**BELL SYSTEM PRACTICES**
**Station Installation and Maintenance**

**SECTION C34.103**
**Issue 1, August, 1954**
**AT&T Co Standard**

# STATION DIALS
## 2, 4, 5, 6, AND 7 TYPES
## MAINTENANCE

### 1. GENERAL

1.01 This section covers the maintenance procedures of 2-, 4-, 5-, 6-, and 7-type station dials.

### 2. CLEANING

2.01 Exterior parts of the dial, except the contacts, shall be wiped with a clean, dry, KS-2423 cloth.

2.02 The number plate shall not be badly marred, nor shall the enamel be chipped, except within 1/16 inch of the inside and outside edges. The characters shall be clearly legible. Clean with a damp KS-2423 cloth or replace number plate.

### 3. MECHANICAL

3.01 Parts shall not be missing or broken (a broken buffer spring on the 2-, 4- or 5-type dials is permissible). Refer to Fig. 8. Only parts listed in the supply section shall be replaced.

**Lubrication**

3.02 Do not lubricate the dial.

**Operation**

3.03 Dial shall operate smoothly without slipping or skipping pulses. It shall not require excessive windup force nor stall on slow return. Check by operating the dial several times.

Dials failing the requirements or suspected of giving wrong numbers shall be replaced. Card holder tabs on the underside of the finger wheel shall clear the number plate clamping ring by a visible amount.

**Caution: Do not adjust tabs of card holder while assembled on dial. Remove card holder and readjust tabs or replace card holder.**

**Finger Stop**

3.04 The finger stop shall not be loose or distorted. Check by feel and sight. With the dial in its unoperated position the finger stop shall not cover any portion of the "0" hole of the finger wheel on 2-, 4-, and 5-type dials and not more than 3/64 inch on the 6- and 7-type dials. Check visually.

3.05 Missing screws and those with stripped threads shall be replaced. If threads in the holes of case are stripped, replace dial.

**Tightness of Finger Wheel**

3.06 If finger wheel is removed a lockwasher shall be placed between finger wheel and finger-wheel nut, except when a plastic finger wheel is used on the 4- or 5-type dials.

**Finger Wheel**

3.07 Check finger-wheel wobble visually at its outside edge throughout its full travel. The wobble shall not exceed 1/16 inch.

3.08 The clearance between edge of finger wheel and finger stop at all points when "0" is dialed shall be 1/64 inch minimum. Check visually. Adjust stop as required.

3.09 Dials on which finger wheels have been replaced and still do not meet clearance requirement 3.08 or wobble requirement 3.07 should be replaced as these dials probably have bent shafts.

**Tightness of Mounting Screws**

3.10 All mounting screws shall be present and shall be tight. Unused screws shall be tightened securely. Missing screws, washers, and eyelets shall be replaced when required.

## 4. CONDUCTORS

4.01 The cord tip terminations of the dial shall be tightly clamped by their associated screws and shall not touch any other metal parts or adjacent cord tips. Cords shall be arranged so as not to interfere with the contacts of the dial or other parts of the telephone set.

## 5. CONTACTS

5.01 Contacts which test open shall be cleaned by burnishing with a 265B tool.

5.02 The shunt contacts on 7-type dials shall be open when the dial is in the normal position. These contacts should not close until the finger wheel has been moved at least 1/16 inch off-normal. They shall remain closed until the last pulse is completed during the return operation of the dial.

5.03 On other types of station dials the receiver contacts shall be closed when the dial is in its normal position. The contacts shall remain closed until the finger wheel has been moved at least 1/16 inch off-normal. The receiver contacts shall open and the transmitter shunt contacts shall close, when digit "1" is dialed, and shall remain in this condition until after the last pulse is completed during the return operation of the dial.

5.04 After the last pulse is completed during the return of the dial, the normally closed receiver contacts shall make after the transmitter shunt contacts break. Check contact sequence and follow visually. If the above requirements are not met, replace dial.

## 6. SPEED

6.01 After all cleaning and checking operations have been performed, check speed in accordance with local instruction and testing apparatus.

