

BELL SYSTEM PRACTICES
Teletypewriter and Data Stations

SECTION P34.441
Issue 1, November, 1963
AT&TCo Standard

28 WALL-MOUNTED KEYBOARD SEND- RECEIVE AND RECEIVE-ONLY TELETYPEWRITER (KSR AND RO) INSTALLATION

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1. GENERAL

1.01 This section describes the installation procedures and the adjustments incidental thereto for the 28 wall-mounted keyboard send-receive and receive-only teletypewriter (KSR and RO).

1.02 In this section, references made to left or right, up or down, and front or rear apply to the apparatus in its normal operating position as viewed from the front.

1.03 The components of the wall-mounted teletypewriter are installed in the following order:

- (1) Backplate Assembly
- (2) Intermediate Gear
- (3) Keyboard (for KSR) or Base (for RO)
- (4) Typing Unit
- (5) Electrical Service Unit
- (6) Cover

1.04 Certain provisions in this section apply only to the wall-mounted teletypewriter mounted on the No. 101 electronic switching system bay. The paragraphs containing these instructions are given the title **Special Set**.

2. MOUNTING BACKPLATE ASSEMBLY

2.01 The fully assembled wall-mounted teletypewriter weighs approximately 110 pounds and has seven mounting holes for attachment to the wall. The supporting wall must be able to withstand a 60-pound shear force and a 90-pound tensile (or compressive) force at each mounting hole.

2.02 The locations of the mounting holes on the backplate assembly are shown in Fig. 1. Since the horizontal distance between holes is 14-5/8 inches, the backplate cannot be mounted on standard 16-inch center-to-center wall studs. When attaching the backplate assembly to wall structures where the existing mounting holes are unsatisfactory, alternate holes may be added along the side and bottom edges. No mounting hardware can be located along the upper central edge, since such hardware would interfere with the paper supply.

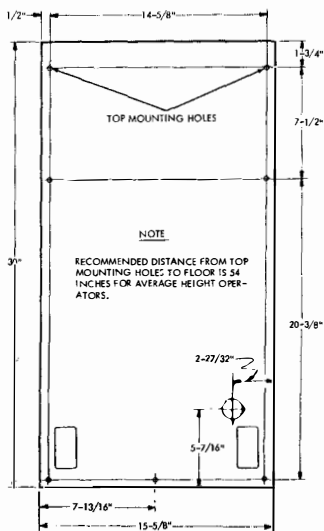


Fig. 1 — Location of Mounting Holes in Backplate

2.03 The following list contains suggested mounting hardware to be used with various wall materials:

- (a) For **masonry walls**, use Ackermann-Johnson retainers, tubular expansion shields (made by the Rawplug Company), or equivalent, with 3/16-inch diameter or #12 bolts.
- (b) For **hollow wood or tile wall**, use 3/16-inch diameter toggle bolts.
- (c) For **solid wood wall**, use #12 roundhead wood screws.
- (d) For **lath and plaster or plasterboard walls**, use 3/16-inch diameter toggle bolts. Auxiliary support may be required for walls of this type. Take every precaution to insure that the supporting wall meets the loading requirements set forth above.

2.04 As indicated in Fig. 1, the recommended height from the floor to the top mounting holes is 54 inches. This distance has been found satisfactory to accommodate an operator of average height. If desired, the height may be varied to meet the customer's requirements.

2.05 If the backplate is used for locating the mounting holes on the wall, it may be more convenient to separate the framework from the backplate. This can be accomplished by loosening the four frame mounting screws shown in Fig. 2 and sliding the framework from the backplate assembly.

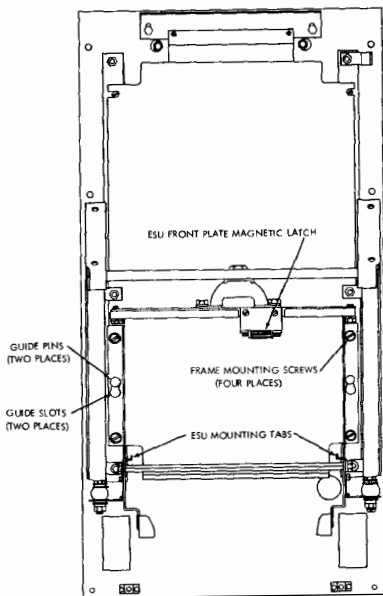


Fig. 2 — Framework Mounted on Backplate

3. SUBASSEMBLY OF COMPONENTS

3.01 The following assembly and adjustments pertaining to the keyboard (or base) and the typing unit are to be performed before the units are installed on the backplate assembly. The purpose is to install and adjust the intermediate gear and adjust the timing belt connecting the intermediate gear assembly and the motor pulleys.

