ENTRON

SCHEDULE SELECT OPTIONS ON EN1000 & EN1001 CONTROLS

INTERNAL, EXTERNAL, BINARY SELECT S49

TABLE OF CONTENTS

The EN1000 Control and EN1001 Constant Current Control provide the user with four modes of SCHEDULE SELECT and/or initiation – INTERNAL (panel-dialed), EXTERNAL (non-panel, FS7/FS11 select) and optional EXTERNAL BINARY SELECT using the S49 Option (50 non-panel, external schedules). The default (factory settings) mode is INTERNAL SCHEDULE SELECT. To use the S49 Option, the control must have either Control Board 600541-009 (EN1000) or 600572-009 (EN1001) and S49 Option 410329-004.

To program control for any of the four SCHEDULE SELECT modes:
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
   $S.S.=03$ for S49 EXTERNAL BINARY SELECT
5. Press the ENTER push button.

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

In this mode, the initiation inputs (TS1-FS3, TS1-FS7, 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 sequence.
3. **Use TS1-FS3 to initiate ANY schedule shown on the panel.**

TS1-FS7 AUTOMATICALLY SELECTS AND INITIATES ON 10:
1. Select schedule 10 using the SCHEDULE push buttons.
2. Program schedule 10 (or a sequence starting on schedule 10).
3. **Use TS1-FS7 to initiate schedule 10 (or a sequence starting on schedule 10).**

NOTICE
Regardless of which schedule the Front Panel displays, TS1-FS7 is dedicated to initiate only on schedule 10.

TS1-FS11 AUTOMATICALLY SELECTS AND INITIATES ON 20:
1. Select schedule 20 using the SCHEDULE push buttons.
2. Program schedule 20 (or a sequence starting on schedule 20).
3. **Use TS1-FS11 to initiate schedule 20 (or a sequence starting on schedule 20).**

NOTICE
Regardless of which schedule the Front Panel displays, TS1-FS11 is dedicated to initiate only on schedule 20.

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
10	*CLOSED*	**OPEN**	TS1-FS3
20	**OPEN**	*CLOSED*	TS1-FS3
30	*CLOSED*	*CLOSED*	TS1-FS3

! CAUTION !
When *S.S.* parameter is changed to *S.S.*=*00*, schedules 10 and 20 are cleared.

NOTICE
In this mode, the operator cannot select schedules using the Front Panel in OPERATE mode and can only initiate using TS1-FS3. Binary selects TS1-FS7 and/or TS1-FS11 must be closed before initiation of TS1-FS3 and must 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.
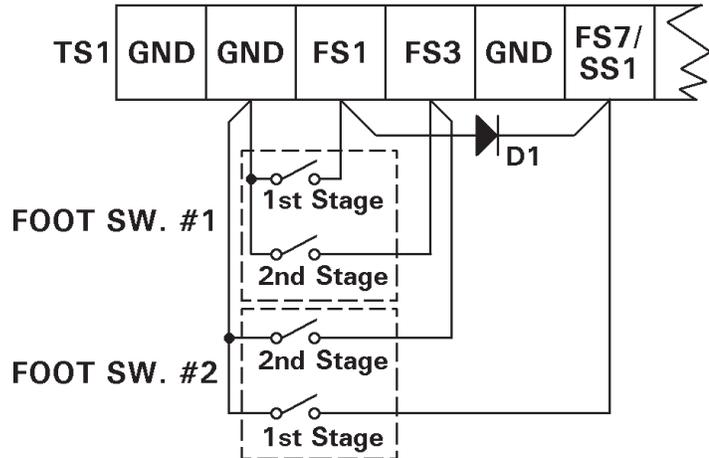

