ENTRON

APPLICATION NOTE 700115F
SCHEDULE SELECT OPTIONS ON EN1000/EN1001 CASCADE CONTROLS
INTERNAL, EXTERNAL, ANTI-TIE DOWN, BINARY SELECT S99

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The EN1000/EN1001 Cascade Control provides the user with four modes of SCHEDULE SELECT and/or initiation – INTERNAL (panel-dialed), EXTERNAL (non-panel, FS7/FS11 select), ANTI-TIE DOWN (panel-dialed, two-hands initiation) and an optional EXTERNAL BINARY SELECT using S99 Option (100 non-panel, external schedules). The default (factory settings) mode is INTERNAL SCHEDULE SELECT.

To program the control for desired SCHEDULE SELECT mode:

1. Put the control in PROGRAM MODE.
2. Use SELECT to find **EF**.
3. Use SCHEDULE push buttons to page through EXTENDED FUNCTIONS and find **S.S.**
4. Enter a value for **S.S.** of **00**, **01**, **02**, or **03** using the DATA push buttons.
   Where: **S.S.**=**00** for INTERNAL SCHEDULE SELECT (default)
   S.S.=**01** for EXTERNAL SCHEDULE SELECT
   S.S.=**02** for ANTI-TIE DOWN
   S.S.=**03** for S99 EXTERNAL BINARY SCHEDULE SELECT
5. Press the ENTER push button.

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RWMA® MEMBER

1.0 INTERNAL SCHEDULE SELECT – *5.5.=00* (default)

In this mode, the initiation inputs (TS1-FS3, TS1-FS7, and TS1-FS11) are dedicated as follows:

TS1-FS3 INITIATES ON ANY DISPLAYED SCHEDULE:

1. Select a schedule using the SCHEDULE push buttons.
2. Program the selected schedule or a sequence.
3. Use TS1-FS3 to initiate ANY schedule shown on the panel.

TS1-FS7 AUTOMATICALLY SELECTS AND INITIATES ON 20:

1. Select schedule 20 using the SCHEDULE push buttons.
2. Program schedule 20 (or a sequence starting at 20).
3. Use TS1-FS7 to initiate schedule 20 (or a sequence starting at 20).

NOTICE

Regardless of what schedule the Front Panel displays, TS1-FS7 is dedicated to initiate only on schedule 20.

TS1-FS11 AUTOMATICALLY SELECTS AND INITIATES ON 40:

1. Select schedule 40 using the SCHEDULE push buttons.
2. Program schedule 40 (or a sequence starting at 40).
3. Use TS1-FS11 to initiate schedule 40 (or a sequence starting at 40).

NOTICE

Regardless of what schedule the Front Panel displays, TS1-FS11 is dedicated to initiate only on schedule 40.

2.0 EXTERNAL SCHEDULE SELECT – *S.S.=01*

In this mode, the initiation inputs (TS1-FS3, TS1-FS7, TS1-FS11) are dedicated as follows:

1. Select one of four schedules by an external device or operator acting on TS1-FS7 and TS1-FS11 as shown in Table 2-1.
2. Initiate the selected schedule using TS1-FS3.

Table 2-1. *EXTERNAL SCHEDULE SELECT*

SCHEDULE	TS1-FS7/SS1	TS1-FS11/SS3	INITIATION
00	**OPEN**	**OPEN**	TS1-FS3
20	***CLOSED***	**OPEN**	TS1-FS3
40	**OPEN**	***CLOSED***	TS1-FS3
60	***CLOSED***	***CLOSED***	TS1-FS3

NOTICE

In this mode, the operator cannot select schedules using the Front Panel and can only initiate using TS1-FS3. Binary selects TS1-FS7 and TS1-FS11 must be closed before initiation of TS1-FS3 and be opened after sequence is started or completed.

2.1 DUAL TWO-STAGE FOOT SWITCHES WITH EXTERNAL SCHEDULE SELECT

The Dual Schedule and EXTERNAL SCHEDULE SELECT functions can be combined to allow initiations by means of 2 two-stage foot switches.

Use schedule 00 for the foot switch #1 sequence and schedule 10 for the foot switch #2 sequence.

The foot switches and additional diode assembly (A/N 600573) are connected to TS1 Terminal Strip (see Figure 2-1). The diode assembly may be substituted with most any silicon diode rated 1 A at 100 V.

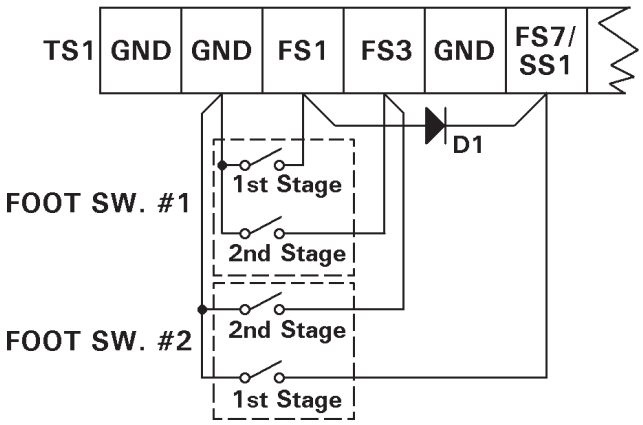

Figure 2-1. *Dual two-stage foot switch initiation*

2.2 MULTIPLE TWO-STAGE FOOT SWITCHES WITH EXTERNAL SCHEDULE SELECT

The Dual Schedule and EXTERNAL SCHEDULE SELECT functions can also be combined to allow initiations by means of multiple two-stage foot switches.

Use schedule 00 for foot switch #1 sequence, schedule 10 for foot switch #2 sequence, schedule 20 for foot switch #3 and schedule 30 for foot switch #4. Similar connections can be used with S99 Option (see Section 4.0).

