

REGISTER TRUNK AND LINK CIRCUIT
MISCELLANEOUS TESTS
STEP-BY-STEP COMMON CONTROL OFFICES

1. GENERAL

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1.01 This section describes a method of making miscellaneous tests on the register trunk and link circuit for step-by-step offices equipped for common control operation.

1.02 This section is reissued:

(a) To include a method for testing trouble time-out transfer of regular and emergency link controller circuits in Test G.

(b) To add a method for testing both the emergency and regular controllers in manual transfer section of Test G.

(c) To make minor changes as required.

1.03 The tests covered are:

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A. Trunk Preference Control: This test checks that when a TP- relay is operated by a line finder bidding for service, the remaining nine TP- relays are locked out until a link is established. Operation of horizontal group control relay (HG-) and corresponding primary hold magnets are also checked. **4**

B. Primary Timer Alarm (PST-): This test checks that when a call originates within a horizontal group of switches, a major alarm sounds if a link is not established within approximately 10 seconds. **5**

C. Register Subgroup and Horizontal Group Control: This test checks that when successive calls originate within a primary switch, each call, in turn, will be assigned to the lowest numbered register subgroup available. **6**

D. Secondary Timer Alarm (SST-): This test checks that if an S-- relay does not release within approximately 5 seconds after operation, a major alarm sounds. **7**

E. Primary-Secondary Link Control: This test checks that two links are provided from each primary switch to each pair of secondary switches associated with a register subgroup. **8**

F. Register Busy Timers (DRBT and TRBT): This test checks that when all rotary dial or TOUCH-TONE® registers within a subgroup become all busy, a signal is applied to the corresponding registers to shorten their work time. DRBT and TRBT timers hold their respective registers on short work time for approximately 30 seconds. When a register does become idle during this timing period, no action occurs. short work time is continued after the initial 30-second interval until a register does become idle. **11**

G. Control Circuit Transfer: This test checks: (1) That when a primary or secondary time-out alarm occurs, the transfer circuit will function when no calls are in progress. (2) That when more than the allowable time is required to complete a function, control of link operations is switched from the controller in use to the idle controller. (3) Manual transfer of emergency or regular control circuit. **11**

H. Register Selection: This test checks that when a call originates from rotary dial or TOUCH-TONE line finder groups, the first idle register within the

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subgroup for either type of call will be selected. When a register is selected, the corresponding secondary switch select magnets are operated. 14

I. Register Load Timers (DB and TB): This test checks that when all rotary dial or TOUCH-TONE registers within a subgroup remain busy for more than 5 seconds, the associated timer operates to give audible and visual alarms. 15

1.04 Consult office records for the following information:

(a) Tests A, B, G—Determine line finder group and number associated with primary frame and horizontal group under test.

(b) Test H—Determines which registers are arranged for rotary dial only and which are arranged for TOUCH-TONE operation for the subgroup under test.

1.05 Test C applies to either regular or emergency control circuits. Transfer service to the control circuit not under test. Since an idle A or B link is required, this test should be made only during periods of light traffic.

1.06 Test D simulates operation of SK- relays to prevent possible traffic delays.

1.07 Test E requires that all registers within a subgroup be made busy and should be performed during periods of light traffic.

1.08 The time periods shown in Table A are nominal. When trouble is indicated in these circuits, check timing interval as specified on circuit requirement table.

TABLE A	
TIMER	PERIOD
SST/DB/TB	5 sec
PST	10 sec
DRBT/TRBT	30 sec

1.09 Test E requires action and verification between the secondary and primary frames under test.

1.10 Lettered Steps: A letter a, b, c, etc, added to step number in Parts 3 or 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table B. The details of each item are covered in the paragraph indicated by the number in parentheses.

TABLE B

APPARATUS	TESTS								
	A	B	C	D	E	F	G	H	I
Cord W1AL (2.02)	1	—	—	—	1	—	—	—	—
Cord 1W13B (2.03)	1	—	—	—	—	1	—	2	1
322A (Make-Busy) Plug	—	—	—	—	✓	—	✓	✓	—
Tool (2.04)	✓	✓	✓	✓	✓	—	✓	✓	—
Stopwatch	—	1	—	1	—	1	1	—	1

2.02 Testing cord, W1AL cord, 2 feet long, equipped with two P-15A864 chucks (used to strap select magnet off-normal springs).

2.03 Two testing cords, 893 cord, 6 feet long equipped with two 360A tools (1W13B cord), one 624A (terminal connector) tool, and one KS-6278 connecting clip (used to apply battery or ground to relays).

