SWITCHES

197- AND 198-TYPES

CONTACT SPRING ASSEMBLIES, TEST JACK ASSEMBLIES, AND NORMAL POST CAMS

PIECE-PART DATA AND REPLACEMENT PROCEDURES

1. GENERAL

1.01 This section covers the piece-part data and replacement procedures for contact spring assemblies, test jack assemblies and normal post cams of 197- and 198-type switches.

1.02 This section is reissued to designate in Table A the 197-type code switches and the individual piece-parts which have been rated Manufacture Discontinued and also to add the following new 197-type codes: 197JN, 197JP, 197JR, 197JS, and 197JT.

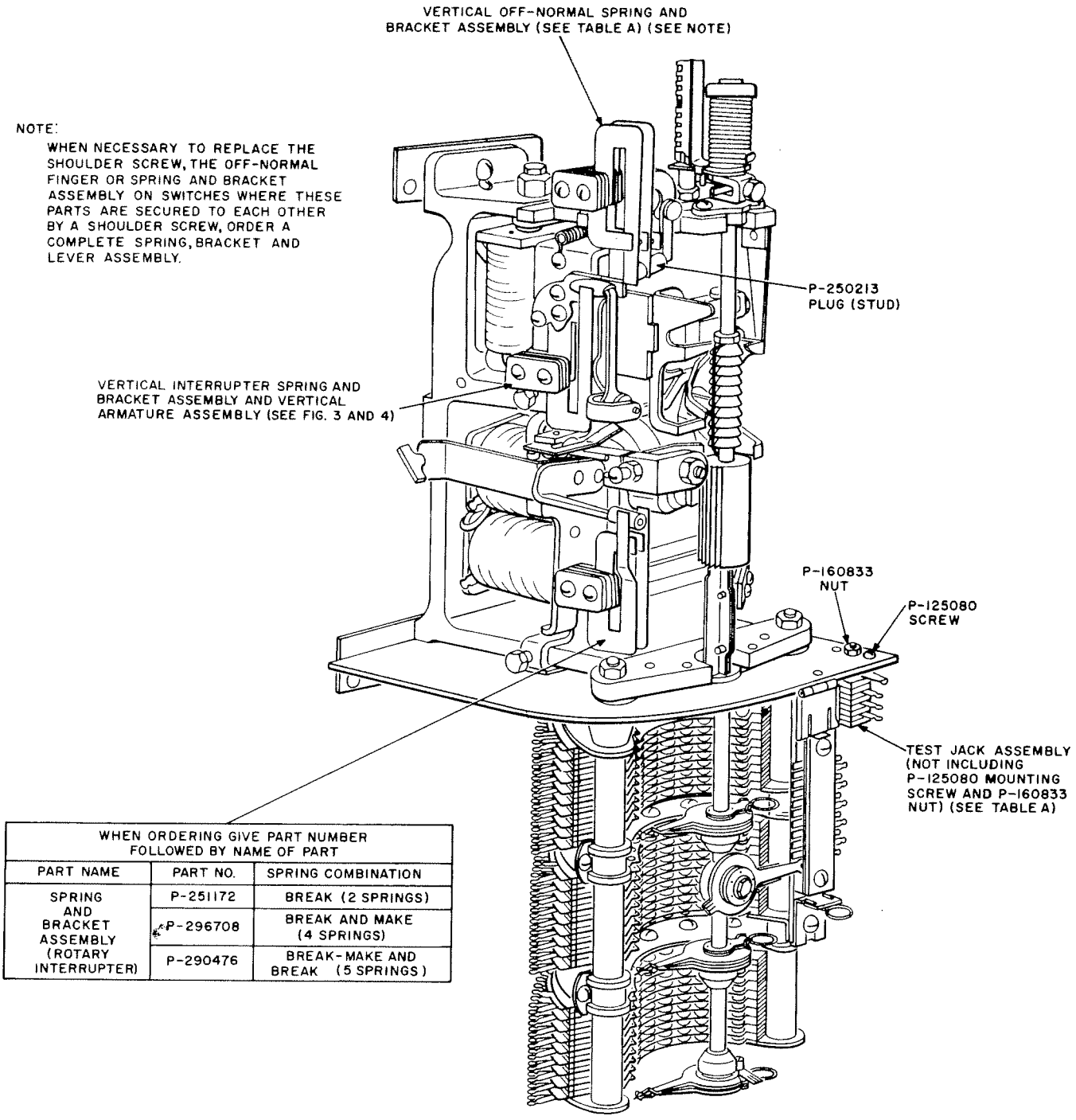
1.03 Part 2 of this section covers the piece-part numbers and corresponding names of the parts which it is practicable to replace in the field in the maintenance of the switches. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts. This information is called Piece-Part Data.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts covered in Part 2. This information is called Replacement Procedures.

2. PIECE-PART DATA

2.01 The method of ordering parts for replacement purposes is covered in Section 030-705-801.

2.02 Information enclosed by parentheses ( ) is not ordering information. This information may be reference to notes, parts referred to in other portions of the section and not considered replaceable, or part names in general use in the field if these names differ from those assigned by the manufacturer.



WHEN ORDERING GIVE PART NUMBER FOLLOWED BY NAME OF PART		
PART NAME	PART NO.	SPRING COMBINATION
SPRING AND BRACKET ASSEMBLY (ROTARY INTERRUPTER)	P-251172	BREAK (2 SPRINGS)
	P-296708	BREAK AND MAKE (4 SPRINGS)
	P-290476	BREAK-MAKE AND BREAK (5 SPRINGS)

Fig. 1 — Contact Spring Assemblies, Test Jack Assemblies, and Associated Parts of 197-Type Switch as Viewed From the Left Side

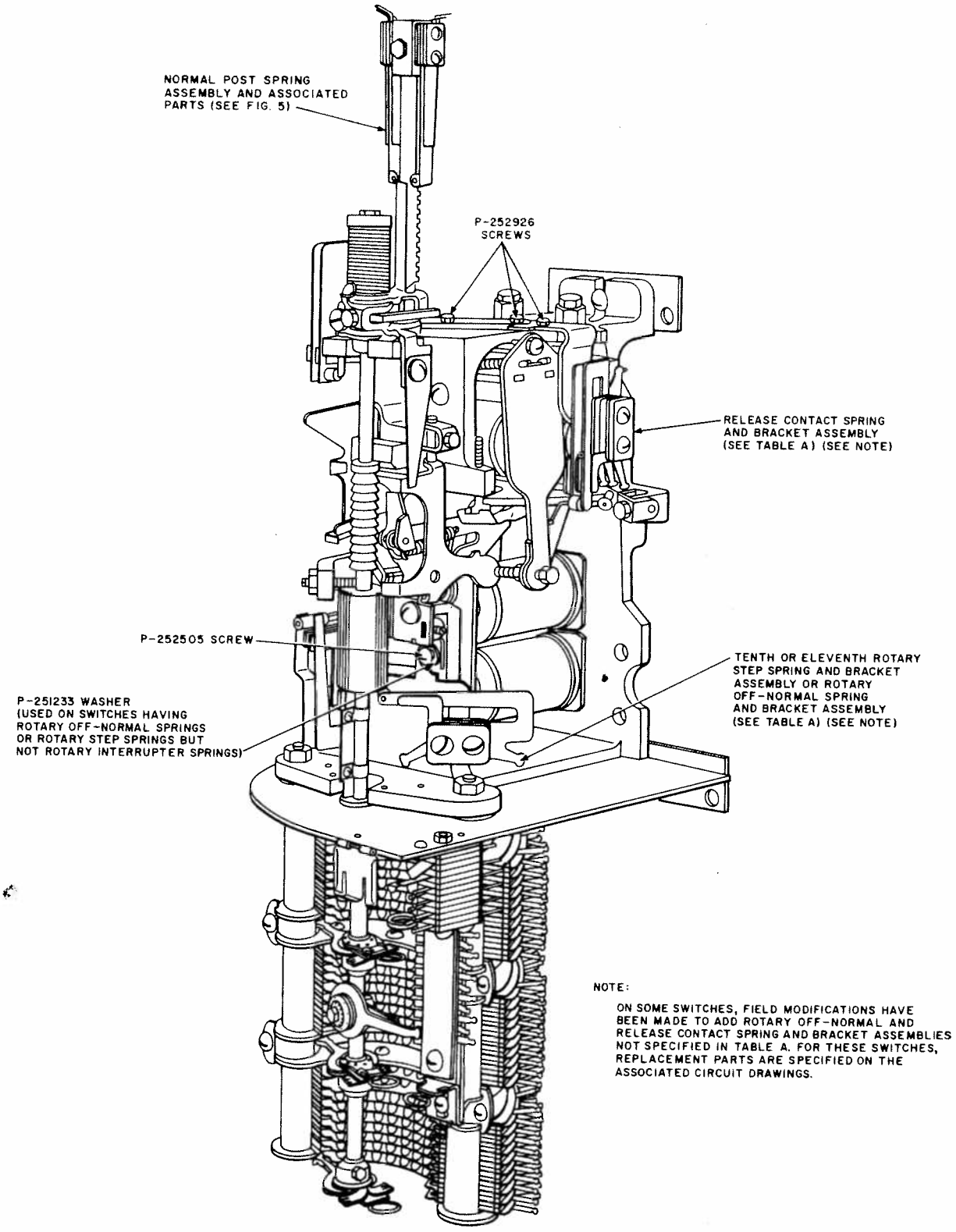


Fig. 2 — Contact Spring Assemblies and Associated Parts of 197-Type Switch as Viewed From the Right Side

