

**BELL SYSTEM PRACTICES**  
**Teletypewriter and Data Stations**

**ADDENDUM P34.435**  
**Issue 1, October, 1962**  
**AT&TCo Standard**

## **28 AUTOMATIC SEND-RECEIVE SET ASSEMBLY**

### **1. GENERAL**

1.001 This addendum supplements Section P34.435, Issue 1.

1.002 This addendum is issued to include additional installation and adjustment information for the 28C, 28E, and 28H transmitter-distributors.

### **7. INSTALLATION OF 28C TRANSMITTER-DISTRIBUTOR**

The following change applies to Part 7 of the section:

(a) 7.19—revised

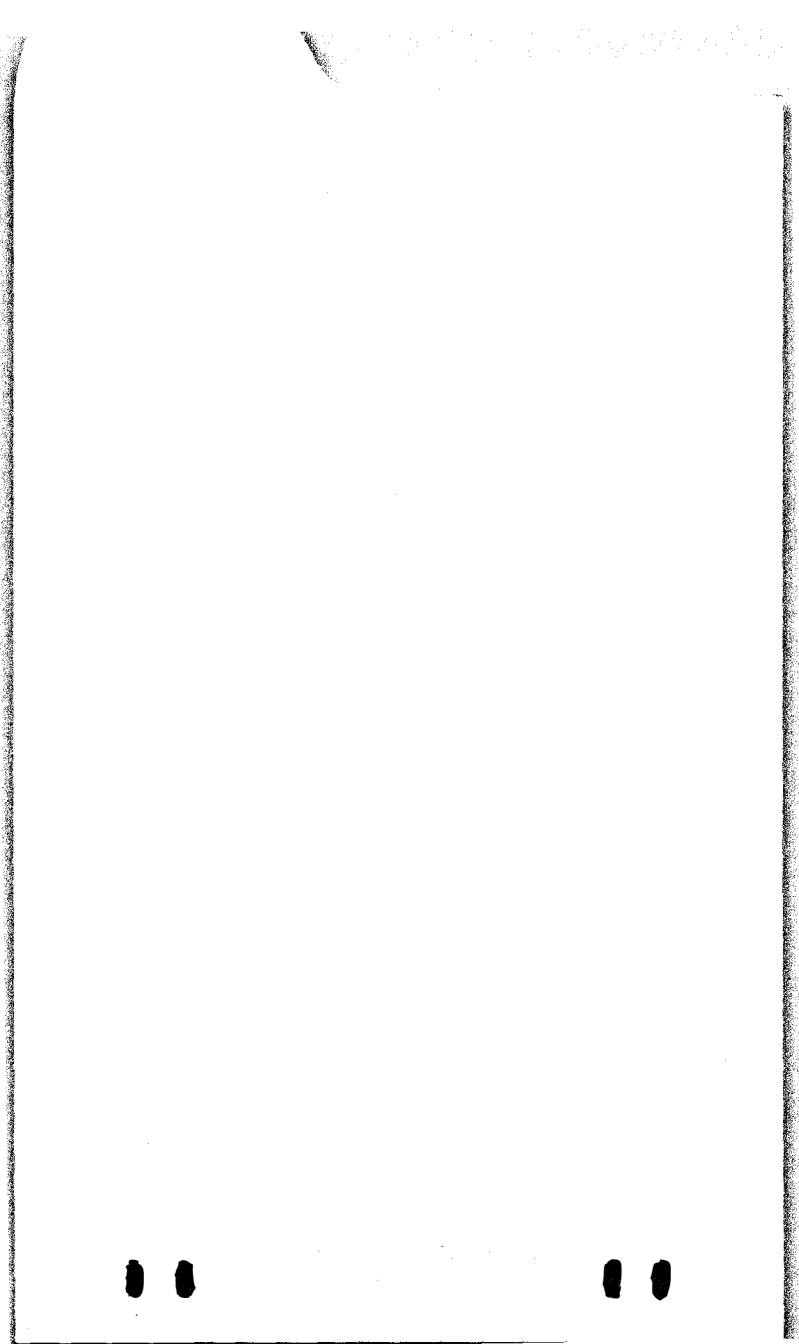
7.19 Install the parts and make the adjustments specified in 6.25, 6.26, 6.27, and 6.28.

### **9. INSTALLATION OF 28E OR 28H TRANSMITTER-DISTRIBUTOR**

The following change applies to Part 9 of the section:

(a) 9.11—revised

9.11 Make the adjustments and install the parts covered in 8.13, 8.14, and 8.15.



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**Teletypewriter and Data Stations**

**SECTION P34.435**  
**Issue 1, May, 1961**  
**AT&T Co Standard**

**28 AUTOMATIC SEND-RECEIVE SET**  
**ASSEMBLY**

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## 1. GENERAL

1.01 This section describes the method of assembling a 28 automatic send-receive set (hereafter referred to as a 28 ASR) and also includes the requirements and adjusting procedures needed for proper operation of the set.

