BELL SYSTEM PRACTICES
Teletypewriter Stations

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AT&T Co Standard

114-TYPE REPERFORATOR-TRANSMITTER MAINTENANCE INSPECTION AND TESTS

1. GENERAL

1.01 This section specifies the procedure for the maintenance of 114-type reperforator-transmitters on customers' premises where complete facilities for routining and testing are not available. If test bench facilities are available, it is recommended that these procedures be supplemented by check tests similar to those in P35.544.

1.02 This section is reissued to make some changes in procedures on the basis of experience with Issue 1. The changes are indicated by marginal arrows.

1.03 The apparatus requirements and adjusting procedures will be found in Section P35.635.

1.04 Studies consistently show that many troubles occur shortly after a routine inspection. Some appear to be due to the methods of carrying out the maintenance work. These instructions have been prepared to avoid such troubles and it is important that they be closely followed.

1.05 The frequency of routine inspections can best be determined locally. Factors to be considered include daily service hours, speed of service and other local conditions. In general, the inspection interval should be the maximum consistent with adequate lubrication.

1.06 The periodic cleaning, lubrication and inspection should be carried out in the order shown. The work should be confined to the items specified except for the correction of conditions obviously requiring attention. Items not requiring special attention at each routine are not specified in this section. Local experience may indicate the desirability of changes in the list of items to be checked.

1.07 The materials for carrying out the cleaning and routining are specified in Section P30.010 "Cleaning, General Requirements" and Section P30.301 "Teletypewriter Tools and Maintenance Supplies", with the following exception:

(1) For cleaning contacts, a 374A tool and KS-6528 linen tape may be found to be desirable.

1.08 For general information on lubrication, refer to P30.011.

2. ROUTINE MAINTENANCE PROCEDURES

A. PREPARATION FOR ROUTINE

2.01 Do all work safely. Do not scatter tools or equipment. Give special attention to avoiding damage to the customer's property.

2.02 Obtain the customer's permission to routine the apparatus and wait until any accumulated tape has cleared.

2.03 Arrange for the release of the equipment in accordance with established procedures. While waiting for the release, observe operation for any abnormal conditions which should be investigated during the routine. Check the tape produced by the unit for clean punching. When the routining and tests are completed, arrange to have the equipment restored to service.

2.04 Upon the release of the unit proceed as follows:

(1) Remove and empty the chad-box drawers.

(2) Disconnect the cable from the unit.

(3) Remove the unit from the machine cabinet, exercising care to avoid damaging parts in close proximity to cabinet surfaces, and mount the unit on the front of the base structure, top side up.

(4) Wipe out the cabinet surface to remove oil and dirt.

B. ROUTINE

2.05 To minimize the shifting and handling of a unit during routine, the instructions below provide for completing first the cleaning and then the lubrication on each part of the machine before going on to the next part.

2.06 During the inspection observe the condition of the machine, but avoid unnecessary dismantling or disturbance of adjustments. So far as possible operating tests should be used to determine the condition of the machine.

Caution: When it is necessary to make any adjustment, all other adjustments that might be affected should be checked and, if necessary, corrected.

(1) Bent, loose or missing parts, binds in parts, elongated springs and parts out of place or out of adjustment should be corrected; check all terminal wires of cables for loose connections or broken wires.

(2) Worn parts which experience indicates may cause trouble before the next scheduled inspection should be replaced. Red or rust-colored deposits indicate wear due to lack of lubrication. If it appears that the parts are not worn sufficiently to require replacement, special care should be taken in lubricating to see that the lubricant reaches the bearing surfaces. Do not over-lubricate.

2.07 The procedure for cleaning the contacts is as follows:

(1) Place a piece of lintless cloth such as KS-2423 twill cloth or KS-6528 linen tape over a burnisher such as a 374A tool.

(2) Moisten the cloth with KS-8372 trichloroethylene and pass the cloth back and forth between the contacts.

(3) Repeat the operation using a dry cloth.

(4) Burnish the contacts.