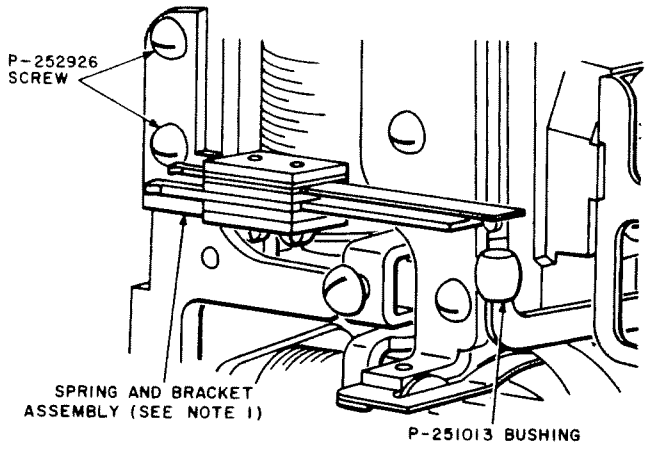


Fig. 3 — Vertical Interrupter Spring and Bracket Assembly and Associated Parts Used With Vertical Armature Assembly Having Vertical Armature Arm

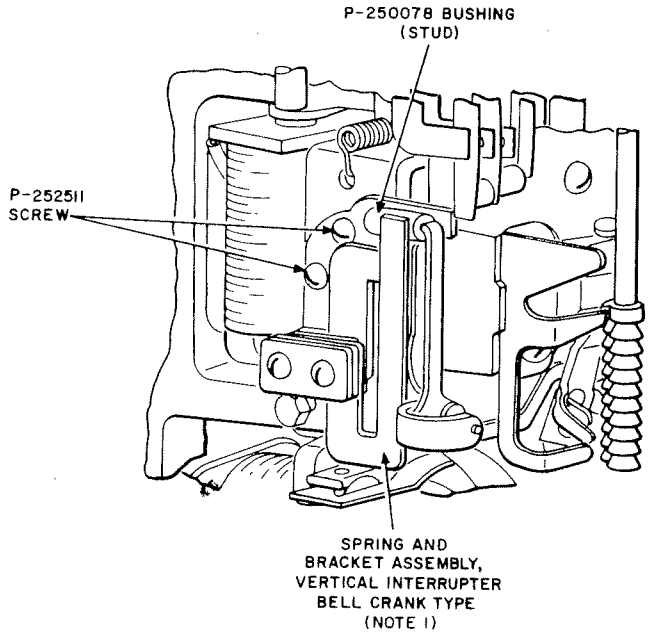


Fig. 4 — Bell Crank Vertical Interrupter Spring and Bracket Assembly and Associated Parts

NOTES (For Fig. 3, 4, and 5)

1. When replacing the vertical interrupter spring and bracket assembly of the type shown in Fig. 3, order the following parts:

   P-251574 Bracket (release magnet bracket)

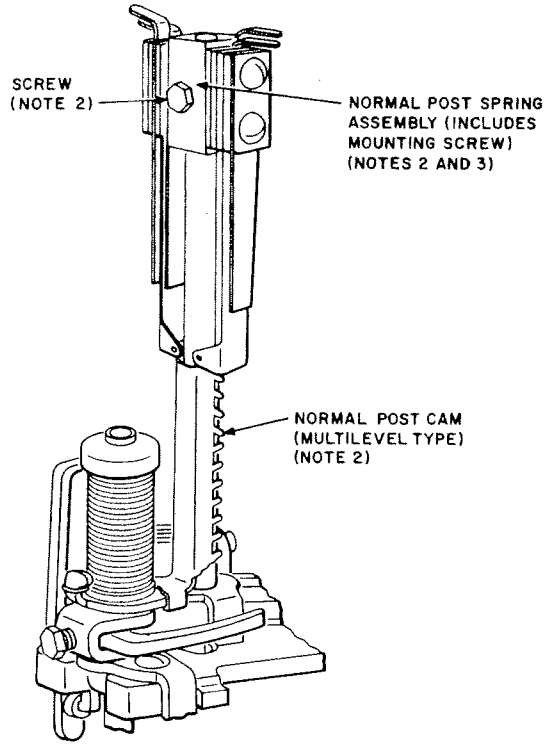


Fig. 5 — Normal Post Spring Assembly and Associated Parts

   P-251581 Spring and Bracket Assembly (vertical interrupter bell crank type)

   P-251721 Vertical Armature Assembly

   P-252511 Screws (two) (assembly mounting screws)

2. When ordering, give the part number followed by the name of the part as listed below:

NORMAL POST SPRING ASSEMBLY		SCREW (NORMAL POST SPRING ASSEMBLY MOUNTING SCREW)	†NORMAL POST CAM MULTI-LEVEL TYPE
PART NUMBER	SPRING COMBINATION		
P-252932	One Make	Fig. 6 or Fig. 7	P-296593 (single cam)
P-252931	Two Makes		
P-252933	Two Break-Makes		
P-252934	Break-Make and Make		

NOTES (For Figs. 3, 4, and 5) (Cont)

NORMAL POST SPRING ASSEMBLY		SCREW (NORMAL POST SPRING ASSEMBLY MOUNTING SCREW)	†NORMAL POST CAM MULTI-LEVEL TYPE
PART NUMBER	SPRING COMBINATION		
P-252935	One Break-Make	Fig. 6 or Fig. 7	P-296593 (single cam)
P-252936	One Break-Make, Two Makes, and Three Additional Wiring Terminals		
P-463366	One Break-Make, One Make, and Five Additional Wiring Terminals		
P-11B930	One Make-Before-Break, One Break, and One Make		
P-15A430	Two Break-Makes and One Make	P-11A042	P-11A039 (double cam)
P-15A431	Four Break-Makes		
P-15A432	Three Break-Makes		
P-402196	Two Break-Makes		

† When ordering a normal post cam, specify the teeth (if any) which are to be adjusted. Designate these teeth as follows:

Tooth Number: The teeth are numbered from 1 to 10, beginning at the top of the cam.

Tooth Row: The rows are designated L (left) or R (right), as viewed from the front of the cam.

Front or Rear (double cams only): The two rows of teeth at the front are designated F; the two rows of teeth at the rear, R.

Examples of Tooth Designations

(1) 2L indicates the second tooth from the top in the left row of a single cam.

(2) 3RR indicates the third tooth from the top in the right rear row of a double cam.

Teeth numbered 1 (at the top of the cam) are associated with No. 1 level (bottom level) on the switch. Teeth numbered 10 (at the bottom of the cam) are associated with the 0 (top) level on the switch.

3. When replacing a normal post spring assembly on switches not having a replaceable normal post cam, order additional parts in accordance with (a) where the switch has a cup-type shaft spring assembly, or in accordance with (b) where the switch has a helical shaft spring assembly.

(a) ***Switches Equipped With Cup-Type Shaft Spring Assembly:*** Also order

P-290112 — Helical Shaft Spring Assembly

P- — Cam (per table in Note 2)

(b) ***Switches Equipped With Helical Shaft Spring Assembly:*** Also order

P-251886 — Shaft Spring Bracket

P-251899 — Normal Pin

P- — Cam (per table in Note 2)

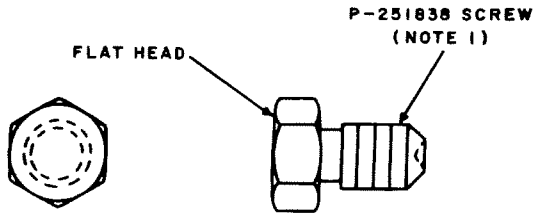


Fig. 6 — Normal Post Spring Assembly Mounting Screw Without Raised Circular Section

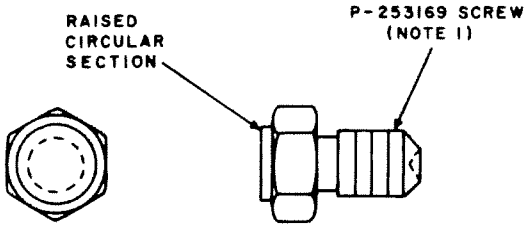


Fig. 7 — Normal Post Spring Assembly Mounting Screw With Raised Circular Section

NOTE (For Fig. 6 and 7)

1. When replacing a missing or damaged screw, a fillister head screw, or a screw of the type shown in Fig. 6, use the P-251838 screw if it can be turned in the associated part without undue pressure. If not, use the P-253169 screw. Shown in Fig. 7.

