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

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.	BSP 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	O	—150	3.5	
			I.S.W.	NO	—150	2.5	
			S//Q				
280J	1	B		O	—12	0.3	
				NO	—12	0.2	
280K	16	A	P1/P2	O	—40	1	
			P1/P2	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	—40	0.8	A
				NO	—40	0.6	A
280AJ	24	A	P/S	O	—25	0.6	B
			P/S	NO	—25	0.4	B
280AK	2	B	P	O	—70	1.7	
			P	NO	—70	1.2	
280AL	18	B	P	O	—28	0.7	
			P	NO	—28	0.5	
280AM	2	B	P	O	—34	0.8	
			P	NO	—34	0.6	
280AN	2	A	P	O	—65	1.5	
			P	NO	—65	1.1	
280AP	2	B	P	O	—65	1.5	
			P	NO	—65	1.1	
280AR	1	A		O	—46	1.1	
				NO	—46	0.8	
280AS	2	B	P	O	—55	1.3	
				NO	—55	0.9	
280AT	2	B	P/S	O	—40	0.9	
			P/S	NO	—40	0.6	
280AU	2	B	S	O	—75	2.1	
			S	NO	—75	1.5	
280AW	1	B		O	—50	1.1	
				NO	—50	0.8	
280AY	1	B		O	—75	1.5	
				NO	—75	1.1	
280BA	1	B		O	—120	2.6	
				NO	—120	1.9	
280BB	18	A	P/S	O	—12	0.3	
			P/S	NO	—12	0.2	
280BC	2	A	S	O	—32	0.8	
				NO	—32	0.6	
280BD	14	A	P/S	O	—12	0.3	
			P/S	NO	—12	0.2	
280BE	2	B	P	O	—13	0.3	
			P	NO	—13	0.2	
280BF	21	B	P	O	—30	0.7	
			P	NO	—30	0.5	
280BG	2	B	P	O	—47	1.1	
			P	NO	—47	0.8	
280BH	3	B	P1	O	—75	1.7	
			P1	NO	—75	1.2	
280BJ	2	B	P	O	—315	7.5	
			P	NO	—315	5.5	
280BK	1	B		O	—12	0.3	
				NO	—12	0.2	
280BL	2	A	P	O	—42	1	
			P	NO	—42	0.7	
280BM	2	B	P	O	—95	2.2	
			P	NO	—95	1.6	
280BN	2	B	P	O	—75	1.7	
			P	NO	—75	1.2	
280BP	1	B		O	—14	0.3	
				NO	—14	0.2	
280BR	2	B	P	O	—22	0.5	
			P	NO	—22	0.3	
280BS	3	A	P1	O	—135	3.2	
			P1	NO	—135	2.3	
280BT	3	B	P1	O	—135	3.2	
			P1	NO	—135	2.3	
280BU	2	A	P	O	—17	0.4	
			P	NO	—17	0.3	
280BW	2	B	P	O	—85	2	
			P	NO	—85	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	—12	0.3	
				NO	—12	0.2	
280CA	1	A		O	—12	0.3	
				NO	—12	0.2	
280CB	1	B		O	—45	1.8	
				NO	—45	1.3	
*280CC	2	B	P	O	—21	0.5	
			P	NO	—21	0.3	
			P	O	—21	2	
			P	NO	21	0.8	
280CD	2	B	P	O	—70	1.5	
			P	NO	—70	1.1	
280CE	18	B	T	O	—65	1.5	
			T	NO	—65	1.1	
280CF	1	B		O	—40	1	
				NO	—40	0.7	
280CG	2	B	P	O	—70	1.6	
			P	NO	—70	1.2	
280CH	1	B		O	—180	4.3	
				NO	—180	3.1	
280CJ	2	B	S	O	—65	1.5	
			S	NO	—65	1.1	
280CK	16	A	P1/P2	O	—16	0.4	
			P1/P2	NO	—16	0.3	
280CL	16	A	P1/P2	O	—16	0.4	
			P1/P2	NO	—16	0.3	
280CM	16	A	P1/P2	O	—16	0.4	
			P1/P2	NO	—16	0.3	
280CN	16	A	P1/P2	O	—16	0.4	
			P1/P2	NO	—16	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	O	—32	0.7	
			P	NO	—32	0.5	
280CR	2	B	P	O	—120	2.8	
			P	NO	—120	2	
280CS	25	B	P	O	—13	0.3	B
			P	NO	—13	0.2	B
280CT	5	B	P//S	O	—40	0.8	
			P//S	NO	—40	0.6	
280CU	1	B		O	—90	7.5	A
				NO	—90	5.5	A
280CW	8	B	P	O	—65	1.5	
			P	NO	—65	1.1	
280CY	6	B	P//T	O	—85	1.7	
			P//T	NO	—85	1.2	
280DA	3	A	P1	O	—50	1.1	
			P1	NO	—50	0.8	
280DB	2	B	P	O	—40	0.9	
			P	NO	—40	0.6	
280DC	6	B	P//T	O	—65	1.3	
				NO	—65	0.9	
280DD	1	B		O	—33	0.7	A
				NO	—33	0.5	A
280DE	18	A	P	O	—50	1.2	
			P	NO	—50	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	P//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 ± 1%.
Note B: See paragraph 4.03
Note C: See paragraph 4.02

