

# **INTERTRON INDUSTRIES, INC.**

**SINGLE PHASE RESISTANCE WELDER  
MICROPROCESSOR CONTROLLER  
MODEL 108B  
WITH EXTENDED FUNCTION  
PERIPHERAL BOARD  
OPERATING MANUAL**

## **REFERENCE MANUAL**

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## **INTERTRON INDUSTRIES INCORPORATED WARRANTY**

The Single Phase Resistance Welder Controller Model 108B has a limited warranty of one year parts and labor, FOB, Santa Ana, California, from the date of purchase. During that period, upon prepaid return to the distributor or the factory, equipment proving to be defective will be repaired (or at our option, replaced) without charge for either material or labor. No responsibility will be assumed for damage to equipment through improper installation, or through attempts to operate it above its rated capacity, intentional or otherwise.

The SCR's used in the ignitron firing module or SCR contactors are warranted for 90 days, if correct installation procedures are used.

**\*WARRANTY EXTENSION, as of May 01, 2001 the limited warranty of one year parts and labor has been extended to THREE years. Any items purchased prior to May 01, 2001 retains the limited warranty of one year parts and labor. In addition, the warranty for the SCR's used in the ignitron firing module or SCR contactors has been extended from 90 days to ONE year, if correct installation procedures are used.**

In addition, the warranty does not cover any customer equipment to which the Model 108B is installed.

# INTRODUCTION

Intertron Industries Incorporated Resistance Welding Controller Model 108B is an upgrade of the Model 105 Microprocessor Welding Control. The sophistication of today's electronics is used to simplify the welder's operating procedures and logistic of operations. The computer powers are used to greatly enhance the flexibility of programming and storing welding programs. The Model 108B can store up to 300 weld schedules. In the following pages we will attempt to give the user a working knowledge of the control system and its parameters.

The extended function peripheral board includes the following functions:

1. 1 to 3 foot switch inputs. Select 1-100 weld schedules in group A,B or C.
2. 9 valve control relays.
3. 6 firing module outputs for 6 contactors.
4. 8 inputs to manually energize valves 1 - 8.
5. 8 limit switch inputs.
6. Limit switch input to set conditional instructions.
7. Limit switch can choose weld schedule selection.
8. (CPC) Constant Profile Current for weld schedules
9. Weld checker with 1 - 20% deviation allowance per weld schedule. Alert function only.
10. Weld checker with 1 - 20% deviation allowance per weld schedule. Halt operation and display % deviation error.
11. \*Cylinder HI - LOW limit pressure sensor.
12. \*Weld pressure regulator.
13. \*Forge pressure regulator.
14. \*Motor speed control.
15. \*RS 232 and edit lockout key.
16. 8 manual valve select program.
17. 6 manual transformer select program
18. 6 Valve Operating modes: squeeze through hold; squeeze through off; off time only (part eject); Index after off time. squeeze through squeeze of next weld schedule, delay start from beginning of cool time.
19. (AVC) Automatic Voltage Compensation or (CPC) Constant Profile Current front panel selectable.

**CAUTION:** Please read the installation instructions carefully prior to installation.

**NOTE:** Some functions are optional and installed as ordered. See (\*)

## FRONT PANEL PROGRAM SETTINGS

Weld schedules A00-A99; B00-B99; C00-C99	
SQUEEZE DELAY TIME	00-99 CYCLES
SQUEEZE TIME	00-99 CYCLES
IMPULSES	00-99
COOL TIME	00-99 CYCLES
HEAT TIME	00-99 CYCLES
HEAT%	00-99
QUENCH TIME	00-99 CYCLES
TEMPER TIME	00-99 CYCLES
TEMPER%	00-99
HOLD TIME	00-99 CYCLES
OFF TIME	00-99 CYCLES
UPSLOPE STEPS	00-99
%HEAT PER STEP	0.0-9.9

HEAT TIME 00 = 1/2 CYCLE ALTERNATE POLARITY

NOTE: In cascade mode polarity changes with every initiation of weld sequence.

REPEAT: Repetitive sequence

WELD: Activates contactor during weld sequence

SEAM: Cool-heat sequence

ROLL SPOT: Roll Spot with clutch/brake on/off control

## AUXILIARY FUNCTIONS

- \*1 CASCADE IN CHAINED MODE
- \*2 CASCADE IN SUCCESSIVE MODE
- \*3 AVC OR CONSTANT CURRENT MODE
- \*4 SET 00-99 PSI WELD PRESSURE
- \*5 SET 00-99 PSI FORGE PRESSURE
- \*6 SET 00-99 PSI HI-LO LIMIT  $\pm 1$ PSI
- \*7 SET 00-99 MOTOR SPEED OR TRANSFORMER SELECT IN CASCADE MODE
- \*8 SET 00-99 CYCLES FORGE DELAY TIME
- \*9 8 MANUAL VALVE SELECT PROGRAM
- \*\*5 LIMIT SWITCH CONDITIONAL INSTRUCTIONS
- \*\*6 SET 1% - 20% CURRENT VARIATION ACCEPTANCE (ALERT MODE)
- \*\*7 SET 1% - 20% CURRENT VARIATION ACCEPTANCE (HALT MODE)

## **SWITCHABLE FUNCTIONS**

- 1.) SPOT
- 2.) SEAM
- 3.) ROLL SPOT
- 4.) CASCADE IN CHAINED OR SUCCESSIVE MODE
- 5.) BUTT-WELD
- 6.) FOOT SWITCH OR ANTI-TIE DOWN MODE
- 7.) PLC CONTROL VIA RS232
- 8.) GROUP A WELD SCHEDULES 00-99
- 9.) GROUP B WELD SCHEDULES 00-99
- 10.) GROUP C WELD SCHEDULES 00-99
- 11.) MANUAL VALVE SELECT PROGRAM 1 TO 8 VALVES
- 12.) MANUAL TRANSFORMER SELECT PROGRAM 1 TO 6 TRANSFORMERS
- 13.) WELD SCHEDULE SELECT/GROUP VIA LS1 - LS8
- 14.) CONDITIONAL INSTRUCTIONS EXECUTED VIA LS1 - LS8

## **MODES OF OPERATION**

- 1.) BUTT-WELD MODE
- 2.) INTERLOCK SCANNER CONTROL
- 3.) WELD SCHEDULE SELECTION BY FOOT SWITCH
- 4.) ANTI-TIE DOWN DUAL PALM BUTTON MOMENTARY ACTION
- 5.) ANTI-TIE DOWN DUAL PALM BUTTON PUSH AND HOLD
- 6.) ANTI-TIE DOWN OR FOOT SWITCH SELECT BY KEY SWITCH
- 7.) AUTOMATIC VOLTAGE COMPENSATION AND/OR CONSTANT CURRENT

# PROGRAMMING

- Set the toggle switch to Weld Schedule Group A. Key in a weld schedule number from 00 to 99. LED's squeeze delay time through off time shall be off. This is a typical STAND BY mode condition.
- The position of the toggle switches REPEAT, WELD, and SEAM/ROLL do not matter for the purposes of setting up a Weld Schedule.
- The keyboard has 10 digits (0-9) plus a \* key and a RED key.
- The \* key returns the program to the STAND BY mode. The RED key steps the sequence from SQUEEZE DELAY TIME through %HEAT PER STEP and back to the STAND BY mode. Keys \*1 through \*9 and \*\*1 through \*\*7 turn on auxiliary functions.
- By pushing the RED key the first time, the sequencer will exit to SQUEEZE DELAY TIME. It should be noted that the SQUEEZE DELAY TIME lamp is on. Also, the two digit display is now showing a two digit value. If it is not showing a two digit value, one must be entered at this time.
- SQUEEZE DELAY TIME occurs only once in a repeat cycle in the first sequence, it will not repeat again for the duration of the foot switch closure. It is recommended that if REPEAT is not used, set SQUEEZE DELAY TIME to zero.
- SQUEEZE DELAY TIME in BUTT-WELD MODE is used to delay the initiation of the UPSET valve upon initiation of the second stage foot switch, thus causing a delay time between the clamp and upset valve. SQUEEZE DELAY TIME has a minimum built in time of one cycle for safety reasons.
- SQUEEZE TIME must be set to the minimum time required to insure that the welding tips are under pressure prior to welding.
- IMPULSES must be set to a minimum of one. It is a multiplier for COOL TIME + HEAT TIME.
- COOL TIME is used when more than one impulse is required, allowing the weld nugget to cool before it is reheated again.
- HEAT TIME is the length of time the heat is being applied. HEAT% is the amount of heat applied. When HEAT TIME is set to 00 the controller will put only one half cycle of heat per impulse, alternating each time in the opposite direction of previous one half cycle.



- Both HEAT TIME and HEAT% can be accessed directly by pushing the RED and GREEN keys located adjacent to these functions. After editing these functions, push the \* key to exit back to STAND BY mode.
- QUENCH TIME allows the weld nugget to cool.
- TEMPER TIME and TEMPER% function in the same way as the HEAT TIME and HEAT%. They are used to anneal the weld so that cracking may be prevented.
- HOLD TIME is programmable from 0-99 cycles.
- In REPEAT MODE, off time is programmable to a value other than zero. This allows the electrodes to separate. The operator can position the material for the next weld while the foot switch is held closed.
- UPSLOPE STEPS must be set to zero when slope is not being used.
- HEAT% PER STEP is to be set to zero when slope is not used.

# UPSLOPE PROGRAMMING AND OPERATION

- Upslope is defined as a stair step ladder where HEAT% is incremented, from an initial value, in small increments and over a specified period of time. (See figure 1)
- A unit of time (selected from 1-99) is composed of two alternating cycles of electrical current, one positive and one negative.
- A program of 01 HEAT TIME at a heat magnitude of 50% will cause the welder controller to pass to the welding transformer one positive and one negative half cycle of electrical current, both with a magnitude of 50%. (See figure 2)
- The welder controller can be programmed to increase the initial value of HEAT% (value set in the first impulse and in the first cycle of HEAT TIME.) The heat will be incremented in one cycle per step for the total amount of steps programmed in UPSLOPE STEPS.
- The HEAT% per step can be set in fractions of a % from 0.0 to 9.9.
- The total number of steps shall always be equal to or less than the total number of heat cycles in HEAT TIME.

**NOTE:** Enter Initial HEAT% in program location "HEAT%"  
Enter Total Number of Steps  
Enter % HEAT per Step

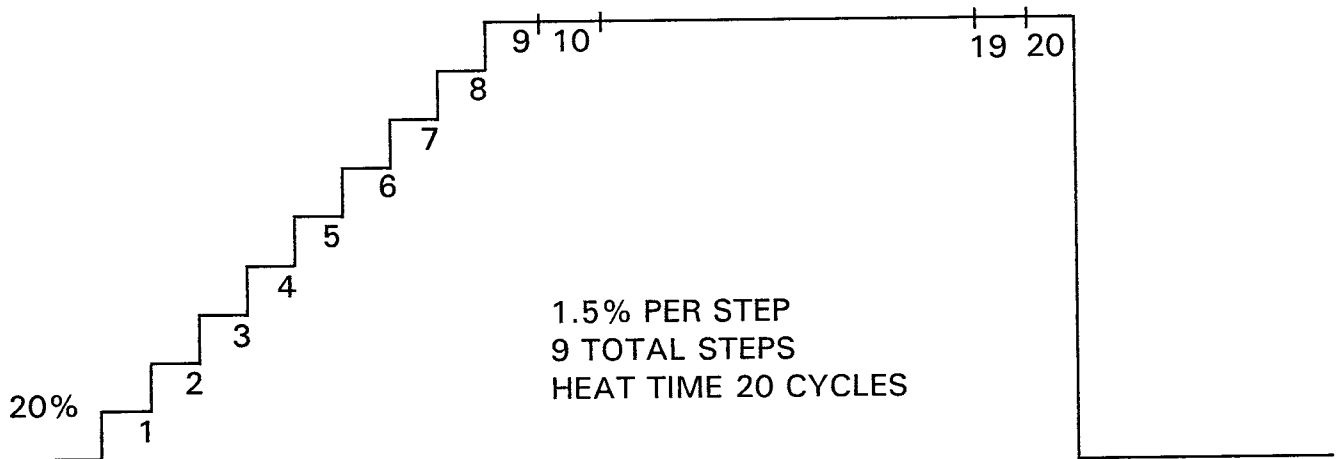


FIG. 1

The upslope feature cannot be used with TEMPER TIME. The illustration in Figure 3 shows a weld schedule using upslope and the relationship between units of HEAT TIME, IMPULSES, STEPS UPSLOPE HEAT INCREASE, and ALTERNATE POSITIVE/NEGATIVE HALF CYCLES of ELECTRICAL CURRENT. Figure 3 will be used to show how the slope is calculated from basic requirements in easy steps:

- 1.) 3 impulses:                    3 cycles of heat time per impulse  
    2 cycles of cool time per impulse
  
- 2.) Slope shall start at 20% heat, increase in 6 cycles of heat time to 50% and continue at a consistent 50% for the remaining 3 cycles of heat time in the third impulse.
  
- 3.) Set up:                         Set IMPULSE counter to 03  
    Set COOL TIME counter to 02  
    Set HEAT TIME counter to 03  
    Set HEAT% counter to 20
  
- 4.) Calculate and set UPSLOPE STEPS counter UPSLOPE STEPS = HEAT TIME in cycles, 6 cycles of UPSLOPE = 6 UPSLOPE STEPS.  
Set UPSLOPE STEPS counter to 06.
  
- 5.) Calculate and set HEAT% per step counter.

$$\frac{(\text{Ending HEAT\%}) - (\text{Starting HEAT\%})}{\text{UPSLOPE STEPS}} = \text{HEAT\% PER STEP}$$

$$\frac{(50\%) - (20\%)}{6 \text{ steps}} = \frac{5.0\% \text{ PER STEP}}{1}$$

Set HEAT% per step to 5.0

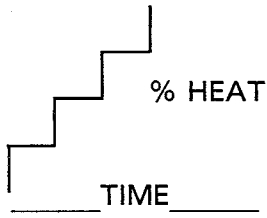


FIG. 1

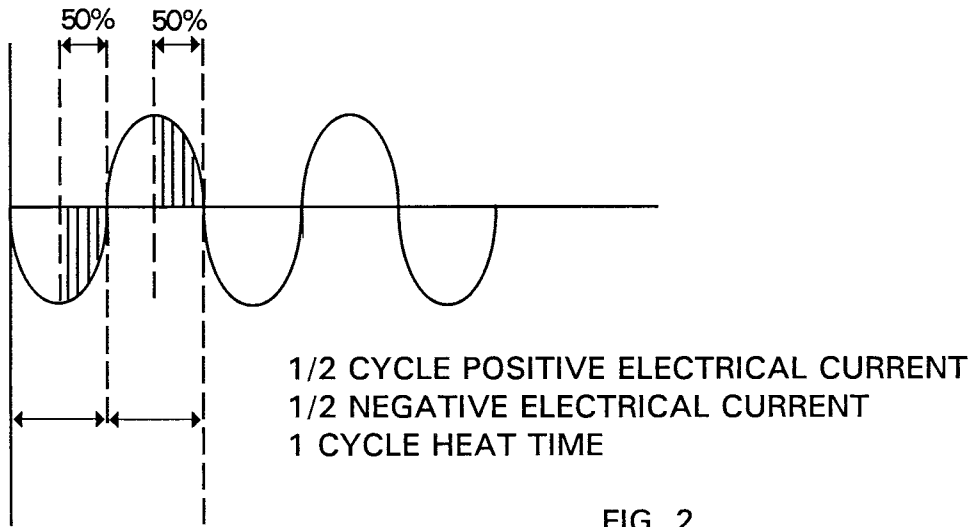


FIG. 2

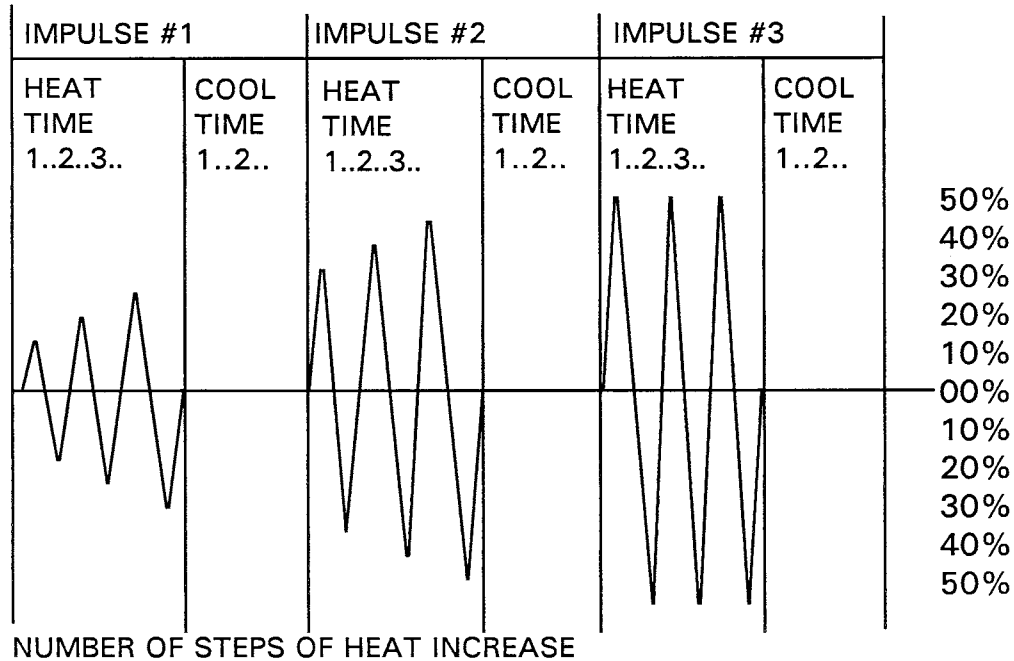


FIG. 3

## SEAM/ROLL SPOT

\*In the SEAM mode, the sequencer will step through SQUEEZE to the first impulse and do a COOL TIME/HEAT TIME sequence continuously until the foot switch is released, then step to HOLD TIME and OFF TIME.

\*A motor clutch/brake and motor on/off control output provides 110 VAC to energize the motor at the first impulse.

In ROLL SPOT mode, the output will energize the motor during OFF TIME when the foot switch is depressed.

\*When in seam or roll spot key #7 will allow motor speed setting from 00 to 99, the motor controller input will see a signal of VDC to 9.9VDC. A speed setting of 50 will produce a 5.0 volt signal to the motor controller.

## CASCADE OPERATION

Cascade mode operation is enabled by turning on the minidip switch S5-1 on the processor board. Cascade is defined as a sequence of weld schedules turning on sequentially six welding guns or six welding transformers, one per weld schedule.

Weld schedules 1 through 6, 21 through 26, ----- 91 through 96 in groups A, B, or C may be used for cascading purposes.

Weld schedule X1 will turn on valve 1 and transformer 1

Weld schedule X2 will turn on valve 2 and transformer 2

Weld schedule X3 will turn on valve 3 and transformer 3

Weld schedule X4 will turn on valve 4 and transformer 4

Weld schedule X5 will turn on valve 5 and transformer 5

Weld schedule X6 will turn on valve 6 and transformer 6

\*7 will allow manual selection of transformers 1-6, only one transformer per weld schedule. If a number other than 1-6 is keyed in, it will default to No. 1. Number 00 will disable manual transformer selection.

Minidip switch SW7-3 on the brain panel, enable manual valve selection via key \*9.

The clamp valve will stay on from the beginning of the first weld schedule through the last weld schedule in the selected group.

\*\*2 in any weld schedule will allow entry of a "repeat" w.s. number 1 to 99. An internal counter will decrement to zero. Then the weld schedule number will change one number up in the chain.

\*\*3 keyed in only in the last weld schedule of a sequence will allow entry of a "repeat" sequence number from 1 to 99. An internal counter will decrement to zero the number of sequences executed. Repeat instruction cannot be entered in a weld schedule other than the last one, the controller will not allow it.

A weld schedule will link itself to the next one in a cascade group in two modes:

- A. CHAINED MODE
- B. SUCCESSIVE MODE

#### **CHAINED MODE.**

CHAINED mode implies that once the first weld schedule in the group is activated, all subsequent weld schedules in the group will automatically be activated in the proper sequence.

Key in \*1 in the STAND BY mode to turn on the LED marked \*1. Now the next weld schedule will be executed at the end of the first one. The last weld schedule in the sequence does not have to have the "CHAINED" LED on. At the end of the last weld schedule to be executed the controller will return to the STAND BY mode with the display showing the first weld schedule in that group.

Turning on the "CHAINED" LED in weld schedule 06 will cause that weld schedule to be linked to weld schedule 11 in the next group.

If "OFF" time is set for a minimum of one cycle time in the last weld schedule, the "OFF" output will turn on for that duration. This output may be used to indicate end of sequence or as a clock for a part counter.