TABLE A — PIECE PARTS VARYING WITH SWITCH CODE NUMBERS

CODE NO.	ORDINARILY USED AS	SPRING AND BRACKET ASSEMBLY (vertical off-normal) (See Fig. 1)	SPRING AND BRACKET ASSEMBLY (rotary step or rotary off-normal) (See Fig. 2)	SPRING AND BRACKET ASSEMBLY (release) (See Fig. 2)	TEST JACK ASSEMBLY (See Fig. 1)
197A	Sel	P-251590	P-251169	—	P-250047
197C	Test Distrib Sel	P-251590	P-251153	—	P-250344
197D	Intermediate Toll Sel	P-251590	P-251453	—	P-250320
197E	Comb. Conn.	P-251591	—	—	P-250374
197F	Toll Conn.	P-251592	—	—	P-250368
197G	Test Distrib	P-251593	—	—	P-250344
197H	Local Conn.	P-251593	—	—	P-250047
197J	Local Rot. Htg Conn.	P-251593	—	—	P-251762
197K	Test Conn.	P-251593	—	—	P-252318
197L	Toll Rot. Htg Conn.	P-251592	—	—	P-250320
197M	Toll Inc Sel	P-251594	P-251453	P-250488	P-250320
197N	Coin Control Sel	P-251593	P-251171	—	P-250047
*197P	Local Rot. Htg Conn.	P-251593	—	—	P-251762
*197R	Comb. Conn.	P-251591	—	—	P-250374
*197S	200-Pt Line Finder	P-251595	P-251453	—	P-251017
*197T	Digit-Absorbing Sel	P-251594	P-251169	—	P-250047
*197U	Local Level Htg Conn.	P-251590	P-251133	‡P-251459	‡P-252343
*197W	Toll Level Htg Conn.	P-251591	P-251137	‡P-251459	P-251146
*197AA	Digit-Absorbing Sel	P-251590	—	‡P-251177	P-250047
197AB	Comb. Conn.	P-251596	—	—	P-250368
*197AC	Local Level Htg Conn.	P-251591	P-251133	‡P-251177	‡P-252343
197AD	Sel Conn. (PBX)	P-251597	P-251435	—	P-250047
197AE	Rot. Htg Sel Conn. (PBX)	P-251597	P-251435	—	P-251762
197AF	Inc First Sel (PBX)	P-251594	P-251169	—	P-250047
*197AG	Regular Inc Conn. (PBX)	P-251591	—	—	P-250047
*197AH	Rot. Htg Inc Conn. (PBX)	P-251591	—	—	P-251762
197AJ	First Sel (PBX)	P-251590	P-251169	—	P-250047
197AK	200-Pt Line Finder (PBX)	P-251598	P-251435	—	P-16A138
*197AL	100-Pt Line Finder (PBX)	P-251595	P-251435	—	P-251361
197AM	Four-Conductor Sel	P-251590	P-251169	—	P-251762

* Manufacture Discontinued.

‡ Manufacture Discontinued. Available on special order.

TABLE A (Cont)

CODE NO.	ORDINARILY USED AS	SPRING AND BRACKET ASSEMBLY (vertical off-normal) (See Fig. 1)	SPRING AND BRACKET ASSEMBLY (rotary step or rotary off-normal) (See Fig. 2)	SPRING AND BRACKET ASSEMBLY (release) (See Fig. 2)	TEST JACK ASSEMBLY (See Fig. 1)
*197AN	Trunk Finder	P-251594	P-251137	—	P-251455
*197AP	Test Conn.	P-251591	P-251150	—	P-251362
197AR	100-Pt Line Finder	P-251595	P-251435	—	P-251361
*197AS	200-Pt Line Finder	P-251595	P-251435	—	P-251017
197AU	Local Level Htg Conn.	P-251591	P-251133	‡P-251459	P-250498
197AW	Toll Level Htg Conn.	P-251591	P-251137	‡P-251459	P-251146
197AY	Sel Conn. (PBX)	P-251597	P-251435	‡P-251465	P-250047
197BA	50-Pt Line Finder (PBX)	P-251595	P-251435	‡P-251465	P-251361
*197BB	Sel Conn. (PBX)	P-251597	—	‡P-251465	P-251762
197BC	Revtg Call Sel	P-251593	—	—	P-250047
197BD	Sel Conn. (PBX)	P-251597	P-251435	‡P-251465	P-250047
197BE	100-Pt Finder	P-251595	P-251435	‡P-251465	P-251361
197BF	Comb. Rot. Htg Conn.	P-251593	—	—	P-250320
197BG	Trunk Finder	P-251591	P-251537	—	P-251455
*197BH	Digit-Absorbing Sel	P-251590	P-251169	‡P-251459	P-250047
197BJ	50-Pt Line Finder	P-251595	P-251435	—	P-251361
197BM	Local Conn.	P-251591	—	—	P-250320
*197BN	Toll Trans Sel	P-251594	P-251453	P-250488	P-250320
*197BP	Sel Conn.	P-251597	P-251096	‡P-251465	P-251762
*197BR	Sel Conn.	P-251597	P-251096	‡P-251465	P-251762
197BS	Sel	P-251590	P-251153	—	P-251762
197BT	Sel Repeater	P-251594	P-251169	‡P-252179	P-252200
*197BU	Digit-Absorbing Sel	P-251594	P-251169	‡P-252060	P-250498
197BW	Sel	P-251594	P-251453	P-250488	P-250320
197BY	Intertoll Sel	P-251590	P-251169	—	P-250320
197CA	Local Rot. Htg Conn.	P-251593	—	—	P-251762
197CB	Comb. Conn.	P-251591	—	—	P-250374
197CC	Conn. (PBX)	P-251597	—	‡P-251465	P-251762
197CD	Intertoll Sel	P-251590	P-456831	—	P-250320
*197CE	Digit-Absorbing Sel	‡P-252489	P-251169	‡P-251459	P-250047
*197CF	200-Pt Line Finder	P-252315	P-252314	P-250488	P-251017
*197CG	200-Pt Line Finder	P-252315	P-252314	P-250488	P-251017
197CH	Comb. Conn.	P-251596	—	—	P-250374
*197CJ	100-Pt Line Finder	P-252315	P-252314	—	P-251361
*197CK	100-Pt Line Finder	P-252315	P-252314	—	P-252317
*197CL	Comb. Rot. Htg Conn.	P-251593	—	—	P-252318
197CM	Test Distrib Sel	P-251593	—	—	P-250344
*197CN	200-Pt Line Finder	P-251595	P-251453	—	P-251017
*197CP	Sel	P-251590	P-251169	‡P-251459	P-250047
*197CR	100-Pt Line Finder	P-251595	P-251435	—	P-251361

* Manufacture Discontinued.

‡ Manufacture Discontinued. Available on special order.

TABLE A (Cont)

CODE NO.	ORDINARILY USED AS	SPRING AND BRACKET ASSEMBLY (vertical off-normal) (See Fig. 1)	SPRING AND BRACKET ASSEMBLY (rotary step or rotary off-normal) (See Fig. 2)	SPRING AND BRACKET ASSEMBLY (release) (See Fig. 2)	TEST JACK ASSEMBLY (See Fig. 1)
*197CS	Sel	P-251590	P-251169	‡P-251459	P-251762
197CT	Rot. Htg Conn.	P-251593	—	—	P-252318
197CU	Intertoll Trans Sel	P-251594	P-456831	P-250488	P-250320
*197CW	200-Pt Line Finder	P-252315	P-252314	P-250488	P-251017
*197CY	Intertoll Through Sel	P-251591	‡P-252413	—	P-250320
197DA	Digit-Absorbing Sel	P-251590	P-251169	P-252368	P-251762
197DB	Comb. Rot. Htg Conn.	P-251596	—	—	P-252318
197DC	Comb. Rot. Htg Conn.	P-251596	—	—	P-252318
197DD	200-Pt Line Finder	P-251592	P-252314	P-250488	P-251017
197DE	200-Pt Line Finder	P-251592	P-252314	P-250488	P-251017
*197DF	Code-Ringing Conn.	P-251591	—	—	P-252318
*197DG	100-Pt Line Finder	P-252315	P-252314	—	P-252317
197DH	100-Pt Line Finder	P-251592	P-252314	—	P-251361
197DJ	100-Pt Line Finder	P-251592	P-252314	—	P-251361
*197DK	100-Pt Line Finder	P-251592	P-252314	—	P-251361
197DL	200-Pt Line Finder	P-251592	P-252314	P-250488	P-251017
*197DM	Inc Conn.	P-251596	—	—	P-250047
197DN	Line Htg Inc Conn.	P-251596	—	—	P-251762
197DP	Sel Repeater	P-251594	P-251169	‡P-252179	P-252200
197DR	Digit-Absorbing Sel	P-251594	P-251169	P-252368	P-250320
*197DS	200-Pt Line Finder	P-251595	P-251453	—	P-252480
197DT	Sel Repeater	P-251591	P-251169	‡P-252060	P-252200
197DW	200-Pt Line Finder	P-251592	P-252314	P-250488	P-252480
*197DY	200-Pt Line Finder	P-251595	P-251453	—	P-251017
197EA	3- or 4-Wire Sel	P-251590	P-463573	—	P-251762
197EB	Comb. or Local Conn.	P-251596	P-251171	—	P-250374
197EC	Comb. Conn.	P-251591	P-251171	—	P-252318
197ED	Test Distrib	P-251593	—	—	P-250344
197EE	Rot. Htg Conn.	P-251596	P-251171	—	P-252318
197EF	Intertoll Dialing Sel	P-251590	P-456831	P-252368	P-250320
*197EG	Digit-Absorbing Sel	P-251590	P-251169	P-252368	P-250047
*197EH	200-Pt. Line Finder	P-251595	P-251453	—	P-252480
197EJ	Trunk Finder	P-251596	P-251453	—	P-252480
*197EK	Trunk Finder	P-251596	P-251453	—	P-252480
*197EL	Dual Selector	P-251594	P-251169	P-252368	P-252842
*197EM	Trunk Finder	P-251595	P-251435	—	P-251017
197EN	Coin Control Conn.	P-251593	P-251150	‡P-251459	P-250047
197EP	Trunk Finder	P-251594	P-251435	—	P-252480
197ER	100-Pt PBX Line Finder	P-251598	P-251435	—	P-251361
197ES	Sel	P-251594	P-251453	P-250488	P-250320

* Manufacture Discontinued.