2.04 Blocking and insulating tools, as required. Use tools and apply as covered in Section 069-020-801.

2.05 KS-3008 stopwatch, or equivalent.

3. PREPARATION

STEP	ACTION	VERIFICATION
Tests A, B, G		
1	At line finders— Make-busy line finders associated with primary frame and switch under test.	
Test C		
2	At secondary frame, key, lamp, talk line, and miscellaneous unit— Operate BAT, STR keys.	EMG or REG lamp lighted. CAT lamp lighted.
3a	If testing regular control circuit— When REG lamp is lighted— Operate TR key.	When no calls are in progress— EMG lamp lighted.
4b	If testing emergency control circuit— When EMG lamp is lighted— Operate TR key.	When no calls are in progress— REG lamp lighted.
5a	At secondary control units— If testing regular control circuit— Block operated RD0 through RD4, RT0 through RT4 relays.	RB0 through RB4 relays operated.
6b	If testing emergency control circuit— Block operated EM RD0 through EM RD4, EM RT0 through EM RT4 relays.	EM RB0 through EM RB4 relays operated.
Test G		
7	At jack, key, and lamp circuit— Select and make busy a subgroup of registers.	Corresponding OR- lamps lighted.
8	At secondary frame, key, lamp, talk line, and miscellaneous unit— Operate BAT key.	EMG or REG lamp lighted.
9	At secondary frame, secondary control units— Block operated GC- relay corresponding to control circuit in use and register subgroup made busy.	

Caution: When insulating springs, use care not to dislodge movable springs from grooves of comb.

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STEP	ACTION	VERIFICATION
10	At primary frame, auxiliary horizontal group unit associated with line finders made busy— Insulate 1M or 12M, 4M or 9M on HGA- relay associated with made-busy register subgroup and horizontal level of made-busy line finders.	
11	At secondary frame, horizontal group control unit— Insulate 4 or 9 of SAL- relay corresponding to register subgroup made busy.	
12	At secondary control unit— Insulate 4 or 9 of PAL- relay corresponding to horizontal group of made-busy line finders.	

Test H

13	At originating register frame for subgroup under test— Make busy all registers within subgroup.	At jack, key, and lamp circuit— Corresponding OR- lamps lighted.
14	At secondary frame, secondary control units— Block operated GC- relay corresponding to register subgroup made busy.	
15	Block nonoperated UP- relay corresponding to subgroup made busy.	
16	Block nonoperated SAL- relay corresponding to subgroup made busy.	

4. METHOD

STEP	ACTION	VERIFICATION
A. Trunk Preference Control		
2	At primary frame under test, auxiliary horizontal group unit— Block nonoperated HGA-, HGB- relays associated with horizontal group under test.	
3	At register trunk unit for horizontal group under test— Momentarily operate each TP- relay.	HG- relay momentarily operated for each Tp- relay operated.
4	connect ground to winding terminal U on TP0 relay.	TP0 relay operated. HG- relay operated.
5	Momentarily ground winding terminal U on TP1 through TP9 relays, one at a time.	Corresponding TP- relay does not operate.

STEP	ACTION	VERIFICATION
6	Momentarily operate TB0 relay.	TB0 relay locks operated. TP0 holds operated. HG- relay released.
7	Momentarily ground each winding terminal U on TP1 through TP9 relays, one at a time.	TP1 through TP9 relays operated.
8	Remove ground from winding terminal U on TP0 relay.	TP0 relay released. TB0 relay released.
9	At primary switch corresponding to horizontal group under test— Strap select magnet off-normal springs 1, 2 multiple.	
10	At register trunk unit for horizontal group under test. Block operated TP0 relay.	At associated primary switch— Right and left 0 holds magnets operated.
11	Momentarily operate TB0 relay.	TB0 relay locks operated. Right and left 0 hold magnets released.
12	Remove blocking tool from TP- relay.	
13	At auxiliary horizontal group unit— Remove blocking tools from HGA-, HGB-relays.	
14	At primary switch under test— Remove strap.	
15a	If no further tests are to be made— Restore made-busy line finders.	
B. Primary Timer Alarm (PST-)		
2	At first primary frame, auxiliary horizontal group unit— block operated HGB0 relay. Start timing.	After approximately 10 seconds— Major alarm sounds. At secondary frame, key, lamp, talk line, and miscellaneous unit— PAL0 lamp lighted.
3	Remove blocking tool from HGB0 relay.	
4	At secondary frame, key, lamp, talk line, and miscellaneous unit— Momentarily operate PAR key.	Major alarm silenced. PAL0 lamp extinguished.
5	At line finders— Restore line finders associated with primary switch 0.	

