I. & M. REQUIREMENTS SPECIFICATION
BELL TELEPHONE LABORATORIES, INC.
SYSTEMS DEVELOPMENT DEPARTMENT, NEW YORK

X-70085-01, ISSUE 1
MAY 13, 1927
SUPERSEDING X-70085
ISSUE 1 OF 4/26/23

INSTALLATION AND MAINTENANCE REQUIREMENTS

FOR

NO. 50-A DIAL TESTERS

REASON FOR ISSUE

This specification is issued to supersede specification X-70085, issue 1, for the following reasons:

1. To change the "Stepping Magnet Armature Spring Pressure" (2.12) from Min. 80 gs., Max. 90 gs. to Min. 70 gs., Max. 80 gs. (Information for the W. E. Company covered by CO-125571).
2. To add requirements for "Cleaning" (2.1), "Transfer Spring Contact Separation" (2.22) and "Transfer Spring Contact Follow" (2.23).
3. To specify the period of lubrication under "Lubrication" (2.2) applied as a test as well as a readjust requirement.
4. To specify test limits for the following requirements:
   (a) Clearance Between Stop Pawl and Disc Teeth (2.4).
   (b) Stop Magnet Armature Spring Pressure (2.5).
   (c) Commutator Brush Pressure (2.7).
   (d) Interrupter Spring Pressure (2.9).
   (e) Stepping Magnet Armature Spring Pressure (2.12).
   (f) Driving Pawl Pressure (2.13).
   (g) Retaining Pawl Pressure (2.14).
   (h) Stepping Magnet Armature Air-Gap (2.15).
5. To make the following requirements apply as both test and readjust:
   (a) Stop Magnet Armature Location (2.6).
   (b) Commutator Brush Location (2.8).
   (c) Interrupter Air-Gap (2.10).
   (d) Driving Pawl Location (2.16).
   (e) Pendulum Locking Device Position (2.24).
6. To specify limits for "Driving Pawl Pressure" (2.13) Readj. Min. 25 gs., Max. 35 gs.

Changes were also made:

7. To bring specification up-to-date as to form with test and readjust requirements on separate sheets.
8. To revise maintenance methods.
9. Add methods for connecting the dial testers for test.

CHANGES FROM X-70085, ISSUE 1

Paragraph No.	Change
1.1	Referred to places where dial tester is used. Omitted.
1.4 and 1.5	Added.
2.01	Added.
*2.001 to *2.011	Added.
*2.1	Added.
*2.2	Were covered by paragraphs 2.7 and 3.02. Reworded.
*2.3	Period of inspection for lubrication made to apply as test requirement.
*2.4	Was covered under 3.031. Test requirement added.
*2.5	Was covered under 3.032. Test requirement added.
*2.6	Was covered under 3.033. Test requirement added.
*2.7	Was covered under 3.041. Test requirement added.
*2.8	Was covered under 3.042. Test requirement added.
*2.9 and *2.10	Were covered under 3.043. Test requirement added.
*2.11	Was covered under 3.044. Requirement made to apply as both test and readjust.
*2.12	Was covered under 3.045. The limits were changed from Min. 80 gs., Max. 90 gs. to Min. 70 gs., Max. 80 gs. Test requirement added.
*2.13	Was covered under 3.046. Readj. limits added, Min. 25 gs., Max. 35 gs. Test requirement added.
*2.14	Was covered under 3.047. Test requirement added.
*2.15	Was covered under 3.048. Test requirement added.
*2.16	Was covered under 3.049. Requirement made to apply as both test and readjust.
*2.17	Was covered under paragraphs 2.2 and 3.05. Reworded.
*2.18	Was covered by paragraphs 2.4 and 3.06. Reworded.
*2.19	Was covered by paragraphs 2.5 and 3.07. Reworded.
*2.20	Was covered by paragraphs 2.3 and 3.08. Reworded.
*2.21	Was covered by paragraphs 2.6 and 3.09. Reworded.
*2.22 and *2.23	Were covered by paragraph 3.10. Changed to specify air-gap and follow. Test requirement added.
*2.24	Was covered by paragraph 3.12. Reworded and made to apply as both test and readjust.

*These paragraphs are given on Sheets 1, 2 and 3 which have been added to this specification. Paragraphs 2.012 to 2.015, inclusive, were formerly covered under paragraph 3.01 (Readj.).

Paragraph No.	Change
3.01 to 3.102, M-3, Incl.	Added.
3.2 and 3.3	Were 3.02. Reworded.
3.4	Was part of 3.031. Reworded.
3.5	Was part of 3.032. Reworded.
3.6	Was part of 3.033. Reworded.
3.7	Was part of 3.041. Reworded.
3.8	Was part of 3.042. Reworded.
3.9 and 3.10	Were part of 3.043. Reworded.
3.11	Was part of 3.044. Reworded.
3.12	Was part of 3.045. Reworded.
3.13	Was part of 3.046. Reworded.
3.14	Was part of 3.047. Reworded.
3.15	Was part of 3.048. Reworded.
3.16	Was part of 3.049. Reworded.
3.17	Was covered by paragraphs 2.2 and 3.05. Reworded.
3.18	Was covered by paragraphs 2.4 and 3.06. Reworded.
3.19	Was covered by paragraphs 2.5 and 3.07. Reworded.
3.20	Was covered by paragraphs 2.3 and 3.08. Reworded and amplified.
3.21	Was covered by paragraphs 2.6 and 3.09. Reworded.
3.22 and 3.23	Added.
3.24	Was covered by paragraph 3.12. Reworded.