6.02 Speed of station dials shall be within minimum 8 and maximum 11 pulses per second. When 2,- 4-, and 5-type dials do not meet this requirement, they should be readjusted to minimum 9-1/2 to maximum 10-1/2 pulses per second. The speed of 6- and 7-type dials is not adjustable and therefore should be replaced when speed requirements are not met.

### Adjustment of Speed

6.03 To adjust the speed of 2-, 4-, and 5-type dials, place the 260 tool on the dial governor so as to hold the movable parts of the governor, as shown in Fig. 1.

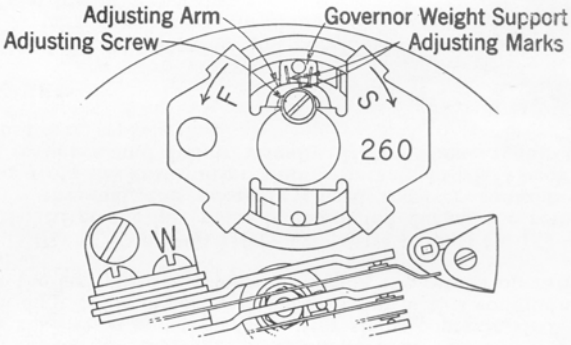



**Fig. 1—Dial Governor with 360 Tool**

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

6.05 Move the adjusting arm toward F (to increase the speed) or toward S (to reduce the speed), gauging the amount of the movement by the adjusting marks where provided. Tighten the adjusting screw and remove the No. 260 tool. With the receiver on the hook, dial "0" to determine roughly whether the desired change in speed has been realized. Recheck the speed of the dial in accordance with local instructions. If speed cannot be adjusted to meet requirements with full travel of adjusting arm, replace dial.

## 7. 6- AND 7-TYPE DIALS

### Retainer for Hub and Motor Spring Assembly

7.01 If finger-wheel hex nut is removed for any reason, the motor spring and hub assembly on dials of earlier manufacture may jump out of its proper position. (See note.) To

prevent this condition, a hub retainer, P-12A951 shall be assembled under the threaded portion of the main shaft. To assemble, hold finger wheel down while nut and washer are removed and insert hub retainer as shown in Fig. 2. Replace dial if motor spring and hub assembly jump out of place.

**Note:** The above paragraph does not apply to dials having a black finished finger wheel nut. This nut indicates that the hub has been staked or the dial has been equipped with a hub retainer.

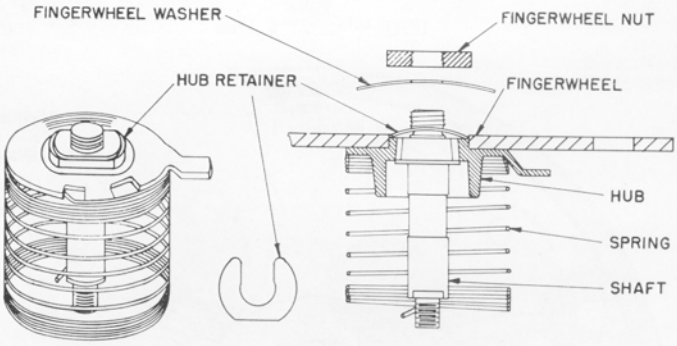



**Fig. 2—Dial Hub Retainer and Spring Washer**

### Finger-Wheel Washers

7.02 If finger-wheel nut is removed and the washer is the flat type, replace it with spring washer P-459447 as shown in Fig. 2.

## 8. NUMBER PLATES

### 7-Type Dial

8.01 Replacement number plate shall be the laminated structure type. These number plates may be identified from the back, by the two-tone material. Assemble to the frame with special P-174053 RHMS (shoulder-type) screws. Refer to Fig. 3.