The foot switches and additional diodes (P/N 170012) are connected to TS1 Terminal Strip as shown in Figure 2-2. The diode assembly may be substituted with most any silicon diode.

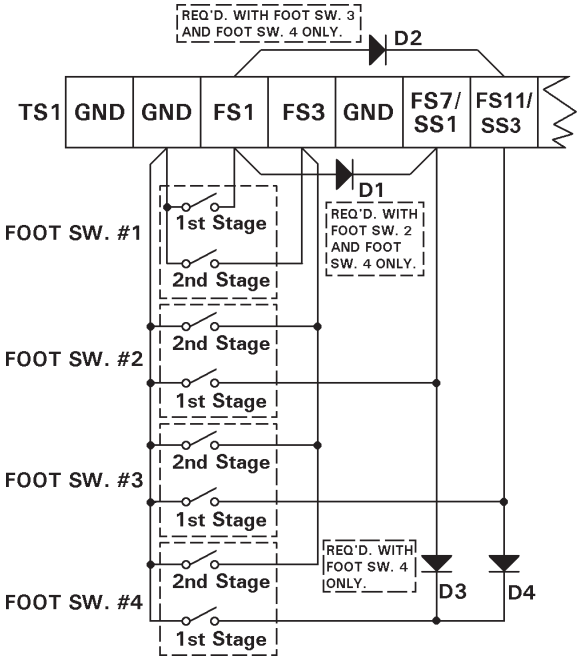

Figure 2-2. *Multiple two-stage foot switch initiation*

3.0 ANTI-TIE DOWN MODE – S.S.=02

When configuring the control for ANTI-TIE DOWN mode using the TS1 connections, the TS1-FS7/SS1 and TS1-FS11/SS3 terminals become inputs for ANTI-TIE DOWN initiations.

1. Use two single pole, normally open push button switches connected between TS1-FS7/SS1 and TS1-GND, and between TS1-FS11/SS3 and TS1-GND (see Figure 3-1).

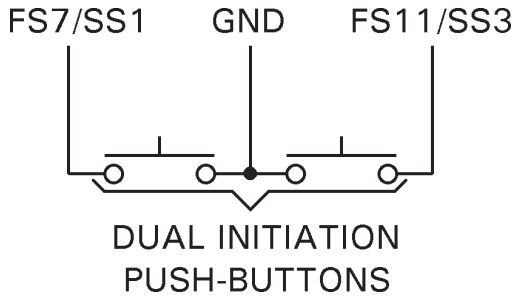

Figure 3-1. *ANTI-TIE DOWN connections*

2. Set the SCHEDULE SELECT EXTENDED FUNCTION to **S.S.=02**.

To initiate a weld using ANTI-TIE DOWN, both switches – TS1-FS7/SS1 and TS1-FS11/SS3 – must be closed within 0.5 seconds of each other. If both TS1-FS7 and TS1-FS11 switches are not closed within 0.5 seconds of each other, the control will show **E.r.**=[- -]. This error will be cleared after releasing remained closed initiations.

With ANTI-TIE DOWN operation, the machine electrodes will retract if either or both initiation push buttons are released before the end of SQUEEZE time.

3.0 ANTI-TIE DOWN MODE – S.S.=02 (cont.)

To provide both ANTI-TIE DOWN (dual push button) and Single Contact initiations (with lockout), terminals TS1-FS3, TS1-FS7/SS1, and TS1-FS11/SS3 may be connected as shown in Figure 3-2.

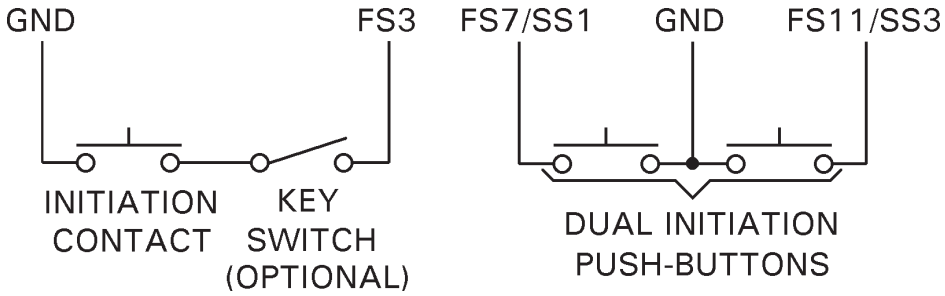

Figure 3-2. *Single Contact and ANTI-TIE DOWN initiations*

Only the displayed schedule will initiate by either pressing the TS1-FS3 single switch or by using the ANTI-TIE DOWN initiation mode (TS1-FS7/SS1 and TS1-FS11/SS3).

NOTICE

The ANTI-TIE DOWN feature affects CHAINED schedules. It is required that the operator's two hands be on the two palm buttons while the electrodes are closing on the parts to be welded. The palm buttons must be held until the end of the last programmed SQUEEZE time. Otherwise the electrodes will retract prematurely.

Any schedule executed which activates a ***new*** valve (CHAINED mode) requires the operator to keep both hands on the switches until after the SQUEEZE time of the last schedule that adds any new valves.

3.1 USING ANTI-TIE DOWN MODE WITH S99 OPTION

If S99 Option Board is present and connected to the Control Board, multiple schedule selection is possible even in this mode. After power-up, the control will automatically detect S99 Board if present and it will enable EXTERNAL BINARY SCHEDULE SELECT in ANTI-TIE DOWN mode if S.S.=02.

NOTICE

Starting with PROM firmware version 619044-002**B**, EXTERNAL BINARY SCHEDULE SELECT is enabled in ANTI-TIE DOWN mode.