SECTION 1 - GENERAL

1.1 This specification supersedes specification X-70085, issue 1 and covers the installation and maintenance requirements for 50-A dial testers. Unless otherwise specified herein or in the Circuit Requirement Tables or Circuit Drawings the requirements covered by this specification apply to all dial testers of the above type.

1.2 Section 2 of this specification covers the requirements for both operating tests and the inspection of mechanical adjustments which shall be used to determine whether the dial tester is in proper condition for delivery to the customer and for service. These are called "Test Requirements" and are listed on Sheets 1 to 3 inclusive attached hereto.

1.3 Section 3 of this specification covers the operating and mechanical requirements which must be met in readjusting a dial tester which fails to meet the test requirements. These are called "Readjust Requirements" and are listed on Sheets 1 to 3 inclusive attached hereto. In addition to the readjust requirements, Section 3 also gives the approved maintenance methods of meeting these requirements.

1.4 The tensional and dimensional requirements set up in this specification, should be met unless otherwise specified, regardless of the method of test or adjustment employed. Facilities for meeting these requirements are provided in the form of standard tools and gauges. However, if it is found by experience that certain requirements can be met satisfactorily by "feel" or by "eye", these methods may be employed. It is suggested that checking with tools and gauges be made often enough to insure that proper test and adjustment requirements are being met. Furthermore, where requirements are close, it would be advisable to use tools and gauges to obtain adjustments.

1.5 The following is a list of tools, gauges and materials specified in Section 2 and Section 3 for use in inspecting and readjusting the dial tester:

Tools

Code No.	Description
35	Screw-driver 3-1/2" (Part of Tool 221)
43	Wrench 3/16" and 1/4" Hex. Open - Double-end Flat
179	Spring Adjuster
209	Wrench 5/16" Hex. Open-end
245	Wrench 3/8" and 7/16" Hex. Open - Double-end Flat
259	Spring Adjuster
265	Contact Burnisher
277	Wrench 1/4" Hex. Open-end
303 or (the replaced 234)	Spring Adjuster
327	Adjuster
349 or (the replaced 231)	Wrench 3/16" and 7/32" Hex. Closed - Double-end Offset 3/16" Flat Open-end Wrench
	Bell System P-Long Nose Pliers - 6-1/2"

Gauges

70	50-0-50 Gram Gauge
74-C	Assembly of No. 75 Type Thickness Gauges
78	.044" and .047" Double-end Thickness Gauge

Code No.	Description	Code No.	Description
79-C or (the replaced 79-A)	0-200 Gram Push-Pull Tension Gauge	-	C.P. Carbon Tetrachloride
	Materials	-	Eagle No. 3 Spindle Oil
	Oil Dag Mixture per KS-2248	-	Oil Dropper (Piece of No. 22 Gauge B & S Bare, Tinned Copper Wire)

SECTION 2 - TEST REQUIREMENTS

2.01 Unless otherwise specified, any dial tester of the type covered by this specification shall meet the test requirements given on Sheets 1 to 3 inclusive attached hereto.

SECTION 3 - READJUST REQUIREMENTS

3.0 General

3.01 A dial tester should be readjusted in accordance with the following methods to meet the readjust requirements specified on Sheets 1 to 3 inclusive attached hereto.

3.02 Where two or more requirements are covered by one set of methods the requirement headings in this section will be connected together with a bracket. The readjustments for meeting these requirements are more or less interdependent and in making readjustments to meet any one requirement consideration should be given to the others.

3.03 Before making any of the tests given below, set the dial tester for operation by moving the reset lever to the extreme left-hand position and then returning it to normal.

3.04 Connections for Test In a number of instances throughout this method it is necessary to connect the dial tester to a dial in order to check various requirements. For this purpose use the dial of the local test desk on which the dial tester is located and make the following set-ups respectively for panel type and step-by-step equipment.

3.041 Panel Type Equipment Insert an operator's telephone set into the operator's jack, select an idle talking line from the final multiple and operate the associated key to the talking (halfway down) position, thereby lighting the busy lamp associated with that key and connecting this final multiple line with the dial on the desk. After receiving dial tone in the operator's telephone set, dial the local test desk code (usually "511") and wait for flashing of red and white lights on one of the incoming test trunks. Insert the secondary cord into the jack associated with the flashing red and white lights and operate the "DT" key. This extinguishes the white light and the red light becomes steady. The dial on the test desk is now connected through to the dial tester and ready for test.

3.04 Step-by-Step Equipment Insert an operator's telephone set into the operator's jack, select an idle talking line from the connector multiple and operate the associated key to the talking (halfway down) position, thereby lighting the busy lamp associated with that key and connecting this connector multiple line with the dial on the desk. After receiving dial tone in the operator's telephone set, dial the local test desk code (usually "117") and wait for flashing of red light on one of the incoming test trunks. Insert the secondary cord into the jack associated with the flashing red light and operate the "DT" key. This extinguishes the red light. The dial on the test desk is now connected through to the dial tester and ready for test.

3.1 Cleaning (See Requirement 2.1 on Sheet 1)

M-1 Ratchet Wheel Teeth, Commutator, Disc Teeth, Commutator Bearings and Transfer Cam If upon inspection there is found to be an accumulation of gummy oil or foreign matter on the ratchet wheel teeth, commutator, disc teeth, commutator bearings and transfer cam, carbon tetrachloride may be used very sparingly to soften this matter so that it may be removed. Only C.P. carbon tetrachloride shall be used. All wearing parts of the dial tester such as the ratchet wheel, armature bearings, and disc teeth must be allowed to dry and then be relubricated, if they are cleaned with carbon tetrachloride.

M-2 Interrupter Contacts Clean the interrupter contacts in accordance with the "X" specification covering "Cleaning of Relay Contacts and Parts".

