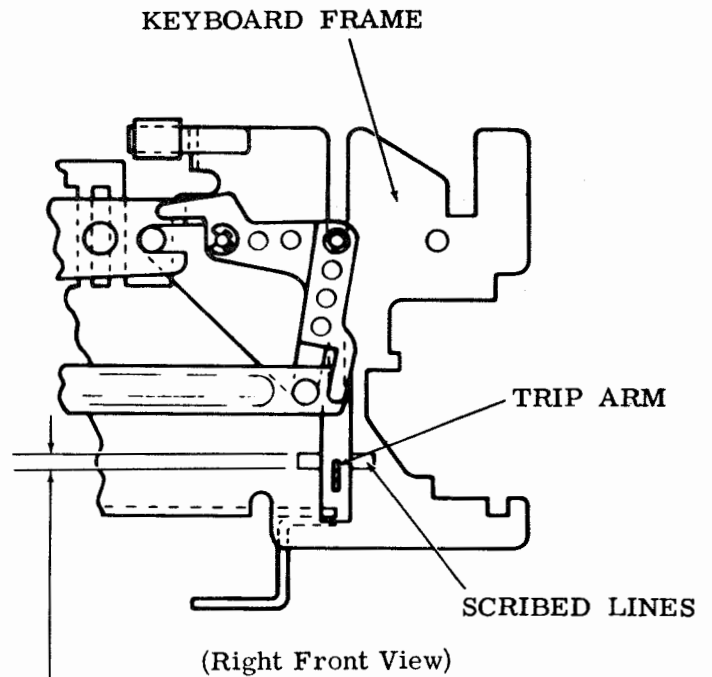
2.02 To replace the typing unit, proceed as follows (Figures 2 through 5).

- (1) Locate the selector clutch on the right end of the typing unit main shaft, and the keyboard reset coupler at the lower center

Note: The typing unit must be installed on the base and secured to make these adjustments, and the keyboard housing must be removed.

To Check

Engage clutch. Rotate shaft until reset bail roller peaks on one of the high points of the cam. Note position of top edge of trip arm relative to scribed lines. Rotate the shaft until reset bail roller peaks on other high point of cam and note the trip position again.



Requirement

The lowest of the two trip arm positions obtained should be between the scribed lines.

To Adjust

Loosen the clamp screw friction tight. Insert screwdriver blade between the pry point and the appropriate arm of the adjusting plate and position trip arm to meet requirement. Tighten clamp screw.

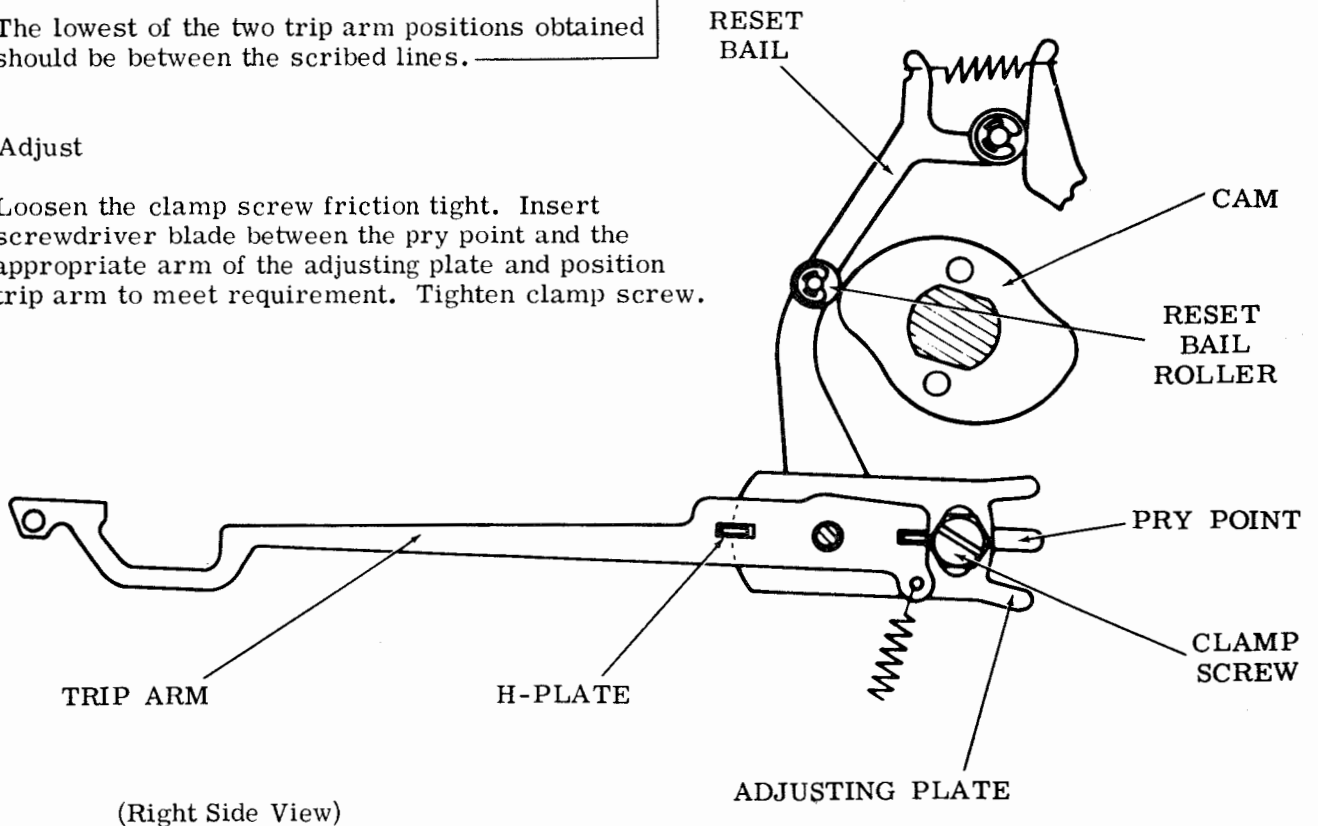


Figure 5 - Keyboard Trip Arm Adjustment

front. Facing the right end of the typing unit, rotate the selector clutch in a counterclockwise direction until the lugs on the keyboard reset coupler are vertical.

Note: Use handwheel TP161430, part of tool kit TP151940, to turn the selector shaft.

(2) Viewing the keyboard from the right side, rotate the mechanical reset shaft in a clockwise direction until the open slots in the plastic universal joint member are vertical to the base.