4.0 EXTERNAL SCHEDULE SELECT – S99 OPTION – *S.S.=03*

In order to program this EXTENDED FUNCTION parameter ***S.S.***=***03***, the S99 Option must be present and connected to the Control Board. The option consists of a J4A ribbon cable and an additional PCB 410329-001 with seven binary schedule select inputs (see Section 5.0 for installation instructions). These seven dry contact closure (approximately 24 VDC) inputs make all 100 schedules remotely available to the operator or machine process control system.

In this mode, the initiation inputs TS1-FS3 and binary schedule select inputs on S99 Option Board TS12-SS1 through TS12-SS64 are dedicated as follows:

1. Select one of 100 schedules by an external device or operator acting on TS12-SS1 through TS12-SS64. See Switch Closure Connections diagram (Figure 4-1) and corresponding SCHEDULE SELECT table (Table 4-1).
2. Initiate the selected schedule using TS1-FS3.

NOTICE

In this mode, the operator cannot select schedules using the Front Panel in OPERATE mode and can only initiate sequence beginning with dialed schedule using TS1-FS3. Function of the other two initiation inputs, TS1-FS7 and TS1-FS11, is unchanged; i.e., TS1-FS7 is dedicated to initiate only on schedule 20, and TS1-FS11 is dedicated to initiate only on schedule 40.

NOTICE

If the binary selection inputs provide a decimal equivalent of 100 or above, the control will display schedule 99.

4.1 MULTIPLE PILOT OPERATION

The EN1000/EN1001 Cascade Control can be configured to allow multiple pilots to initiate multiple schedules using the S99 Option. Once the control is put into the EXTERNAL SCHEDULE SELECT mode (***S.S.***=***03***), a switch closure between TS1-FS3 and TS1-GND initiates schedule externally selected via TS12-SS1 through TS12-SS64.

Additional pilot circuits can be accomplished by the addition of diodes. Each new pilot circuit will require at least two diodes and a single pole, normally open, momentary type switch. Refer to the Multiple Pilot Switch Connections diagram (Figure 4-2) during the following discussion.

The schedule selected by each new pilot switch is determined by the diodes connected to the schedule select inputs. In Figure 4-2, SW7 initiates schedule 07. Notice there is a diode connected to SS1, SS2, and SS4; if these are added together, they equal 7 (1 + 2 + 4 = 7). SW15 will initiate schedule 15, the diodes are connected to SS1, SS2, SS4, and SS8. Any schedule (00 to 99) can be selected in this way. To select schedule 99, a diode is connected to SS1, SS2, SS32, and SS64 inputs.

These examples can be combined and thus several pilots can select several schedules. It is possible to connect more than one pilot circuit to the same schedule select terminals. Therefore, it is possible to have one pilot initiate schedule 07 (SS1, SS2, SS4) and another pilot initiate schedule 15 (SS1, SS2, SS4, SS8).

4.2 S99 OPTION CONNECTION DIAGRAMS & SCHEDULE SELECT TABLE

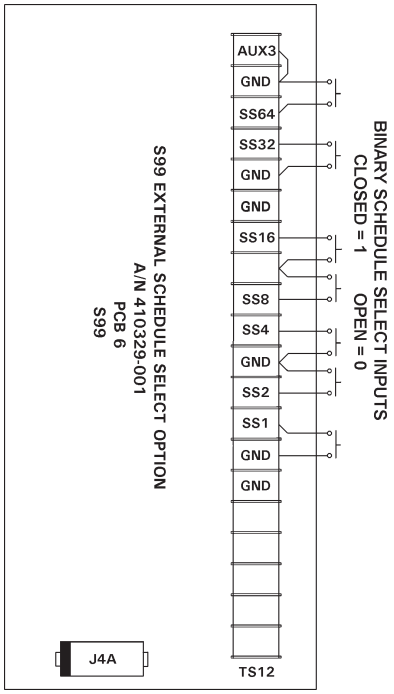

Figure 4-1. *Switch closure connections*

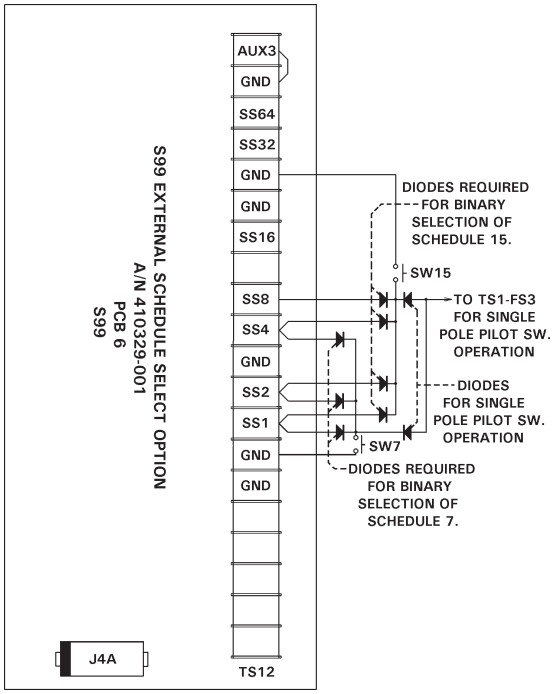

Figure 4-2. *Multiple pilot switch connections*

Table 4-1. *S99 EXTERNAL SCHEDULE SELECT*

DECIMAL (**SCHEDULE**) TO BINARY (TS12-SS1 through TS12-SS64)