#### **SUCCESSIVE MODE.**

The CASCADE SUCCESSIVE mode operates in a similar fashion to the CHAINED mode. The difference is that in the SUCCESSIVE mode the controller will halt at the end of "OFF" time of every weld schedule in the sequence. A new initiation by the foot switch, palm button or PLC interface will cause the controller to advance to the next weld schedule in the group. To create a link between weld schedules in the successive move, the \*2 LED must be turned on. To turn that LED on or off the \*2 keys must be depressed.

Note: A group of CASCADE weld schedules may be set with a mixture of CHAINED and SUCCESSIVE instructions.

The same weld schedule numbers in group A, B or C may be activated by 3 independent foot switches.

Weld schedules with the least significant digit being 0, 7, 8 and 9 may be used as non cascade weld schedules; however, they will always activate squeeze valve #1 and transformer #1. They could not be set in a cascade mode.

CASCADE may also be used in the BUTT WELD mode, by turning on the switch S5-4 on the processor board. The clamp and upset valve will be common to all butt welders. The transformers will fire in sequence.

The cascade 1 to 24 valve interface board (See schematic drw. 155-019-01D Page 14) will automatically energize valve 1 through valve 24 one at a time sequentially for each weld schedule.

## CASCADE VALVE RELAY OPERATION

- 1.)
  - The CLAMP VALVE will be energized up on the first stage foot switch closure FS1 and released when the foot switch is released.
  
  - If FS1 is not released and the 2nd stage foot switch is closed momentarily, the clamp valve will latch on and remain energized throughout the full sequence of the weld schedule 1, 2, 3, 4, 5, and 6. The clamp will be released at the end of weld schedule 6 of the last group in the cascade sequence.
  
- 2.) At the beginning of the squeeze time of weld schedule 1 an output VL1 will energize a valve to operate Gun#1. This valve will remain energized until the end of the HOLD TIME of weld schedule 1. An additional output called FM1 is available to energize a welding transformer only from that weld schedule.
  
- 3.)
  - At the end of weld schedule 1, weld schedule 2 will begin. An output called VL2 will energize a valve to operate Gun#2.
  - This valve will remain energized until the HOLD TIME of weld schedule 2. An additional output called FM2 is available to energize a second welding transformer, but only from weld schedule 2.
  
- 4.) At the end of weld schedule 2, weld schedule 3 will begin. An output called VL3 will energize until the end of HOLD TIME of weld schedule 3. An additional output called FM3 is available to energize a third welding transformer, but only from weld schedule 3.  
The sequence of operation in the above sections 2, 3, and 4 will continue for weld schedules 4, 5, and 6. Valve outputs VL4, VL5, VL6 will turn on sequentially in weld schedules 4, 5 and 6.
  
- 5.) For installation details see drawing No. 155-019-01C REV. A.  
Valve 7 and 8 will switch valves in groups of 6 to enable a total sequential switching of up to 24 valves from 24 weld schedules.  
WS1-VL1, WS2-VL2, WS3-VL3, WS4-VL4, WS5-VL5, WS6-VL6, WS11-VL7, WS12-VL8, WS13-VL9, WS14-VL10, WS15-VL11, WS16-VL12, WS21-VL13, WS22-VL14, WS23-VL15, WS24-VL16, WS25-VL17, WS26-VL18, WS31-VL19, WS32-VL20, WS33-VL21, WS34-VL22, WS35-VL23, WS36-VL24.



## MANUAL 1-8 VALVE SELECT PROGRAM

In the cascade mode, valve relay outputs VL1 through VL6 are automatically turned on in the appropriate sequence, one for each of the selected weld schedules with the least significant digit 1 through 6. In applications requiring more than one valve to be energized at one time, to be used as additional gun valve or clamp or as shift cylinder or as ejector pin cylinder, the manual valve select program must be initiated. This operating mode is enabled by turning on the minidip switch SW7-3 on the processor board. With that switch turned on, no valve outputs will be energized unless so designated in the manual valve select program.

- From the stand by mode push keys \*9.
- The front panel LED labeled \*9 will flash.
- The display will show digits 10.
- By pushing the red key the display will be changed to 20, 30, 40, 50, 60, 70 and 80. The most significant digit indicates selection of valves 1 through 8.  
1 = VL1; 2 = VL2; 3 = VL3; 4 = VL4; 5 = VL5; 6 = VL6; 7 = VL7  
and 8 = VL8.
- As the valves display are scrolled from 10 through 80 via the red key, the least significant digit may be changed from 0 to 1 or 2 or 3 or 4 or 5 or 6.  
0 = valve not active  
1 = valve active from squeeze through hold time  
2 = valve active from squeeze through off time  
3 = valve active during off time only  
4 = valve active after "OFF TIME" and prior to squeeze function in the next weld schedule and for the duration of "OFF TIME" or release of LS7 (part in position) if LS7 was turned on.  
5 = valve active from squeeze time of one weld schedule and through the next weld schedule if valve is also selected on.  
6 = valve active from the beginning of cool time, delayed by \*\* cycles keyed in by \*\*1
- After setting the operating mode from 0 to 6 to all eight valves, push the \* key to return to stand by mode.
- Push \*\*1 to key in the delay cycles from beginning of cool time for the valve set to operate in mode 6. **NOTE: Next weld schedule with the same valve must be set to mode 1 or 2.**
- Repeat the valve selection process for all the weld schedules in the cascade group. All the selections will be stored together with all other weld parameters in the Model 108B memory.

Note: The manual valve select program is also operative in standard spot-seam-roll spot mode. The pre-specified valve operation for forge valve and motor will occur concurrently with the manual selection.

## BUTT-WELD MODE

This mode is set up by turning on the minidip switch S5-4. The clamp valve may be turned on or released with the "first stage" of the foot switch. The second stage foot switch turns on the upset output delayed by the number of cycles of time set in SQUEEZE DELAY TIME. The sequence starts and the upset valve is turned off at the end of HOLD TIME. The clamp stays on until the end of the weld sequence.

- The Interlock input in butt-weld may be used, via a switch, to exit HEAT TIME and enter QUENCH TIME. See drawing No. 155-018-01B REV. A Page 10.

## RETRACTION AND TIP DRESS

- A RETRACTION RELAY output is also available to operate a retraction valve for Spot, Seam and Roll Spot.

- A TIP DRESS relay output is also available to provide reduced air pressure for tip dressing in Spot and also energize motor in Seam or Roll Spot at the same time. A terminal strip is available to connect switches to energize all valves independently during set up.

- VL6 output may be used for retraction and VL7 for tip dress.

- All outputs except for VL1 are factory installed options. It is suggested that the controller brain panel and peripheral board be returned to the factory for upgrading, when that becomes a requirement.

## INTERLOCK

The controller will interface directly with the 10 station Interlock Scanner Model 375. When enabled it will wait at the end of squeeze time for an enable signal from the scanner to let the next controller in line to start welding. The Interlock is enabled by minidip switch S5-3.

## ANTI-TIE DOWN MODE

On the 108 processor board, set the minidip switch SW7-1 to on for a "MOMENTARY PUSH" action of FS1 and FS2.

On the 108 processor board, set the minidip switch SW7-2 to on for a "PUSH AND HOLD" (means push and hold buttons from the beginning of squeeze to the end of hold time) action of FS1 and FS2.

FS1 and FS2 inputs are to be connected to two (momentary on) palm buttons. Palm button switches must be activated within .75 seconds of each other.

**Note: "MOMENTARY PUSH" ON time can be set from 1-99 cycles if  
"SQUEEZE DELAY TIME" is set from 1 to 99 cycles.**

## WELD SCHEDULE SELECTION BY FOOT SWITCH

•Typically, weld schedule selections are done by keying in a two digit number with the controller in the stand by mode. A 3 position toggle switch located on the bezel of the brain panel selects group A, B or C, each holding weld schedules 00 through 99. One of 3 foot switches will select the same weld schedule number in group A, B, or C.

### EXAMPLE:

Set weld schedule number to 25.  
Set A-B-C selector switch to position B.  
Foot switch #1 will enable weld schedule A25  
Foot switch #2 will enable weld schedule B25  
Foot switch #3 will enable weld schedule C25

The same holds true when selecting a cascade group.

### EXAMPLE:

Set weld schedule number to 31.  
Set A-B-C selector switch to position B.  
Foot switch #1 will enable weld schedules A31, A32, A33, A34, A35, A36  
Foot switch #2 will enable weld schedules B31, B32, B33, B34, B35, B36  
Foot switch #3 will enable weld schedules C31, C32, C33, C34, C35, C36

Note: Squeeze delay time, if initiated by foot switch, may be aborted if the foot switch closure is removed and the control returns to stand by mode. Setting the squeeze delay time to zero allows the operator to initiate squeeze delay time with "FIRST STAGE" only and abort if necessary, or initiate "FIRST and SECOND STAGE" and immediately step to "SQUEEZE TIME" where the sequence is locked on.

The weld schedule selection by foot switch of groups A,B or C may be also accomplished by an optional module with an interior scanner which interlocks up to 3 operators with 3 separate two stage foot switches, to operate 3 welding machines controlled by weld schedules set in group A or B or C.

Note: When more then one operator is controlling the foot switch, or palm buttons in Group "A" or "B" or "C" in the CASCADES modes "CHAINED or SUCCESSIVE:  
1. All 3 groups must start with a weld schedule no. of 01,11,21,31.....

## **FORGE DELAY TIME**

From standby mode, push keys \*8 on the front panel. The LED adjacent to \*8 will flash. Key in a number from 01 to 99 for "FORGE TIME DELAY". Push the \* button to return to standby mode. Forge delay time counter starts counting line frequency cycles from the beginning of the first heat impulse. At the end of count down, a forge designated relay "VL9" will turn on and stay on until "END" of hold time. "00" in forge delay will make that function inactive.

# LIMIT SWITCH CONDITIONAL INSTRUCTIONS

1. Limit switches 1 through 8 will become active up on switch closure only is programmed in a specific weld schedule.
2. To access the CONDITIONAL INSTRUCTIONS menu, the operator will push keys \*\*5 in the stand by mode of the weld schedule.
3. The \*\*5 LED will flash, and the display will show the number "10". The RED key on the front panel keyboard will scroll the display from 10 to 80 then wrap around.
4. The most significant digit will indicate which limit switch is being initialized, from 1 to 8.
5. The least significant digit defines the conditional instruction active for that limit switch.

0 = Limit switch not active.

1 = HALT

The controller will execute the weld schedule, then halt prior to exiting HOLD TIME. Valves programmed ON, shall remain ON until the selected limit switch is closed, then complete the weld schedule execution.

2 = RESET

The controller will execute the weld schedule, then reset to the initial weld schedule in that particular cascade sequence, unless the limit switch is found closed at the end of that weld schedule.

3 = PAUSE BEFORE SQUEEZE TIME

The controller will not initiate SQUEEZE TIME until the designated limit switch is closed.

Typically used for PART IN POSITION function.

4 = PAUSE AFTER SQUEEZE TIME

The controller will not initiate IMPULSE HEAT function until the designated limit switch is closed.

Typically used for pressure switch sensing prior to weld.

5 = PAUSE AFTER OFF TIME

The controller shall pause at the end of OFF TIME prior to exit waiting for the designated limit switch to close.

6 = SKIP WELD SCHEDULE

The controller will skip that weld schedule, unless the designated limit switch is found to be closed at weld schedule initiation.

7 = WELD SCHEDULE SELECTION BY LIMIT SWITCH

8 = PART IN POSITION SENSE BY LIMIT SWITCH

Closure of FS1 and FS2 (or palm buttons) with limit switch open, will cause front panel led's A-B-C to flash. This indicates part not in position. Set part in position with limit switch closed. Led's will stop flashing. Close FS1 and FS2 again to start weld schedule sequence.

Conditional instructions per limit switch may be changed from one weld schedule to another within the same group as long as there is no conflict of operation.

## **WELD SCHEDULE SELECTION BY LIMIT SWITCH IN NON CASCADE MODE**

Limit switches inputs LS1 through LS8 located on TB9 on the peripheral board, are used to select the next weld schedule up from the one selected and shown in the next two digit display window. The limit switch or switches must be closed prior to FS1 foot switch input, or anti-tie down palm buttons.

The weld schedule selection is done by adding the limit switch number to the weld schedules number initially selected and displayed in the front panel window in the stand by mode. Limit Switch Conditional Instruction 7 needs to be selected.

Example 1: With the controller set at W.S.15 and LS3 closed, weld schedule 18 will be executed, then the controller will return back to W.S.15.

Example 2: With the controller set at W.S.1 and LS8 and LS7 closed, weld schedule 16 will be executed, then the controller will return back to W.S.1.

## **WELD SCHEDULE SELECTION BY LIMIT SWITCH IN CASCADE MODE**

Limit switches inputs LS1 through LS8 located on TB9 on the peripheral board, are used to select the next weld schedule group up from the one selected and shown in the next two digit display window. The limit switch or switches must be closed prior to FS1 foot switch input, or anti-tie down palm buttons.

The weld schedule group selection is done by adding the limit switch number to the weld schedule group initially selected and displayed in the front panel window in the stand by mode. Limit Switch Conditional Instruction 7 needs to be selected.

Example 1: With the controller set at W.S.01 and LS3 closed, weld schedule group starting with weld schedule 31 will be executed, then the controller will return back to W.S.01.

Example 2: With the controller set at W.S.01 Group A and LS7 and LS8 closed, weld schedule group starting with weld schedule 91 Group A will be executed, then the controller will return back to W.S.01 Group A.

**Note: Limited to group A, B or C**

## **SOFT EMERGENCY STOP**

This is a momentary switch which is normally closed. When incorporated in the system, the foot switch common line which is normally connected to TB2-1 in the peripheral board, must be disconnected and reconnected to the emergency stop switch as shown in the installation diagrams. The use of the soft emergency stop method is recommended when the emergency stop function is repeatedly used during the day.

## **HARD EMERGENCY STOP**

This function disconnects the controller's electrical power via a momentary N.C switch TB1-6 and TB1-7. This emergency stop method is recommended for infrequent use only. The second pole of the switch shall be a momentary N.O. contact in series with a 5ohm, 5watt resistor between TB2-1 and TB2-10.

## INSTALLATION INSTRUCTIONS

- Use DWG. 155-018-01A as a reference. The power transformer T1 has 5 taps on the primary side. A metallic sticker on the transformer shows the tap arrangement and physical location. Taps to set are 200V-220V-440V-480V.
  
- The transformer 110V secondary output has a total capacity of 150VA standard or optional 250VA to be used with the designated loads as specified for the Model 108. All valves have typically a 110V/20VA solenoid coil. If the 110V source is to be used to operate an external load switched on/off by a mechanical switch, a 0.1 MF/ 600VAC capacitor must be used across the switch. If this is not done, electrical noise generated by the switch will interfere with the controller operation.

<b>CHART OF SOLENOID VALVE INTERCONNECT</b>		
1.) VL com	TB5-10	Common to all valves
2.) VL1	TB5-1	Squeeze Valve 1
3.) VL2	TB5-2	Squeeze Valve 2
4.) VL3	TB5-3	Squeeze Valve 3
5.) VL4	TB5-4	Squeeze Valve 4
6.) VL5	TB5-5	Squeeze Valve 5
7.) VL6	TB5-6	Squeeze Valve 6 (Retraction)
8.) VL7	TB5-7	Manual Select (Tip Dress)
9.) VL8	TB5-8	Manual Select (Motor)
10.) VL9	TB5-9	Clamp / Forge



<b>CHART OF SOLENOID VALVE MANUAL ENERGIZE SWITCHES</b>	
0.) EN com. (Gnd.)	TB8-9; TB2-11
1.) EN VL1	TB8-1
2.) EN VL2	TB8-2
3.) EN VL3	TB8-3
4.) EN VL4	TB8-4
5.) EN VL5	TB8-5
6.) EN VL6 Retraction Valve	TB8-6; TB2-12
7.) EN VL7 Man. Sel. Tip Dres	TB8-7
8.) EN VL8 Man. Sel. Motor	TB8-8

Note: The switches will be switching 5VDC/20MA

To energize one welding transformer, one firing module is connected to TB2-6 and 7. (Observe Polarity) To energize 6 transformers in the Cascade mode, 6 firing modules are connected TB3-1 through TB3-12. See drawing No. 155-017D-01 REV. A, and 155-019-01C REV. A for 6 transformer firing module interconnect diagram.

### **PRESSURE SWITCH CONNECTION**

Terminal strip TB1-11 and TB1-12 are to be connected to the (a) N.O. pressure switch. After the closure of the first stage foot switch FS1, the controller will stay in the squeeze time until the pressure switch is closed. Then it will allow the sequence to start if FS2 is also closed.

A normally closed temperature switch is connected across TB1-10 and TB1-11. This switch is connected in series with the pressure switch described above.

# **AUTOMATIC VOLTAGE COMPENSATION (AVC)**

## **WHAT IT IS WHAT IT DOES HOW IT DOES IT**

The welding current produced by the secondary winding of the welding transformer is directly proportional to the power line input AC voltage.

With all other conditions remaining the same, if the power input voltage dropped 10%, the welding current will drop by 10%.

The current amplitude is typically selected by changing the degree firing angle of the SCRs used to switch portion of the power line to the welding transformer.

The 108 controller stores in its memory a reference nominal line voltage, set in the "CALIBRATION MODE".

Any deviation from that nominal voltage will cause the 108 controller to automatically change the preset % heat up or down. The end result will be a secondary current which will remain the same value with power line voltage fluctuations.

The 108 controller has two inherent limitations, beyond which it cannot provide compensation for line voltage variations.

1. Voltage drop in excess of 20% below nominal.  
If this happens, the controller will halt with an error message in the brain panel display window. The error message is a flashing "03" in the display window.
2. If % heat is set near maximum and the line voltage has dropped beyond correction limit.

The AVC feature may be turned on or off by the minidip switch SW1-3 located on the peripheral board. (Before switching SW1-3 power must be turned off)

The 108 controller reads the input voltage via transformer T2. (See DRW. 155-017D REV. A)

The input voltage is connected to TB4. The transformer T2 secondary voltage is a low voltage, not to exceed 12VAC. This output is passed through via SW1-3 switch to potentiometer R16. This is the potentiometer which sets the nominal input line voltage in the "CALIBRATION MODE". The preset reference voltage may also be read with a DC voltmeter at test point TP1-9 and TP1-6.

## **TRANSFORMER TAP SWITCH CHECKING**

Most welding transformers are built with two to eight primary tap switches. When constant profile current is used it is important that jobs are repeated with the same weld schedules and also at the same tap switch settings. To insure the integrity of the tap switch setting the 108 controller reads and stores the tap switch setting by turning on the welding transformer for 1 cycle prior to "SQUEEZE TIME". For cascading transformers it will read sequentially up to 6 transformer tap switch positions via relays RL7 through RL12. (See DRW. 155-017D-01 REV. A)

The relays switch the transformer secondary outputs to isolation transformer T1. With the transformer tap switch set to the highest tap position and in the "CALIBRATION MODE" potentiometer R12 on the peripheral board is used to set the maximum tap switch voltage. (See details in the calibration instructions) If tap switch is set lower than the stored preset position the controller will halt with error message "01" in the display window. Push the E. stop button momentarily to reset controller. If the tap switch is set higher than the stored preset position the controller will halt with error message "02" in the display window. Push the E. stop button momentarily to reset controller.

In the cascade mode with multiple transformers, calibration is done only for transformer #1. It is assumed that all transformers are equal.

Tap switch check is factory set to zero and disabled. Its use is recommended only in applications where parts to be welded are guaranteed not to touch both electrodes prior to foot switch closure.

## **CONSTANT PROFILE CURRENT (CPC)**

### **WHAT IT IS**

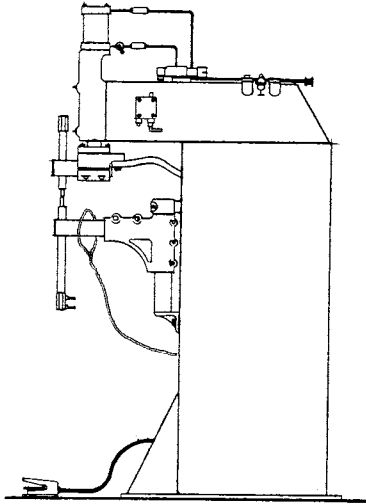
### **WHAT IT DOES**

### **HOW IT DOES IT**

Constant current by definition is a flat line in time, whereby the RMS current cycle by cycle is the same value throughout the entire weld.

Due to the instantaneous variation in line voltage and material resistance, this is practically not possible. In certain type of welds not desirable. What is required however, is a current profile established in a qualified weld, repeatable in all subsequent welds of the same material.

The Model 108B controller takes an imprint of the RMS current for each impulse of heat time and stores these values as a current profile of that weld. The first 1/2 cycle is limited to no more than 87 degrees. Below 50% the impulse length has to be a 4 cycle minimum for the constant profile current to be functional. Above 50% the impulse length has to be a 5 cycle minimum for the constant profile current to be functional. The 108B controller reads the welder secondary current by using an air core transformer.



The current transformer is a loop, 5" or 10" in diameter, which is looped around the secondary arm of the welding transformer.