1.02 Instructions for installing an auxiliary typing reperforator in a 28 ASR cabinet (28G teletypewriter cabinet) will be given in a separate Bell System Practice.

1.03 In this section all references to direction are made from the operator's position in front of the set.

1.04 As stated in the section entitled 28 Automatic Send-Receive Set—List of Units, the 28 ASR is not coded as a set but the various components must be ordered with regard to the features for which they are coded in order for the individual 28 ASR to provide the facilities desired.

## 2. GENERAL SEQUENCE OF INSTALLATION OF COMPONENTS

2.01 The components should be installed in the following sequence when assembling a 28 ASR.

- (1) Cabinet
- (2) Electrical Service Unit
- (3) Perforator-Transmitter-Base, Motor Unit, Gears for both the Typing Unit and the Punch Mechanism
- (4) Typing Unit
- (5) Transmitter-Distributor Unit and Base

The general arrangement of the components of the 28 ASR are shown in diagram form in Fig. 1. An illustration of a typical 28 ASR with typing unit removed (top view) is shown in Fig. 2.

**Fig. 1, 2**

**Note:** If the set is being assembled from new components, observe the following precautions:

Unpack all components with care.

Observe all caution labels and instructions.

All bags and loose parts should be kept with their associated components until used to assemble the set.

## 3. CABINET ASSEMBLY

3.01 Adjust the four feet of the cabinet using a 3/4-inch open-end wrench, until the cabinet is level. If desired, a maximum of one-inch increase in cabinet height may be obtained by this adjustment. This adjustment may be modified at the time of station installation, if necessary.

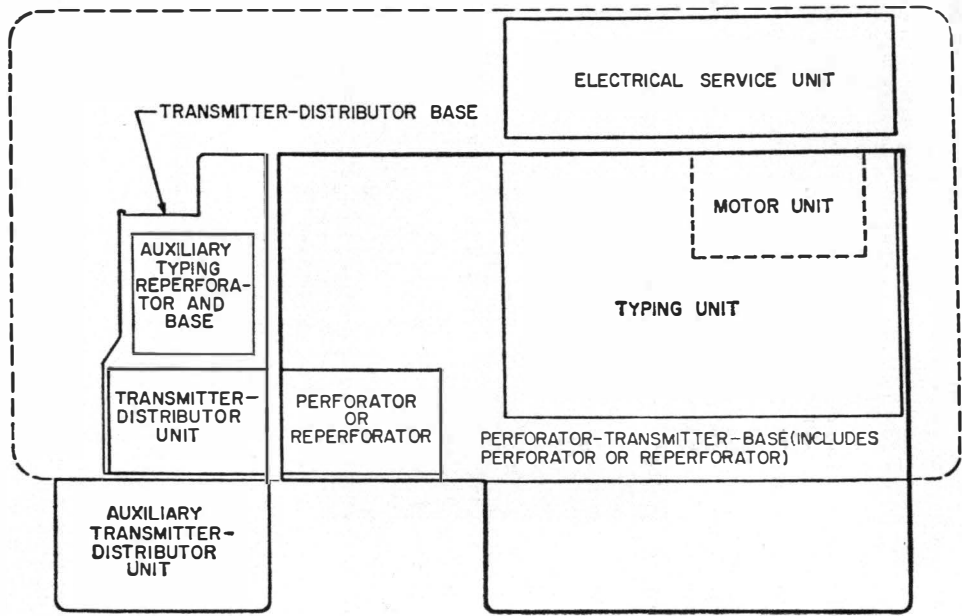


Fig. 1

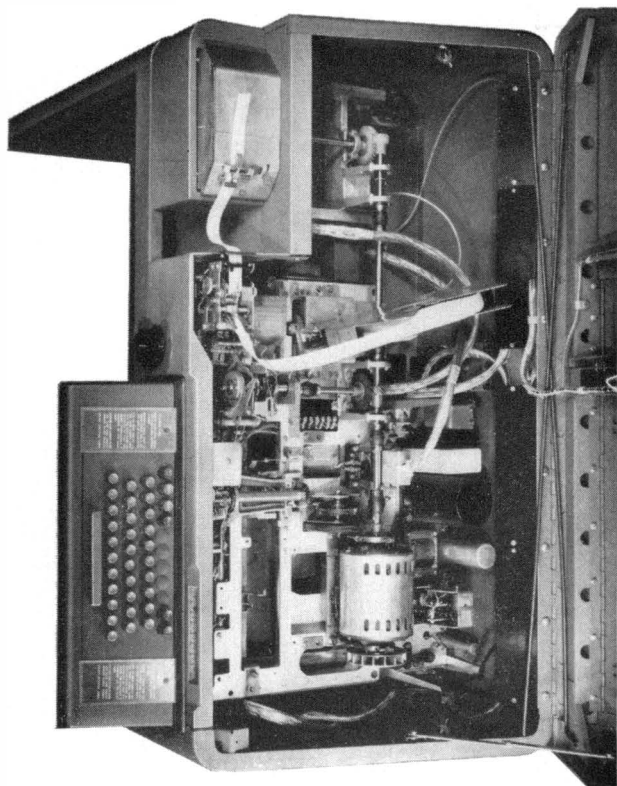


Fig. 2

### 3.02 Electrical Connections

(a) Remove the cover plate from the right rear corner of the floor of the lower compartment of the cabinet. Remove the two punchouts from the cover plate and reinstall the cover plate in the floor of the cabinet. Install clamp bushings in the two punched-out holes and feed the line and power cords through them and then up through the hole in the right rear corner of the shelf of the apparatus compartment. If additional cable thickness is required, wind the clamping point of the cord with electrical or friction tape.