A. Addition of Intermediate Gear to Keyboard or Base

3.02 Remove the retainer ring which is adjacent to the left bearing side and the 3/8-inch hex nut and associated lockwasher from the right end of the shaft. Slide the shaft to the left and remove the pulley, the two belt retainers, and the belt. Place the rubber isolator over the small end of the intermediate gear. Slide the gear with isolator onto the shaft so that the isolator side is on the left. Replace the two belt retainers, the belt, and the pulley. Then slide the shaft to the right, back to its original position, and replace the retainer ring and the 3/8-inch hex nut and associated lockwasher. Locate the intermediate gear in its correct position and fasten it with the two setscrews supplied.

B. Mounting Typing Unit on Keyboard (or Base)

Note: Loosen the mounting screws on the intermediate gear assembly and move it to its rearmost position.

3.03 **Special Set:** This teletypewriter requires the addition of a clip on the typing unit as follows:

- (a) Remove the clip from the muslin bag attached to the stuntbox.
- (b) Remove the bottom screw and lockwasher on the left end of the codebar guide mechanism.
- (c) Add the clip and replace the screw and lockwasher, making sure that the clip engages the FIGS-LTRS codebar.

3.04 Remove and retain the four mounting screws supplied with the base unit. (See Fig. 3.) Place the typing unit on the keyboard (or base) unit and make certain that the front feet of the typing unit are placed over the locating studs provided on the base unit. Rotate the intermediate shaft by hand in order to mesh the gear teeth. Secure the typing unit to the base unit with the four mounting screws.

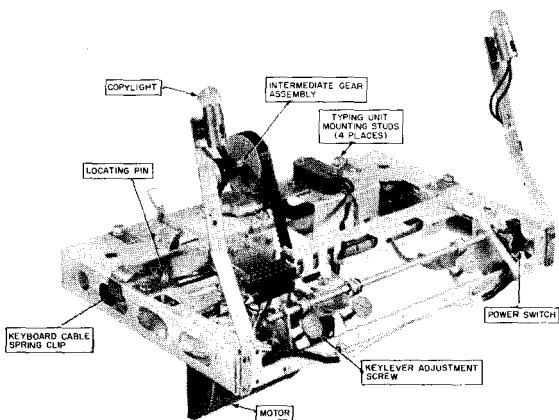


Fig. 3— Wall-mounted Teletypewriter Base

C. Intermediate Gear and Timing Belt Adjustments

3.05 Adjust the intermediate gear assembly and the timing belt as indicated in Fig. 4 and 5.

**INTERMEDIATE GEAR ASSEMBLY
REQUIREMENTS**

- (1) CLEARANCE BETWEEN DRIVEN GEAR ON PRINTER AND INTERMEDIATE GEAR SHALL BE
MIN. 0.004 INCH --- MAX. 0.008 INCH.
- (2) THERE SHALL BE SOME CLEARANCE BETWEEN RIGHT BELT RETAINER ON INTERMEDIATE GEAR ASSEMBLY AND SPACING CUTOUT LEVER ON PRINTER. TO ADJUST
 - (1) LOOSEN THREE MOUNTING SCREWS AND MAKE THEM FRICTION TIGHT. POSITION THE ASSEMBLY TOWARD FRONT OR REAR TO MEET REQUIREMENT (1).
 - (2) POSITION THE ASSEMBLY TOWARD THE LEFT TO MEET REQUIREMENT (2). TIGHTEN SCREWS.

