ATC II™

AUTOMATIC TORCH CONTROL

Operation / Installation Manual

P/N: S8M5018

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The Computer Weld Technology Automatic Torch Control (ATC II™) is a compact, lightweight, weld torch manipulation control system comprised of the micro-controller based Automatic Torch Control (ATC II) and a stepper motor driven Linear Slide Assembly (LSA). This system is capable of providing independent control of all torch movements in the vertical plane.

The ATC II provides automatic torch Height control using Computer Weld Technology's patented Thru-Arc™ sensing technology. The Thru-Arc sensor provides two modes of Torch Height Control.   Mode 4 provides Torch Height Control using Arc Voltage Control (AVC). Mode 5 provides torch height control using Arc Current Control (ACC). The entire Torch tracking information is derived from the welding arc. The arc voltage and welding current is measured with an external voltage probe and Hall-Effect clamp on current sensor provided with the system.

The ATC II provides a user definable 50 sequence Programmable Logic Controller (PLC) with four 24-vdc inputs and two N.O. relay contacts. Using the PLC the user can provide external program control and simple power source interface. A RS-232 serial port is provided for off-line programming and system configuration. The RS-232 port can also be used to remote control the ATC II.

The Automatic Torch Control (ATC II) provides the necessary command signals to the stepper motor powered drive to permit the selection of the following functions from the front panel of the ATC Control box.

CONTROL	FUNCTION
RUN	Enable Slide Home and AVC/ACC operation
TRACK	Enable/Disable Thru-Arc™ AVC/ACC tracking
JOG	Jog the Torch slide position p or down
SPEED	Control the speed of the slide
GAIN	Provide sensitivity control for all tracking functions

The Linear Slide Assembly (LSA) is a stepper motor driven mechanical assembly that provides the motion for weld torch manipulation. The standard LSA provides 7" of vertical motion and has a weight capacity of 25 lbs @ 3" from the face of the carriage. The Torch Slide Assembly module can be installed in any position using the mounting bracket. The mounting bracket can be installed on the bottom or in the center of the back of the slide.

ATC II™ ENCLOSURE SPECIFICATIONS

Dimensions	6.62"H X 4.12"W X 8.75"L (168mm X 105mm X 222mm)
Weight	5.5 lbs (2.5kg)
Power Requirements	115 vac or 42 vac 50/60 Hz @ 220 va
Velocity	0.2 - 15 inch/min
Motor Torque	120 oz-in max (Holding Torque

LIGHT DUTY SLIDE SPECIFICATIONS

Dimensions	13.25"H x 4.7"W x 3.5"D (336mm X 102mm x 89mm)
Max Travel	7.25" (184mm)
Weight	7 lbs (3.18kg)
Velocity	0.2 – 1.5 inch/sec
Weight Capacity	10 lbs @ 3" from slide face

MEDIUM DUTY SLIDE SPECIFICATIONS

Dimensions	16.66"H x 3.38"W x 2.88"D (423mm X 86mm x 73mm)
Max Travel	7.25" (184mm)
Weight	7 lbs (3.18kg)
Velocity	0.2 – 1.5 inch/sec
Weight Capacity	25 lbs @ 3" from slide face

HEAVY DUTY SLIDE SPECIFICATIONS

Dimensions	17.08"H x 5.00"W x 2.63"D (434mm X 127mm x 67mm)
Max Travel	7.25" (184mm)
Weight	9-1/2 lbs (4.32kg)
Velocity	0.2 – 1.5 inch/sec
Weight Capacity	45 lbs @ 3" from slide face

2.0 INSTALLATION

2.1 ATC CONTROL

The ATC Control assembly should be located to allow easy operator access to the front panel. The control is provided with four 10-32 captive PEM nuts located on the left side of the enclosure.   Figure 1 shows the physical mounting dimensions.
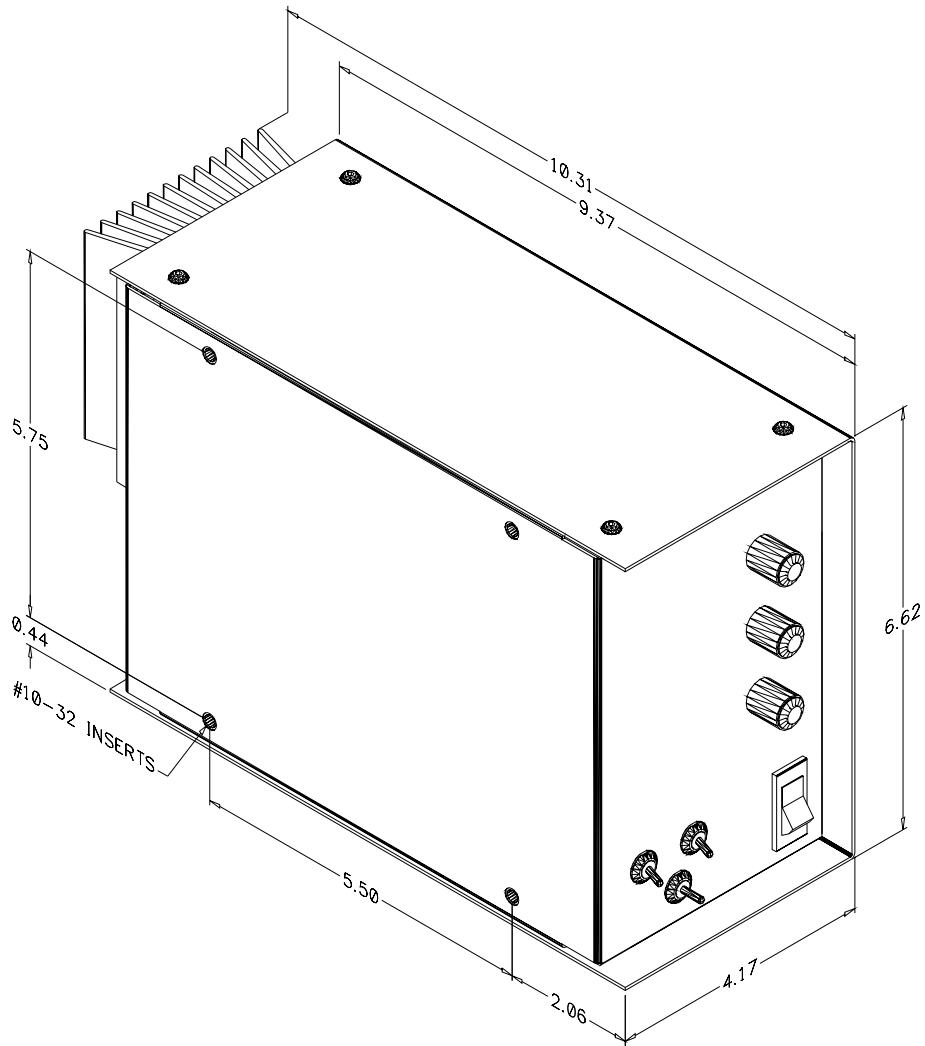
FIGURE 1 - Control Physical Dimensions

2.2 ATC SLIDE ASSEMBLIES

See Figure 2, 3 and 4 for mounting locations and physical dimensions for light, medium and heavy duty slides.

WIRE LIST			
Part	Wire Color	To	Description
Motor	White #1	Pin C	Chassis Ground
	White #2	Pin C	
	Blue	Pin J	Phase 4
	Green/Yellow	Pin K	Phase 2
	Violet	Pin L	Phase 3
	Brown	Pin M	Phase 1
Sensor	Brown	Pin A	+VDC
	Blue	Pin B	Common
	Black	Pin D	Sensor
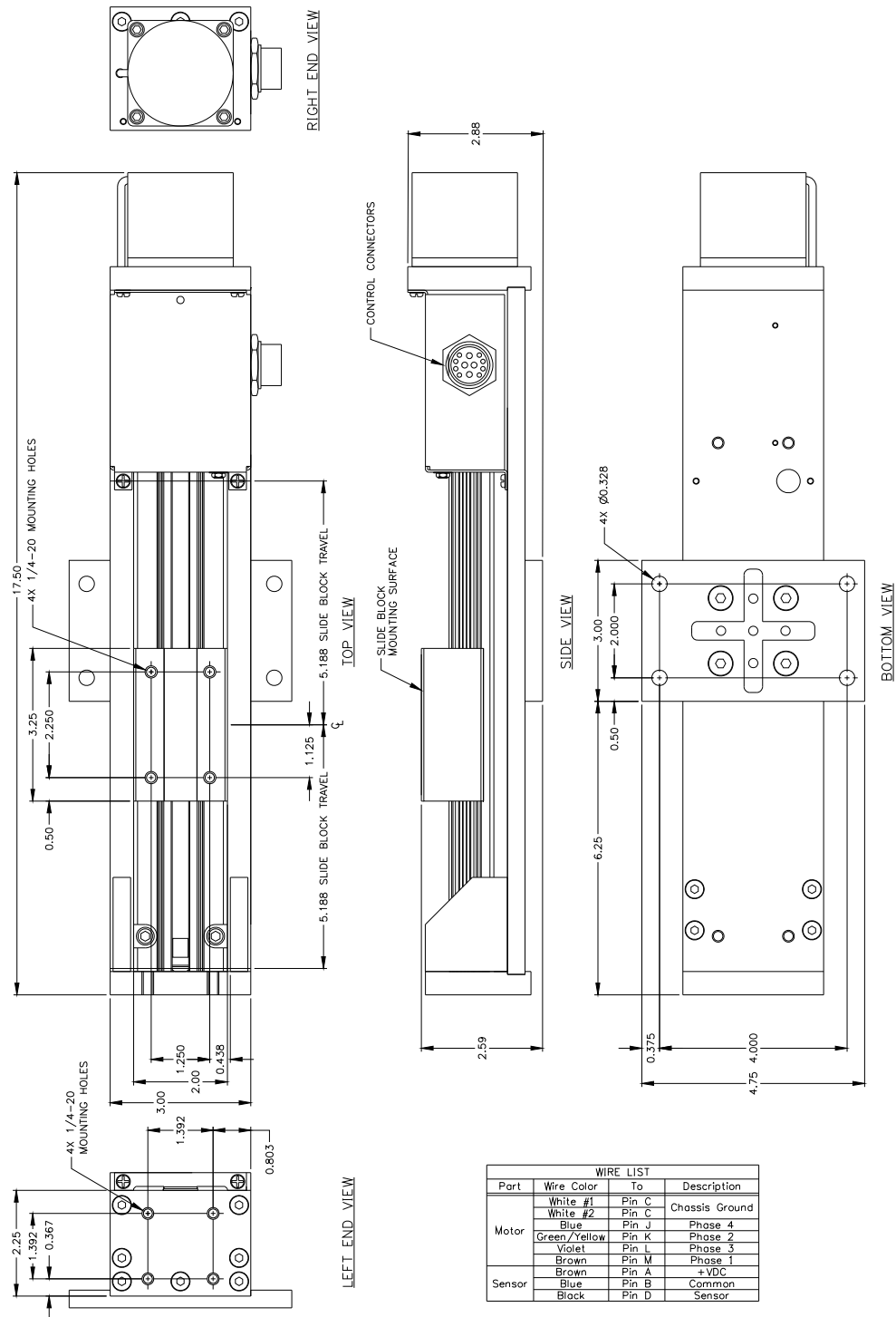
FIGURE 2- Light Duty Slide Physical Dimensions