‡ Manufacture Discontinued. Available on special order.

TABLE A (Cont)

CODE NO.	ORDINARILY USED AS	SPRING AND BRACKET ASSEMBLY (vertical off-normal) (See Fig. 1)	SPRING AND BRACKET ASSEMBLY (rotary step or rotary off-normal) (See Fig. 2)	SPRING AND BRACKET ASSEMBLY (release) (See Fig. 2)	TEST JACK ASSEMBLY (See Fig. 1)
197ET	Sel Conn.	P-251597	P-251435	—	P-251762
197EU	Digit-Absorbing Sel	P-251598	P-463573	‡P-251465	P-251762
197EW	100-Pt Line Finder	P-251595	P-251435	—	P-251361
197EY	A-B Toll Preceding Sel	P-251590	P-463573	P-252368	P-250320
197FA	Toll Trans Sel	P-251594	P-251435	P-250488	P-250320
197FB	Comb. Conn.	P-251596	P-485590	—	P-250374
197FC	Toll Intermediate Sel	P-251590	P-251453	‡P-251459	P-250320
197FD	Digit-Absorbing Sel	P-251594	P-251169	—	P-251762
197FE	Inc Sel	P-251590	P-463573	—	P-251762
197FF	Digit-Absorbing Sel	P-11A761	†P-10A882	‡P-252060	P-252842
197FG	Intertoll Dialing Sel	P-251590	P-16A039	P-252368	P-250320
197FH	Sel Repeater	P-251594	P-16A039	‡P-252060	P-250320
197FJ	Digit-Absorbing Sel	P-251598	P-15A679	‡P-251459	P-251762
197FK	Toll Preceding Sel	P-251590	P-463573	—	P-250047
197FL	Digit-Absorbing Sel	P-251594	P-463573	P-252368	P-251762
197FM	Digit-Absorbing Sel	P-11A761	P-463573	‡P-251465	P-251762
197FN	Digit-Absorbing Sel	P-251590	P-251169	P-252368	P-251762
197FP	200-Pt Line or Trunk Finder	P-251595	P-251453	—	P-16A138
197FR	200-Pt Line or Trunk Finder	P-251595	P-251453	—	P-16A137
197FS	200-Pt Line or Trunk Finder	P-251595	P-251453	—	P-16A137
197FT	200-Pt Line or Trunk Finder	P-251595	P-251453	—	P-16A138
197FU	200-Pt Line or Trunk Finder	P-251595	P-251453	—	P-16A138
197FW	Pair Ident Test Set	P-251593	P-251096	‡P-251465	P-251362
197FY	Line Finder & Trunk Finder	P-251595	P-251453	—	P-16A137
197GA	200-Pt Local Conn.	P-11B644	P-251150	P-12B224	P-11B642
197GB	200-Pt Rot. Htg Conn.	P-11B644	P-251150	P-12B224	P-11B642
*197GC	200-Pt Local Conn.	P-251593	P-251150	P-12B224	P-11B642
*197GD	200-Pt Rot. Htg Conn.	P-251593	P-251150	P-12B224	P-11B642
197GE	200-Pt Comb. Conn.	P-11B644	P-251171	P-12B224	P-11B643
*197GF	200-Pt Comb. Conn.	P-251591	P-251150	P-12B224	P-11B643
197GG	200-Pt Test Conn.	P-251593	—	—	P-11B643
197GH	Local Conn.	P-251592	P-251150	—	P-250344
*197GJ	Code Sel, Local Level Htg Conn.	P-251591	P-251133	‡P-251459	P-250498

† Combined rotary off-normal spring and eleventh rotary step spring assembly.

* Manufacture Discontinued.

‡ Manufacture Discontinued. Available on special order.

TABLE A (Cont)

CODE NO.	ORDINARILY USED AS	SPRING AND BRACKET ASSEMBLY (vertical off-normal) (See Fig. 1)	SPRING AND BRACKET ASSEMBLY (rotary step or rotary off-normal) (See Fig. 2)	SPRING AND BRACKET ASSEMBLY (release) (See Fig. 2)	TEST JACK ASSEMBLY (See Fig. 1)
197GK	Local Incoming	P-251590	P-463573	P-252368	P-250320
197GL	Code Sel, Local Level Htg Conn.	P-251591	P-251133	‡P-251459	P-250498
197GM	Trunk, Position Finder	P-251596	P-251453	—	P-16A137
*197GN	Local Rot. Htg Conn.	P-251593	—	P-12B224	P-251762
*197GP	Comb. Toll & Local Conn.	P-251591	—	P-12B224	P-250374
*197GR	Local Conn.	P-251593	—	P-12B224	P-250047
*197GS	Coin Conn.	P-251593	—	P-12B224	P-252318
*197GT	Comb Conn.	P-251596	—	P-12B224	P-252318
197GU	Inc Sel	P-251590	P-463573	P-252368	P-250320
197GW	Local Conn.	P-251591	—	P-12B224	P-251762
197GY	Inc Sel	P-251591	P-251150	—	P-251762
197HA	Test Group Sel	P-251590	P-251169	—	P-12B325
197HB	Test Group Sel	P-251593	P-251150	—	P-12B325
197HC	Comb. Conn.	P-251591	P-251171	P-12B224	P-252318
197HD	Comb. Toll & Local Conn.	P-251596	P-485590	P-12B224	P-250374
197HE	Test Distrib	P-251593	—	—	P-250344
*197HF	Comb. Toll & Local Conn.	P-251591	—	P-12B224	P-250374
197HG	Trunk Finder	P-251598	P-251435	—	P-12B748
197HH	Intertoll Sel	P-251590	P-15A679	—	P-250320
197HJ	Intertoll Sel	P-251590	P-15A679	P-252368	P-250320
*197HK	Local Rot. Htg Conn.	P-251593	—	P-12B224	P-251762
*197HL	Local Rot. Htg Conn.	P-251593	—	P-12B224	P-252318
*197HM	Comb. Rot. Htg Conn.	P-251596	—	P-12B224	P-252318
*197HN	Local Rot. Htg Conn.	P-251593	—	P-12B224	P-250320
197HP	Local Rot. Htg Conn.	P-251593	P-13B221	P-12B224	P-251762
197HR	Comb. Toll or Local Conn.	P-251591	P-13B221	P-12B224	P-250374
197HS	Local Conn.	P-251593	P-13B221	P-12B224	P-250047
197HT	Coin Conn.	P-251593	P-13B221	P-12B224	P-252318
197HU	Comb. Conn.	P-251596	P-13B221	P-12B224	P-252318
197HW	Comb. Toll or Local Conn.	P-251591	P-13B221	P-12B224	P-250374
197HY	Local Rot. Htg Conn.	P-251593	P-13B221	P-12B224	P-251762
197JA	Local Rot. Htg Conn.	P-251593	P-13B221	P-12B224	P-252318
197JB	Comb. Rot. Htg Conn.	P-251596	P-13B221	P-12B224	P-252318
197JC	Local Rot. Htg Conn.	P-251593	P-13B221	P-12B224	P-250320
197JD	200-Pt Local Conn.	P-251593	P-13B220	P-12B224	P-11B642
197JE	200-Pt Rot. Htg Conn.	P-251593	P-13B220	P-12B224	P-11B642
197JF	200-Pt Comb. Conn.	P-251591	P-13B220	P-12B224	P-11B643
197JG	Perm Sig Finder	P-251595	P-251435	—	P-251762
197JH	Control and Trunk Conn.	P-251593	—	P-42F846	P-46M572

* Manufacture Discontinued.

‡ Manufacture Discontinued. Available on special order.