Position of the current transformer at the rear of the welding arm as shown in the diagram. Use electrical tape to secure the open end of the current transformer inside the plastic retainer. Also use tape to secure the current transformer to the welder arm. The loose two wire cable may be cut to any length and connected to TB7-13, 14 on the peripheral board.

The current transformer is also calibrated in the "CALIBRATION MODE". Calibration is done via potentiometers R5 and R19. (See details in the calibration instructions)

To capture a weld profile current, push the keys \*3 on the front panel.

The LED \*3 will flash. At this point in time the controller will exit the AVC mode and is ready to capture a profile current. Push the foot switch and make a weld. The \*3 LED will stop flashing and turn on solid. The 108 controller has stored with that weld schedule the tap switch position and the RMS current profile. If the weld is not satisfactory, push the keys \*3 to turn off constant profile current, then push \*3 keys again. The LED \*3 will flash, ready to capture another sample.

When using longitudinal welders with throat depths of 13" to 60" and welding magnetically sensitive materials, use the material all the way in the machine to make the initial acceptance weld sample.

The conduction angle increases as the steel is progressively being fed into the throat of the weld. This way an acceptable weld is being assured under worst case condition. The display on the brain panel will show, during each weld, the % deviation error from the reference captured RMS current.

For controllers with an RS232 port, the weld schedule is transferred to a PC laptop with the RMS reference profile current stored in memory.

## **CPC CAPTURE IN SEAM AND ROLL SPOT**

Due to changes in material resistance from the first spot to all subsequent overlap spot welds in seam and roll spot, the 108B controller will sample and store two weld schedule currents:

1. The first spot after foot switch closure.
2. The second spot after foot switch closure.

The controller will check and compare deviation error from the stored current values for the first spot, then compare the second stored value to the balance of all welds.

# WELD CURRENT CHECKER

The 108 controller has two modes of weld current checking.

1. Alert Only Mode
2. Halt Mode

Push keys \*, \*, 6 in a weld schedule with constant profile current set to ON.

The \*\*6 LED will flash.

Key in a number from 1%-20% deviation error acceptance. 00 indicates this function is turned off.

Push \* key to exit.

% deviation error may be observed in seam on the display panel, as it occurs.

Push keys \*, \*, 7 in the same weld schedule.

The \*\*7 LED will flash.

Key in a number from 1%-20% deviation error acceptance. 00 indicates this function is turned off.

Push \* key to exit.

Whenever the keyed in deviation error is exceeded, the controller will halt. The display will show the % deviation error.

Push the (\*) star button to reset controller.

**Note:** FS1 and FS2 must be turned off.

A fault relay, normally open contact output is available to be used as fault indication. The relay contact is good for up to 24 volts / 200 milliamperes, AC or DC.

In the ALERT mode, the contact will close for one second.

In the HALT mode the contact will stay closed, until reset by pressing the front panel (\*) button, or the SOFT EMERGENCY STOP switch normally closed contact which may be externally connected to the controller.

The relay contact is available at the peripheral board connector TB7-15 and TB7-16. They are labeled FLT-1 and FLT-2.

SOFT EMERGENCY STOP connection is available at the connector TB1-10 and TB1-11. See schematic wiring diagram on page 5.

## WELD CURRENT CHECKING WITH CPC OFF

Weld current checking may be done on weld schedules with constant profile current off.

Push keys \*, \*, 6.

The LED \*\*6 will flash.

Key in the number 88.

Push \* key

Make a weld.

The display will change to 00.

The captured weld current is stored in memory.

Key in an acceptance % deviation error.

Push \* key to exit.

Push \*\*7 to key in HALT % deviation error. The controller will halt when that value is exceeded and the % error will be displayed.

Push the (\*) star button to reset controller.

Note: FS1 and FS2 must be turned off.

Taking a weld sample with weld switch "OFF" will cancel weld checking for that schedule.

# AVC AND CPC CALIBRATION INSTRUCTIONS

## PRE-CALIBRATION SETUP

1. Set electrodes tips apart ready to fire tip to tip.
2. Set transformer tap switch to highest position.
3. Set minidip switch S5-1 and S5-4 on the 108 brain panel to ON position.
4. Set "REPEAT" switch on the front panel to ON.
5. Push the hard E. STOP switch momentarily to ON.
6. LEDs \*1, \*2 and \*3 will start flashing indicating calibration mode.
7. Make sure that minidip switch SW1-3 located on the peripheral board is in the ON position.
8. If system is using electronic air pressure regulator, set to 50 PSI prior to starting calibration.

## AVC CALIBRATION

1. Push key 1 on the keyboard.
2. LED \*4 will turn on.
3. Close foot switch once.  
The controller will take 1 cycle sample of the line voltage and display a number from 00 to 50 on the front panel display.
4. If number is above 40, turn potentiometer R16 on the peripheral board counter clockwise. Push foot switch and read display value.
5. Repeat step 4 until the value read is 40.  
40 equals nominal line voltage.  
44 equals 10% above nominal.  
36 equals 10% below nominal.
6. AVC calibration is completed.

**NOTE:** In the BUTT WELD mode, the clamp closes, and with no material between the copper jaws no current will flow. This is fine for AVC calibration.

## TAP SWITCH CHECK CALIBRATION

1. While still in calibration mode, push key 2 on the keyboard.
2. The LED \*4 will turn off, and the LED5 will turn on.
3. Push foot switch once. With the welder electrodes in the open position, the 108 controller will fire 1 cycle of heat time. The display will show a number from 00 to 50.
4. Turn potentiometer R12 on the peripheral board and repeat pushing foot switch until the display reads the number 40.
5. The tap switch calibration is completed.
6. Display setting of less than 20 will cause the tap switch check feature to be not functional.
7. Set display to zero if function is not used.
8. Prior to exiting the calibration mode, push the (\*) button on the key board then power down. Failure to do that, Tap switch calibration will not be stored in computer memory.

## TAP SWITCH CHECK CALIBRATION

NOTE: Tap switch test is set to zero at the factory and bypassed by a jumper connected to the terminal strip on the peripheral board TB7-1 (XT1-1) and TB7-2 (XT1-2). Tap switch check is to be used only if it is guaranteed that the material to be welded will never touch both electrodes at the time the foot switch or palm buttons are being closed to initiate squeeze time.

## CURRENT TRANSFORMER CALIBRATION

1. For SEAM/SPOT Welder start at Step 3. For BUTT WELDER start at Step 2.
2. For BUTT WELDERS only it is important that a piece of cold roll steel rod of at least 1/8" dia. or equivalent to the largest diameter to be welded is laid flat over the jaws prior to the calibration initiation. The material will allow you to complete the circuit and the current to flow during calibration. You can then proceed to Step 3.
3. While still in the calibration mode, push key 3 on the keyboard.
4. The LED \*5 will turn off and the LED \*6 will turn on.
5. The welder electrodes will close tip to tip.
6. Depress the foot switch once. The controller will fire 1 cycle of heat at 80%. The display will read a number from 00 to 50.
7. If the number is above 40 turn potentiometer R19 on the peripheral board counter clockwise. Repeat step 4 and 5 until the number is 40.
8. If the initial reading is below 40, turn potentiometer R5 clockwise. Repeat pushing the foot switch until the number 40 is reached.
9. Calibration is completed.
10. Turn repeat switch to **OFF**, and S5-1 and S5-4 to appropriate position prior to calibration.
11. Turn power off momentarily. LEDs \*1, \*2 and \*3 will stop flashing. The controller is restored to normal operating conditions.

## PERIPHERAL DIAGNOSTICS - BRAIN PANEL

On the brain panel there is a row of red lamps L.E.D. in a rectangular package called LM1. When either one is lit, it has the following indication:

- 1.) PS/TS                      Pressure switch and thermal switch are closed.
- 2.) FS1                        Foot switch first stage switch is closed.
- 3.) FS2                        Foot switch second stage switch is closed.
- 4.) Clamp/Forge Computer is turning on the clamp relay.
- 5.) SQ1 SOL.                 NOT USED
- 6.) SQ2 SOL.                 NOT USED
- 7.) SQ3 SOL.                 NOT USED
- 8.) MOTOR                    NOT USED
- 9.) SCAN OUT                Computer is turning on the INTERLOCK output.
- 10.) OFF OUT                 Computer is turning on the OFF TIME output.
- 11.) LED 17                 Computer is receiving signal from Interlock scanner to start welding.
- 12.) LED 18                 Computer is generating pulses to energize the firing module.



## PERIPHERAL DIAGNOSTICS

On the extended function peripheral board there is a row of 3 LEDs labeled LED 1, 2 and 3 followed by 2 rectangular packages of 10 LEDs per package, labeled LM1 and LM2. See Drawing 155-017D-01 REV. A, SHEET 4 OF 4

- 1.) LED labeled "FLT"  
It will turn on for 1 second when the weld checker in "ALERT" mode indicates a fault.  
It will turn on and stay on when the weld checker in "HALT" mode indicates a fault. It will turn off when the fault condition is reset.
- 2.) LED 2 "XT1" Indicates HEAT TIME for transformer 1
- 3.) LED 1 "XT2" Indicates HEAT TIME for transformer 2
- 4.) Module LM1-1 "XT3" Indicates HEAT TIME for transformer 3
- 5.) Module LM1-2 "XT4" Indicates HEAT TIME for transformer 4
- 6.) Module LM1-3 "XT5" Indicates HEAT TIME for transformer 5
- 7.) Module LM1-4 "XT6" Indicates HEAT TIME for transformer 6
- 8.) Module LM1-5 "VL1" Indicates ON TIME for valve 1
- 9.) Module LM1-6 "VL2" Indicates ON TIME for valve 2
- 10.) Module LM1-7 "VL3" Indicates ON TIME for valve 3
- 11.) Module LM1-8 "VL4" Indicates ON TIME for valve 4
- 12.) Module LM1-9 "VL5" Indicates ON TIME for valve 5
- 13.) Module LM1-10 "VL6" Indicates ON TIME for valve 6
- 14.) Module LM2-1 "VL7" Indicates ON TIME for valve 7
- 15.) Module LM2-2 "VL8" Indicates ON TIME for valve 8
- 16.) Module LM2-3 "LS1" Indicates ON TIME limit switch 1
- 17.) Module LM2-4 "LS2" Indicates ON TIME limit switch 2
- 18.) Module LM2-5 "LS3" Indicates ON TIME limit switch 3
- 19.) Module LM2-6 "LS4" Indicates ON TIME limit switch 4
- 20.) Module LM2-7 "LS5" Indicates ON TIME limit switch 5
- 21.) Module LM2-8 "LS6" Indicates ON TIME limit switch 6
- 22.) Module LM2-9 "LS7" Indicates ON TIME limit switch 7
- 23.) Module LM2-10 "LS8" Indicates ON TIME limit switch 8

## OPERATING MODE SETTING

On the brain panel is a 4 minidip switch module labeled S5 for setting the operating mode.

<u>S5-1</u>		<u>S5-2</u>		<u>Operating Mode</u>
OFF	:	OFF	:	SPOT WELD
OFF	:	ON	:	SEAM/ROLL SPOT
ON	:	OFF	:	CASCADE

S5-3	ON	Enables Interlock
S5-4	ON	Enables BUTT-WELD MODE
SW7-1	ON	Enables ANTI-TIE DOWN push momentary on
SW7-2	ON	Enables ANTI-TIE DOWN push and maintain
SW7-3	ON	Enables MANUAL VALVE SELECT program

87 DEGREE FIRING LIMIT is active only for the first heat cycle after SQUEEZE TIME.

## UNDER VOLTAGE LINE MONITOR

Comparator Q1 will automatically halt the controller, if the line voltage dips below a safe operating limit. Typically there is a 20% line voltage drop margin with no effect on the power line monitor.

## POWER UP PROTECTION

The controller's computer monitors the foot switch condition on power up, and if it finds it to be closed, it will inhibit operation. It will also flag the operator by inserting the number 88 in the display window. Simply release the foot switch and proceed welding.

# **ELECTRONIC PRESSURE REGULATION AND MOTOR SPEED CONTROL**

THE MODEL 108B CONTROLLER HAS THE CAPABILITY TO STORE IN ITS MEMORY, WITH EACH WELD SCHEDULE, A TWO DIGIT NUMBER FOR WELD PRESSURE, A TWO DIGIT NUMBER FOR FORGE PRESSURE AND A TWO DIGIT NUMBER FOR MOTOR SPEED CONTROL.

THESE VALUES ARE KEYED IN VIA THE 108B FRONT PANEL, BY USING THE KEYS (\*4) FOR WELD PRESSURE, (\*5) FOR FORGE PRESSURE AND (\*7) FOR MOTOR SPEED CONTROL. THE 108B MICRO CONTROLLER SENDS THAT DATA TO THE 108B EXTENDED FUNCTION BOARD, WHERE THE D/A CONVERTER U4 GENERATES AN ANALOG SIGNAL FROM 0V TO 10VDC. U4 REQUIRES NO CALIBRATION AND THE 0V TO 10V SIGNAL IS LINEAR AND DIRECTLY PROPORTIONAL TO THE PROGRAMMED VALUES OF 00 TO 99 PSIG, OR MOTOR SPEED. THAT SIGNAL IS BUFFERED THROUGH THE UNITY GAIN AMPLIFIERS U5A, U5B AND U5C.

THE DC OUTPUT MAY BE VERIFIED WITH A DC VOLTMETER AT THE FOLLOWING TEST POINTS ON THE AUXILIARY BOARD:

1. TP1.1 FOR WELD PRESSURE OR CONNECTOR TB6-1
2. TP1.2 FOR FORGE PRESSURE OR CONNECTOR TB6-3
3. TP1.3 FOR MOTOR SPEED OR CONNECTOR TB6-5
4. TP1.6 IS SIGNAL COMMON OR CONNECTOR TB6-2, 4, 6  
SEE SCHEMATIC NO: 155-017D-01 REV. A, SHEET 1 OF 4

AN ELECTRONIC PRESSURE TRANSDUCER MODEL T6000 AND PRE-CALIBRATED FOR 0 TO 100 PSIG IS MOUNTED IN THE REAR OF THE STANDARD 108B CABINET. ITS OUTPUT FLOW CAPACITY IS 10CFM AT 100 PSI. IT IS RECOMMENDED THAT IT BE COUPLED TO A 1 TO 1 VOLUME BOOSTER WITH A 40 CFM CAPACITY MODEL 20 OR ANOTHER WITH 150 CFM CAPACITY. AN AIR FILTER SHOULD BE USED AT THE INPUT TO PREVENT DUST AND OIL FROM PLUGGING UP THE PILOT REGULATOR.

SEE INSTALLATION DRAWING 155-017B-01 OR 155-017C-01

TWO REGULATORS ARE MOUNTED IN THE REAR OF THE STANDARD 108 CABINET, IF WELD AND FORGE PRESSURE ARE REQUIRED.

THE MODEL T6000 REGULATOR HAS AN OFFSET AND SPAN ADJUSTMENT FOR CALIBRATION. THESE ARE FACTORY PRESET AND NEED NOT BE READJUSTED UNLESS A DEFECTIVE PART IS REPLACED.

THE MOTOR SPEED CONTROL OUTPUT IS CONNECTED TO AN OPTICALLY ISOLATED DC MOTOR SPEED CONTROLLER WITH AN ARMATURE OUTPUT OF 0 TO 90 VDC FOR 120VAC INPUT, OR 0 TO 180 VDC FOR 220 VAC INPUT. DC MOTORS FROM FRACTIONAL HP TO 1.5HP MAY BE USED.

## HI - LOW LIMIT WELD CYLINDER PRESSURE SENSOR

THE MODEL 108B CONTROLLER HAS THE CAPABILITY TO STORE IN ITS MEMORY, WITH EACH WELD SCHEDULE, A TWO DIGIT NUMBER FOR HI - LOW LIMIT PRESSURE. THAT VALUE HAS A WINDOW OF ACCEPTANCE OF + OR - 1 PSI. THE PRESSURE TRANSDUCER MEASURING THE CYLINDER PRESSURE IS DIFFERENTIAL. PORT B IS USED TO MEASURE THE UPPER SIDE OF THE CYLINDER PRESSURE. PORT A IS USED WHEN THE BOTTOM SIDE OF THE CYLINDER HAS AIR PROVIDING A BUCKING PRESSURE FROM A SECONDARY FORGE AIR PRESSURE REGULATOR. IN THAT CASE, THE PRESSURE VALUE STORED IN THE 108B MEMORY, IS THE DIFFERENTIAL PRESSURE BETWEEN THE TWO SIDES OF THE CYLINDER. THE VALUE IS KEYED IN VIA THE 108B FRONT PANEL, BY USING THE KEYS (\*6) FOR HI - LOW LIMIT PRESSURE. THE LED LABELED \*6 WILL FLASH DURING DATA ENTRY OR DATA VIEWING.

AT THE END OF SQUEEZE TIME, THE 108B CONTROLLER WILL CHECK THE SENSOR PRESSURE VALUE FOR TWO CONTINUOUS CYCLES OF TIME. IF THE VALUE READ IS IN THE SPECIFIED RANGE  $\pm 1$ PSIG, THE CONTROLLER WILL SEQUENCE TO HEAT TIME. IF THE PRESSURE READ IS OUT OF THE SPECIFIED BOUNDARY, THE LED \*6 WILL FLASH, THE DISPLAY WILL SHOW THE READ PRESSURE VALUE AND STAY IN SQUEEZE TIME UNTIL THE CORRECT PRESSURE IS REACHED. TO EXIT WELD SCHEDULE IF PRESSURE IS OTHER THAN WHAT IS SET IN THE CONTROLLER MEMORY, RELEASE FS1 AND FS2 THEN PUSH (\*) KEY. KEYING IN THE 108B CONTROLLER THE VALUE "00" WILL CAUSE THE CONTROLLER TO BYPASS THE PRESSURE TEST. THE ANALOG VALUE OF READ PRESSURE BY THE PRESSURE TRANSDUCER MAY BE READ WITH A METER AT THE TEST POINTS TP1.4 AND TP1.6 AT THE TOP SIDE OF THE EXTENDED FUNCTION PERIPHERAL BOARD. SEE DETAIL ON DRAWING 155-017D-01 REV. A. SENSOR PLUMBING INSTALLATION ON DRAWINGS 155-017B-01 REV. A AND 155-017C-01 REV. A. AN AIR FILTER MAY BE REQUIRED IF THERE IS OIL IN THE LINE.

# PC TO MODEL 108B RS232 COMMUNICATION

The Model 108B weld controllers with the EXTENDED FUNCTION PERIPHERAL BOARD, have an RS232 port available via a DB9 connector. The connector is mounted at the rear of the cabinet.

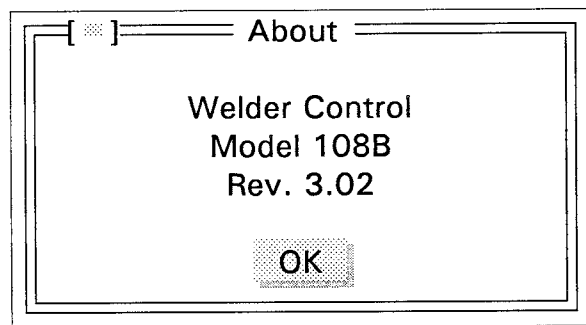
The purpose of the RS232 port is to facilitate transfer of WELD SCHEDULES from the weld controller to a PC for storage, editing and printing the WELD SCHEDULES on a laser printer. All 300 WELD SCHEDULES are stored under a file name with an extension "WLD". The WELD SCHEDULES may be transferred all at once or one at a time. The transmission is done at 9600 baud, 8 bits, no parity one stop bit, and no flow control.

