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

SECTION P36.802
Issue 1, January, 1937
AT&T Co. Standard

15-TYPE APPARATUS
IMPROVEMENTS AND CHANGES

1. GENERAL

1.01 This section lists improvements and changes in 15-type teletypewriter apparatus which have recently become available. The points involved are listed below and are also discussed individually.

1.02 **For 15-Type Teletypewriter Apparatus:**

Omission of fuses in 15-type bases delivered from the factory

Change in paper spindle

Improvement to insure against non-uniform tabulator operation

Use of spring cushion key tops

Device to reduce the peak distortion of keyboards

Change in send-receive-break mechanism

Change in 74072 carriage return operating lever bearing

Change in synchronous motors used with 14, 15 and 19-type sets

Tabulation indicator

Loose fit of 18-type resistances in 71670 friction type mountings

Change in material of type bar back stop

Steel springs for 18-type connecting blocks

Parts to convert sprocket feed teletypewriter to friction feed

Wide pressure roller for sprocket feed

Omission of power cord with 15A base

Method of fastening carriage of 15-type typing unit for transportation

Cam follower roller assembly

1.03 **For 15-Type Perforator-Transmitters:**

Improved chad chute

Change in 81553 feed pawl

Change to prevent marring the top of the 19-A table when a 15-type perforator-transmitter is withdrawn from the teletypewriter base

Change in tape reel spindle of 15-M teletypewriter cover

2. 15-TYPE TELETYPEWRITER APPARATUS

2.01 **Omission of Fuses in 15-Type Bases Delivered from the Factory.** In the past, 3-ampere fuses have been supplied in bases for No. 15 teletypewriters. These fuses are to be omitted in bases supplied by the manufacturer in future so that it will be necessary to furnish and place in position the proper fuse at the time of installation.

2.02 **Change in Paper Spindle.** In new spindles the drilled hole for the pin will be approximately 3/32 inch shorter, in order to prevent the possibility of the pin being driven in so that the spindle is not usable.

2.03 **Improvement to Insure Against Non-Uniform Tabulator Operation.** With the tabulator mechanism as it was first supplied, machines on the same circuit might fail to tabulate in the same way if an attempt was made to tabulate within two spaces of a tabulator stop, and the operating instructions cautioned against this. A new spacing escapement pawl operating arm, 89097, is now available in which the forward extension of the arm is narrower than that of the standard arm and permits the front spacing pawl to engage a tooth on the spacing ratchet when the tabulator is selected. With this arrangement, it is possible to move the carriage reliably as little as one space with the tabulator so that, if tabulation is attempted when the carriage is immediately to the left of a tabulator stop, the carriage will come to rest at that stop and not move on to the next one as has heretofore been the case.

The 89097 spacing escapement pawl operating arm is applied to the typing unit using the same adjustments as are specified for the former arm and no change is required in the adjusting of the tabulator mechanism. Arrangements have been made to provide one of the new arms in all new sets of tabulator parts. Arms of the new type for use with tabulator mechanisms already in the field may be obtained by calling for the designation given above.

2.04 **Use of Spring Cushion Key Tops.** Spring cushion key tops are now being supplied on all 14 and 15-type keyboards delivered from the factory. These key tops have a top surface of green celluloid which is readily cleanable, and are provided with a spring which absorbs the impact in typing. They present a satisfactory appearance for a much longer time than the pneumatic key tops formerly supplied, and have a much longer life.

2.05 **Device to Reduce the Peak Distortion of Keyboards.** Measurements in the field on certain keyboards have shown occasional sporadic distortion as high as 20 to 30 per cent. Distortion of this magnitude may cause errors in copy at the distant or receiving end of a circuit without any indication of such errors on the sending machine.

Investigation indicated that these peak distortions were caused by the lengthening of the start pulse when signals were being sent, due to the improper closure of the clutch on the sending cam shaft assembly. If the clutch teeth are worn, it is possible on closing the clutch to have incomplete meshing of the clutch teeth in that they will catch near their peaks and the driven member will start to turn with the teeth in this position. The driven member will turn until a load is placed on the cams by the opening of the start pulse contact. This load is sufficient to cause the clutch teeth to ride over their sticking point and mesh fully one tooth back, which action makes the cam shaft hesitate and increases the length of the start pulse. It was found that the lengthening of the start pulse due to this hesitation while skipping one tooth of the clutch would result in approximately the amount of distortion measured.