3.2 Lubrication (See Requirement 2.2 on Sheet 1)

M-1 Commutator Bearings Apply one drop of Eagle No. 3 Spindle Oil on both the upper and lower bearings of the commutator shaft.

M-2 Ratchet Wheel Teeth Apply two drops of oil dag mixture per KS-2248 to the surfaces of the ratchet wheel teeth while slowly operating and releasing the stepping magnet armature.

3.3 Record of Lubrication (See Requirement 2.3 on Sheet 2)

3.4 Clearance Between the Stop Pawl and the Disc Teeth (See Requirement 2.4 on Sheet 2)

M-1 To adjust for clearance between the stop pawl and the disc teeth attempt to insert the .010" blade or the .018" blade of the No. 74-C gauge between the stop pawl and the disc teeth.

M-2 Apply the No. 303 spring adjuster close to the base of the stop pawl spring and adjust the spring as required so that the minimum gauge enters the gap and the

maximum gauge does not enter the gap or if it does, fits snugly in the gap.

3.5 Stop Magnet Armature Spring Pressure (See Requirement 2.5 on Sheet 2)

M-1 To check the stop magnet armature spring pressure, operate the stop magnet armature and apply a No. 70 gram gauge to the end of each of the springs. The tension registered on the gauge shall be at least the specified minimum pressure but not more than the specified maximum pressure against the armature studs.

M-2 To adjust the stop magnet armature spring pressure apply the No. 179 spring adjuster near the bases of the springs and tension the springs as required.

M-3 For the correct operation of the dial tester it is essential that the tension of these springs be within their specified limits.

3.6 Stop Magnet Armature Air-Gap (See Requirement 2.6 on Sheet 2)

M-1 To check the stop magnet armature air-gap note whether or not, with the armature unoperated (pawl engaging the teeth), a slight movement of the armature toward its core will cause the disc to follow in the same direction. If the pawl bottoms in the teeth, this movement can be detected. In order that slight rotation of the disc which may result from this movement of the pawl will not be confused with displacement of the disc in line with the pawl, the latter movement should be observed at the tube enclosing the suspension wire where it enters the arbor of the dial tester. If this movement is more than .002" or .003" the armature air-gap should be reduced.

M-2 To adjust the armature air-gap apply the No. 349 double-end offset wrench to the armature back stop nut and by turning the nut to the left or to the right adjust the gap until the pawl just bottoms in the disc teeth checked as described in M-1.

3.7 Commutator Brush Pressure (See Requirement 2.7 on Sheet 2)

M-1 To adjust the pressure of the commutator brush, apply the No. 179 spring adjuster near the base of the brush and obtain the required pressure by adjusting the brush to the right or to the left as necessary.

3.8 Commutator Brush Location (See Requirement 2.8 on Sheet 2)

M-1 To check for the proper commutator brush location, step the commutator to the point where commutator brush occupies an insulated slot of the commutator and note that the brush is then approximately equidistant from the edges of the slot of the commutator.

M-2 To adjust the location of the commutator brush apply the No. 303 spring adjuster near the contact end of the brush and adjust the brush as required.

3.9 Interrupter Spring Pressure (See Requirement 2.9 on Sheet 2)

3.10 Interrupter Spring Contact Separation (See Requirement 2.10 on Sheet 2)

3.11 Interrupter Spring Contact Follow (See Requirement 2.11 on Sheet 2)

M-1 To adjust for spring pressure, contact separation and contact follow, apply the No. 179 spring adjuster near the base of the interrupter springs and adjust them as required. If it is difficult to meet the requirement for follow by readjustment of the springs in this manner, it will be satisfactory to bend the tang a slight amount. Use P-long nose pliers to bend the tang.

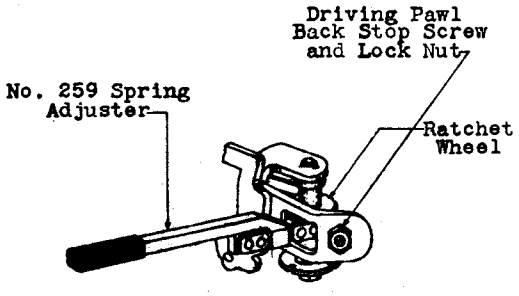
3.12 Stepping Magnet Armature Spring Pressure (See Requirement 2.12 on Sheet 2)

M-1 To adjust the pressure of the stepping magnet armature springs, apply the No. 179 spring adjuster close to the base of the springs and tension them as required.

3.13 Driving Pawl Pressure (See Requirement 2.13 on Sheet 3)

M-1 To check the driving pawl pressure, rotate the disc and observe that the pawl engages satisfactorily against the root of any ratchet wheel tooth.

M-2 To adjust the driving pawl pressure, remove the armature back-stop nut with the No. 277 1/4" hex. open-end wrench and loosen the driving pawl back-stop screw and nut with a No. 35 screw-driver and a No. 209 5/16" hex. open-end wrench sufficiently to allow the driving pawl to clear the ratchet wheel when the armature is moved away from the core. Hold the armature so that the pawl clears the ratchet wheel, apply the No. 259 spring adjuster to the reed of the driving pawl in the manner shown in Fig. A and carefully adjust the pawl as required.



Method of Adjusting
Driving Pawl Pressure

Fig. A

M-3 After making this adjustment replace the armature back-stop nut and adjust the position of the driving pawl back-stop screw as required.

3.14 Retaining Pawl Pressure (See Requirement 2.14 on Sheet 2)

M-1 To adjust the retaining pawl pressure, apply the No. 179 spring adjuster near the base of the spring and adjust it as required.