2.08 Items other than those listed should not be cleaned unless dirt is present which might cause trouble by working into bearing surfaces or onto contacts. Before the start of detailed cleaning, loose deposits of dirt or tape should be brushed off.

2.09 IN THE FOLLOWING WHERE LUBRICATION IS SPECIFIED, OIL OR GREASE SHOULD BE APPLIED ONLY IF THE PART IN QUESTION DOES NOT HAVE SUFFICIENT LUBRICATION TO CARRY OVER TO THE NEXT REGULAR INSPECTION PERIOD. WHERE LUBRICATION IS REQUIRED, LUBRICANTS SHOULD BE APPLIED SPARINGLY UNLESS OTHERWISE SPECIFIED. Excess lubricant may affect the operation of the contacts or other parts not requiring lubrication, thereby introducing trouble. In the following list, detailed information on lubrication is not given. The detailed information on items requiring lubrication and the lubrication required on an initial lubrication are given in Part 2D. For oiling use KS-7470 oil except where KS-6232 oil is specified.

2.10 **Cleaning and Lubrication**

(1) Remove the range finder and the magnet cover.

(2) Clean the range-finder mechanism and check the adjustments of the mechanism (stop pawl, trip-latch spring and stop-pawl spring adjustments).

(3) Lubricate the range-finder mechanism with KS-6232 oil.

(4) Clean the selector mounting-plate.

(5) Clean the selector-magnet pole-face and the armature. Use bond paper or lintless cloth moistened with trichloroethylene followed by dry bond paper or lintless cloth.

(6) Lubricate the armature lever and the selector-arm pivot screws, applying KS-6232 oil very sparingly.

(7) Remove the selector cam-sleeve assembly.

(8) Replace the friction washers if they are glazed or worn. Graphite-impregnated washers are now specified for all new machines. When a change is made, graphite-impregnated washers should always be used.

(9) Saturate the friction washers with oil, separating the driving discs with a screwdriver to relieve the pressure.

(10) Fill the main-shaft cavity with oil.

(11) Reinstall the selector cam-sleeve assembly.

(12) Check the alignment of the selector levers and the selector cam-sleeve peaks.

(13) Check the magnet-armature pivot-screw adjustment, selector-magnet-bracket position, selector-arm operating-screw clearance and the locking-lever clearance.

(14) Before installing the oil-shield replace the felt oil-stop with a dry one. See that the felt oil-stop seals the opening in the plastic oil-shield without interfering with the movement of the armature lever.

(15) Check the trip-off screw adjustment.

(16) Check the engagement of the range-finder stop pawl and the selector-cam stop-arm.

(17) Check the adjustment of the main-clutch throwout lever.

(18) Clean the universal contacts and check their adjustment.

(19) Lubricate the selector mechanism.

NOTE: Do not oil the felt wick on the armature lever.

(20) Lubricate the main clutch and the throwout lever.

(21) Lubricate the receiving-shaft mechanisms.

(22) Remove the code punch-block.

(23) Remove the lint from the punch-block.

(24) If desired, rinse the punch-block in clean petroleum spirits.

(25) Lubricate the punch-block sparingly with KS-6232 oil at the feed-roll bearings and the slots in the lower ends of the punch pins.

(26) Remove the code-punch-block tape guide if necessary to facilitate cleaning.

(27) Wipe out the tape passage in the guide and clean the punch-selector fingers and linkages.

(28) Clean the prepunch mechanism.

(29) Clean the prepunch tape guide and the tape passage in the prepunch block using the standard cleaning tool.

(30) Lubricate the prepunch mechanism.

(31) Lubricate the selector fingers at the ends which engage the punch pins and at all the bearing points.

(32) Reinstall the punch-block and the tape guide. Lubricate the detent star wheel and the other parts requiring lubrication.

(33) Check the punch-selector finger—code punch-pin alignment.

(34) Remove the sensing-contact guard.

(35) Clean the transmitter yoke and lid, the transmitter mechanism and linkages between the sensing pins and the sensing contacts.

