

280-TYPE RELAYS

REPLACEMENT OF 206- AND 239-TYPE RELAYS

1. GENERAL

1.01 This section covers information that is required when a 280 type relay is used to replace a 206 or 239 type relay in existing equipment. This information is provided because mounting information and the electrical requirements for the 280 type relay may not be available. This section should be used in conjunction with Section 040-267-701.

1.02 Cartons containing 280 type relays are stamped with the following information. If this relay is used to replace a 206 or 239 type relay see BSP.

1.03 Tables 1 and 2 herein contain the following information

- (a) **Table 1:** List of coded 280 type relays and the corresponding 206 or 239 type relays which they supersede.
- (b) **Table 2:** Current flow values necessary for applying the magnetic balance requirement to a particular coded 280 type relay.

2. DEFINITIONS

2.01 The magnetic balance for 280 type relays is obtained electrically using an operate and non-operate current flow applied in each direction. The current flow values for the magnetic balance requirements are individual to the code and are shown in Table 2.

2.02 The letters A and B, shown in the "BSP Fig." column in Table 2 of this section, indicate the adjustment to apply to the 280 type relay. Adjustment A applies to relays without biasing springs and adjustment B applies to relays equipped with biasing springs. The method for applying these adjustments is covered in Section 040-267-701.

2.03 The test current flow values for the A adjustment are the same as shown on the circuit requirement table for the replaced 206

and 239 type relays. On relays for which the B adjustment is specified, there are no test values for the magnetic balance requirement. After the magnetic balance adjustment has been applied, the test and readjust current flow values specified on the circuit requirement table for the replaced 206 or 239 type relay apply to the 280 type relay with the biasing spring engaged. These electrical requirements are not shown in this section except for the No. 280 CC relay when it is used as a replacement for the No. 206 AK and No. 206 AU relays. In these cases, the values specified in Table 2 shall be used in place of the values shown on the circuit requirement table.

3. MOUNTING

3.01 When a 280 type relay is to be mounted in place of a 206 or 239 type relay, make sure that all the washers used to mount the replaced relay are used. This is necessary to avoid possible electrical shorting of the relay terminals with the mounting screws on certain mounting plates. The mounting washers furnished with the 280 type relay should be discarded. Also make sure that the mounting insulator and the mounting screws furnished with the 280 type relay are used in mounting this relay. This is necessary because the terminal slot in the insulator used with the 206 or 239 type relay is too narrow to fit over the terminals of the 280 type and the mounting screws have a different thread than those used to mount 206 and 239 type relays.

4. WIRING AND TESTING

4.01 All 280 type relays are equipped with chatterless armatures and transfer (BM) spring combinations. Therefore, when a 280 type relay is received in place of a 206 type relay equipped with only a make or a break spring combination, the winding arrangement number and terminal numbering will be different. In such cases, a dagger adjacent to the 206 code

in Table 1 will indicate a change in terminal numbering. The winding arrangement and terminal numbering for 280 type relays is covered in Table 2 and in Fig. 1.

4.02 The primary and secondary windings of the Nos. 280 DF and 280 DG relays are connected to the same numbered terminals and perform the same functions in the circuit as the secondary and primary windings, respectively, of the replaced 206 or 239 type relays. Therefore, no change in wiring or test clip data is required. It should be noted, however, that the information in the "Test Wdg." column of the circuit requirement table refers to the windings of the 206 or 239 type relays. Therefore, the P or S designations in this case should be disregarded and the current flow values applied to the equivalent windings of the 280 type relay as described above.

4.03 Certain 280 type relays wound with primary and secondary or secondary and tertiary windings replace 206 or 239 type relays having P1 and P2 or S1 and S2 windings. Included in this category are the Nos. 280 AJ, 280 CS, 280 DL, 280 DY, 280 EF and 280 ER relays. No change in wiring or test clip data is necessary in these cases. The current flow values specified on the circuit requirement table which refer to the relay being replaced should be applied to the equivalent winding of the 280 type relay.