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STEP	ACTION	VERIFICATION
6	At line finders— Make busy, in turn, line finders associated with primary switches 1 through 9.	
7	At first primary frame, auxiliary horizontal group unit— Block operated, in turn, HGB- relay associated with line finders made busy. Start timing.	After approximately 10 seconds— Major alarm sounds. At secondary frame, key, lamp, talk line, and miscellaneous unit— PAL- lamp lighted corresponding to HGB- relay blocked operated.
8	At secondary frame, key, lamp, talk line, and miscellaneous unit— Momentarily operate PAR key.	Major alarm silenced. PAL- lamp extinguished.
9	At line finders— Restore line finders, in turn, associated with horizontal group.	

C. Register Subgroup and Horizontal Group Control

Testing Regular Control Circuit

7	At horizontal group control units— Block operated GC1 through GC4 relays.	RB0 remains operated. RB1 through RB4 relays released.
8	Apply battery to 1L of BC0 relay.	RB0 relay released. BC0, S00, GC0 relays operated.
9	Remove battery from 1L of BC0 relay.	RB0 relay operated. BC0, S00, GC0 relays released.
10	Apply battery to 2L of BC0 relay.	RB0 relay released. BC0, S00, GC0 relays operated.
11	Remove battery from 2L of BC0 relay.	RB0 relay operated. BC0, S00, GC0 relays released.
12	Block operated GC0 relay.	
13	Remove blocking tool from GC1 relay.	RB1 relay operated. RB0, RB2 through RB4 relays released.
14	Apply battery to 1L of BC0 relay.	RB1 relay released. BC0, S10, GC1 relays operated.
15	Remove battery from 1L of BC0 relay.	RB1 relay operated. BC0, S10, GC1 relays released.
16	Apply battery to 2L of BC0 relay.	RB1 relay released. BC0, S10, GC1 relays operated.

STEP	ACTION	VERIFICATION
17	Remove battery from 2L of BC0 relay.	RB1 realy operated. BC0, S10, GC1 relays released.
18	Test remaining S-- and GC- relays for horizontal group 0 in this manner until all five GC- relays have been operated.	
19	Repeat Steps 7 through 18 to test BC-, S--, and GC- relays associated with horizontal groups 1 through 9.	
Testing Emergency Control Circuit		
20	Repeat Steps 7 through 19 for EM- prefixed relays.	
21	When tests are completed— At secondary control units— remove blocking tools from RD- or EMRD-, RT-, or EMRT- relays.	
22	At horizontal group control unit— Remove blocking tool from GC- or EMGC-relays.	
23	Remove battery from BC- or EMBC- relays.	
24	At key, lamp, talk line, and miscellaneous unit— Restore STR, BAT keys.	All lamps extinguished.
D. Secondary Timer Alarm (SST-)		
1a	At secondary frame, secondary control units— If SK0 relay is operated, wait until released— Insulate 2B of SK0 relay. Start timing.	After approximately 5 seconds— Major alarm sounds. At key, lamp, talk line, and miscellaneous units— SAL0 lamp lighted.
2	At key, lamp, talk line, and miscellaneous unit— Momentarily operate SAR key.	Major alarm silenced. SAL0 lamp extinguished.
3	At secondary control unit— Remove insulating tool from SK0 relay.	
4	Repeat Steps 1a through 3 for SK1 through SK4 relays.	Same as Step 1a through 3 except SAL- lamp lighted corresponding to SAL- timer under test.

STEP	ACTION	VERIFICATION
B Link Test		
12	At secondary control units— Block nonoperated a0 relay.	
13	At register and horizontal group select units— Block operated S00 relay.	At L0, R0 primary switch— 1 select magnets operated. 0 hold magnets operated. At L1, R1 secondary switches— 0 hold magnets operated.
14	Remove blocking tool from S00 relay.	At L0, R0 primary switch— 1 select magnets released. 0 hold magnets released. At L0, R0 secondary switches— 0 hold magnets released.
15	At secondary control units— Remove blocking tool from A0 relay.	
16	At primary frame under test, register trunk unit 0— Remove blocking tool from TP0 relay.	
17	At secondary frame, horizontal group control unit— Remove blocking tool from PAL0 relay.	
18	At primary frame under test, auxiliary horizontal group unit— Remove blocking tool from HGA0 relay.	
19	At line finders— Restore made-busy line finders to service.	