(3) Loosen the control panel retaining screws at the right and left upper rear corners of the control panel. Raise the control panel upward and forward.

(4) Grasp the typing unit under the curve at the top rear of the left side of the frame, and in the rectangular opening at the right top corner of the front plate. Raise the typing unit and position it directly over the base. Tilt the typing unit slightly forward (toward the keyboard) from a normal level attitude. Align the reset coupler with the slot in the plastic universal joint member, and carefully lower the typing unit onto the locating studs and tilt back to engage the intermediate gear assembly. Be certain that the main shaft driven gear and the intermediate gear mesh properly.

(5) Secure the typing unit to the base with the four typing unit mounting screws, beginning with the left rear screw.

Note: If a replacement typing unit (other than the original) is installed, the following adjustments are required.

(6) Adjust keyboard trip arm following the procedures given in Figure 5.

(7) Remove the two screws and lockwashers holding the intermediate gear guard to the typing unit base and remove the guard. Loosen the five motor mounting screws and move the motor away from engagement with the intermediate gear assembly.

(8) Using the pry points at the rear of the intermediate gear assembly, adjust the intermediate gear assembly from front to rear until there is a barely perceptible backlash between the main shaft driven gear and the intermediate drive gear. This backlash

can be from 0.004 inch to 0.015 inch. Tighten the three intermediate gear assembly mounting screws.

(9) Using the back left edge of the motor cradle and the rear flange of the base as a pry point, move the motor forward to fully engage the motor pinion and the intermediate driven gear. Then using the pry point located forward of the left rear mounting screw, ease the motor unit back to establish a barely perceptible backlash. Tighten the five motor mounting screws. Make sure the fan guard does not interfere with free rotation of fan.

(10) Install the gear guard over the intermediate gear assembly with the two screws and lockwashers taken out during the removal procedures. Align guard to clear gears and motor unit, and tighten.

(11) Install the keyboard housing at this time by aligning it with the keyboard cover and sliding it back against the housing brackets.

(12) Secure keyboard housing with one keyboard housing mounting screw, lockwasher, and flat washer inserted from the rear center of the right and left housing brackets. Check housing for proper fit and secure screws.

(13) The remaining replacement procedures are the reverse of the removal procedures.

CONTROL PANEL

2.03 To remove the control panel, proceed as follows (Figures 2, 3, 6, and 7).

(1) Detach the control panel cable clamps from the rear of the keyboard by taking out the screw, lockwasher, and flat washer securing each (one clamp for each switch assembly).

(2) Disconnect the control panel cable plugs from the control panel by pulling them straight out, using care to avoid bending the connector pins. Wrap the plugs with a protective covering and tape it securely to protect the plug.

(3) Take out the control panel mounting screw, lockwasher, and flat washer at the upper right and left sides of the control panel securing the panel to the arc slides.

(4) Lift the control panel free from the keyboard and store it in a closed container to protect the switch and connector contacts.

2.04 To replace the control panel, reverse the procedures used for removal.

Note: After installing and attaching the cable clamps on the control panel cables closest to the plugs, position the lower cable clamp 4 inches down the cable to allow a loop in the cable before securing the lower clamp.

KEYBOARD

2.05 To remove the keyboard from the base assembly, proceed as follows (Figures 2, 3, and 6).

(1) Remove the keyboard housing mounting screws, lockwashers and flat washers from the rear center of the left and right housing brackets. Slide the keyboard housing straight forward to remove.