TABLE A (Cont)

CODE NO.	ORDINARILY USED AS	SPRING AND BRACKET ASSEMBLY (vertical off-normal) (See Fig. 1)	SPRING AND BRACKET ASSEMBLY (rotary step or rotary off-normal) (See Fig. 2)	SPRING AND BRACKET ASSEMBLY (release) (See Fig. 2)	TEST JACK ASSEMBLY (See Fig. 1)
197JJ	Control and Trunk Conn.	P-251593	—	—	P-251762
197JK	Local Rot. Htg Conn.	P-251593	P-13B221	—	—
197JL	Local Rot. Htg Conn.	P-251593	P-13B221	—	P-250320
197JM	Line Finder (100-Pt)	P-251598	P-251435	—	P-46M134
197JN	Incom First Sel Cir	P-251594	P-251169	—	P-250047
197JP	PBX Sel Conn. Cir	P-251597	P-10A882	—	P-251762
197JR	3A Auto. Finding Sys	P-251594	P-251435	—	P-252480
197JS	Auto. Intercept Serv	P-251595	P-10A882	—	P-16A138
197JT	First Sel 701 PBX	P-251590	P-251159	‡P-252060	P-250047
D-90541	Message Rate Sel	P-251598	P-251169	—	P-250047
*D-91385	Inc First Sel (PBX)	P-251594	P-251169	‡P-251459	P-250047
D-96233	Mon Serv Dial Sel	P-251593	—	—	P-251362
*D-96565	Inc First Sel (PBX)	P-251598	P-251169	‡P-251459	P-250047
D-141901	Digit-Absorbing Sel	P-251594	P-251169	—	P-251762
D-141916	Sel	P-251590	P-251169	—	P-250047
D-141917	Sel	P-251590	P-251169	‡P-251459	P-250368
D-141922	Rot. Conn.	P-251593	—	—	P-251762
D-141943	Sel	P-251594	P-251453	‡P-251459	P-250047
D-141951	Conn.	P-251593	—	—	P-250047
D-141952	Sel Conn.	P-251597	P-251435	—	P-250047
D-156214	Dial Obs Sel	P-251591	P-251169	P-252060	P-250047
D-156664	Test Distrib Sel	P-251593	—	—	P-250344
D-159594	Comb. Toll or Local Conn.	P-251596	P-485590	—	P-250368
D-160098	Sel	P-251590	P-251169	—	P-250047
D-160731	First Sel	P-251594	P-251169	‡P-251459	P-250047
D-161742	Sel Conn.	P-251591	P-251453	—	P-250047
D-162477	Trunk Finder	P-251594	P-251435	—	P-251017
D-175728	Comb. Conn.	P-251596	P-485590	—	P-250374
D-175849	Trunk Finder	P-251591	P-251537	—	P-251455
198A	Revtg Call Sel	—	P-251150	—	P-251762
198B	Revtg Call Sel	—	P-251096	—	P-250344
198C	Revtg Call Sel	—	P-251096	—	P-250344

* Manufacture Discontinued.

‡ Manufacture Discontinued. Available on special order.

3. REPLACEMENT PROCEDURES

3.01 *List of Tools*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
319B	Lamp Cap Extractor
417A	1/4- and 3/8-Inch Open Double-End Flat Wrench
418A	5/16- and 7/32-Inch Open Double-End Flat Wrench
485A	Smooth-Jaw Pliers
555A	3/16-Inch Single-End Socket Wrench

CODE NO. SPEC NO.	DESCRIPTION
TOOLS	
563A	90-Degree Offset Screwdriver
564A	45-Degree Offset Screwdriver
KS-20266	Camtooth Adjuster (replaces H-47202)
—	5-Inch Diagonal Pliers
—	P Long-Nose Pliers (or the replaced long-nose pliers)
—	3-Inch C Screwdriver
—	4-Inch E Screwdriver

3.02 The procedures given in this section cover the replacement of parts on the switches in the following order.

Vertical Interrupter Spring Assembly and Associated Parts (3.03 and 3.04)

Vertical Off-Normal Spring Assembly and Associated Parts (3.05 and 3.06)

Rotary Interrupter Spring Assembly and Associated Parts (3.07)

Release Spring Assembly and Associated Parts (3.08)

Tenth or Eleventh Rotary Step Spring Assembly, Rotary Off-Normal Spring Assembly and Associated Parts (3.09)

Normal Post Spring Assembly and Associated Parts (3.10 to 3.14, inclusive)

Test Jack Assembly and Associated Parts (3.15)

VERTICAL INTERRUPTER SPRING ASSEMBLY AND ASSOCIATED PARTS

3.03 *Vertical Interrupter Spring Assembly:* To replace this spring assembly, tag and disconnect the leads connected to the spring terminals. Remove the two screws which mount the interrupter spring bracket with the 4-inch E screwdriver. Place the new spring assembly in position and fasten it in place by inserting the mounting screws and tightening them securely.

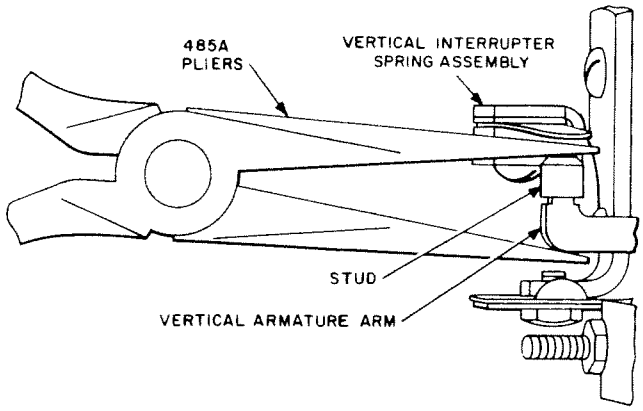


Fig. 8 — Method of Replacing Stud on Vertical Armature Arm

Connect the leads to the spring terminals. When it is necessary to replace the earlier type of vertical interrupter spring assembly, remove the assembly and replace the release magnet bracket and the vertical armature assembly as described in Section 030-705-802.

3.04 *Stud for Operating Vertical Interrupter Springs:* To replace the stud, remove it by cutting it with the diagonal pliers. Hold the new stud on the end of the bell crank arm or vertical armature arm using the 319B extractor, and force it into position with the 485A pliers. Take care not to mar the finish on the arm or to break the stud. If difficulty is experienced in forcing the stud onto the arm, heat the arm slightly with a soldering copper to soften the stud sufficiently to permit it to be forced into position on the arm. Fig. 8 shows the method of mounting the stud on a vertical armature arm.

VERTICAL OFF-NORMAL SPRING ASSEMBLY AND ASSOCIATED PARTS

3.05 *Vertical Off-Normal Spring Assembly (Fig. 9):* To replace this assembly, raise the switch manually to the top level, with the double dog out of the slot in the release link, and tag and disconnect the leads to the spring terminals. Remove the two screws which fasten the vertical off-normal spring bracket to the frame with the 563A or 564A offset screwdrivers or the 417A wrench. Place the new assembly in position. Make sure that the normal pin clamp screw does not interfere with the lever on the vertical off-normal spring assembly on the tenth or

eleventh rotary step. If necessary, shift the assembly to provide clearance. Securely fasten the two bracket mounting screws. Connect the leads to the proper spring terminals.

3.06 ***Stud on Off-Normal Finger:*** Where the off-normal finger is fastened to the spring assembly by a shoulder screw, remove the off-normal finger from the switch using the 4-inch E screwdriver. Where the off-normal finger is riveted to the spring assembly, remove the entire assembly as described in 3.05. To replace the stud, grasp the finger at a point just back of the stud with the 485A pliers, and rotate the pliers slightly in such a direction as to force the stud from the finger. Place the new stud in position on the end of the off-normal finger, grasp the bottom of the finger and the top of the stud with the pliers, and compress the pliers until the stud assumes its normal position on the finger. Remount the parts. If difficulty is experienced in forcing the stud onto the finger, heat the end of the finger slightly with a soldering copper. This will soften the stud slightly during mounting to facilitate forcing it into position. Remount the spring assembly or off-normal finger.

ROTARY INTERRUPTER SPRING ASSEMBLY AND ASSOCIATED PARTS

3.07 ***Rotary Interrupter Spring Assembly:*** To replace this spring assembly, tag and disconnect the leads connected to the springs. Raise the shaft to the top level, with the double dog out of the slot in the release link. Using the 4-inch E screwdriver, remove the rotary interrupter spring assembly bracket mounting screws. On switches also equipped with rotary step or rotary off-normal spring assemblies, the bracket for these assemblies is mounted by these screws. Substitute the new rotary interrupter spring assembly. Where a rotary step or rotary off-normal spring assembly is provided, position the mounting lugs of this assembly bracket on the mount-