(36) Clean the sensing contacts where necessary. Check that the spings are not easily shifted sidewise.

(37) Check the sensing-contact spring pileups for contact alignment and "make and follow" adjustments.

(38) Check the continuity of the sensing contacts for FIGS, LTRS and H as follows:

(a) Set up FIGS manually in the sensing contacts and check for continuity without perceptible resistance between terminals 13 and 33 of the Jones plug on the base.

(b) Repeat, with the LTRS combination and terminals 14 and 33.

(c) Repeat, with the H combination and terminals 12 and 33.

(39) Lubricate the transmitter mechanism and linkages between the sensing pins and the sensing contacts. Reinstall the sensing contact guard.

(40) Remove the guard for the sensing magnet. Clean the magnet armature and the core. Check the connections to the magnet coils. Lubricate the mechanism and fill the oilcup for the rear bearing. Reinstall the guard.

(41) Place the unit bottom-side up.

(42) Clean the cavity of the base and wipe out the tape chute between the code punch-block and the transmitter mechanism.

(43) Remove one screw holding the distributor-contact adjusting-screw bridge to the mounting structure. Loosen the second screw and shift the bridge structure out of position to provide access to the contacts.

(44) Clean the distributor contacts.

(45) Clean the distributor-contact adjusting-screw bridge and put it back in place.

(46) Clean the distributor cam surfaces and the distributor-contact operating levers.

(47) Apply oil sparingly to the felt lubricators of the distributor-cam and the sensing cam.

(48) Replace the oil-absorbing felt washers on the contact levers with dry washers.

(49) Lubricate sparingly all bearing points of the operating levers associated with the cams.

(50) Clean the distributor-magnet pole faces. Check the connections to the magnet coils.

(51) Lubricate the armature pivot points.

(52) Clean the auxiliary contacts, tape-out contacts, transmitter-stop contacts and the universal contacts. Check the pileup screws for tightness. Check the adjustments of the contacts.

(53) Fill the distributor-shaft rear-bearing oilcup.

(54) Apply two to six drops of oil in the sensing and distributor shaft cavities.

(55) Apply oil sparingly to the sensing and the distributor shaft clutches and to the detent mechanisms associated with the cams.

(56) See that the inside surface of the prepunch chad tube is clean. If necessary the chad tube may be removed for cleaning.

(57) Lubricate all the bearing points and the gears on the underside of the base.

C. CHECK TESTS

2.11 After completion of the routine, make the following check tests.

(1) Reinstall the unit on the reperforator transmitter base and connect the Jones plug to the reperforator unit.

(2) With the unit sending, the distortion of signals measured at the test room should meet the requirements of Section P30.002. To facilitate checking and adjusting the individual contacts the following repeated characters should be sent during this test: BLANK, T, CAR RET, SPACE, LINE FEED and E.

(3) With the unit receiving distorted signals supplied locally or over a line from a distant office, check the receiving margins of the selector. If distorted signals are not available, send signals to the selector magnet from a keyboard, reperforator transmitter unit or a transmitter distributor meeting the distortion requirements. Determine the orientation range and position the range-finder arm in the middle of the range.

(4) Using miscellaneous text matter, check that the unit operates satisfactorily both sending and receiving. In this test, check for correct functioning of the following:

(a) Tape-Out Contacts.
(b) Transmitter-Stop Contacts.
(c) Tape-Feed-Indicator Contacts.
(d) Universal Contacts.
(e) Tape-Out Switch.

(5) Check the alignment of the feed holes with respect to the code-punch holes.

(a) The center lines of the feed holes and the code-punch holes should coincide. Also the center line of the code-punch holes should be at right angles to the edge of the tape.

(6) Check the alignment of the transmitter tape-guide plate and code punch block.

(a) The right edge of the transmitter tape-guide plate should be parallel to the left edge of the code punch block. The tape slot of the code punch block should be in line with the tape passage of the tape-guide plate.

(7) Check the adjustment of the transmitter tape-guide plate with respect to the code-punch holes.

