

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

**SECTION P34.106**  
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## 28 MOTOR UNITS AND SETS OF GEARS

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#### 1. GENERAL

1.01 This section gives a brief description and the code designation of the 28 motor units and the 28 sets of gears used to drive the 28 line of Teletype equipment.

1.02 Some of the information contained in this section is also covered in P34.101, P34.102, and P34.104, but will be deleted from those sections when they are next reissued.

## 2. MOTOR UNITS

2.01 **28A Motor Unit:** This unit is a complete assembly consisting of a 1/20 horsepower synchronous motor and a suitable mounting arrangement. It is used to drive a 28 KSR, 28 RO, a 28 self-contained transmitter-distributor set using a 28E, 28F, 28H, or 28G transmitter-distributor unit, and a 28 typing or nontyping reperforator unit. The motor consists of a 2-pole wound stator with a main running winding and a starting winding, a squirrel-cage type ball-bearing rotor, and a fan. The starting winding is in series with an electrolytic capacitor and with the current-operated starting relay contacts. The initial starting current causes the relay to pull up and its contacts close the starting winding circuit. As the motor gains speed, the flow of current through the motor and the relay coil decreases. When a predetermined current value is reached, the relay armature is released, the relay contacts are opened, and the starting winding is removed from the circuit. A thermal cutout switch fastened to the motor mounting bracket is in series with both the starting and the running windings. If excessive current is drawn by the motor, the thermal cutout switch will open the circuit in order to prevent it from overheating or damaging the motor. The switch may be reset manually after the motor has been allowed to cool. Additional information on the 28A motor unit is given in tabular form in 2.07.

2.02 **28B Motor Unit:** This unit is a complete assembly consisting of a 1/20 horsepower universal series motor and a suitable mounting arrangement. It is primarily intended to be used to drive a 28 teletypewriter where the available power is 60-cycle nonregulated frequency ac, but can also be used where the available power is dc. When this unit is operated on dc power, a capacitor resistor assembly is required and should be mounted on the associated electrical service unit. This motor unit is equipped with a centrifugal-type governor and all the necessary components for governing and spark protection circuits. A ground strap is provided between the motor frame and one of the motor unit mounting screws. See 2.07.

2.03 **28C Motor Unit:** This unit is a complete assembly consisting of a 1/12 horsepower synchronous motor and a suitable mounting arrangement. It is primarily intended to be used to drive a 28 ASR. It is similar to the 28A motor unit except

it has increased horsepower, a larger starting capacitor, and a heavier duty thermal cutout switch and starting relay. See 2.07.

**Note:** The synchronous motor which is a part of the 28-type reperforator-transmitter units is the same as the 28C motor unit except its end shields are turned 180 degrees so that when the motor is mounted its oil holes are upward.

2.04 **28D Motor Unit:** This unit is a complete assembly consisting of a 1/15 horsepower universal series motor and a suitable mounting arrangement. It is primarily intended to be used to drive a 28 ASR where the available power is 50-60-cycle nonregulated frequency ac, but may be operated on dc or 25-cycle ac by using a suitable capacitor resistor assembly mounted on the associated electrical service unit. The motor is equipped with a centrifugal-type governor and all the necessary components for governing and spark protection circuits. It is also equipped with radio frequency suppressors and has a ground strap between the motor housing and the mounting bracket. See 2.07.

**Note:** The series motor which is a part of 28-type reperforator-transmitter units is the same as the 28D motor unit except its end shields are turned 180 degrees so that when the motor is mounted its oil holes are upward and the radio frequency suppressors are not included.

2.05 **28E Motor Unit:** This unit is a complete assembly consisting of a 1/15 horsepower series motor and a suitable mounting arrangement. It operates on 48-volt dc only and its initial application is to drive a 28 KSR in the 6A switchboard center. It is equipped with a radio frequency suppression filter network and with a centrifugal-type governor with spark protection. See 2.07.

2.06 **28LA Motor Unit:** This unit is the same as the 28A motor unit except that the capacitor is mounted on the side of the motor instead of beneath it. See 2.07.

## 2.07 28 Motor Units

Bell System Code	28A and 28LA	28B			28C	28D		28E
Type	Synchronous	Universal Series			Synchronous	Universal Series		Series
Input Voltage	115V $\pm$ 10% ac	115V $\pm$ 10% ac/dc			115V $\pm$ 10% ac	115V $\pm$ 10% ac		48V dc
Phase	Single	Single or dc			Single	Single		—
Frequency	60 cycles $\pm$ 0.75%	50-60 cycles or dc			60 cycles $\pm$ 0.75%	50-60 cycles ac		—
Input Current (Amps)		Cycles				Cycles		
		50	60	DC		50	60	
		Starting	2.7	1.9		1.8	13.8	
Running	1.85	1.4	1.2	0.9	2.6	2.10	2.1	2.75
Power Factor Full Load	30%	74%	71%	—	45%	81%	79%	—
Watts Input Full Load	65	115	95	105	150	200	190	130
Start Capacitor Rating	43 mf min				170 mf min			—
Target		4, 6, & 35 spot				4, 6, & 35 spot		4, 6, & 35 spot
Horsepower	1/20	1/20			1/12	1/15		1/15
Speed	3600 rpm	3600 rpm			3600 rpm	3600 rpm		3600 rpm
Rotation	Counterclockwise viewed from fan end.	Counterclockwise viewed from commutator end.			Counterclockwise viewed from fan end.	Counterclockwise viewed from fan end.		Counterclockwise viewed from fan end.