Primary Switches 1 through 9 (Register Subgroup 0)

20	At line finders— Make-busy line finders associated with primary switch under test.	
21	At secondary frame, horizontal group control unit— Block nonoperated PAL- relay associated with primary switch under test.	
22	At primary frame under test, auxiliary horizontal group units— Block nonoperated HGA- relay associated with primary switch under test.	

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STEP	ACTION	VERIFICATION
A Link Test		
23	At secondary frame, secondary control units— Block nonoperated B0 relay.	
24	At register and horizontal group select units— Block operated S0- relay corresponding to primary switch under test.	At secondary control units— SK0 relay operated. At horizontal group control units— HK- relay operated corresponding to primary switch under test.
25	At primary frame under test, register trunk unit corresponding to primary switch under test— Block operated TP0 relay.	At L-, R- primary switch under test— 0 select magnets operated. 0 hold magnets operated. At L0, R0 secondary switches— Hold magnets operated corresponding to number of primary switch under test.
26	At secondary frame, register and horizontal group select units— Remove blocking tool from s0- relay.	At L-, R- primary switch under test— 0 select and hold magnets released. At L0, R0 secondary switches— Operated hold magnets released.
27	At secondary control units— Remove blocking tool from B0 relay.	
B Link Test		
28	At secondary control units— Block nonoperated A0 relay.	
29	At register and horizontal group select units— Block operated S0- relay corresponding to primary switch under test.	At L-, R- primary switch under test— 1 select magnets operated. 0 hold magnets operated. At L0, R0 secondary switches— Hold magnets operated corresponding to number of primary switch under test.
30	Remove blocking tool from S0- relay.	At L-, R- primary switch under test— 1 select magnets released. 0 hold magnets released. At L0, R0 secondary switches— Operated hold magnets released.
31	At secondary control units— Remove blocking tool from A0 relay.	
32	At primary frame under test, register trunk unit used for test— Remove blocking tool from TP0 relay.	
33	At secondary frame, horizontal group control units— Remove blocking tool from PAL- relay used.	

STEP	ACTION	VERIFICATION
34	At primary frame under test, auxiliary horizontal group unit— Remove blocking tool from HGA- relay used.	
35	At line finders— Restore made-busy line finders to service.	
36b	If linkage to no other register subgroups is to be tested— At secondary frame, secondary control units— Remove blocking tools from GC0, SAL0 relays.	
37b	At secondary switches L0/R0, L1/R1— Remove strap from select magnet off-normal springs.	
38c	If linkage tests are to be made for other register subgroups— Refer to Table C and repeat Steps 1a through 37b for each register subgroup.	
F. Register Busy Timers (DRBT and TRBT)		
1a	At secondary frame, timing and transfer units— If DRB relay is operated, wait until released— Momentarily ground 1U terminal on DRB relay. Start timing.	DRB relay operated. After approximately 30 seconds— TOD, RCD relays operated and released. DRB relay released.
2b	If TRB relay is operated, wait until released— Momentarily ground terminal 1U on TRB relay. Start timing.	TRB relay operated. After approximately 30 seconds— TOT, RCT relays operated and released. TRB relay released.
G. Control Circuit Transfer		
Alarm Transfer		
13	At secondary frame, register and horizontal group select units— Block operated S-- relay associated with made-busy register subgroup and horizontal group of line finders made busy.	After approximately 5 seconds— At key, lamp, talk line, and miscellaneous unit— SAL- lamp lighted corresponding to register subgroup made busy.
14	At primary frame, register trunk unit associated with made-busy line finders— Block operated associated HGB- relay.	After approximately 10 seconds— At key, lamp, talk line, and miscellaneous unit— PAL- lamp lighted corresponding to horizontal group of made-busy line finders. When no calls are in progress— Idle control circuit cuts in. At secondary frame, key, lamp, talk line, and miscellaneous unit— EMG or REG lamp lighted.