3.15 Stepping Magnet Armature Air-Gap (See Requirement 2.15 on Sheet 3)

M-1 To check the armature air-gap of the stepping magnet, operate the armature and apply the No. 78 thickness gauge between the back of the armature and the armature adjusting nut. The .044" end of the gauge should not bind and the .047" end of the gauge should fit snugly.

M-2 To adjust the armature air-gap of the stepping magnet, apply the No. 277 1/4" hex. open-end wrench to the armature adjusting nut and turn the nut to the left or right as required.

3.16 Driving Pawl Location (See Requirement 2.16 on Sheet 3)

M-1 To check the location of the driving pawl, observe that it just touches its back-stop on its back stroke when the stepping magnet is operated electrically.

M-2 To adjust the location of the driving pawl loosen the driving pawl back-stop lock nut with the No. 209 wrench and turn the screw in or out as required with the No. 35 screw-driver.

3.17 Oscillation Check for Alignment (See Requirement 2.17 on Sheet 3)

M-1 To check the alignment of a dial tester, move the disc to its start position by means of the reset lever and return the lever to its normal position.

M-2 Make the connections for test which are outlined under paragraph 3.04.

M-3 Dial the digit 1 or release the "DT" key. This causes the stepping magnet to make one step, which brings the commutator brush (normally resting on an insulated segment of the commutator) in contact with a metallic segment of the commutator, thereby operating the stop magnet which releases the disc of the dial tester and allows the disc to oscillate.

M-4 While the disc is oscillating, count its swings (a complete swing being a motion from one extreme position of the disc to the opposite extreme position). If, after 20 swings, the decrease in amplitude exceeds 10° as indicated on the scale, it is an indication that the dial tester is not properly aligned.

M-5 In making the above tests sufficient time (usually about one second) should be allowed between the setting of the disc and its release to permit it to come to rest.

M-6 If the dial tester is not properly aligned, observe the lower part of the pendulum arbor where it swings in the hole in the lower part of the dial tester. When the dial tester is level the arbor will be approximately centered in the hole.

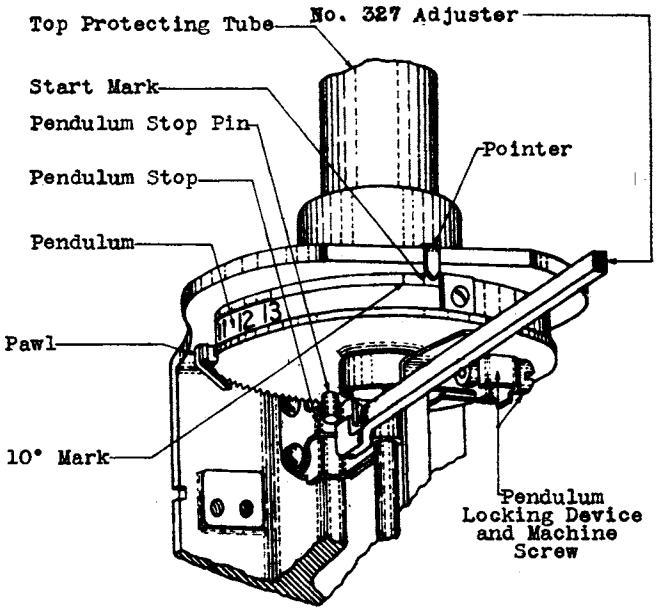
M-7 If it is observed to touch at the front or back of the hole it will be necessary to loosen the bolts by means of which the dial tester is mounted on the test board with a No. 245 3/8" and 7/16" hex. open, double-end flat wrench and place small fibre shims behind the top or bottom of the dial tester as necessary.

M-8 Should it be observed to touch at the right or left of the hole, loosen the mounting bolts with the No. 245 3/8" and 7/16" hex. open double-end flat wrench and shift the dial tester slightly to level it.

M-9 After leveling the dial tester, repeat the tests for alignment.

3.18 Start Position of Disc (See Requirement 2.18 on Sheet 3)

M-1 If readjustment for the start position of the disc is necessary, adjust the pendulum stop with a No. 327 Adjuster in the manner shown in Fig. B.



Method of Adjusting Start Position of Disc

Fig. B

M-2 If the start mark on the scale is not directly beneath the pointer, loosen the scale clamping screws at both ends of the scale with a No. 35 screw-driver and slide the scale to the left or to the right until the start mark on the scale is directly beneath the pointer. Retighten the scale clamping screws after the desired adjustment has been obtained.

3.19 Rest Position of Disc (See Requirement 2.19 on Sheet 3)

M-1 To observe the disc in its rest position, move the disc to its start position by means of the reset lever and return the lever to its normal position.

M-2 Make the connections for test which are outlined under paragraph 3.04.

M-3 Dial the digit 1 or release the "DT" key. This causes the stepping magnet to make one step, which brings the commutator brush (normally resting on an insulated segment of the commutator) in contact with a metallic segment of the commutator, thereby operating the stop magnet which releases the disc of the dial tester and allows the disc to oscillate. Allow the disc to oscillate freely until it comes to rest. It is permissible to dampen the swing of the disc to allow it to come to rest quickly.

M-4 Observe that the disc stops with the figure 10 exactly beneath the pointer.

M-5 If it is necessary to make a correction for this requirement, remove the top protecting tube, release the knurled torsion head locking screw in the torsion head and turn the torsion head in the proper direction to line up the figure 10 on the scale with the pointer.

M-6 After making these corrections, tighten the locking screw and replace the top protecting tube.

3.20 Oscillation Test for Speed (See Requirement 2.20 on Sheet 3)

M-1 Move the reset arm to its extreme left-hand position and then return it to normal.