(b) Make line and power connections to the cabinet terminal block in accordance with the wiring diagram for the 28 ASR cabinet being used.

**Note:** At the time of station installation, the screw located on the right rear of the cabinet above the C40 terminal should be connected to the common station ground.

3.03 Insert the shaft of the power switch under the right base angle of the cradle so that the control handle protrudes through the hole provided in the right front of the cabinet, the shaft rests on the spring mounted under the right end of the rear base rail, and the arm bracket is to the rear of but just touching the rear base rail of the cradle.

**Note:** In order to prevent transmission of vibrations to the cabinet and thereby to aid in reduction of the operating noise level, be sure that all components of the set are mounted in such a way that they do not come in direct contact with the cabinet shell.

3.04 Before making any tests, connect the set to the external line and then to power.

## 4. INSTALLATION OF ELECTRICAL SERVICE UNIT

4.01 Insert the LINE-TEST key shaft under the left side of the cradle of the cabinet so that the control handle protrudes through the hole provided in the center front of the cabinet, the shaft rests on the spring mounted on the left end of the rear base rail, and the arm bracket is to the rear of but just touching the rear base rail of the cradle.

4.02 Place the electrical service unit in the rear right corner of the cabinet behind the cradle with the legs extending upward and the nameplate facing the front. Install the two mounting studs through the holes in the electrical service unit container and into the threaded holes in the cabinet shelf.

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4.03 Connect the cabinet terminal block cables in accordance with the wiring diagram for the particular cabinet and electrical service unit being used.

4.04 Route each of the cables to be used to connect the typing unit, the perforator-transmitter-base, and the transmitter-distributor to the approximate location where it will later be connected to its respective component.

4.05 Make the necessary strap connections at the cabinet terminal block as shown in the wiring diagram for the electrical service unit.

4.06 Fasten the power switch fork to the bracket arm of the power control switch with the screws, lockwashers, and washers provided. Place this fork end over the power switch on the electrical service unit and locate the end of the power control switch shaft in the hole near the right end of the container of the electrical service unit. The right-angle handle of this switch should point to the right. Make certain that the groove in the end of the shaft engages the hole in the electrical service unit container.

4.07 Repeat 4.06 for the LINE-TEST key switch on the left side of the electrical service unit, with the exception that the control handle should point to the left.

## **5. INSTALLATION OF PERFORATOR-TRANSMITTER-BASE, MOTOR UNIT, AND TYPING UNIT**

### **Initial Assembly before Installation in Cabinet**

5.01 Place the motor unit on right rear of the perforator-transmitter-base and line up the screw holes of the motor mounting plate with the screw holes of the motor mounting strip. Secure the motor unit to the base with three of four mounting screws (with captive lockwashers). At this time omit the screw from the left rear corner of the motor mounting plate.

5.02 Connect the motor leads to terminals 1 and 2 of the terminal block on the perforator-transmitter-base just to the left of the motor unit.

5.03 Install the gears for 60, 75, or 100 wpm operation of the 28 ASR using the following procedure.

- (a) Remove the screw and lockwasher from the left end of the motor shaft. Place the motor pinion on the motor shaft with the gear end toward the motor. Secure the gear with the screw and lockwasher just removed.



(b) Remove the two screws and lockwashers from the hub on the right end of the intermediate gear shaft. Mount the typing-unit intermediate driven gear on the shaft with the flat side of the gear to the right. Secure the gear with the two screws and lockwashers just removed. Make certain the motor gear and the typing-unit intermediate driven gear are properly meshed.

(c) Slide the end of the motor coupling shaft into the coupling end of the motor gear. Slide the coupling with setscrews over the shaft with bearings and the pinion gear for the punch. Properly seat the shafts in the couplings and tighten the setscrews in both couplings. Place the gear guard over the motor pinion, matching up the screw hole in the gear guard with the rear left screw hole of the motor mounting plate. Secure the guard with the remaining motor mounting screw.

(d) Place the typing unit on the keyboard base mechanism with the front feet of the typing unit placed over the typing unit locating studs. Rotate the motor shaft by hand until the gear teeth are meshed. Secure the typing unit to the base using the four mounting screws with captive lockwashers.

### **Adjustments before Installation**

**5.04 Typing Unit to Signal Generator:** There should be a barely perceptible amount of backlash between the signal-generator gear and the typing-unit main-shaft gear at their closest point.