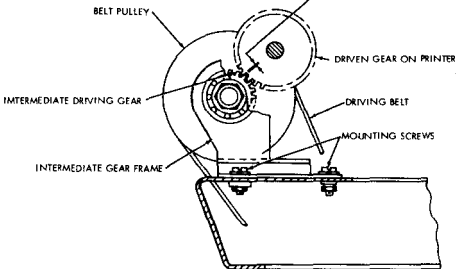


Fig. 4 — Intermediate Gear Assembly Adjustment

**TIMING BELT
REQUIREMENT**

FORCE OF $2 \pm 1/2$ OZS. TO DEFLECT BELT $1/8$
INCH WHEN MEASURED MIDWAY BETWEEN PULLEYS.
TO ADJUST

WITH MOTOR-PLATE MOUNTING SCREWS LOOSENED,
SLIDE MOTOR TOWARD FRONT OF BASE TO
INCREASE TENSION OR TOWARD REAR OF BASE TO
DECREASE TENSION. TIGHTEN SCREWS.

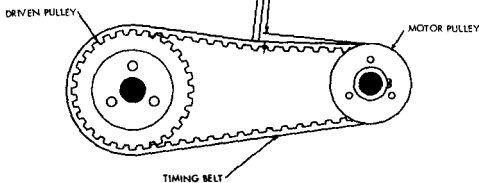


Fig. 5—Timing Belt Adjustment

3.06 Remove the typing unit from the keyboard (or base) in preparation for installing the keyboard (or base) on the backplate assembly.

4. MOUNTING KEYBOARD OR BASE TO WALL-MOUNTED BACKPLATE ASSEMBLY

4.01 Insert the keyboard ground strap between the mounting stud and the vibration plate located in the front right corner.

4.02 With the motor unit in its properly adjusted position and the typing unit removed from the base, secure the keyboard (or base) to the backplate assembly with the mounting studs which are supplied as part of the keyboard (or base) assembly.

5. MOUNTING TYPING UNIT TO KEYBOARD OR BASE

5.01 Remove and retain the four mounting screws supplied with the base unit. Place the typing unit on the keyboard (or base) unit and make certain that the front feet of the typing unit are placed over the locating studs provided on the base unit. Rotate the intermediate shaft by hand in order to mesh the gear teeth. Secure the typing unit to the base unit with the four mounting screws.

5.02 With the keyboard (or base) and typing unit in place, adjust the two support hinges near the base of the backplate assembly as indicated in Fig. 6.

HINGE MOUNTS
REQUIREMENT
KEYBOARD, PRINTER, AND MOTOR UNIT IN
PLACE. HINGE SHALL BE PERPENDICULAR TO
SIDE PLATE AS GAUGED BY EYE.
TO ADJUST
WITH MOUNTING SCREWS LOOSENED, MOVE THE
HINGES UP OR DOWN TO MEET REQUIREMENT.
TIGHTEN SCREWS.

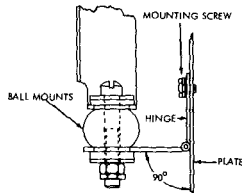


Fig. 6—Hinge Mount Adjustment

6. MOUNTING AND CONNECTING THE ELECTRICAL SERVICE UNIT

6.01 The lower part of the mounting frame has four projecting tabs upon which the electrical service unit rests, as shown in Fig. 2. Place the service unit into the frame. The hinged front plate is held in place by a magnetic latch on the mounting frame. The plate and latch shall be perpendicular to each other as gauged by eye. If necessary, loosen the screws and position the latch to meet the requirement.

6.02 **Special Set:** Route the keyboard connecting cable directly to the keyboard connector located on the lower right side of the keyboard.

6.03 In all other cases route the keyboard connecting cable up along the left side of the mounting frame. Route the cable behind all spring clips supplied with the mounting frame for this purpose. Clamp the keyboard cable to the keyboard with the spring clip supplied on the keyboard as shown in Fig. 3.

6.04 Route the typing unit connector up along the right side of the mounting frame and fasten with the spring clips supplied with the frame.

6.05 Connect the two ground straps at the left end of the electrical service unit securely to the cabinet mounting frame and the teletypewriter mounting frame. See Fig. 7. The screws chosen to make the ground connection must go into tapped holes in both of the mounting frames to insure a sufficient ground.