SCH	SS1	SS2	SS4	SS8	SS16	SS32	SS64
00	0	0	0	0	0	0	0
01	1	0	0	0	0	0	0
02	0	1	0	0	0	0	0
03	1	1	0	0	0	0	0
04	0	0	1	0	0	0	0
05	1	0	1	0	0	0	0
06	0	1	1	0	0	0	0
07	1	1	1	0	0	0	0
08	0	0	0	1	0	0	0
09	1	0	0	1	0	0	0
10	0	1	0	1	0	0	0
11	1	1	0	1	0	0	0
12	0	0	1	1	0	0	0
13	1	0	1	1	0	0	0
14	0	1	1	1	0	0	0
15	1	1	1	1	0	0	0
16	0	0	0	0	1	0	0
17	1	0	0	0	1	0	0
18	0	1	0	0	1	0	0
19	1	1	0	0	1	0	0
20	0	0	1	0	1	0	0
21	1	0	1	0	1	0	0
22	0	1	1	0	1	0	0
23	1	1	1	0	1	0	0
24	0	0	0	1	1	0	0
25	1	0	0	1	1	0	0
26	0	1	0	1	1	0	0
27	1	1	0	1	1	0	0
28	0	0	1	1	1	0	0
29	1	0	1	1	1	0	0
30	0	1	1	1	1	0	0
31	1	1	1	1	1	0	0
32	0	0	0	0	0	1	0
33	1	0	0	0	0	1	0
34	0	1	0	0	0	1	0
35	1	1	0	0	0	1	0
36	0	0	1	0	0	1	0
37	1	0	1	0	0	1	0
38	0	1	1	0	0	1	0
39	1	1	1	0	0	1	0
40	0	0	0	1	0	1	0
41	1	0	0	1	0	1	0
42	0	1	0	1	0	1	0
43	1	1	0	1	0	1	0
44	0	0	1	1	0	1	0
45	1	0	1	1	0	1	0
46	0	1	1	1	0	1	0
47	1	1	1	1	0	1	0
48	0	0	0	0	1	1	0
49	1	0	0	0	1	1	0
50	0	1	0	0	1	1	0
51	1	1	0	0	1	1	0
52	0	0	1	0	1	1	0
53	1	0	1	0	1	1	0
54	0	1	1	0	1	1	0
55	1	1	1	0	1	1	0
56	0	0	0	1	1	1	0
57	1	0	0	1	1	1	0
58	0	1	0	1	1	1	0
59	1	1	0	1	1	1	0
60	0	0	1	1	1	1	0
61	1	0	1	1	1	1	0
62	0	1	1	1	1	1	0
63	1	1	1	1	1	1	0
64	0	0	0	0	0	0	1
65	1	0	0	0	0	0	1
66	0	1	0	0	0	0	1
67	1	1	0	0	0	0	1
68	0	0	1	0	0	0	1
69	1	0	1	0	0	0	1
70	0	1	1	0	0	0	1
71	1	1	1	0	0	0	1
72	0	0	0	1	0	0	1
73	1	0	0	1	0	0	1
74	0	1	0	1	0	0	1
75	1	1	0	1	0	0	1
76	0	0	1	1	0	0	1
77	1	0	1	1	0	0	1
78	0	1	1	1	0	0	1
79	1	1	1	1	0	0	1
80	0	0	0	0	1	0	1
81	1	0	0	0	1	0	1
82	0	1	0	0	1	0	1
83	1	1	0	0	1	0	1
84	0	0	1	0	1	0	1
85	1	0	1	0	1	0	1
86	0	1	1	0	1	0	1
87	1	1	1	0	1	0	1
88	0	0	0	1	1	0	1
89	1	0	0	1	1	0	1
90	0	1	0	1	1	0	1
91	1	1	0	1	1	0	1
92	0	0	1	1	1	0	1
93	1	0	1	1	1	0	1
94	0	1	1	1	1	0	1
95	1	1	1	1	1	0	1
96	0	0	0	0	0	1	1
97	1	0	0	0	0	1	1
98	0	1	0	0	0	1	1
99	1	1	0	0	0	1	1

1 = CLOSED 0 = OPEN

TS12-SS1 through TS12-SS64 require 24 VDC at 50 mA contacts

5.0 INSTALLATION INSTRUCTIONS

5.1 CUSTOMER INSTALLATION OF S99 SCHEDULE SELECT OPTION In an existing “L”, “H”, “G” or “U” Cabinet

600624-001 Door Mtd.	600624-002 Side Mtd.	PARTS LIST	
QUANTITY		PART NO.	DESCRIPTION
1	1	410329-001	Assembly, PCB, S99 Schedule Select Board
1	1	510236	Assembly, PCB, Mounting Plate
1		322356	Harness Assembly, J4A-J4A-J4A-J4A
	1	322357	Harness Assembly, J4A-J4A-J4A-J4A
4	4	555031	Spacer, 6-32 x 1/2, 1/4 Hex Brass, Brite
3	3	557003	6-32 x 1/4 PHSMS, Phil, Brite
4	4	557006	6-32 x 3/8 PHSMS, Phil, Brite
1	1	421214-034	Wiring Diagram, EN1000-Series/S99
1	1	421438-019	Wiring Diagram, EN1001-Series/S99
1	1	700115	Application Note, S99 Option

or

1. Remove **ALL** power to control. Open door.
2. Remove J4A-J4A-J4A harness from Program Board/Terminal Strip Output Board/Terminal Strip Input Board.
3. Remove the four (4) screws holding the Terminal Strip Input Board (A/N 410329) to its mounting bracket. Rotate the Board 180° (so the terminal strip is at the top), plug J4A-J4A-J4A-J4A harness into its jack and route harness **under** the PCB and re-mount the Board using the same four (4) screws.
4. Drill and tap rear panel per Figure 5-1, be sure to vacuum or otherwise remove ALL metal chips before assembling PCB Mounting Plate (A/N 510236) to rear panel using three (3) 6-32 x 1/4 PHSMS, Phil., Brite. Add extra spacer (P/N 555031) to each existing spacer (4 places) to offset PCB 1″ from panel.
5. Mount S99 Option PCB (A/N 410329-001) to Mounting Plate (A/N 510236) using four (4) #6-32 x 3/8 PHSMS, Phil., Brite (see Figure 5-1).
6. Connect J4A-J4A-J4A-J4A Harness (A/N 322356 or 322357) per Cascade Wiring Diagram included with this kit.

