

BELL SYSTEM PRACTICES
Teletypewriter and Manual
Telegraph Station and P.B.X.
Installation and Maintenance

SECTION P35.613
Issue 1, May, 1935
AT&T Co. Standard

MONITORING TELETYPEWRITER

14 TYPE

REQUIREMENTS AND PROCEDURES

1. GENERAL

1.01 This section covers supplementary requirements and procedures which apply in connection with 14-type teletypewriters used for monitoring purposes.

1.02 For requirements and procedures other than those specifically covered in this section, see the sections in the "P" series which cover respectively the lubrication and the requirements and procedures for 14-type typing unit and base, and for line relays.

2. ADJUSTMENT FOR ZERO INTERNAL BIAS

2.01 The adjustment of a monitoring teletypewriter so that it is free from internal bias is essential in all cases.

2.02 The theory of signal reception in teletypewriters is covered in Section E45.521 of Bell System Practices and the requirements and procedures outlined below are based on the considerations discussed in that section.

2.03 A teletypewriter can be tested for internal bias by comparing the orientation range on signals having zero bias with those obtained using signals which have first some marking bias and then some spacing bias. If the upper limit is raised by the reception of signals having spacing bias, the teletypewriter has an internal bias which is marking. Conversely, if the lower limit is lowered by the reception of signals having marking bias, the teletypewriter has an internal bias which is spacing.

2.04 The internal bias of the teletypewriter is dependent on the line relay used and changing the line relay will change the bias of a machine.

2.05 Bias can usually be eliminated from the teletypewriter by making an appropriate adjustment as described later. However, in some machines it may not be possible because of manufacturing variations to remove it to within the required limit of 2%. Selection of machines for monitoring purposes may therefore be required.

Source of Biased Signals

2.06 Any device which provides signals having no distortion other than marking or spacing bias as desired, may be used in making the test. It is not essential that the exact amount of bias introduced into the signals be known, nor is there any definite requirement regarding the amount of bias introduced, except that the introduced bias should be between 10 and 35 per cent.

2.07 Where no source of biased signals for testing purposes is already available a test set made locally may be used as shown in Figs. 1 and 2. As shown in Fig. 1, this set consists of a 60-milliampere "dummy" circuit with arrangements for inserting a retardation coil to produce spacing bias and for bridging a spark-killer across the sending contacts or distributor to produce marking bias. The amount of bias produced will depend upon the adjustment of the line relay of the teletypewriter and will ordinarily be between 10 and 20 per cent. for both marking (positive) and spacing (negative) bias.

(a) To set up the operating condition a + 130 volt (120 ohm) battery tap is patched to the jack labeled "+ 130 V.," ground to the jack labeled "G," a source of substantially perfect signals to the jack labeled "SIG" and the teletypewriter to the jack labeled "TTY". With the key in the normal position signals will be unbiased. To obtain signals with marking or spacing bias the key is operated to either the "+" or "-" position. An equipment assembly suitable for mounting in a box is shown in Fig. 2. If desired the equipment may be assembled on a panel for mounting on a relay rack.

2.08 Adjustment Procedure

(a) Check the speeds of the teletypewriter as outlined in Part 4 and readjust if necessary.

(b) Check the adjustment of the line relay in accordance with the requirements and procedures covering line relays and readjust if necessary. Where a relay test panel or test table is available, the relay should be checked and, if necessary, readjusted using this apparatus.

(c) With the teletypewriter operating at 60 speed, obtain orientation range limits as outlined in the section cov-

ering requirements and procedures for the 14-type typing unit using substantially perfect signals having zero bias.

Note: Range should be minimum 70 per cent.

(d) Obtain orientation range limits as in (c) using signals having spacing bias in measuring the upper limit and marking bias in measuring the lower limit, the signals to be obtained from a source as described in paragraph 2.06.

Note: If upper limit obtained in (d) is greater than that obtained in (c), the teletypewriter has internal marking bias. If lower limit obtained in (d) is lower than that obtained in (c) the teletypewriter has internal spacing bias.

