

BELL SYSTEM PRACTICES
Teletypewriter and Data Stations

SECTION P34.104
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AT&T Co Standard

28 TYPING REPERFORATOR AND REPERFORATOR-TRANSMITTER SET LIST OF UNITS AND AUXILIARY FEATURES

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1. GENERAL

1.01 This section gives a brief description and the code designations of 28 reperforator-transmitter sets and 28 typing reperforators. It also lists available modification kits which furnish auxiliary features for this apparatus. The modification kits included in the applicable parts bulletins have not been listed in this section.

1.02 This section is reissued to add descriptions and codes of new apparatus, to list the auxiliary features and change the title of the section accordingly, and to delete all references to cabinets, tables, and covers. (The list of units and auxiliary features for all 28 cabinets, tables, covers, and housings, including the Bell System number suffixes for color and type of finish of these items, is being incorporated in BSP Section P34.105.) Changes are indicated by marginal arrows.

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2. REPERFORATOR-TRANSMITTER SET

GENERAL

2.01 The reperforator-transmitter set consists of a reperforator-transmitter unit and a reperforator-transmitter stand. The reperforator-transmitter unit is basically made up of two parts, the receiving element and the sending element, which are mounted on a base plate formed by a casting measuring 8-1/2 inches wide, 2-1/2 inches high, and 20 inches deep. The motor, drive shaft, and gear assembly which are a part of the unit are mounted on the underside of the casting, together with the power-supply plug, motor terminal block, and switch mechanism. Two tape-guide roller brackets are mounted on top of the casting. Four legs are attached to the casting to give clearance for the suspended parts when it is desired to place the reperforator-transmitter unit on a table. Recessed handgrips for lifting are provided in the front and rear of the casting. A storage feature between the receiving element and the sending element is furnished by a tape storage bin in the 28A reperforator-transmitter stand. This stand also contains a supply reel for new paper tape and a tape winder for used tape, the latter being driven by a belt from the gear assembly.

Figs. 1, 2

2.02 Existing 28 reperforator-transmitter sets are made up as follows:

Reperforator- Transmitter Set	Consists of	
	Reperforator- Transmitter Unit	Reperforator- Transmitter Stand
28A	28A	28A
28B	28B	28A
28C	28C	28A
28D	28D	28A

2.03 The entire reperforator-transmitter set measures 36 inches high, 8-1/2 inches wide, by 20 inches deep, and weighs approximately 85 pounds.

2.04 The 28 reperforator-transmitter sets are mainly intended for use in teletypewriter switching systems and their initial application was in the 82B1 teletypewriter switching system. The reperforator-transmitters formed the heart of this