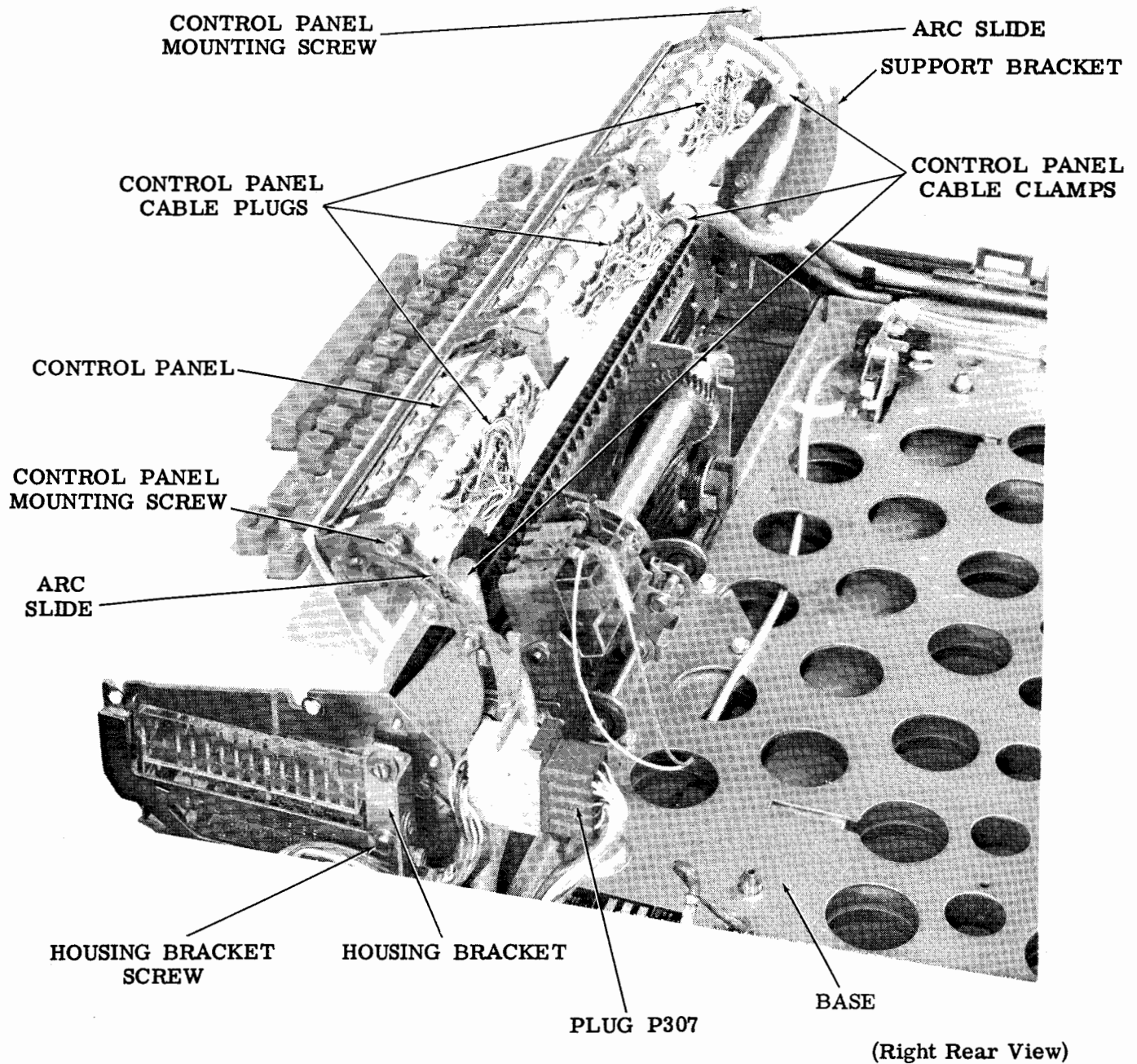


Figure 6 - Control Panel and Keyboard

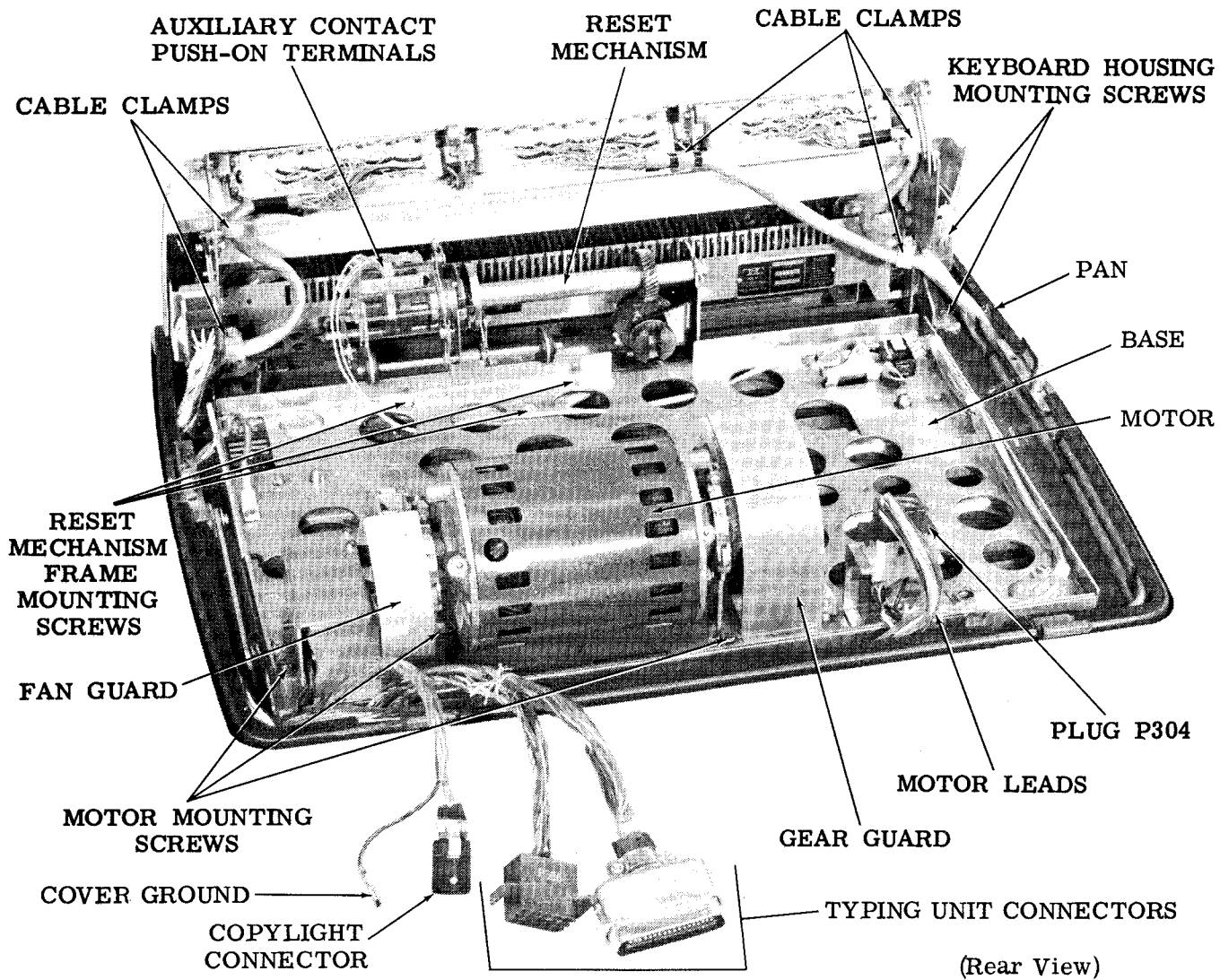


Figure 7 - Keyboard, Control Panel, Reset Mechanism, and Motor Unit

Note: Do not loosen or remove the two bracket retaining screws in the housing brackets that secure the brackets to the keyboard, unless removal is necessary. If the brackets are disturbed, they will require realignment during reassembly to properly align the keyboard housing.

- (2) Disconnect electrical plug P307 from the keyboard connector.
- (3) Support the lower front of the keyboard and remove the two keyboard mounting screws, lockwashers, and flat washers from each side securing the keyboard to the base.

(4) Lift the keyboard up very slowly, tilting the right side up slightly, and moving the keyboard a little to the right until the H-plate disengages from the trip arm in the keyboard. Holding the H-plate to the left as the keyboard is lifted will assist the disengagement process.

(5) Store the keyboard in a protected area.

2.06 To replace the keyboard, reverse the procedures used for removal.

Note: Use great care to assure the H-plate is properly engaged in the front and rear slots of the trip arm before lowering the keyboard and moving it to the left to its proper position on the base.

MOTOR UNIT

2.07 To remove the motor unit from the base, proceed as follows (Figure 7).

- (1) Remove typing unit as described in 2.01.
- (2) Disconnect the two motor leads from the two leads originating from the bottom of connector J304 mounted on the left rear of the base.
- (3) Remove the fan guard by taking out the motor mounting screws securing it in the right rear corner of the base.
- (4) Take out the remaining four motor mounting screws and lift the motor unit from the base. Set motor unit aside.

2.08 To replace the motor unit, reverse the procedures used for removal. Adjust the motor to the intermediate gear assembly as described in 2.02(8).

INTERMEDIATE GEAR ASSEMBLY

2.09 To remove the intermediate gear assembly from the base, proceed as follows (Figures 7 and 8).

- (1) Remove typing unit as described in 2.01.
- (2) Remove two screws and lockwashers securing the gear guard to the base.
- (3) Remove the gear guard.
- (4) Remove the three intermediate gear assembly mounting screws, lockwashers, and flat washers securing the intermediate gear assembly to the base.
- (5) Lift the intermediate gear assembly from the base and set aside.