Figure 2-1. *Dual two-stage foot switch initiation*

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 S49 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.
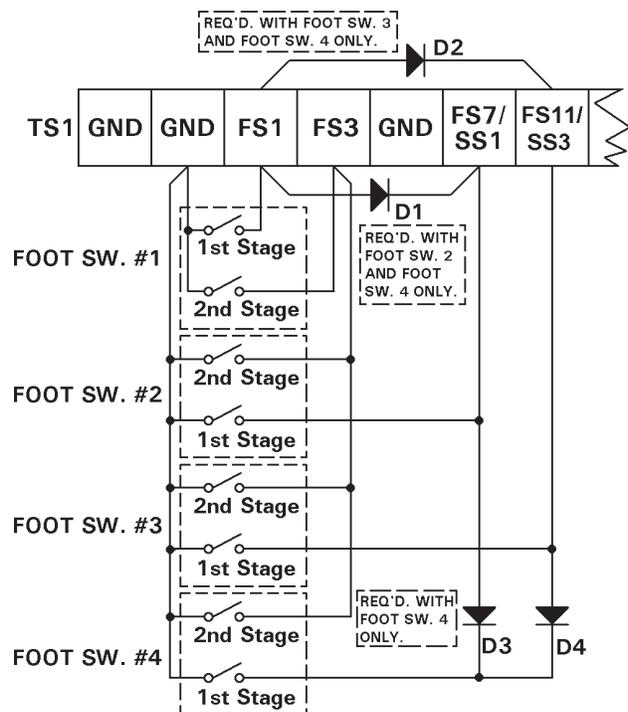
4.0 EXTERNAL BINARY SELECT – S49 OPTION – 𝟧.𝟧.=𝟢𝟥

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

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4.0 EXTERNAL BINARY SELECT – S49 OPTION – S.S.=03

EXTERNAL BINARY SELECT requires use of the S49 Option, consisting of a J4 ribbon cable, an additional PCB (410329-004) with six binary schedule select inputs and Control Board 600572-009 (EN1001) or 600541-009 (EN1000). These six dry contact closure inputs (approximately 24 VDC) make all 50 schedules remotely available to the operator or machine process control system.

In this mode, the initiation inputs (TS1-FS3 and S49 Option PCB TS12-SS1 through TS12-SS32) are dedicated as follows:
1. Select one of 50 schedules by an external device or operator acting on TS12-SS1 through TS12-SS32. See Switch Closure Connections diagram (Figure 4-1) and corresponding SCHEDULE SELECT table (Table 4-1).
2. Initiate sequence beginning with 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 10, and TS1-FS11 is dedicated to initiate only on schedule 20.

NOTICE
If the binary inputs provide decimal equivalent of 50 or above, control will display schedule 49.

4.1 MULTIPLE PILOT OPERATION

The EN1000/EN1001 can be configured to allow multiple pilot switches to initiate multiple schedules using the S49 Option. Once the control is put into the EXTERNAL BINARY SELECT mode (S.S.=03), a switch closure between TS1-FS3 and TS1-GND initiates the schedule externally selected via TS12-SS1 through TS12-SS32.

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 the diagram, 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 as the diodes are connected to SS1, SS2, SS4, and SS8. Any schedule (00 to 49) can be selected in this way. To select schedule 49, a diode is connected to SS1, SS16, and SS32.

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).