1. First create a directory in DOS on the "C" drive called 108B PC.
2. Copy the 108B PC program provided on a floppy disc to that directory.
3. Remove floppy disc and store safely.
4. Your PC will typically have two COMM ports, labeled COMM 1 and COMM 2; Your PC may also have a mouse connected to one of the COMM ports.
5. From your SUB DIRECTORY 108B PC in "C" drive type:
  - A. 108B PC 2 ENTER key if you are using COMM 2 port.
  - B. 108B PC 1 ENTER key if you are using COMM 1 port.
6. The PC screen will show the following:

---

File

Comm



F1 Help

Alt-X Exit

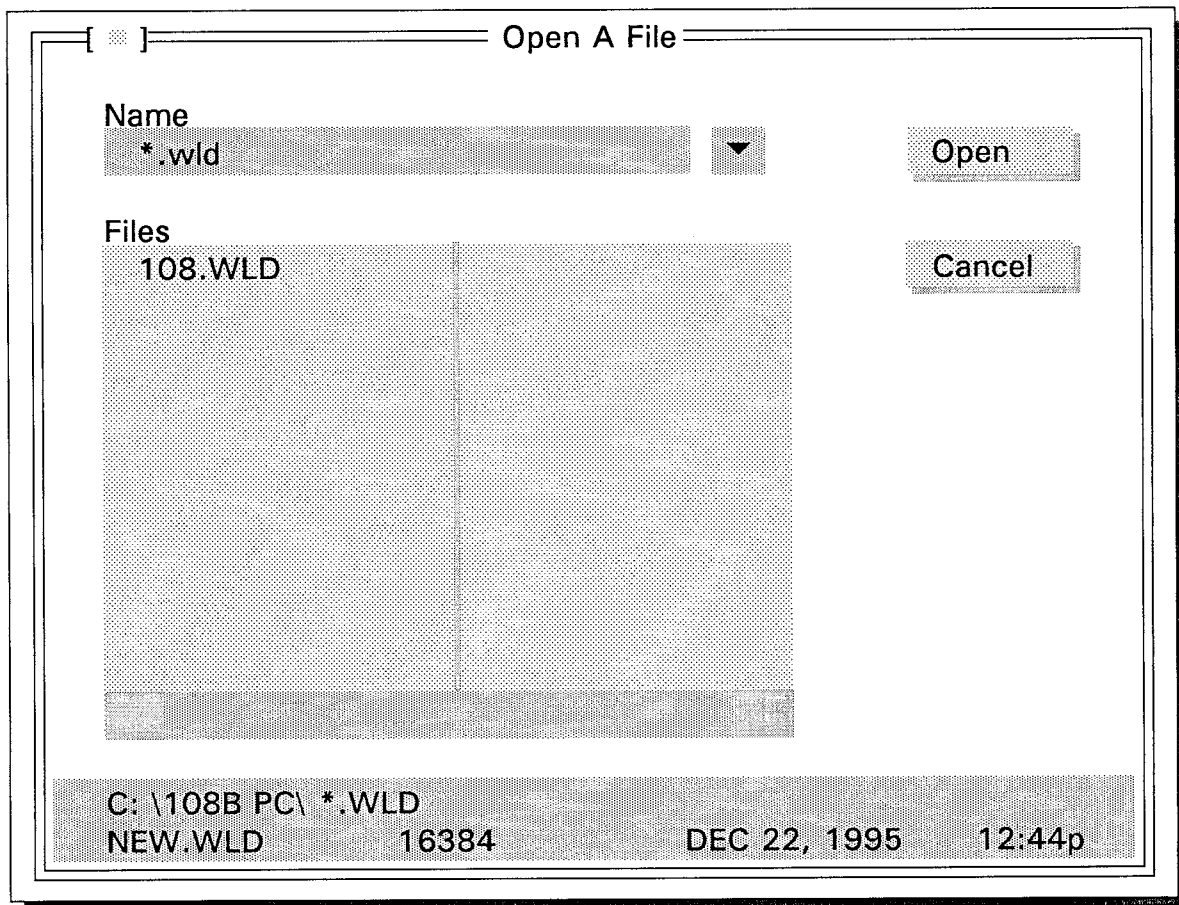
---

Push the ENTER key on your PC.  
The PC screen will go to the file select menu.

## FILE SELECTION MENU

---

File            Comm



F1    Help            Alt-X Exit

---

The screen is in a WINDOWS type format and a mouse may be used in the NAME designated space to key in up to a 25 letter file name.  
The mouse may also be used to click in a preexisting file name from the list of file names displayed in the "Files" column on the screen.  
If a mouse driver is not available, the Up/ Down arrow keys will allow selection of a file in the File listing column. After a file has been selected, push the Alt-O key or click on "Open" on the screen to open that file. The "ENTER" key will also open the file after a file selection.

## FILE MENU SCREEN

File                      Comm

NEW.WLD

	W. S. #	0		Enter
Squeeze Delay	0		HiLo PSI	0
Squeeze Time	0		Motor Speed	0
Impulses	0		Transformer	0
Cool Time	0		Forge Delay	0
Heat Time	0			
Heat %	0		Manual	
Quench Time	0		Conditional	1.00
Temper Time	0		Instructions	
Temper %	0			
Hold Time	0		Current Factor	1.00
Off Time	0		(*) None	
Upslope Steps	0		( ) Chained	
Upslope % Heat	0.0		( ) Successive	
Weld PSI	0		( ) C P C	
Forge PSI	0			

Next
Prev
Erase
Select
Ext

F1    Help                      Alt-X Exit

All weld functions available in the 108B controls will be displayed on the screen, starting with weld schedule 00.

Weld Schedules Group A 00 - 99 will be seen as W.S. 00 - 99

Weld Schedules Group B 00 - 99 will be seen as W.S. 100 - 199

Weld Schedules Group C 00 - 99 will be seen as W.S. 200 - 299

To scroll through the weld schedules in the file:

A: Click on Next with mouse or use Alt-N (forward scroll).

B: Click on Prev with the mouse or use Alt-P (backwards scroll).

To EDIT weld schedule data:

A: Click on the appropriate data field to be edited, then change the data using the keys 0 through 9 on the PC.

B: Use the Tab key to scroll forward through the data fields, then change the data followed by the Enter key.

C: Use the Shift-Tab key to scroll backward through the data fields.

Note: If ENTER field is not clicked on, or the ENTER key is not pushed prior to exit to a new weld schedule, the edited screen data will not be stored in the PC memory and will be lost.

D: The fields (\*) None ( )Chained ( )Successive are mutually exclusive and the \* is moved from one to another via the Up / Down arrow keys, once the field is accessed via the Tab key or the mouse.

E: The fields (\*) CPC (Constant Profile Current) will have a \* when the constant current is enabled in the weld schedule. Constant current may not be initiated in the PC edit program. It must be set on the weld controller when a weld sample is made.

If data entered in is not within the acceptance limits of the 108B weld controller, when saved it will be set to zero, or the extra digits in the data field are erased.

Alt-E or clicking the mouse on the Erase field, will set all the data to zero. The erased data will not be saved unless followed by the ENTER key.

Alt-S or clicking the mouse on the Select field, will set create a temporary field in the center of the screen. Key in a value from 0 to 299, then push the ENTER key. The Weld Schedule screen will show the data of the newly selected weld schedule.

File

Comm

-----

NEW.WLD	
Ref Primary	0
Ref Secondary	0
Soft Error Band	0
Hard Error Band	0

RMS KA by Impulse	
1	0.000
2	0.000
3	0.000
4	0.000
5	0.000
6	0.000
7	0.000
8	0.000
9	0.000
10	0.000

Ok                      Cancel

F1 Help                      Alt-X Exit

-----

Constant current values may be seen on the laptop CRT menu, once a calibrated "Constant Multiplier" listed as current factor is keyed in. In the weld schedule menu is the "Current Factor" column. The listed default value is 1.0. This number is multiplied by the stored value in the controller and displayed in the next screen showing the RMS KA (kiloamps) value per impulse. To get to this screen, push ALT-T in the previous menu. The numbers displayed under the RMS KA by impulse column are the sampled constant current values for the first 10 impulses with a default current factor of 1.0.



They do not represent the true RMS secondary current. To obtain true RMS secondary current use a calibrated secondary current meter at the same time a current sample is taken. Transfer that weld schedule to the laptop. Divide the RMS KA read on the meter by the value listed on the laptop screen for the first impulse. Key in the result as the new current factor. The new RMS value listed on the screen shall equal the one on the meter. Key in that current factor in all weld schedules obtained on the welding control.

REF primary and REF secondary listed on the screen are tap switch test conditions.

Soft error band is the \*\*6 value.

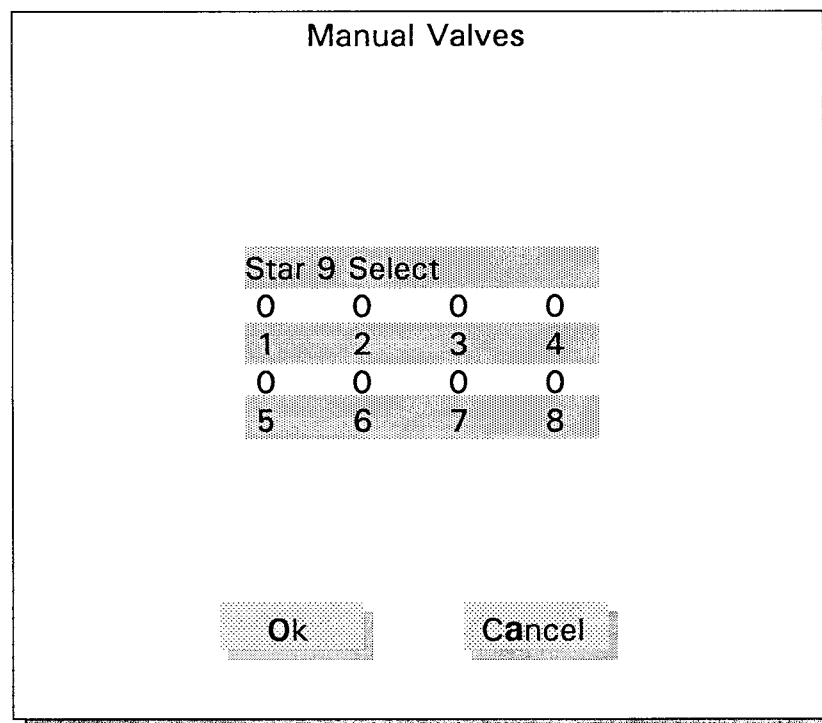
Hard error band is the \*\*7 value.

Conditional Instructions are the \*\*5 values.

## MANUAL VALVE SELECT

From the file menu screen click on MANUAL.

- \*9 (STAR 9 SELECT) 108B controls will display valve designated operating code function from 0 to 5 for all units with 8 valves and manual valve control.



## COPY WELD DATA FROM ONE WELD SCHEDULE TO ANOTHER

1. Select a weld schedule with weld data to be copied from.  
The field W.S.# -- will show the weld schedule selected.
2. With the screen cursor adjacent to W.S.# -- use the BACK SPACE key to clear the existing weld schedule number. Key in a new weld schedule number. Push the ENTER key. Now the whole weld schedule data field has been saved with the new weld schedule number in the memory location reserved for the newly selected weld schedule.

## FILE COMMANDS

From the WELD SCHEDULE menu click on the File field or push Alt-F. A menu will appear in the upper left hand corner.

-----  
File            Comm

Open	F3
Close	F4
Save	F2
Print	F9
-----	
Exit	Alt-X

Use the Up / Down arrow keys to scroll through the five fields, or use the designated F keys or the mouse.

The Open command will prompt the file selection menu.

The Close command will close the file .

The Save command will save the file to disk.

The Print command will superimpose on the screen the following menu:

-----  
File            Comm

[ ] Select Weld Schedule  
W. S.      to        
  
Material #1 Type  
Material #1 Thickness  
Material #2 Type  
Material #2 Thickness  
Upper Tip  
Lower Tip  
  
Ok      Cancel

F1      Help            Alt-X Exit  
-----

Use the Tab key to scroll through the fields where pertinent data is to be entered. Key in only one weld schedule number to print it with all material and electrode type informations.

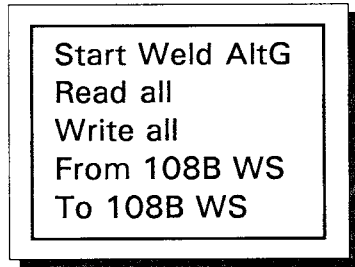
Key in the starting and ending weld schedule numbers for the group of weld schedules used in the chained or successive group.

## UPLOADING AND DOWNLOADING WELD SCHEDULES

Connect an RS232 cable from the PC to the DB9 connector located in the rear of the 108 controller cabinet. Only those welding controllers ordered with the optional RS232 feature will have that connector. Set the 108 weld controller in the stand by mode. On the PC use the mouse to click on Comm or push Alt-C on the keyboard. In the Upper left corner of the screen the following field shall appear:

-----  
File

Comm



The Up / Down arrow keys will enable scrolling through this field.

"Read all" command will read all 300 weld schedules from the 108 weld controller to the existing file on the PC screen. If data is needed to be saved, click on File and open a file under a new name.

"Write all" command will write all 300 weld schedules from the existing file on the PC screen to the 108 weld controller.

If RS232 communication is not established between the PC and the 108 weld controller, an error message will appear on the screen.

"From 108B WS" command will read that particular weld schedule displayed on the 108B weld controller front panel in group A or B or C. The file name and weld schedule number should be selected prior to data transfer, if that data is to be stored in a specific location.

"To 108B WS" command will write that selected weld schedule to the corresponding location in the 108 weld controller memory.

## PLC CONTROL SIMULATION ON THE PC

Set the 108B weld controller in the PLC mode by turning the minidip switches SW7-1 and SW7-2 to the ON position.

If the PC has WINDOWS loaded on the C drive, click on TERMINAL.

It is located in the ACCESSORIES group within the WINDOWS program. Your screen will show the following:

Terminal

File                      Settings                      Phone                      Transfers                      Help

Click on settings, and from the menu listed, click again on Communications.

Set BAUD RATE to 9600

Set DATA BITS to 8

Set STOP BITS to 1

Set PARITY to None

Set FLOW CONTROL to None

Set CONNECTOR to Com1 or Com2 (the port connected to the 108).

Click on OK to validate the settings selection.

Turn FS1 on at the 108 controller input.

The character W followed by the number 0 through 299, followed by a period, will choose a weld schedule to be set in the 108 front panel display.

Example:    To select weld schedule 51, send "W51."

              To select weld schedule 5, send "W5."

To initiate a weld schedule, turn on FS1 on the 108 weld controller, then send the character "g". When the 108 weld controller has finished executing the weld and returned to stand by mode, it will transmit back to the PC the character ".". If transmission occurs without prior initiation of FS1 a "," character will be returned to the PC screen.

## **WELD SCHEDULE MEMORY RESET**

There are two ways to set all weld schedule data to zero.

1. If the RS232 option is installed, then from a PC laptop open up an unused file, and do an all weld schedule transfer to the 108 controller.
2. Power Down the 108 controller, set the brain panel switches S5-1; S5-3; S5-4; SW7-1 and SW7-2 on, repeat switch off, then power up the 108 controller. The front panel will display 88 in the window, then change to 00 when all memory has been reset to zero. Turn power off, set S5 and SW7 to the normally selected operating position, then power up the 108 controller. The controller is now ready to be programmed and used.

## **WELD SCHEDULE EDIT LOCKOUT KEY**

An optional weld edit lockout key is provided with the RS232 option. It allows selection of a weld schedule to be used, but it disables the operator ability to scroll through the weld schedule and edit its contents.

**MODEL 108B CONTROLLER**  
**APPLICATION HINTS AND SPECIAL**  
**APPLICATION DRAWINGS**

# MODEL 108B WELD CONTROL SET UP SHEET

GROUP A, B, C SELECTED BY FOOT SWITCH #1, #2, #3  
 USE TOGGLE SWITCH TO SET #A, #B, #C (PROGRAMS PER SWITCH SELECTION)

JOB # \_\_\_\_\_

DATE: \_\_\_\_\_

FUNCTION	GROUP A	GROUP B	GROUP C
WELD SCHEDULE NUMBER	_____	_____	_____
SQUEEZE DELAY	_____	_____	_____
SQUEEZE TIME	_____	_____	_____
IMPULSE	_____	_____	_____
COOL TIME	_____	_____	_____
HEAT TIME	_____	_____	_____
HEAT %	_____	_____	_____
QUENCH TIME	_____	_____	_____
TEMPER TIME	_____	_____	_____
TEMPER %	_____	_____	_____
HOLD TIME	_____	_____	_____
OFF TIME	_____	_____	_____
UP SLOPE STEPS	_____	_____	_____
% HEAT /STEP	_____	_____	_____
MATERIAL 1 TYPE	_____	_____	_____
MATERIAL THICKNESS	_____	_____	_____
MATERIAL 2 TYPE	_____	_____	_____
MATERIAL THICKNESS	_____	_____	_____
UPPER TIP/WHEEL MAT & SIZE	_____		
LOWER TIP/WHEEL MAT & SIZE	_____		
SEAM/ROLL MOTOR SPEED	_____		

<p><input type="checkbox"/> * BUTTON RESETS CONTROL TO STANDBY                  RED BUTTON STEPS THROUGH SEQUENCE                  GREEN BUTTON EDIT HEAT TIME                  RED BUTTON EDIT % HEAT</p>	<p>PUSH * TO RESET                  PUSH * TO RESET</p>	<p>(USE AFTER ENTRY)                  (LOWER RIGHT OF KEYPAD)                  (WINDOW DISPLAY WELD SCHEDULE)                  (LOWER CENTER)</p>
--	---	---

NOTE: RESET SELECTOR TOGGLE SWITCH TO POSITION #B FOR 3 FOOT SWITCH SELECT  
 (SET TOGGLE SWITCH TO POSITION #A TO LOCK ALL FOOT SWITCHES TO GROUP #A)  
 SET "00" IN ANY FUNCTION NOT REQUIRED)



# UPSLOPE CALCULATIONS & SETTINGS FOR MODEL 108B WELDING CONTROL

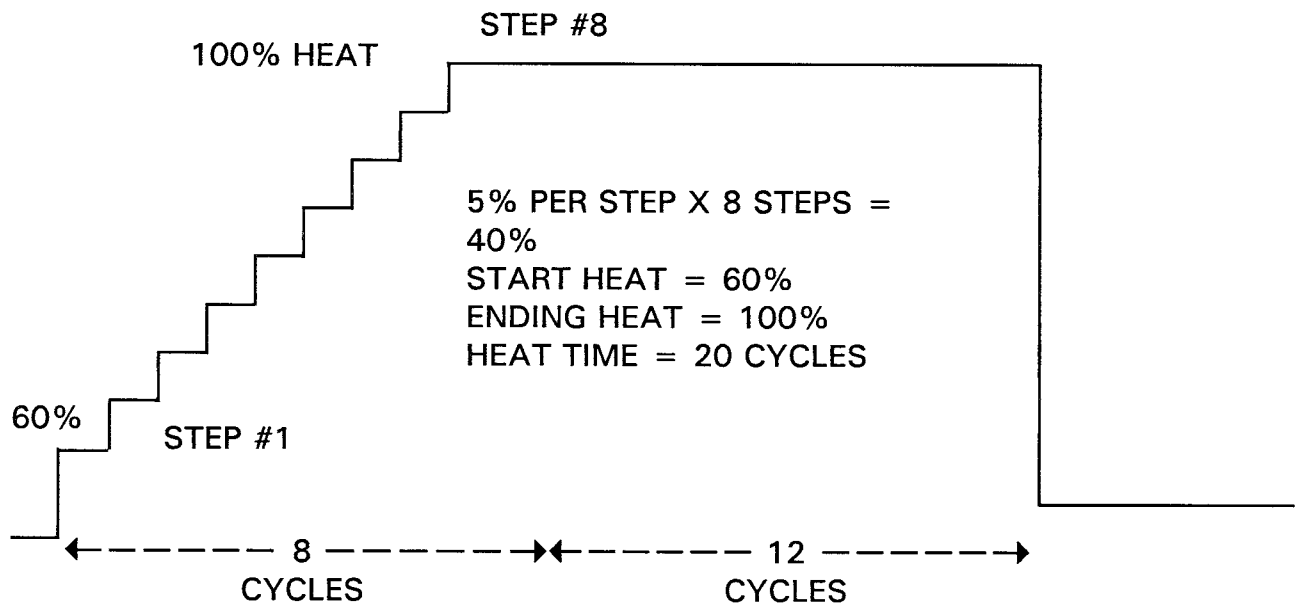
UPSLOPE CONTROLS THE RATE OF HEAT APPLIED TO THE WELDING ELECTRODES. THIS GRADUAL INCREASING CURRENT EXTENDS THE LIFE OF THE ELECTRODES AND REDUCES EXPULSION AND SPLATTER. UPSLOPE IS RECOMMENDED FOR PROJECTION WELDING AND WHEN WELDING COATED MATERIALS.

FORMULA:  $\frac{(\text{ENDING HEAT \%} - \text{STARTING HEAT})}{\text{UPSLOPE STEPS}} = \text{HEAT \% PER STEP}$

$\frac{(100\% - 60\%)}{8 \text{ STEPS}} = 5\% \text{ PER STEP}$

EXAMPLE NO. 1  
SINGLE IMPULSE SETTING

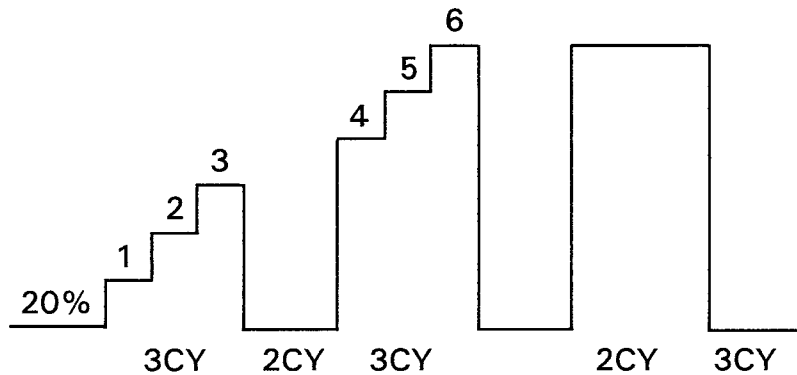
IMPULSE = 1  
HEAT TIME = 20  
HEAT % = 60  
UPSLOPE STEPS = 8  
% HEAT/STEPS = 5



## MULTIPLE PULSE SETTINGS (SEE PAGE 8-9-10 OF OPERATING BOOK)

FORMULA: 
$$\frac{(\text{END HEAT} - \text{START HEAT})}{\text{UPSLOPE STEPS}} = \frac{(50 - 20)}{6 \text{ STEPS}} = \text{HEAT \% PER STEP}$$

### EXAMPLE NO. 2 MULTI-PULSE SETTING



IMPULSE = 3  
HEAT TIME = 3  
COOL TIME = 2  
HEAT % = 20  
UPSLOPE STEPS = 6 "STEPS"  
% HEAT = 5 "PER STEP"

THE TOTAL NUMBER OF UPSLOPE STEPS SHALL ALWAYS BE EQUAL OR LESS THAN THE TOTAL NUMBER OF HEAT CYCLES X IMPULSES.