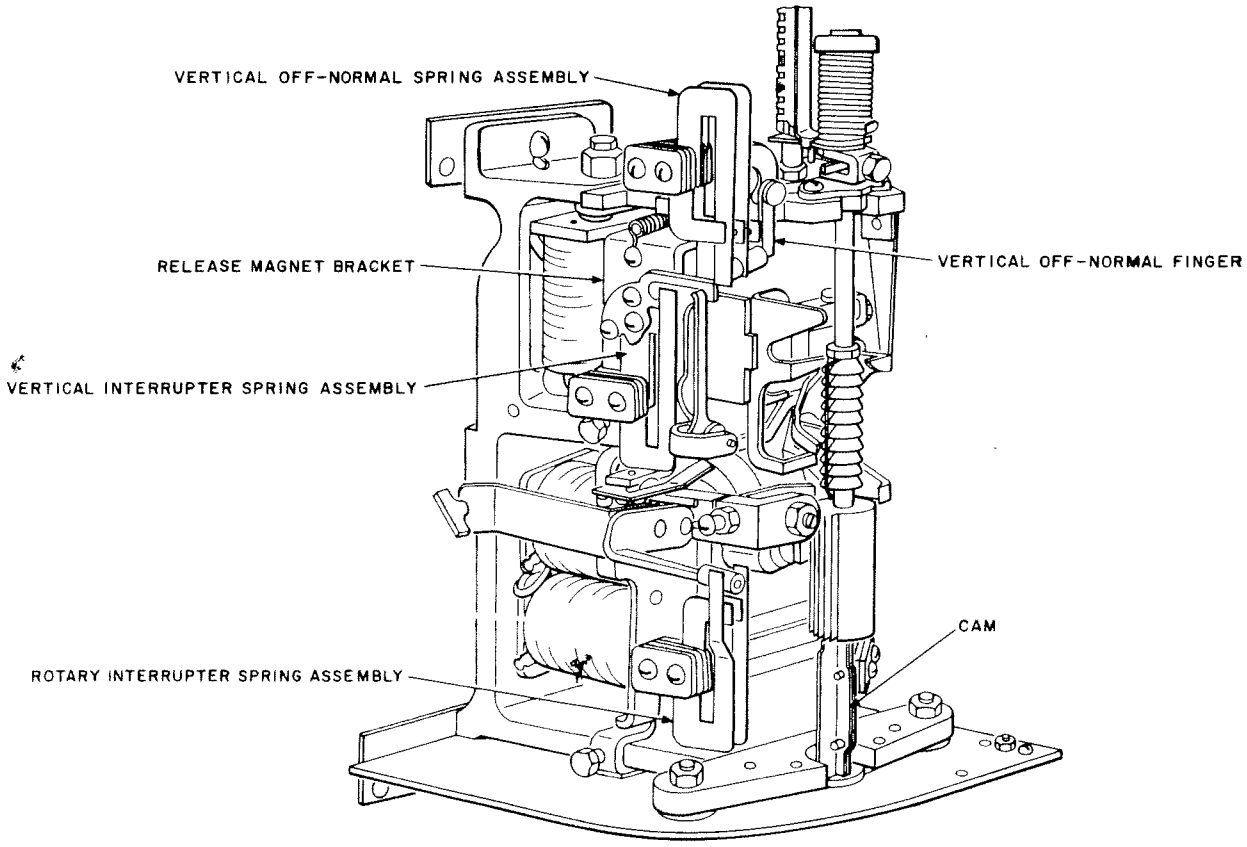


Fig. 9 — Parts of 197-Type Switch as Viewed From the Left Side

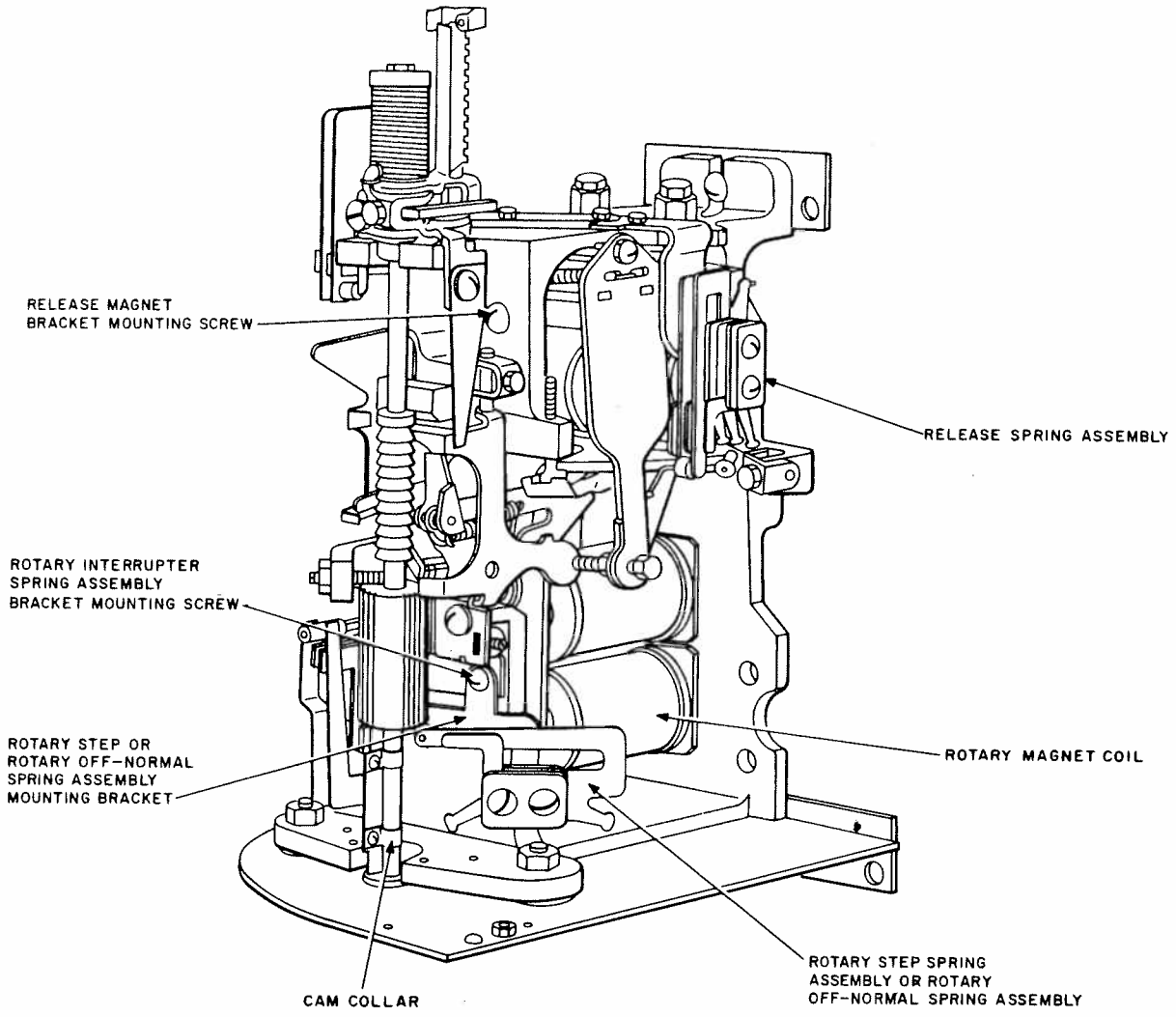


Fig. 10 — Parts of 197-Type Switch as Viewed From the Right Side

ing bracket of the interrupter spring assembly and securely tighten the mounting screws. Connect the leads to the interrupter spring terminals.

RELEASE SPRING ASSEMBLY AND ASSOCIATED PARTS

3.08 *Release Spring Assembly (Fig. 10):* To replace this spring assembly, tag and disconnect the leads connected to the springs. Remove the screw which mounts the release spring assembly bracket to the frame with the 563A or 564A offset screwdriver. Remove the release spring assembly from the frame by drawing the assembly toward the front or rear of the switch as required to free the contact springs from the stud on the release armature. Mount the new spring assembly in position and insert the mounting screws. Before tightening the mounting screws, note that the stud of the release armature is in the proper position for operating the release contact springs. Connect the leads to the terminals of the release contact springs.

TENTH OR ELEVENTH ROTARY STEP SPRING ASSEMBLY, ROTARY OFF-NORMAL SPRING ASSEMBLY AND ASSOCIATED PARTS

3.09 *Rotary Step or Rotary Off-Normal Spring Assembly.*

(1) Raise the shaft to the top level with the double dog out of the slot in the release link. Tag and disconnect the leads connected

to the springs. Remove the spring assembly bracket mounting screws using the 4-inch E screwdriver.

(2) If the switch is also equipped with a rotary interrupter spring assembly, position the mounting lugs of the new rotary step or rotary off-normal spring assembly bracket on the mounting bracket of the interrupter spring assembly and securely tighten the mounting screws. Connect the leads to the springs of the new assembly.

(3) If the switch is not equipped with a rotary interrupter spring assembly, make sure that the P-251233 spacing washer is positioned under each mounting lug of the rotary step or rotary off-normal spring assembly bracket and securely tighten the mounting screws. Connect the leads to the springs of the assembly.

NORMAL POST SPRING ASSEMBLY AND ASSOCIATED PARTS

Normal Post Spring Assembly With Cam per Fig. 11, 12, 13, and 14

3.10 Tag and disconnect the leads connected to the normal post spring assembly. Loosen the setscrews holding the normal post spring bracket to the normal post using the 3-inch C screwdriver or the 555A wrench. Lift the spring assembly from the top of the normal post.

3.11 Place the new spring assembly in position. Position the new assembly so that the springs operate properly and then tighten the mounting screws securely. Connect the leads to the terminals of the spring assembly.

Normal Post Spring Assembly Operated by Shaft Spring Bracket per Fig. 15 or by Normal Post Collar

3.12 *Switches With Helical Shaft Spring Assemblies*

(1) To replace the normal post spring assembly on a switch equipped with a helical shaft spring assembly, it is necessary to replace the shaft spring bracket, normal pin, and normal post spring assembly, and to add a normal post cam in accordance with Fig. 5. Full-, partial-, or nonsnap-on-type cams shown in Fig. 11 to 13 may be used.

(2) Tag and disconnect the leads to the normal post spring assembly. Loosen the normal post spring assembly clamping screw with the 3-inch C screwdriver or the 555A wrench. Lift the spring assembly from the top of the normal post.

(3) Remove the helical shaft spring, the shaft spring bracket, and the normal pin as described in Section 030-705-802. Substitute parts as covered in Fig. 5 and mount the helical shaft spring and normal pin.

(4) If the camteeth are not bent out to operate the normal post springs at the proper levels, bend out the camteeth corresponding to the levels at which the springs are to operate as covered in 3.14(5).