(a) To adjust, remove the signal generator and add or remove shims beneath the rear of the signal generator frame.

**5.05 Typing-unit Intermediate Driving Gear to Typing-unit Main-shaft Gear:** There should be a barely perceptible amount of backlash between the typing-unit main-shaft gear and the typing-unit intermediate driving gear at their closest point.

(a) To adjust, loosen the three mounting screws on the intermediate-gear bracket until the bracket is held only friction tight. Position the complete intermediate-gear assembly by utilizing the adjusting slot at the rear of the bracket. Tighten the mounting screws.

**5.06 Motor Pinion to Intermediate Driven Gear:** There should be a barely perceptible amount of backlash between the motor pinion and the intermediate driven gear at their closest point.

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(a) To adjust, loosen the adjusting and clamping screws located on the front end of the intermediate-gear bracket and raise or lower the front end of the bracket as required. Refine this adjustment and the typing-unit gear adjustment if necessary in order to obtain quiet operation. Tighten the screws.

5.07 Remove the four mounting screws that secure the typing unit and lift the typing unit off the base.

### **Installation of Units in Cabinet**

5.08 Remove the front panel and the transmitter-distributor housing including the crossbar from the cabinet in accordance with the section entitled 28 Teletypewriter Cabinet—Disassembly and Reassembly Routines.

**Note:** Before installing the perforator-transmitter-base in the cabinet, check to see whether or not the transmitter-distributor base has been equipped with rubber isolation bushings for reduction of noise level. If the transmitter-distributor base has been modified in this manner, then the perforator-transmitter-base must be raised by inserting a washer 0.095 inch thick under each corner in order to maintain proper alignment between the keyboard and the shafting of the transmitter-distributor base.

5.09 Fasten the perforator-transmitter-base to the cabinet cradle assembly with the four studs provided.

### **5.10 Typing Unit**

**Note:** Before reinstalling the typing unit, insert a piece of bond paper between the selector-magnet pole faces and the armature to soak up any lubricant which may have accumulated. When removing the paper make sure no lint or bits of paper remain on the pole faces. Reinstall the typing unit on the base in accordance with 5.03(d).

5.11 **Electrical Connection:** Insert the plug that terminates the cable coming from the left end of the electrical service unit into the receptacle connector at the middle rear of the perforator-transmitter-base. Push the plug down until it is latched in position in the receptacle.

## **6. INSTALLATION OF 28B TRANSMITTER-DISTRIBUTOR**

6.01 Mount the tape chute (supplied with the 28F teletypewriter cabinet) friction tight on the transmitter-distributor base using the two screws, two lockwashers, and two washers provided.

6.02 Loosen the base locating bracket on the cradle of the cabinet. Install and tighten the two transmitter-distributor adjusting studs in the front base rail of the cradle.

6.03 Loosen the two gear-guard mounting screws, slide the gear guard forward and lift it off the transmitter-distributor base.

6.04 Install the gear for 60, 75, or 100 wpm operation on the main shaft, and install the pinion on the shaft with bearings of the transmitter-distributor base.

6.05 Install the transmitter-distributor base on the cradle using the screw, three lockwashers, three washers, and two nuts furnished with the base. Fasten friction tight.

6.06 Install the coupling shaft and the two rubber couplings between the driving shaft of the transmitter-distributor base and the power shaft of the perforator-transmitter-base. The driving shaft and power shaft should be in line.

(a) To adjust, move the transmitter-distributor base backward or forward until the shafts are lined up. Check with a straightedge.

6.07 Remount the gear guard on the transmitter-distributor base and tighten its mounting screws.

6.08 Mount the plate with studs (part of the 28B transmitter-distributor housing) to the front of the transmitter-distributor unit using the two screws, lockwashers, and washers provided. This plate should fit tightly against the cover plate, top plate, and tape-guide plate.

6.09 Turn the three mounting bushings of the transmitter-distributor unit so that they protrude approximately  $7/32$  inch beneath the unit's main casting and place the unit on the base. Mount the two receptacles of the transmitter-distributor cable assembly on the mounting bracket on the base with the female receptacle next to the base casting. Plug the cabling from the electrical service unit into the receptacles.

6.10 The transmitter-distributor unit should be against the two locating studs on the left.

6.11 There should be a barely perceptible amount of backlash between the gears at their closest point, and the cover plate and top plate of the fixed-head unit should be parallel within  $1/32$  inch to the top of the tape-winder access door on the cabinet.

(a) To adjust, turn the three mounting bushings as required. Tighten the locknuts.

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6.12 Fasten the transmitter-distributor unit to the base using the three mounting screws, lockwashers, and flat washers. Turn the screws until they are friction tight.

6.13 Check again to be sure the unit is against the two locating studs on the left side of the base. With the pivoted sensing head against the punch, the top plate of the pivoted sensing head (tape lid open) should be flush to 0.010 inch below the bottom surface of the tape slot in the punch block.