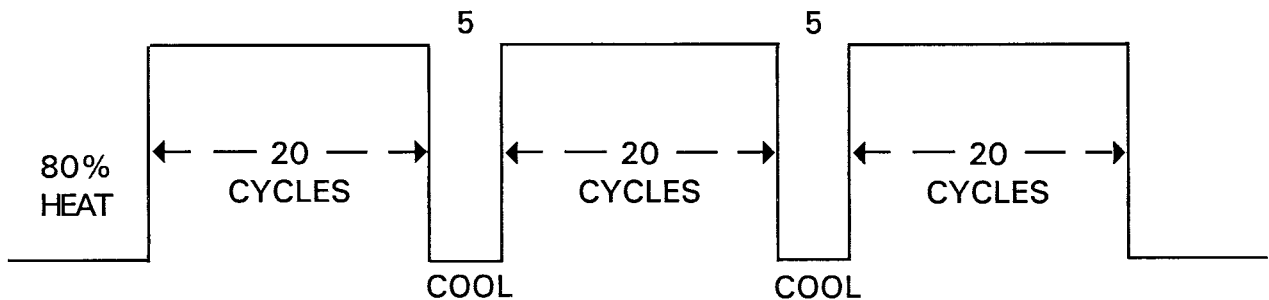
NOTE: FOR MINOR ADJUSTMENTS IN THE CURRENT CHANGE THE MAIN "HEAT %" SETTING.

# PULSATION & QUENCH - TEMPER OPTIONS FOR: MODEL 108B INTERLOCK SPOT WELD CONTROLS

---

**PULSATION FEATURE:** PROVIDES MULTIPLE IMPULSES OF WELD TIME WHICH GRADUALLY HEATS UP THICKER MATERIALS. THIS METHOD REDUCES TIP EXPULSION AND INCREASES ELECTRODE (TIP) LIFE. IT IS MANDATORY WHEN WELDING MATERIALS 1/8" OR THICKER TO USE PULSATION. USING THIS METHOD ON THIN MATERIALS RESULTS IN BETTER APPEARANCE WELDS AND REDUCES TIP WEAR.

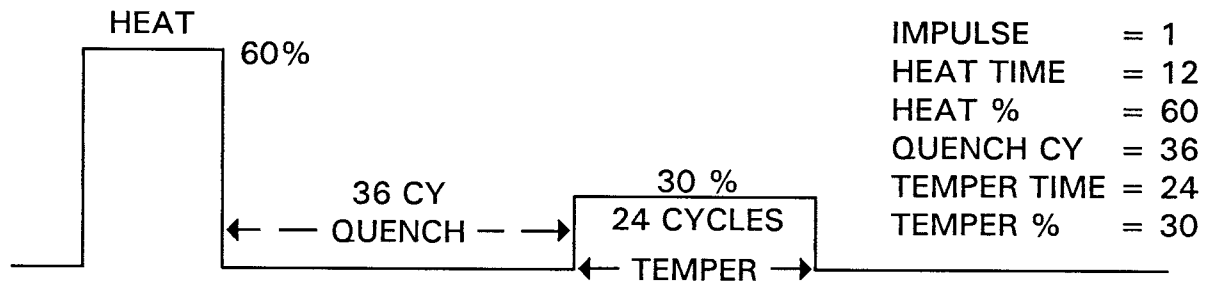
**EXAMPLE SETTINGS:** IMPULSE = 3  
HEAT TIME = 20  
**PULSATION WELD** HEAT % = 80  
COOL TIME = 5



# QUENCH AND TEMPER CONTROL SETTINGS

QUENCH & TEMPER: PROVIDES AN ADDITIONAL WELD CYCLE THAT IS OF LESSER MAGNITUDE THAT THE ORIGINAL, BUT APPLIED FOR A LONGER PERIOD OF TIME, WHICH ANNEALS THE WELD AREA. THIS METHOD IS RECOMMENDED WHEN HIGH CARBON STEELS ARE TO BE SPOT WELDED. (1020 CARBON ETC.)

EXAMPLE SETTINGS:



SETTING GUIDE: QUENCH TIME = 3 X HEAT TIME  
 TEMPER TIME = 2 X HEAT TIME  
 TEMPER % = 1/2 OF HEAT %

## Model 108RC Remote Control Box

The Model 108RC Remote Control Box is a microprocessor based controller. The controller reads the 00-99 weld schedules thumbwheel switches in Group A or B or C. It reads the position of the REPEAT and the WELD switches. It communicates with the 108B brain panel via the RS232 serial port. A 25' cable with male/female connector is used to transfer data between the two ports. The Remote/Local Edit Key Lock located on the 108B controller cabinet controls from where the selection is taken.

1. Key in Local position
  - A. The red LED on the Remote Control Box is OFF.
  - B. The Remote Control Box is not active and not usable.
  - C. Weld Schedule Selection, Repeat and Weld switches are set on the 108 weld controller brain panel.
2. Key in Remote position
  - A. The red LED on the Remote Control Box is ON, indicating that it is active and functional.
  - B. The "OFF" LED on the 108 Brain Panel is flashing ON/OFF indicating that data entry via the Brain Panel is locked out.
  - C. The two digit display on the Brain Panel will now display the weld schedule selection set on the Remote Control Box.
  - D. Group A-B-C switch located adjacent to the WS selector switch will function identical to the one located on the Brain Panel.
3. Upload/Download data to PC

Remove serial port cable from the Remote Control Box and reconnect it to the 9 pin connector COM PORT on your PC. Follow the instructions written in your manual regarding weld schedule data transfer to PC.

Two additional ON/OFF switches may be added for future custom applications. They are not part of the standard product.

# Fairchild Electronic Pressure Regulator and Volume Booster Calibration Procedure

**THE ELECTRONIC PRESSURE REGULATOR HAS A ZERO AND SPAN ADJUSTMENT FOR CALIBRATION. THESE ARE FACTORY PRESET AND NEED NOT BE READJUSTED UNLESS A DEFECTIVE PART IS REPLACED.**

## 1. System Description

The model 108 weld controller puts out a 0 volt to 10 volt DC signal to the Fairchild Pilot Pressure Regulator, which will put out a pilot pressure of 10 CFM from 0 PSIG to 100 PSIG. The regulator output connects to a 1 to 1 air volume booster, which boosts the air flow capacity to 40 CMF or 150 CFM depending on the model used. The volume booster output is connected to a pressure gage and to an air valve which controls the airflow direction.

## 2. WELD and FORGE Pressure Calibration

Connect a 4" diameter calibrated pressure gage with a range of 100 PSIG full scale to the volume booster output.

STEP 1: On the 108 controller push \*4 and set weld pressure to **20** PSI. The gage should read 20 PSI. If not, use a flat screw driver to adjust the screw marked "**ZERO**" located on the back side of the Pilot WELD Pressure Regulator until the pressure gage reads 20 PSI.

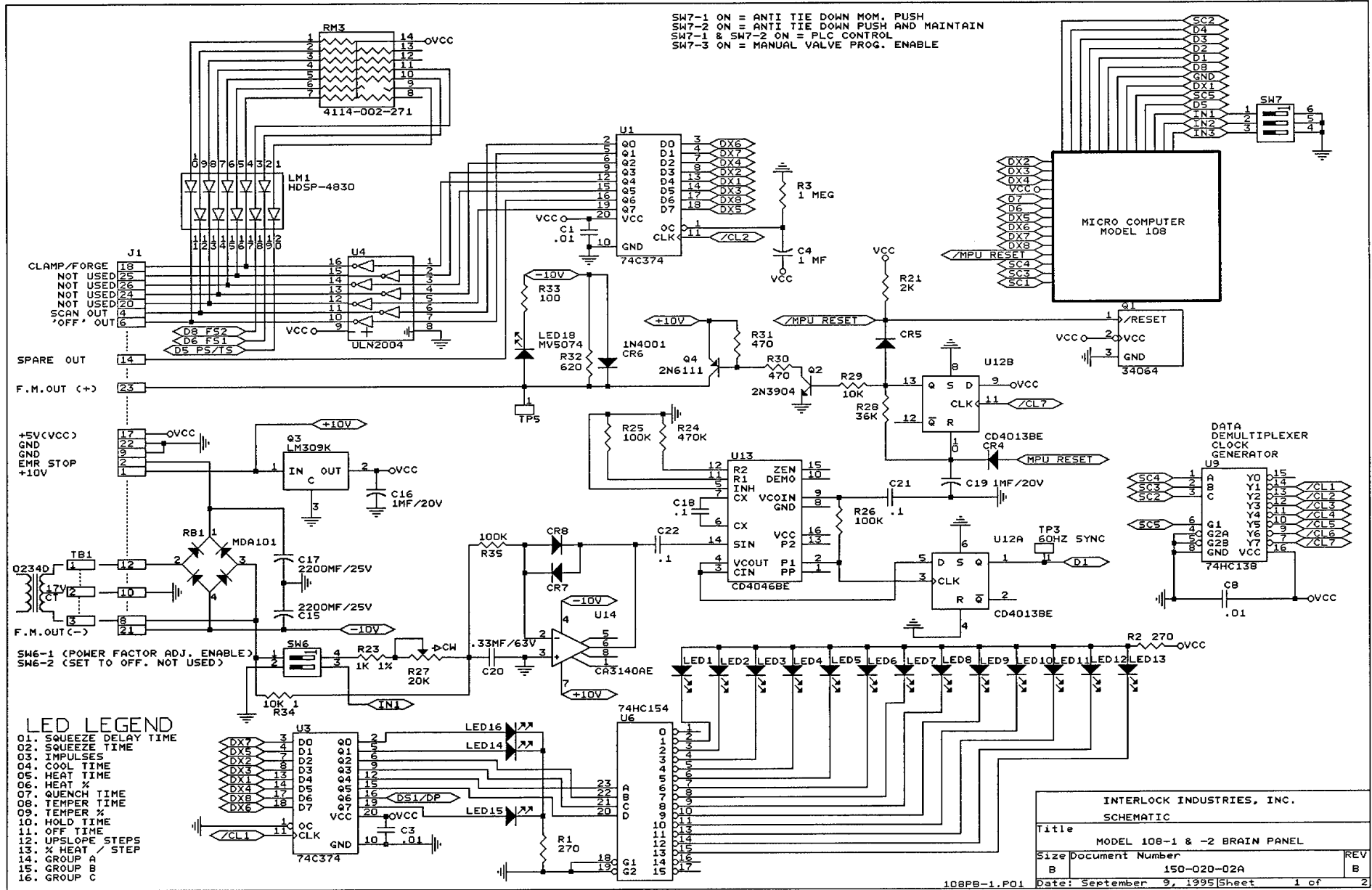
STEP 2: On the 108 controller push \*4 and set weld pressure to **80** PSI. The gage should read 80 PSI. If not, use a flat screw driver to adjust the screw marked "**SPAN**" located on the back side of the Pilot Pressure Regulator until the pressure gage reads 80 PSI.

Go back and re-calibrate ZERO at 20 PSI and SPAN at 80 PSI. Follow Step 1 and Step 2 until your gage reads the proper settings.

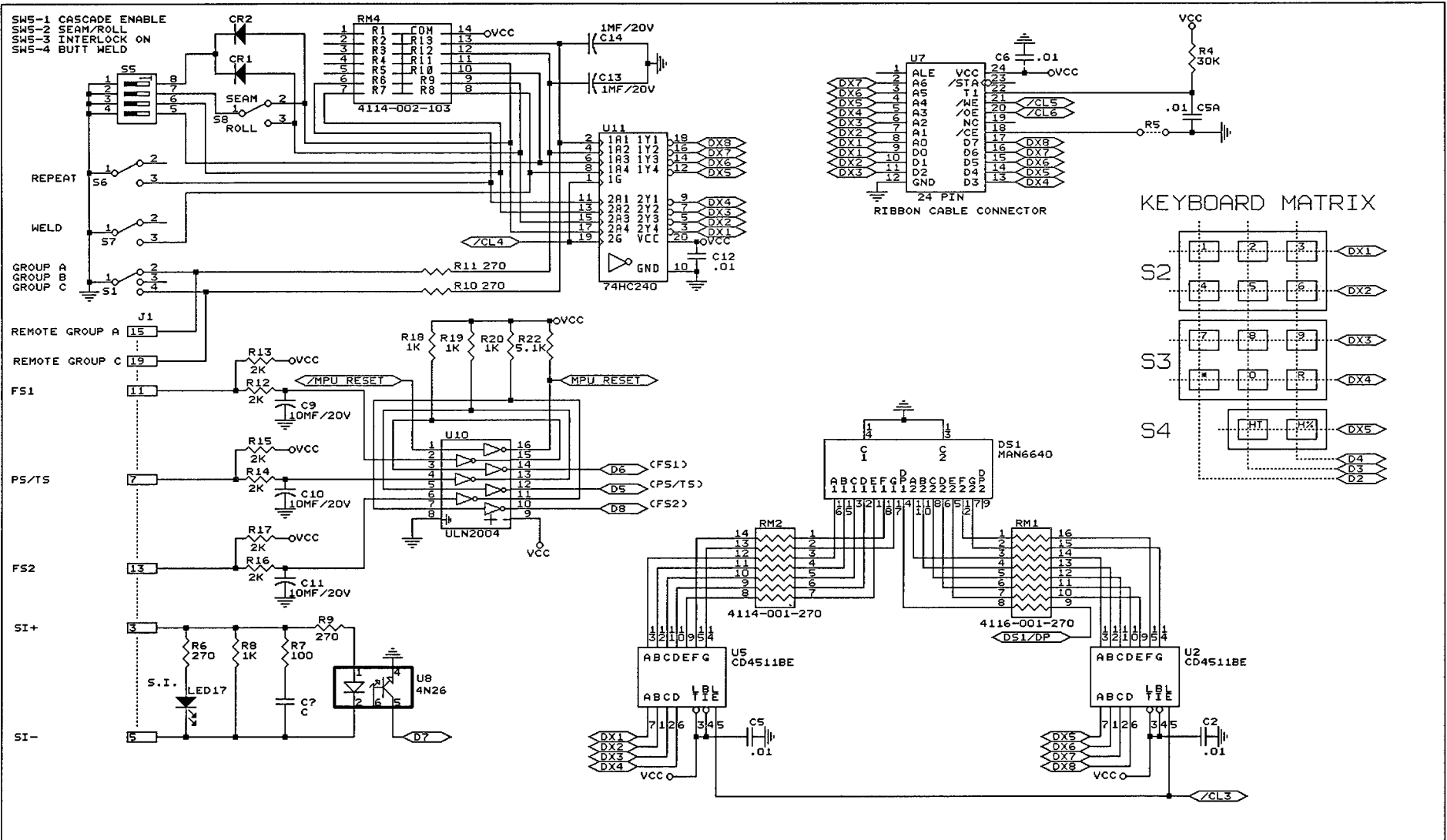
Use the same calibration procedures for the FORGE Pressure Regulator entering \*5.

# SCHEMATICS

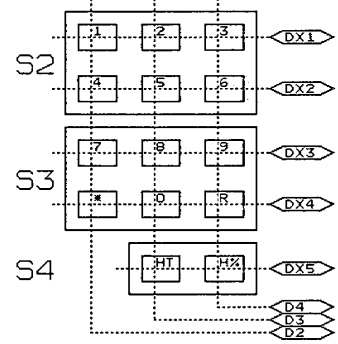
MODEL 108B-1 BRAIN PANEL SCHEMATIC	
150-020-02A .....	1, 2
108B AUXILIARY PERIPHERAL BOARD	
155-017D-01 .....	3
108B-1 EXTENDED FUNCTION PERIPHERAL BOARD	
155-017D-01 .....	4
108B-1 EXTENDED FUNCTION PERIPHERAL BOARD	
155-017D-01 .....	5
108B-1 EXTENDED FUNCTION PERIPHERAL BOARD	
155-017D-01 .....	6
MODEL 108B STANDARD WELDER SPOT / SEAM (0234D or 0266 TRANSFORMER)	
155-018-01A .....	7
MODEL 108B STANDARD WELDER SPOT / SEAM (0234F-50 HZ TRANSFORMER)	
155-018-01B .....	7A
MODEL 108B STANDARD WELDER SPOT / SEAM	
155-019-01B .....	8
MODEL 108B CASCADE CONTACTORS	
155-019-02C .....	9
MODEL 108B STANDARD BUTT WELDER	
155-018-01B .....	10
PRESSURE AND MOTOR CONTROL WIRING DIAGRAM	
155-017B-01 .....	11
PRESSURE REGULATOR AND PRESSURE SENSOR	
155-017C-01 .....	12
MODEL 224 3 OPERATOR FOOT SWITCH INTERLOCK	
155-019-01F .....	13
MODEL 108 CASCADE 1 - 24 VALVES INTERFACE BOARD	
155-019-01D .....	14
108BMSC MOTOR SPEED CONTROL	
146-010-03 .....	15
402A IGNITRON FIRING MODULE	
150-022-01 .....	16
IGNITRON AND SCR CONTACTOR INTERCONNECT	
150-010-01 .....	17