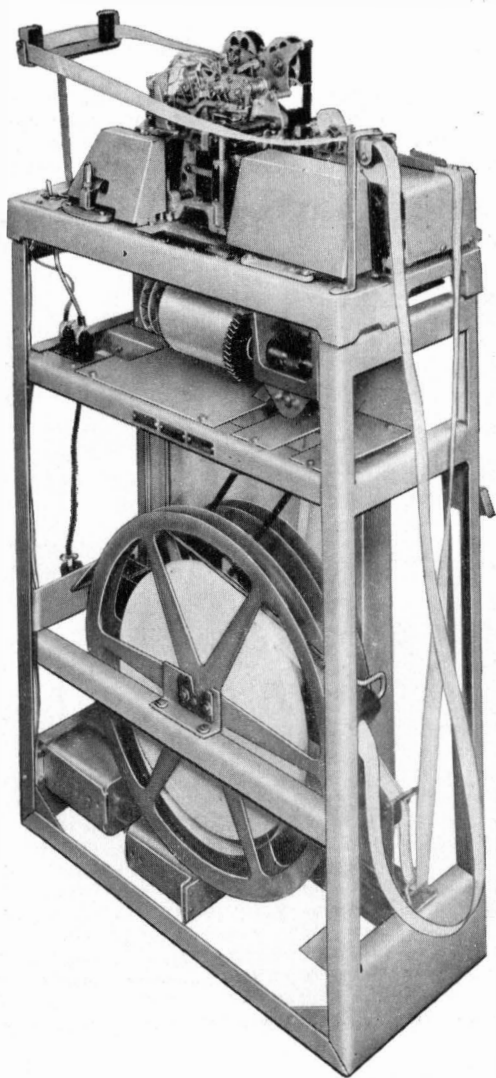


Fig. 1—28A Reperforator-Transmitter Set—Left Side

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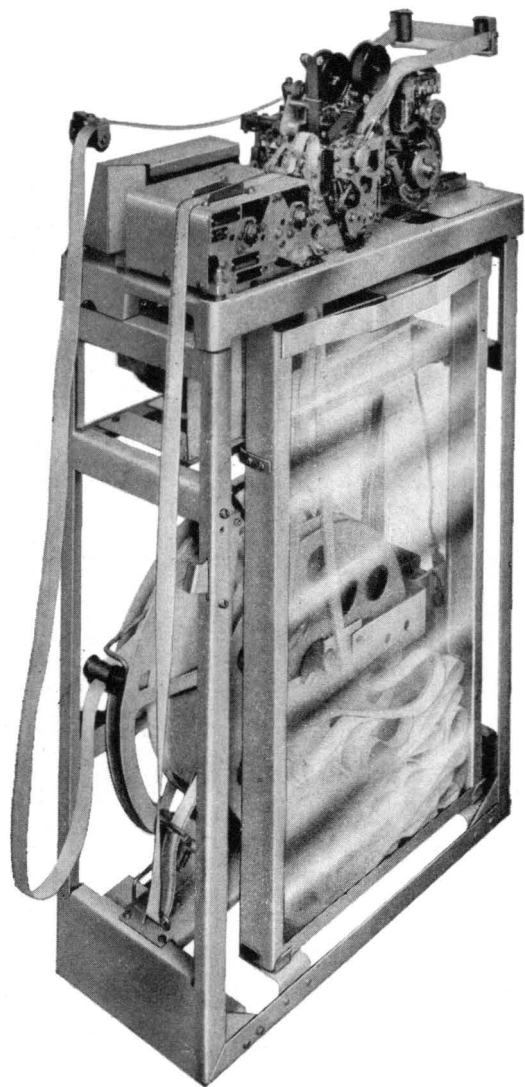


Fig. 2—28A Reperforator-Transmitter Set—Right Side

latter system providing storage devices on the incoming paths and outgoing paths at the message center. Also, together with relay circuitry, the reperforator-transmitter accomplished the necessary switching between lines.

2.05 The receiving element of the reperforator-transmitter unit consists of a reperforator which upon receiving the teletypewriter signals from any source causes a paper tape to be punched in accordance with the teletypewriter code of the signals received. Some receiving elements will also type the incoming message on the tape.

2.06 The sending element of the reperforator-transmitter unit is a transmitter-distributor which senses or reads the punched tape and sends the signal to the line. The sensing portion is independent of the actual distributor which sends the signal, and each can be started and stopped separately from external circuits. The sensing portion is able to read the last character punched by climbing up the tape until it is stopped against the punch block by the last-character switch. **Fig. 3**

REPERFORATOR-TRANSMITTER UNITS

2.07 The 28A, 28B, and 28C reperforator-transmitter units function in general in the 82B1 teletypewriter switching system as follows and are suitable for similar use.

(a) The **28A reperforator-transmitter unit** serves as the storage device on the incoming paths. It is arranged to receive at any one of the line speeds 60, 75, or 100 words per minute and is equipped with a gearshift so that it may be changed readily to receive at any one of these speeds; **however, the motor should be stopped before changing speed.** The unit prints on the tape. It is arranged to send (crossoffice) at a fixed speed of 200 words per minute.

Figs. 1, 2

(b) The **28B reperforator-transmitter unit** is used as part of the director circuit in the 82B1 teletypewriter switching system. It is arranged to receive and send (crossoffice) at a fixed speed of 200 words per minute, and does not print on the perforated tape.

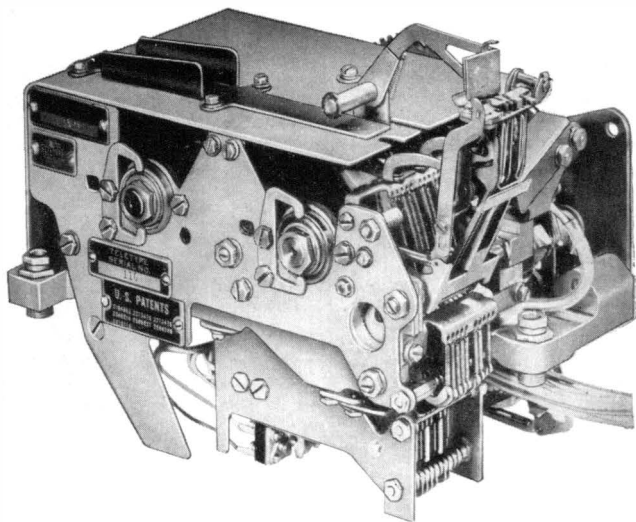


Fig. 3—Transmitter-Distributor Unit of the 28C Reperforator-Transmitter Set

(c) The **28C reperforator-transmitter unit** is used on the outgoing paths from the message center of the 82B1 teletypewriter switching system. This unit is arranged to receive (crossoffice) at a fixed speed of 200 words per minute and does not print on the tape. The sending element is arranged to transmit at any one of the line speeds of 60, 75, or 100 words per minute and is equipped with a gearshift for changing speed. **The motor should be stopped before changing speed.**