> **NOTICE**
> On Wiring Diagram, the dark band on connectors indicates stripe on ribbon harness. Harness **MUST** be installed with ribbon harness stripe oriented correctly.

7. Close door. Reapply power.

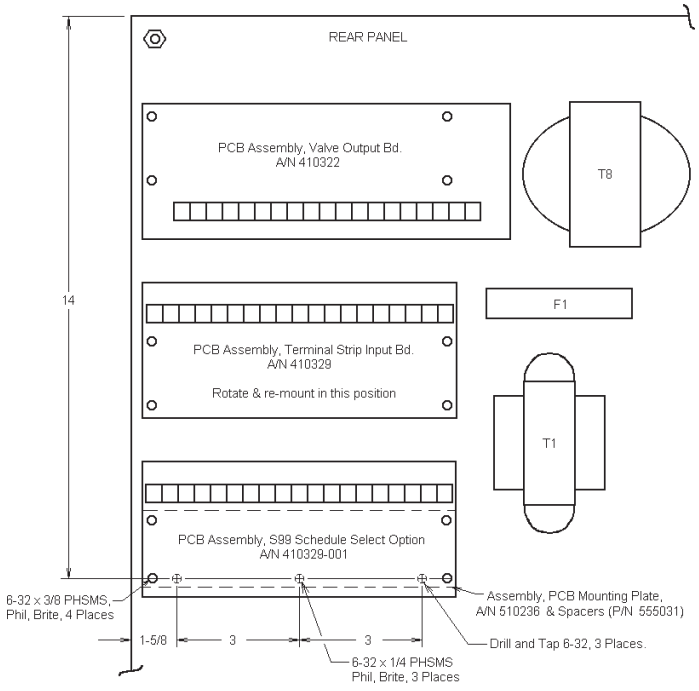

Figure 5-1. *Mounting detail for “L”, “H”, “G”, or “U” Cabinet*

5.2 CUSTOMER INSTALLATION OF S99 SCHEDULE SELECT OPTION
In an existing “T” or “D” Cabinet

600624-003 "T" Cabinet	600624-004 "D" Cabinet	PARTS LIST	
QUANTITY		PART NO.	DESCRIPTION
1	1	410329-001	Assembly, PCB, S99 Schedule Select Board
1		322356-001	Harness Assembly, J4A-J4A-J4A-J4A
	1	322357-001	Harness Assembly, J4A-J4A-J4A-J4A
8	8	555031	Spacer, 6-32 x 1/2, 1/4 Hex Brass, Brite
4	4	557003	6-32 x 1/4 PHSMS, Phil, Brite
4	4	557006	6-32 x 3/8 PHSMS, Phil, Brite
1	1	421214-034	Wiring Diagram, EN1000-Series/S99
or 1	1	421438-019	Wiring Diagram, EN1001-Series/S99
1	1	700115	Application Note, S99 Option

1. Remove **ALL** power to control. Open door.
2. Remove J4A-J4A-J4A harness from Program Board/Terminal Strip Output Board/Terminal Strip Input Board.
3. Remove the four (4) screws mounting the Terminal Strip Input Board (A/N 410329) to the Cabinet. Rotate the Board 180° (so the terminal strip is at the top), plug J4A-J4A-J4A-J4A harness into its jack and route the harness **under** the PCB and re-mount the Board using the same four (4) screws.
4. Drill and tap the left side of the cabinet per Figure 5-2, be sure to vacuum or otherwise remove ALL metal chips before installing four (4) 6-32 x 3/8 PHSMS, Phil., Brite from outside the cabinet. On the inside of the cabinet, mount two (2) 6-32 x 1/2 spacers (P/N 555031) on each exposed thread (4 places) to offset PCB 1″ from cabinet wall.
5. Mount S99 Option PCB (A/N 410329-001) to spacers using four (4) 6-32 x 1/4 PHSMS, Phil., Brite (see Figure 5-2).
6. Connect J4A-J4A-J4A-J4A Harness (A/N 322356-001 for “T” Cabinets, A/N 322357-001 for “D” Cabinets) per Cascade Wiring Diagram included with this kit.

NOTICE

On the Wiring Diagram, the dark band on connectors indicates stripe on ribbon harness. Harness **MUST** be installed with ribbon harness stripe oriented correctly.

7. Close door. Reapply power

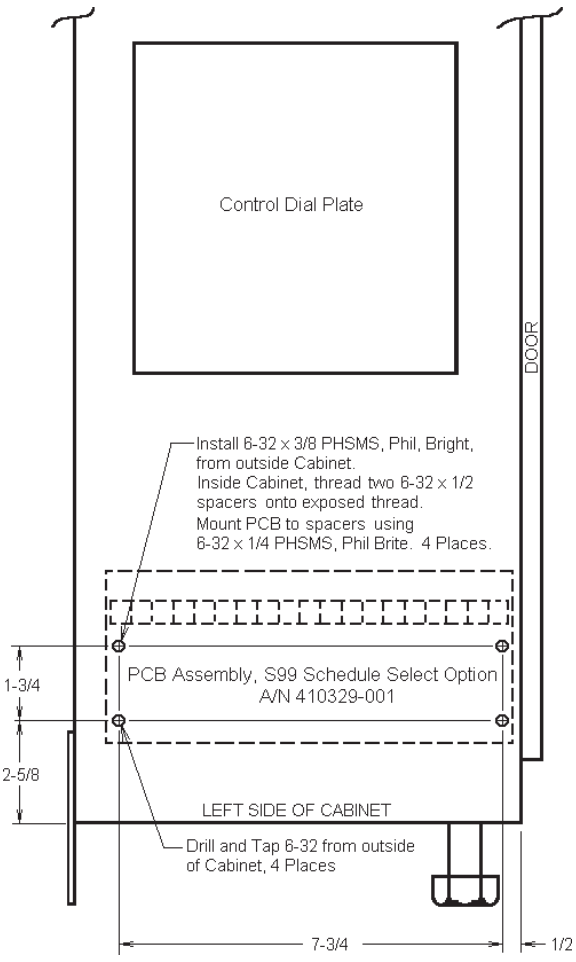

Figure 5-2. *Mounting detail for “T” or “D” Cabinet*

5.3 CUSTOMER INSTALLATION OF S99 SCHEDULE SELECT OPTION
In an existing "L", "H", "G", or "U" Cabinet with pre-existing RS232