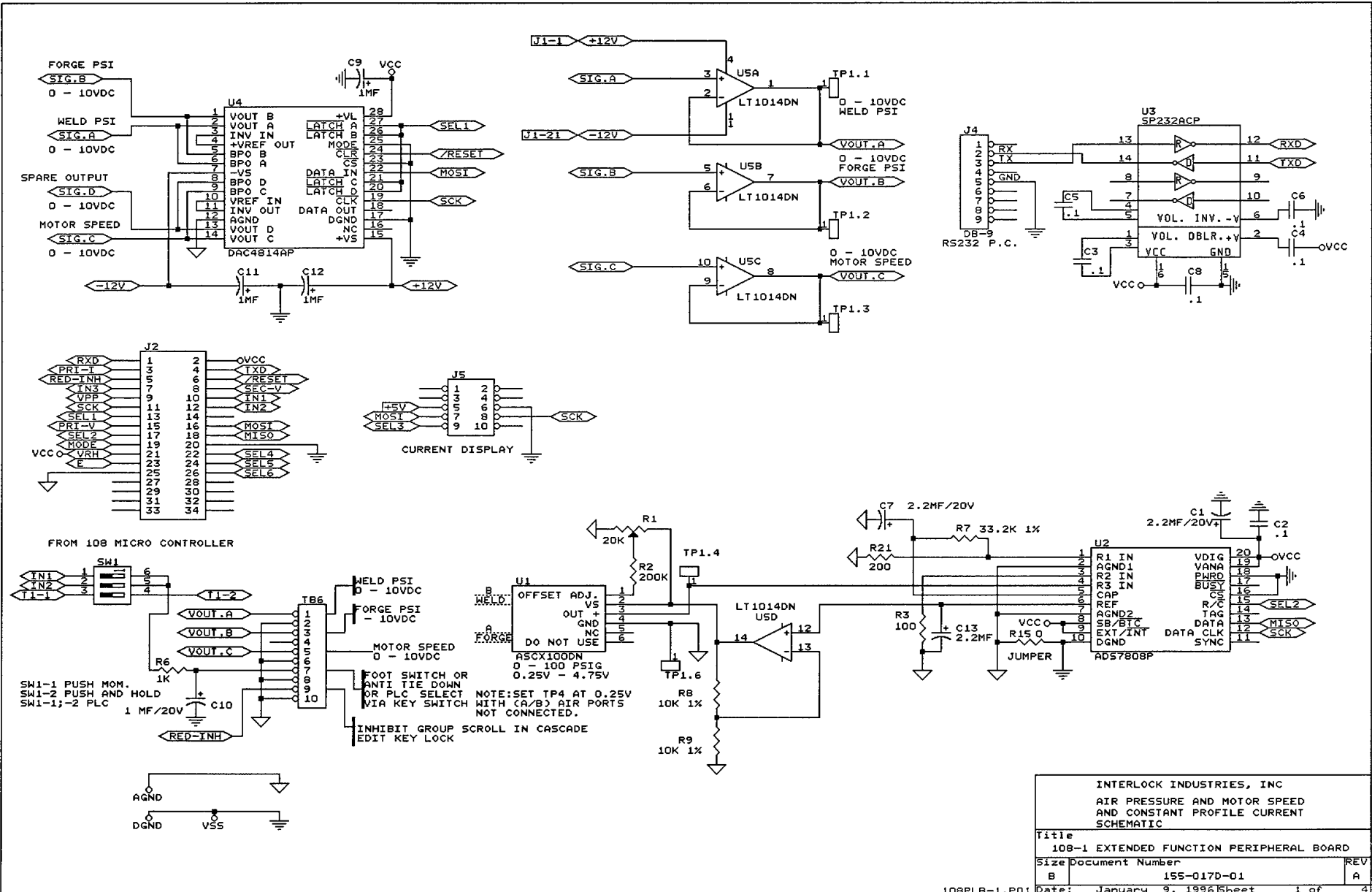




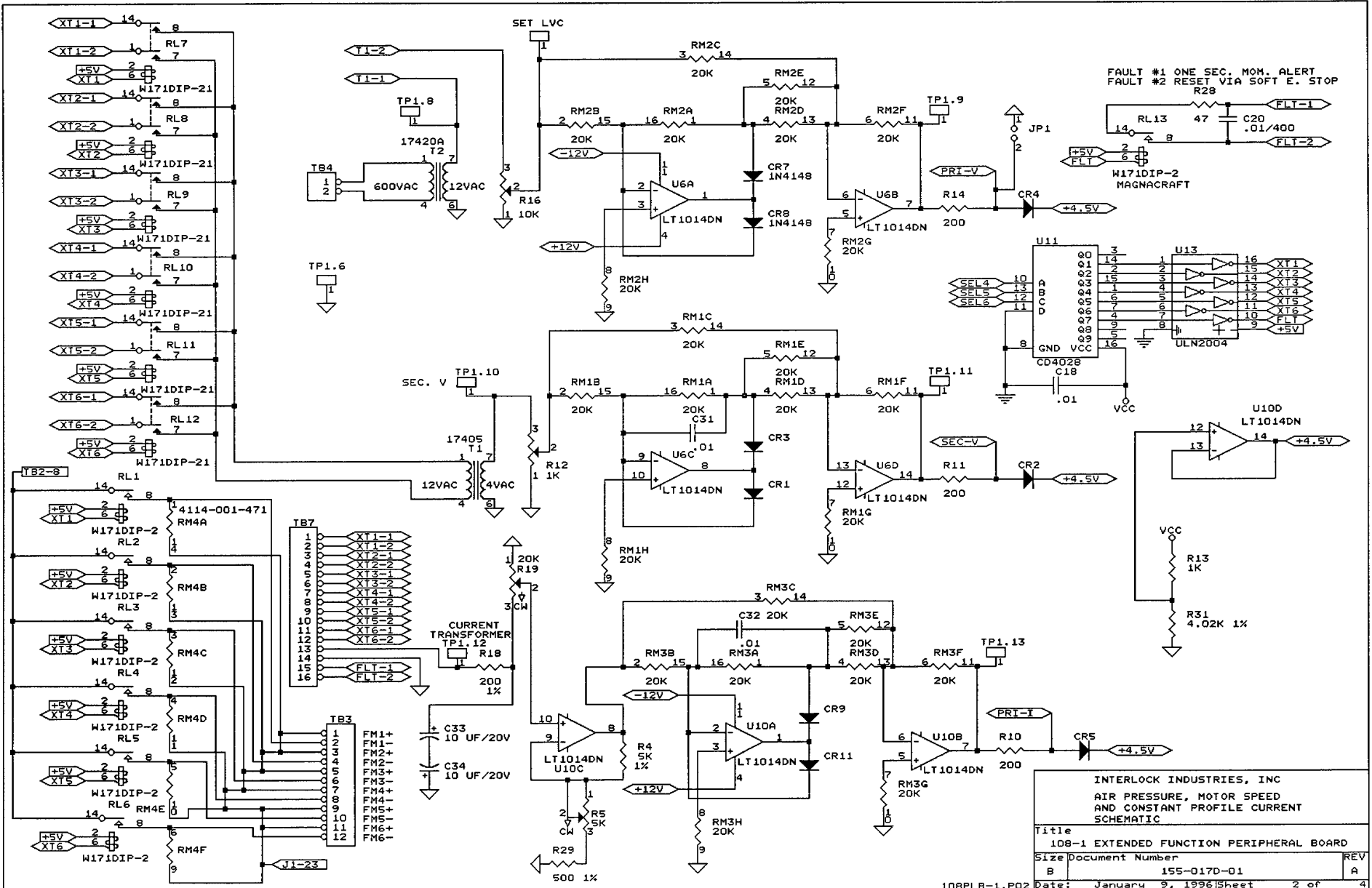
KEYBOARD MATRIX



INTERLOCK INDUSTRIES, INC.	
SCHEMATIC	
Title MODEL 108-1 & -2 BRAIN PANEL	
Size B	Document Number 150-020-02A
REV D	

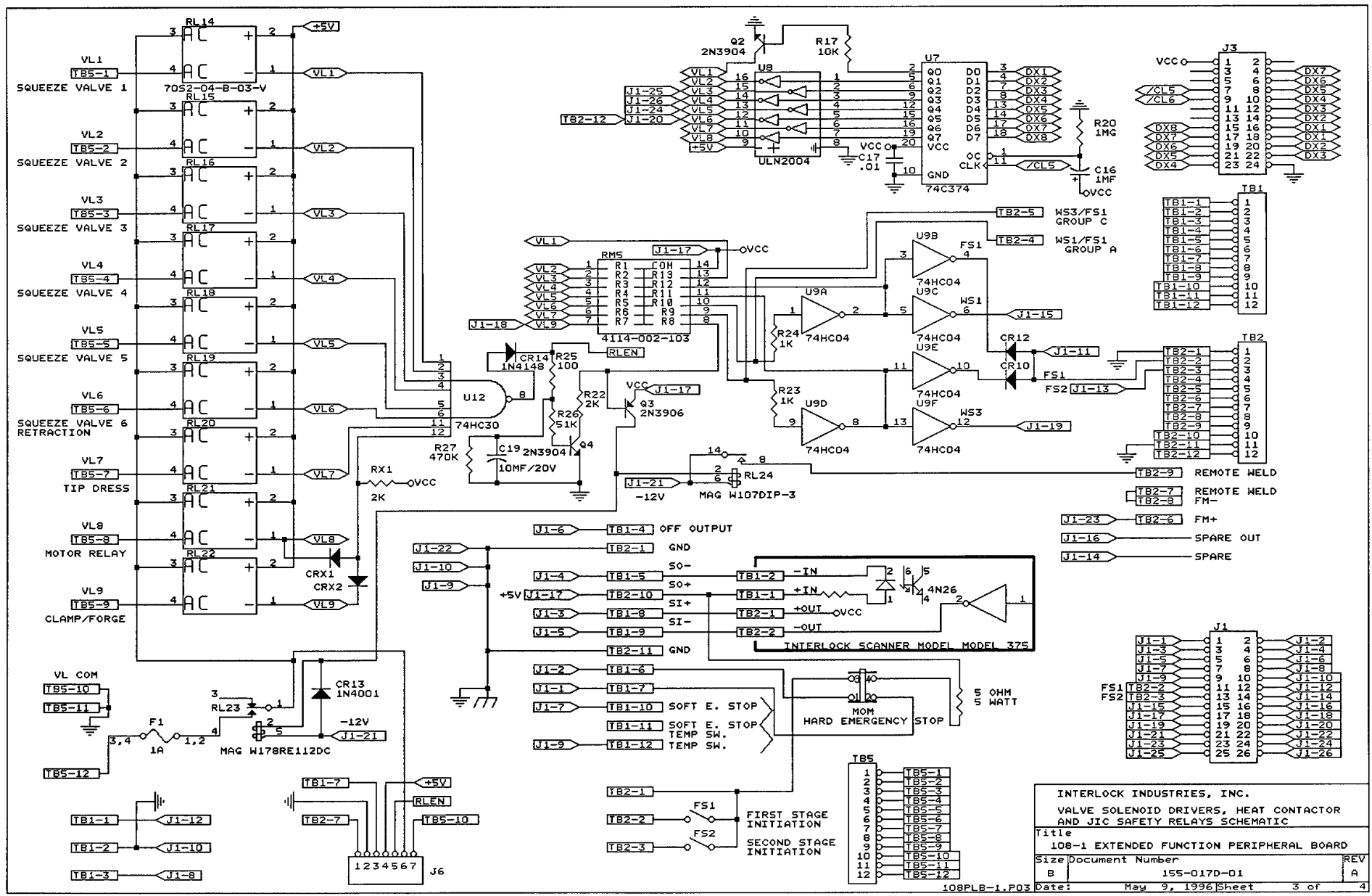


INTERLOCK INDUSTRIES, INC	
AIR PRESSURE AND MOTOR SPEED AND CONSTANT PROFILE CURRENT SCHEMATIC	
Title	108-1 EXTENDED FUNCTION PERIPHERAL BOARD
Size	Document Number
B	155-017D-01
REV	A
Date: January 9, 1996 Sheet 1 of 4	



INTERLOCK INDUSTRIES, INC  
 AIR PRESSURE, MOTOR SPEED  
 AND CONSTANT PROFILE CURRENT  
 SCHEMATIC

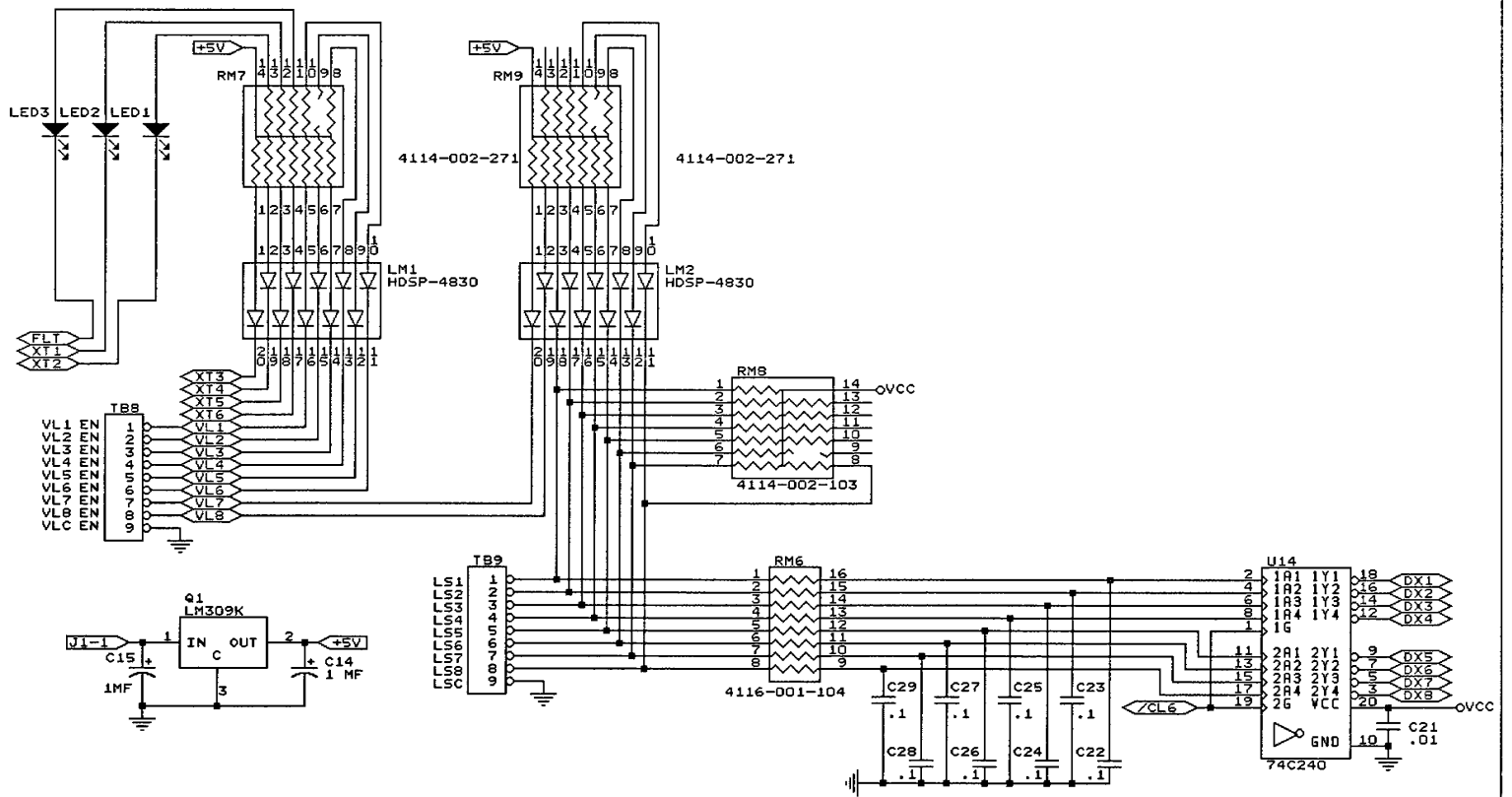
Title	108-1 EXTENDED FUNCTION PERIPHERAL BOARD	REV
Size	Document Number	A
B	155-017D-01	
Date:	January 9, 1996	Sheet 2 of 4



INTERLOCK INDUSTRIES, INC.  
 VALVE SOLENOID DRIVERS, HEAT CONTOR  
 AND JIC SAFETY RELAYS SCHEMATIC

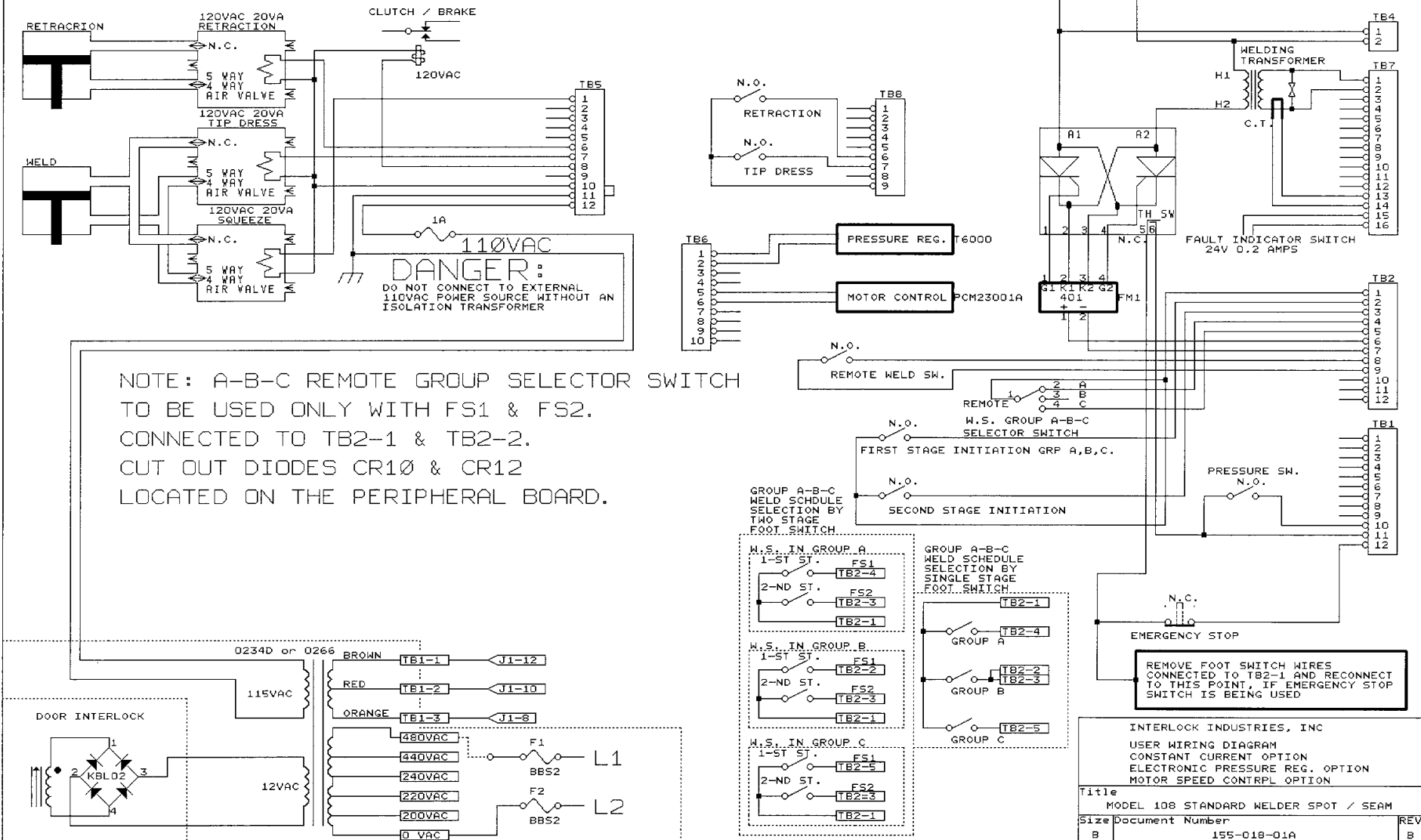
Title: 108-1 EXTENDED FUNCTION PERIPHERAL BOARD  
 Size: Document Number: 155-017D-01  
 B | 11 | 12 | REV: A

108PLB-1.P03 Date: May 9, 1996 Sheet 3 of 4

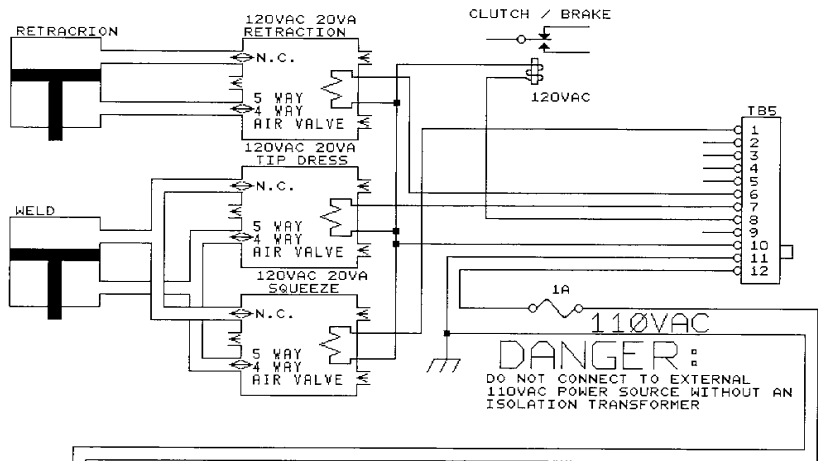


INTERLOCK INDUSTRIES, INC	
8 LIMIT SWITCH INPUTS	
Title	
108-1 EXTENDED FUNCTION PERIPHERAL BOARD	
Size Document Number	
B	155-0170-01
REV	