4.04 Where a 280 type relay replaces a 206 or 239 type relay in a pulse generator circuit, the pulse output rate may be slower than that specified on the circuit requirement table. In this case, adjust the 280 type relay in accordance with Fig. 13 of Section 040-228-701, providing Fig. 10 or Fig. 13 has been specified on the circuit requirement table for the replaced relay.

4.05 Where the circuit arrangement is such that the relay winding is connected in parallel with a condenser, difficulty may be experienced in applying the A or B adjustment. In such cases, where a filter is not specified on the circuit requirement table, connect a filter of 4600 ohms $\pm 1\%$ in series with 4.28 to 4.36 MF across the test leads. The use of the filter will, in most cases, eliminate the difficulty.

4.06 Where the specified soak current cannot be obtained, use the maximum current that can be obtained with the specified circuit arrangement.

4.07 In some cases, a 500 ohm $\pm 1\%$ resistance connected across the winding under test is required to obtain readable values in the test set. Where this is necessary, it will be indicated in Table 2 in this section. However, the shunt should be removed when applying the additional current flow values shown on the circuit requirement table unless the circuit requirement table specifies its use.

Table 1

Code	Supersedes	Code	Supersedes	Code	Supersedes
280A	239FC	280AK	239KF	280CU	239FT
	239GR	280AL	239JP	280CW	†206AA
280B	206GS	280AM	239KG	280CY	239GC
	239FK	280AN	239GG	280DA	206CF
280C	239GS	280AP	239JR	280DB	206S
280D	206GU		239JY		206AP
280E	239FL	280AR	239GF	280DC	206G
	239GW	280AS	239HL	280DD	†206FC
280F	206AD	280AT	206GB		†206FL
	206AN	280AU	239HR	280DE	239JT
	206BH	280AW	239GB	280DF	206AT
	206FF	280AY	206GA		239HC
	206FG		239HA	280DG	†206CK
	206FH	280BA	206AH		206CL
	239FP		239JU	280DH	239JL
	239HM	280BB	239KE	280DJ	239FR
280G	239FU	280BC	239FE	280DK	206AF
280H	†206GC	280BD	239FD		†206BJ
	†206GG	280BE	239KJ	280DL	239GJ
	206GY	280BF	239JB	280DM	206CE
	239FJ	280BG	239KK	280DN	206GJ
280J	206C	280BH	239FA	280DP	239KH
	205L	280BJ	239HP	280DR	206E
	206AM	280BK	206AC	280DS	239GT
	206AY	280BL	239GL	280DT	206GD
	†206BA	280BM	239KC	280DU	††239GH
	†206BM	280BN	239JN	280DW	239FG
	†206BY	280BP	206CM	280DY	239JC
	†206CB	280BR	239KD	280EA	206W
	206FJ	280BS	239GE		206AJ
	239FM	280BT	239JJ	280EB	†206FK
280K	239FN	280BU	206GH		206GR
	239FB	280BW	239GM	280EC	239HF
	239HT	280BY	206J	280ED	239HB
280L	206FY		†206BT	280EE	†206BP
280M	206AE		†206CA	280EF	239JM
	206BK	280CA	206BR	280EG	239HS
	206BL	280CB	206BW	280EH	206FD
280N	239JW	280CC	††206AK	280EJ	206FS
280P	206GW		††206AU	280EK	206FT
280R	206GT	280CD	239HD	280EL	206FU
	239FF		†206FM	280EM	206AW
	239GN		239FS	280EN	†206FN
280S	239HK		239JH	280EP	†206CH
280T	206Y	280CE	239JG	280ER	239KA
280U	206BU	280CF	206H	280ES	239GD
	206N		206P	280ET	239HG
	239GU		206AR	280EU	239HN
280W	239HE		206BF	280EW	239HU
280Y	206GN		206BG	280EY	239HW
280AA	†206BD	280CG	239JA	280FA	239HY
	†206BE	280CH	†206FP	280FB	239JS
	†206FB		206GM	280FC	239KB
	206GL	280CJ	239GK	280FD	206AG
	239FH	280CK	239JD	280FE	239
280AB	206FA	280CL	206GK		Type
280AC	206FR	280CM	206GE		per
	239GA	280CN	†206GC		D-95195
	239HJ	280CP	239FY		
280AD	206AS	280CR	239JF		
	†206CD	280CS	239JE		
	206FW	280CT	206CJ		
280AE	239FW				
280AF	239HH				
280AG	†206U				
280AH	†206FE				
280AJ	239JK				

Table 1 (Cont.)