4

END VIEW

WIRE LIST			
Part	Wire Color	To	Description
Motor	White #1	Pin C	Chassis Ground
	White #2	Pin C	
	Blue	Pin J	Phase 4
	Green/Yellow	Pin K	Phase 2
	Violet	Pin L	Phase 3
	Brown	Pin M	Phase 1
Sensor	Brown	Pin A	+VDC
	Blue	Pin B	Common
	Black	Pin D	Sensor

2.351

2.000

CONTROL CONNECTOR

14.663

4X 1/4-20 UNC

kerk

TOP VIEW

2.250

3.250

0.500

SLIDE BLOCK
MOUNTING SURFACE

SIDE VIEW

4X 5/16-18 UNC 2B ▽0.38

4.000

3.350

BOTTOM VIEW

1.250

0.375

2.000

3.375

0.687

2.147

0.688

2.000

0.688

FIGURE 3- Medium Duty Slide Physical Dimensions

END VIEW

2.63

0.125

CONTROL CONNECTORS

17.06

TOP VIEW

SLIDE BLOCK
MOUNTING SURFACE

SIDE VIEW

4X 1/4-20 UNC 2B ∇0.38
4X 5/16-18 UNC 2B ∇0.38

2.500
1.392

6.063
6.617

BOTTOM VIEW

5.00

2.58

1.392
2.500

2.054
1.500

END VIEW

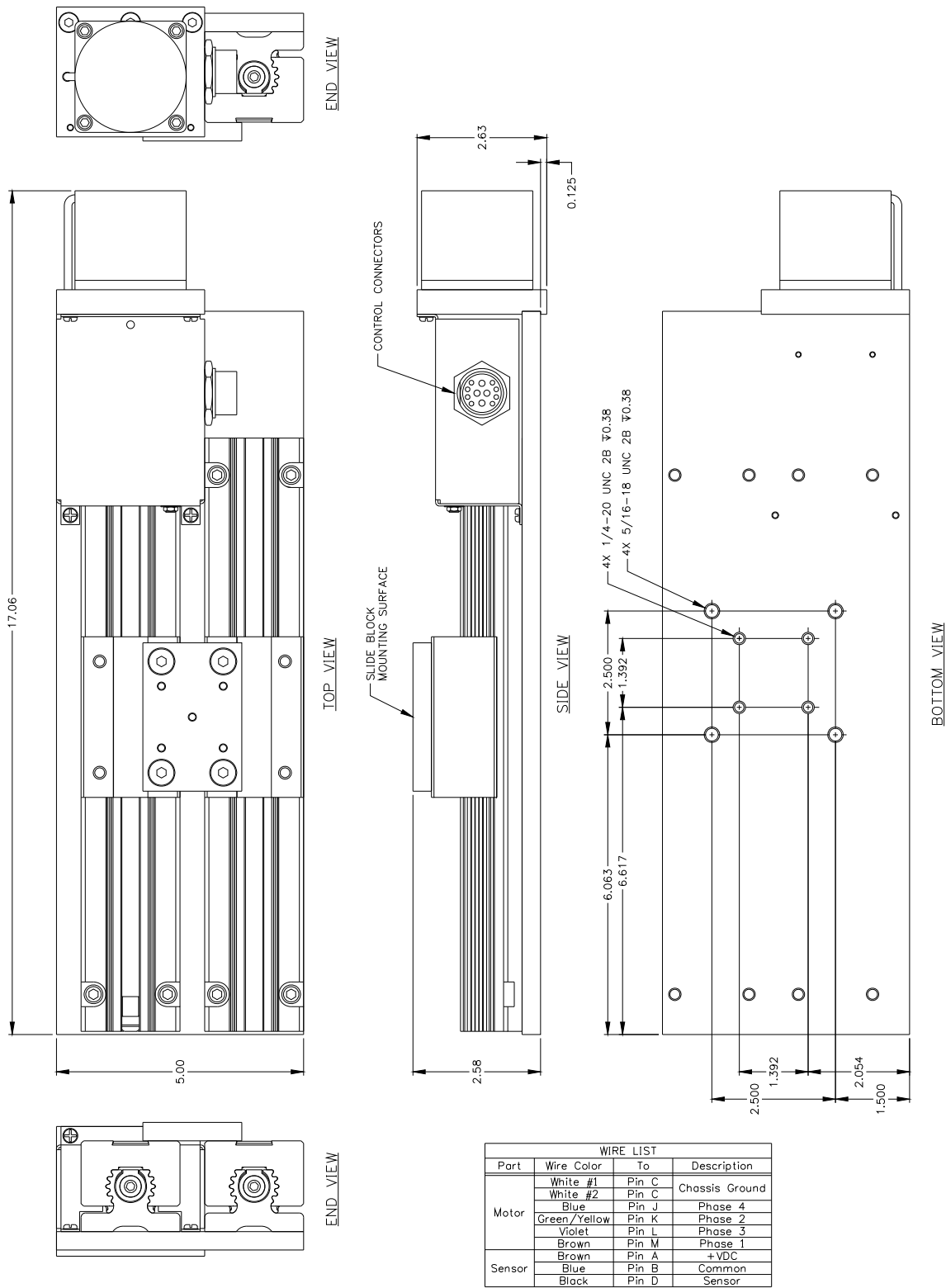| WIRE LIST			
Part	Wire Color	To	Description
Motor	White #1	Pin C	Chassis Ground
	White #2	Pin C	
	Blue	Pin J	Phase 4
	Green/Yellow	Pin K	Phase 2
	Violet	Pin L	Phase 3
	Brown	Pin M	Phase 1
Sensor	Brown	Pin A	+VDC
	Blue	Pin B	Common
	Black	Pin D	Sensor

FIGURE 4- Heavy Duty Slide Physical Dimensions

6

2.3   CABLES

Perform the following to install the cables and sensors for the ATC II.

WARNING
Do not connect or disconnect the SLIDE MOTOR CABLE from the Slide or ATC II back panel with Power Applied to the control. Doing so will damage the control and slide assembly.

- Connect the ATC **Slide Motor Cable** to the Motor mating connector on the rear of the control enclosure (Fig 5) and to the Motor mating connector on the Slide Assembly.

- Mount the **Current Sensor** such that the welding ground cable passes through the sensor (Fig 5). The two RED dots should point toward the power supply for GMAW applications and toward the work piece for GTAW and Plasma applications. Connect the **Current Sensor Cable** to the Sensor Cable Connector and to the CURRENT mating connector on the rear panel of the ATC II (Fig 5).
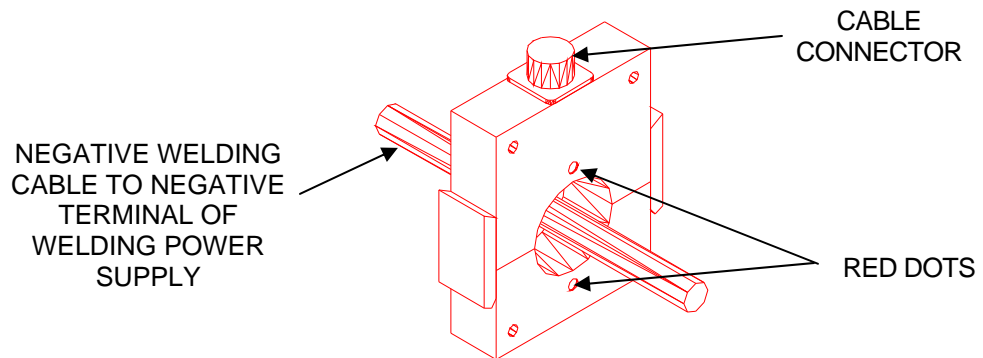

FIGURE 5 - Current Sensor Installation

- Connect the RED and BLACK leads of the **Voltage Sensor** in accordance with **Table 1** below. Connect the lead for the Electrode as close as possible to the welding torch. Connect the **Voltage Sensor Cable** to the mating connector on the Voltage Sensor and connect the other end to the ATC II rear panel VOLTAGE Connector.