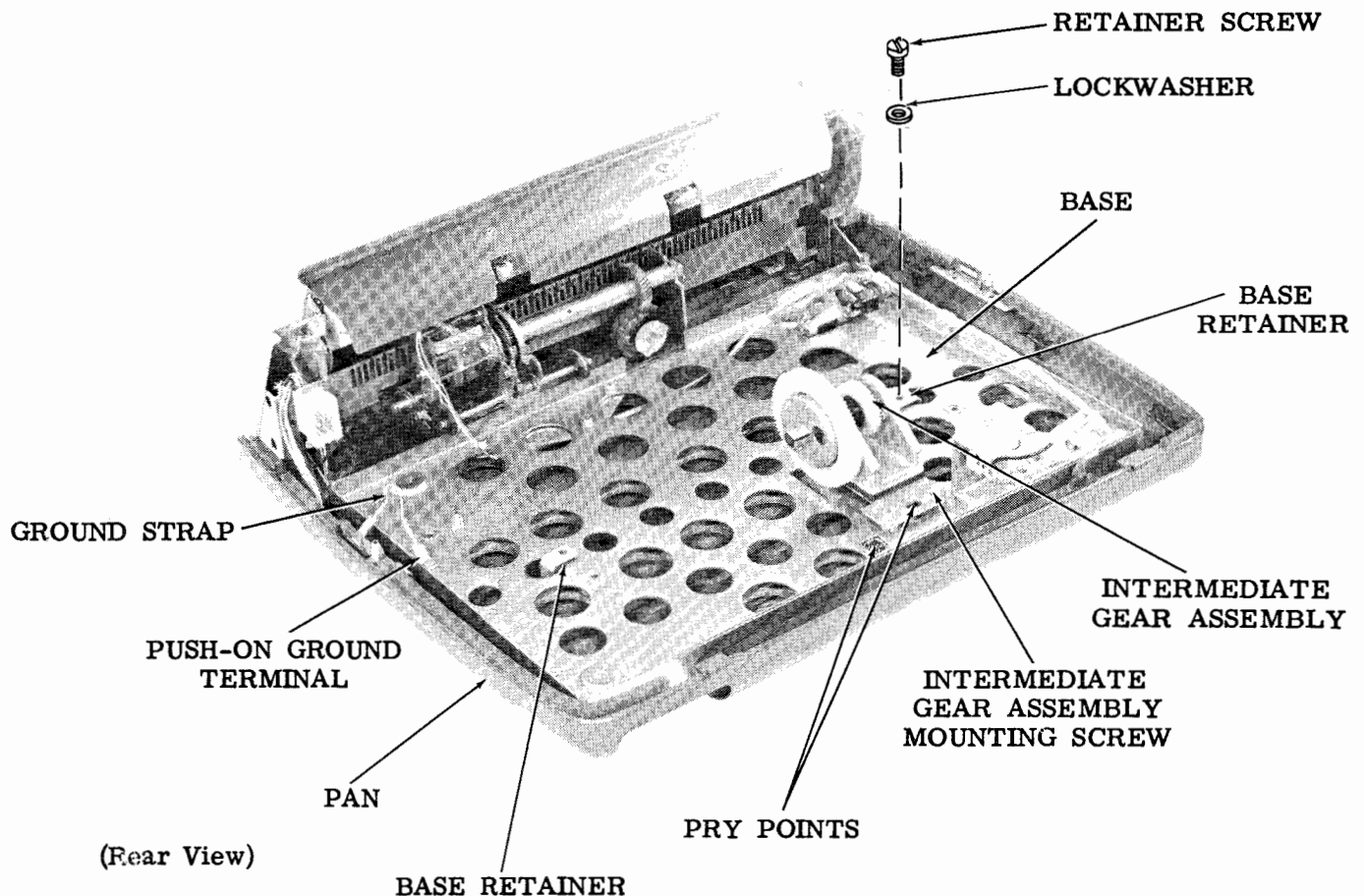
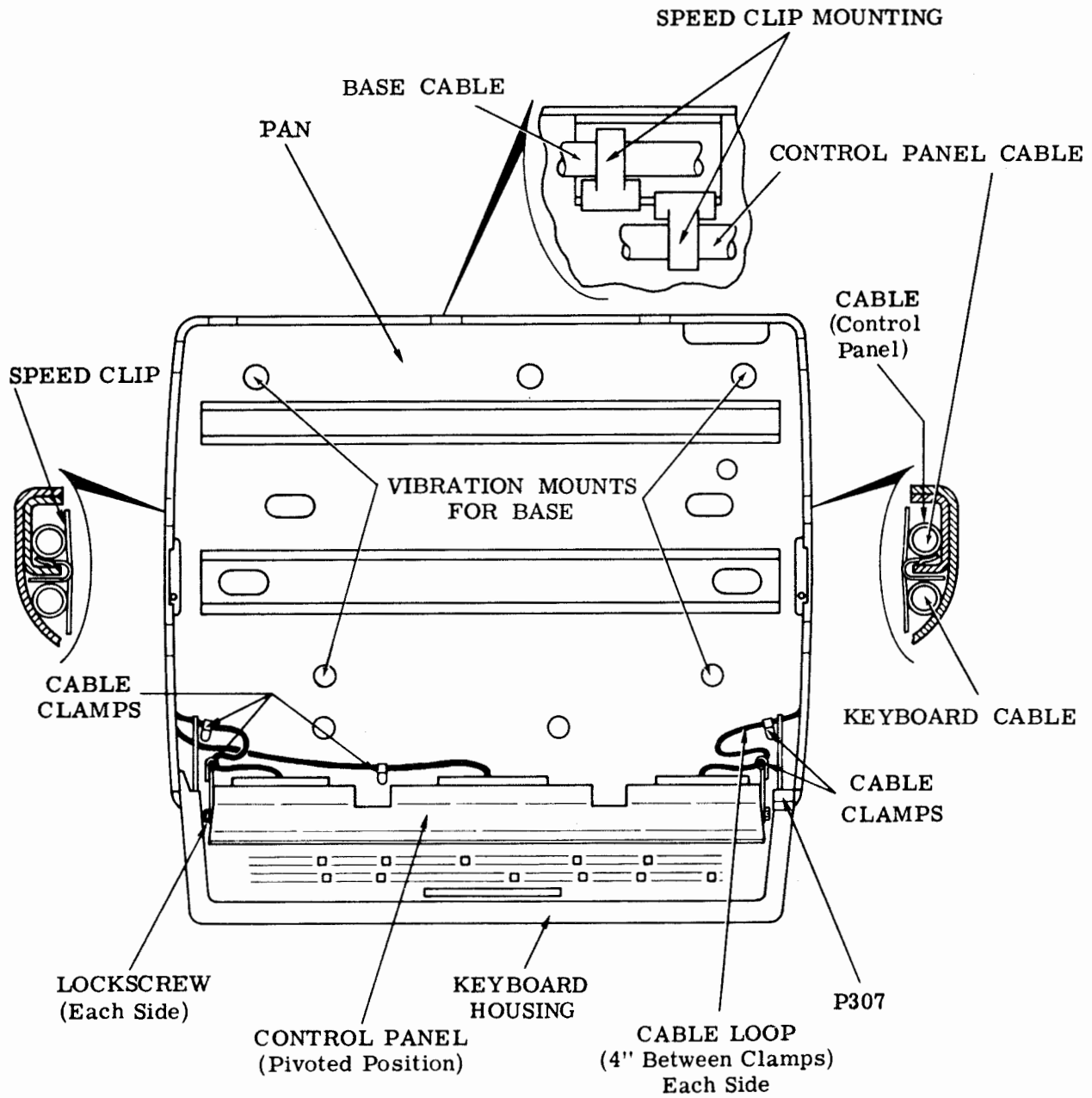