Caution: Ground connections must be made properly to eliminate shock hazard.

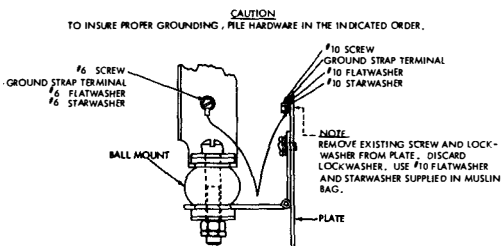


Fig. 7— Electrical Service Unit Ground Strap Attachment

7. COVER ADJUSTMENTS AND INSTALLATION

7.01 With the cover removed from the backplate assembly, perform the cover hinge, latch, and copyholder adjustments given in Fig. 8.

NOTE
PERFORM ADJUSTMENTS WITH COVER REMOVED FROM BACK-
PLATE ASSEMBLY.

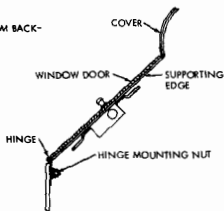
(A) WINDOW-DOOR HINGE MOUNTS

REQUIREMENT

WINDOW-DOOR SHALL LIE FLAT
ON SUPPORTING EDGES OF CABINET
AS GAUGED BY EYE.

TO ADJUST

LOOSEN TWO NUTS ON EACH HINGE.
POSITION DOOR. TIGHTEN NUTS.



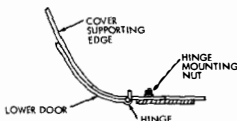
(B) LOWER DOOR HINGE MOUNTS

REQUIREMENT

DOOR SHALL LIE FLAT AGAINST
COVER.

TO ADJUST

LOOSEN TWO NUTS ON EACH HINGE.
POSITION DOOR. TIGHTEN NUTS.



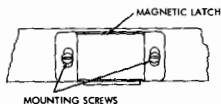
(C) LOWER DOOR LATCHES

REQUIREMENT

DOOR SHALL LATCH SOLIDLY WITH
MAGNET LATCHES AND LIE FLAT
AGAINST COVER.

TO ADJUST

LOOSEN LATCH SCREWS. POSITION
LATCHES. TIGHTEN SCREWS.



(D) COPYHOLDER

REQUIREMENT

THERE SHALL BE SUFFICIENT TENSION
ON THE LINE GUIDE TO HOLD COPY
IN PLACE AND TO PREVENT THE LINE
GUIDE FROM SLIPPING DOWN ITS
SHAFT. LINE GUIDE SHALL BE
PARALLEL TO COPYHOLDER TRAY.

TO ADJUST

REMOVE THE MOUNTING SCREWS OR
NUTS FROM THE LINE-GUIDE SHAFT
AND TURN THE SHAFT. REMOUNT THE
SHAFT AND TIGHTEN SCREWS OR NUTS.
BEND LINE GUIDE TO MAKE IT PARALLEL
TO COPYHOLDER.

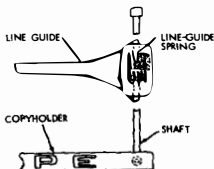


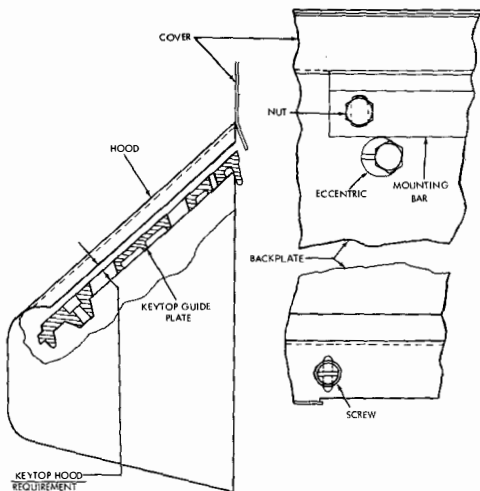
Fig. 8—Cover Hinge, Latch, and Copyholder Adjustments

7.02 Before placing the cover on the backplate assembly, loosen the nut securing the large central mount and make it friction tight. The mount is illustrated in Fig. 10. For receive-only sets (RO), remove the three keylever assemblies from the cover by removing six nuts, lockwashers, and flat washers.