†Note changed terminal numbering for 280 type relays when used to replace the single daggered 206 or 239 type relays.

††When the No. 280CC relay is used to replace the No. 206AK or No. 206AU relay, use all the electrical requirements specified for adjusting and testing the No. 280CC in Table 2 of this section and disregard the electrical requirements specified on the circuit requirement table for the Nos. 206AK or 206AU relays.

†††Use the 280DU to replace the 239GH when the tertiary winding is not required.

Table 2

CODE	WDG. ARR.	BSF FIG.	TEST WDG.	TEST FOR	SOAK MA	READJ. MA	SEE NOTE
280A	2	A	P	O	-65	1.5	
			P	NO	-65	1.1	
280B	1	B		O	-30	0.7	
				NO	-30	0.5	
280C	21	A	P	O	-45	1	
			P	NO	-45	0.7	
280D	1	B		O	-13	0.3	
				NO	-13	0.2	
280E	1	B		O	-65	1.1	A
				NO	-65	0.8	A
280F	1	B		O	-16	0.4	
				NO	-16	0.3	
280G	20	B	P	O	-35	0.7	
			P	NO	-35	0.5	
280H	13	B	P//T I.S.W. S//Q	O	-150	3.5	
				NO	-150	2.5	
280J	1	B		O	-12	0.3	
				NO	-12	0.2	
280K	16	A	P1/P2 P1/P2	O	-40	1	
				NO	-40	0.7	
280L	2	B	P	O	-30	0.6	
			P	NO	-30	0.4	
280M	1	B		O	-25	0.6	
				NO	-25	0.4	
280N	1	A		O	-19	0.4	
				NO	-19	0.3	
280P	18	B	P	O	-35	0.7	
			P	NO	-35	0.5	
280R	16	A	P1	O	-40	1	
			P1	NO	-40	0.7	
280S	2	B	P	O	-40	0.9	
			P	NO	-40	0.6	
280T	1	B		O	-25	0.6	
				NO	-25	0.4	
280U	5	B	P//S	O	-105	2.3	
				NO	-105	1.7	
280W	18	A	P	O	-33	0.8	
			P	NO	-33	0.6	
280Y	2	B	P	O	-45	1.1	
			P	NO	-45	0.8	
280AA	1	B		O	-40	0.9	
				NO	-40	0.6	
280AB	2	B	P	O	-13	0.3	
			P	NO	-13	0.2	
280AC	2	B	P	O	-24	0.6	
			P	NO	-24	0.4	
280AD	1	B		O	-90	2.7	A
				NO	-90	1.9	A
280AE	2	B	P	O	-23	0.6	
			P	NO	-23	0.4	
280AF	2	B	S	O	-45	1.1	
				NO	-45	0.8	
280AG	7	B	P	O	-30	0.7	
			P	NO	-30	0.5	

Table 2 (Cont.)