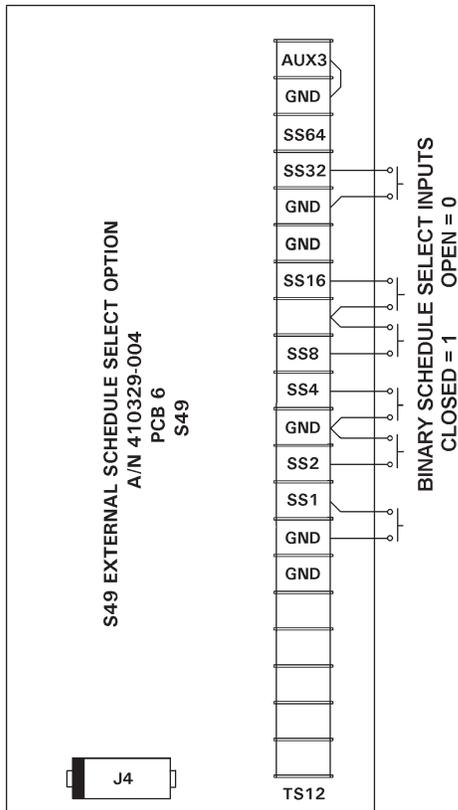## 4.2 S49 OPTION CONNECTION DIAGRAMS & SCHEDULE SELECT TABLE
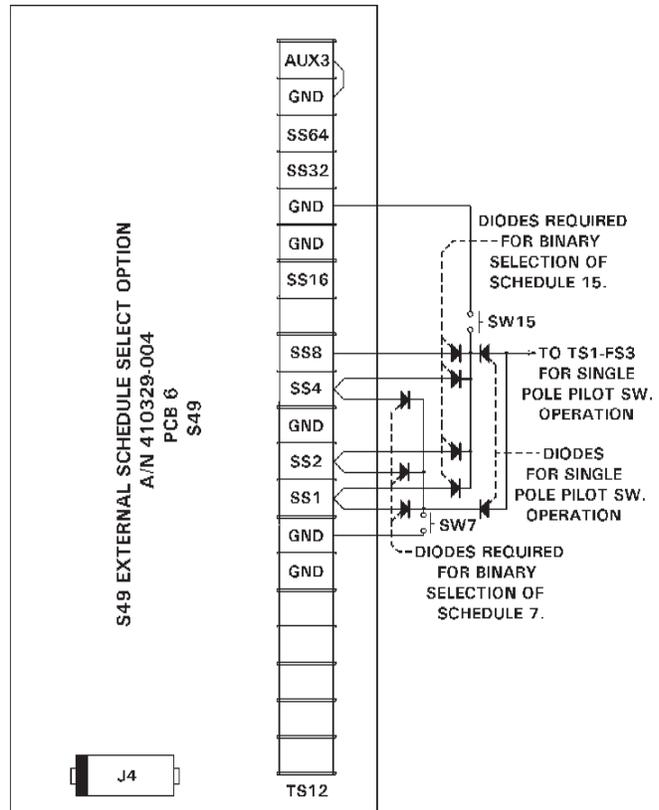

Figure 4-1. *Switch closure connections*

Figure 4-2. *Multiple pilot switch connections*

Table 4-1. *S49 EXTERNAL SCHEDULE SELECT*
DECIMAL (**SCHEDULE**) TO BINARY (TS12-SS1 through TS12-SS32)

SCHED	SS1	SS2	SS4	SS8	SS16	SS32	SCHED	SS1	SS2	SS4	SS8	SS16	SS32
00	0	0	0	0	0	0	25	1	0	0	1	1	0
01	1	0	0	0	0	0	26	0	1	0	1	1	0
02	0	1	0	0	0	0	27	1	1	0	1	1	0
03	1	1	0	0	0	0	28	0	0	1	1	1	0
04	0	0	1	0	0	0	29	1	0	1	1	1	0
05	1	0	1	0	0	0	30	0	1	1	1	1	0
06	0	1	1	0	0	0	31	1	1	1	1	1	0
07	1	1	1	0	0	0	32	0	0	0	0	0	1
08	0	0	0	1	0	0	33	1	0	0	0	0	1
09	1	0	0	1	0	0	34	0	1	0	0	0	1
10	0	1	0	1	0	0	35	1	1	0	0	0	1
11	1	1	0	1	0	0	36	0	0	1	0	0	1
12	0	0	1	1	0	0	37	1	0	1	0	0	1
13	1	0	1	1	0	0	38	0	1	1	0	0	1
14	0	1	1	1	0	0	39	1	1	1	0	0	1
15	1	1	1	1	0	0	40	0	0	0	1	0	1
16	0	0	0	0	1	0	41	1	0	0	1	0	1
17	1	0	0	0	1	0	42	0	1	0	1	0	1
18	0	1	0	0	1	0	43	1	1	0	1	0	1
19	1	1	0	0	1	0	44	0	0	1	1	0	1
20	0	0	1	0	1	0	45	1	0	1	1	0	1
21	1	0	1	0	1	0	46	0	1	1	1	0	1
22	0	1	1	0	1	0	47	1	1	1	1	0	1
23	1	1	1	0	1	0	48	0	0	0	0	1	1
24	0	0	0	1	1	0	49	1	0	0	0	1	1

1 = CLOSED   0 = OPEN
TS12-SS1 through TS12-SS32 require 24 VDC at 50 mA contacts

4.3 OPERATION USING STEPPER

When the control is programmed for Stepper use, the S49 Option automatically changes to select steppers directly. In this case, the schedule select inputs could be re-labeled: SS00, SS10, SS20, SS30, and SS40. This functionality allows for the automatic external selection of any of the five available steppers and subsequent initiation. This offers extra flexibility when a weld gun changes fixtures in the middle of a job. In that case, it is not necessary to reset the Stepper for a new fixture until its assigned Stepper program is really completed.