(a) The transmitter pins should be located approximately centrally with respect to the code-punch holes with the transmitter assembly at the center, extreme right or extreme left of its travel.

(8) Check the selector-clutch torque.

2.12 Clean the selector-magnet pole faces. Use bond paper or lintless cloth moistened with trichloroethylene followed by dry bond paper or lintless cloth.

2.13 Remove the excess lubricants and return the unit to service.

D. DETAILED LUBRICATION

2.14 Unless otherwise specified, one or two drops of oil at each place indicated in the following list will be sufficient. Use KS-7470 oil and KS-7471 grease except where KS-6232 oil is called for.

2.15 A small stiff brush, such as the R-2119 brush, may be used to apply grease in a thin film at points where grease is specified.

2.16 New felt washers and wicks should be saturated with oil.

2.17 Oil both loops of all helical springs which exert a nominal tension of less than 2-1/2 lb.

2.18 Apply grease to both loops of all helical springs that exert a nominal tension of 2-1/2 lb or more.

2.19 **Selector Mechanism.**

Note: Be careful not to get oil between the pole faces of the selector magnet and the magnet armature.

(1) Armature lever—two pivot screws, very sparingly. ←

(2) Selector arm—two pivot screws, two sword contact points, locking tip, and point of contact with operating screw.

(3) Selector-arm detent—bearing and point of contact with selector arm.

(4) Range-finder assembly.

(a) Trip-latch plunger, bearing, and two points of contact.

(b) Bellcrank—bearing.

(c) Trip latch—bearing and points of contact.

(d) Stop lever—bearing and point of contact with stop arm.

(5) Swords and selector levers—drop oil between separator plates.

(6) Selector T levers—all points of contact.

(7) Selector-arm locking-lever—at pivot.

(8) Selector cam-sleeve—each cam peak.

(9) Tape feed-out lever—point of contact with trip-latch bellcrank.

2.20 **Receiving Shaft.**

Remove range scale. Remove the cam-sleeve retaining disc (left-hand threads) and fill the shaft with oil.

(1) Locking-lever-cam felt oiler—saturate.

(2) Selector-cam friction washers (2)—saturate.

(3) Eccentric-cam oil-hole—4 drops of oil.
(4) Receiving-shaft ball bearings (2)—grease lower, oil upper.
(5) Clutch-throwout lever—2 bearings, grease end of lever.
(6) Clutch—oil freely.
(7) Receiving-shaft gear—grease.
(8) Compression springs (2)—allow oil to flow into prongs under springs.
(9) Universal-contact operating lever—at bearing and apply a thin film of grease to camming surface.
(10) Reinstall the disc.
(11) Reinstall the range scale.

2.21 **Reperforating Mechanism (Code-Punch Bracket).**

(1) Punch lever—fill oilcup for bearing—oil shoulder screws at both ends—saturate felt washer.
(2) Punch-arm link at adjusting-screw extension.
(3) Selector transfer levers—drop oil between separators at both ends and at bearing.
(4) Vertical stop levers—at juncture with selector levers, at bearing shaft, at juncture with punch-selector fingers.
(5) Punch-selector fingers at front guide comb and point of contact with punches.
(6) Punch-bail pilot-screw—2 bearings.
(7) Feed-pawl bearing.
(8) Feed roll—2 bearings.
(9) Feed-roll-detent wheel—grease.
(10) Feed-roll detent—bearing and roller.
(11) Code punches.
(12) Code-punch retracting bail—bearings (2) and points of contact with code punches.
(13) Tape-feed suppressor at bearing—at point of contact with feed pawl.
(14) Locking-bail bearings—(2).
(15) Contact surfaces between locking bail and stop levers—grease.
(16) Locking-bail retractor at points of contact with locking bail—grease.
(17) Tape-depressing bail—bearing.

2.22 **Pivoted Transmitter and Transfer Mechanism.**

(1) Transmitter lid—bearings (2).