CODE	WDG. ARR.	BSP FIG.	TEST WDG.	TEST FOR	SOAK MA	READJ. MA	SEE NOTE
280AH	1	B		O NO	-40 -40	0.8 0.6	A A
280AJ	24	A	P/S P/S	O NO	-25 -25	0.6 0.4	B B
280AK	2	B	P P	O NO	-70 -70	1.7 1.2	
280AL	18	B	P P	O NO	-28 -28	0.7 0.5	
280AM	2	B	P P	O NO	-34 -34	0.8 0.6	
280AN	2	A	P P	O NO	-65 -65	1.5 1.1	
280AP	2	B	P P	O NO	-65 -65	1.5 1.1	
280AR	1	A		O NO	-46 -46	1.1 0.8	
280AS	2	B	P	O NO	-55 -55	1.3 0.9	
280AT	2	B	P/S P/S	O NO	-40 -40	0.9 0.6	
280AU	2	B	S S	O NO	-75 -75	2.1 1.5	
280AW	1	B		O NO	-50 -50	1.1 0.8	
280AY	1	B		O NO	-75 -75	1.5 1.1	
280BA	1	B		O NO	-120 -120	2.6 1.9	
280BB	18	A	P/S P/S	O NO	-12 -12	0.3 0.2	
280BC	2	A	S	O NO	-32 -32	0.8 0.6	
280BD	14	A	P/S P/S	O NO	-12 -12	0.3 0.2	
280BE	2	B	P P	O NO	-13 -13	0.3 0.2	
280BF	21	B	P P	O NO	-30 -30	0.7 0.5	
280BG	2	B	P P	O NO	-47 -47	1.1 0.8	
280BH	3	B	P1 P1	O NO	-75 -75	1.7 1.2	
280BJ	2	B	P P	O NO	-315 -315	7.5 5.5	
280BK	1	B		O NO	-12 -12	0.3 0.2	
280BL	2	A	P P	O NO	-42 -42	1 0.7	
280BM	2	B	P P	O NO	-95 -95	2.2 1.6	
280BN	2	B	P P	O NO	-75 -75	1.7 1.2	
280BP	1	B		O NO	-14 -14	0.3 0.2	
280BR	2	B	P P	O NO	-22 -22	0.5 0.3	
280BS	3	A	P1 P1	O NO	-135 -135	3.2 2.3	
280BT	3	B	P1 P1	O NO	-135 -135	3.2 2.3	
280BU	2	A	P P	O NO	-17 -17	0.4 0.3	
280BW	2	B	P P	O NO	-85 -85	2 1.4	

Table 2 (Cont.)

CODE	WDG. ARR.	BSP FIG.	TEST WDG.	TEST FOR	SOAK MA	READJ. MA	SEE NOTE
280BY	1	B	P	O NO	-12 -12	0.3 0.2	
280CA	1	A		O NO	-12 -12	0.3 0.2	
280CB	1	B		O NO	-45 -45	1.8 1.3	
* 280CC	2	B	P P P P	O NO O NO	-21 -21 -21 21	0.5 0.3 2 0.8	
280CD	2	B	P P	O NO	-70 -70	1.5 1.1	
280CE	18	B	T T	O NO	-65 -65	1.5 1.1	
280CF	1	B		O NO	-40 -40	1 0.7	
280CG	2	B	P P	O NO	-70 -70	1.6 1.2	
280CH	1	B		O NO	-180 -180	4.3 3.1	
280CJ	2	B	S S	O NO	-65 -65	1.5 1.1	
280CK	16	A	P1/P2 P1/P2	O NO	-16 -16	0.4 0.3	
280CL	16	A	P1/P2 P1/P2	O NO	-16 -16	0.4 0.3	
280CM	16	A	P1/P2 P1/P2	O NO	-16 -16	0.4 0.3	
280CN	16	A	P1/P2 P1/P2	O NO	-16 -16	0.4 0.3	

* Where the No. 280CC replaces the No. 206AK or No. 206AU relay, use all the requirements specified herein and disregard the requirements specified on the circuit requirement table. The test current flow values with the biasing spring tensioned against the armature are as follows:

TEST WDG.	TEST FOR	SOAK MA	TEST MA
P	O	-21	2.1
P	NO	21	0.7
S	O		8.4

CODE	WDG. ARR.	BSP FIG.	TEST WDG.	TEST FOR	SOAK MA	READJ. MA	SEE NOTE
280CP	2	B	P P	O NO	-32 -32	0.7 0.5	
280CR	2	B	P P	O NO	-120 -120	2.8 2	
280CS	25	B	P P	O NO	-13 -13	0.3 0.2	B B
280CT	5	B	P//S P//S	O NO	-40 -40	0.8 0.6	
280CU	1	B		O NO	-90 -90	7.5 5.5	A A
280CW	8	B	P P	O NO	-65 -65	1.5 1.1	
280CY	6	B	P//T P//T	O NO	-85 -85	1.7 1.2	
280DA	3	A	P1 P1	O NO	-50 -50	1.1 0.8	
280DB	2	B	P P	O NO	-40 -40	0.9 0.6	
280DC	6	B	P//T	O NO	-65 -65	1.3 0.9	
280DD	1	B		O NO	-33 -33	0.7 0.5	A A
280DE	18	A	P P	O NO	-50 -50	1.2 0.9	

Table 2 (Cont.)