In order to prevent this faulty clutch action and to provide positive clutch closure, a device has been made available which places a drag on the sending cam and by means of the load applied by this drag forces complete closure of the clutch before the cam starts to rotate. The catalogue designation, 91042 Set of Parts, has been assigned to this device. Installation information covering these parts is given in Section P36.467. The general installation of this set of parts does not appear warranted, but its installation is recommended on keyboards in the field which show large distortion in transmitted signals as indicated by measurements with a 118A1 telegraph transmission measuring set.

The set of parts cannot be applied to 14-type teletypewriters having electrical end-of-line indicators or to 14-type monitoring teletypewriters equipped with the present design of the polar-neutral key mounting detail. This latter part is being redesigned to obviate interference. Interference between the device and the pulsing contacts on 15-type perforator-transmitters

prohibits its use with these units, but in this case more load is placed on the sending cam shaft by extra mechanisms forming part of the unit and it is not believed that further load is required.

2.06 **Change in Send-Receive-Break Mechanism.** Because of difficulty from the break contact at a TWX station being accidentally locked open, thus removing ground from the tip side of the loop, a change in adjustments of this mechanism was recently included in the "P" series. Although the change in adjustment eliminates the difficulty, the resulting adjustment does not leave enough margin of operation to guarantee successful operation of the units over an extended period of time. A new set of parts has been developed which may be installed on typing units in the field in order to prevent this trouble. This set of parts consists of a bracket mounted on the typing unit containing an adjustable down stop screw to prevent the reset lever becoming depressed to a point where the break contacts lock in the open position. This set of parts is applicable to machines equipped with either the old style or the new style send-receive-break mechanisms. It has been assigned the catalogue designation 89442 Set of Parts.

It has been reported that the send-receive-break reset lever upper adjusting screw is not long enough to permit adjustment to specified limits in all teletypewriters. In order to eliminate this difficulty the 1168 adjusting screw, which is .312 inch long, has been replaced by the 1097 screw, which is .469 inch long.

2.07 **Change in 74072 Carriage Return Operating Lever Bearing.** Because of difficulty experienced in adequately lubricating this bearing, the part has been redesigned to include an oil hole in the cylindrical bearing portion which is easily accessible and provides lubrication throughout the length of the bearing. The change does not affect the interchangeability of old and new style parts and the same catalogue number, 74072, is retained for the new style part.

2.08 **Change in Synchronous Motors Used with 14, 15 and 19-Type Sets.** An improvement has been made in the 82714 and the 82283 synchronous motors used with 14, 15, 19 and 20-type teletypewriter apparatus to prevent serious damage to the motor in case the spring of the centrifugal starting switch breaks. This improvement will also reduce the noise of the starting mechanism. Up to the present time, the three brush arms of the centrifugal starting switch have been held in their respective positions by means of the garter spring which provides the tension required to operate the switch mechanism. If this spring breaks, the brush arms fly loose from their positions and are likely to cause serious damage to

the motor windings. In order to prevent this, the mechanism has been redesigned so that the brush arms are fastened in such a way that they will not fly loose if the garter spring breaks. It is not proposed to have this change affect apparatus under repair.

2.09 **Tabulation Indicator.** The tabulator mechanism for the 15-type teletypewriter is best suited to meet the requirement for typing in regular columns as, for instance, with forms, but where the carriage is required to be positioned at other than regular stops, a less expensive tabulation indicator may now be used. This indicator consists of an etched scale to mount under the lower edge of the glass on the 15-C cover and a pointer which is mounted under the left ribbon cup of the type basket. Since the indicator scale is mounted on the cover and the pointer is on the type basket, and there is a possibility of slight movement of the cover with respect to the typing unit, the indication of the scale for a given position of the type basket may vary one or two divisions due to changes in position of the cover. Experience has indicated that this is not unsatisfactory, since the cover does not ordinarily shift appreciably during sending of any given message.

The new device has been assigned the catalogue designation 90249 Set of Tabulation Indicator Parts. The installation and adjustment of this device are covered in Section P36.466.