### 3. SETS OF GEARS

3.01 **General:** The sets of gears listed below, together with the intermediate gear mechanisms which are a part of the coded apparatus, furnish all the gearing needed for the various units of the 28 line of equipment designed to be operated at a single speed setting of 60, 75, or 100 words per minute. The sets of gears are not considered a part of the coded apparatus they drive, but are coded separately, and therefore must be ordered separately.

3.02 Certain items of the 28 line of equipment are provided with a 3-speed gearshift mechanism to permit operation at 60, 75, or 100 words per minute, and in these cases the gears are a part of the coded apparatus and are not coded separately. The 28A and 28D typing reperforator bases, the 28LA tape teletypewriter base, and all of the reperforator-transmitter units designed to receive and/or transmit at 60, 75, or 100 words per minute have a gearshift mechanism. The gears are also a part of those reperforator-transmitter units designed to receive and transmit at 200 words per minute.

3.03 **28 KSR and 28 RO:** The 28A, 28B, and 28C sets of gears for use with the 28 keyboard send-receive and receiving-only teletypewriters are made with a steel pinion and a fiber driven gear. The 28A-1, 28B-1, and 28C-1 sets of gears are made of nylon and are available for use where quiet operation is desired.

<u>Bell System Codes for Sets of Gears</u>	<u>Teletype No.</u>	<u>Speed (WPM)</u>
28A	TP151060	60
28A-1	TP161293	60
28B	TP151075	75
28B-1	TP161294	75
28C	TP151100	100
28C-1	TP161295	100

3.04 **28 ASR:** The sets of gears for the 28 ASR drive the typing unit, the transmitter-distributor unit, and the punch mechanism of the perforator-transmitter-base. Originally the gears for the 28 ASR were made with a steel pinion and fiber driven gears. They were coded as the 28D, 28E, and 28F sets of gears and have now been replaced by the 28D-1, 28E-1, and 28F-1 sets of gears respectively, which are made of nylon.

<u>Bell System Codes for Sets of Gears</u>	<u>Teletype No.</u>	<u>Speed (WPM)</u>
28D-1	TP164583	60
28E-1	TP164584	75
28F-1	TP164585	100

(a) **28D and 28F Perforator-Transmitter-Base:** When the perforator-transmitter-base of the 28 ASR is equipped with a typing or a nontyping reperforator, additional gears are needed to drive the selector mechanism. The 28N, 28P, and 28R sets of gears formerly used with these bases, have been replaced by the following sets of gears made of nylon.

<u>Bell System Codes for Sets of Gears</u>	<u>Teletype No.</u>	<u>Speed (WPM)</u>
28N-1	TP163023	60
28P-1	TP163024	75
28R-1	TP163025	100

(b) **28LA Perforator-Transmitter-Base:** When a 28 ASR is equipped with this perforator-transmitter-base which has a multimagnet reperforator, the following set of gears is required.

<u>Bell System Codes for Sets of Gears</u>	<u>Teletype No.</u>	<u>Speed (WPM)</u>
28I.B	TP144993	100

**Note:** In order to connect the 28LA perforator-transmitter-base to the transmitter-distributor base, a TP163598 set of gears is required.

(c) **28H Perforator-Transmitter-Base:** When a 28 ASR is equipped with a 28H perforator-transmitter-base, no additional gears are required since the perforator-transmitter-base has a 2-speed gearshift.

3.05 **28 Self-contained Transmitter-Distributor Sets:** The 28G and 28H transmitter-distributor mounting and cover assemblies designed to mount a single transmitter-distributor unit and the 28J and 28K transmitter-distributor bases designed to mount three transmitter-distributor units each, use the following gears:

<u>Bell System Codes for Sets of Gears</u>	<u>Teletype No.</u>	<u>Speed (WPM)</u>
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**28G and 28H Transmitter-Distributor Mounting and Cover Assemblies**

28G	TP156658	60
28H	TP156728	75
28J	TP156659	100

**28J Transmitter-Distributor Base**

28W	TP173098	60
28Y	TP173101	75
28AA	TP173104	100

**28K Transmitter-Distributor Base**

28AB	TP172767	60
28AC	TP172770	75
28AD	TP172773	100

3.06 **28 Typing Reperforator Bases:** As stated in 3.02, the 28A and 28D typing reperforator bases are each equipped with a 3-speed gearshift and the gears are a part of the coded base. However, for the 28B and 28C typing reperforator bases it is necessary to use the coded sets of gears listed below.

<u>Bell System Codes for Sets of Gears</u>	<u>Teletype No.</u>	<u>Speed (WPM)</u>
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**28B Typing Reperforator Base**

28K	TP161680	60
28L	TP162213	75
28M	TP162217	100

**28C Typing Reperforator Base**

28S	TP161811	60
28T	TP161812	75
28U	TP161813	100

#### 4. ASSOCIATED BELL SYSTEM PRACTICES

4.01 The following Bell System Practices provide additional information that may be required in connection with this section.

<u>Subject</u>	<u>Section</u>
Teletypewriter Apparatus—Cleaning	P30.010
Teletypewriter Apparatus, Lubrication, General Information and Routines	P30.011
Teletypewriter Apparatus, General Requirements and Procedures	P30.012
Teletypewriter Apparatus, Disassembly and Reassembly, General Information and Routines	P30.013
Teletypewriter Tools and Maintenance Supplies	P30.301
Teletypewriter Apparatus, Preparation of Apparatus for Installation	P33.014
Alphabetical Index of 28-type Equipment, Bell System Practices, and Associated 28 ASR Station Drawings	P34.001