CODE	WDG. ARR.	BSP FIG.	TEST WDG.	TEST FOR	SOAK MA	READJ. MA	SEE NOTE
280DF	26	B	S	O	-30	0.7	C
			S	NO	-30	0.5	C
280DG	27	B	P	O	-36	0.9	C
			P	NO	-36	0.6	C
280DH	2	B	S	O	-23	0.6	
			S	NO	-23	0.4	
280DJ	2	B	P	O	-15	0.3	
			P	NO	-15	0.2	
280DK	28	B		O	-90	6.3	
				NO	-90	4.7	
280DL	25	A	P	O	-32	0.7	B
			P	NO	-32	0.5	B
280DM	2	B	S	O	-125	3	
			S	NO	-125	2.2	
280DN	1	B		O	-29	0.6	A
				NO	-29	0.4	A
280DP	23	A	P4	O	-42	1	
			P4	NO	-42	0.7	
280DR	5	A	P1/S	O	-60	1.2	
				NO	-60	0.9	
280DS	2	A	S	O	-65	1.5	
			S	NO	-65	1.1	
280DT	3	B	P1/P2	O	-21	0.5	
			P1/P2	NO	-21	0.3	
280DU	25	B	P/S	O	-12	0.3	
			P/S	NO	-12	0.2	
280DW	17	A	T	O	-110	2.6	
			T	NO	-110	1.9	
280DY	16	B	P1	O	-55	1.3	B
			P1	NO	-55	0.9	B
280EA	2	B	P	O	-43	1	
			P	NO	-43	0.7	
280EB	12	A	S	O	-55	1.1	A
			S	NO	-55	0.8	A
280EC	2	A	P	O	-30	0.7	
			P	NO	-30	0.5	
280ED	18	A	P	O	-30	0.7	
			P	NO	-30	0.5	
280EE	2	B	P	O	-40	0.9	
			P	NO	-40	0.6	
280EF	29	A	P	O	-45	1.1	B
			P	NO	-45	0.8	B
280EG	2	A	P	O	-16	0.4	
			P	NO	-16	0.3	

Table 2 (Cont.)

CODE	WDG. ARR.	BSP FIG.	TEST WDG.	TEST FOR	SOAK MA	READJ. MA	SEE NOTE
280EH	2	B	P	O	-60	1.4	
			P	NO	-60	1	
280EJ	2	B	P	O	-125	3	
			P	NO	-125	2.2	
280EK	2	B	P	O	-115	2.8	
			P	NO	-115	2	
280EL	2	B	P	O	-125	3	
			P	NO	-125	2.2	
280EM	2	B	P	O	-200	4.8	
			P	NO	-200	3.5	
280EN	2	B	P	O	-110	2.5	
			P	NO	-110	1.8	
280EP	2	B	P	O	-25	0.6	
			P	NO	-25	0.4	
280ER	24	A	P	O	-50	1.2	B
			P	NO	-50	0.9	B
280ES	2	A	S	O	-30	0.7	
			S	NO	-30	0.5	
280ET	2	A	P	O	-85	2	
			P	NO	-85	1.4	
280EU	2	B	P	O	-68	1.6	
			P	NO	-68	1.2	
280EW	18	B	P	O	-29	0.7	
			P	NO	-29	0.5	
280EY	2	B	P	O	-27	0.6	
			P	NO	-27	0.4	
280FA	18	B	P	O	-23	0.5	
			P	NO	-23	0.3	
280FB	3	A	P1	O	-50	1.2	
			P1	NO	-50	0.8	
280FC	16	A	P1	O	-40	1	
			P1	NO	-40	0.7	
280FD	2	B	P	O	-40	0.9	
			P	NO	-40	0.6	
280FE	18	A	S	O	-55	1.1	A
				NO	-55	0.8	A

Note A: Adjusted with relay shunted by a resistance of 500 ohms $\pm 1\%$.