APPLICATION	RED (+) LEAD	BLACK (-) Lead
GMAW	Electrode	Work
P-GMAW	Electrode	Work
GTAW	Work	Electrode
P-GTAW	Work	Electrode
PAW	Work	Electrode
P-PAW	Work	Electrode

Table 1 - Voltage Sensor Installation

- If the ATC II is to be used to control the welding power source connect the **Remote Control Cable** to DB9 I/O connector on the rear panel of the ATC II (Fig 6). (Remote Control Cable is not part of the base unit and must be purchased separate) Refer to Appendix D for samples interconnect drawings for various weld power supplies.

- Connect the **Power Cable** to the rear mating POWER connector on the rear panel of the ATC II (Fig 6).

- This completes the cable installation.

RED WIRE
1/2" RING
TERMINAL

BLACK WIRE
1/2" RING
TERMINAL

VOLTAGE
CABLE
P/N: S3W5044

VOLTAGE SENSOR
P/N: S3A5053

CURRENT SENSOR
P/N: X3Q5010

CURRENT CABLE
P/N: S3W5045

VOLTAGE CABLE
P/N: E3W5045

ATC II
ENCLOSURE
P/N: S3A5127

TERM CABLE
P/N: S3W5050

MIRCOSTEP
CABLE
P/N: S3W5034

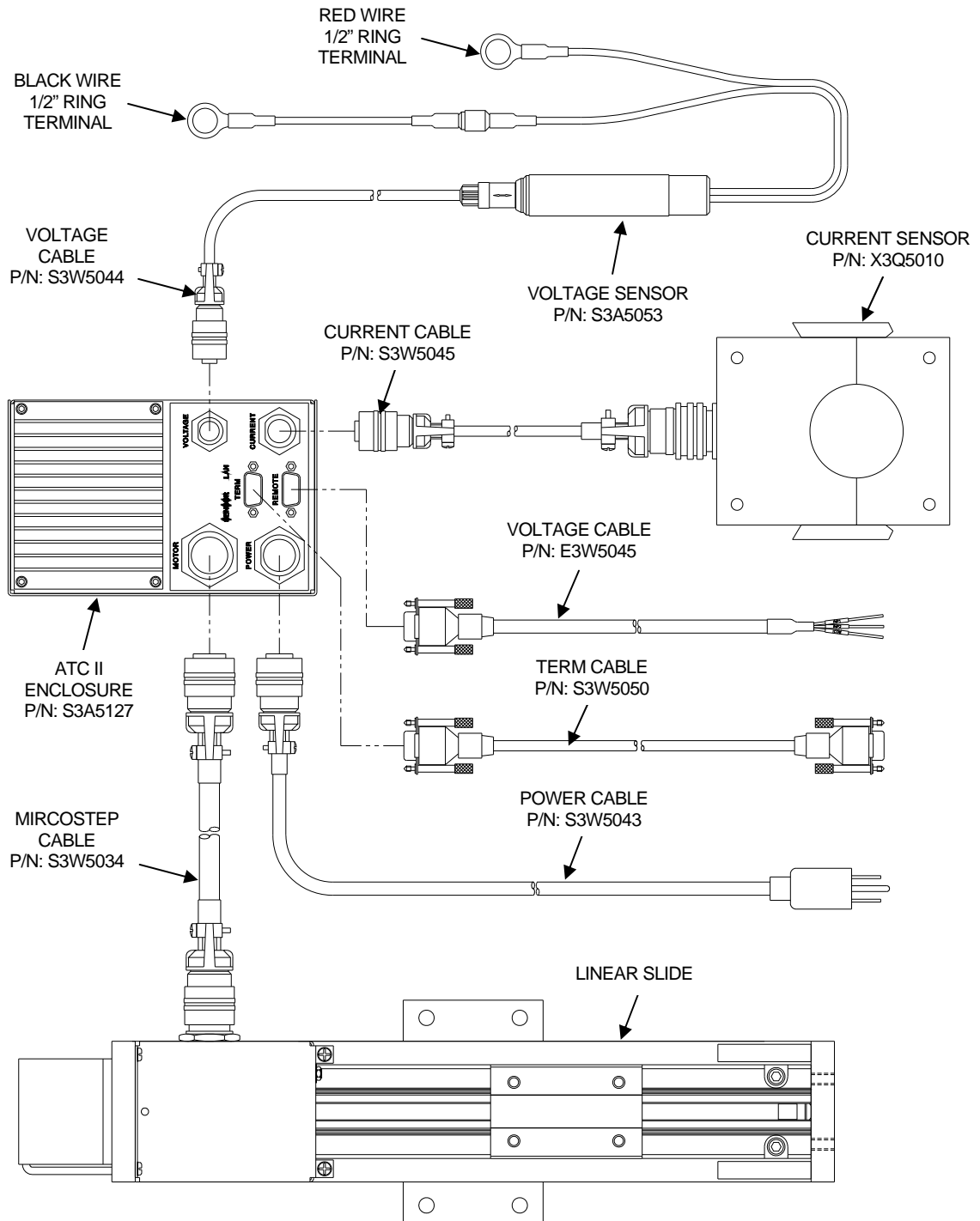POWER CABLE
P/N: S3W5043

LINEAR SLIDE

FIGURE 6 – System Layout

The ATC Control has a DB-9S remote control connector located on the rear panel of the ATC II (Fig 6). The remote inputs can be used to provide remote control of the ATC II and the outputs can be used to control a device through the ATC II (such as Power Source Weld Contactor to start the weld process). These functions are based on the configuration of the ATC II PLC Program. Figure 7 shows the pin-out for the remote connector and the Input/Output configuration for the I/O port.
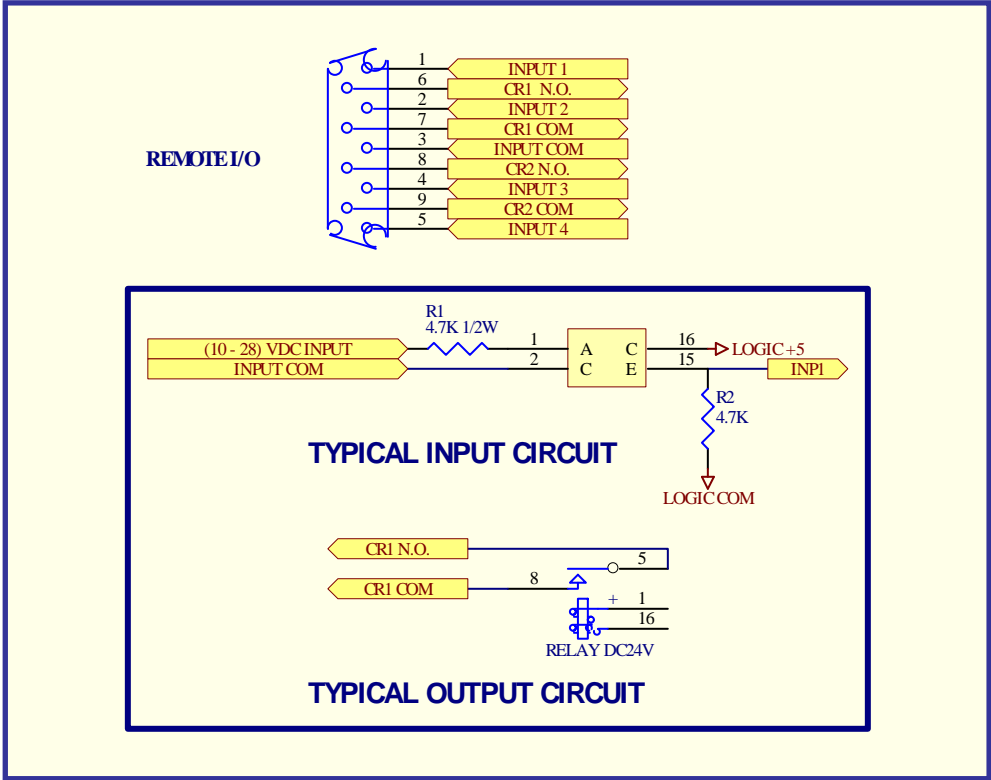

FIGURE 7 - Remote Input/Output Configuration

2.4   REMOTE CONTROL FUNCTIONS

All input and output functions are defined and controlled using he ATC II PLC Program

The following is a functional description of the remote control specifications:

PIN	FUNCTIONS
1	INP1 - 24 vdc remote input 1 (24vdc @ 5.0 ma. Active High)
2	INP2 - 24 vdc remote input 1 (24vdc @ 5.0 ma. Active High)
3	INP COM - Digital input signal common
4	INP3 - 24 vdc remote input 1 (24vdc @ 5.0 ma. Active High)
5	INP4 - 24 vdc remote input 1 (24vdc @ 5.0 ma. Active High)
6	CR1-A - CR1 relay Normally Open (N.O.) output (Default weld contactor)
7	CR1-B - CR1 common output (Default Weld contactor)
8	CR2-A - CR2 relay Normally Open (N.O.) output (Default arc active)
9	CR2-B - CR2 common output (Default arc active)