Fig. 3

2.08 The **28D reperforator-transmitter unit** will have its initial application in the 83B2 selective calling system. It combines the typing reperforator of the 28A reperforator-transmitter unit and the transmitter-distributor of the 28C reperforator-transmitter unit allowing it both to receive and to transmit at speeds equivalent to 60, 75, and 100 words per minute. Both the receiving and transmitting elements are equipped with gearshifts to permit changing the speed readily. **The motor should be stopped before changing speed.**

REPERFORATOR-TRANSMITTER STAND

2.09 The **28A reperforator-transmitter stand** is used to support the reperforator-transmitter unit and is a steel framework with four uprights made rigid by the use of cross-pieces. The stand measures about 26-1/4 inches high, 8 inches wide, and 20 inches deep. Locating pins for the reperforator-transmitter unit are provided on the upper crosspieces of the stand. Such stands will ordinarily be slid into cabinets, so a latch is provided on one front leg to hold the stand in place in the cabinet. This stand is finished in gray enamel only. Fig. 4 shows an installation of reperforator-transmitter sets in a switching center. **Fig. 4**

2.10 The stand holds a supply-reel assembly capable of holding 3000 feet of new tape. This reel rests on two V-block bearings to permit convenient removal. The supply reel may be taken apart for replacement of the tape roll. The core of the tape retainer turns on ball bearings independently of the tape-retainer assembly. A tape-supply arm rides on the tape roll to retard its motion and prevent overrunning and tangling. This arm also serves to operate low-tape-supply contacts connected by separable connectors to leads from the reperforator-transmitter units. See wiring diagram in BSP Section P34.306. **Fig. 1**

2.11 The stand also has a tape winder capable of holding 1000 feet of chadless tape and of winding tape coming from the transmitter-distributor at a rate equivalent to 200 words per minute. This winder is turned by gearing operated by a belt from the main driving mechanism. The tape coming down from the transmitter-distributor is passed through a loop in the end of a tape arm and through a spring-operated tape guide before being fastened in the slotted core of the tape winder. The tape arm throws a clutch on the winder in or out as required to feed the tape to the winder. The tape guide flattens the chad in the tape and applies a constant tension to the tape to insure compact winding. **Fig. 2**

2.12 The stand also mounts the two motor power-factor-correction capacitors under the tape-winder assembly. One capacitor is fastened to the bottom of the winder and the other to the framework. The cable from these capacitors runs up one of the frame uprights to a plug which will mate with a receptacle-ended lead from the reperforator-transmitter unit.

2.13 A tape storage bin fits into the stand to store perforated tape for subsequent transmission. The bin is made of two parallel safety-glass walls framed with wood and metal. The upper part of the frame forms the handle. The bottom

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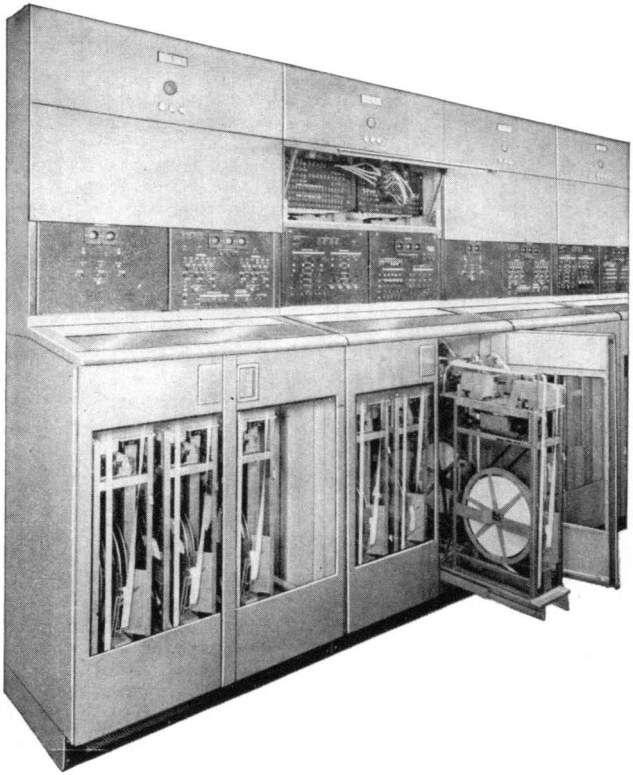