M-2 Make the connections for test which are outlined under paragraph 3.04.

M-3 Dial the digit 1 or release the "DT" key. This causes the stepping magnet to make one step, which brings the commutator brush (normally resting on an insulated segment of the commutator) in contact with a metallic segment of the commutator, thereby operating the stop magnet which releases the disc of the dial tester and allows the disc to oscillate.

M-4 Allow the disc to swing from its starting point. Note the time required for 50 complete swings. The 50 complete swings should occur in at least 89 seconds but not more than 91 seconds. If the disc is slow it may be due to its not being properly aligned or to the suspension wire not being taut.

M-5 To tighten the suspension wire, remove the top and the bottom protecting tubes and turn the knurled sleeve nut, which is attached to the lower head screw, down until the clearance between adjacent turns of the compression spring is approximately 1/64" or an amount which is sufficient to prevent adjacent turns from touching.

M-6 Care should be exercised in turning the knurled sleeve nut since if it is turned to a point where there is no clearance between the adjacent turns of the compression spring, the suspension wire may be broken.

M-7 In case the suspension wire cannot be tightened sufficiently to obtain the proper torsion under the above conditions, turn the knurled sleeve nut up as far as possible and then, with the No. 43 double-end flat wrench loosen the suspension wire bottom set-screw sufficiently to allow the wire to be pulled through the hole in the bottom anchor screw. Take up the slack in the suspension wire, tighten the locking nut and turn the knurled sleeve nut down as described under M-5 above. Then replace the protecting tubes.

M-8 To make the pendulum fast or slow, turn the adjusting screw in a clockwise direction to increase the speed and in a counter-clockwise direction to decrease the speed. It is very improbable that such adjustment will be needed. Therefore this adjusting screw should be moved only after a check of all of the parts has failed to remedy the trouble.

3.21 Stepping Magnet Operation (See Requirement 2.21 on Sheet 3)

M-1 To check the release of the stepping magnet, short-circuit the two lower transfer springs and move the reset lever slightly from its normal position. The stepping magnet should then operate and release at a speed which will rotate the commutator not less than 10 complete revolutions in 16 seconds.

M-2 Before adjusting this requirement observe whether or not the stepping magnet meets all of the other requirements specified for it. If the stepping magnet meets all the other requirements but fails to operate at the desired speed, it may be necessary to change the tension of the interrupter springs or armature springs.

M-3 Care should be taken when reducing spring pressures to weaken the springs which have the strongest pressure and not to weaken any spring below its required pressure.

3.22 Transfer Spring Contact Separation (See Requirement 2.22 on Sheet 3)

3.23 Transfer Spring Contact Follow (See Requirement 2.23 on Sheet 3)

M-1 To check that the transfer springs have the proper contact separation and follow place the reset lever in its normal position and observe that the actuating spring is in its lowest position in a notch of the cam. Then observe whether or not the air-gap between the open contacts is approximately .020".

M-2 Move the reset lever from the normal position and observe that the back contact springs have a follow of 1/32".

M-3 After moving the reset lever from the normal position, move it to the operated position and, as the actuating spring returns to its position in a notch of the cam observe that the front contact springs have a follow of 1/32".

M-4 To adjust for contact separation and follow apply the No. 259 spring adjuster to

the upper and the lower sets of springs and adjust them as required.

M-5 In making any of the above adjustments, care should be taken to avoid making sharp bends or kinks in springs.

3.24 Pendulum Locking Device Position (See Requirement 2.24 on Sheet 3)

M-1 When it is necessary to ship or move a dial tester from one position to another the pendulum locking device should be tightened by turning the pendulum locking screw in (to the right) with a No. 35 screw-driver. The device clamps the pendulum in a rigid position thereby preventing swinging of the pendulum and breaking the suspension wire.

M-2 After the dial tester is mounted on the test desk, the pendulum should be released by loosening the pendulum locking screw. This should be done by turning the locking screw out (to the left) with the screw-driver.

M-3 In loosening the locking screw, care should be taken to see that the screw is turned out far enough so that the locking device does not touch the pendulum when it is swinging.

Attached:

X-70085-01, Sheets 1 to 3 Incl., Issue 1

BELL TELEPHONE LABORATORIES, INC.

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DEFINITIONS AND GENERAL INFORMATION

