

## STATION DIALS

### 41 TYPE

#### 1. GENERAL

**1.01** This section covers identification, operation, maintenance, and application of the 41A dial.

**1.02** The 41A dial is an electromechanical device which permits an automatic dialing function when incorporated into a station telephone set.

**1.03** This dial is compatible with all common switching systems in general use. The nominal pulsing rate is 10 pps with 61 per cent break and 39 per cent make.

**1.04** The 41A dial requires 12.5 volts ac to 19 volts ac for proper operation. This may be furnished by one of the power supplies listed in Table A.

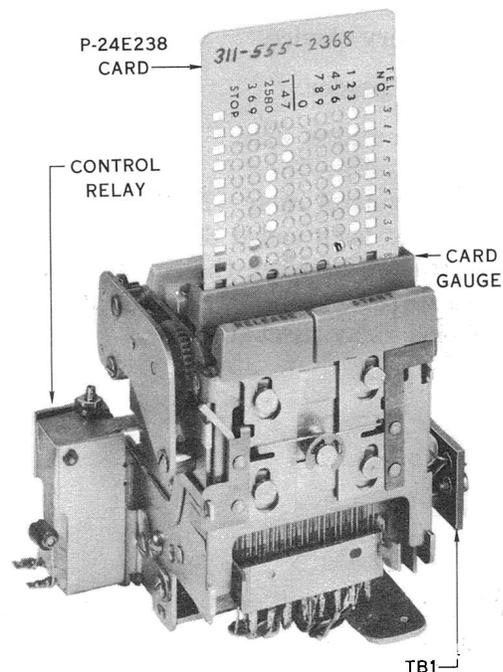


Fig. 1 — 41A Dial with Card Inserted, Front View

TABLE A  
POWER SUPPLY CAPACITIES

Type of Power Supply	Capacity of Power Supply	Maximum Distance Between Dial and Power Supply		
		BUA Cable (22 ga)	IW Cable (24 ga)	JKT Wire (20 ga)
101G or 101J	6 dials	600 ft	400 ft	1000 ft
KS-16886, L2, transformer term. 4 and 6	3 dials	1150 ft	700 ft	1850 ft
2075A transformer	1 dial	675 ft	425 ft	1075 ft



*The maximum number of dials that will operate satisfactorily on either of the power supplies listed above depends on*

*the length of the loop to the stations plus the features involved such as lamps, relays, buzzers, etc. With maximum number of dials which would be one per line, and features operating simultaneously, there shall be a MINIMUM of 12.5 volts ac across terminals P1 and P2 on TB2.*



*When wiring keyless stations, the dials may be paralleled. For key stations, it is recommended that individual power supply leads be run to each station.*

**1.05** At the end of each pulsing cycle or coded digit, the commutator disc returns to a home position. (Fig. 2). The home position is provided to ensure that each pulsing cycle will start from the same relative point on the commutator disc.

## 2. IDENTIFICATION

2.01 The 41A dial consists of four major components:

- Control relay.
- Memory device.
- Card reader.
- Commutator disc.

2.02 The control relay (Fig. 1) operates at the end of each coded digit over the electrical path completed between the commutator disc and the wire spring brushes. (See Fig. 2.) The operation of this relay mechanically:

- (a) Disengages the clutch, allowing the disc to return to its home position.
- (b) Operates a set of pulse-muting contacts to short arc 11 and 12 on the commutator disc and keeps the dial from generating additional pulses on the telephone line while the disc is returning.
- (c) Advances the card up one row to prepare for next pulsing cycle.

2.03 The memory device is an injection-molded P-24E238 plastic card. (Fig. 1). The card has eight vertical columns of 14 circular slugs each. Seven of the columns are used for digit information and one for the dial stop function.