(5) Then mount the normal post cam as covered in 3.14(7) if it is a full snap-on-type cam per Fig. 11; as covered in 3.14(8) if it is a partial snap-on-type cam per Fig. 12; or as covered in 3.14(9) if it is a nonsnap-on-type cam per Fig. 13 and 14.

(6) Mount the new spring assembly on the normal post, placing the assembly so that the springs operate properly. Tighten the assembly mounting screws securely. Connect the leads to the spring terminals. Check all requirements on the normal post spring assembly and associated parts as covered in Section 030-705-703.

3.13 *Switches With Cup-Type Shaft Spring Assembly*

(1) To replace a normal post spring assembly on a switch having a cup-type shaft spring assembly, it is necessary to replace the cup spring assembly by a helical shaft spring assembly and to add a normal post cam and normal post spring assembly in accordance with Fig. 5. Full-, partial-, or nonsnap-on-type cam shown in Fig. 11 to 13 may be used.

(2) Tag and disconnect the leads connected to the normal post springs. Remove the assembly as covered in 3.10.

(3) Remove the cup spring assembly, the shaft spring bracket, the normal pin, and the

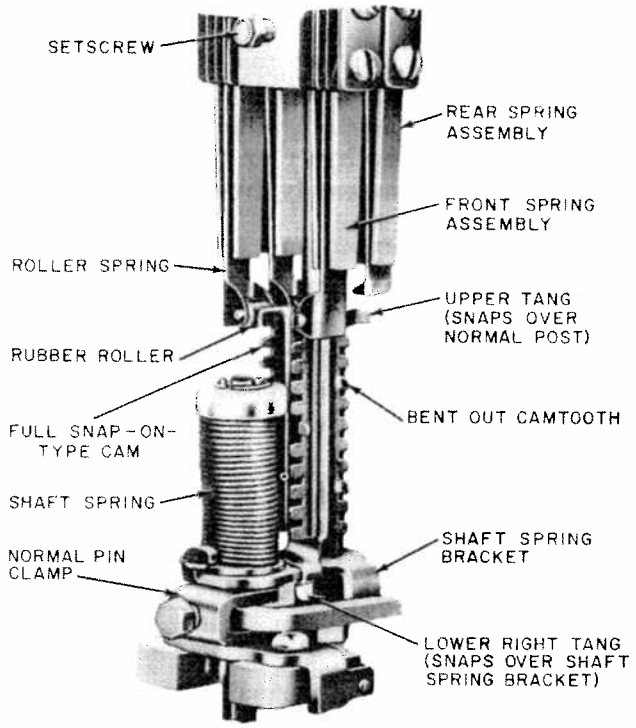


Fig. 11 — Normal Post Spring Assembly Having Rubber Rollers Operated by Full Snap-On-Type Cam

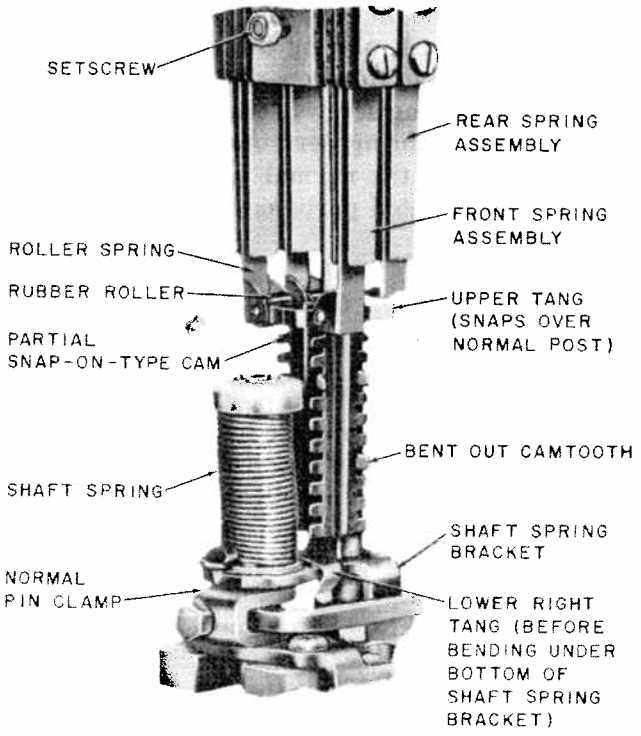


Fig. 12 — Normal Post Spring Assembly Having Rubber Rollers Operated by Partial Snap-On-Type Cam

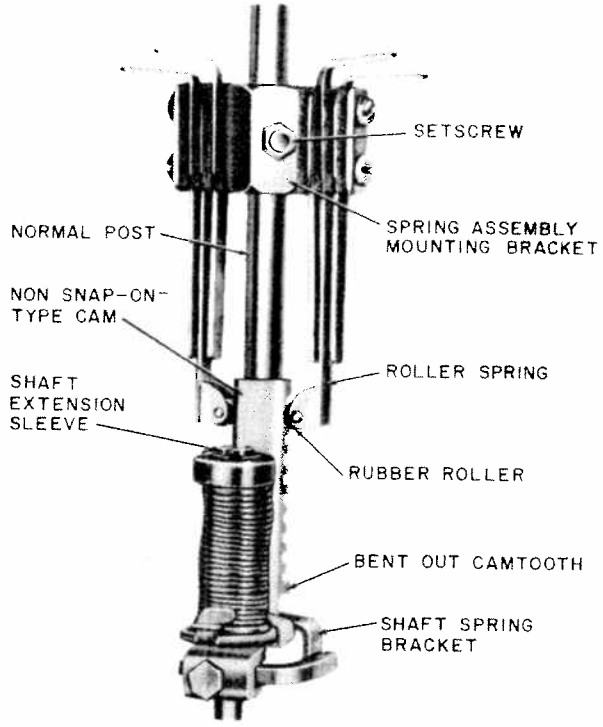


Fig. 13 — Normal Post Spring Assembly Having Rubber Rollers Operated by Nonsnap-On-Type Cam (single cam illustrated)

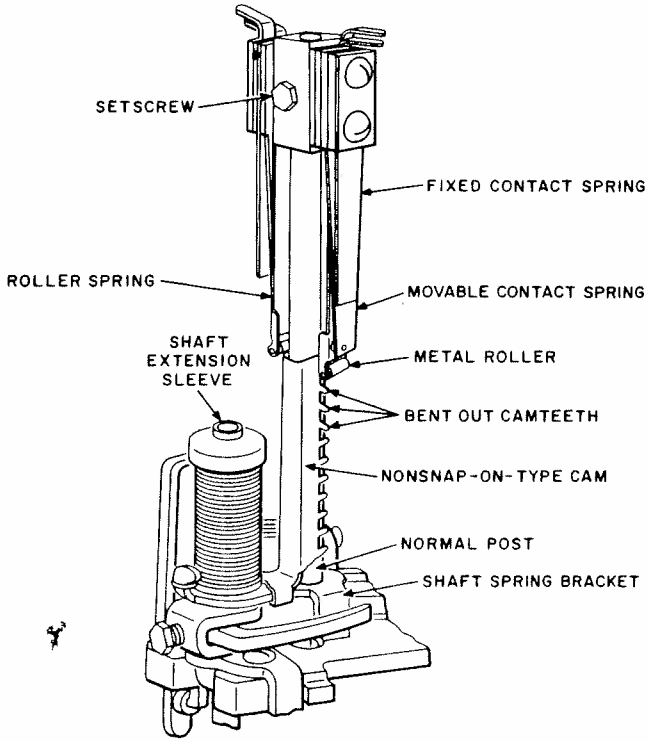


Fig. 14 — Normal Post Spring Assembly Having Metal Rollers Operated by Nonsnap-On-Type Cam

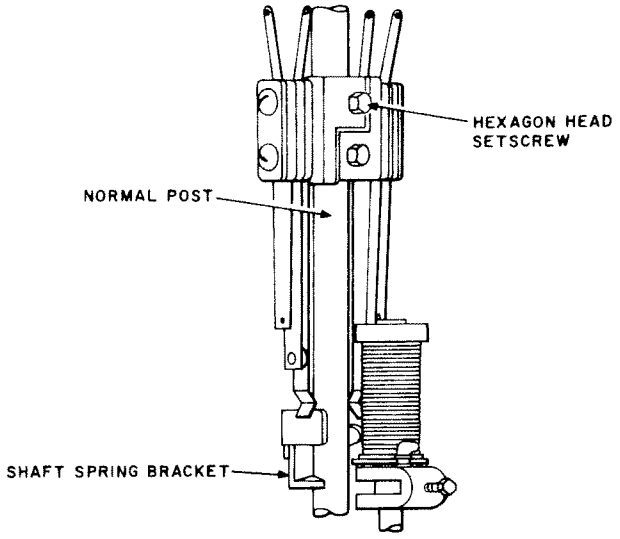


Fig. 15 — Normal Post Spring Assembly Operated by Shaft Spring Bracket

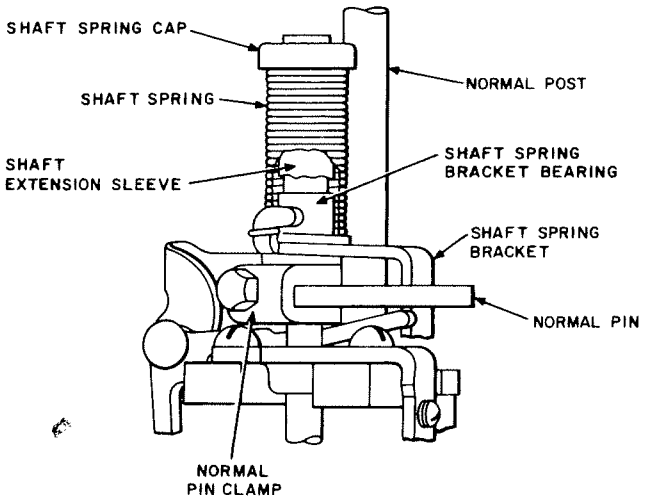


Fig. 16 — Helical-Type Shaft Spring Assembly

normal pin clamp as described in Section 030-705-802.

