STATION DIALS
2 AND 4 TYPES
MAINTENANCE

1. GENERAL

1.01 This section outlines the requirements, and the testing and adjusting procedures for the maintenance of 2A, 2C, 2H, 4H, and 4C type dials.

2. REQUIREMENTS

General

2.01 Parts of dials of the types referred to herein are shown in Fig. 1.

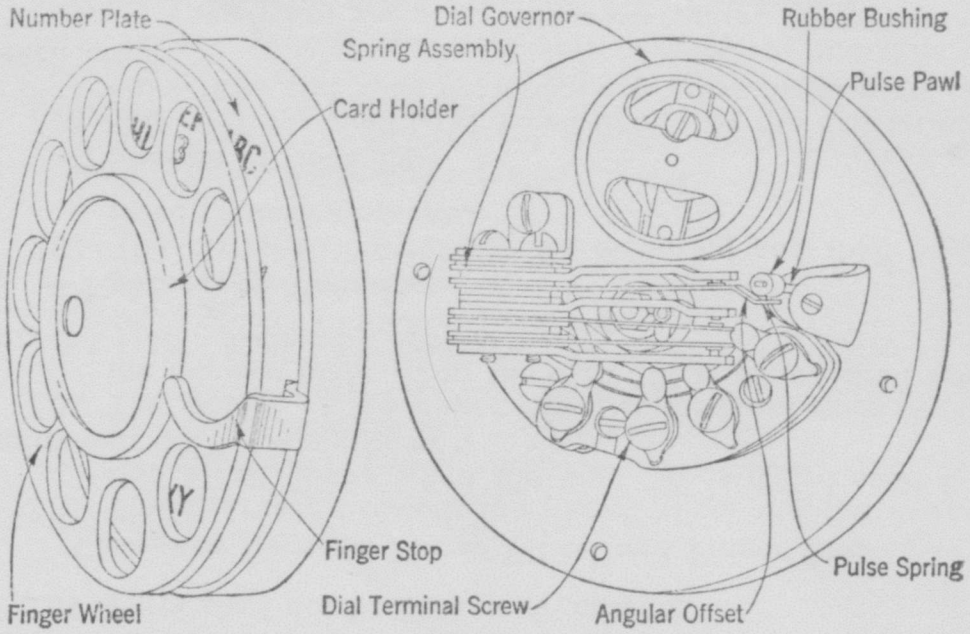

Fig. 1.

Lubrication

2.02 Do not lubricate any parts of dials at stations.

Appearance

2.03 The dial number plate shall not be dirty or badly marred, nor have the enamel chipped so as to present an unsatisfactory appearance.

2.04 Parts shall not be broken or missing.

Clearance Between Finger Wheel and Finger Stop

2.05 The clearance between the finger wheel and the finger stop at all points when the digit "0" is dialed shall be minimum .025". Gauge by eye.

2.06 The wobble of the finger wheel toward and away from the number plate when the digit "0" is dialed shall not exceed 1/32". Gauge by eye.

Tightness of Mounting

2.07 The dial shall be tight on its mounting and shall have three mounting screws.

Tightness of Cord Tips

2.08 The cord tips shall be clamped tightly by the dial terminal screws and shall not touch any other metal parts or each other.

Arrangement of Cord Tips and Free Conductors

2.09 The arrangement of cord tips and free conductors shall be in accordance with the cording practices for the particular piece of apparatus, so as not to interfere with the working parts of the dial.

Straightness of Contact Springs

2.10 The dial contact springs shall not be distorted. These springs shall not be adjusted in the field.

Pulse Pawl Adjustment

2.11 The pulse pawl shall strike the flat portion of the pulse spring and not the angular offset. Gauge by eye.

2.12 There shall be a perceptible clearance (minimum .005") between the rubber bushing on the pulse pawl and the adjacent pulse spring when the dial is at rest. Gauge by eye.

Speed

2.13 Before making a speed test always inspect the dial and make any necessary permissible repairs.

2.14 The speed of the particular dial being tested shall be within the limits specified in the table on page 3 when the digit "0" is dialed.

Dials	Pulses per Second			
	Test		Readjust	
	Min.	Max.	Min.	Max.
2A, 2H, 4H	8	11	9–1/2	10–1/2
2C, 4C	11	13	11	13

2.15 **Check for Dial Speed:** The procedure for checking the dial speed depends upon the type of testing apparatus used.