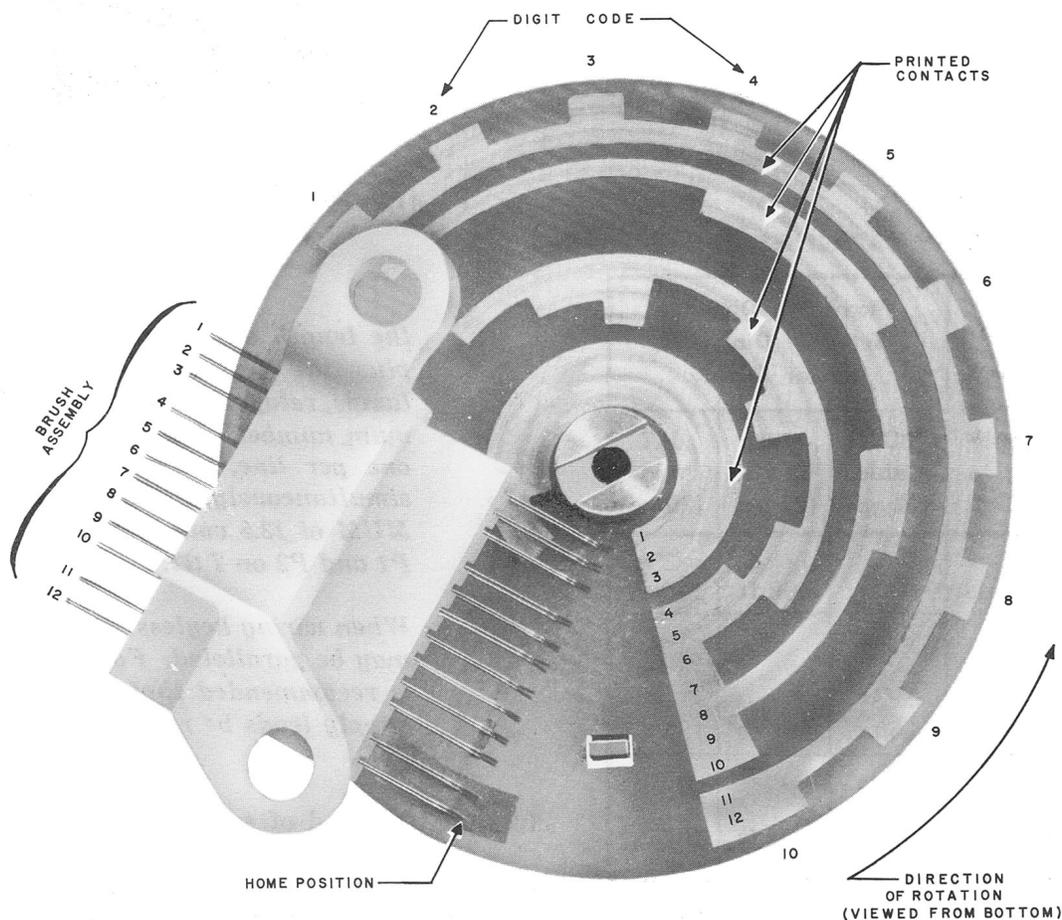
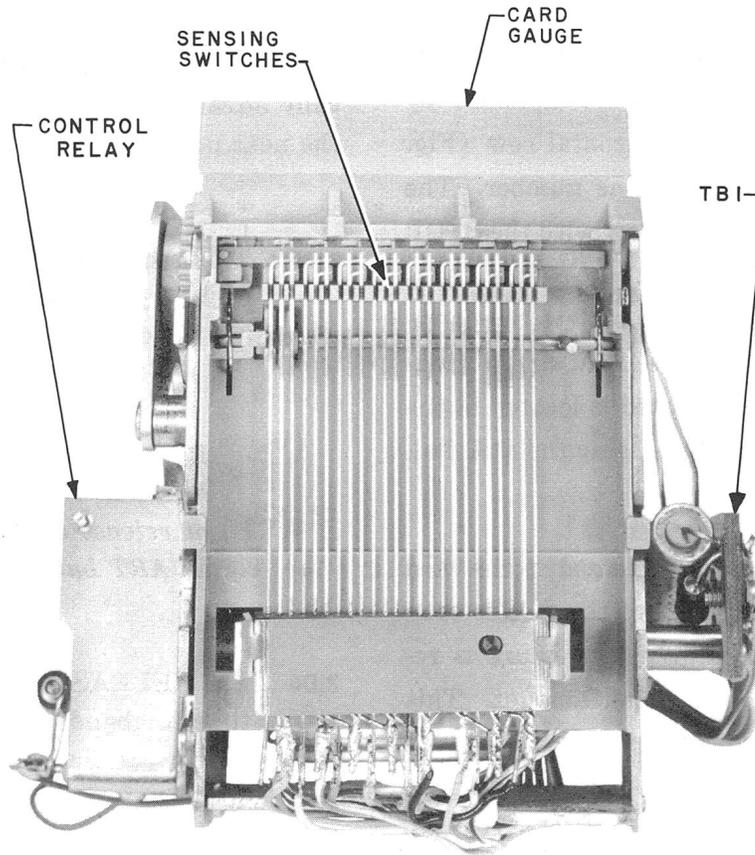
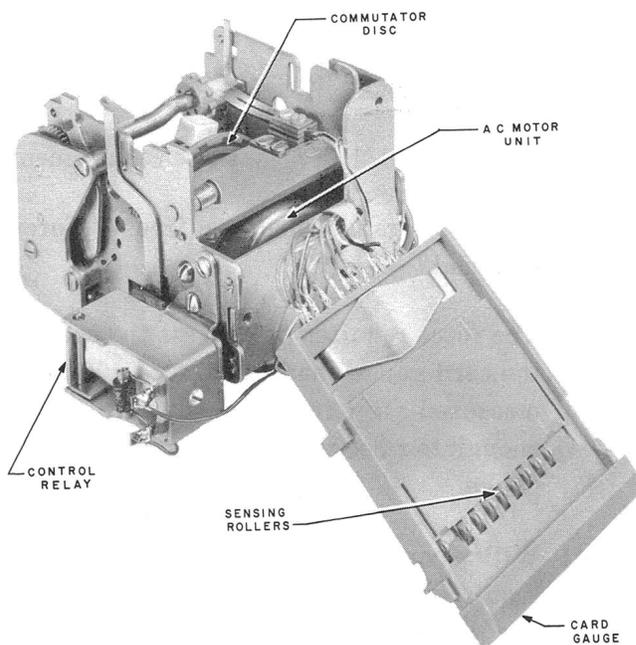