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STEP	ACTION	VERIFICATION
15	At secondary frame, register and horizontal group select units— Remove blocking tool from S-- relay.	At key, lamp, talk line, and miscellaneous unit— SAL- lamp extinguished.
16	At primary frame, register trunk unit— Remove blocking tool from HGB- relay.	PAL- lamp extinguished.
17a	At secondary frame, key, lamp, talk line, and miscellaneous units— If EMG lamp lighted and REG lamp extinguished— Operate TR key.	When no calls are in progress— REG lamp lighted. EMG lamp extinguished.
18a	Restore TR key.	
19b	At secondary frame, key, lamp, talk line, and miscellaneous units— Operate TR key.	When no calls are in progress— EMG lamp lighted. REG lamp extinguished.
20b	Restore TR key.	
▶Trouble Time-Out Transfer		
21	At secondary frame, timing and transfer unit— Block operated PAL- relay corresponding to horizontal group of made-busy line finders.	At key, lamp, talk line, and miscellaneous unit— PAL- lamp lighted corresponding to horizontal group of made-busy line finders. If EMG lamp was lighted— REG lamp lighted. EMG lamp extinguished. If REG lamp was lighted— EMG lamp lighted. REG lamp extinguished.
22	Remove blocking tool from PAL- relay.	PAL- lamp extinguished.
23	Block operated SAL- relay corresponding to register subgroup made busy.	SAL- lamp lighted corresponding to register subgroup made busy. If REG lamp was lighted— EMG lamp lighted. REG lamp extinguished. If EMG lamp was lighted— REG lamp lighted. EMG lamp extinguished.
24	Remove blocking tool from SAL- relay.	SAL- lamp extinguished.
25c	If no further tests are to be made— At line finders— Restore made-busy line finders used for test.	
26	At primary frame, auxiliary horizontal group unit— Remove insulating tool from HGA- relay.⚡	

STEP	ACTION	VERIFICATION
27	At secondary frame, key, lamp, talk line, and miscellaneous unit— Restore BAT key.	
28	At secondary control units— Remove blocking tool from GC- relay.	
29	At horizontal group control unit— Remove insulating tool from SAL- relay.	
30	At secondary control unit— Remove blocking tool from PAL- relay.	
Manual Transfer		
31	At secondary frame, key, lamp, talk line, and miscellaneous unit— Operate STR key.	CAT lamp lighted. Control circuit held under manual control.
32	Operate TR key.	When no calls are in progress— If EMG lamp was lighted— REG lamp lighted. EMG lamp extinguished. If REG lamp was lighted— EMG lamp lighted. REG lamp extinguished.
33	After transfer has occurred as indicated by EMG, REG lamps— Restore TR key.	
34	Restore STR key.	CAT lamp extinguished.
35	Operate STR key.	CAT lamp lighted. Control circuit held under manual control.
36	Operate TR key.	When no calls are in progress— If REG lamp was lighted— EMG lamp lighted. REG lamp extinguished. If EMG lamp was lighted— REG lamp lighted. EMG lamp extinguished.
37	After transfer has occurred as indicated by EMG, REG lamps— Restore TR key.	Control circuit held under manual control.
38	Restore STR key.	CAT lamp extinguished. Automatic operation restored. ♦

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STEP	ACTION	VERIFICATION
39d	◆ If no further tests are to be made— At jack, key, and lamp circuit— Remove make busy from the selected subgroup of registers.◆	
H. Register Selection		
Rotary Dial Registers		
17	At secondary frame, register and horizontal group select units— Block operated an active S-- relay associated with subgroup under test.	At secondary control unit— Associated SK- relay operated.
18	At register preference unit associated with subgroup under test— Ground winding terminal U on RP-9, RP-8 relays.	RP-9 relay operated. At pair of secondary switches associated with subgroup under test— Select magnets 9 operated.
19	remove ground from winding of RP-9 relay.	RP-9 relay released. RP-8 relay operated. At associated secondary switches— Select magnets 9 released. Select magnets 8 operated.
20	Ground winding terminal U on RP-7 relay.	
21	Remove ground from RP-8 relay.	RP-8 relay released. RP-7 relay operated. At associated secondary switches— Select magnets 8 released. Select magnets 7 operated.
22	repeat Steps 15, 16 for remaining RP-- relays arranged for rotary dial operation.	Higher numbered RP-- relay released. Lower numbered RP-- relay operated. Lower numbered RP-- relay operated. At associated secondary switches— Corresponding higher numbered select magnets released. Corresponding lower numbered select magnets operated.
TOUCH-TONE Registers		
23	Block operated TR- relay associated with subgroup under test.	
24	Ground winding terminal U on highest numbered RP-- relay arranged for TOUCH-TONE operation.	Corresponding RP-- relay operated. At associated secondary switches— Corresponding select magnets operated.
25	Ground winding terminal U on RP-0 relay.	