2.10 **Loose Fit of 18-Type Resistances in 71670 Friction Type Mountings.** Reports have been received from the field that variations in width of the 18-type resistances result in poor contact between the resistances and the springs in the friction type mountings used in 14-type typing units and 15-type bases. Pending a change in the method of mounting the resistances, difficulty from poor contact with the 18-type resistance can be overcome by soldering conductors between the terminal posts of the resistance unit and the screws used to hold the resistance mounting contact springs.

2.11 **Change in Material of Type Bar Back Stop.** The use of split chrome leather has been approved for the type bar back stop instead of the leather belting previously called for, in order to obtain more satisfactory service. In ordering the type bar back stop assembly and the leather strap for this assembly, the same catalogue numbers will apply as those formerly shown.

2.12 **Steel Springs for 18-Type Connecting Blocks.** Reports have been received of difficulty due to movement of the line relays in the springs which form a part of the 18-type connecting block furnished in 14 and 15-type teletypewriters. Arrangements have, therefore, been made to utilize steel springs

in place of the nickel silver springs previously used and new 18-type connecting blocks will be so equipped. Where difficulty is experienced because of the springs in connecting blocks now in the field, the steel springs may be ordered by calling for P-241195.

2.13 **Parts to Convert Sprocket Feed Teletypewriters to Friction Feed.** In order to simplify obtaining the parts required to convert sprocket feed teletypewriters to friction feed, the catalogue designation 84913 Set of Parts has been assigned to cover the parts involved.

2.14 **Wide Pressure Roller for Sprocket Feed.** A pressure roller wider than the standard 80413 roller has been made available for use in sprocket feed teletypewriter installations where the forms used are the type having the carbon sheets offset. In some installations of this sort, difficulty has been experienced from the initial copy coming out from behind the standard roller. The use of a wide roller should materially reduce difficulty of this nature.

When the machine is equipped with two standard rollers, the maximum length of type line possible is 74 characters. The use of one standard roller in conjunction with one of the new wide rollers located on the side toward which the carbon sheets are offset reduces the maximum length of the typing line to 73 characters. This should not prove a disadvantage, however, as the standard length of typing line on 8-1/2-inch forms is 72 characters and the machines are delivered adjusted for this length of line. It is planned to furnish the new roller as an accessory part, rather than to include it with the 80483 set of sprocket feed parts, as the wide roller will not be required in all installations. It has been assigned the catalogue designation 89858 Pressure Roller.

2.15 **Omission of Power Cord with 15-A Base.** A two-conductor power cord and plug has previously been furnished with the 15-A base. This cord would reach the power fittings on the table when the base was used on a 15-A table but is not suitable for use with the 15-N table or the 19-A table. It has, therefore, been decided to omit the cord from the 15-A base.

2.16 **Method of Fastening Carriage of 15-Type Typing Unit for Transportation.** The carriage fastening clip used to fasten the carriage of 15-type typing units when shipped from the factory may frequently be employed to advantage when shipping teletypewriters locally or to the Western Electric Distributing House shops, since in shipping typing units it is important, in order to prevent breakage, to hold the carriage in the center of its travel in such a way that it will not break

loose. The two carriage fastening clips which are required for each carriage have been designated: 91239 Left-Hand Carriage Fastening Clip—91240 Right-Hand Carriage Fastening Clip. The two clips used are slightly different in design but are easily distinguished since the one used to fasten the type basket on the right has one end bent into a complete circle. The method of using these clips is as follows:

(1) Hook the semicircular part of the left-hand clip over the stud between the left-hand 74240 roller and the casting of the type basket.

(2) Release the carriage and move it to the right until the hook of the left-hand clip catches under the left-hand support of the 74062 lower track.

(3) Hook the semicircular part of the right-hand clip over the stud between the right-hand 74240 roller and the casting of the type basket.

(4) By pressing with the fingers snap the other end of the right-hand clip over the right-hand support of the 74062 lower track.

(5) **Do not** lock the carriage by operating the 74251 dash pot lever, as this will place a strain on the teeth of the spacing rack and pinion.

2.17 **Cam Follower Roller Assembly.** Service difficulties have been reported due to sticking of the main shaft clutch in the 15-type typing unit which may cause the omission of a character, and certain changes have been made in the manufacture and lubrication of the main shaft clutch which it was believed would reduce difficulty of this nature. Reports received recently have indicated that this difficulty is still being experienced and that cases are occurring in new machines where wear of the parts is not a factor in producing the trouble. In further work done on this problem improvement in the clutch action has been obtained by using roller bearings for the cam followers of the printing and function cams. A preliminary lot of 500 machines was made up with these parts starting with serial No. 16875 and they are incorporated in all 15-type typing units above the serial No. 17500.