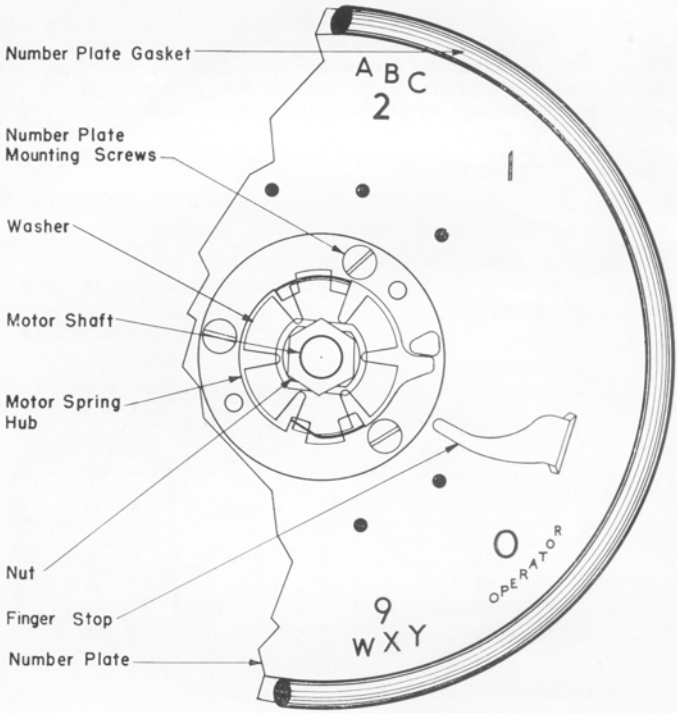



**Fig. 3—7-Type Dial**

8.02 To change the number plate on the 7-type dial, remove card holder frame, finger-wheel nut, washer, finger wheel, finger stop, and the three exposed screws. See 7.01.

**6-Type Dial**

8.03 To change number plate on the 6-type dial, remove card holder, finger-wheel nut, finger wheel, and the three exposed screws as shown in Fig. 4. See 7.01 before removing finger-wheel nut. If P-164A or P-164B number plates are used

for replacement, the dial must be equipped with a P-16A839 finger stop (6 stamped on vertical portion) to allow the letter and numbers to line up with the finger-wheel holes. Recheck finger stop position per 3.04.

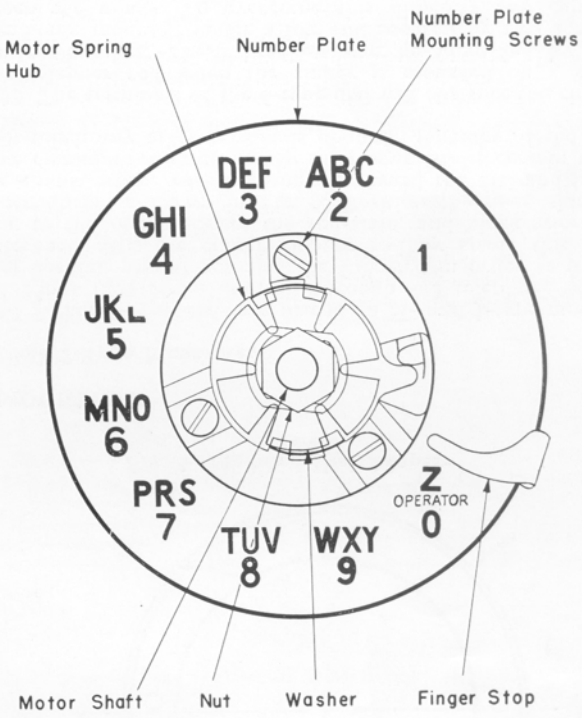



**Fig. 4—6-Type Dial**

## 9. DIAL ADAPTER

9.01 When a 6-type dial is used as a replacement and where a 59A dial adapter is present, it may be necessary to alter the dial adapter, if not already done, by cutting to the

approximate dimensions as shown in Fig. 5. This can be done without removing the adapter from the housing and when the adapter is so altered it can be used interchangeably with 4-, 5- and 6-type dials.