STEP	ACTION	VERIFICATION
26	Remove ground from highest numbered RP-- relay.	RP-- relay released. RP-0 relay operated. At associated secondary switches— Higher numbered select magnets released. 0 select magnets operated.
27	Remove ground from RP-0 relay.	RP-0 relay released. At associated secondary switches— RP-0 select magnets operated.
28	Remove blocking tools from GC-, S--, SAL- relays.	
I. Register Load Timers (DB and TB)		
1	At secondary frame, timing and transfer units— Insulate 9M of DAB relay. Start timing.	After approximately 5 seconds— Minor alarm sounds. At jack, key, and lamp circuit— DGB lamp lights.
2	Remove insulating tool from DAB relay.	Minor alarm silences.
3	Insulate 9M of TAB relay. Start timing.	After approximately 5 seconds— Minor alarm sounds. At jack, key, and lamp circuit— TGB lamp lights.
4	Remove insulating tool from TAB relay.	Minor alarm silences.
5	At jack, key, and lamp circuit— Momentarily insert 322A make-busy plug into AR jack.	DGB, TGB lamps extinguished.

TABLE C — PRIMARY-SECONDARY LINK CONTROL																												
		ACTION				VERIFICATION			ACTION		VERIFICATION			ACTION		VERIFICATION			ACTION		VERIFICATION							
	PRI SW-	BLK NOPR REL-	BLK NOPR REL-	BLK NOPR REL-	BLK OPR REL-	PRI SM-OPR	SEC HM-OPR		BLK NOPR REL-	BLK OPR REL-	PRI SM-OPR	SEC HM-OPR		BLK NOPR REL-	BLK OPR REL-	PRI SM-OPR	SEC HM-OPR		BLK NOPR REL-	BLK OPR REL-	PRI SM-OPR	SEC HM-OPR		BLK NOPR REL-	BLK OPR REL-	PRI SM-OPR	SEC HM-OPR	
							L0/R0	L1/L2				L2/R2	L3/R3				L4/R4	L5/R5				L6/R6	L7/R7				L8/R8	L9/R9
A L I N K	9	PAL9	HGA9	B0	S09	0	9		B1	S19	2	9		B2	S29	4	9		B3	S39	6	9		B4	S49	8	9	
	8	PAL8	HGA8	↑	S08	↑	8		↑	S18	↑	8		↑	S28	↑	8		↑	S38	↑	8		↑	S48	↑	8	
	7	PAL7	HGA7		S07		7			S17		7			S27		7			S37		7			S47		7	
	6	PAL6	HGA6		S06		6			S16		6			S26		6			S36		6			S46		6	
	5	PAL5	HGA5		S05		5			S15		5			S25		5			S35		5			S45		5	
	4	PAL4	HGA4		S04		4			S14		4			S24		4			S34		4			S44		4	
	3	PAL3	HGA3		S03		3			S13		3			S23		3			S33		3			S43		3	
	2	PAL2	HGA2		S02		2			S12		2			S22		2			S32		2			S42		2	
	1	PAL1	HGA1		S01		1			S11		1			S21		1			S31		1			S41		1	
	0	PAL0	HGA0	B0	S00	0	0		B1	S10	2	0		B2	S20	4	0		B3	S30	6	0		B4	S40	8	0	
B L I N K	9	PAL9	HGA9	A0	S09	1	9		A1	S19	3	9		A2	S29	5	9		A3	S39	7	9		A4	S49	9	9	
	8	PAL8	HGA8	↑	S08	↑	8		↑	S18	↑	8		↑	S28	↑	8		↑	S38	↑	8		↑	S48	↑	8	
	7	PAL7	HGA7		S07		7			S17		7			S27		7			S37		7			S47		7	
	6	PAL6	HGA6		S06		6			S16		6			S26		6			S36		6			S46		6	
	5	PAL5	HGA5		S05		5			S15		5			S25		5			S35		5			S45		5	
	4	PAL4	HGA4		S04		4			S14		4			S24		4			S34		4			S44		4	
	3	PAL3	HGA3		S03		3			S13		3			S23		3			S33		3			S43		3	
	2	PAL2	HGA2		S02		2			S12		2			S22		2			S32		2			S42		2	
	1	PAL1	HGA1		S01		1			S11		1			S21		1			S31		1			S41		1	
	0	PAL0	HGA0	A0	S00	1	0		A1	S10	3	0		A2	S20	5	0		A3	S30	7	0		A4	S40	9	0	
BLK OPR REL-				GC0				GC1				GC2				GC3				GC4								
BLK NOPR REL-				SAL0				SAL1				SAL2				SAL3				SAL4								
REG SUBGROUP				0				1				2				3				4								