Note: The following adjustments are to be performed with the cover in place but not secured; i.e., the two screws at the bottom of the backplate assembly are not tightened.

A. Send-Receive Hood and Cover Adjustments

7.03 Adjust the hood and cover as shown in Fig. 9 and 10. The mounting bar is moved up or down to increase or decrease the gap between the keyboard hood and the keytop guide plate; and the keyboard is moved in or out to decrease or increase the gap between the keytop guide plate and the cover lip.



KEYTOP HOOD
REQUIREMENT

WITH COVER IN PLACE, GAP BETWEEN KEYTOP HOOD
AND GUIDE PLATE SHALL BE
MIN. 0.090 INCH --- MAX. 0.125 INCH.

TO ADJUST
LOOSEN THE TWO NUTS (ON THE COVER MOUNTING
BAR) AND THE LOWER SCREWS. ADJUST ECCENTRICS TO
MEET REQUIREMENT. TIGHTEN NUTS.

Fig. 9 — Keytop Hood Adjustment (KSR)

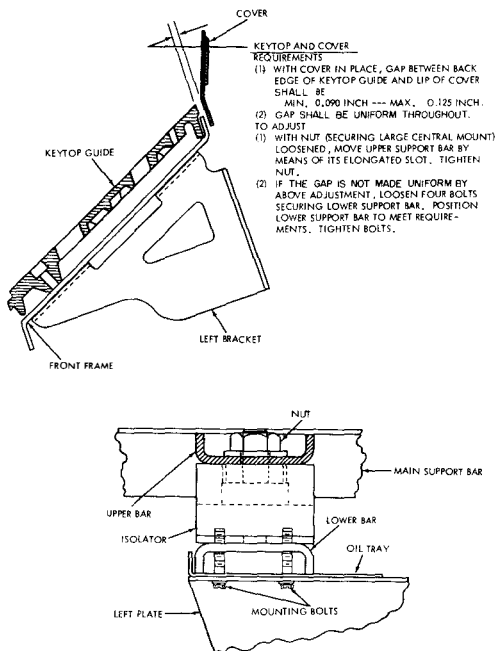


Fig. 10 — Keytop and Cover Adjustment (KSR)

B. Receive-only Cover, Power Switch, and Keylever Adjustments

7.04 Adjust the cover, power switch, and keylever assemblies as shown in Fig. 11, 12, and 13. The cover is moved up or down to vary the upper and lower gap between the power switch and the cover. The deflected power switch is made flush with the cover either by a local adjustment of the base front plate or by moving the base in or out. The keylever assemblies are adjusted by moving the keylever adjusting screw in or out.

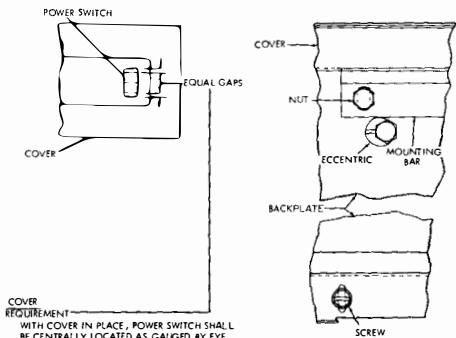


Fig. 11 — Cover Adjustment (RO)

**POWER SWITCH
REQUIREMENT**

WITH COVER IN PLACE, DEFLECTED SURFACE OF POWER SWITCH, INDICATING EITHER ON OR OFF, SHALL BE FLUSH WITH COVER SURFACE.

TO ADJUST

(1) REMOVE COVER. WITH ADJUSTING SCREWS FRICTION TIGHT, POSITION SWITCH. TIGHTEN SCREWS.

(2) IF REQUIREMENT CANNOT BE MET WITH ABOVE ADJUSTMENT, LOOSEN NUT SECURING LARGE CENTRAL MOUNT AND MOVE THE UPPER SUPPORT BAR BY MEANS OF ITS ELONGATED SLOT. REMOVE COVER. TIGHTEN NUT.