	600624-005 Door Mtd.	600624-006 Side Mtd.	PARTS LIST	
	QUANTITY		PART NO.	DESCRIPTION
	1	1	410329-001	Assembly, PCB, S99 Schedule Select Board
	1		322356-001	Harness Assembly, J4A-J4A-J4A-J4A
		1	322357-001	Harness Assembly, J4A-J4A-J4A-J4A
	8	8	555031	Spacer, 6-32 x 1/2, 1/4 Hex Brass, Brite
	4	4	557003	6-32 x 1/4 PHSMS, Phil, Brite
	4	4	557006	6-32 x 3/8 PHSMS, Phil, Brite
or	1	1	421214-013 – ***Obsolete***	Wiring Diagram, EN1000-Series/S99-232 460V
	1	1	421214-014 – ***Obsolete***	Wiring Diagram, EN1000-Series/S99-232 230V
	1	1	700115	Application Note, S99 Option

1. Remove **ALL** power to control. Open door.
2. Remove J4A-J4A-J4A harness from Program Board/ Terminal Strip Output Board/Terminal Strip Input Board.
3. Remove the four (4) screws mounting the Terminal Strip Input Board (A/N 410329) to the Cabinet. Rotate the Board 180° (so the terminal strip is at the top), plug J4A-J4A-J4A-J4A harness into its jack and route the harness **under** the PCB and re-mount the Board using the same four (4) screws.
4. Drill and tap the left side of the cabinet per Figure 5-3, be sure to vacuum or otherwise remove ALL metal chips before installing four (4) 6-32 x 3/8 PHSMS, Phil., Brite from outside the cabinet. On the inside of the cabinet, mount two (2) 6-32 x 1/2 spacers (P/N 555031) on each exposed thread (4 places) to offset PCB 1″ from cabinet wall.
5. Mount S99 Option PCB (A/N 410329-001) to spacers using four (4) 6-32 x 1/4 PHSMS, Phil., Brite (see Figure 5-3).
6. Connect J4A-J4A-J4A-J4A Harness (A/N 322356-001 or A/N 322357-001) per Cascade Wiring Diagram included with this kit.

NOTICE

On the Wiring Diagram, the dark band on connectors indicates stripe on ribbon harness. Harness **MUST** be installed with ribbon harness stripe oriented correctly.

7. Close door. Reapply power

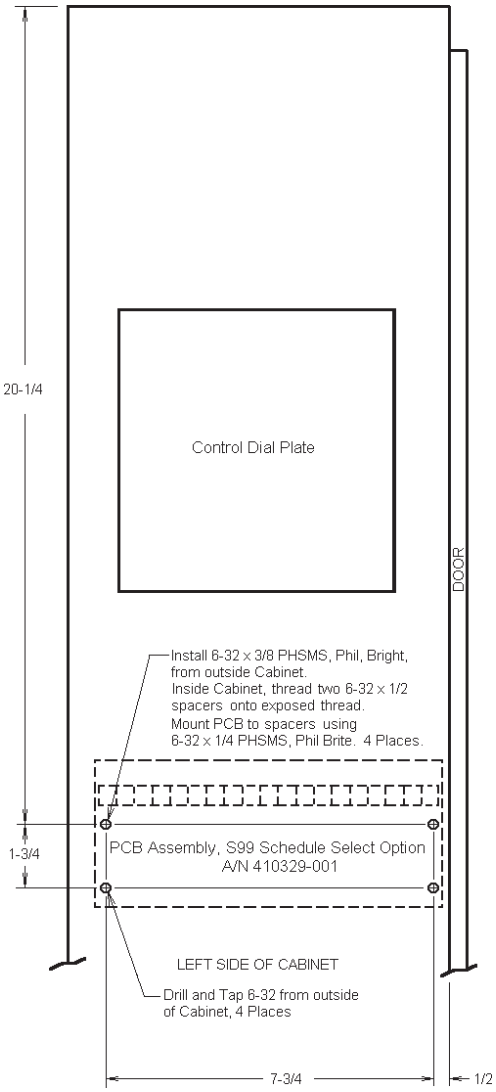

Figure 5-3. *Mounting detail for "L", "H", "G", or "U" Cabinet with RS232*

5.4 CUSTOMER INSTALLATION OF S99 SCHEDULE SELECT OPTION On an existing Flat Plate Cascade Control

600624-007	PARTS LIST	
QUANTITY	**PART NO.**	**DESCRIPTION**
1	410329-001	Assembly, PCB, S99 Schedule Select Board
1	322446	Harness Assembly, J4A-J4A-J4A-J4A
4	557006	6-32 x 3/8 PHSMS, Phil, Brite
1	421214-020 – ***Obsolete***	Wiring Diagram, EN1000-Series/S99-FP 460V
1	700115	Application Note, S99 Option

1. Remove **ALL** power to control.
2. Remove J4A-J4A-J4A harness from Program Board/Terminal Strip Output Board/Terminal Strip Input Board.
3. Mount S99 Option PCB (A/N 410329-001) to existing spacers using four (4) 6-32 x 3/8 PHSMS, Phil., Brite (see Figure 5-4).
4. Connect J4A-J4A-J4A-J4A Harness (A/N 322446) per Cascade Wiring Diagram included with this kit.