Figure 8 - Keyboard, Control Unit, Reset Mechanism, and Intermediate Gear Assembly



(Top View)

Figure 9 - Pan Cable Routing

2.10 To replace the intermediate gear assembly, reverse the procedures used during removal. If original intermediate gear assembly is installed, make sure there is a barely perceptible amount of backlash between the motor and intermediate gear assembly before tightening screws. If other than original intermediate gear assembly is installed, replace the typing unit and follow the adjustment information described in 2.02(7) and 2.02(8). Replace the gear guard.

KEYBOARD RESET MECHANISM

2.11 To remove the keyboard reset mechanism from the base, proceed as follows (Figure 6 and 7).

- (1) Remove the typing unit as described in 2.01.
- (2) Remove the control panel cables as described in 2.03(3) and 2.03(4).
- (3) Remove the keyboard as described in 2.05.
- (4) Pull the two push-on lead terminals straight off from the auxiliary contacts on the top rear of the keyboard reset mechanism.
- (5) Remove the three reset mechanism frame mounting screws, lockwashers, and flat washers securing the reset mechanism to the base.
- (6) Pull the keyboard reset mechanism forward until the frame extension clears the base. Set the keyboard reset mechanism aside in a protected area.

2.12 To replace the keyboard reset mechanism, reverse the procedures used for removal.

Note: Route the leads down through the first hole in the left front corner of the base, bring them back up through the front center hole, then pass leads back down through the second hole from the right front of the base, and finally bring them up through the hole in the right front center before attaching them to the auxiliary contacts.

BASE

2.13 To remove the base from the typing unit cover and pan, proceed as follows (Figure 8).

(1) Remove the typing unit (2.01), control panel cables (2.03(3) and (4)), and keyboard (2.05).

(2) Remove the two base retainers by taking out the retainer screws and lockwashers securing each to the pan.

Note: If the screw and lockwasher attaching each base retainer to the base for immobility during shipment are still in place, they should be removed and discarded at this time.

(3) Lift base retainers from the pan through holes in base.

(4) Remove the ground strap from the base by pulling the push-on ground terminal straight off from the terminal tab mounted on the right side of the base.

(5) Lift the base free from the pan one corner at a time. The shock mounts may hold the base firmly due to a suction formed in the cup in the base. A little force will break the base loose.

Note: No further disassembly of the base is recommended unless parts require replacement.

2.14 To replace the base, reverse the procedures used during removal.

TYPING UNIT COVER AND PAN

2.15 To remove the typing unit cover and pan, from the table, proceed as follows (Figures 9 and 11).

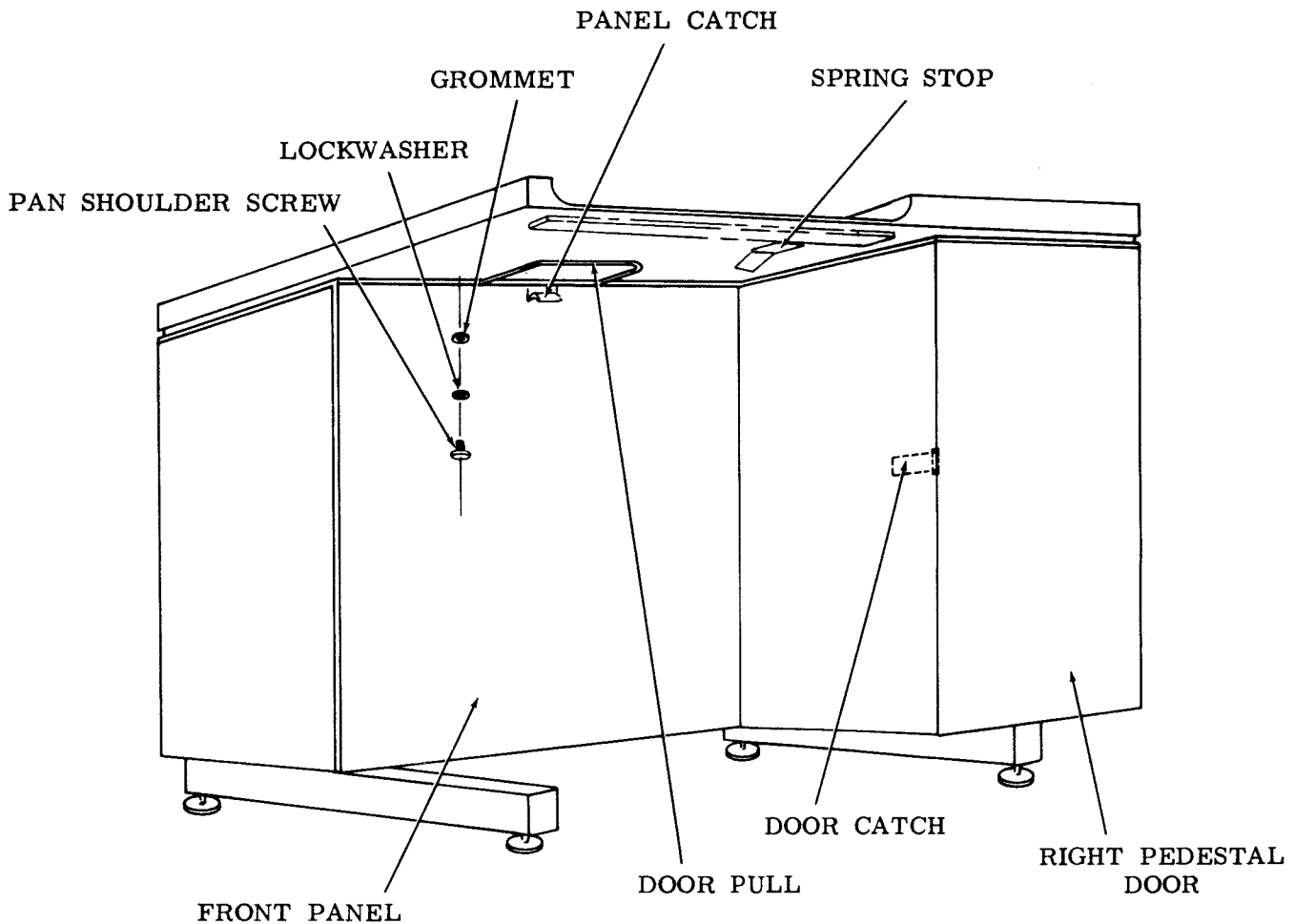
(1) Remove the typing unit pan (2.13).