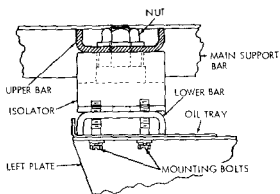
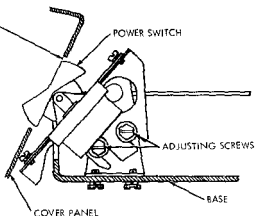


Fig. 12 — Power Switch Adjustment (RO)

KEYLEVER

REQUIREMENT (THREE PLACES)

WITH COVER IN PLACE, CLEARANCE BETWEEN SURFACE OF LEVER ADJUSTING SCREW AND OUTER SURFACE OF COVER SHALL BE

MIN. 7/8 INCH --- MAX. 15/16 INCH.

TO ADJUST

REMOVE KEYLEVER ASSEMBLIES. TURN ADJUSTING SCREW TO MEET REQUIREMENT. (SLOT IN SCREW SHOULD BE HORIZONTAL AFTER ADJUSTING.) REMOVE COVER AND REPLACE KEYLEVER ASSEMBLIES. INSERT KEYPADS IN THEIR PROPER OPENINGS.

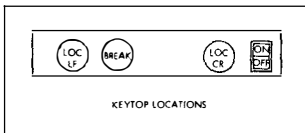
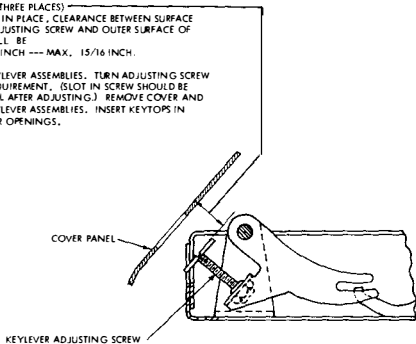


Fig. 13 — Keylever Adjustment (RO)

C. General Cover Adjustments and Installation

7.05 Adjust the paper guide and window as shown in Fig. 14.

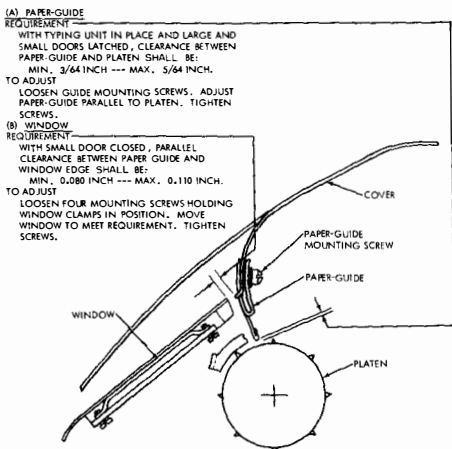


Fig. 14. — Paper Guide and Window Adjustments

7.06 Upon completion of the above adjustment, secure the cover in position with the two screws located near the bottom of the backplate assembly.

7.07 Clip the lamp shields on the two copylight lamp holders. The clearance between the lamp shields and the cover shall be a minimum of 1/16 inch. If an adjustment is required, bend the support brackets.

8. POWER AND TELEGRAPH CONNECTIONS

8.01 The power cord to be used with the apparatus must be of the three-wire type. A Twist-lock receptacle supplied with the electrical service unit is to be connected to the mate provided on the bottom plate of the service unit. Attach the ground lead to the center post of the Twist-lock receptacle.

Caution: Do not wire the ac power cord directly to terminals C-39 and C-40 of the electrical service unit. This creates a serious electrical hazard since it puts 110V ac on the male ac power receptacle.

8.02 Power and telegraph leads may be brought through the rear of the backplate assembly or through the hole located in the bottom of the cover.

8.03 **Special Set:** A mating connector supplied with the electrical service unit is to be used to provide connections to the distributor used in conjunction with this unit.

9. INSTALLATION OF PAPER AND RIBBON

9.01 The paper spindle for the friction-feed teletypewriter is supplied with the typing unit. Insert the spindle in a roll of paper and mount it in the lower part of the cabinet so that the paper unwinds from underneath. Route the paper up through the paper channel in the rear and down under the platen as shown in Fig. 15. Check the power lead and, if necessary, route it in such a manner as not to interfere with the paper.