(e) Remove marking bias by increasing the armature air-gap and armature spring tension, and remove spacing bias by decreasing the air-gap and spring tension keeping the adjustment of these parts within the limits specified in the section covering the requirements and procedures for the 14-type typing unit.

Note: If in any case the internal bias cannot be removed to within one or two per cent. using the above procedure, it may be necessary to readjust some other part of the typing unit affecting the orientation range or as a final resort it may be necessary to replace the typing unit. The parts whose adjustments affect the orientation range are:

- Selector Armature
- Selector Armature Bracket
- Selector Armature Bracket Link
- Selector Clutch Spring
- Armature Locking Wedge
- Armature Trip-Off Eccentric Screw
- Magnet Bracket

3. ADJUSTMENT OF 83562(M) 14-TYPE MONITORING RANGE SCALE ASSEMBLY (CRANK OPERATED)

3.01 The stop lever eccentric screw on the range scale sector, the stop lever spring tension and the trip latch spring tension should be in accordance with the requirements and procedures for the 14-type typing unit.

3.02 Worm shaft should have some end play, not more than .004", and be so located that there will be just perceptible radial play between the worm and gear sector at the closest point in their rotation.

(a) Gauge by eye and feel, holding detent spring away from ratchet wheel.

(b) To adjust, reposition shaft rear bearing bracket.

3.03 Scale pointer shall line up with range scale division 60 when the detent spring roller is directly above the centerline of the worm shaft and in the space between two worm shaft ratchet wheel detents.

(a) Gauge by eye.

(b) To adjust, reposition detent spring.

3.04 Detent spring tension shall be Min. 24 ozs. (680 gms.), Max. 32 ozs. (900 gms.) measured at the detent spring roller stud as the roller starts to move.

(a) Gauge with a 138-58(M) scale.

(b) To adjust, bend detent spring.

3.05 End zero scales shall be located so that the zero scale division coincides with the extremities of the teletypewriter orientation range as determined on substantially perfect signals received with zero bias.

(a) Gauge by eye when measuring orientation range.

(b) To position, remove end zero scale mounting screws and reposition scales as required. Reinsert mounting screws with flat and spring washers under head of screw. Tighten screws.

Note: It is not possible to set these end zero scales on a teletypewriter having an orientation range of less than 70 divisions because each end zero scale extends from its zero point for a distance of 35 divisions.

4. ADJUSTMENTS FOR TWO-SPEED GOVERNOR

4.01 Governor contacts, adjusting wheels and brushes shall be adjusted as specified for edge-contacting type single speed governors (see section covering requirements and procedures for 14-type typing unit).

4.02 Speed. The free speed of receiving shaft in revolutions per minute corresponding to operations per minute is:

<u>Speed</u>	<u>Operations per Min.</u>	<u>Words per Min.</u>	<u>Target</u>	<u>Black Target Spots</u>	<u>Free Speed Rec. Shaft in R.P.M.</u>
Low	240.0	40.0	1J	23	274.3
High	368.0	61.3	1G	10	420.6

(a) Check speed as outlined in the section covering speed regulation, checking and adjusting the 40 speed governor before checking 60 speed.

Note: Governor switch should be in "LO" position while checking and adjusting the 40 speed governor

and in "HI" position while checking and adjusting the 60 speed governor.

(b) Adjust speed using the right governor contacting spring adjusting thumb wheel (side of governor adjacent to motor) for adjusting the 40 speed governor and the left thumb wheel for adjusting the 60 speed governor. Turn the thumb screws as indicated by letters "S" and "F" to decrease and increase the speed respectively.

Note: 40 speed governor must be checked and adjusted before 60 speed governor.