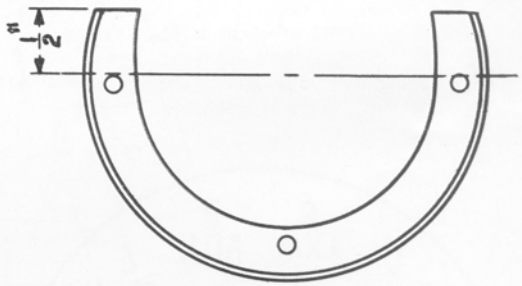



**Fig. 5—Modified Dial Adapter**

## 10. MOUNTINGS

### H- and J-Type Mountings

10.01 When 6-type dials are placed on H- and J-type mountings (300 series and 401 through 412 telephone sets), proper cording procedures must be followed in order to avoid interference with the ringer clapper rod by spade tips and wiring to the dial. Connect the red-slate, and black wires to dial terminals as shown in Fig. 6. Position the open side of spade shank, where wire is clamped, toward the dial and bend to give maximum clearance from the ringer. Make certain they do not touch any other terminals or metal portions of the set.

10.02 The terminals of the 6-type dial will obstruct the ringer clapper rod when the ringer is mounted on a steel mounting bracket. These brackets can be identified by the ringer being mounted under a lug and secured by two screws between the gongs. To overcome this difficulty two captive washers (P-14A100) shall be placed on each of the base plate mounting screws. This allows the necessary clearance between the mounting base and housing.

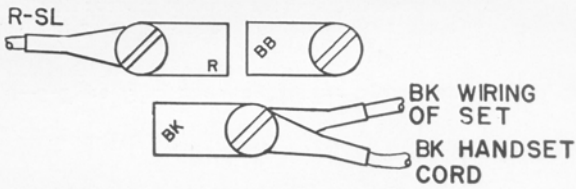



**Fig. 6—Position of Cords on Dial**

### B-, C-, D-, and G-Type Handset Mounting

10.03 When necessary to place a 6-type dial on the above handset mounting, the plastic cover shall be omitted. When placed on metal mountings the cord spades shall be dressed so that they will not touch the metal mounting.

## 11. 2-, 4-, AND 5-TYPE DIALS

11.01 To change the number plate, remove card holder, finger-wheel nut, washer, finger wheel, and then remove number plate clamping ring as shown in Fig. 7.

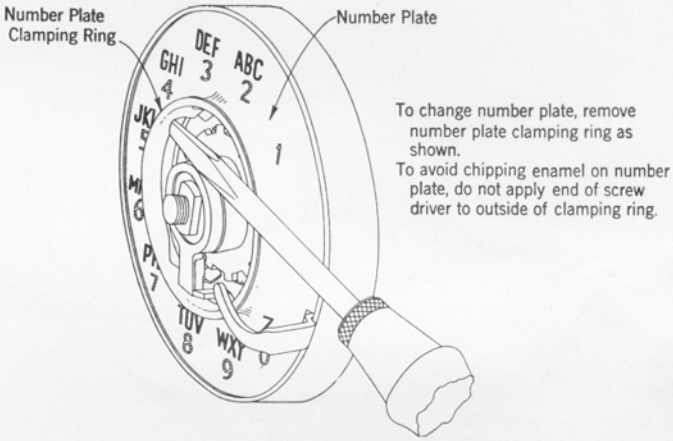



**Fig. 7—Removal of Clamping Ring**

**Caution: When replacing clamping ring over number plate, first insert a prong of the clamping ring into lower slot in number plate and then force the other two prongs into remaining slots.**

11.02 On 5-type dials, if number plate is removed for any reason, the dial shall be equipped with a vincellatate muslin dust cover (gasket P-347826) and a metal guard P-347836. The metal guard is designed to prevent interference between dust cover and main gear assembly. Refer to Fig. 8.