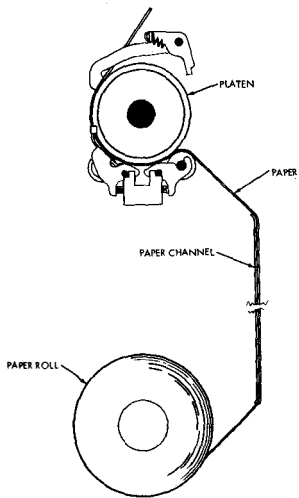


Fig. 15 — Path of Paper (Friction-feed Units Only)

9.02 If a sprocket-feed teletypewriter is installed, the bakelite spindle retainers may be removed to provide additional storage space for sprocket-feed forms. These retainers are attached to the lower part of the backplate assembly.

9.03 Remove both spools from the ribbon-spool shafts. Engage the hook on the end of the new ribbon in the hub of the empty spool. Wind a few turns of the ribbon onto the empty spool in the same direction as that in which it comes off the full spool. Make sure that the reversing eyelet has been wound up on the empty spool. Place the spools on the spool shafts so that the ribbon on the right spool comes off the right side and the ribbon on the left spool comes off the left side without twisting. Thread the ribbon around the rollers and through the ribbon-reverse lever slots as shown in Fig. 16.

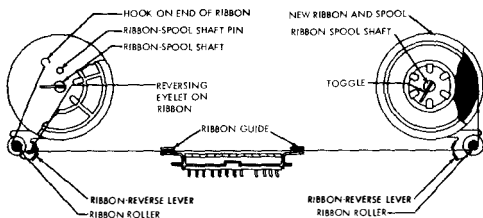


Fig. 16 — Path of Ribbon

10. OPERATING TESTS

10.01 After completion of the installation and associated adjustment procedures, make the operating tests which follow.

A. Operating Tests Applicable to Special Set Only

10.02 Determine that the green period key (.) can only be depressed when the red period key (.) is depressed.

10.03 Since this keyboard does not contain the complete alphabet, normal test sentence procedure will not be applicable. Instead, type the entire keytop arrangement a few times and test for accuracy. In addition, the following typing and stuntbox operations are not keyboard-controlled and should be checked by sending the following mark-space combinations to the unit.

Code	Operation	
MSSMM	A	
MSSSS	B	
MSMSM	D	M — Mark
MSMMM	G	S — Space
MMSSM	H	
MMSMS	K	
MMSMM	L	#1 Pulse
MMMSM	X	#2 Pulse
MMMMS	Y	#3 Pulse
MMMMM	Z	#4 Pulse
MMMSS	CR, LF, AND BELL	#5 Pulse



B. Operating Tests Not Applicable to Special Set

- 10.04 Type several lines of a sentence, such as "The quick brown fox, etc" and check for accuracy.
- 10.05 Depressing the keyboard lock (KBD LOCK) key shall prevent operation of any other key except the local line-feed, keyboard-unlock, and local carriage-return keys. It shall remain depressed until released by the keyboard-unlock key.
- 10.06 Depressing the keyboard unlock (KBD UNLK) key shall unlock the keyboard.
- 10.07 Depressing the BREAK key shall hold the transmitting line open. If the duration of the open-line interval is greater than two character cycles, the keyboard lock shall operate.
- 10.08 With the typebox in FIGS position, the bell shall ring clearly on single or repeated operations of the BELL key.
- 10.09 Determine that the operation of the FIGS key conditions the machine for the typing of upper-case characters and that the operation of the LTRS key conditions it for the typing of lower-case characters.

C. Operating Tests Common to All Sets

- 10.10 Depressing the local line feed (LOC LF) key shall cause the paper to be fed out of the machine approximately three times faster than when the line-feed key is operated repeatedly.
- 10.11 Depressing the repeat (REPT) key together with any other keylever except the local keys shall cause repeated transmission of the signal.
- 10.12 Depressing the local carriage return (LOC CR) key shall cause the carriage to return.

11. ASSOCIATED BELL SYSTEM PRACTICES

- 11.01 Other Bell System Practices that may be required in connection with this section are listed in Section P34.001, Alphabetical Index of 28-type Equipment, Bell System Practices, and Associated 28ASR Station Drawings.