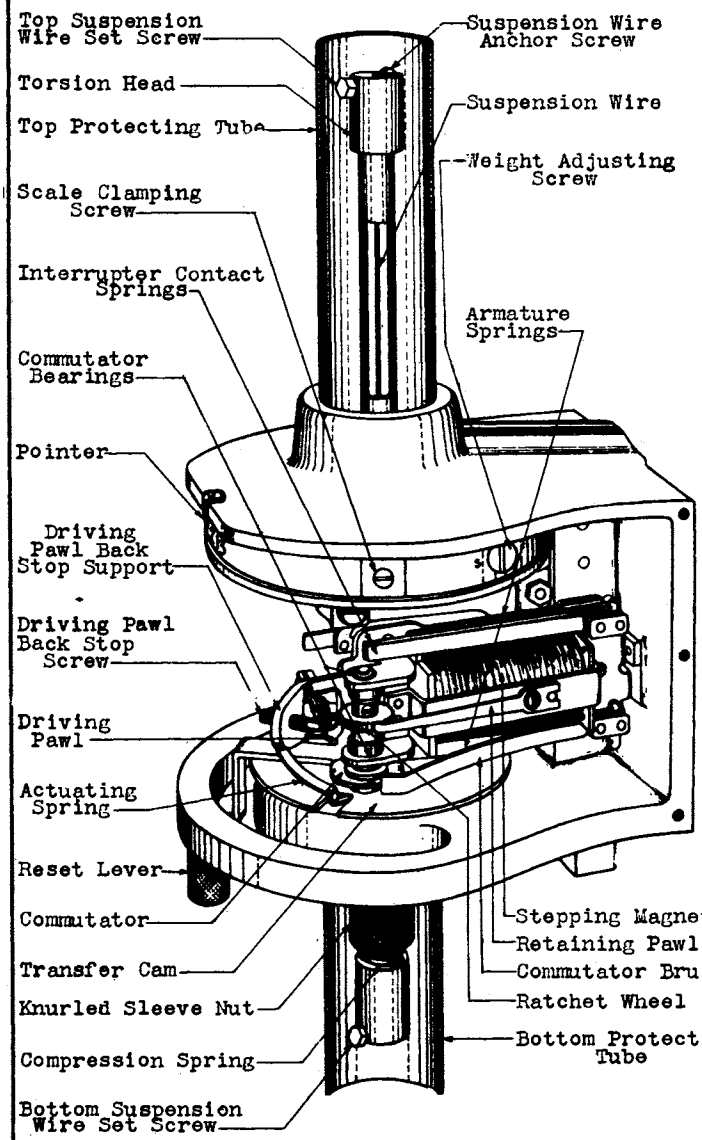
2.001 Operated position of the stop and stepping magnets is that to which the armature advances when the specified current is applied to the magnet and the armature moves so that at least one of the non-freezing discs is touching the magnet core.

2.002 Non-operated or normal position of the stop and stepping magnets is that which the armature assumes when it is resting against the armature back stop screw with the armature air-gap within the specified limits.

2.003 Operated position of rese lever is that in which the lever is in its extreme left-hand position.

2.004 Normal position of reset lever is that in which the lever is in its extreme right-hand position.

2.005 One Drop of Oil The amount of oil obtained from a piece of No. 22 "B" and "S" gauge bare, tinned, copper wire, when it is dipped 1/2" into the oil and quickly removed shall constitute one drop.



Dial Tester in Intermediate Position

Fig. 1

2.006 Unless otherwise specified, the requirements given on Sheets 1 to 3 inclusive are both test and readjust requirements.

2.007 Unless otherwise specified, where the test requirement is the same as the readjust requirement and where there is a maximum and a minimum limit for the requirement, an effort should be made in readjusting a dial tester to work to the mean of the limits.

2.008 Unless otherwise specified, where a readjust requirement specifies only one limit (either a maximum or a minimum limit) it is advisable, if possible, to readjust inside of the limit.

2.009 Unless otherwise specified contact pressure shall be measured at the point of contact just as the contacts break. Other spring tensions shall be measured at the points indicated.

2.010 Requirements are given in the order in which adjustments should be made by the Telephone Company.

2.011 Gauges and methods are listed for the use of the Telephone Company.

2.012 After setting the disc at the starting point, the reset lever should always be returned to the normal (extreme right-hand) position, before the dial is operated, to prevent interference with the motion of the disc.

2.013 The instrument is designed to test the speed of dials only when the digit 0 is dialed. If any other digit is dialed, the stop magnet is not released and the disc will continue to oscillate after the dial has come to rest.

2.014 Care should be taken to prevent jarring the instrument while testing the speed of a dial since the accuracy of the result will be affected.

2.015 Be sure always to allow sufficient time (usually about one second) after setting the disc at its start position to allow it to come to rest.

REQUIREMENTS

2.1 Cleaning (Readjust Only) The ratchet wheel commutator, disc teeth, commutator bearings, and transfer cam shall be cleaned only by approved methods, and the interrupter contacts shall be cleaned when necessary in accordance with the "X" specification covering "Cleaning of Relay Contacts and Parts".

2.2 Lubrication

(a) Commutator Shaft Bearings The upper and lower bearings of the commutator shaft shall each be lubricated with one drop of Eagle No. 3 spindle oil.

(b) Ratchet Wheel Teeth The surfaces of the ratchet wheel teeth shall be lubricated with two drops of oil dag mixture per KS-2248. This lubricant shall be applied while slowly operating and releasing the stepping magnet armature.

(c) It is recommended that initially, the above mentioned parts of the dial tester shall be lubricated at intervals of six months.

(d) Periodic inspections shall be made to determine whether local conditions will permit an extension of the interval between lubrication periods.