NOTICE

On the Wiring Diagram, the dark band on connectors indicates stripe on ribbon harness. Harness **MUST** be installed with ribbon harness stripe oriented correctly.

5. Reapply power.

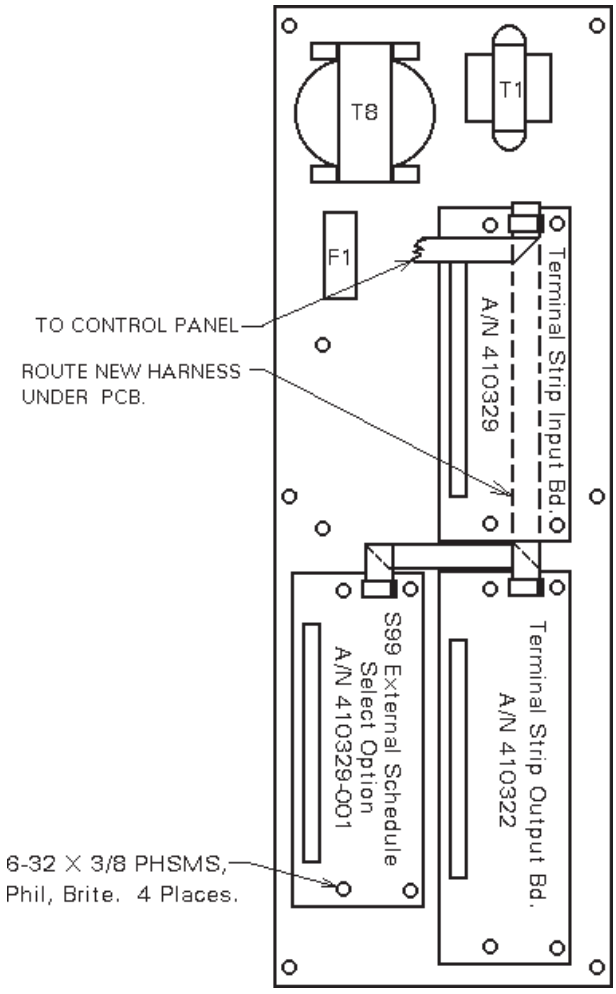

Figure 5-4. *Mounting detail for Flat Plate Cascade*

5.5 CUSTOMER INSTALLATION OF 9-16 VALVE OUTPUT OPTION AND S99 SCHEDULE SELECT OPTION
In an existing “L”, “H”, “G” or “U” Cabinet

	600765-001 Door Mtd.	600765-002 Side Mtd.	PARTS LIST	
	QUANTITY		PART NO.	DESCRIPTION
	1	1	410322-001	Assembly, PCB, 9-16 Valve Extension Board, 24-240VAC
	1	1	410329-001	Assembly, PCB, S99 Schedule Select Board
	1	1	510236	Assembly, PCB, Mounting Plate
	1	1	322435	Harness Assembly, TS10 to TS15
	1		322456	Harness Assembly, J4A-J4A-J4A-J4A-J4A
		1	322457	Harness Assembly, J4A-J4A-J4A-J4A-J4A
	12	12	555031	Spacer, 6-32 x 1/2, 1/4 Hex Brass, Brite
	7	7	557003	6-32 x 1/4 PHSMS, Phil, Brite
	8	8	557006	6-32 x 3/8 PHSMS, Phil, Brite
or	1	1	421214-042	Wiring Diagram, EN1000-Series/VE/S99
	1	1	421438-020	Wiring Diagram, EN1001-Series/VE/S99
	1	1	700146	Application Note, VE Option
	1	1	700115	Application Note, S99 Option

1. Remove **ALL** power to control. Open door.
2. Remove J4A-J4A-J4A harness from Program Board/Terminal Strip Output Board/Terminal Strip Input Board.
3. Remove the four (4) screws mounting the Terminal Strip Input Board (A/N 410329) to the cabinet. Rotate the Board 180° (so the terminal strip is at the top) and re-mount the Board using the same four (4) screws.
4. Drill and tap the left side of the cabinet per Figure 5-5, be sure to vacuum or otherwise remove ALL metal chips before installing four (4) 6-32 x 3/8 PHSMS, Phil., Brite from outside of cabinet. On the inside of the cabinet, mount two (2) 6-32 x 1/2 spacers (P/N 555031) on each exposed thread (4 places) to offset PCB 1″ from cabinet wall.
5. Mount S99 PCB (A/N 410329-001) to spacers using four (4) 6-32 x 1/4 PHSMS, Phil., Brite. See Figure 5-5.

(Instructions continued on following page)

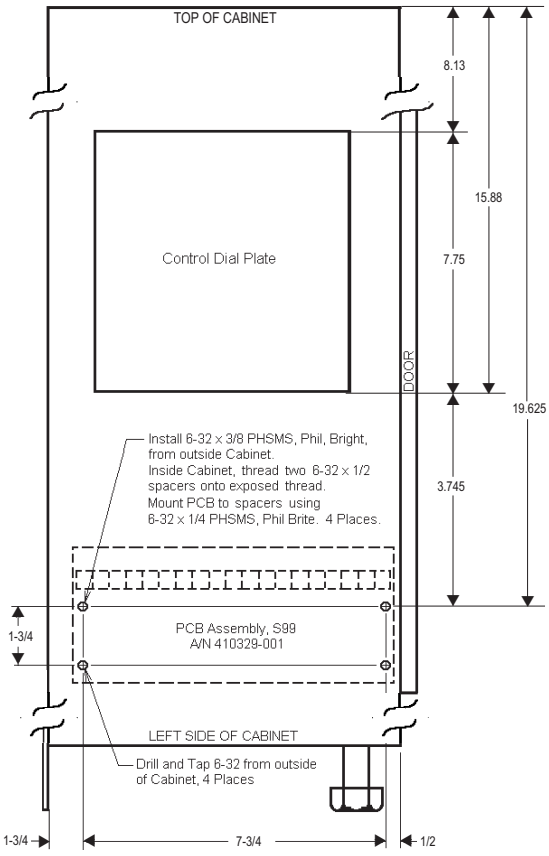

Figure 5-5. *S99 Mounting detail for “L”, “H”, “G”, or “U” Cabinet*

5.5 CUSTOMER INSTALLATION OF 9-16 VALVE OUTPUT OPTION AND S99 SCHEDULE SELECT OPTION In an existing “L”, “H”, “G” or “U” Cabinet (cont.)