2.16 **50 Type Dial Tester:** Dial the test desk code (usually 511 in panel type offices and 117 in step-by-step offices) and advise the test deskman of the type of dial to be tested. When dial tone is heard, indicating that the test deskman has connected the line to a dial tester and that the dial tester is ready to receive pulses, dial "0." The test deskman will ask that this be repeated at least once to determine whether successive operations are between the specified limits.

2.17 **51 Type Dial Tester—With Assistance:** Dial the test desk code and advise the test deskman of the type of dial to be tested and also whether it is desired to test or adjust. When dial tone is heard dial "0" and listen for the audible signal which will indicate whether the dial speed is O.K., Fast, or Slow. The audible signals are as follows:

O.K. Ringing Induction.

Fast Rapidly interrupted dial tone (.2 to .3 seconds on, .2 to .3 seconds off).

Slow Slowly interrupted dial tone (.15 to .3 seconds on, 1.15 to 1.2 seconds off).

2.18 If a repeat test is desired, advise the test deskman who will again prepare the dial tester for test.

2.19 **51 Type Dial Tester—Without Assistance:** Dial the ringer test code and listen for dial tone. Then dial the desired digit indicated in the following table:

Dial	Digit to be Dialed	Test
2A, 2H, 4H	2	Test Value (8 to 11 pulses per second).
2A, 2H, 4H	3	Adjust Value (9-1/2 to 10-1/2 pulses per second).
2C, 4C	4	Test and Readjust Value (11 to 13 pulses per second). Use in step-by-step offices only.

2.20 When dial tone is heard after dialing one of the above digits, dial "0" and listen for the audible signal as covered in paragraph 2.16 to determine whether the dial speed is O.K., Fast or Slow. To repeat the test, dial the proper digit as given in the table above and when dial tone is heard dial "0" again. The test may be repeated as many times as necessary, changing from the test to the adjust value if desired, by dialing the proper digits except that if the connection is held too long the test circuit will be automatically disconnected. If this occurs, disconnect momentarily and repeat the test operations.

2.21 **Stroboscope Dial Tester:** The stroboscope dial tester consists of a 2A target and an 11A tuning fork. One side of the 2A target is for the test limits (8 to 11 P.P.S.) and the other is for the readjust limits (9-1/2 to 10-1/2 P.P.S.). The stroboscope is for testing 2A, 2H, and 4H type dials only. If necessary to reverse the disc, unscrew the knob and invert the disc. In replacing the disc take care to see that the pin in the base of the target properly engages the hole in the disc.

2.22 Mount the 2A target on the dial to be tested by grasping the knurled knob and depressing the push button to expand the prongs as shown in Fig. 2. (Use of the push button is especially important when placing the target on colored dials to avoid marring their finish.)

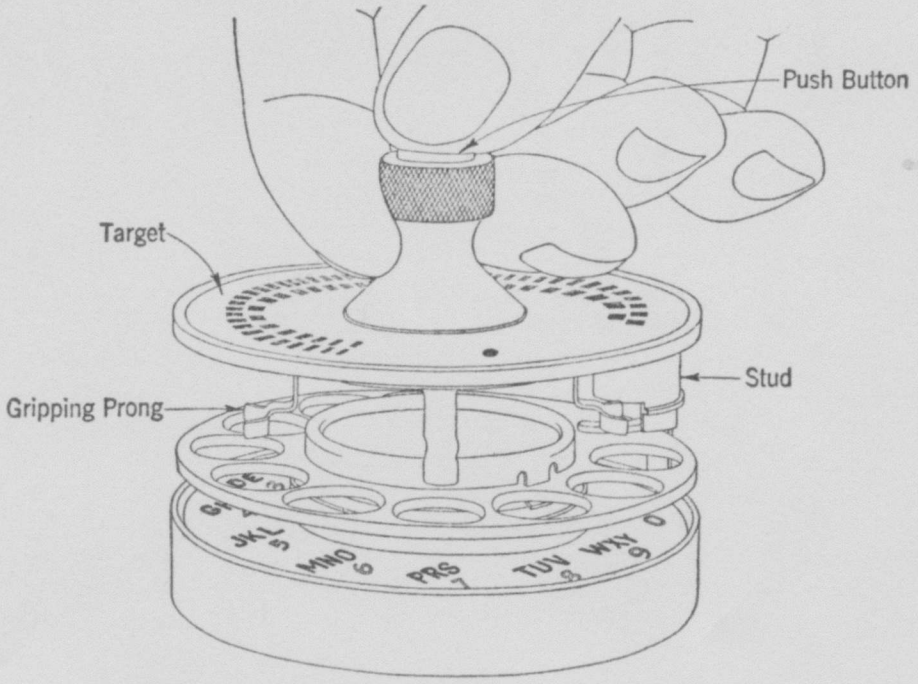

Fig. 2.