5. LUBRICATION OF 83562(M) 14-TYPE MONITORING RANGE SCALE ASSEMBLY (CRANK OPERATED)

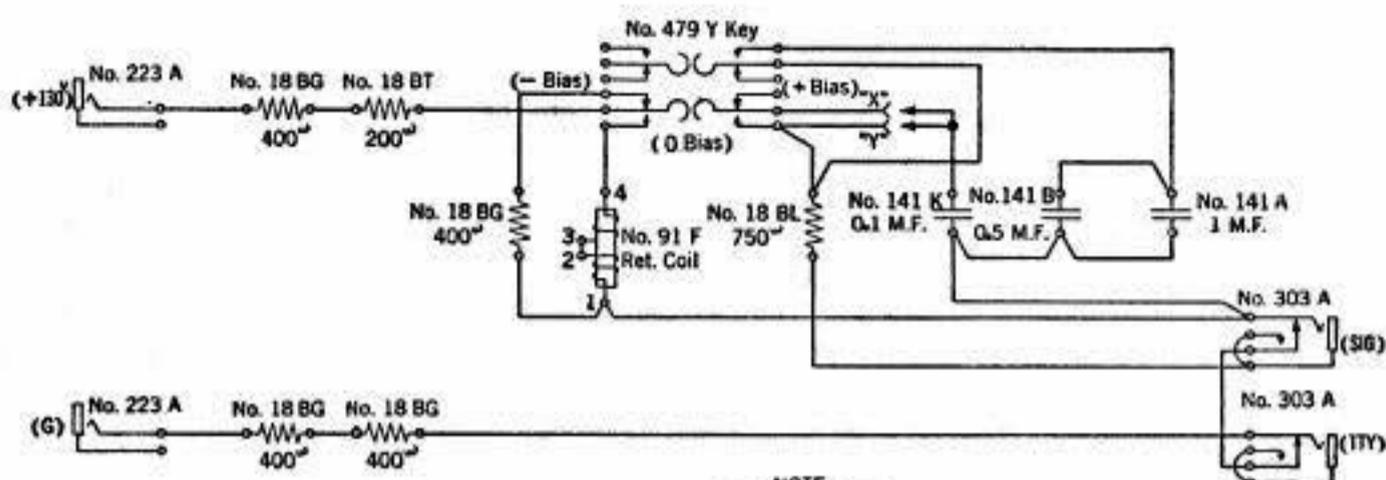
5.01 The oils and grease referred to herein are those specified in the section on Teletypewriter Apparatus—Lubrication—General Requirements.

5.02 The following parts should be lubricated sparingly with oil:

- Front and rear shaft bearings.
- Detent roller bearing.
- Pointer shoulder screw.
- Trip plunger.
- Trip bell crank pivot.
- Stop pawl latch pivot.
- Stop pawl shoulder screw.