6. Drill and tap rear panel per Figure 5-6, be sure to vacuum or otherwise remove ALL metal chips before adding Mounting Plate (A/N 510236) to rear panel using 3 ea. 6-32 x 1/4 PHSMS, Phil Brite. Add extra spacer (P/N 555031) to each existing spacer (4 places) to offset PCB 1″ from panel.
7. Mount 9-16 Valve Extension PCB (A/N 410322-001) to bracket (P/N 510236) using four (4) 6-32 x 3/8 PHSMS, Phil., Brite. See Figure 5-6.
8. Connect J4A-J4A-J4A-J4A-J4A Harness (A/N 322456 for Door Mounted Cabinets or 322457 for Side Mounted Cabinets) and Harness Assembly TS10 to TS15 (A/N 322435) per Wiring Diagram included with this kit.

NOTICE
On the Wiring Diagram, the dark band on connectors indicates stripe on ribbon harness. Harness **MUST** be installed with ribbon harness stripe oriented correctly.

9. Close door. Reapply power.

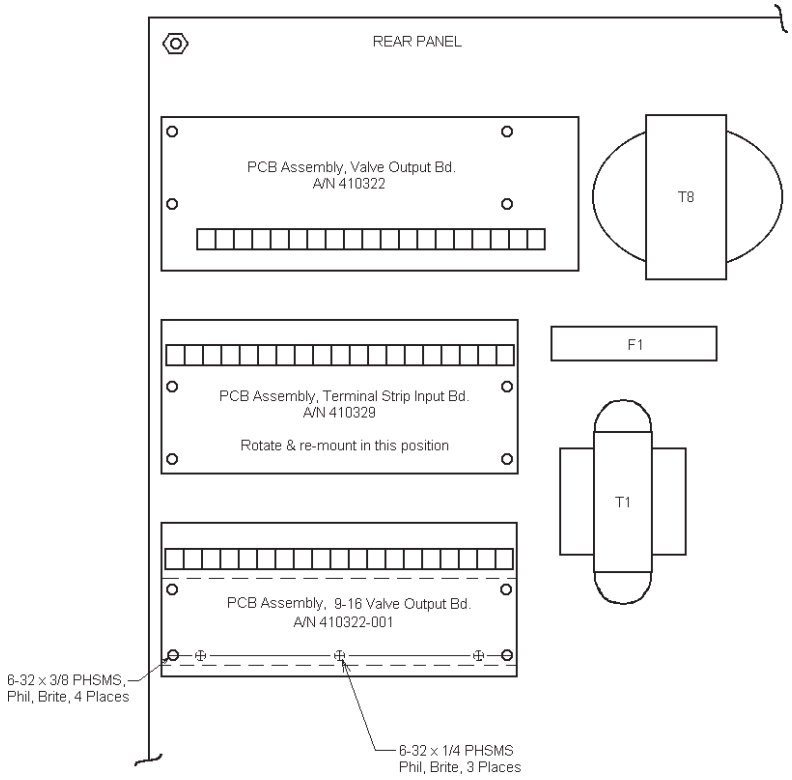

Figure 5-6. *9-16 Valve Extension Mounting detail for “L”, “H”, “G”, or “U” Cabinet*

6.0 LIST OF WIRING DIAGRAMS (available as of 4-12)

421214-005 (*Obsolete*)	Wiring Diagram, EN1000/S99-3200(1)/SP, NEMA Cabinet, 460VAC, SP=3200A Contactor
421214-013 (*Obsolete*)	Wiring Diagram, EN1000/S99-(1-8) Series/232, NEMA Cabinet, 460VAC
421214-014 (*Obsolete*)	Wiring Diagram, EN1000/S99-(1-8) Series/232, NEMA Cabinet, 230VAC
421214-020 (*Obsolete*)	Wiring Diagram, EN1000/S99-(1-8)FP(SCR), 9x24 Flat Plate, 460VAC
421214-030	Wiring Diagram, EN1000/S99/TSS-(1-8) Series, NEMA Cabinet, 460VAC
421214-034	Wiring Diagram, EN1000/S99-(1-8) Series, 230/380/460/575V
421214-037	Wiring Diagram, EN1000/S99-(1-8) Series, 230/380/460/575V, with DC Valve Output
421214-042	Wiring Diagram, EN1000/VE/S99-(1-8) Series, 230/380/460/575V, with DC Valve Output
421214-043	Wiring Diagram, EN1000/S99/485-(1-8) Series, 230/380/460/575V
421428	Wiring Diagram, EN(2)1000/S99-1800(1), “GF” Cabinet, 460V
421436	Wiring Diagram, EN(2)1000/S99-1200(2), “GF” Cabinet, 460V
421438-011	Wiring Diagram, EN1001/S99-(1-8) Series, NEMA Cabinet, 230/380/460/575V, with DC Valve Output
421438-019	Wiring Diagram, EN1001/S99-(1-8) Series, 230/380/460/575V
421438-020	Wiring Diagram, EN1001/VE/S99-(1-8) Series, 230/380/460/575V