Fig. 4—Reperforator-Transmitter Sets in a Switching Center

part of the bin is held in the stand by two brackets, and the top is secured by spring clip catches to permit easy removal. A motor-driven tape stuffer is provided. **Fig. 2**

2.14 A 28A tape splicer may be hooked onto the end of the stand for splicing a nearly exhausted tape supply to a fresh supply, in order to assure a continuous tape record. For information on the 28A tape splicer see BSP Sections P34.617 and P34.312.

ELECTRICAL CHARACTERISTICS OF THE REPERFORATOR-TRANSMITTER SET

2.15 In order that the 28A, 28B, 28C, and 28D reperforator-transmitter sets may serve their functions as integral parts of the electrical circuitry of teletypewriter switching systems, they contain various electrical elements which are used in the performance of the switching operations.

Motor Drive

2.16 The motor drive is provided by an ac synchronous motor with its power-factor corrector.

Receiving Element

2.17 The received signals operate a selecting magnet which causes mechanical devices to perforate tape in accordance with the signals, and, in the case of the 28A and 28D units to print the corresponding characters on the tape.

2.18 Since in addition it is necessary to read the incoming characters for other functions in the switching circuitry, the receiving element is equipped with six contacts. Five of these contacts are set up in accordance with the received code combination, and the sixth contact, also known as the start-stop or auxiliary contact, opens at the beginning of the start element and closes after the five reading contacts come to rest.

2.19 A universal contact is supplied in the reperforator function with an alarm feature in associated equipment in order to show that the receiving mechanism is in operation when it ought to be.

2.20 A tape-supply contact is provided to operate when the supply of unperforated tape is running low.

Sending Element

2.21 The sending element of the reperforator-transmitter is made up of two parts—the sensing portion whose function is to read the perforated tape when the proper time comes, and the distributor whose function is to transmit the teletypewriter signals sequentially. Each of these parts is equipped with a clutch which is tripped off electrically by a clutch-release magnet.

2.22 The sensing portion of the transmitter-distributor has a set of five contacts which close in accordance with the perforations in the tape. A transmitter auxiliary contact is supplied which closes when the sensing contacts come to rest. In some parts of the usual switching operations, associated

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equipment uses characters read in the sensing head to determine the switching that is to take place. Some of these characters are subsequently sent out by associated equipment. At other times the characters sensed are sent out directly and a contact is supplied to trip off the distributor magnet under this condition. A transmitter-stop contact is used in indicating when the sensing head is away from the punch block, that is, when there is punched tape available in the unit. An additional contact is used in indicating when tape is torn or otherwise out of the sensing head.

2.23 The distributor portion of the transmitter-distributor has five contacts so arranged that when the distributor clutch magnet is tripped, a stop contact is opened and the five sending contacts are closed in sequence to transmit the typewriter elements sequentially from either the associated circuitry or the sensing head. There are two distributor auxiliary contacts. Both of them are closed during the transmission of the character and are timed to permit them to be used to set off the switching circuitry.

3. TYPING REPERFORATOR

3.01 The 28 receiving-only typing reperforator combines a tape reperforator and a tape printer and provides means for receiving telegraph messages and presenting them on standard width (11/16 inch) tape on which both the printed characters and the corresponding chadless code perforations are automatically recorded in the same general operation. The printed characters simplify the tape-handling procedure by eliminating the necessity of reading the code perforations. The complete typing reperforator consists of a typing-reperforator unit, a typing-reperforator base (receiving-only), a motor, an electrical service unit, cords, plugs, connectors, and wiring, and means for mounting the assembly. Single typing-reperforator units with their bases will ordinarily be mounted on a typing-reperforator table under a typing-reperforator cover. Where as many as four or six typing-reperforator units are required, cabinets will ordinarily be used to house them. A gearshift mechanism in the typing-reperforator base provides for operation at various speeds. **The motor should be stopped before shifting speeds.** Similar typing-reperforator units are a part of the 28D and 28E perforator-transmitter-bases.

Note: A sending and receiving typing-reperforator base is contemplated for the future but is not available at this writing.