As Table 4-2 shows, only one input is necessary for each stepper. This helps economize on PLC outputs otherwise necessary to select schedule for any of five steppers.

Table 4-2. *Stepper selection using SS1, SS2, SS4, SS8*

STEPPER	SCHEDULE	SS1	SS2	SS4	SS8	INITIATION
A	00	0	0	0	0	TS1-FS3
B	10	1	0	0	0	TS1-FS3
C	20	0	1	0	0	TS1-FS3
D	30	0	0	1	0	TS1-FS3
E	40	0	0	0	1	TS1-FS3

4.4 OPERATION IN SEAM MODE

In SEAM mode, this option offers the ability to switch from any schedule to any other schedule on the fly. When the control is in the SEAM mode (**S.E.**=**01**), it will respond to any of the available inputs and select the schedule requested by the input board signals. However, during a seam weld, the control can be commanded on the fly to change heats as it welds. This allows for extreme flexibility, since all 50 schedules can be selected automatically using a PLC or other dedicated input means (see Section 4.1).

For example, a part to be welded requires schedules 00 and 01. A second, larger part requires schedules 10 and 11. The PLC can select schedule 00 before beginning the weld and switch to 01 whenever appropriate during the weld. It can just as easily select 10 before beginning the weld, and switch to 11 whenever appropriate during that weld. Ultimately, the application dictates the schedule selected.

5.0 INSTALLATION INSTRUCTIONS

5.1 CUSTOMER INSTALLATION OF S49 SCHEDULE SELECT OPTION
In an existing EN1000 or EN1001 "T/D" or "L" Cabinet

600675-001 EN1000	600675 EN1001	PARTS LIST	
QUANTITY		**PART NO.**	**DESCRIPTION**
1		600541-009	PCB Assem., Seq. Ctrl. Bd., EN1000/S49
	1	600572-009	PCB Assem., Seq. Ctrl. Bd., EN1001/S49
1		421210-032	Wiring Diagram, EN1000/S49-Series, T/D/L Cabinet
	1	421269-018	Wiring Diagram, EN1001/S49-Series, T/D/L Cabinet
1	1	410329-004	Assembly, PCB, S49 Option
1	1	322458	Harness Assembly, J4-J4
4	4	557003	6-32 x 1/4 PHSMS, Phil., Brite

1. Remove **ALL** power to control. Open door.

2. Mount the S49 Option PCB (A/N 410329-004) to standoffs on rear panel using four (4) 6-32 x 1/4 PHSMS, Phil., Brite (see Figure 5-1).

3. Connect J4-J4 Harness (A/N 322458) 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.
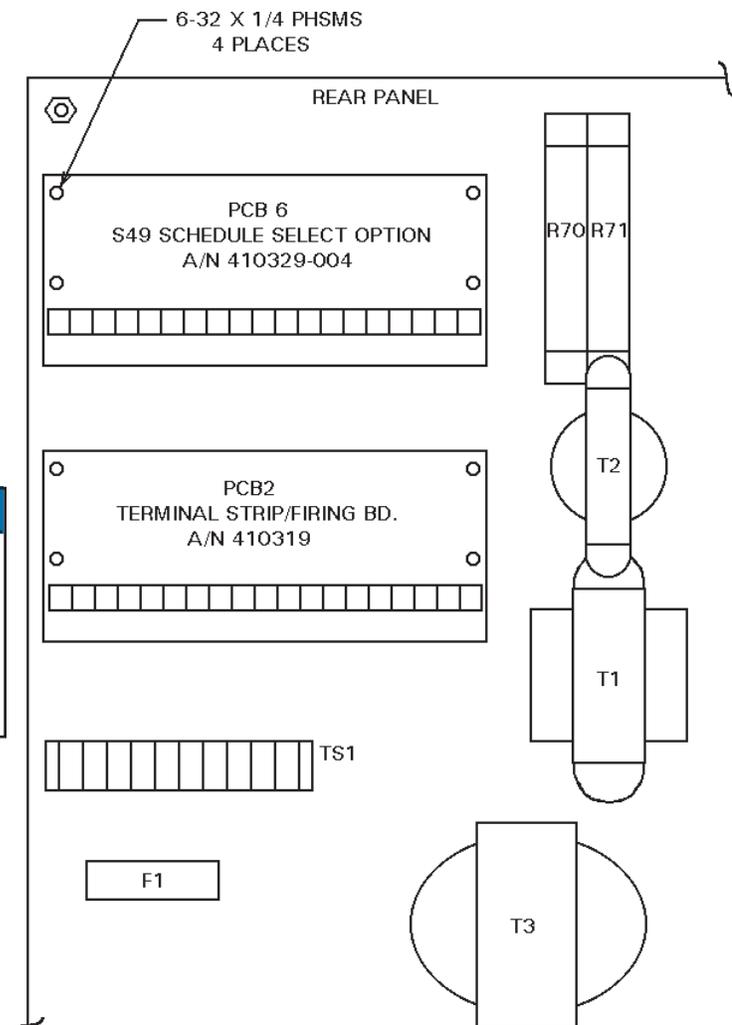
4. Close door. Reapply power.