Fig. 2 — Commutator Disc, Bottom View



**Fig. 3 — Card Gauge, Front View**



**Fig. 4 — Card Gauge, Rear View**

**2.04** Two columns of prepunched square holes at each edge of the card engage sprockets to wind up a spring used for card advance and ejection. This card will accept all telephone numbers to a maximum of 14 digits.

**2.05** The card reader consists of a card gauge, eight sensing rollers, and eight wire spring switches. (Fig. 3 and 4). The card gauge positions the card against the sensing rollers. The rollers fall into the punched code holes row by row and transform the card information into switch contact operation.

**2.06** The commutator disc (Fig. 2) is a fiber disc with printed gold contact surfaces. The contact surfaces are arranged in 12 circular arcs. Wire spring brushes ride the contact surfaces to establish switching circuits as the disc rotates.

### 3. METHOD OF OPERATION

**3.01** A telephone number is coded on the P-24E238 card. This is accomplished by removing two slugs in each horizontal row (Fig. 1) for each digit of the telephone number. The first digit is punched in the top row with the STOP code which is prepunched. The rest of the digits follow row by row until the complete telephone number has been coded. More detailed information on coding the P-24E238 card is located in the sections covering telephone sets using the 41A dial.

**3.02** Push the coded card downward in the card gauge until the top edge of the card is even with the top of the gauge. When pressure is removed, the card will rise a small amount. This aligns the first row of coded holes with the sensing rollers. The rollers move into the coded holes closing the sensing switches for the particular number coded. Assume the digit "5" has been coded in the top row.

**3.03** Depressing the START button closes the start contacts. The motor starts driving the commutator disc in a clockwise direction (when viewed from the top) at 37.5 rpm. The disc rotates a sufficient distance to generate 5 pulses on the telephone line. With the disc in this position there is a completed circuit for the operation of the control relay (Fig. 6) from P1 on TB2 through the operated start contacts, terminal 2 to 1 on TB1, normal contacts sensing switch G, operated contacts sensing switch F, to brush 5 on commutator disc. The circuit continues from brush 9 on the disc, operated contacts on sensing switch B, normal contacts sensing switch C, winding of control relay to brush 1 on the disc, back on brush 2 to swing spring on stop contact to terminal P2 on TB2.