5. WINDING ARRANGEMENTS

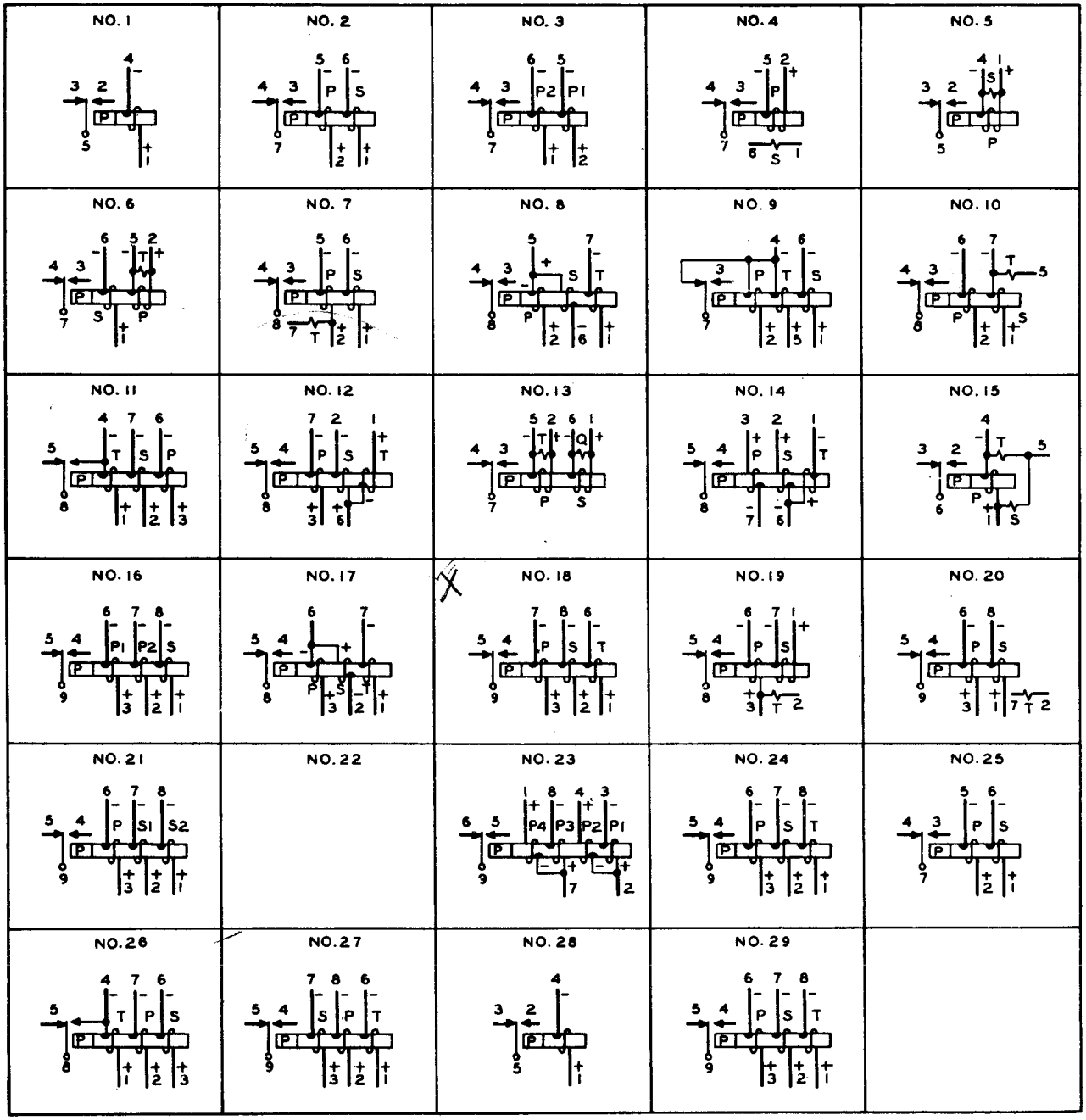

Fig. 1—Winding Arrangements—280 Type Relays