(2) Disconnect the copyright cable plug P302 from the 2-pin connector in the cover.

(3) Pull the push-on ground terminal free from the ground terminal tab in the cover.

(4) Use a screwdriver blade or needle nose pliers to spring the upper speed clip at the rear of the pan inward, and pull the base cable free. In a similar manner release the control panel cable from the lower speed clip.

(5) Release the control cable(s) from the speed clips on the left side of the pan.



(Left Oblique Front View)

Figure 10 - Table

- (6) Release the control cable and keyboard cable from the speed clips on the right side of the pan.
- (7) Open the front panel of the table by pressing upward on the panel catch while pulling outward on the door pull. The panel will be stopped by the spring stop, but can be released by pressing upward on the strip. Lower the panel until the door pull rests on the floor.
- (8) Locate the copyright cable under the table. Draw the cable down and carefully feed the plug P302 and ground terminal through the oblong slots in the pan and table.
- (9) Draw the base cable down and feed its plug P304 through the slots.
- (10) Draw the selector cable and its plug P306, and the function box cable and its plug P308 down through the hole.
- (11) Draw the keyboard cable and its plug P307 back and down through the table slot.
- (12) Very carefully work the control panel cables and connector plugs down through the slot.

(13) Remove the four pan shoulder screws and lockwashers from the grommets in the lower side of the table to release the typing unit pan and cover.

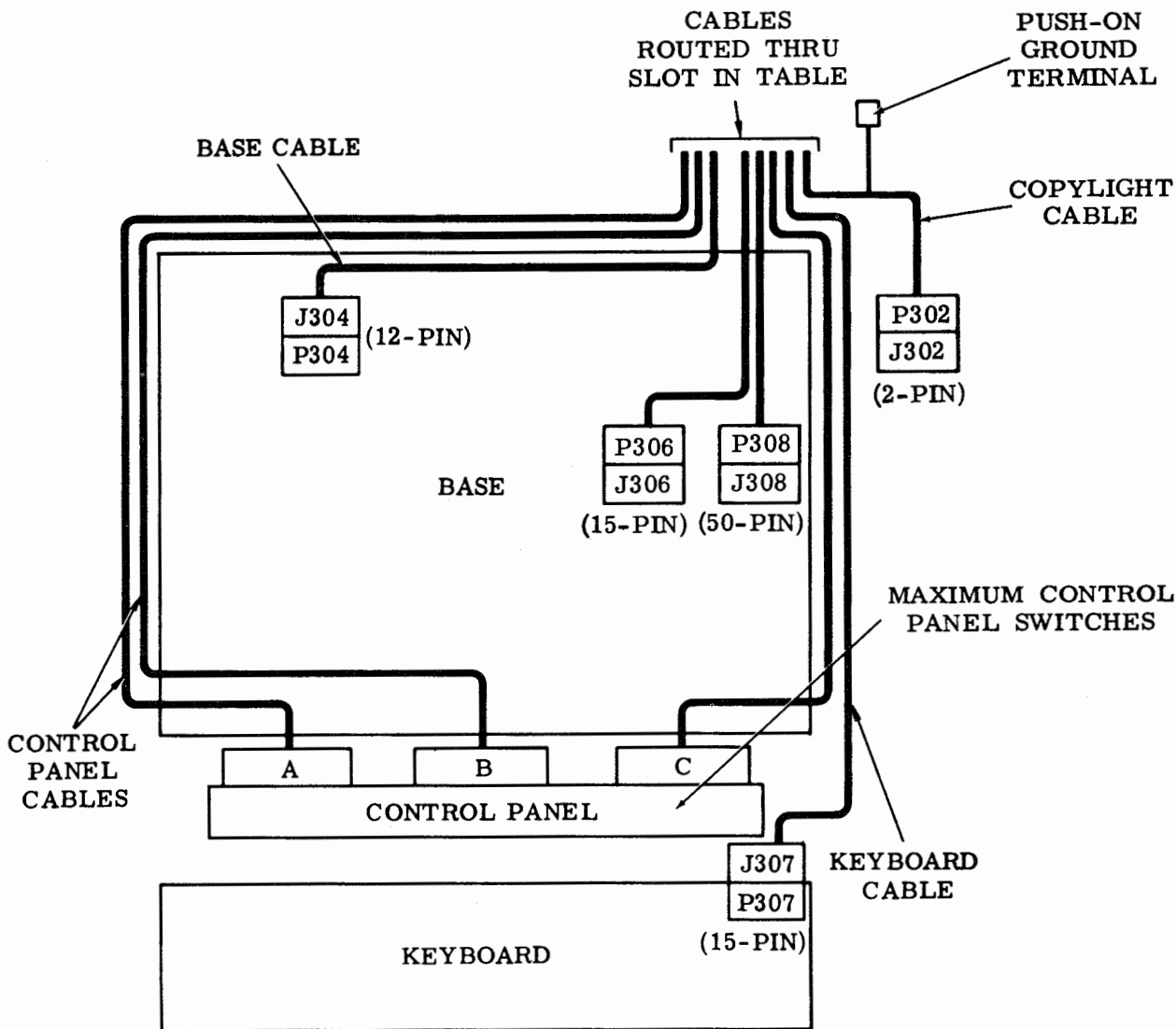
(14) Lift the typing unit pan and cover out of the recess in the table and set aside.