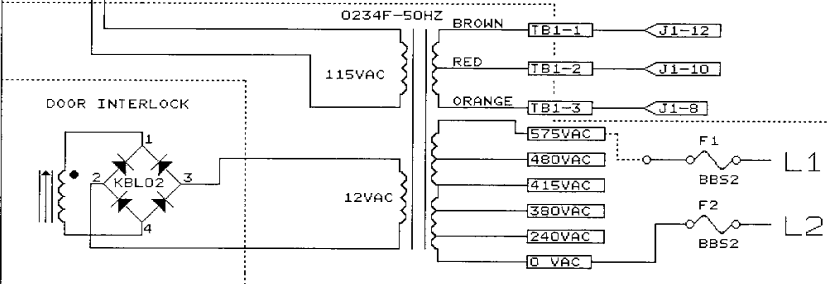
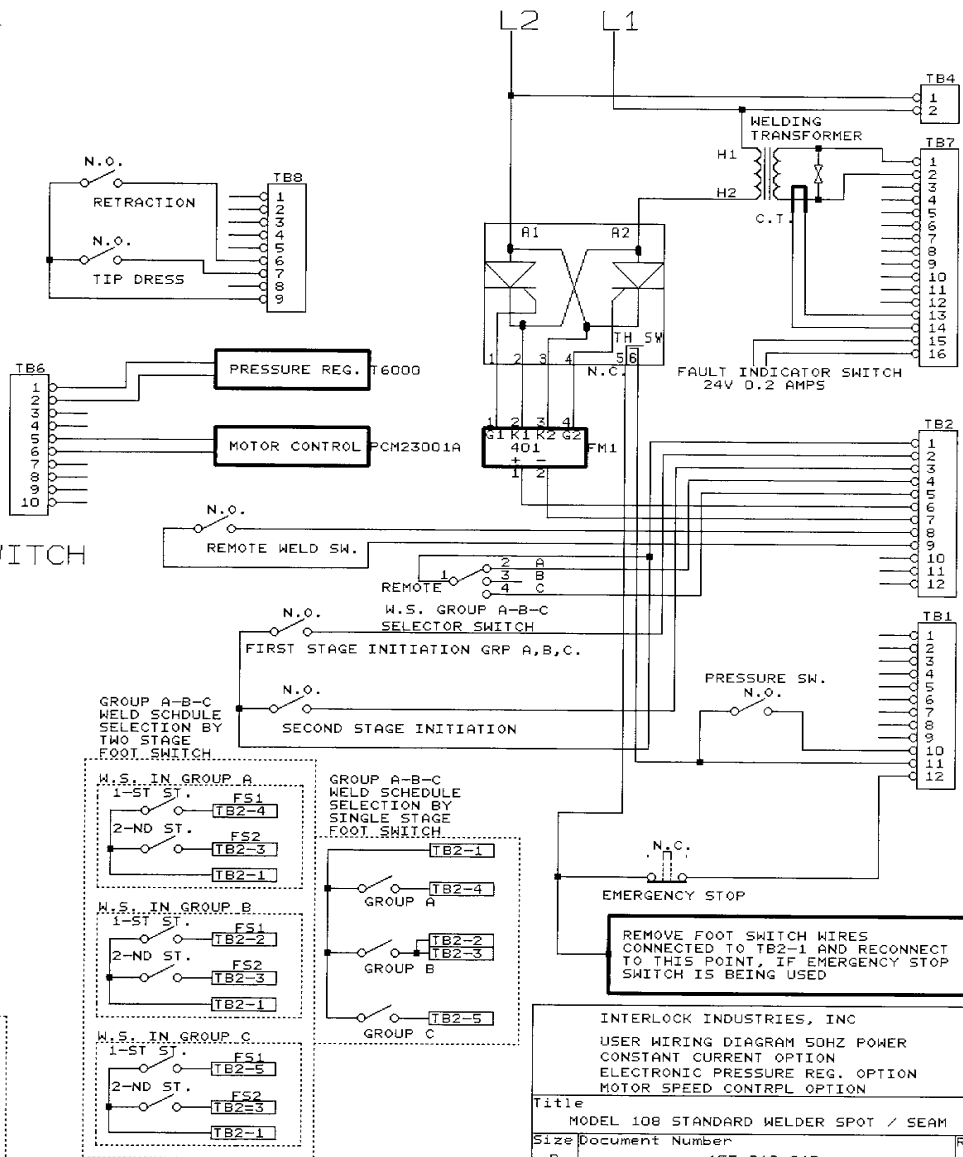
# SINGLE HEAD WELDING MACHINE



# SINGLE HEAD WELDING MACHINE

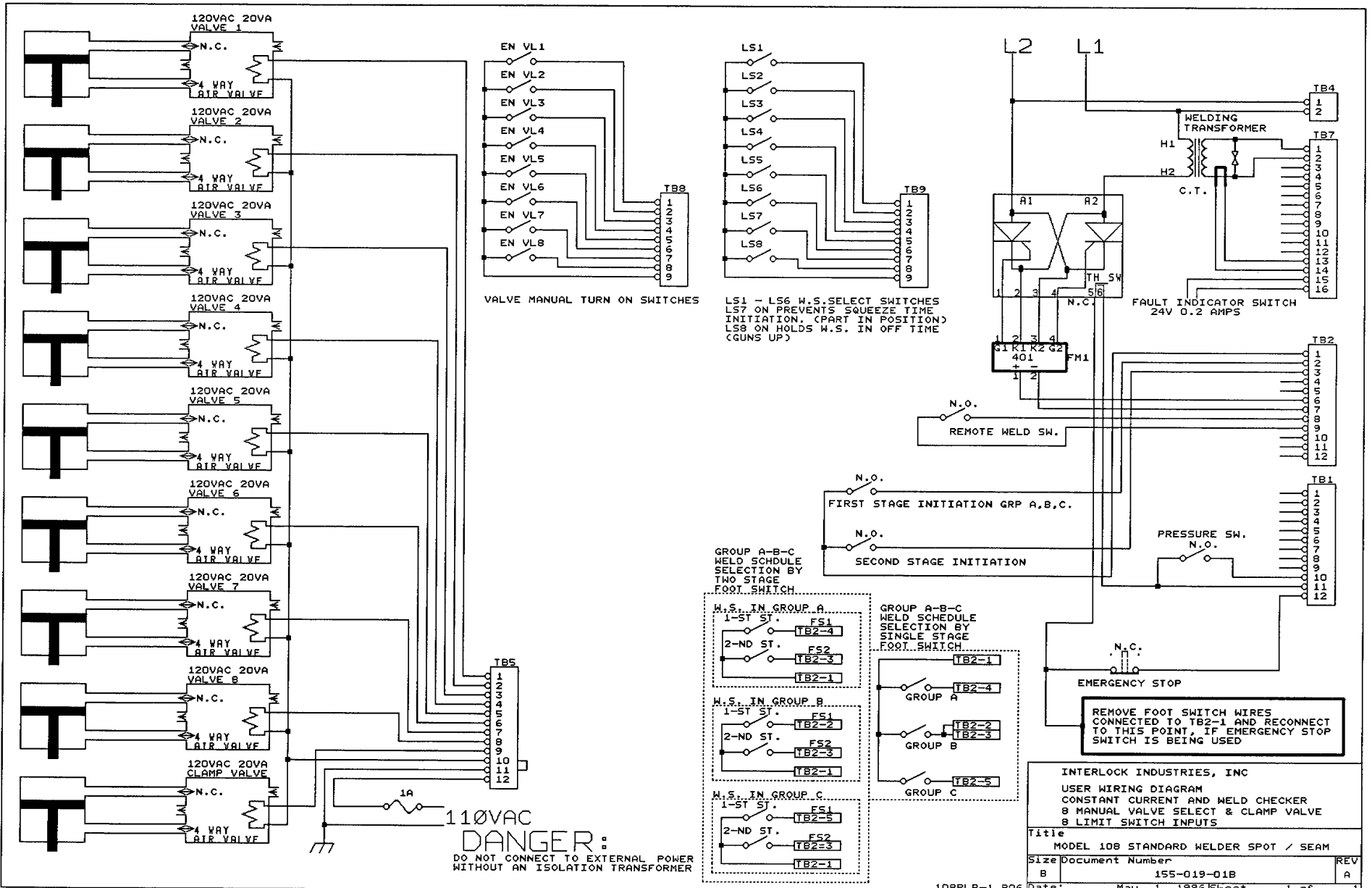


NOTE: A-B-C REMOTE GROUP SELECTOR SWITCH TO BE USED ONLY WITH FS1 & FS2. CONNECTED TO TB2-1 & TB2-2. CUT OUT DIODES CR10 & CR12 LOCATED ON THE PERIPHERAL BOARD.



INTERLOCK INDUSTRIES, INC  
 USER WIRING DIAGRAM 50HZ POWER  
 CONSTANT CURRENT OPTION  
 ELECTRONIC PRESSURE REG. OPTION  
 MOTOR SPEED CONTRPL OPTION

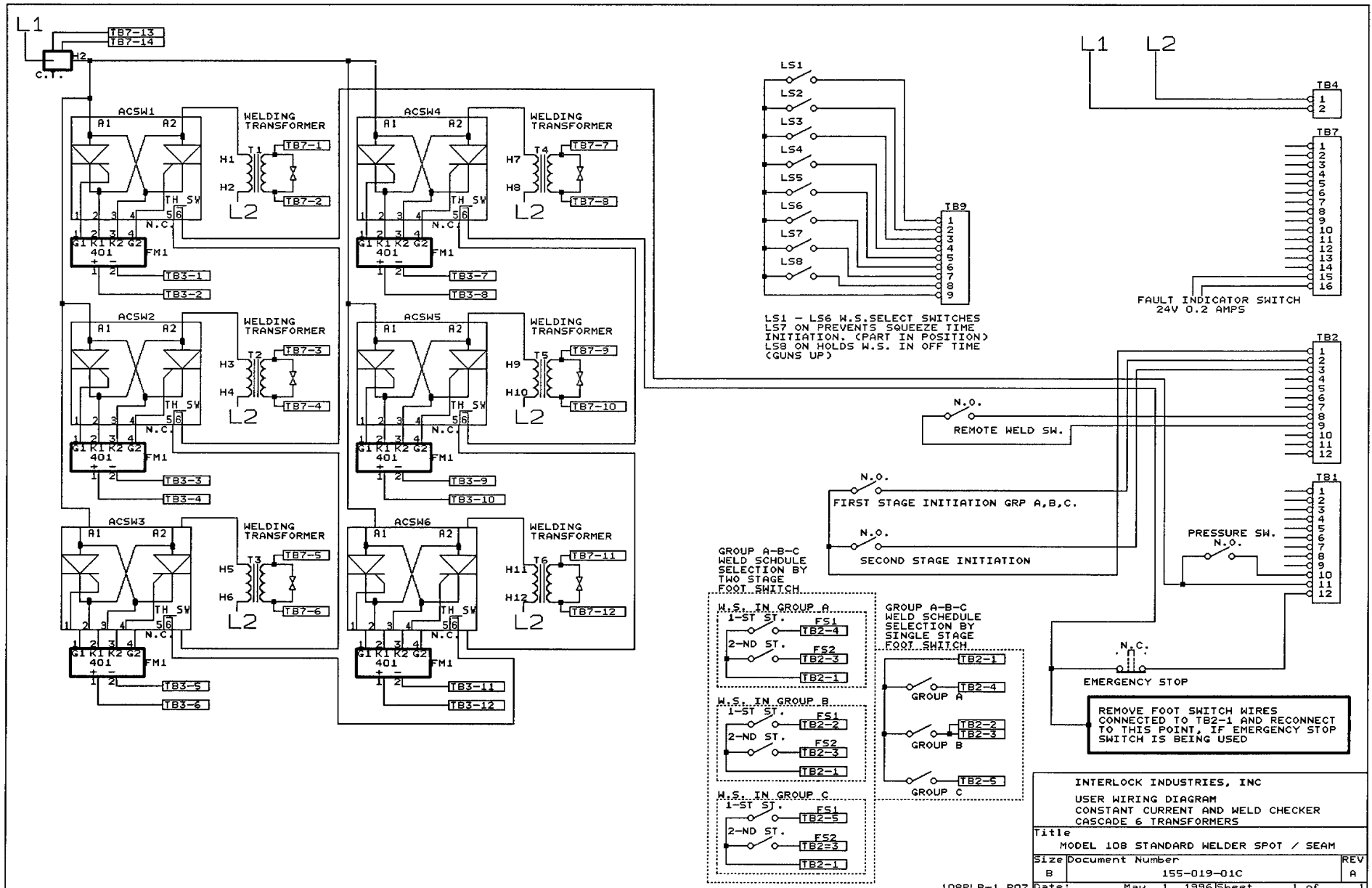
Title	MODEL 108 STANDARD WELDER SPOT / SEAM	
Size	Document Number	REV
B	155-018-01B	A



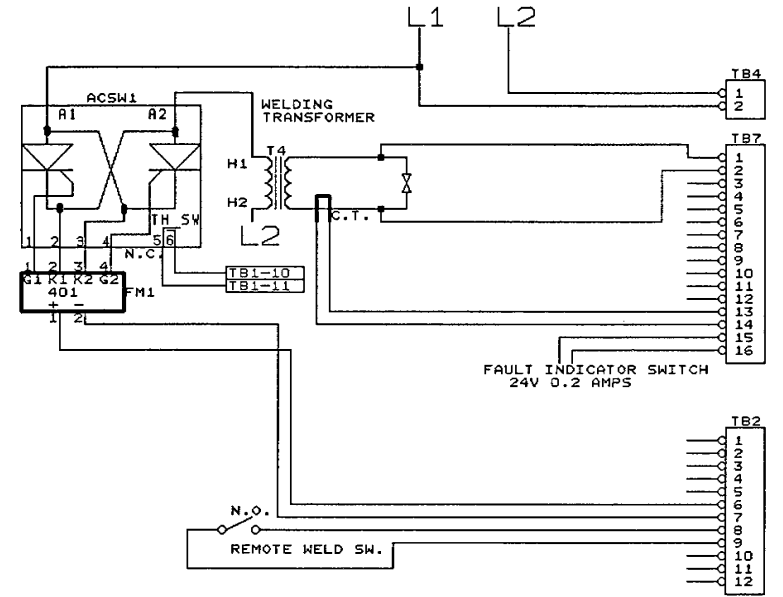
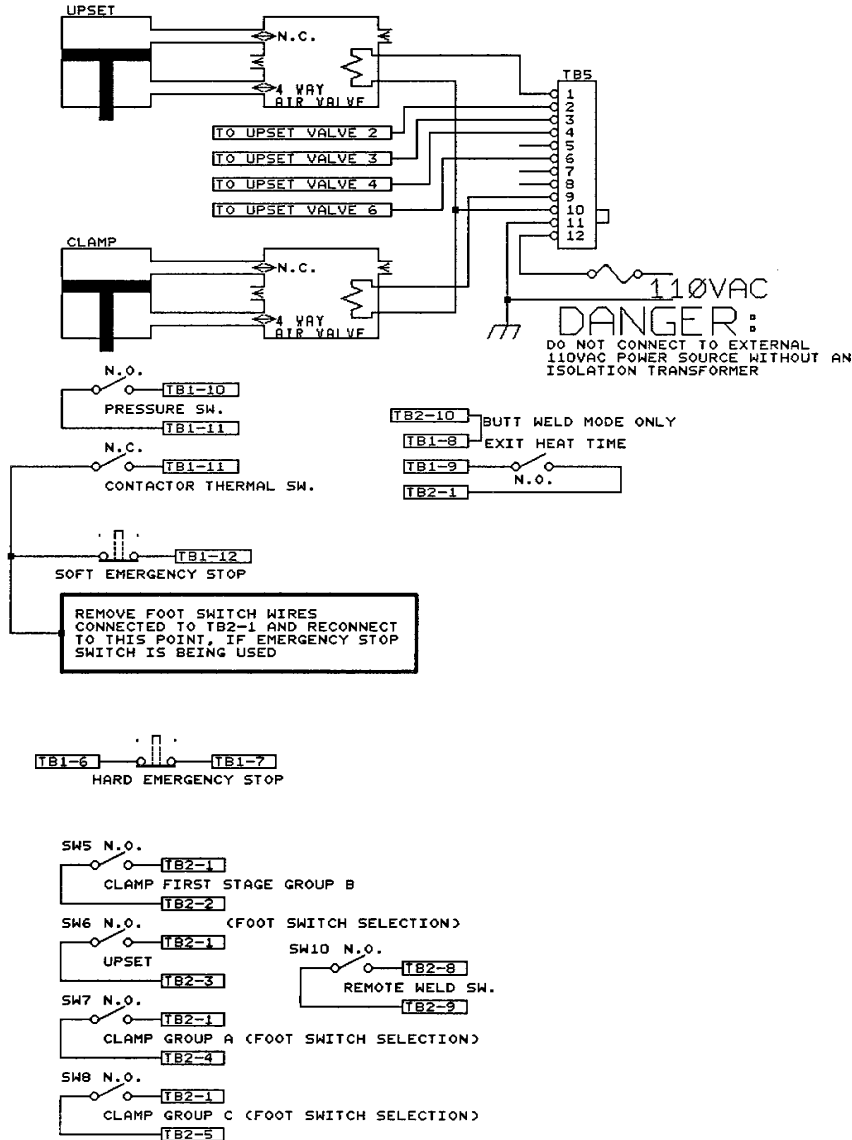
INTERLOCK INDUSTRIES, INC  
 USER WIRING DIAGRAM  
 CONSTANT CURRENT AND WELD CHECKER  
 8 MANUAL VALVE SELECT & CLAMP VALVE  
 8 LIMIT SWITCH INPUTS

Title  
 MODEL 108 STANDARD WELDER SPOT / SEAM  
 Size Document Number  
 B 155-019-01B REV A  
 Date: May 1, 1996 Sheet 1 of 1

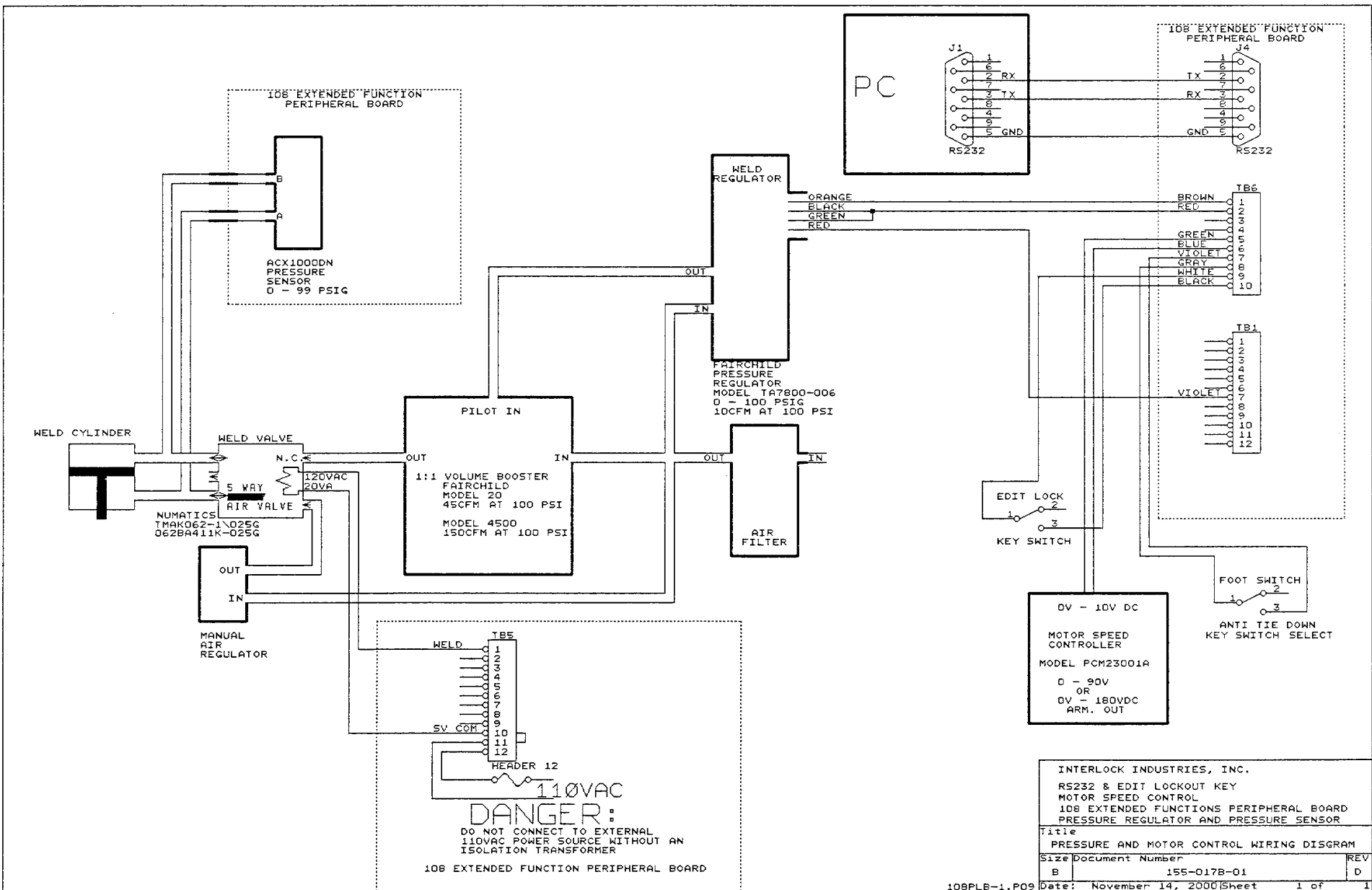




# BUTT WELD MACHINE



INTERLOCK INDUSTRIES, INC		
USER WIRING DIAGRAM		
EXTENDED FUNCTIONS PERIPHERAL BOARD		
CASCADE 6 UPSET VALVES WITH 1 CLAMP		
AVC OR CONSTANT PROFILE CURRENT		
Title		
MODEL 108 STANDARD BUTT WELDER		
Size	Document Number	REV
B	155-018-01B	A
Date: January 17, 1996 Sheet 1 of 1		