**3.04** When the control relay operates, the clutch disengages allowing the commutator disc to return to its home position. The card mechanically advances one row and the dial is ready for the next pulsing cycle.

**3.05** This sequence of operation is repeated for each digit until the complete telephone number is dialed.



*Be sure no objectionable clicks are heard in the receiver during insertion or release of the card, operation of the START button, or pulsing of digits.*

**3.06** The RELEASE key may be operated at any time to abandon a call or release the card. A linkage forces the clutch face open when the RELEASE key is depressed. This allows the disc to return to its home position. When the disc is in its home position, the 8C dial can be used to dial a number as on any normal telephone set. This provides a failproof feature in case of a power failure to the motor.

### 4. MAINTENANCE

**4.01** The 41A dial shall meet these requirements:

- (a) The card gauge shall be free of foreign material.
- (b) The force required to depress the card into the card gauge shall not exceed 400 grams, measured after inserting the card just far enough to raise the sensing rollers; use 62B gauge.
- (c) With a card inserted in the dialer, the force required to operate the START button or the RELEASE button shall be 375 grams maximum; use 62B gauge.

- (d) There shall be no binding or sticking of the card or transport mechanism at any point during deposit or return of the card.
- (e) The dial speed shall meet the test requirements of 8 to 11 pulses per second.

**4.02** To test the dial in areas providing automatic dial test equipment:

- (1) Code a card with the dial test number for 8 to 11 pps. Code a STOP following the access code, then a zero followed by a STOP.
- (2) Insert card and operate START button.
- (3) When second dial tone is heard, reoperate the START button momentarily.
- (4) Upon completion of dialing, an audible signal will be heard indicating how the dial meets the test. The signals are as follows:

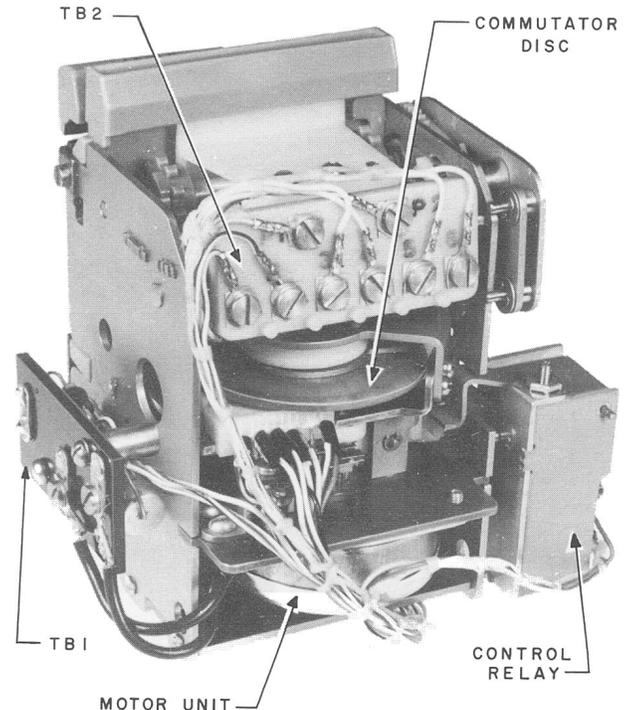
- Ringing induction—dial speed satisfactory.
- Rapidly interrupted dial tone—dial speed fast.
- Slowly interrupted dial tone—dial speed slow.

- (5) In areas without automatic dial test equipment, test in accordance with local instructions.

**4.03** Replace dials that fail to meet these requirements, except item 1 and 2, in accordance with local instructions; ie, replace the 41A dial or the complete telephone set.

**4.04** To replace the dial:

- (1) Disconnect the spade tipped conductors on TB2 (Fig. 5).
- (2) Remove three mounting screws in baseplate.



**Fig. 5 — 41A Dial, Rear View**

**4.05** Position new dial and reterminate conductors. Dress all conductors away from moving parts.

**4.06** Field adjustment or repair of the 41A dial is not recommended.

**5. APPLICATION**

**5.01** The use of the 41A dial in 660- and 662-type telephone sets is covered in the section on 660- and 662-type telephone sets.