(a) To adjust, turn each of the two base adjusting studs in the same direction an equal amount at a time until the requirement is met. Loosen the base mounting screws and check that the base is resting on all three mounting bushings. The cover and top plates should remain parallel within 1/32 inch to the top of the tape-winder access door on the cabinet.

6.14 The tape sensing pins should line up with the punch pins. Gauge by eye.

(a) To adjust, move the transmitter-distributor unit backward or forward using the play in the mounting holes.

6.15 Tighten the mounting screws for both the unit and the base.

6.16 Position the eccentric on the transmitter-distributor base so it rests against the lower right corner of the rear plate of the unit and tighten its mounting screw.

6.17 Position the base locating bracket on the cabinet cradle assembly so that both locating surfaces rest against the base. Tighten the mounting screws.

6.18 Tighten the setscrews on the rubber couplings.

6.19 The top plate of the pivoted sensing head should meet the punch squarely.

(a) To adjust, remake the top plate adjustment given in the section entitled 28B Transmitter-Distributor Unit—Requirements and Adjustments.

6.20 There should be a clearance of 3/16 inch between the tape depressor and the punch.

(a) To adjust, position the tape-depressor bracket using the play in the base mounting holes if necessary. Re-check the squareness and the alignment of the shafts. If it was necessary to loosen the base mounting screws in making this adjustment, tighten them.

6.21 The tape chute mounted on the casting of the transmitter-distributor unit should clear all moving parts on the transmitter-distributor unit and perforator at their closest point to the chute during an operating cycle.

(a) To adjust, loosen the tape chute mounting screws to friction tight and position the chute. Tighten the mounting screws.

6.22 Reinstall the crossbar, the housing that encloses the fixed head of the transmitter-distributor unit, and the front panel of the cabinet (removed in 5.08). Care should be taken in order not to damage the character counter.

6.23 Mount the auxiliary transmitter-distributor cover to the rear of the fixed tape-sensing unit using the screw, lockwasher, and flat washer provided.

6.24 Install the keyboard-tape designation plate with the screws and lockwashers provided.

6.25 Attach the keyboard control switch shaft to its knob using the setscrew in the knob. Then install the shaft with knob by inserting the shaft through the hole in the designation plate and turning and pushing it until it snaps in place.

6.26 Fasten the tape storage bin to the cabinet by means of the two studs and the thumbscrew. Plug the cord into the receptacle provided on the left side of the cabinet partition.

#### 6.27 **Tape-depressor Extension**

(a) The tape-depressor extension should be 0.040 inch to 0.080 inch from the punch block, and flush to 0.060 inch below the top of the punch block.

(b) The small tip of the tape-depressor extension should be centered in the area between the second and third punch-pin slots of the punch block.

(1) To adjust, loosen the locknut and position the depressor extension by moving it angularly and/or horizontally.

(2) If the requirement cannot be met by following the adjustment given in (1), loosen the four mounting screws securing the oil reservoir mounting bar to the unit and turn the bar until the requirement is met. Tighten the four mounting screws. Remake the oil reservoir assembly adjustment and check the tape-depressor adjustment given in the section entitled 28B Transmitter-Distributor Unit—Requirements and Adjustments.

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- (3) Loosen the two horizontal adjusting screws on the depressor extension and position the extension as required to meet (b).
- (c) With the tape following in its normal path, and with the pivoted head approximately 15 characters from the punch block, the edge of the tape must not touch the depressor.
  - (1) If necessary, refine the tape-depressor adjustment given in the section entitled 28B Transmitter-Distributor Unit—Requirements and Adjustments.
- (d) With the pivoted-transmitter unit not transmitting, and with the tape following in its normal path and flowing from the punch, the tape depressor should guide the tape to the tape beater to assure positive stuffing of the tape into the tape storage bin.
  - (1) If necessary, readjust the tape-depressor extension.

**6.28 Last-character Contact-switch Assembly:**

- (a) With the motor running and tape extending from the punch to the pivoted sensing head, and with the sensing head one character away from the punch block, there should be a clearance of 0.010 inch to 0.015 inch between the tape-deflector ear and the last-character-switch insulating button. With the pivoted sensing head against the punch block, there should be a clearance of at least 0.005 inch between the contacts.
  - (1) To adjust, loosen the contact bracket mounting screws and position the bracket as required. Tighten the screws.

**7. INSTALLATION OF 28C TRANSMITTER-DISTRIBUTOR**

- 7.01 Mount the tape chute (furnished with the 28F teletypewriter cabinet) friction tight on the transmitter-distributor base using the two screws, lockwashers, and flat washers provided.
- 7.02 Loosen the gear-guard mounting screws, slide the gear guard forward and lift it off the transmitter-distributor base.
- 7.03 Install the gear for 60, 75, or 100 wpm operation on the main shaft, and install the pinion on the shaft with bearings of the transmitter-distributor base.
- 7.04 Adjust the three mounting bushings on the transmitter-distributor unit so they protrude approximately  $7/32$  inch beneath the main casting and place the unit on the base.