Figure 5-1. *Mounting detail for "T/D" or "L" Cabinet*

5.2 CUSTOMER INSTALLATION OF S49 SCHEDULE SELECT OPTION
In an existing EN1000 or EN1001 "E" Cabinet

600675-003 EN1000	600675-002 EN1001	PARTS LIST	
QUANTITY		PART NO.	DESCRIPTION
1		600541-009	PCB Assem., Seq. Ctrl. Bd., EN1000/S49
	1	600572-009	PCB Assem., Seq. Ctrl. Bd., EN1001/S49
1		421212-009	Wiring Diagram, EN1000/S49-Series, E Cabinet
	1	421268-012	Wiring Diagram, EN1001/S49-Series, E Cabinet
1	1	525125	Bracket, Terminal Strip/PCB Mtg.
1	1	510236	Assem., Mtg. Plate, Term Strip/Firing Bd.
1	1	410329-004	Assembly, PCB, S49 Option
1	1	322525	Harness Assembly, J4-J4
7	7	557003	6-32 x 1/4 PHSMS, Phil., Brite
3	3	557006	6-32 x 3/8 PHSMS, Phil., Brite
3	3	557017	#6 Split Lockwasher
3	3	557018	6-32 x 1/4 AF Hex Nut

1. Remove **ALL** power to control. Open door.

2. Drill rear panel of cabinet as indicated in Figure 5-2. Mount angled bracket (P/N 525125) using the 6-32 x 3/8 Screws, Split Lockwashers and Nuts provided. Mount the PCB Mounting Plate (A/N 510236) using three (3) of the 6-32 x 1/4 Screws and Lockwashers.

3. Mount the S49 Option PCB (A/N 410329-004) to standoffs on the PCB Mounting Plate with the J4 connector at the top, using four (4) 6-32 x 1/4 PHSMS, Phil., Brite (see Figure 5-2).

4. Connect J4-J4 Harness (A/N 322525) 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.
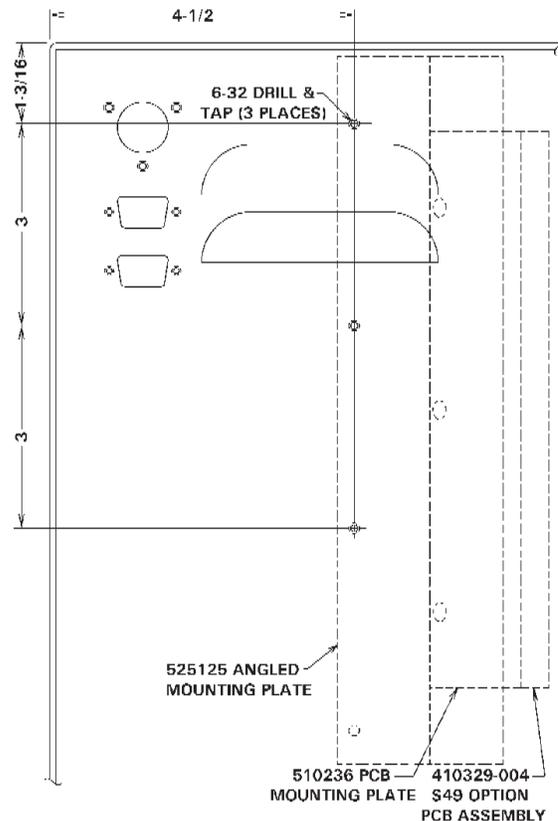
5. Vacuum or otherwise remove ALL metal chips. Close door. Reapply power.