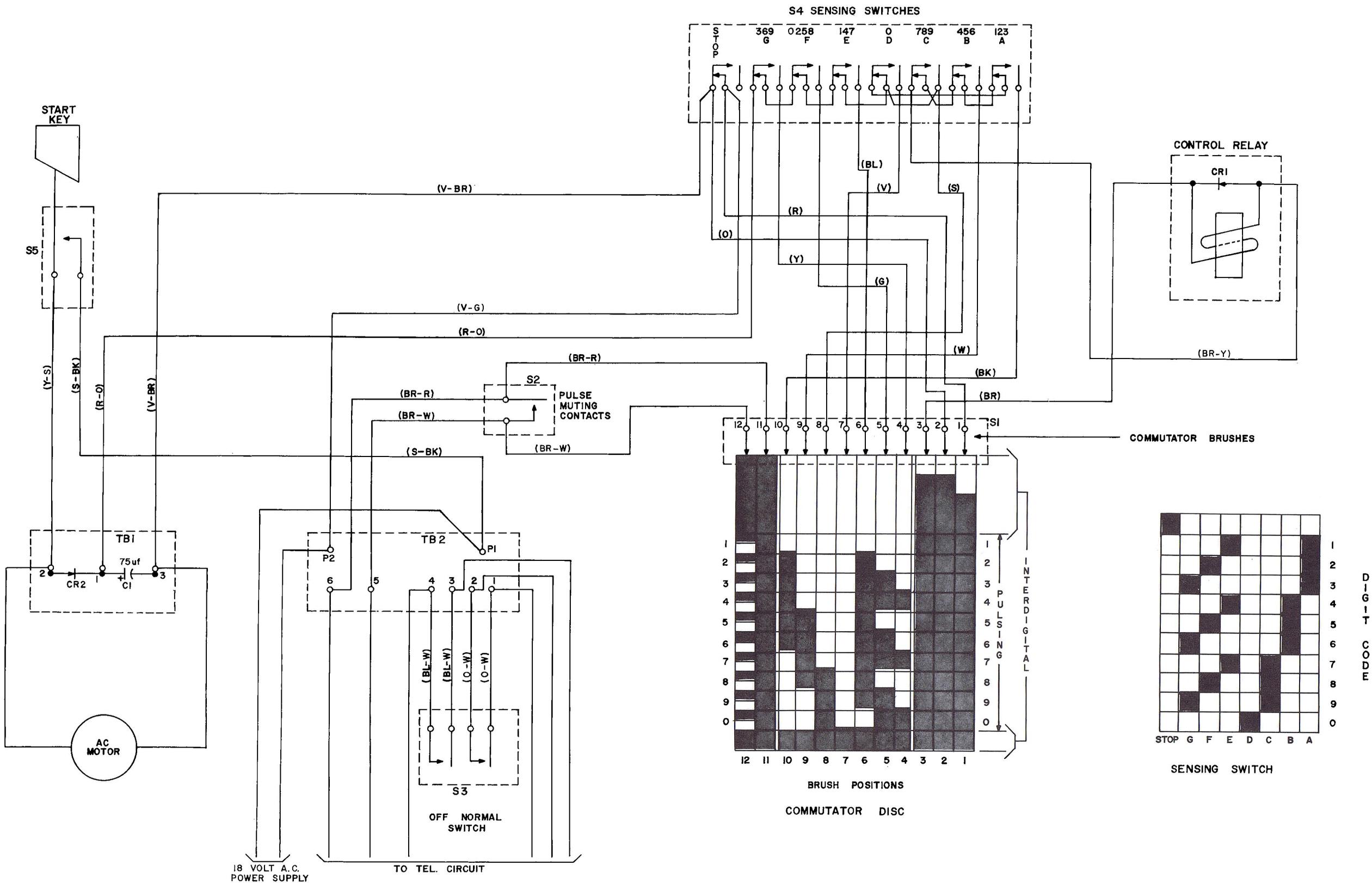


Fig. 6 - 41A Dial, Schematic