Partially insert the notched stud and prong into the zero hole of the dial and so that the remaining three prongs are above holes 1, 4 and 7. While still depressing the push button so as to avoid marring the finish of the dial, carefully press the target into place so that the prongs engage the holes above mentioned.

2.23 See that the target does not affect the dial speed by determining that there is some clearance between the gripping prongs of the target and the number plate and number plate clamping ring throughout the rotation of the dial. Also see that there is some clearance between the three prongs of the target and the finger stop. The prongs of the target should be square with the base in order to obtain proper clearance and grip. Use long nose pliers to adjust the target in case the prongs are not square.

2.24 Slide the cover on the 11A tuning fork so as to expose the prongs, and grasp the fork in a temporary position in the palm of one hand, with the cover projecting beyond the hand and with the push button convenient to the thumb. By means of the knob on the target wind the dial to the stop position with this same hand. (By suitably turning this hand and wrist before gripping the knob the dial can be wound in one operation.) When wound, hold the dial with the other

hand by placing the index finger against the edge of the finger wheel. Also hold the tuning fork over the target with one hand steadying the other as shown in Fig. 3.

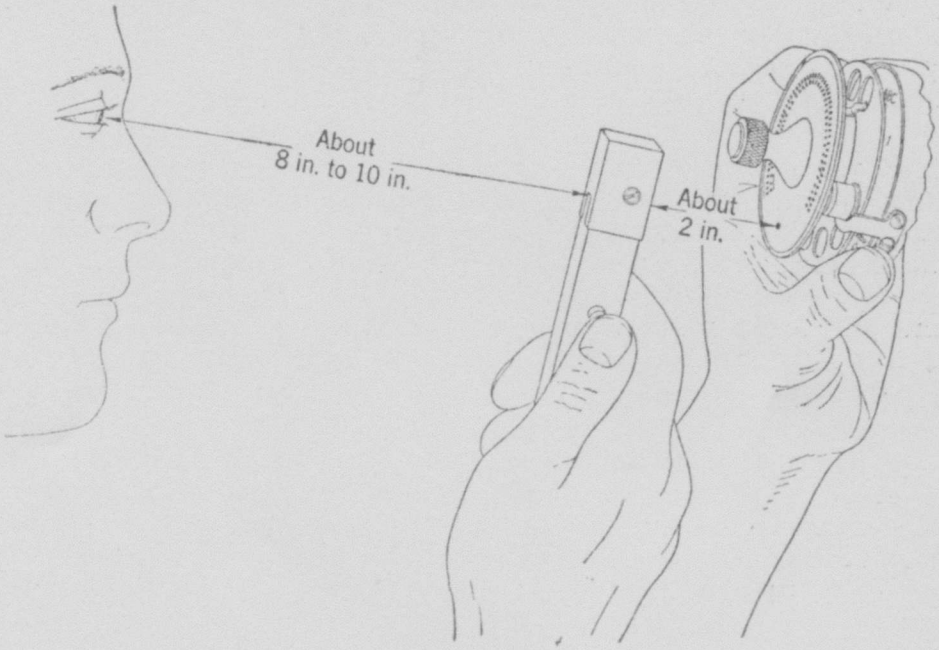

Fig. 3.

With the thumb pressing the button in far enough to partially open the prongs, centrally sight the spot on the target marked "Sight Here." (For the average individual the fork should be held about 2 inches from the target and 8 or 10 inches from the eye.) Fully press the button, and then release the dial by removing the index finger from the finger wheel.

2.25 The apparent movement of the rows of divisions on the target as viewed through the vibrating fork indicates whether the dial speed is within, at or outside the limits appearing on the target. The apparent movement of the rows of divisions at various speeds has the following significance:

Apparent Movement of Rows of Divisions	Speed Indication
Rows of divisions rotate in opposite directions (Directions indicated by arrows on target).	Dial speed is within limits indicated on target.
Inside row of divisions (labeled "Max") appears to stand still or to rotate in counter-clockwise direction. (Opposite to direction indicated by arrow.)	Dial speed is at or above its maximum speed limit.
Outside row of divisions (labeled "Min") appears to stand still or to rotate in a clockwise direction. (Opposite to direction indicated by arrow.)	Dial speed is at or below its minimum speed limit.