The new style follower and a new pilot screw which is used with it may be obtained by calling for catalogue No. 91175 Cam Follower Roller Assembly. Two of these are required for each typing unit.

The new pilot screw differs from the old style in that it has a bevel at the end, whereas the old style was only slightly rounded. The new pilot screw which bears the same catalogue number as the former screw (82986) may be used with the old style 3108 solid cam followers as well as the new cam fol-

lowers. The new screw will be delivered on all orders for this part as soon as existing stocks of the old type screw are exhausted and, as noted above, will be furnished on orders for the 91175 cam follower roller assembly.

In the new roller bearing assembly the pilot screw forms the inner race for the roller bearing and, consequently, care must be taken in removing the pilot screw or in assembling the unit to prevent the roller bearings dropping out of the shell of the follower. The assembly is furnished packed in grease which will hold the rollers in place if care is taken in removing and replacing the screw. After the followers have been installed they should be thoroughly lubricated with KS-7470 oil without removing the grease with which they are packed when furnished, and subsequent lubrication should be applied in the form of oil, grease and then oil as called for in Section P36.601 for the old style solid cam follower.

3. 15-TYPE PERFORATOR-TRANSMITTER

3.01 **Improved Chad Chute.** On units manufactured in the future a new chad chute will be supplied differing from the old chute in that the shape of the top is such as to lead the punchings more readily into the tube which communicates with the chad box on the table. The new chute may be distinguished from the old chute in having an angular rather than a rounded top. The change to the new chute will be made on all perforator-transmitters repaired in the future at Western Electric Distributing House shops.

The new chute may be readily installed in the field. It has been assigned the designation 86865 Chad Chute.

3.02 **Change in 81553 Feed Pawl.** In order to overcome difficulty from breakage, a change has been made in the design of this pawl whereby the riveted pin is replaced by a formed-over part of the pawl slightly rounded on the edge which engages the feed pawl release arm. This change will be incorporated in perforator-transmitters manufactured in the future so far as this can be done without delaying deliveries. It will also be incorporated in all 15-type perforator-transmitters repaired at Western Electric Distributing House shops as soon as an adequate supply of new parts has been delivered. The same catalogue number will apply to the modified pawl.

3.03 **Change to Prevent Marring the Top of the 19-A Table when a 15-Type Perforator-Transmitter is withdrawn from the Teletypewriter Base.** In order to overcome difficulty from marring of the table a change has been authorized so that flat head screws will be substituted on the under side of the unit for the screws which project somewhat on previous units

and rub on the edge of the table. A new strap, 89354, provided with countersunk holes and two screws, 1268, are substituted for the old strap and its mounting screws and lock washers under the left side of the unit, and a new 89354 Strap and 1268 Screws are added at the right side over the 83442 Cable Clamp. The old screws and washers for the cable clamp are omitted.

The change to the new parts will be made in all units repaired in the future by the Western Electric Company. The improvement may be incorporated easily in units now in the field by obtaining the necessary parts and substituting them as noted above.

3.04 **Change in Tape Reel Spindle of 15-M Teletypewriter Cover.** The tape reel spindle of 15-M teletypewriter covers has previously been provided with a wooden filler with an outside diameter to accommodate rolls of tape with a center hole of approximately 2 inches. In order to permit the use of rolls of tape having a center hole of only 3/4 inch a new tape reel spindle has been authorized for units to be manufactured in the future. In the new design the new core, 89087, is approximately 3/4 inch in diameter and the wooden filler, 89088, which will normally be used increases the diameter to approximately 2 inches. The wooden filler is secured to the inner core by means of a 33-238 screw, 2191 lock washer and 8330 washer in order to prevent accidental removal and loss of the filler. When it is desired to use rolls of tape with an inner hole of 3/4 inch diameter the filler is removed. The change requires the use of a new tape reel, 89086, and tape retainer, 89089, to fit the smaller size core.

The change to these parts will be made by Western Electric Company Distributing House shops only when it is specifically requested in connection with equipment sent in for repair.