TEST AND READJUST REQUIREMENTS
FOR
NO. 50-A DIAL TESTERS

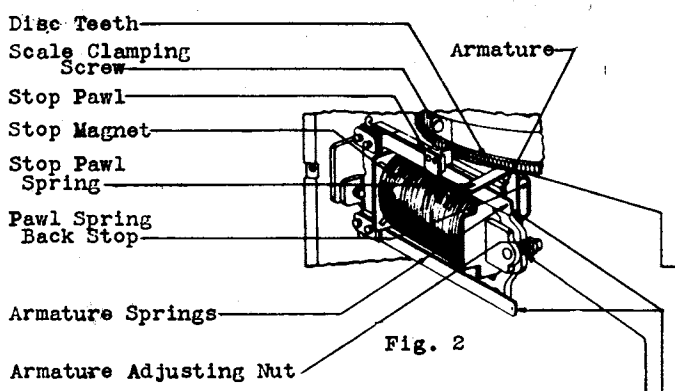
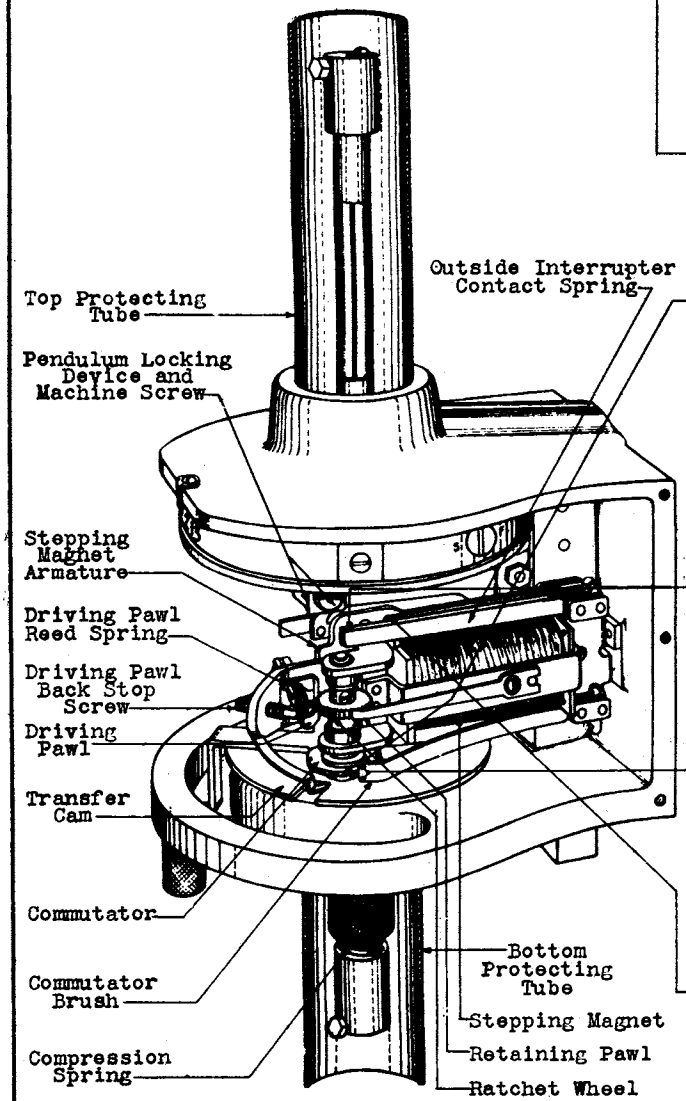


Fig. 2



Dial Tester In Intermediate Position

Fig. 3

(e) No dial tester shall be turned over to the Telephone Company which has been operated for more than three (3) months since the dial tester was last lubricated.

2.3 Record of Lubrication During the period of installation, a record shall be kept, by date, of the lubrication of the dial tester and this record shall be turned over to the Telephone Company with the equipment.

2.4 Clearance Between Stop Pawl and Disc Teeth With the stop magnet operated, there shall be a clearance between the stop pawl and the disc teeth at any point on the periphery of the disc of:

Test - Min. .005", Max. .017"
Readjust - Min. .010", Max. .017"

The .018" blade of the No. 74-C gauge shall not enter. Use the .005" and .010" blades of the No. 74-C gauge to check the minimum limits.

2.5 Stop Magnet Armature Spring Pressure With the armature in its operated position, the pressure of each stop magnet armature spring measured at the end of the spring shall be:

Test - Min. 25 grams, Max. 35 grams
Readjust - Min. 27 grams, Max. 33 grams

Use a No. 70 gram gauge.

2.6 Stop Magnet Armature Location The armature shall just touch the armature adjusting nut when the stop pawl bottoms in the teeth on the rim of the disc, gauged when the disc is in the start position and also when the disc is hanging freely in its rest position. Gauge by eye.

2.7 Commutator Brush Pressure The pressure of the commutator brush measured at the end of the brush shall be:

Test - Min. 25 grams, Max. 35 grams
Readjust - Min. 27 grams, Max. 33 grams

Use a No. 70 gram gauge.

2.8 Commutator Brush Location When the commutator brush is resting on an insulated slot of the commutator it shall be as near as practicable equidistant from the edges of the slot of the commutator. Gauge by eye.

2.9 Interrupter Spring Pressure With the stepping magnet operated, the pressure of the outside interrupter contact spring, measured at the end of the spring, shall be:

Test - Min. 23 grams, Max. 33 grams
Readjust - Min. 25 grams, Max. 31 grams

Use a No. 70 gram gauge.

2.10 Interrupter Spring Contact Separation With the stepping magnet operated, the air-gap between the open contact of the interrupter contact springs shall be approximately .020". Gauge by eye.

2.11 Interrupter Spring Contact Follow When the armature is restored to its normal position, the contact follow shall be approximately .005". Gauge by eye.

2.12 Stepping Magnet Armature Spring Pressure With the armature in its operated position, the pressure of each armature spring against the armature, measured at the end of the spring shall be:

Test - Min. 65 grams, Max. 85 grams
Readjust - Min. 70 grams, Max. 80 grams

Use a No. 79-C gram gauge.