3.0 OPERATION

3.1 OPERATIONAL SEQUENCES

The following operational sequence is based on the **DEFAULT PLC** program provided with the unit. The operation may vary based on user defined PLC code. Refer to Section 5 for PLC programming information. Figure 8 shows the location of the operator controls.
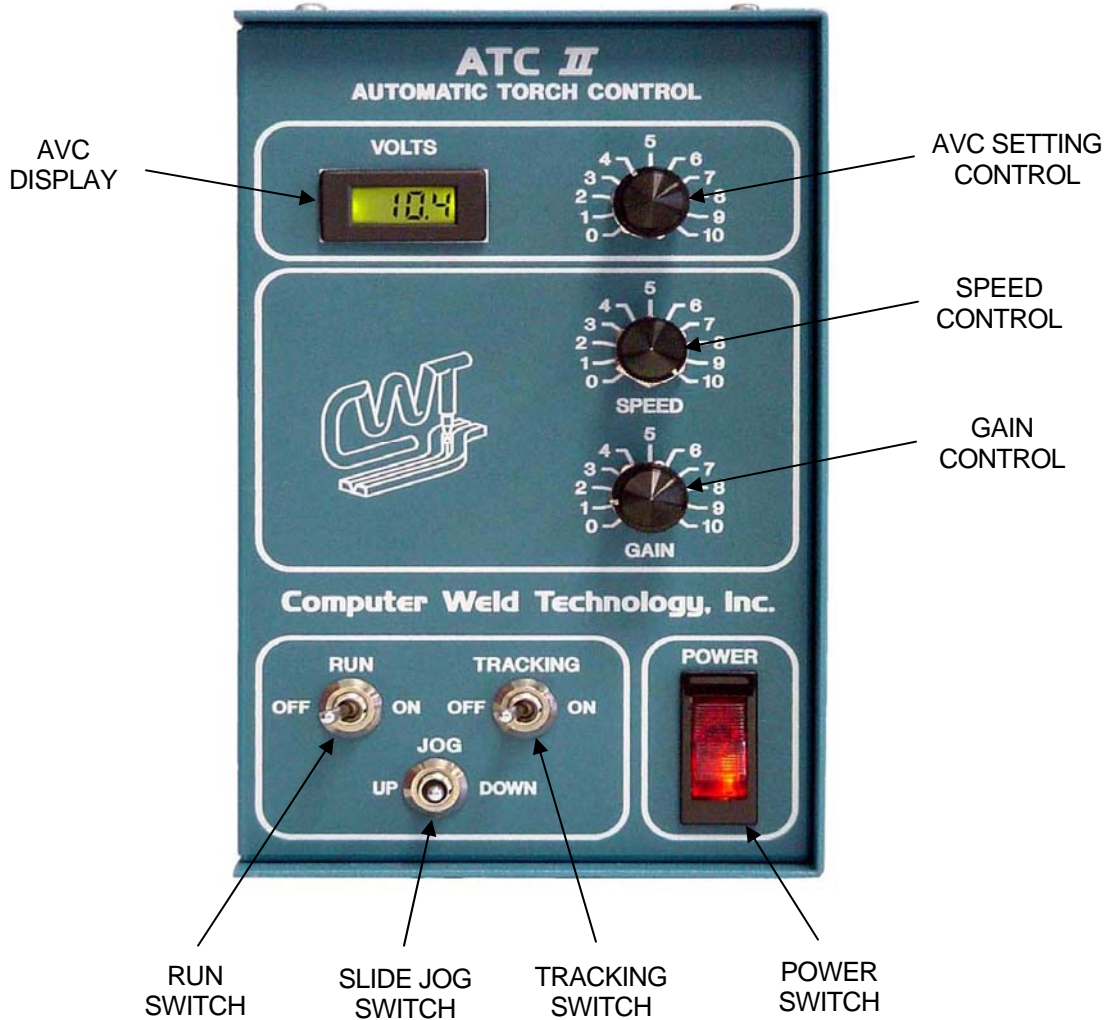

FIGURE 8 - Front Control Panel Layout

- **To operate the control**, turn the main power switch to the "Up" position. The power switch will illuminate indicating that the unit is operational. The AVC Display will illuminate and display the active AVC setting.

- **To initialize the slide**, turn the "RUN" switch to the "On" position. The Torch slide will move to the upper slide limit switch and stop. Turn the "RUN" switch to the "Off" position. **This operation must be performed every time the ATC II is powered on**. The front panel controls will remain inoperable until the slide is initialized.

- **To change the Slide speed**, adjust the "SPEED" control.

- **To change the AVC set point value** adjust the "AVC" control.

- **To move the Torch Slide** use the "JOG" switch. Holding the "JOG" switch in the "**UP**" direction will move Torch Slide in the up direction. Holding the "JOG" switch in the "**DOWN**" position will move the torch slide in the down direction. The "JOG" switch is disabled when the "TRACKING" Switch is on and the "ARC IS ACTIVE".

- **How to Set and Save the Torch Start Weld Position**.

1. With the "RUN" switch in the "OFF" position use the "JOG" Switch to move the Torch to the desired START WELD position.

2. To Save the START WELD position set the "RUN" switch to the "ON" position. By performing this operation the ATC will store the START WELD position of the torch slide.

- After the START WELD position is saved it can be restored to the saved START WELD position by toggling the "RUN" switch to the "Off" position. After the START WELD position has been restored move the "RUN" switch back to the "ON" position.

- **To operate the ATC II without saving a START WELD position** place the "RUN" switch in the "ON" position.

- Using the "JOG" switch set the torch to the desired weld start position.

- **To enable the AVC tracking** set the "TRACKING" switch to the "ON" position.

- Start the welding arc and the AVC control will begin operation when the arc is detected. To adjust the AVC set point, adjust the "AVC" control to the desired level.

- **To halt the AVC torch tracking** toggle the "TRACKING" switch to the "OFF" position. When the Tracking switch is "OFF" the "JOG" switch will be enabled and the operator can manually adjust the torch position.

To start a welding sequence using the DEFAULT PLC PROGRAM:

- Turn the "RUN" switch to the "ON" position.

- The ATC II will activate the CR1 output relay (connected to the Power Source Contactor through the optional Remote I/O Cable) and will wait for an arc on condition.

- **An arc on condition is set when the current is greater than 8 amps and the voltage is greater than 3.0 volts as detected by the Voltage and Current Sensor of the ATC II.** The arc active signal will be reset if current or voltage falls below preset values and tracking will stop.

- When the arc is active CR2 will be set.

- To activate the selected tracking mode set the "TRACKING" switch to the "ON" position. To disable the selected tracking mode set the "TRACKING" switch to the "OFF" position.

- While tracking the "GAIN" control can be used to adjust the sensitivity of the tracking. If the Torch is moving UP and DOWN too much the GAIN may be too HIGH. If the Torch moves too little the GAIN is too LOW. Adjust the GAIN until the Torch movement is stable.
  NOTE: If excessive "GAIN" is used the torch slide will over-correct and the weld bead will wander. Decrease the gain to obtain stable torch tracking.

- The control will start the tracking from the last position as determined when the "RUN" switch is set to the "ON" position.

- When the **"TRACKING" switch is set to the "OFF"** position the AVC control will be disabled. When the "TRACKING" switch is in the "OFF" position the Torch position can be moved by activating the "JOG" switch in the "UP" or "DOWN" position. When the "JOG" is returned to the center position the control will use the new torch position as the new start location.

4.1   SERIAL TERMINAL PORT INTERFACE

The RS-232 communications port is used to off-line program the ATC II PLC sequences drive motor parameters and the operating parameters for the ATC II. The Protocol is a simple ASCII command string that allows the user to up-load or download the various parameters. The serial port is configured for the following data format:

> *Baud Rate:*   *9600, Full Duplex*
> *Word Length:* *8 Data Bits, One Stop and no parity*
> *Hand Shaking:* *None*

4.2   PORT PROTOCOL

The Protocol consists of a command string and optional data bytes. The command string is an Alpha character and option number followed by a "=" or "?" followed by optional data and terminated with an ASCII "cr" (0dh). The "=" will indicate that data is being sent to the select parameter by the host controller. The "?" will indicate a request for data from the ATC II to the Host controller. If the host is up-loading data to the ATC II the data will be placed after the "=" character and will be an ASCII string terminated with an ASCII "cr" (0dh). The following is an example of sending a new step motor speed to the ATC II:

> *V1=1000(cr)*   *- Sent from Host*

To read the ATC II step motor speed, send the following command:

> *V1?(cr)*   *- Sent from Host*
> *1000(cr)*   *- Received from ATC II*

4.3   TERMINAL COMMANDS

The following is a summary of the RS-232 serial Commands supported by the ATC II:

COMMAND   **DESCRIPTION**

A1 - A4 Read ATC II Analog Inputs. The following is a summary of the analog command functions:

> **A1** - AVC Control Pot input (1 to 255 = 0.01 to 25.5 on the display).
>
> **A2** - Speed Pot input (255 = 5.12 vdc Step Rate = Value * Rate Multiplier (M5)).
>
> **A3** - Not Used.
>
> **A4** - Not Used.
>
> **A5** - Not Used.
>
> **A6** - Gain Pot analog input (255 = 5.12 vdc).
>
> **A7** - Current sensor excitation current (255 = 255 ma.)
>
> **A8** - Set motor Excitation current reference (255 = 2.55 amps).