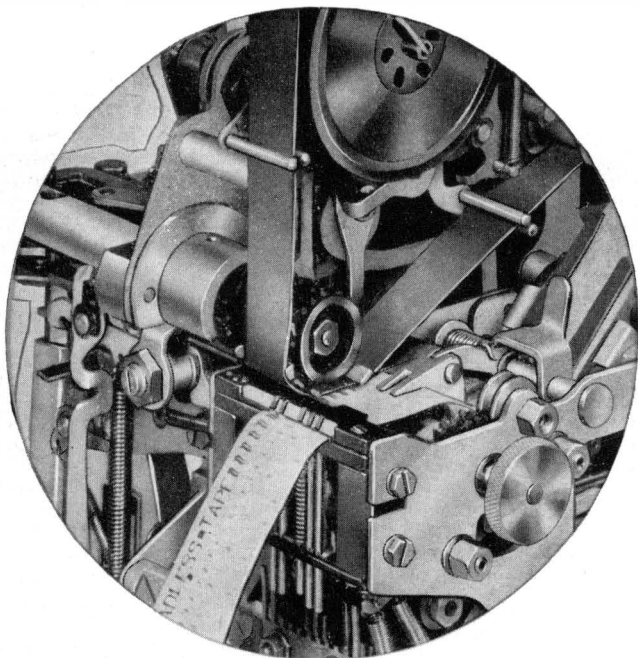


Fig. 5—28A Typing-Reperforator Unit

TYPING-REPERFORATOR UNITS

3.02 The **28A typing-reperforator unit** was first used with the 82B1 switching system. This unit is equipped with a selecting mechanism, a tape punch and feeding mechanism, and a typewheel which prints the characters in the area of the No. 1 and No. 2 code punch holes six spaces behind the corresponding perforated character. A small function box area is provided with a capacity of four function bars. The unit is equipped with function bars for FIGS, LTRS, and bell on upper-case S. The function bar for the bell on upper-case S has a contact associated with it which operates a signal bell included as part of the electrical service unit. A manually operated LTRS feedout is provided, operable by a lever-type.

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handle adjacent to the selector mechanism. The characters on the typewheel are in accordance with type arrangement A except for the 0 (zero) which has a diagonal through it (ϕ), and the inclusion of printing on functions. The wiring of the unit is terminated on two terminal blocks on the base. Connection is then made by cord and plug or connector to the electrical service unit or to the terminal block of a cabinet. **Fig. 5**

3.03 The **28B typing-reperforator unit** is the same as the 28A except that the tape-feedout mechanism can be operated by a magnet as well as manually by the lever.

3.04 The **28C typing-reperforator unit** is the same as the 28A typing-reperforator unit except that type arrangement C is used, it has an unshift-on-space feature, and the wiring is brought out to a 36-point subminiature electrical connector.

3.05 The **28D typing-reperforator unit** is the same as the 28B typing-reperforator unit except that type arrangement C is used, it has an unshift-on-space feature, and the wiring is brought out to a 36-point subminiature electrical connector.

3.06 The **28E typing-reperforator unit** is the same as the 28A typing-reperforator unit except that type arrangement D is used, it has an unshift-on-space feature, and the wiring is brought out to a 36-point subminiature electrical connector.

3.07 The **28F typing-reperforator unit** is the same as the 28B typing-reperforator unit except that type arrangement D is used, it has an unshift-on-space feature, and the wiring is brought out to a 36-point subminiature electrical connector.

TYPING-REPERFORATOR BASE

3.08 The **28A typing-reperforator base** is used to mount a 28A or 28B typing-reperforator unit, and had its initial application in the 82B1 teletypewriter switching system. It is a receiving-only base equipped with a 3-speed gearshift mechanism arranged to provide for operation of a 28 typing-reperforator unit at 60, 75, or 100 words per minute. **The motor should be stopped when changing speed.** Power is transferred from the gearshift mechanism to the typing-reperforator unit by means of a flexible timing belt milled to mate with toothed drive wheels. The base includes a tape-supply reel with which two pairs of tape-out contacts function. The reel holds 1000 feet of standard perforator tape. When the tape supply nears exhaus-

tion, one pair of contacts lights an indicating lamp on the base and the other pair of contacts closes a circuit running to a bell on the electrical service unit. The power cord is connected to the base by means of a 3-conductor twist-lock connector mounted on a bracket at the rear of the base. A 4-ampere time-delay fuse holder and fuse are mounted on this bracket. A multiple terminal connector for the wiring system also mounts here.