Note B: See paragraph 4.03

Note C: See paragraph 4.02

5. WINDING ARRANGEMENTS

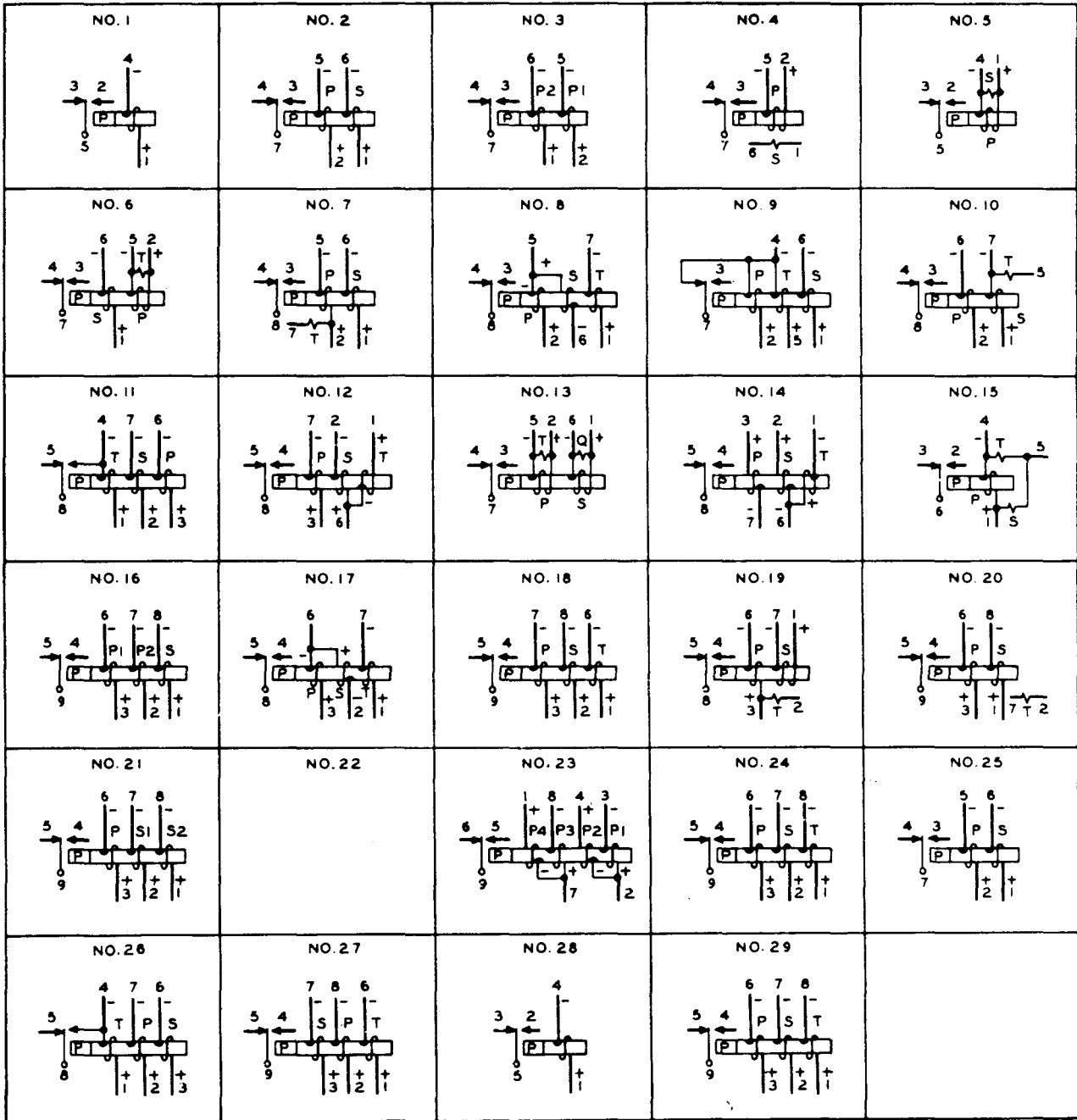


Fig. 1—Winding Arrangements—280 Type Relays