TEST AND READJUST REQUIREMENTS
FOR
NO. 50-A DIAL TESTERS

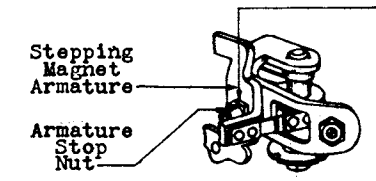


Fig. 4

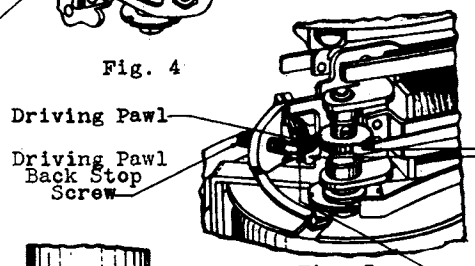


Fig. 5

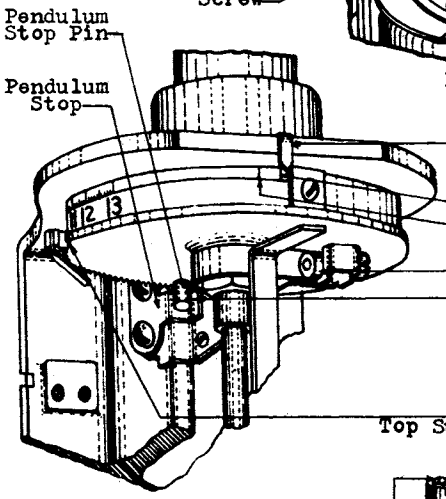
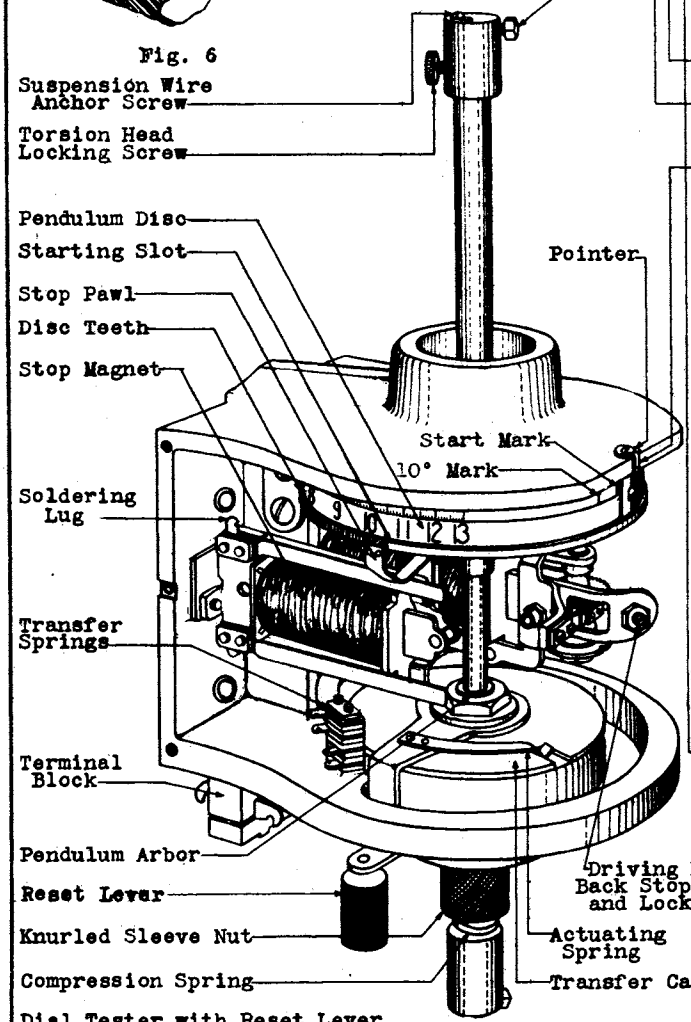


Fig. 6



Dial Tester with Reset Lever in Operated Position

Fig. 7

2.13 Driving Pawl Pressure The pressure of the driving pawl measured at the hook shall be:
Test - Min. 20 grams, Max. 40 grams
Readjust - Min. 25 grams, Max. 35 grams
Use a No. 70 gram gauge.

2.14 Retaining Pawl Pressure The pressure of the retaining pawl, measured at the bend in the spring with the spring resting on the crown of any ratchet wheel tooth, shall be:
Test - Min. 20 grams, Max. 30 grams
Readjust - Min. 22 grams, Max. 28 grams
Use a No. 70 gram gauge.

2.15 Stepping Magnet Armature Air-Gap With the armature in its operated position, the armature air-gap, measured between the back of the armature and the armature adjusting nut shall be:
Test - Min. .040", Max. .050"
Readjust - Min. .044", Max. .047"
Use a No. 78 thickness gauge.

2.16 Driving Pawl Location The driving pawl shall just touch its back stop on its back stroke. Gauge by eye.

2.17 Oscillation Check for Alignment When the disc is allowed to swing from its start position the decrease in amplitude of the disc at the end of the first twenty swings shall be less than 10°. Gauge by eye.

2.18 Start Position of Disc
(a) With the reset arm moved to the extreme left-hand position and then returned to normal the stop pawl shall fall in the starting slot and rest against the first tooth in the rim of the disc.
(b) The clearance between the pendulum stop pin and its stop shall not exceed 1/64".
(c) The start mark on the scale shall be directly beneath the pointer.
Gauge by eye.

2.19 Rest Position of Disc When the disc is allowed to oscillate freely it shall come to rest with the figure 10 directly beneath the pointer. Gauge by eye.

2.20 Oscillation Test for Speed
(a) When the disc is allowed to swing from its starting point, fifty complete swings shall occur in at least 89 seconds, but not more than 91 seconds.
(b) The suspension wire shall always be kept taut. Gauge by eye.

2.21 Stepping Magnet Operation The stepping magnet shall release in a local circuit at a speed which will rotate the commutator not less than ten complete revolutions in 16 seconds. Gauge by eye.

2.22 Transfer Spring Contact Separation The air-gap between the open contacts of the springs shall be approximately .020".

2.23 Transfer Spring Contact Follow The transfer springs shall have a follow of 1/32". Gauge by eye.

2.24 Pendulum Locking Device Position The locking device shall not touch the pendulum when it is swinging. Gauge by eye.

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