M0 - M5 Set system control mode functions:

M0 - Set programmable sequence number to value.

M1 - Read Switch input status (1 = on, 0 = off)

BIT 0 = Remote INP1 (value= 1).
BIT 1 = Remote INP2 (value= 2).
BIT 2 = Slide Home Limit (value= 4).
BIT 3 = Remote INP4 (value= 8).
BIT 4 = "JOG UP" switch input (value= 16).
BIT 5 = "JOG DOWN" switch input (value= 32).
BIT 6 = "RUN" switch input (value= 64).
BIT 7 = "Track" switch input (value= 128).

M2 - Set output relays CR1 - CR2 (1=on, 0=off).

BIT 0 = Relay CR1 (value= 1)
BIT 1 = Relay CR2 (value= 2)

M3 - Set Step motor current value #.## amps (.55 - 2.55 amps).

M4 - Set Current sensor excitation value (1 - 255).

M5 - Set motor step rate multiplier value. Motor speed = [1 / (Value x Rate)].

M6 - Step motor scale factor (Steps / Distance).

M7 - Analog input automatic scan starting parameter (0 - 5). When the value is set to zero the front panel pot values will be used. To disable the pot controls set the scan value to 6. This will enable off-line programming of the oscillator parameters.

M8 - CWT LAN ID number. Setting a LAN ID value will disable the RS-232 communications and enable the LAN communications routines (Range 1 - 4).

M9 - Enable ATC II auto sequence routines.

Command	Function
M9=1	Enable Auto sequence input
M9=2	Clear Auto sequence input
M9=3	Set Initialize sequence input
M9=4	Calculate maximum position based on external limit switch inputs.

M10- Tracking gain.

M11- Set the Auto Arc On detection current level (0 – 255 amps).

M12- Enable/Disable tracking data up-load (1 = Enable, 0 = Disable).

M13- Set Tracking mode: 0 = Center line Tracking.
1 = Width control tracking.
2 = Left side Tracking with constant width
3 = Right side tracking with constant width.
********* *Firmware Version 1.22 or higher* *********
4 = AVC torch height control (Ver 1.22 or greater)
5 = ACC Torch Height control (Ver 1.22 or greater)

M14- Depth of penetration value used for tracking modes 1 - 2. The value controls the depth of penetration of the arc into the sidewall of the welding bevel.

M15 Torch height correction sample time period (10 – 255 msec)

S1 - S50 Programmable Sequence Commands - See Section 5.0 for description of programmable sequence commands and data format.

V1 - V9 Write/Read double byte variables:

    V1 = Motor speed value.

    V2 = Current Drive Position (Scaled step motor count).

    V3 = Move position value. Decrement by the step motor drive command.

    V4 = Maximum oscillator position limit.

    V5 = Slide center position.

    V6 = Slide Oscillator width.

    V7 = Maximum Slide Oscillation width limit used by the adaptive width tracking mode 1.

    V8 = Minimum Slide Oscillation width limit used by the adaptive width tracking mode 1.

    V9 = Current torch to work position.

    V10= Maximum cross seam correction limit.

    V11= Maximum torch to work correction limit.

    ***************** Firmware Version 1.22 or higher ********************************

    V12= Torch to work reference voltage used in tracking mode 4 and 5

    V13= Torch to work reference current used in tracking mode 4 and 5

    V14= Actual Arc Voltage value (0.1 volt increments, 100 = 10.0 volts)

    V15= Actual Arc Current value (1 amp increment, 100 = 100 amps)

In addition to the terminal commands the ATC II supports several special control key functions. These functions are used to save the programmed data in the EEPROM and to clear any pending terminal commands. The following commands are generated by pressing the CTRL" and specified letter key at the same time. When sending any of the following control codes, the ATC II will respond with an ASCII "CR". The following is a summary of the special control character function supported by the ATC II:

Control Code	Command Function
^W	Save current parameters and sequence values to ATC II EEPROM
^C	Reset the terminal serial port and clear any pending terminal commands
^S	Up-load stored sequence commands from ATC II to terminal.
^R	Load sequence commands from EEPROM to RAM

5.0   ATC II PROGRAMMABLE SEQUENCE PROTOCOL

5.1   PROGRAMMABLE SEQUENCES

The ATC II programmable sequence consists of a 3-byte command. The First byte is the command byte followed by a two-byte value:

{Byte1}, {Byte2 (MSB)(:)Byte3 (LSB)}

The value bytes must be set even if not required by the command. The value bytes may be branch addresses or real data passed to the selected function. The Command and value must be separated by a comma. The MSB byte and LSB byte of the value may be separated by a colon (":"). The colon will cause the MSB and LSB byte to concatenate to form a single two-byte value.

5.2   SPECIFIC COMMAND FUNCTION

When setting MSB and LSB bytes for specific command function the MSB and LSB byte may be separated by a ":" or the total value may be specified by the decimal equivalent of the two bytes. To set the decimal value for the MSB and LSB bytes use the following equation:

Decimal Value = (MSB x 256) + LSB

The following is an example of how to set sequence 4 to the "SWITCH ON" command (1) and branch to sequence number 10 when "OFF" (MSB) and to test switch input 1 (LSB):

Decimal Value = (MSB x 256)+LSB = (10 x 256)+1 = 2561

Decimal Command sent to ATC II:**S4=1,2561**
Optional Command format: **S4=1,10:1**

5.3   RELAY OUTPUTS

When Setting / Resetting the relay outputs the individual relays are selected by setting the decimal value for each relay and use the result as the value for the command. The following is an example of programming sequence 5 to set relay CR1 and CR2 using the "SET RELAY" command (2):

Decimal Value for CR1 = 1 and CR6 = 3
Decimal Value = 1 + 2 = 3
Command sent ATC II: **S5=2,3**

The following is the decimal value for individual bits used for the relay outputs and switch inputs:

BIT NUMBER	DECIMAL	RELAY	SWITCH INPUT SWITCH
BIT 0	1	CR1	INP1
BIT 1	2	CR2	INP2
BIT 2	4	N/A	Slide Home Limit
BIT 3	8	N/A	INP4
BIT 4	16	N/A	"JOG UP" Switch
BIT 5	32	N/A	"JOG DOWN" Switch
BIT 6	64	N/A	"RUN" Switch
BIT 7	128	N/A	"TRACK" Switch

5.5   AVAILABLE COMMAND

The following is summary of the available commands and the required values:

COMMAND   DESCRIPTION

0   **NOP** - No Operation increment to next sequence

Example: *S20=0,0*   *;Skip sequence - No operation.*

1   **SWITCH ON** - LSB selects switch input MSB is branch to sequence number if switch is "OFF". If MSB is zero, function will wait for switch "ON" condition then increment to next sequence.

Example 1:   *S20=1,0:1*   *;Wait for input 1 "ON".*
Example 2:   *S20=1,40:1*   *;If input 1 is "OFF" branch to SEQ40. If "ON" increment to next sequence*

2   **SWITCH OFF** - LSB selects switch input, MSB is branch to sequence number if switch is "ON". If MSB is zero, function will wait for switch "OFF" condition then increment to next sequence.

Example 1:   *S20=2,0:1*   *;Wait for input 1 "OFF".*
Example 2:   *S20=2,40:1*   *;If input 1 is "ON" branch to SEQ40. If "OFF" increment to next sequence*

3   **SET RELAY** - Set relay output specified by LSB byte (CR1 = 64 and CR2 = 128).

Example 1:   *S20=3,2*   *;Set CR2 relay output.*
Example 2:   *S20=3,3*   *;Set CR1 and CR2 relay output*

4   **CLEAR RELAY** - Clear relay output specified by LSB byte (CR1 = 64 and CR2 = 128).

Example 1:   *S20=4,2*   *;Reset CR2 relay output.*
Example 2:   *S20=4,3*   *;Reset CR1 and CR2 relay output*

5   **DELAY TIME** - Delay program execution by time specified by the value. The value specified is in 10 msecond increments. (Example: 13,50   Set delay time to 0.50 seconds)

Example: *S20=5,20*   *;Delay for 0,20 seconds.*

6   **AUTO EXECUTE** - If the Auto execute input is active branch to LSB sequence. If the Auto Execute input is not active branch to sequence number specified by the MSB. If MSB is 0 the function will wait until the input becomes active. If input is active the function will branch to the sequence number specified by the LSB byte. If the LSB is 0 the function increment to the next sequence.

Example: *S20=6,10:20*   *;If the auto active flag is set jump to SEQ 20 else jump to SEQ 10.*

7   **INITIALIZE** - If the Initialize input is active branch to LSB sequence. If the Initialize input is not active branch to sequence number specified by the MSB. If MSB is 0 the function will wait until the input becomes active. If input is active the function will branch to the sequence number specified by the LSB byte. If the LSB is 0 the function increment to the next sequence.

Example: *S20=7,10:20*   *;If the initialize flag is set jump to SEQ 20 else jump to SEQ 10.*

8   **CLEAR INITIALIZE** - Clear initialize input.

Example: *S20=8,0*   *;Clear Initialize Flag.*

9   **HALT MOVE** - Halt current move command and stop stepper drive motor.