Do not tighten the locknuts. There should be a barely perceptible amount of backlash between the gears at their closest point.

(a) To adjust, turn the mounting bushings as required.

7.05 Loosen the locating bracket on the cradle assembly. Place the base, together with the unit mounted on it, on the cradle assembly. Mount the connector of the cable assembly to the side mounting bracket on the base using the two screws and lockwashers furnished. Plug the cable from the electrical service unit into the connector.

7.06 Fasten the base friction tight using the three screws, lockwashers, and flat washers furnished with the cabinet.

7.07 Install the coupling shaft and the two rubber couplings between the driving shaft of the base and the power shaft of the perforator-transmitter-base. The driving shaft and the power shaft should be in line.

(a) To adjust, move the transmitter-distributor base backward or forward until the shafts are lined up. Check with a straightedge.

7.08 Remount the gear guard on the transmitter-distributor base and tighten its mounting screws.

7.09 Make certain the unit is against the two locating studs on the left side of the base.

7.10 The pivoted sensing head should meet the punch squarely.

(a) To adjust, position the base using the play in the base mounting holes. If necessary, remake the top plate adjustment given in the section entitled 28C Transmitter-Distributor Unit—Requirements and Adjustments.

7.11 There should be a clearance of 3/16 inch between the tape depressor and the punch.

(a) To adjust, position the tape depressor bracket using the play in the base mounting holes. Recheck squareness and shaft line-up. Tighten the base mounting screws.

7.12 Position the base locating bracket on the cradle assembly so that both of its locating surfaces rest against the transmitter-distributor base. Tighten the locating bracket mounting screws and the setscrews on the rubber couplings.

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7.13 With the pivoted sensing head against the punch, the top plate of the pivoted sensing head (tape lid open) should be flush to 0.010 inch below the bottom surface of the tape slot in the punch block.

(a) To adjust, use the gear mesh point as a pivot point and turn the mounting bushings of the transmitter-distributor unit as required. Recheck gear backlash.

7.14 The sensing pins of the transmitter-distributor unit should line up with the punch pins. Gauge by eye.

(a) To adjust, move the transmitter-distributor unit backward or forward as required, and then fasten the unit with the three mounting screws, lockwashers, and washers.

7.15 Position the eccentric on the transmitter-distributor base so that it rests against the rear plate of the transmitter-distributor unit, and tighten its screw.

7.16 Position the tape chute so that it clears all moving parts on the transmitter-distributor unit and perforator at their closest point to the chute during an operating cycle.

(a) To adjust, loosen the tape-chute mounting screws to friction tight and position the chute. Tighten the mounting screws.

7.17 Reinstall the crossbar and then the front panel removed in 5.08. Care should be taken in order not to damage the character counter.

7.18 Install the designation plate to the left of the keyboard using the two screws and lockwashers provided.

7.19 Install the parts and make the adjustments specified in 6.23, 6.24, 6.25, and 6.26.

## **8. INSTALLATION OF 28F OR 28G TRANSMITTER-DISTRIBUTOR**

8.01 Remove the deflector from the top of the rear plate of the transmitter-distributor unit by first removing the two screws, the two lockwashers, and the washer used to mount it. Replace the right mounting screw and lockwasher. The deflector and the remaining screw, lockwasher, and washer may be discarded.

8.02 Screw in the three bushings which serve as the mounting feet of the transmitter-distributor unit until they are tight. (No vertical adjustment of the unit is needed.)

8.03 Loosen the two gear-guard mounting screws, slide the gear guard forward, and lift it off the transmitter-distributor base.



8.04 Install the gear for 60, 75, or 100 wpm operation on the main shaft, and install the motor pinion on the shaft with bearings of the transmitter-distributor base.

8.05 Mount the transmitter-distributor unit on the transmitter-distributor base using the three screws, lockwashers, and washers provided. Tighten the mounting screws until they are friction tight.

8.06 Remove the screw from the left front corner of the cabinet cradle assembly. Place the base and unit on the cradle. Raise the corner of the cradle, being careful not to disturb any adjustments, and route the transmitter-distributor cabling under the cradle to the rear left corner of the transmitter-distributor base and mount the cable and connector to the bracket using the hardware furnished. Replace and fasten the screw removed from cradle. Plug the cabling from the electrical service unit into the connector.

8.07 Fasten the base to the cradle assembly using the three screws, lockwashers, and washer furnished. Tighten the mounting screws until they are friction tight.

8.08 Couple the transmitter-distributor shaft to the shaft of the perforator-transmitter-base. The shafts should be in line. Check with a straightedge.

(a) To adjust, use the play in the mounting holes of the transmitter-distributor base to line up the driving shaft, the coupling shaft, and the shafting of the perforator-transmitter-base. Tighten the transmitter-distributor base mounting screws and the setscrews on the rubber coupling.

8.09 The gears should be aligned and there should be a barely perceptible amount of backlash between the gears at their closest point.