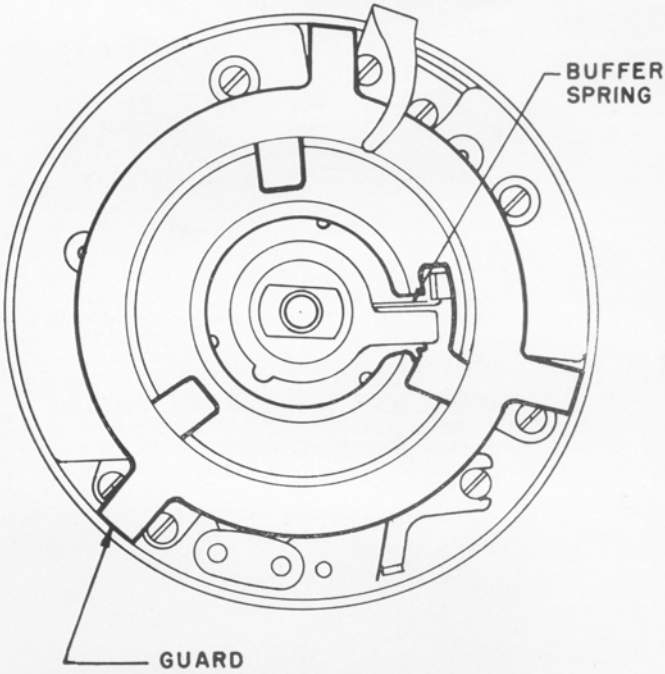



**Fig. 8—5-Type Dial Showing Buffer Spring and Metal Guard**

11.03 On 2- and 4-type dials, if number plate is removed for any reason, the dial shall be equipped with a vincellatate

muslin dust cover. The dial need not be equipped with a metal dust cover guard, unless specified by local practices. The metal guard is designed to prevent interference between the dust cover and the main gear assembly.

11.04 In assembly of guard and dust cover the metal guard is assembled next to the number plate support, then the dust cover is placed over the metal guard. The dust cover shall not be badly creased or wrinkled. Operate dial after assembly to assure that the dial operates freely.

**Note:** If 132-type number plate is present, use P-459089 (old) guard or change to 149, 150, or P-164A number plate and P-347836 (new) guard.

## 12. CIRCUITS

12.01 When 4-, 5-, or 6-type dials are used in station circuits where the "R" spring is not normally required, it is necessary to strap dial terminals "'R" and "BB" with P-290076 dial strap as indicated in Fig. 9, left-hand view.

**Schematic**

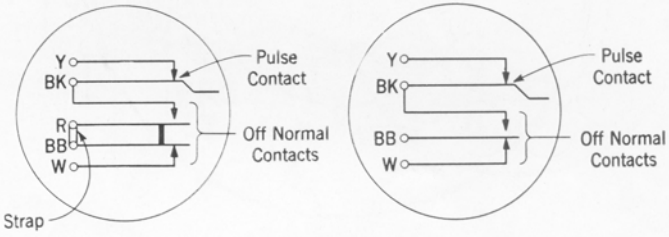



**Fig. 9—Use of Dial Strap**

## 13. PLASTIC FINGER WHEELS

### Removal of P-372629 Finger Wheel

13.01 Removal of finger wheel may be accomplished as follows:

(1) Hold finger wheel in stationary position.

(2) Rotate finger-wheel clamp tab in counterclockwise direction, using a thin bladed tool. Refer to Fig. 10.

**Caution: To prevent thin bladed tool from slipping when using to operate clamp, sight between finger wheel and number plate being certain that the tool is firmly engaged and at right angles with finger-wheel clamp tab and place thumb of hand in which tool is being held against finger wheel to prevent its rotation.**