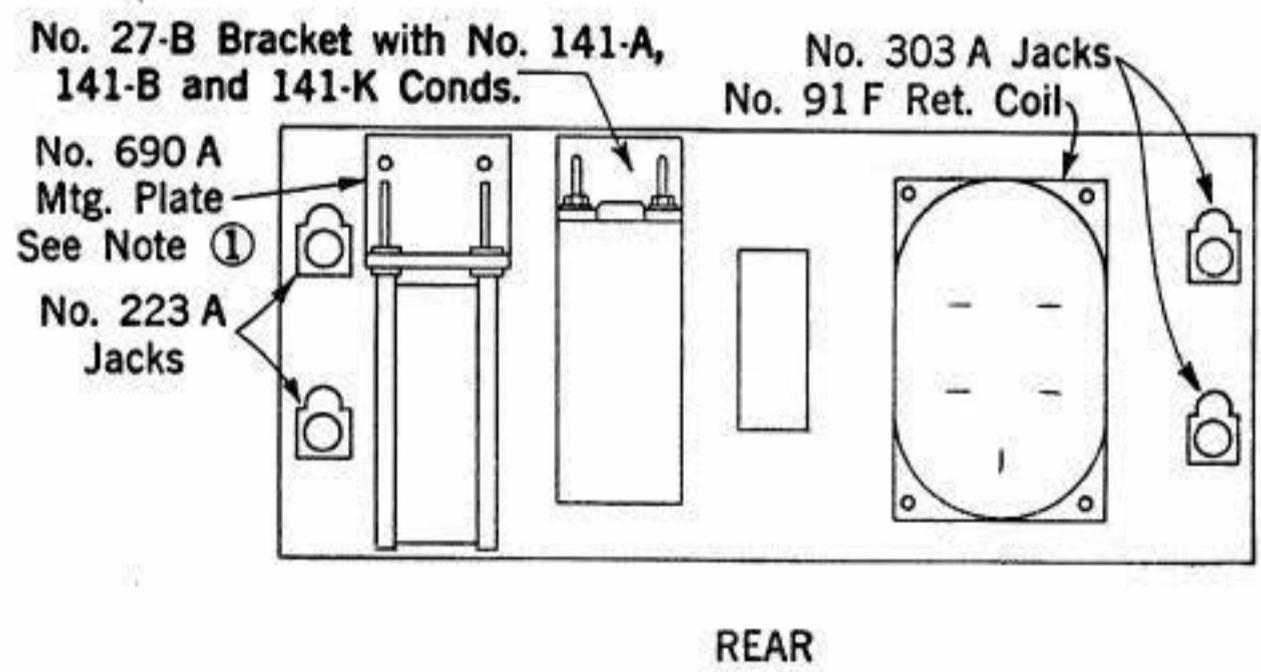
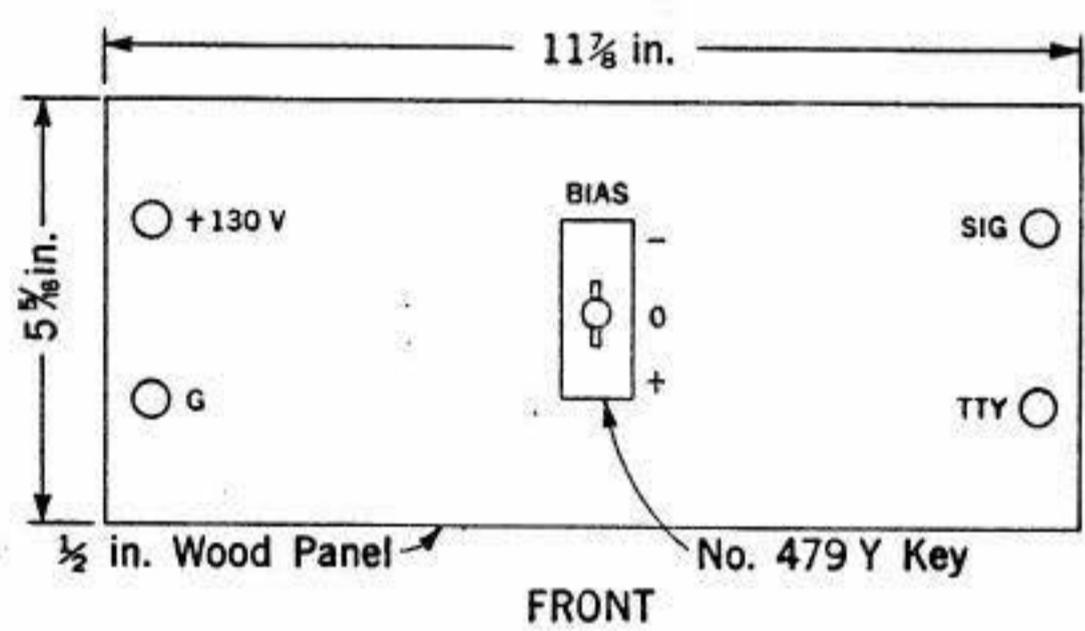
5.03 The following parts shall be sparingly lubricated with grease:

- Worm and sector teeth.
- Detent star wheel.
- Sliding surfaces of pointer extension and main bracket.
- Sliding surfaces of sector and main bracket.



NOTE
Use "X" wiring for signals from Brush Distributor
and "Y" wiring for multiple sender signals.

Fig. 1



NOTE

① Drilled in Pos. 1 - 6 for No. 18 type resistances.

Fig. 2