2.16 To replace the typing unit pan and cover, reverse the procedures used during removal.

ELECTRICAL SERVICE UNIT

2.17 To remove the electrical service unit from the left compartment in the base of the table proceed as follows (Figures 10 through 13).

(1) Open the front panel of the table and draw all electrical service unit cables back through the oblong slot in the table as directed in 2.15.



(Top View)

Figure 11 - Cable Routing Above Table

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- (2) Disconnect the power cord plug from the utility strip.
- (3) Remove three service unit retaining screws, lockwashers, and flat washers from the retaining flanges at the front top and bottom of the unit.
- (4) If the shipping bracket secured to the floor of the left table compartment for shipment has not been removed, take out the mounting screw and lockwasher holding it in place and discard this hardware.
- (5) Lift the electrical cables out of the cable hanger at the top rear wall of the compartment.
- (6) Pull the electrical service unit straight forward out of the table.

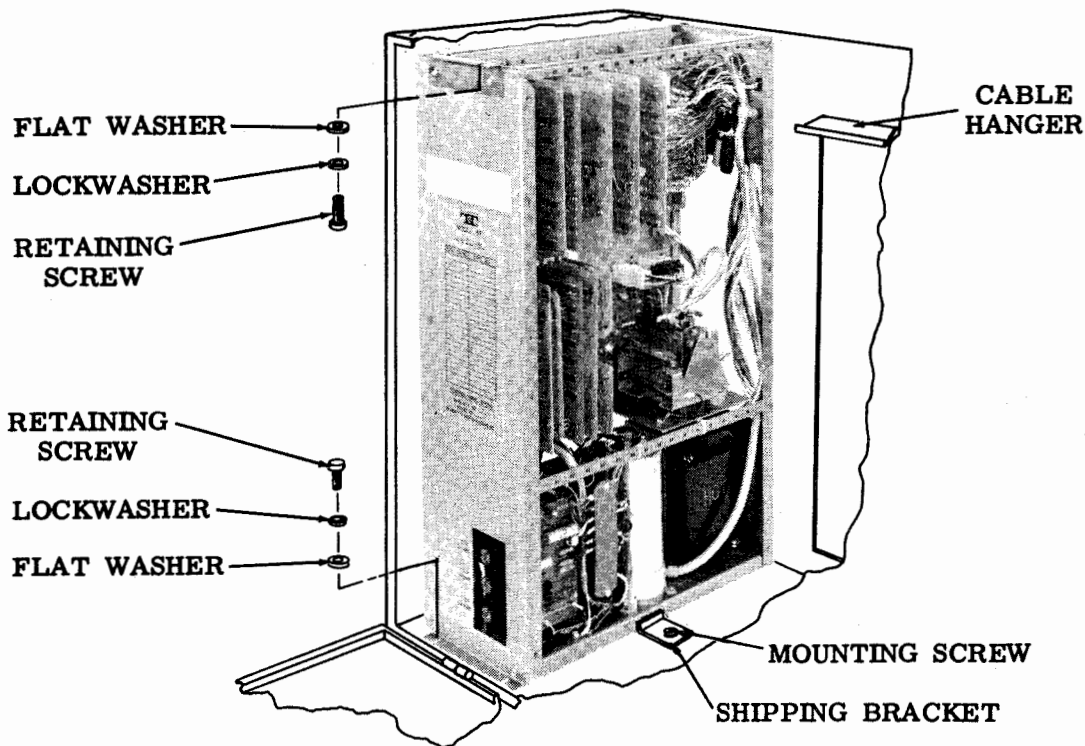
2.18 To replace the electrical service unit, reverse the removal procedures.

ANSWER-BACK ASSEMBLY

2.19 To remove the answer-back assembly from the electrical service unit, proceed as follows (Figure 11).

- (1) Carefully pull plug connectors from the top of the printed circuit card on the answer-back assembly.
- (2) Remove four answer-back mounting screws, lockwashers, and flat washers from the corners of the answer-back mounting plate.
- (3) Lift the answer-back assembly out of the electrical unit, and set aside.

2.20 To replace the answer-back assembly, reverse the removal procedures.



(Right Oblique Cut-Away View of Table)