Figure 5-2. *Mounting detail for "E" Cabinet*

5.3 CUSTOMER INSTALLATION OF S49 SCHEDULE SELECT OPTION
In an existing EN1000 or EN1001 "S" Cabinet

600675-005 EN1000	600675-004 EN1001	PARTS LIST	
QUANTITY		PART NO.	DESCRIPTION
1		600541-009	PCB Assem., Seq. Ctrl. Bd., EN1000/S49
	1	600572-009	PCB Assem., Seq. Ctrl. Bd., EN1001/S49
1		421180-010	Wiring Diagram, EN1000/S49-Series, S Cabinet
	1	421270-008	Wiring Diagram, EN1001/S49-Series, S Cabinet
1	1	410329-004	Assembly, PCB, S49 Option
1	1	322539	Harness Assembly, J4-J4
4	4	557003	6-32 x 1/4 PHSMS, Phil., Brite
4	4	557006	6-32 x 3/8 PHSMS, Phil., Brite
4	4	555031	6-32 x 1/2 Standoff, Hex Threaded Brass

1. Remove **ALL** power to control. Open door.

2. Drill and tap door of cabinet as indicated in Figure 5-3. Install the standoffs by using four (4) 6-32 x 3/8 Screws from the outside of the door, 6-32 x 1/2 standoffs on inside of the door.

3. Mount the S49 Option PCB (A/N 410329-004) to the standoffs with the J4 connector towards the rear panel of the cabinet, using four (4) 6-32 x 1/4 PHSMS, Phil, Brite.

4. Connect J4-J4 Harness (A/N 322539) 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.

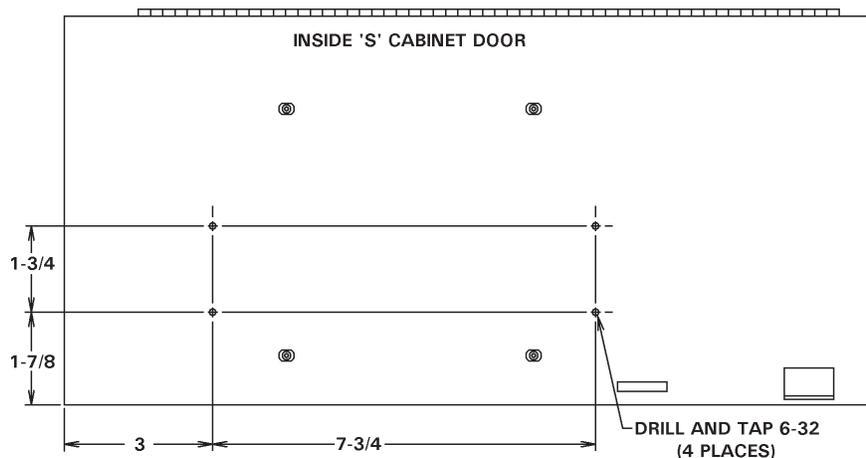5. Vacuum or otherwise remove ALL metal chips. Close door. Reapply power.

Figure 5-3. *Mounting detail for "S" Cabinet*

5.4 CUSTOMER INSTALLATION OF S49 SCHEDULE SELECT OPTION
In an existing EN1200 "T/D" or "L" Cabinet – OBSOLETE

600675-006 EN1200	PARTS LIST	
QUANTITY	PART NO.	DESCRIPTION
1	600606-001	PCB Assem., Seq. Ctrl. Bd., EN1200/S49
1	421325-005	Wiring Diagram, EN1200/S49-Series, L Cabinet
1	410329-004	Assembly, PCB, S49 Option
1	322536	Harness Assembly, J4-J4
4	557003	6-32 x 1/4 PHSMS, Phil., Brite

1. Remove **ALL** power to control. Open door.

NOTICE
This control may still have hazardous power stored, be certain the Red DANGER LED has stopped flashing and capacitors have discharged before opening the EN1200 chassis.

2. Mount the S49 Option PCB (A/N 410329-004) to standoffs on rear panel using four (4) 6-32 x 1/4 PHSMS, Phil., Brite (see Figure 5-4).