Example: *S20=9,0*   *;Halt current move command and stop motor drive.*

10   **SET SPEED** - Value equal new drive velocity [LSB] (1 - 255).

Example: *S20=10,20*   *;Set motor speed to low speed ([1 / (Value * Rate)]).*

11   **SET POSITION** - Set current position to value specified by [MSB:LSB].

Example: *S20=11,1000*   *;Set current position to 1000.*

12   **SAVE POSITION** - Save current position encoder count to temporary position register and increment to next sequence.

Example: *S20=12,0*   *;Save current position.*

13   **RESTORE POSITION** - Move to position saved in temporary position register and increment to next sequence.

Example: *S20=13,0*   *;Restore save position and move oscillator to the saved position.*

14   **MOVE TO POSITION** - Move to position and increment to next sequence.

Example: *S20=14,1000*   *;Move oscillator to position specified.*

15   **SET MAXIMUM POSITION** - Set maximum position limit to value specified.

Example: *S20=15,10000*   *;Set oscillator maximum to position 10000.*

16   **LOAD POSITION TO MAX** - Set maximum position limit to current position.

Example: *S20=16,0*   *;Load current oscillator position to Max position.*

17   **JOG POSITION CW** - Add value specified to current position and move to new position.

Example:	*S20=17,100*	*;Jog current position 100 steps in the CW direction.*

18   **JOG POSITION CCW** - Subtract value specified from current position and move to new position.

Example:	*S20=18,100*	*;Jog current position 100 steps in the CCW direction.*

19   **MOVE COMPLETE** - Has drive completed the last move command? If the MSB byte is set the function will jump to the selected sequence number if the move is not complete. If the LSB byte is zero the function will wait for the move to be completed then increment to the next sequence or branch to the sequence number set by the LSB.

Example 1:	*S20=19,0*	*;Wait for oscillator move complete*
Example 2:	*S20=19,40:0*	*;Is oscillator move complete? No - Branch to SEQ 40*

20   **SET LOOP COUNTER** - Load selected loop counter (0-4) with starting value. MSB byte is the value to load and the LSB byte is the selected counter. There are 5 Loop counters available.

Example:	*S20=20,25:1*	*;Load Loop counter 1 with a value of 25.*

21   **INCREMENT LOOP COUNTER** - Increment the selected counter (0 - 4) and set the condition code register. The LSB byte selects the loop counter to Increment.

Example:	*S20=21,1*	*;Increment Loop counter 1 and set condition code register.*

22   **DECREMENT LOOP COUNTER** - Decrement the selected counter (0 - 4) and set the condition code register. The LSB byte selects the loop counter to decrement.

Example:	*S20=22,1*	*;Decrement Loop counter 1 and set condition code register.*

23   **CLEAR LOOP COUNTER** - Clears the selected loop counter (0 - 4). The LSB byte selects the desired loop counter to be cleared and sets the condition code register.

Example:	*S20=23,1*	*;Clear Loop counter 1 and set condition code register.*

24   **JUMP TO SEQUENCE** - Jump to sequence specified by LSB byte.

Example:	*S20=24,40*	*;Jump to sequence S40.*

25   **JUMP SUBROUTINE** - Jump to specified sequence number subroutine. The sequence subroutine must be terminated with a return from subroutine command (32). The ATC II allows nesting of up to 5 subroutines. All commands may be used in subroutines.

Example:	*S20=25,40*	*;Jump to subroutine at sequence S40.*

26   **RETURN FROM SUBROUTINE** - Returns the sequence counter to the "jump subroutine " sequence number plus 1. If a return subroutine command is executed with out a "jump subroutine " the sequence counter will be incremented to the next sequence.

Example:	*S20=26,0*	*;Return from subroutine.*

27   **COMPARE VALUE TO POSITION** - Compares the value (MSB, LSB) to the current position and set the condition code register. The comparison is a subtraction of the current position from the command value (CURRENT POSITION - COMMAND

Example: *S20=27,1000*   *;Compare current position to 1000 and set condition code register.*

28   **COMPARE SWITCH INPUT** - Compares the current ATC II switch inputs to the binary value specified in the LSB byte (SWITCH - VALUE) and sets the condition code register.

Example: *S20=28,3*   *;Compare input to 3 (Input 1 and 2 active) and set condition code register.*

29   **COMPARE LOOP VALUE** - Compares the loop counter specified by the LSB byte to VALUE).

Example: *S20=29,10:1*   *;Compare Loop counter 1 to 10 and set condition code registers.*

30   **BRANCH NOT EQUAL** - Branch to sequence specified by LSB byte as a result of the previous parameter value not being equal to command value or not equal zero. As specified by the condition code register. If not zero increment to next sequence number.

Function: (Parameter != Compare) then Branch to Seq #

Example: *S20=30,40*   *;If comparison parameter is not equal to value branch to SEQ 40.*

31   **RANCH IF LOWER** - Branch to sequence specified by LSB as a result f the previous parameter value being less than the command value. As specified by the condition code register. If not less than stored value increment to next sequence number.

Function: Parameter < Compare then Branch to Seq #

Example: S20=31,40   *;If comparison parameter < value branch to SEQ 40.*

32   **BRANCH IF HIGHER** - Branch to sequence specified by LSB byte as a result of the previous parameter value being greater than the command value. As specified by the condition code register. If not greater than parameter value increment to next sequence number.

Function: Parameter > Compare then Branch to Seq #

Example: S20=32,40   *;If comparison parameter > value branch to SEQ 40.*

33   **BRANCH IF EQUAL** - Branch to sequence specified by LSB byte as a result of the previous parameter value being equal to the command value (Note: result of comparison is zero). As specified by the condition code register. If not equal to parameter value increment to next sequence number.

Function: Parameter = Compare then Branch to Seq #

Example: S20=33,40   *;If comparison parameter = value branch to SEQ 40.*

34   **BRANCH IF HIGHER OR EQUAL** - Branch to sequence specified by LSB byte as a result of the previous parameter value being greater than or equal to the command value. As specified by the condition code register. If not greater than command value increment to next sequence number.

Function: Parameter >= Compare then Branch to Seq #

35   **BRANCH IF LESS THEN OR EQUAL** - Branch to sequence specified by LSB byte as a result of the previous parameter value being less than or equal to the command value (Note: result of comparison is zero). As specified by the condition code register. If not equal to parameter value increment to next sequence number.

 Function: Parameter <= Compare then Branch to Seq #

Example: S20=35,40   ;If comparison parameter <= to value branch to SEQ 40.

36   **START OSCILLATOR** - Start the mechanical oscillation based on current width, speed, and dwell parameters.

Example: S20=36,0 ;Start oscillation.

37   **STOP OSCILLATOR** - Halt the current oscillation and move oscillator to the current center position.

Example: S20=37,0 ;Stop oscillation.

38   **START TRACKING** - Start centerline tracking with the mode specified by the [LSB] byte. The following are the valid tracking mode commands: 0 = Centerline tracking, 1 = Width control tracking, 2 = Right side tracking, 3 = Left side tracking.

Example 1: S20=38,0   Start tracking using the centerline mode
Example 2: S20=38,1   Start tracking using the width mode
Example 3: S20=38,2   Start tracking using the Right side mode
Example 4: S20=38,3   Start tracking using the Left side mode

39   **STOP TRACKING** – Disable the centerline tracking functions.

Example: S20=39,1   Disable center line tracking

40   **CR1 ON/OFF** - Activate CR1 based on the [LSB] specified input. If the [LSB] input is active set CR1,. If the [LSB] byte specified input is inactive reset CR1.

Example: S20=38,1 ;Set/Reset CR1 based on input 1 status

41   **CR2 ON/OFF** - Activate CR2 based on the [LSB] specified input. If the [LSB] input is active set CR2,. If the [LSB] byte specified input is inactive reset CR2.

Example: S20=39,1 ;Set/Reset CR2 based on input 1 status

42   **OSCILLATOR ON/OFF** – Activate the Oscillator based on the [LSC] specified input. If the [LSB] input is active start the Oscillator. If the [LSB] byte specified input is inactive stop the oscillator.

Example: S20=40,1 ;Start/Stop the oscillator based on input 1 status

43   **TRACK ON/OFF** - Activate the tracking mode specified by the [MSB] based on the [LSB] specified input. If the [LSB] input is active, start the tracking mode specified by the [MSB] byte. If the [LSB] byte is inactive disable the tracking function. The following are the valid tracking mode [MSB] values: 0 = Centerline tracking, 1 = Width control tracking, 2 = Right side tracking, 3 = Left side tracking.

Example 1: S20=43,0:1   If INP 1 is active start tracking using the centerline mode
Example 2: S20=43,1:1   If INP 2 is active start tracking using the width mode
Example 3: S20=43,2:1   If INP 1 is active start tracking using the Right side mode
Example 4: S20=43,3:1   If INP 2 is active start tracking using the Left side mode

44   **JOG CW ON/OFF** - Jog the oscillator center position in the CW direction by the value specified in the [MSB] byte.   The [LSB] specifies the input to test. If the [LSB] specified input is active jog the center position by the value specified in the [MSB] byte. If the [LSB] byte is inactive the change center position is unchanged.

   Example: S20=41,10:1   ;If INP 1 is active increment center position 10 steps in the CW direction

45   **JOG CCW ON/OFF** - Jog the oscillator center position in the CCW direction by the value specified in the [MSB] byte.   The [LSB] specifies the input to test. If the [LSB] specified input is active jog the center position by the value specified in the [MSB] byte. If the [LSB] byte is inactive the change center position is unchanged.