Figure 12 - Electrical Service Unit

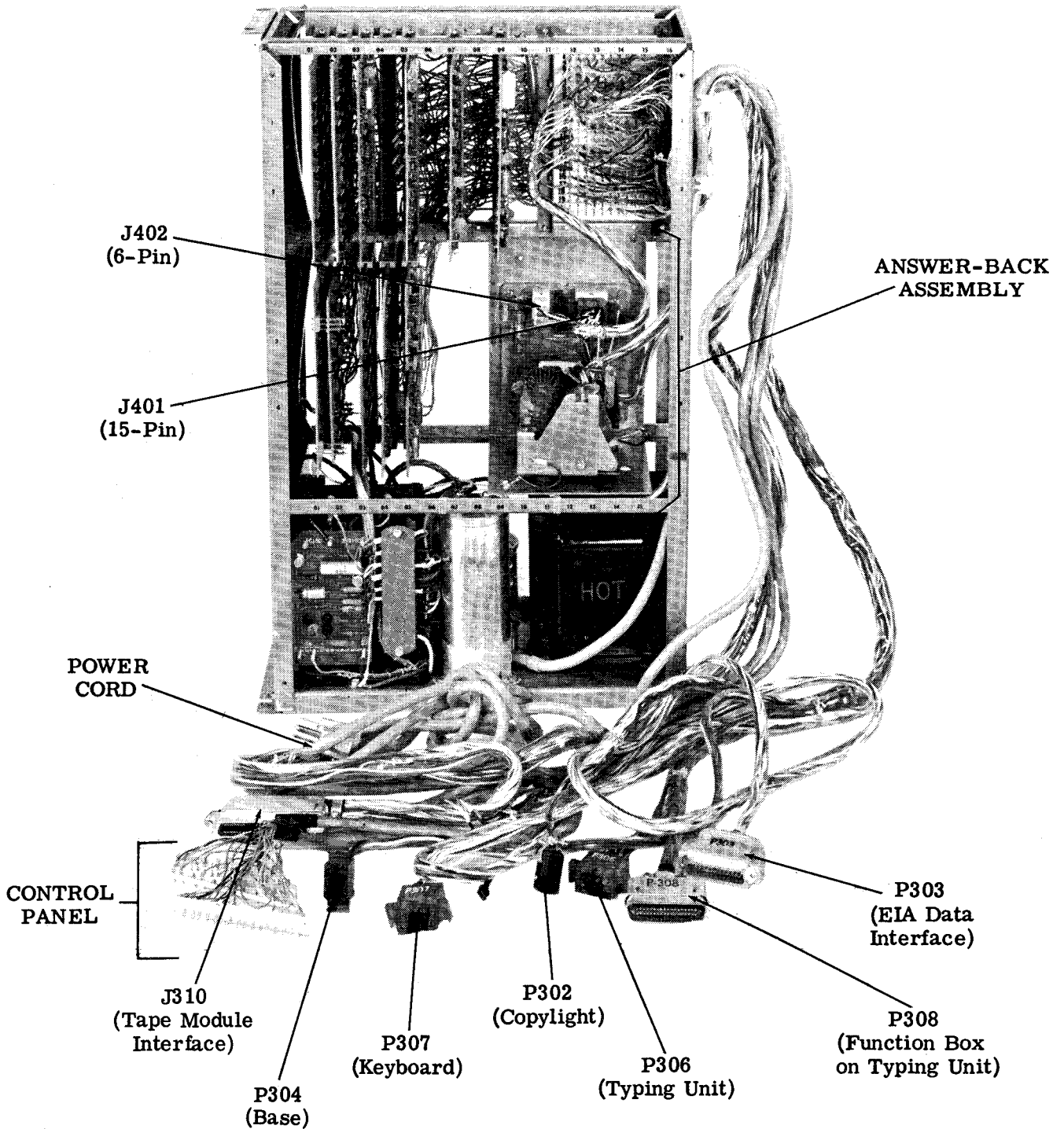
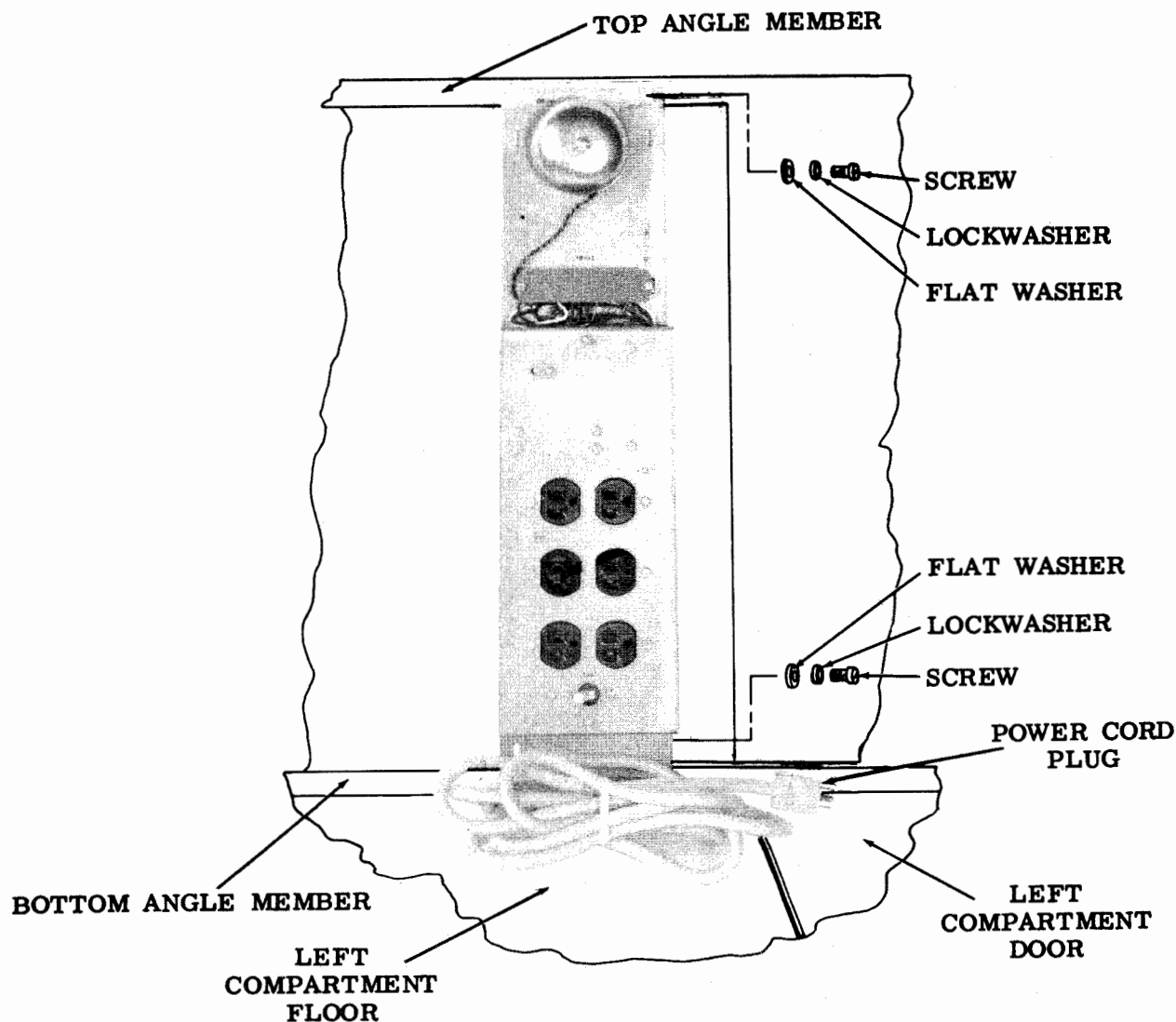


Figure 13 - Electrical Service Unit



(Left Cut-Away View of Table)

Figure 14 - Utility Strip

UTILITY STRIP

2.21 To remove the utility strip from the left compartment in the base of the table, proceed as follows (Figures 8 and 12).

- (1) Open the front panel of the table by pressing upward on the panel catch, and pull forward on the door pull.
- (2) Press upward on the spring stop, and continue to swing the panel outward and downward until the door pull rests on the floor.
- (3) Disconnect the utility strip power cord plug, if it is connected to power.

(4) Remove two utility strip mounting screws, lockwashers, and flat washers securing the utility strip to the top and bottom angle members of the table on the right side of the left compartment.

(5) Remove the utility strip from the table and store.

2.22 To replace the utility strip, reverse the removal procedures.

TABLE

2.23 No removal or replacement procedures are required for the table since all areas are accessible through the front panel and the right pedestal door.