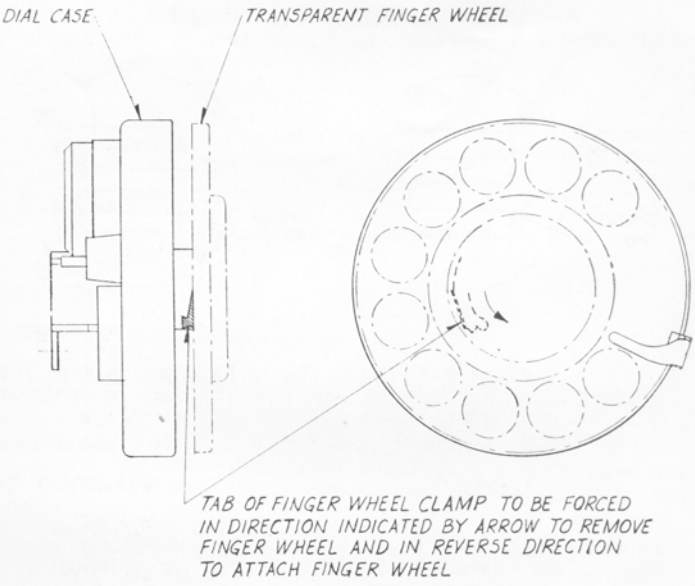


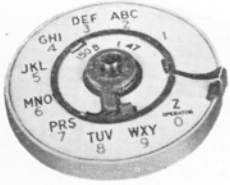

**Fig. 10—Tab of Finger-Wheel Clamp**

13.02 Installation of station number card in under side of finger wheel. Refer to Fig. 11.

(1) Seat window with its slot fitted in the lug molded on side of card recess.

(2) Assemble number card mask in a similar manner with cutaway portion of card fitted into the lug and press in place.

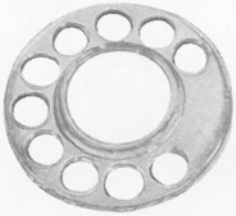
(3) Place number card support (P-479182) with convex side down and turn in a counterclockwise direction so that the legs of the support enter grooves in the wall of the finger-wheel card recess and continue turning until stopped by the end of these grooves.




**Finger Wheel Support P-480323**

**Finger Wheel Clamp P-372628**

**Hex. Nut P-480324**



**Finger Wheel P-372629**

**Window P-137593**

**Card Support P-479182**

**Fig. 11—P-335580 Finger Wheel Assembly**

**Installation of P-335580 Plastic Finger Wheel Assembly, 4- and 5-Type Dials**

13.03 Remove existing finger wheel and number-plate clamping ring and proceed as follows. Refer to Fig. 11 for identification of parts.

(1) Insert P-298942 (flat) number plate clamping ring making sure it lies flat against number plate to prevent finger wheel from rubbing on finger-wheel clamp.

(2) Place finger-wheel support P-480323 on hub.

(3) Place finger-wheel clamp P-372628 over support.

(4) Secure both support and clamp in place with finger-wheel nut, tighten securely. Make sure the shoulder portion of the nut faces downward and passes through hole in finger-wheel clamp. After nut is tightened, finger-wheel clamp shall move without bind. Refer to Fig. 11 for identification of parts.

(5) Assemble number card in accordance with instructions as covered in 13.02.

(6) Place P-372629 finger wheel over finger-wheel clamp with the three legs of clamp seated in the corresponding notches of finger wheel and rotate finger-wheel clamp by exerting a slight upward pressure on its hub and move in a clockwise direction. A thin bladed tool may be used to operate the clamp. Refer to Fig. 10 and caution contained in 13.01.


4J&5J Dial with Finger Wheel Clamp P-347999 and Hex Nut P-153996

Finger Wheel P-344837 with Number Card Support P-479182 and Window P-137593

Finger Wheel Clamp P-347999

Hex Nut P-153996

**Fig. 12—P-43A212 Finger-Wheel Assembly for 4- and 5-Type Dials**

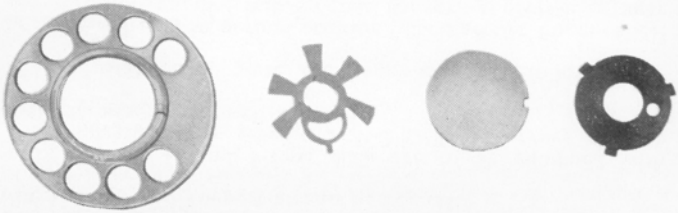


**Fig. 13—P-13A106 Finger-Wheel Assembly for 6- and 7-Type Dials**

### Removal of P-344837 and P-19B524 Plastic Finger Wheel

13.04 The P-344837 and P-19B524 plastic finger wheels may be identified by a small hole in the edge of the number card holder between the "9" and "0" finger holes. Remove as covered below:

(1) Rotate finger wheel in a clockwise direction as far as possible.