   Example: S20=42,10:1   ;If INP 1 is active increment center position 10 steps in the CCW direction

46   **WAIT FOR ARC ON CONDITION** - Wait for valid arc condition defined by arc voltage greater then 2.5 volts and current greater then 10 amps.   If MSB byte is set the function will branch to the selected sequence number while the ARC ON Flag is clear. If the LSB is set and the "ARC ON" flag is set the function will branch to the specified sequence. If the LSB is zero the function will increment to next sequence.

   Example 1: S20=46,0   Wait for Arc Active.
   Example 2: S20=46,40:30   If Arc is not active branch to SEQ 40. If Arc is active branch to SEQ 30

47   **SET WIDTH** - Set oscillation width control to [LSB] (0 - 255) value. This function is used to set a default width Pot value when the auto scan function is set to 5 to disable user Pot controls.

   Example: S20=47,20   ;Set oscillation width to LSB value.

************ *Only Available In Firmware Version 1.21 Or Greater* ************

48   **SET RIGHT DWELL** - Set oscillation Right Dwell control to [LSB] (0 - 255) value. This function is used to set a default Right Dwell Pot value when the auto scan function is set to 5 to disable user Pot controls.

   Example: S20=48,20   ;Set oscillation Right Dwell to LSB value.

49   **SET LEFT DWELL** - Set oscillation Left Dwell control to [LSB] (0 - 255) value. This function is used to set a default Left Dwell Pot value when the auto scan function is set to 5 to disable user Pot controls.

   Example: S20=49,20   ;Set oscillation Left Dwell to LSB value.

50   **SET CENTER DWELL** - Set oscillation Center Dwell control to [LSB] (0 - 255) value. This function is used to set default Center Dwell Pot value when the auto scan function is set to 5 to disable user Pot controls.

   Example: S20=50,20   ;Set oscillation Center Dwell to LSB value.

51   **SET TRACKIN GAIN** - Set Cross Seam Tracking Gain control to [LSB] (0 - 255) value. This function is used to set default Tracking Gain Pot value when the auto scan function is set to 5 to disable user Pot controls.

   Example: S20=51,20   ;Set Tracking Gain to LSB value.

   ******************************** *Firmware Version 1.22 or Higher* ********************************

52   **SET VOLT REFERANCE** - Set Voltage reference to the value and increment to the next sequence. This value is used as a reference for torch height control tracking mode 4 or 5. The units are in 0.1-volt increments (i.e. 100 = 10.0 volts)

Example: *S20=52,230*   *;Set Torch tracking voltage to 23.0 volts.*

53   **SET CURRENT REFERANCE** - Set Current reference to the value and increment to the next sequence. This value is used as a reference for torch height control tracking mode 4 or 5. The units are in 1-amp increments (i.e. 100 = 100 amps).

Example: *S20=53,220*   *;Set Torch height to 220 amps.*

54   **TOUCH-RETRACT** – This command provides an automatic touch retract torch routine. The [MSB} byte sets the retract distance and the [LSB] sets the step down increments. When this command is executed the Torch slide will be move down until the sensed arc voltage falls below 0.8 volts. The command will then halt the down ward motion and back up the number of steps set in the [MSB] byte. This routine requires an external voltage source be applied to the torch and is normally used with GTAW application.

Example: *S20=54,100:2*   *; 100 step retract and 2 step down increment .*

55   **HOME SLIDE** – Find Upper home position of a vertical slide assemble. Requires external N.C. upper limit switch to indicate home position. The [LSB] byte specifies the remote input used to indicate the Home position. This command will set the current slide position to the user defined V4 max position limit and will move the slide up until the selected remote input [LSB] is inactive or the max position step count has been reached.

Example: *S20=55,1*   *;Home vertical slide using INP1 as home limit.*

56   **SET VOLT REF TO POT** - Set Volt reference, for torch height tracking, to the Pot value specified by the [LSB]. This function is used to set torch Tracking reference voltage to the value controlled by the selected control panel pot. The auto scan function must be enabled. The [LSB] sets the control pot that is used (0 = A1… 5 =A6).

Example: *S20=56,1*   *;Set Volt Reference to the Width Pot.*

57   **SET CURRENT REF TO POT** - Set Current reference, for torch height tracking, to the Pot value specified by the [LSB]. This function is used to set torch tracking reference current to the value controlled by the selected control panel pot. The auto scan function must be enabled. The [LSB] sets the control panel pot that is used (0 = A1… 5 =A6).

Example: *S20=56,3*   *;Set Current Reference to the Center Dwell Pot.*

58   **MOVE SLIDE CW BY INPUT VALUE** – Move slide in CW direction based on Input Value specified by the [LSB] at the speed specified by the [MSB]. This function moves the slide in the CW Direction when the Input Value is equal to the Value in the [LSB] at the speed indicated in the [MSB].

Example: *S20=58,200:16*   *;If Input Value Equals 16 (Input 5 is Active) Move*
                                          Slide Down at Speed of 200.

59   **MOVE SLIDE CCW BY INPUT VALUE** – Move slide in CCW direction based on Input value specified by the [LSB] at the speed specified by the [MSB]. This function