(a) To adjust, move the transmitter-distributor unit laterally on the base as required. Tighten the mounting screws on the transmitter-distributor unit.

8.10 Install the plate with studs on the front of the transmitter-distributor unit using the two screws, lockwashers, and washers.

8.11 Remount the gear guard on the transmitter-distributor base and tighten its mounting screws.

8.12 Reinstall the crossbar and cover of the transmitter-distributor housing and the front panel of the teletypewriter cabinet (in that order). Take care that no damage is done to the character counter.

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8.13 In order to maintain a low noise level, there should be a minimum clearance of 1/32 inch between the transmitter-distributor unit and the cabinet, and also between the sides and top plates and the housing.

(a) To adjust, loosen the mounting screws of the housing detent spring until they are friction tight and move the spring backward or forward as required. Tighten the mounting screws. See 11.01, 11.02, and 11.03.

8.14 Install the designation plate to the left of the keyboard using the screws and lockwashers provided.

8.15 Attach the keyboard control switch shaft to its knob using the setscrew in the knob. Then install the shaft with knob by inserting the shaft through the hole in the designation plate and turning and pushing it until it snaps in place.

## **9. INSTALLATION OF 28E OR 28H TRANSMITTER-DISTRIBUTOR**

**Note:** No vertical adjustment of the transmitter-distributor unit is needed.

9.01 Loosen the two gear-guard mounting screws, slide the gear guard forward and lift it off the transmitter-distributor base.

9.02 Install the gear for 60, 75, or 100 wpm operation on the main shaft, and install the motor pinion on the shaft with bearings of the transmitter-distributor base.

9.03 Mount the transmitter-distributor unit on its base using the three mounting screws, lockwashers, and flat washers provided. Turn the screws until they are friction tight.

9.04 Place the unit and base assembly on the cabinet cradle. Route the cable assembly along the right side of the base and mount the connector with the hardware furnished. Plug the cabling from the electrical service unit into the connector.

9.05 Fasten the base to the cradle assembly using the three screws, lockwashers, and washers furnished. Turn the screws until they are friction tight.

9.06 Couple the transmitter-distributor shaft to the shaft of the perforator-transmitter-base. The driving shaft of the transmitter-distributor, the coupling shaft, and the power shaft of the perforator-transmitter-base should be in line. Check with a straightedge.

(a) To adjust, position the transmitter-distributor shaft by using the play in the transmitter-distributor base mounting holes. Tighten the transmitter-distributor base mounting screws and the coupling setscrews.

9.07 The gears should be in alignment and there should be a barely perceptible amount of backlash between the gears at their closest point.

(a) To adjust, laterally position the transmitter-distributor unit on the base. Tighten the mounting screws.

9.08 Remount the gear guard on the transmitter-distributor base and tighten its mounting screws.

9.09 Install the plate with studs on the front of the transmitter-distributor unit using the screws, lockwashers, and washers provided.

9.10 Reinstall the crossbar and the auxiliary housing of the transmitter-distributor housing, and the front panel of the teletypewriter cabinet (in that order). In doing this care should be taken not to damage the character counter.

9.11 Make the adjustments and install the parts covered in 8.11, 8.12, and 8.13.

## **10. INSTALLATION OF 4A TAPE WINDER IN A 28 TELETYPEWRITER CABINET WITH TAPE-WINDER COMPARTMENT**

10.01 The backlash and alignment between the motor pinion and the driven gear should meet the standard requirements of the Bell System Practice entitled 4A Tape Winder (Motor Driven)—Requirements and Procedures.

10.02 With the motor toward the rear, place the tape winder between the two side flanges of the tape-winder tray. Plug the cord into the receptacle in the cabinet. Slide the tape winder back until its base plate drops into place behind the front retaining flange of the tray.

## **11. MISCELLANEOUS INSTRUCTIONS**

11.01 The cabinet cradle is factory-adjusted (no load) for nominal squareness and parallelism with respect to the cabinet. Two locating eccentrics are positioned against the rear rail. The cradle may have to be repositioned after the units are installed in order to level the equipment and obtain a flush fit with respect to the cabinet.

11.02 If it is necessary to raise or lower the cradle after the units are installed, loosen the locknuts on the right front and the two rear vibration mounts, and the locknut on

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the lower end of the stud in the left vibration mount. Raise or lower the cradle by turning the studs. Tighten the locknuts while holding the studs in position.

11.03 If it is necessary to move the cradle backward or forward after the units are installed, loosen the four screws holding the front and rear rails and the two screws securing the eccentrics. Move the cradle as necessary. Tighten the four cradle-rail mounting screws. Position the eccentrics against the rear rail and tighten their mounting screws.