3. Connect J4-J4-J4 Harness (A/N 322536) per Wiring Diagram included with this kit.

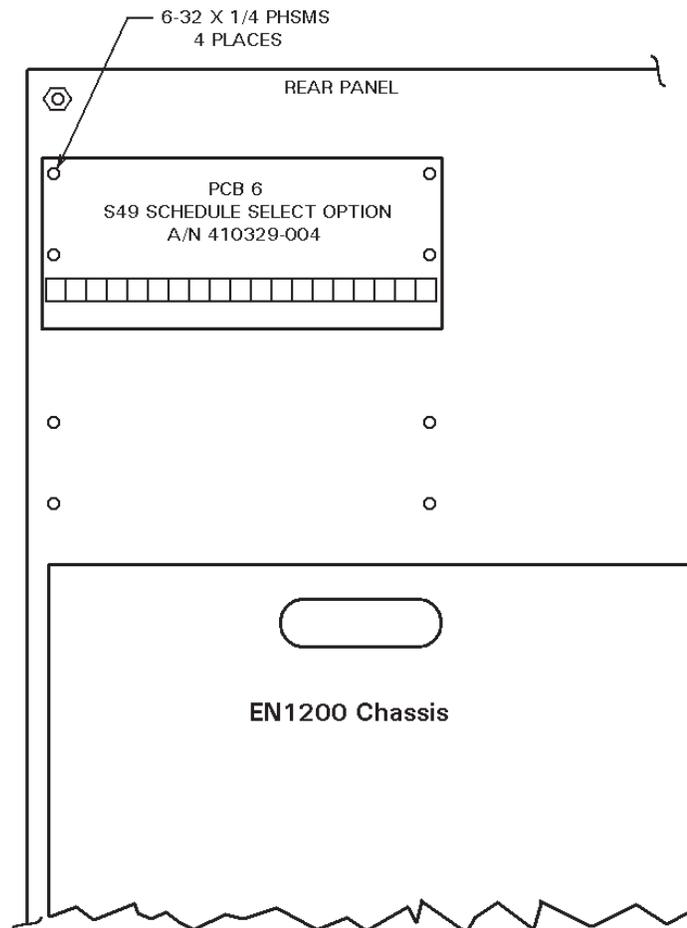| NOTICE |
|---|
| On the Wiring Diagram, the dark band on connectors indicates stripe on ribbon harness. Harness **MUST** be installed with ribbon harness stripe oriented correctly. |

4. Close door. Reapply power.

Figure 5-4. *Mounting detail for EN1200*

6.0 S49 OPTION WIRING DIAGRAMS (available as of 3-16)

421180-010	Wiring Diagram, EN1000/S49-Series, S Cabinet
421210-030	Wiring Diagram, EN1000-FPX(SCR)/S49, 11x11 Flat Plate
421210-032	Wiring Diagram, EN1000/S49-Series, T/D/L Cabinet
421210-038	Wiring Diagram, EN1000/S49 SP-Series, T/D/L Cabinet SP=DC Valve Output and 24VDC Power Supply
421212-009	Wiring Diagram, EN1000/S49-Series, E Cabinet
421268-010	Wiring Diagram, EN1001/S49-Series/485, E Cabinet
421268-012	Wiring Diagram, EN1001/S49-Series, E Cabinet
421269-018	Wiring Diagram, EN1001/S49-Series, T/D/L Cabinet
421269-024	Wiring Diagram, EN1001/S49/RDH/SP-Series, T/D/L Cabinet, SP=DC Valve Output and 24VDC Power Supply
421269-027	Wiring Diagram, EN1001/½/S49-Series, T/D/L Cabinet
421269-028	Wiring Diagram, EN1001/S49-Series/232, T/D/L Cabinet
421269-030	Wiring Diagram, EN1001/RDH/S49/SP-3200, L Cabinet, SP=Customer Supplied Circuit Breaker & Contactor Mounting
421270-008	Wiring Diagram, EN1001/S49-Series, S Cabinet
421435-002 (*Obsolete*)	Wiring Diagram, EN1200/RDH/S49-Series/485, T Cabinet
421435-005 (*Obsolete*)	Wiring Diagram, EN1200/S49-Series, L Cabinet