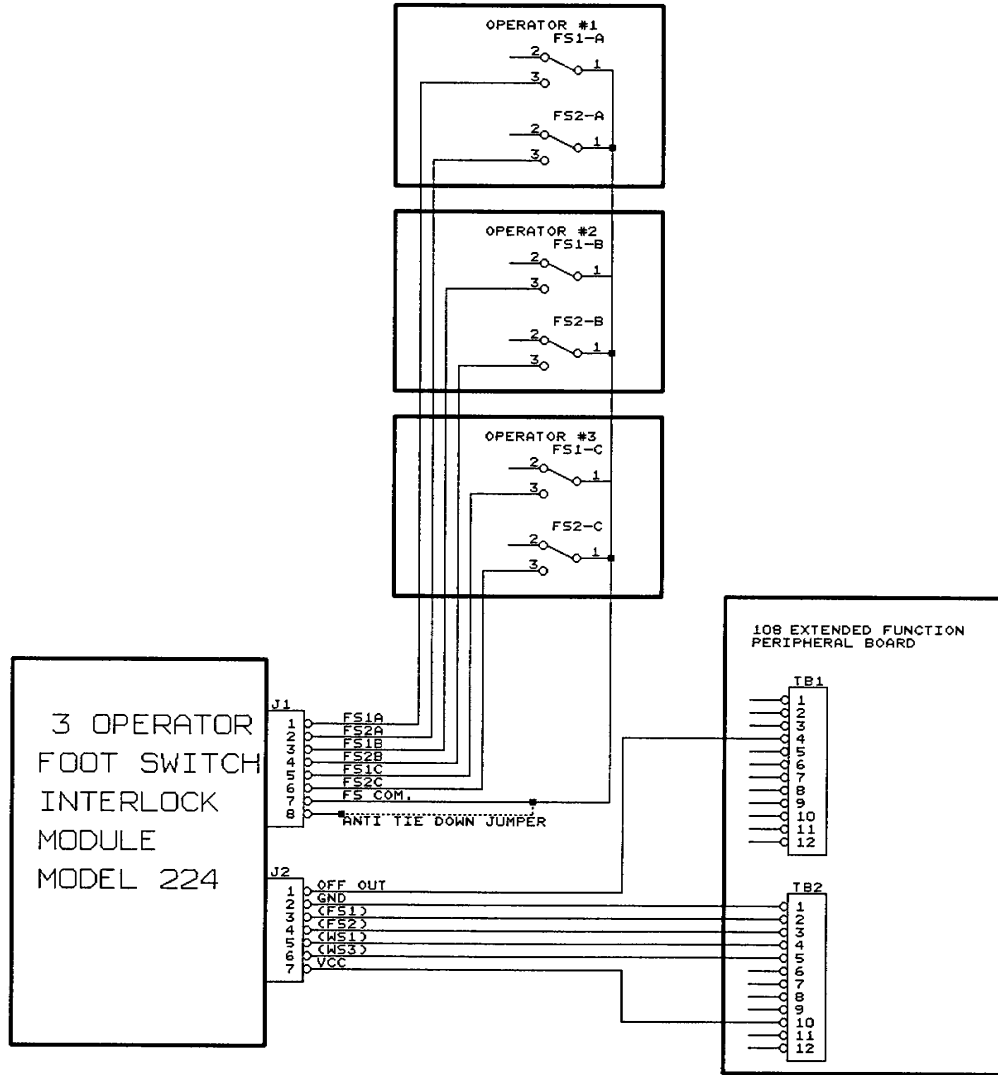
INTERLOCK INDUSTRIES, INC.  
RS232 & EDIT LOCKOUT KEY  
MOTOR SPEED CONTROL  
108 EXTENDED FUNCTIONS PERIPHERAL BOARD  
PRESSURE REGULATOR AND PRESSURE SENSOR

Title  
PRESSURE AND MOTOR CONTROL WIRING DIAGRAM

Size	Document Number	REV
B	155-017B-01	D

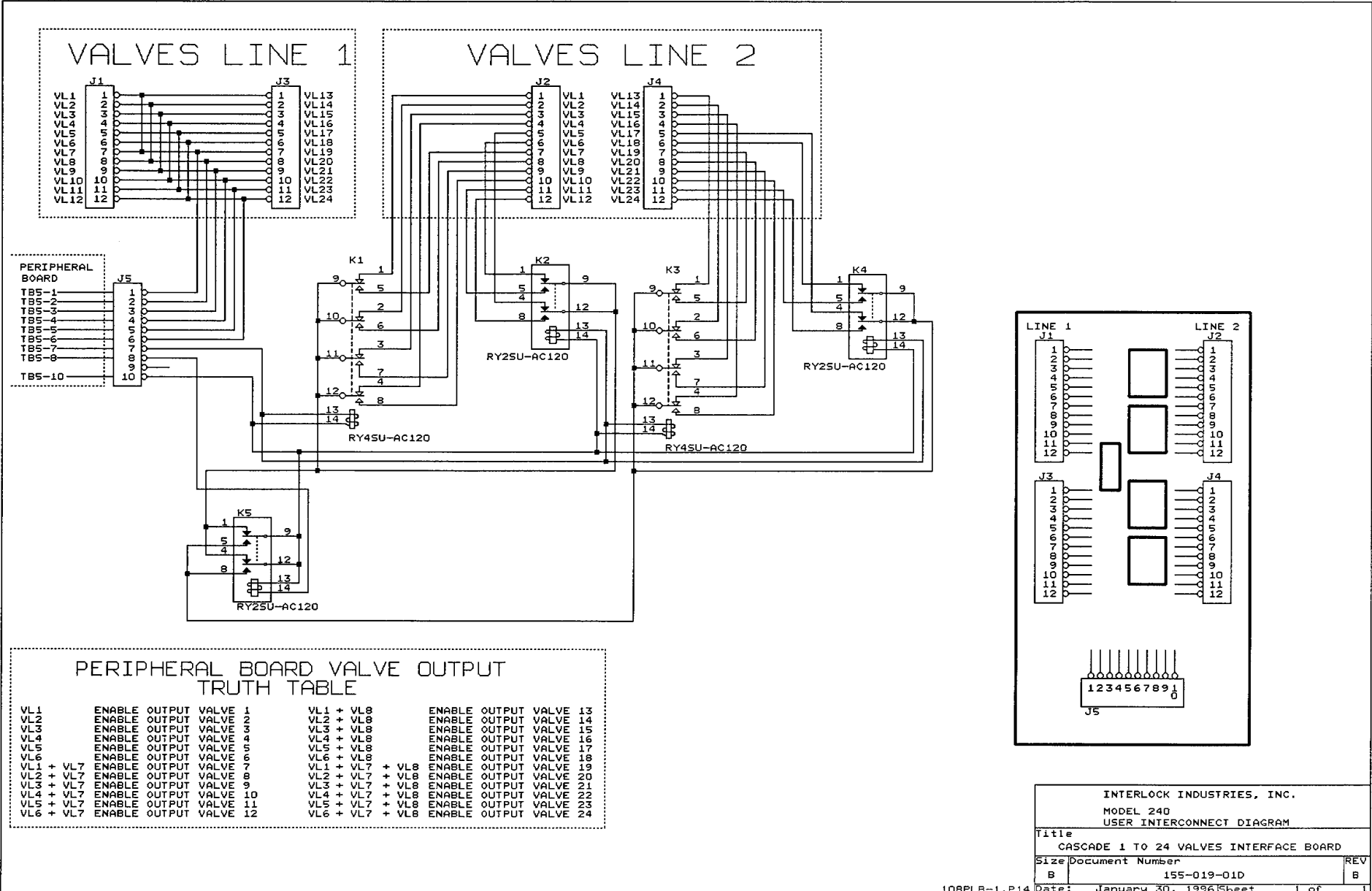
108PLB-1.P09 Date: November 14, 2000 Sheet 1 of 1





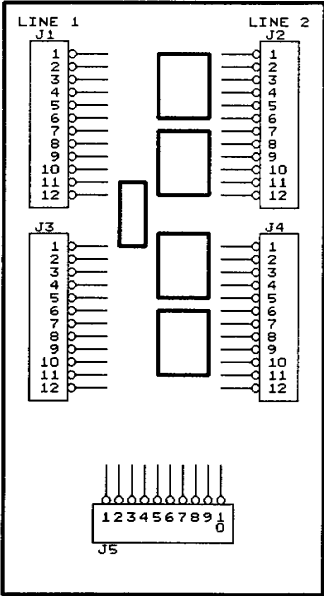
NOTE: CONNECT J1-7 TO J1-8 IF DUAL ANTI TIE DOWN PALM PUTTIONS ARE USED

INTERLOCK INDUSTRIES, INC.	
MODEL 108 CONTROLLER	
USER WIRING DIAGRAM	
EXTENDED FUNCTION PERIPHERAL BOARD	
Title	MODEL 224 3 OPERATOR FOOT SWITCH INTERLOCK
Size	Document Number
B	155-019-01F
Date:	December 26, 1995
Sheet	1 of 1

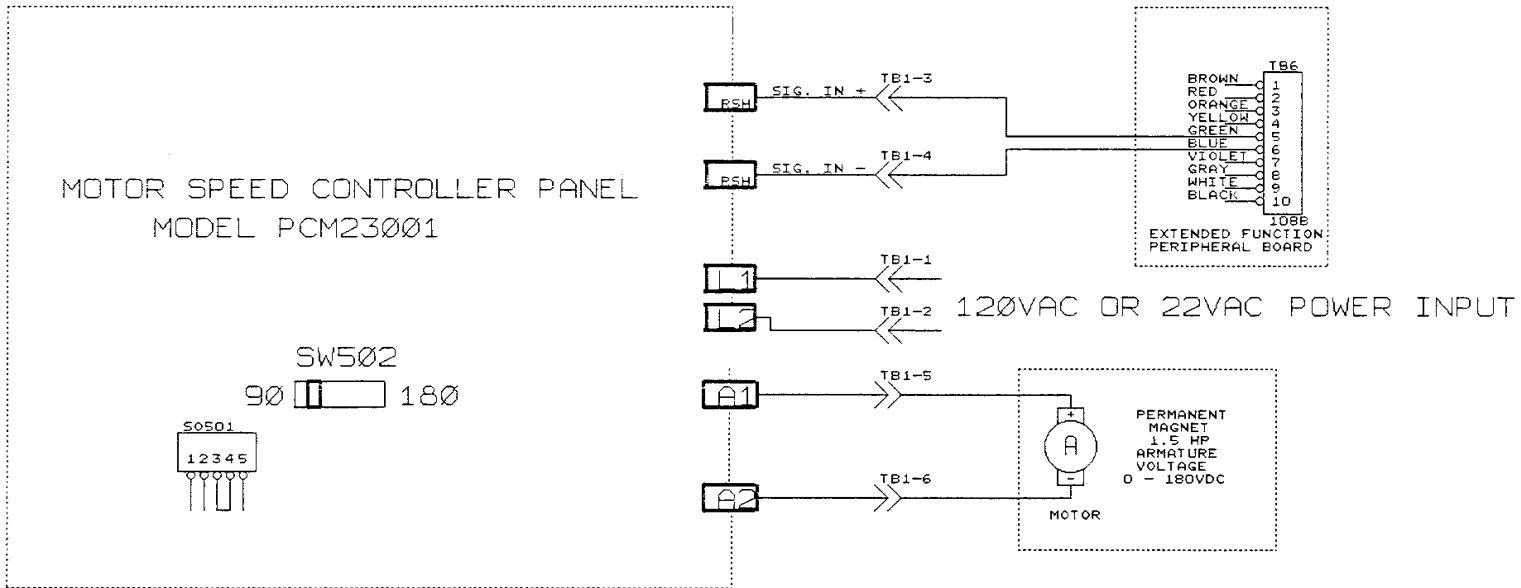


PERIPHERAL BOARD VALVE OUTPUT TRUTH TABLE

VL1	ENABLE	OUTPUT VALVE 1	VL1 + VL8	ENABLE	OUTPUT VALVE 13
VL2	ENABLE	OUTPUT VALVE 2	VL2 + VL8	ENABLE	OUTPUT VALVE 14
VL3	ENABLE	OUTPUT VALVE 3	VL3 + VL8	ENABLE	OUTPUT VALVE 15
VL4	ENABLE	OUTPUT VALVE 4	VL4 + VL8	ENABLE	OUTPUT VALVE 16
VL5	ENABLE	OUTPUT VALVE 5	VL5 + VL8	ENABLE	OUTPUT VALVE 17
VL6	ENABLE	OUTPUT VALVE 6	VL6 + VL8	ENABLE	OUTPUT VALVE 18
VL1 + VL7	ENABLE	OUTPUT VALVE 7	VL1 + VL7 + VL8	ENABLE	OUTPUT VALVE 19
VL2 + VL7	ENABLE	OUTPUT VALVE 8	VL2 + VL7 + VL8	ENABLE	OUTPUT VALVE 20
VL3 + VL7	ENABLE	OUTPUT VALVE 9	VL3 + VL7 + VL8	ENABLE	OUTPUT VALVE 21
VL4 + VL7	ENABLE	OUTPUT VALVE 10	VL4 + VL7 + VL8	ENABLE	OUTPUT VALVE 22
VL5 + VL7	ENABLE	OUTPUT VALVE 11	VL5 + VL7 + VL8	ENABLE	OUTPUT VALVE 23
VL6 + VL7	ENABLE	OUTPUT VALVE 12	VL6 + VL7 + VL8	ENABLE	OUTPUT VALVE 24



INTERLOCK INDUSTRIES, INC.		
MODEL 240		
USER INTERCONNECT DIAGRAM		
Title		
CASCADE 1 TO 24 VALVES INTERFACE BOARD		
Size Document Number		
B	155-019-01D	REV
		B



NOTE:

THIS MOTOR CONTROLLER IS TO BE USED WITH PERMANENT MAGNET MOTORS ONLY.

FOR 0 - 90VDC ARMATURE VOLTAGE

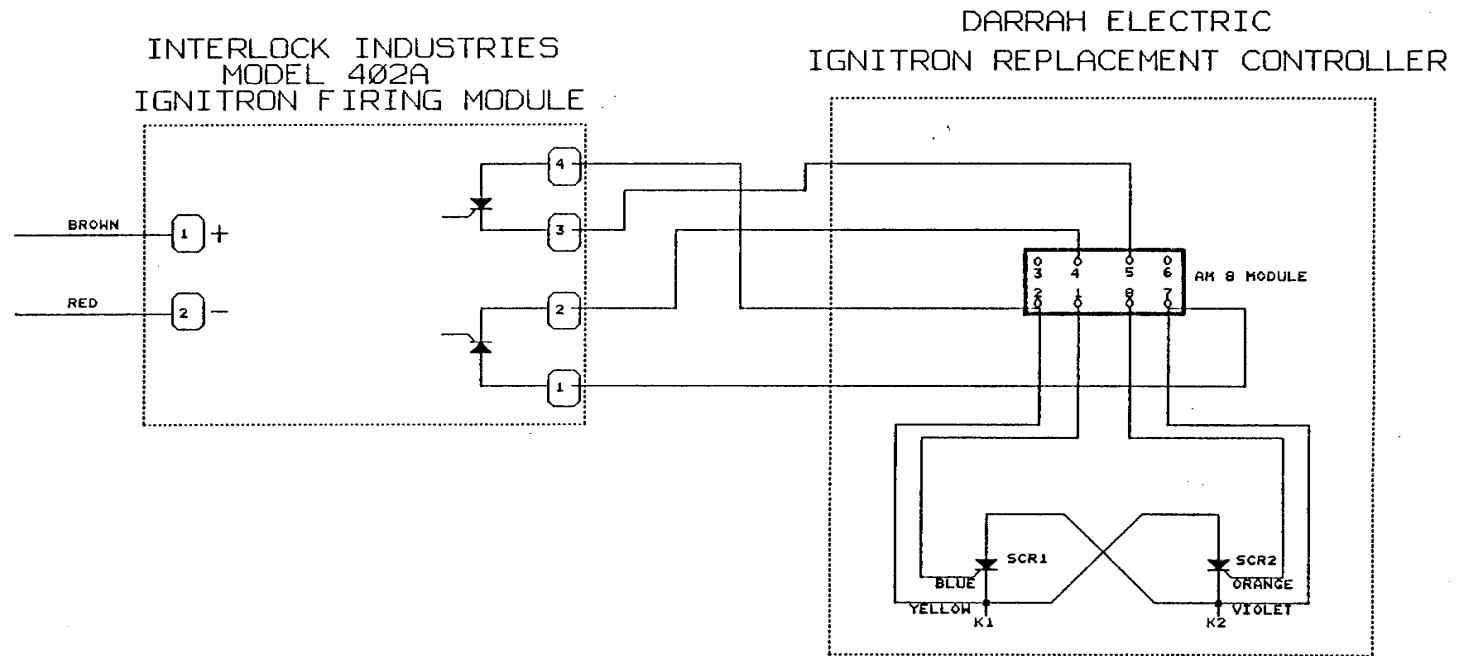
110VAC POWER INPUT, FOR 0 - 180VDC ARMATURE VOLTAGE

220VAC POWER INPUT

SWITCH SW502 MUST BE SET TO 90 FOR 0V - 90VDC ARMATURE OUTPUT

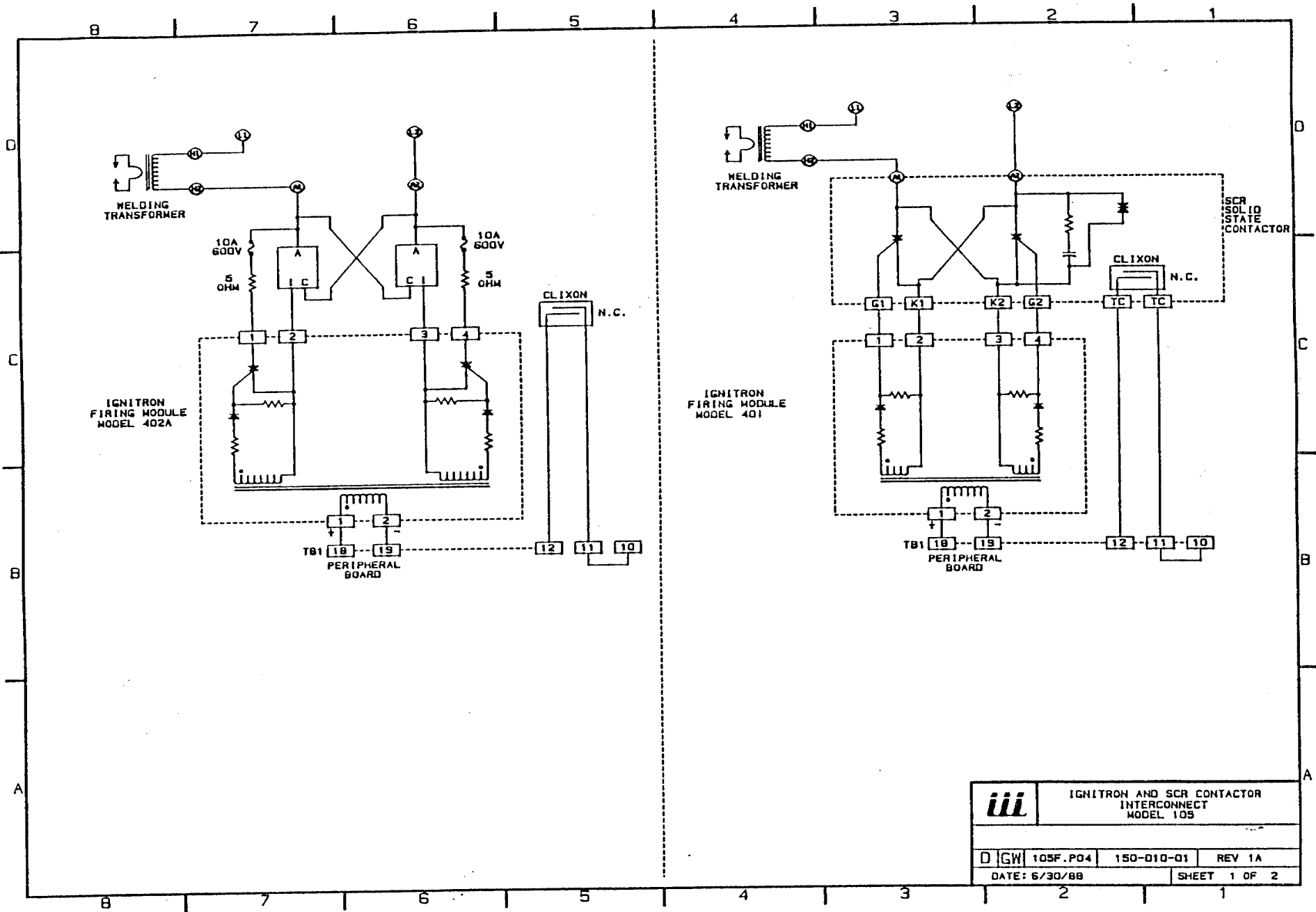
AND TO 180 FOR 0 - 180VDC ARMATURE OUTPUT

INTERLOCK INDUSTRIES, INC.		
ASSEMBLY WIRING DIAGRAM		
REGENERATIVE DRIVE		
Title		
108BMSC MOTOR SPEED CONTROL		
Size	Document Number	REV
B	146-010-03	B
Date:	November 14, 2000	Sheet 1 of 1



INTERLOCK INDUSTRIES, INC.		
DARRAH ELECTRIC IGNITRON REPLACEMENT WIRING DIAGRAM		
Title 402A IGNITRON FIRING MODULE		
Size Document Number		REV
B	150-022-01	1
Date:	July 26, 1991	Sheet 1 of 1





	IGNITRON AND SCR CONTACTOR INTERCONNECT MODEL 105		
	D   GW	105F.P04	150-010-01 REV 1A
DATE: 6/30/88		SHEET 1 OF 2	