3.09 The **28B typing-reperforator base** is arranged to mount three 28 typing- or nontyping-reperforator units and a 28A motor, and is designed to be mounted in a standard universal cabinet or a 28-type universal cabinet. It is equipped with a pinion and a mating gear which drive a cross-shaft at a fixed operating speed of 368 opm. Sprocket gears 28K, 28L, or 28M used to operate the typing reperforators independently of each other at speeds equivalent to 60, 75, or 100 words per minute, respectively, must be ordered separately. Three tape holders and three tape-supply reels are mounted on the rear of the base. Tape-out contacts are provided for each tape-supply reel. An ON-OFF power switch is located on the left side of the front of the base. The wiring is terminated at a 14-point connector and a 4-point terminal board.

3.10 The **28C typing-reperforator base** is the base used to install a 28C, 28D, 28E or 28F typing-reperforator unit as an auxiliary in a 28G teletypewriter cabinet. The base mounts on three posts, two of which are fastened to the rear base rail of the cradle assembly of the cabinet, and the third to the transmitter-distributor base. At the rear of this base are a tape holder and a tape reel; at the right front is a tubular tape chute. This base is equipped with nylon gears for the motor and countershaft, but the sprocket gears (28S, 28T, or 28U) used to provide a single operating speed equivalent to 60, 75, or 100 words per minute must be ordered separately. A cable with a 16-terminal connector and a cable with a 36-terminal plug are part of the base and are used to connect it to the electrical service unit and the typing-reperforator unit.

3.11 The **28D typing-reperforator base** may be used to mount a 28C, 28D, 28E, or 28F typing-reperforator unit. It is the same as the 28A typing-reperforator base except that the wiring used to connect it to the typing-reperforator unit is terminated in a 36-point connector.

4. ELECTRICAL SERVICE UNIT

4.01 The **28D electrical service unit** was designed for use with the 28 typing reperforator. It is equipped with a line-shunt relay, a line-relay mounting assembly, a rectifier

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assembly, and an alarm-bell assembly which includes an interrupter that will cause the bell to ring intermittently. The power cord is connected to a terminal strip located under the line-shunt relay. A cable is connected to a terminal strip under the other end of the unit's frame. The outer end of this cable is equipped with a connector for attachment to the typing-reperforator base. A special feature of the 28D electrical service unit is that the line-shunt relay is moved over to provide space for mounting the alarm-bell assembly. This is accomplished by the use of a new shunt-relay mounting plate.

4.02 The **28D-1 electrical service unit** was designed to be used with a 28B typing-reperforator unit mounted on a 28A typing-reperforator base in the station control circuit of the 81D1 switching system. It is the same as the 28D electrical service unit except that its polarity is reversed.

4.03 The **28K electrical service unit** was designed for use with the 28 typing reperforators in the 100-word per minute 81D1 system. It is the same as the 28D electrical service unit except the line-relay mounting and the rectifier are omitted.

5. MOTORS

5.01 **For Typing Reperforators:** The **28A motor unit** described in Section P34.101 is used with the 28 typing reperforators. It is not a part of the typing reperforator and must be ordered separately.

5.02 **For Reperforator-Transmitters:** A special motor of the 28C motor unit design, modified as necessary to mount it upside down under the reperforator-transmitter casting, is a part of the 28 reperforator-transmitter unit. The 28C motor unit is described in Section P34.102.

6. AUXILIARY FEATURES

6.01 Auxiliary Features for 28 Typing Reperforators

<u>Mod. Kit</u>	<u>Description</u>	<u>Spec.</u>
TP162276	Replaces the TP156226 hub with a hub of improved design	5914S
TP162369	Provides improved main shaft, function clutch bearings, spring washer, and hub	5911S
TP162375	Provides an unshift function on receipt of a space code combination	5909S

6.02 Auxiliary Features for 28 Reperforator-Transmitter Set

<u>Mod. Kit</u>	<u>Description</u>	<u>Spec.</u>
TP162367	Provides improved main shaft, function clutch bearings, and spring washer for 28B and 28C reperforator-transmitter units	5911S
TP162369	Provides improved main shaft, function clutch bearings, spring washer, and hub for 28A and 28D reperforator-transmitter units	5911S

7. REFERENCE BELL SYSTEM PRACTICES

7.01 In addition to the Bell System Practices listed below, most of the P34 series of practices will prove useful in connection with Section P34.104.

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28A Tape Splicer—Wiring Diagram	P34.312
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