(2) Insert a stiff wire, such as a paper clip, into small hole in edge of raised center of finger wheel and push down to disengage the finger-wheel clamp spring while continuing to rotate finger wheel in a clockwise direction. Refer to Fig. 14B.

(3) Lift off finger wheel.

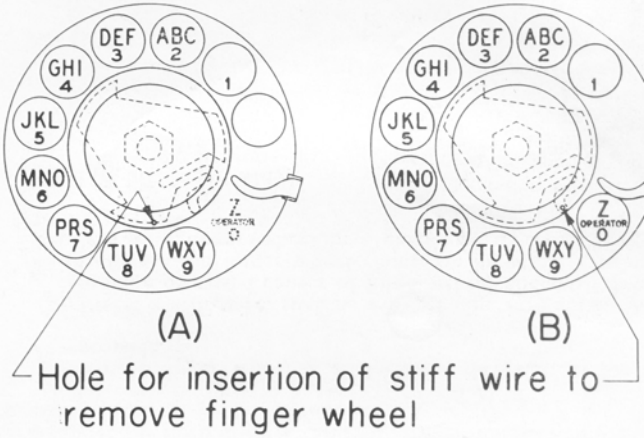



**Fig. 14—Hole for Insertion of Stiff Wire to Remove Finger Wheel**

**Installation of P-344837 and P-19B524 Plastic Finger Wheels**

13.05 The P-19B524 plastic finger wheel may be used on all dials equipped with one piece finger-wheel clamp plate. This finger wheel can not be used with the two piece finger-wheel clamp and support shown in Fig. 11.

13.06 When 4- and 5-type dials are to be equipped with plastic finger wheels, a P-298942 (flat type) number plate clamping ring shall be used.

13.07 Install clamp plate and finger wheel as follows:

(1) With dial in normal position, place proper finger-wheel clamp on dial hub so that its spring portion is near the "9" on the number plate. Refer to Fig. 15.

(2) Place finger-wheel washer and nut on hub and tighten. Omit spring washer on 4- and 5-type dials.

(3) Place station number card in accordance with 13.02.

(4) Place finger wheel over clamp with "0" hole directly over digit "9" making sure that finger-wheel depressions are properly seated on prongs of clamp plate. Refer to Fig. 14A.

(5) Rotate finger wheel in a counterclockwise direction until clamp spring snaps into notch on underside of finger wheel. Refer to Fig. 14B.

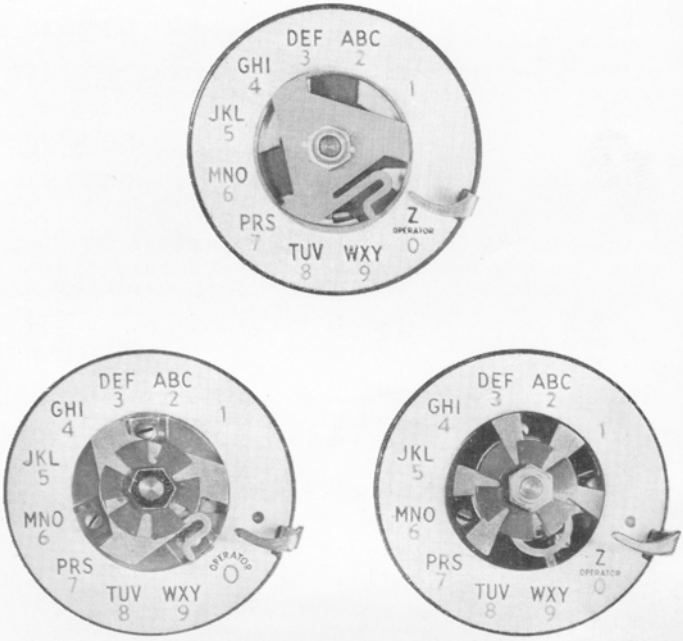



**Fig. 15—Clamp Plates Mounted on Dials**