Note: The relative apparent speed of the two rows of divisions with respect to each other is an indication of the proximity of the dial speed to either maximum or minimum limit.

3. ADJUSTING AND CLEANING PROCEDURES

General

3.01 Where a part is specified to be replaced, replace it with another part of the same code number or its equivalent.

Clearance Between Finger Wheel and Finger Stop

3.02 If the clearance between the finger wheel and the finger stop does not meet requirements, adjust the finger stop with a pair of long nose or duck bill pliers. If the finger wheel is bent and does not meet requirements, replace it.

Number Plate

3.03 If the number plate is dirty, wipe it clean with a clean, moist KS-2423 cloth. If the number plate is badly marred or if the enamel is chipped, replace it. To change the number plate, remove card holder, and then remove number plate clamping ring as shown in Fig. 4.

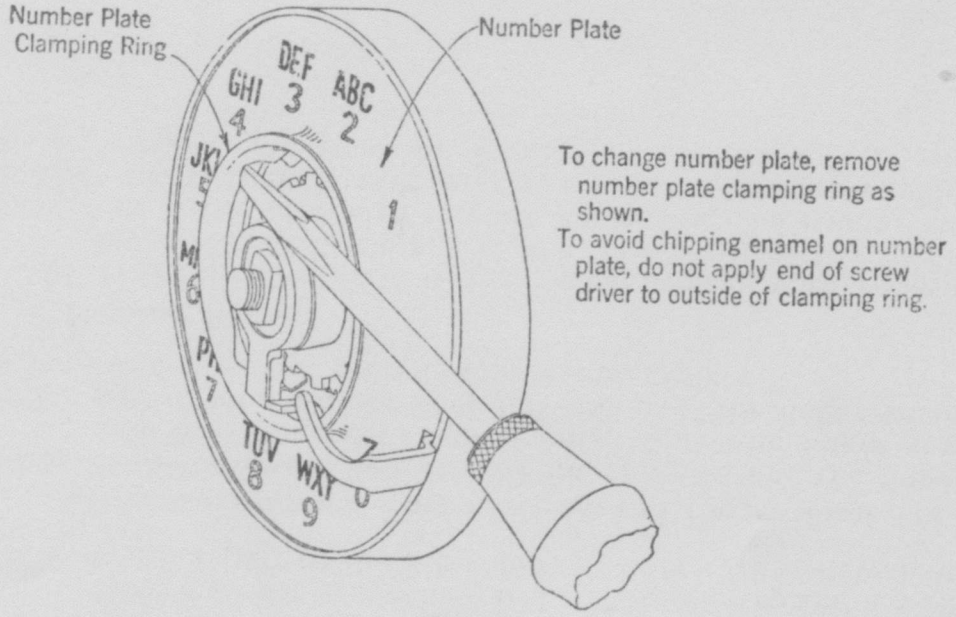

Fig. 4.

Contacts and Contact Springs

3.04 Contacts should be cleaned by burnishing with a 265-B tool.

3.05 Contact springs should not be adjusted. If they are found distorted, replace the dial.

Pulse Pawl

3.06 If the pulse pawl requirement is not met, replace the dial.

Tightness of Mounting

3.07 If the dial is loose on its mounting, tighten the mounting screws and replace any that are missing. Be sure that lock washers are in position.

Speed

3.08 To adjust the speed of a dial, place the 260 tool on the dial governor so as to hold the movable parts of the governor, as shown in Fig. 5.

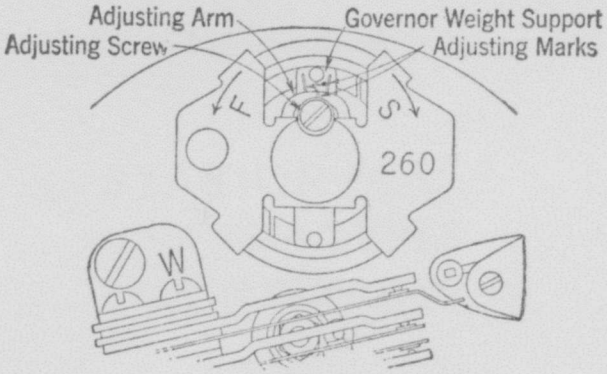

Fig. 5.

3.09 Loosen the governor adjusting screw only enough to permit movement of the adjusting arm with slight friction.

3.10 Move the adjusting arm toward F (to increase the speed) or toward S (to reduce the speed), gauging the amount of movement by the adjusting marks where provided. Tighten the adjusting screw, remove the 260 tool, and recheck the speed of the dial.