11.04 Secure all cords and cables where necessary to keep them away from moving parts.

11.05 Apply a thin film of grease to all newly installed gears.

11.06 Check to see that the fuses, plugs, screw terminal connections, and lamps are not loose or broken.

11.07 **CAUTION: ALL Transmitter-distributor bases equipped with rubber isolation bushings must be grounded to the cradle using a TP117366 jumper with terminals.**

11.08 Check that the power switch is in the OFF position and then connect the set to the power.

11.09 Install paper and ribbon in the typing unit.

11.10 Mount the tape guide on the tape-reel container using the nut plate, the two lockwashers, the two washers, and the two screws provided. The open end of the tape guide should be to the right. Thread the tape from the top of the roll of tape through the open end of the tape guide and into the tape entry chute.

## 12. OPERATING TESTS

12.01 Check to see that the set will operate properly by performing the following tests.

12.02 With the keyboard control knob in the keyboard (K) position and the LINE-TEST key (if present) in LINE position, manually depress each character key and determine that the proper character is printed.

12.03 With the keyboard control knob still in the K position, operate the following keys and determine that the proper functions are performed.

(a) Depress the LOC LF (local line feed) key. This shall cause the paper to feed from the typing unit at approximately three times the speed obtained when the LINE FEED and REPT (repeat) keys are held depressed.

(b) Depress the REC (keyboard lock) key. This shall cause the signal generator to be shunted, and thereby prevent signal generation. This key shall remain depressed until released by depressing the SEND key.

(c) Depress the SEND key (keyboard unlock). This shall remove the shunt from the signal generator.

(d) Depress the BREAK key and hold it depressed for about two seconds. This shall operate the electrical keyboard lock as in (b), making it necessary to depress the SEND key to resume keyboard transmission.

(e) Hold the REPT (repeat) key depressed together with any other key except the local function keys. This shall cause repeated transmission of the associated code combination.

(f) Depress the LOC CR (local carriage return) key. This shall cause the carriage to be returned to the left-hand margin.

(g) Depressing the upper-case S key shall cause the bell to ring once clearly each time the key is depressed.

(h) Depressing the Blank key alternately with any other key except the local function keys shall not lock the keyboard. Depressing the Blank key twice in succession shall operate the keyboard lock, making it necessary to depress the SEND key to resume keyboard transmission.

(i) Operate the LINE-TEST key to the TEST position. Performing the tests given in 12.02 and 12.03(a) through (h) shall give the same results, except that operation shall be on a local loop. No break in the signal line shall occur as the LINE-TEST key is switched.

12.04 With the keyboard control knob in the keyboard-tape (K-T) position and the LINE-TEST key (if available) in the LINE position, manually depress each key and determine that the correct character has been printed on the page printer and perforated in the tape. If the perforator-transmitter-base includes a **typing** perforator or reperforator, the correct character shall also be printed on the tape.

12.05 With the keyboard control knob still in the K-T position, operate the following keys and determine that the proper functions are performed.

(a) Depress the Blank and REPT (repeat) keys simultaneously. This shall cause the tape to feed out without interruption.

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(b) Depress the E and REPT keys simultaneously. This shall cause the character counter to count without missing. The end-of-line indicator lamp shall light when its preset count is reached. Depressing the CAR RET (carriage return) key shall cause the indicator of the character counter to return to zero. Depressing the E key again, shall cause the counter to count one character.

(c) Depress the keys indicated in 12.03(b) through (i). The same functions shall be performed as indicated in those tests.

(d) The transmitter-distributor shall be operative. Check the accuracy of transmission by using a prepared tape and monitoring the transmission on the typing unit.

(e) Operate the LINE-TEST key to the TEST position. Performing the tests given in (a) through (d) shall give the same results except that operation shall be on a local loop.

12.06 With the keyboard control knob in the tape (T) position and the LINE-TEST key (if available) in the LINE position, depress the Blank and REPT keys simultaneously. This shall cause the tape to be fed out of the punch at high speed without interruption until the depressed keys are released.

12.07 Perform the test covered in 12.05(b).

12.08 Operate the LINE-TEST key to the TEST position. Performing the tests covered in 12.06 and 12.07 shall give the same results.

12.09 The cabinet lighting is controlled by a 3-position switch located inside the top of the cover just to the left of the top right door. With the set connected to power, the power switch in the ON position, and the light switch in the OFF position, all lights shall be off; with the light switch in the NORMAL ON position, all lights shall be on except for the end-of-line indicator lamp; with the light switch in the MAINTENANCE ON position, all lights shall be on continuously except for the end-of-line indicator lamp. With the set connected to power, the power switch in the OFF position, and the light switch in the MAINTENANCE ON position, all lights shall be on except for the end-of-line indicator lamp.

### **13. REFERENCE BELL SYSTEM PRACTICES**

13.01 All of the Bell System Practices referred to in this section for supplementary information are listed in Section P34.001, Alphabetical Index of 28-type Equipment.

13.02 The following Bell System Practices also contain information that may be useful in connection with this section.

<u>Subject</u>	<u>Section</u>
Teletypewriter — General Requirements .....	P30.012
Teletypewriter Tools and Maintenance Supplies.....	P30.301
Preparation of Teletypewriter Apparatus for Installation .....	P33.014

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