(2) Sensing fingers—bearings, and point of contact with guide plate.
(3) Transmitter yoke—bearings (2).
(4) Tape-feed lever—bearings (2).
(5) Tape-feed-pin lever bearing.
(6) Feed-pin oscillator—bearing and points of contact with feed-pin lever and guide.
(7) Feed-pin-oscillator lever—bearing, and guide comb.
(8) Transfer-selector levers (Y levers)—bearing, and at guide comb 2 places.
(9) Contact lever—bearing.
(10) Transmitter stop-contact operating plunger.

2.23 **Transfer and Slide-Lever Mechanism.**

(1) T levers—bearings, and at points of contact with selector levers and transfer-slide levers.
(2) T lever operating bail (transfer bail)—bearings (2).
(3) Transfer-slide levers—bearings 2 each.
(4) Contact-operating levers—bearings, and grease at point of contact with transfer-slide levers.

2.24 **Sensing Shaft.**

(1) Sensing-shaft bearings—ball bearing at right, fill oilcup at left.
(2) Sensing shaft—remove thumb-screw from right end of shaft and fill shaft with oil.
(3) Sensing-shaft gear—grease.
(4) Clutch assembly—oil freely.
(5) Detent lever at bearing.
(6) Oscillator-lever roller.
(7) T lever operating (transfer) bail roller.
(8) Clutch lever—bearings (2)—grease end.
(9) Thin film of grease on bearing surface of all cams.
(10) Oil lubricating wicks.

2.25 **Distributor Shaft.**

(1) Distributor-shaft bearings—ball bearing at right, fill oilcup at left. (NOTE: Oilcup should be set at a 45° angle with open end toward front.)
(2) Distributor shaft. Remove thumb-screw from right end of shaft and fill shaft with oil.
(3) Distributor-shaft gear—grease.
(4) Clutch assembly—oil freely.

(5) Detent lever—bearing.

(6) Clutch contact-operating levers—at bearing and thin film of grease at point of contact with contact insulator.

(7) Clutch lever—bearings (2)—grease end.

(8) Distributor-contact levers—bearing, grease point of contact with cams, thin film of grease on point of contact with contact insulator.

(9) Thin film of grease on bearing surface of all cams.

(10) Oil lubricating wicks.

NOTE: Remove all oil and grease from distributor contacts and excess oil from associated parts.

2.26 **Sensing and Distributor Cam-Sleeve Detents**

(1) Both loops of the detent-lever springs—(4).

(2) Clutch-detent levers—bearings (2).

(3) Clutch-detent levers—grease engaging surface with cam (2).

(4) Detent cams—thin film of grease (2).

(5) Lubricators—saturate with oil (2).

2.27 **Sensing and Distributing Drive Shalf.**

(1) Sensing and distributing drive-shaft gears (2)—grease.

(2) Sensing and distributing drive-shaft bearings (2).

2.28 **Contact Insulators.**

Apply a thin film of grease on the insulators of the following contacts at the point where insulators bear against their operating levers:

(1) Universal contact.

(2) Transmitter-stop contact.

(3) Tape-out contact.

(4) Distributor-shaft clutch-magnet contact.

(5) Clutch-magnet auxiliary contact.

(6) Switching contacts.

NOTE: Remove all excess oil and grease after lubrication and check that all contacts are free from oil, dirt or grease.

2.29 Base Main Shaft.

(a) Main-shaft motor gear—grease.

(b) Motor pinion—grease.

(c) Main-shaft ball bearings—grease.

(d) Main-shaft sensing and distributing drive gears—grease.

(e) Receiving-shaft drive gears—grease.

2.30 Lubricate the motor at yearly intervals—tag the motor to indicate the date of lubrication.

Caution: Experience indicates that more trouble is caused by over-lubrication of motor bearings than by under-lubrication. Care should be taken that the bearings are not over-lubricated.

2.31 After lubrication has been completed, clean the selector-magnet pole-face and associated armature. Use bond paper or lintless cloth moistened with trichloroethylene followed by dry bond paper or lintless cloth.

2.32 Connect power to the unit and after it has run for at least 10 minutes, check the tension of the selector cam clutch.