(4) If the switch is equipped with a normal post collar, remove and discard it.

(5) Mount the shaft extension sleeve, normal pin clamp, normal pin, shaft spring bracket, and shaft spring in accordance with Section 030-705-802.

(6) If the camteeth are not bent out to operate the normal post springs at the proper levels, bend out the camteeth corresponding to the levels at which the springs are to operate as covered in 3.14(5).

(7) Then mount the normal post cam as covered in 3.14(7) if it is a full snap-on-type cam per Fig. 11; as covered in 3.14(8) if it is a partial snap-on-type cam per Fig. 12; or as covered in 3.14(9) if it is a non-snap-on-type cam per Fig. 13 and 14.

(8) Mount the new spring assembly on the normal post, placing the assembly so that the springs operate properly. Tighten the assembling mounting screw securely. Connect the leads to the spring terminals. Check all requirements on the normal post spring assembly and associated parts as covered in Section 030-705-703.

3.14 *Multilevel Normal Post Cam*

General

(1) To replace a normal post cam, remove the cam as covered in (2) if it is a full snap-on-type cam per Fig. 11; as covered in (3) if it is a partial snap-on-type cam per Fig. 12; or as covered in (4) if it is a nonsnap-on-type cam per Fig. 13 and 14. If the proper teeth on the replacing cam have not been bent out, bend out as covered in (5) the teeth corresponding to the levels at which the normal post springs are to be operated. Mount the replacing cam as covered in (7) if it is a full snap-on-type cam per Fig. 11; as covered in (8) if it is a partial snap-on-type cam per Fig. 12; or as covered in (9) if it is a nonsnap-on-type cam per Fig. 13 and 14.

Method of Removing Cams

(2) ***Full Snap-On-Type Cam per Fig. 11***

(a) Pry the lower right tang of the cam free from the shaft spring bracket by inserting the 3-inch C screwdriver behind the end of the tang under the bracket. Pivot the screwdriver on the right rear corner of the upper lug of the normal pin clamp.

(b) Raise the cam above the shaft spring. Then grasp the lower right tang of the

cam with the P long-nose pliers and pull the lower part of the cam forward until the upper part is forced from the normal post.

(3) *Partial Snap-On-Type Cam per Fig. 12*

Using the long-nose pliers, slightly bend outward the lower right tang of the cam which is bent under the shaft spring bracket. To avoid breaking the tang, do not bend it more than necessary. Then remove the cam from the switch as covered in 2(b).

(4) *Nonsnap-On-Type Cam per Fig. 13 and 14*

(a) If the cam is being replaced by a full or partial snap-on-type cam, remove the old cam as covered in (b). If the cam is being replaced by another nonsnap-on-type cam, remove the old cam and normal post spring assembly as covered in (c) through (e).

(b) Grasp the lower right tang with the P long-nose pliers and bend it down and outward to free the cam from the shaft spring bracket. Then raise the cam above the shaft spring. Grasp the lower end of the cam with the long-nose pliers and pull it forward until the upper end is forced from the normal post.

(c) Before removing the cam, place a pencil mark on the normal post above the normal post spring assembly to indicate the vertical position of the assembly. Then loosen the spring assembly setscrew with the 555A wrench and remove the spring assembly from the top of the normal post.

(d) Place a vertical pencil mark approximately 1/2 inch long on the shaft spring to facilitate remounting the spring. Grasp the spring cap with the fingers and turn the cam in a clockwise direction as far as the bayonet slot will permit. Then lift the cap so the crossbar is free of the slot and allow the spring to unwind slowly. Disengage the lower loop of the spring from the lug on the shaft spring bracket and remove the spring from the shaft extension sleeve.

(e) Remove the cam and shaft spring bracket from the top of the normal post. Disengage the cam from the bracket.

Method of Bending Out Camteeth

(5) Hold the cam with the KS-7782 pliers and place the slot of the KS-20266 adjuster over the tooth to be bent out, with the bottom of the slot against the outer end of the tooth. Center the adjuster on the tooth. Bend the tooth as required until it is at right angles to the side of the cam, maintaining pressure against the tooth at all times to avoid burring.

Note: See Note 2 associated with Fig. 5 for the method of numbering the camteeth.

Method of Mounting Cams

(6) *General:* If the proper teeth have not been bent out, bend out as covered in (5) teeth corresponding to the levels at which the normal post springs are to be operated. Then proceed as covered in (7), (8), or (9).

(7) *Full Snap-On-Type Cam per Fig. 11*

(a) After the teeth have been bent out, snap the cam onto the upper part of the normal post. Then slide the cam downward until the lower tangs span the shaft spring bracket.

(b) If the cam does not slide freely on the normal post, remove the cam as covered in (2)(b) and bend outward with the long-nose pliers the part causing the interference. Remount the cam as covered in (a).

(c) Press the cam downward and to the left to snap the lower right tang under the lower edge of the shaft spring bracket.

(d) Check the vertical play between the cam and the shaft spring bracket as covered in Section 030-705-703. If the requirement is not met, remove the cam as covered in (2) and bend outward the lower right tang slightly with the P long-nose pliers.

(e) Remount the cam as covered in (a) and (c).

(8) *Partial Snap-On-Type Cam per Fig. 12*

After the teeth have been bent out, mount the cam as covered in (7). However, in this

case bend the lower right tang of the cam under the bottom edge of the shaft spring bracket using the P long-nose pliers.

(9) *Nonsnap-On-Type Cam per Fig. 13 and 14*

(a) After the teeth have been bent out, mount the cam on the shaft spring bracket. Check the vertical play between the cam and the shaft spring bracket as covered in Section 030-705-703 and adjust if necessary.

(b) Mount the shaft spring bracket and cam on the normal post and shaft extension sleeve. If the cam does not slide freely on the normal post, remove the cam and bracket from the normal post and bend outward with the P long-nose pliers the part causing the interference. Remount the cam and shaft spring bracket on the normal post and shaft extension sleeve.

(c) Lubricate the shaft extension sleeve as covered in Section 030-705-706. Place the shaft spring over the sleeve and engage the lower loop of the spring with the lug on the shaft spring bracket. Then turn the shaft spring cap in a clockwise direction. After each quarter turn, the crossbar in the spring cap may be placed into the slots in the sleeve to maintain the tension while a new hold is secured on the cap. Continue to turn the shaft spring until the pencil mark placed on the spring forms a vertical line. The shaft spring will then have the same tension as it did prior to its removal. Make sure that the crossbar in the spring cap is engaged in the bayonet slots to lock the spring firmly in position. Check that the shaft spring tension requirement covered in Section 030-705-703 is met and adjust if necessary.

(d) Remount the normal post spring assembly on the normal post, aligning the top of the assembly with the pencil mark previously placed on the normal post. Tighten the setscrew securely. Check requirements for normal post springs as covered in Section 030-705-703 and adjust if necessary.

TEST JACK ASSEMBLY AND ASSOCIATED PARTS

3.15 *Test Jack Assembly*

(1) To replace this assembly, tag and disconnect the leads connected to the test jack terminals at the rear of the test jack. Unsolder and tag the wiper cords from the front of the jack assembly.

(2) Loosen the test jack assembly mounting screw and nut, using the 3-inch C screwdriver and the 417A or 418A wrench. Mount the new assembly securely in position. The screw nearest the front of the switch which fastens the test jack assembly to the lower coverplate is only required on switches with a P-251147 commutator.

(3) Connect leads to the rear of the assembly. Dress and connect the wiper cords as shown in Fig. 17. If the wiper cords are M1G cords (M1G cords do not have cord tips), replace them with M1R cords as described in Section 030-705-804.

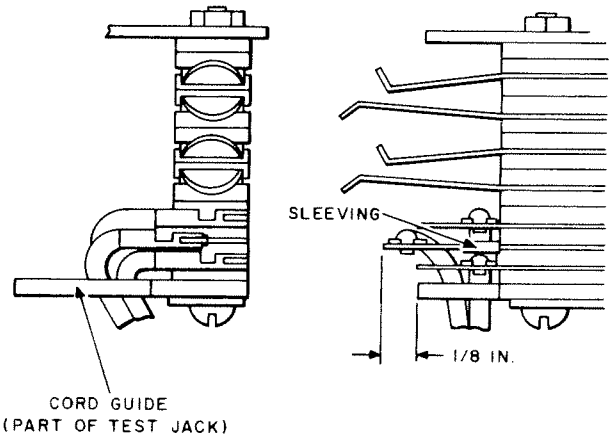


Fig. 17 — Method of Dressing and Connecting Wiper Cords at Test Jack Assembly