5.6   FACTORY DEFAULTS

As shipped from the factory the ATC II has a basic operation PLC program. The PLC code allows the user to start/stop the welding process using the "RUN" switch. By connecting the CR1 relay output to the "Gun Switch" input on the wire feeder the ATC II will activate the welding system. When an arc is established the oscillator will be activated. The centerline-tracking mode will be activated when the operator activates the "TRACKING" switch.   The PLC code is divided into three sections. The first section is the non-welding routine and consists of Sequence 1 - 5. This section checks the various input control switches and will jog the oscillator center, start/stop the oscillator and start the welding sequence. The second section is the welding routines. When the "RUN" switch is active the CR1 relay is set and the PLC code will wait for an arc on condition. When the arc is established the oscillator will automatically start. When the "TRACKING" switch is activated the ATC II will begin centerline tracking. To change the mode of tracking the user will need to change line S10 to reflect the desired tracking mode. The operator can also jog the oscillation center position using the "JOG" control switch. The following is a listing of the default PLC program provided:

```
;═══════ ATC II AVC TRACKING SYSTEM CONFIGURATION PARAMTERS ═══════
;         CR1 - Cycle Start Latch Relay Output
;         CR2 - ARC Active Travel Start Relay
;         INP1 - Not Used
;         INP2 - Not Used
;         INP3 - Slide Home Input
;         INP4 – Not Used
;
;═══════════════════════════ ATC II Default  PLC ════════════════════════
S1=25,30              ; Jump to Initialize Subroutine S30
;═══════════ Idle Switch Test Routine═════════════════════════════-
S2=25,25             ; Jump to Jog Up/Down Subroutine S25
S3=1,2:64            ; IS RUN SWITCH ON - NO GO TO SEQ 2

;═════════════════════ WELD "ON" ROUTINE ══════════════════════════
S4=12,0              ; Save Current Position
S5=3,1               ; SET RELAY 1 "CYCLE ON"
S6=1,16:64           ; Is RUN Switch still active? No End Weld
S7=25,25             ; Check JOG switch inputs
S8=46,6:9            ; IS ARC ACTIVE?  NO - GO TO S8 AND RECHECK

;------------------- ARC Active Scan Routine --------------------------
S9=3,2               ; SET ARC ACTIVE RELAY CR2
S10=43,4:128         ; START/STOP CENTER LINE TRACKING BASED ON SWITCH?
S11=2,13:128         ; IF Tracking on THEN skip Jog Switch Test
S12=25,25            ; ELSE - Check for Jog Switch Command
S13=56,0             ; Load A1"Volt" pot to Volt Reference
S14=1,16:64          ; IS WELD SWITCH STILL ON - NO GOTO S16 END WELD
S15=46,16:9          ; IS ARC STILL ACTIVE - NO GOTO S22 ELSE GOTO S16

;═══════════════════ END WELD CYCLE ══════════════════════════════
S16=39,4             ; STOP CENTER LINE TRACKING
S17=4,2              ; RESET CR2 "ARC ACTIVE" RELAYS
S18=2,6:64           ; Wait for Input Off
S19=3,1              ; Reset "Cycle On" Relay
S20=10,255           ; Set Speed
S21=13,0             ; Restore Position
S22=19,0             ; Wait for Move Complete
S23=24,2             ; JUMP TO SEQ 2
```

```
;═══════════ Jog Up/Down Subroutine ═══════════════════
S25=58,200:32        ; IF CW SWITCH ON - JOG CW
S26=5,5              ; Delay
S27=59,200:16        ; IF CCW SWITCH ON - JOG CCW
S28=26,0             ; Return from Subroutine


;═══════════ Initialize Routine ═══════════════════-
S30=1,64             ; Wait for "RUN" switch on
S31=4,3              ; Reset all Relays
S32=5,1              ; Delay
S33=55,4             ; Home Slide and wait for Input 3
S34=19,0             ; Wait for Move Complete
S35=11,1             ; Reset position Register
S36=2,64             ; Wait for Run Switch Off
S37=26,0             ; Return from Subroutine
```
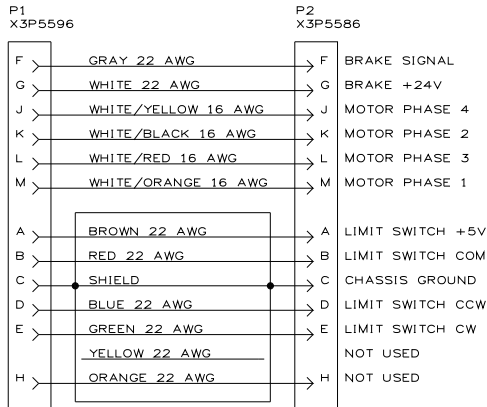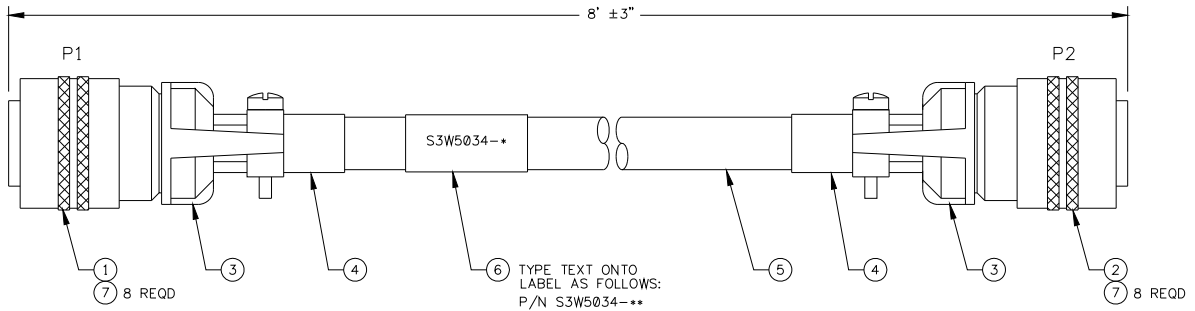
A.1   ATC II CONTROL ENCLOSURE
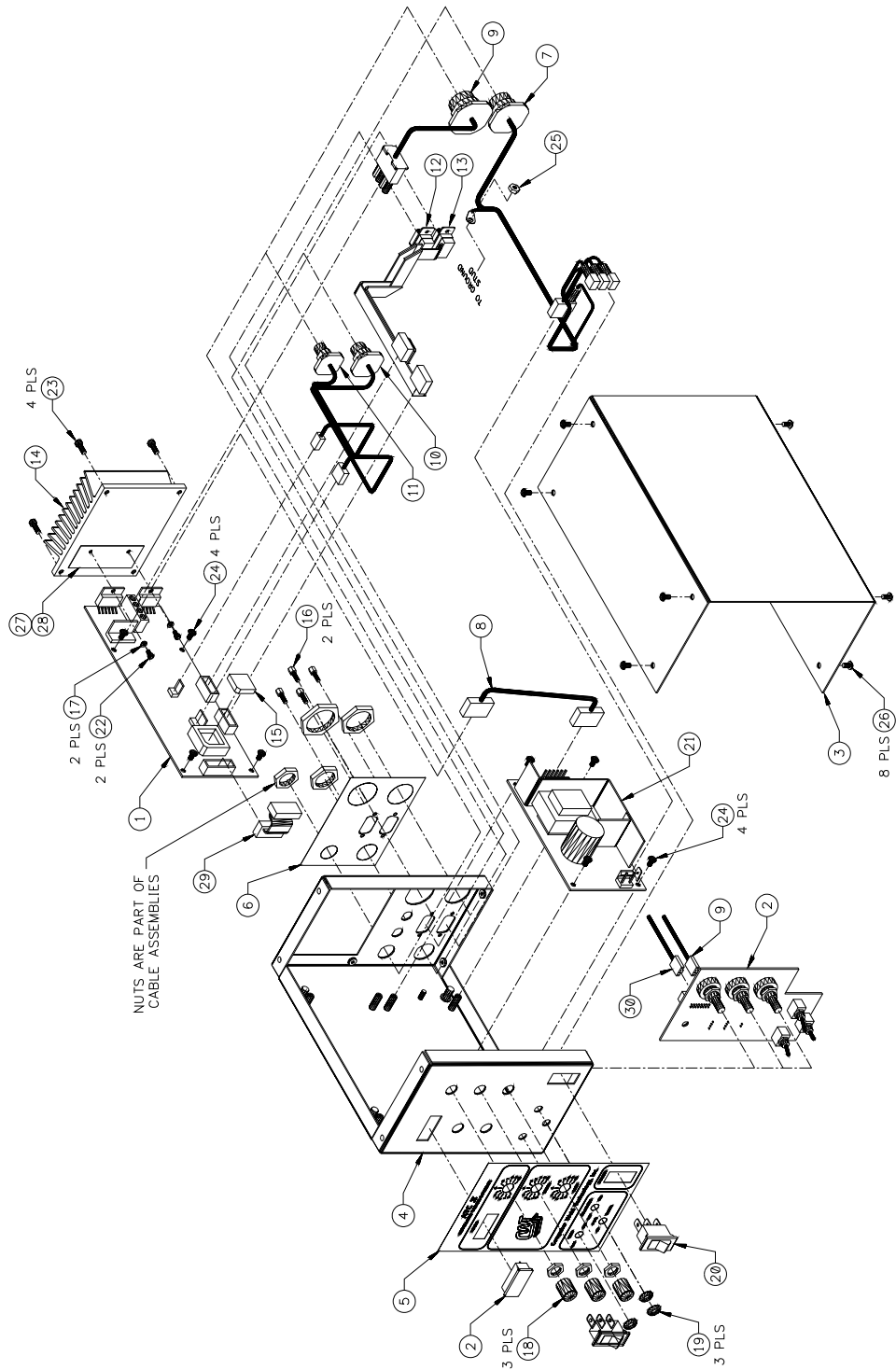
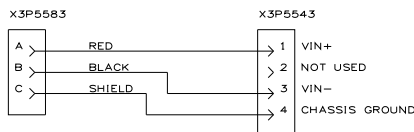| COMPUTER WELD TECHNOLOGY – PARTS LIST			
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	E5A5027	WOC–1000 CONTROL PCB ASSY
2	1	S5A5047	ATC II FRONT PANEL PCB ASSY
3	1	E3E5010	WOC–500 COVER
4	1	S3E5100	ATC II ENCLOSURE
5	1	S3E5098	ATC II FRONT OVERLAY
6	1	E3E5014	WOC–1000 REAR OVERLAY
7	1	E3W5037	WOC–1000 POWER IN CABLE
8	1	S3W5140	ATC II 24VDC CABLE
9	1	S3W5154	ATC II MOTOR AND SENSOR CABLE
10	1	E3W5040	WOC–1000 CURRENT CABLE
11	1	E3W5041	WOC–1000 VOLTAGE CABLE
12	1	E3W5042	WOC–1000 TERM CABLE
13	1	E3W5043	WOC–1000 REMOTE CABLE
14	1	E3E5015	WOC–1000 HEATSINK
15	1	S5I5002	ATC II PROCESSOR
16	2	X3Z5027	"AMP" D–SUB SCREWLOCK KIT #205817–3
17	2	X5Z5007	"THERMALLOY" SHOULDER WASHER #7721–7PPS
18	3	X6A5015	"ALCOSWITCH" BLACK KNOB #KD500B1/4
19	3	X3Z5038	"C&K" DRESS NUT #7760
20	1	X3S5078	"ARROWHART" ROCKER SWITCH #1600R11E
21	1	X3T5067	"COMPUTER PROD" 24V POWER SUPPLY #NFS40–7624
22	2		4–40 X 1/4" PAN HD SCW w/WASHER
23	4		6–32 X 3/8" SOCKET HD CAP SCREW
24	8		6–32 X 1/4" PAN HD SCW w/WASHER
25	1		6–32 HEX NUT
26	8		6–32 X 1/4" BLACK BTN HD SCREW
27	A/R		"TERMALLOY" TERMAL COMPOUND
28	0.1'		"3M" KAPTON TAPE
29	1	A3W0155	2" 16 PIN IDC CABLE
30	1	S3W5138	ATC II LIMITS CABLE

A.2 MICROSTEP MOTOR CABLE P/N: S3W5034

8' ±3"

P1

P2

S3W5034-*

1 7 8 REQD
3
4
6 TYPE TEXT ONTO LABEL AS FOLLOWS: P/N S3W5034-**
5
4
3
2 7 8 REQD

P1
X3P5596

P2
X3P5586

F	GRAY 22 AWG	F	BRAKE SIGNAL
G	WHITE 22 AWG	G	BRAKE +24V
J	WHITE/YELLOW 16 AWG	J	MOTOR PHASE 4
K	WHITE/BLACK 16 AWG	K	MOTOR PHASE 2
L	WHITE/RED 16 AWG	L	MOTOR PHASE 3
M	WHITE/ORANGE 16 AWG	M	MOTOR PHASE 1
A	BROWN 22 AWG	A	LIMIT SWITCH +5V
B	RED 22 AWG	B	LIMIT SWITCH COM
C	SHIELD	C	CHASSIS GROUND
D	BLUE 22 AWG	D	LIMIT SWITCH CCW
E	GREEN 22 AWG	E	LIMIT SWITCH CW
	YELLOW 22 AWG		NOT USED
H	ORANGE 22 AWG	H	NOT USED

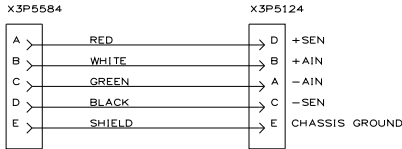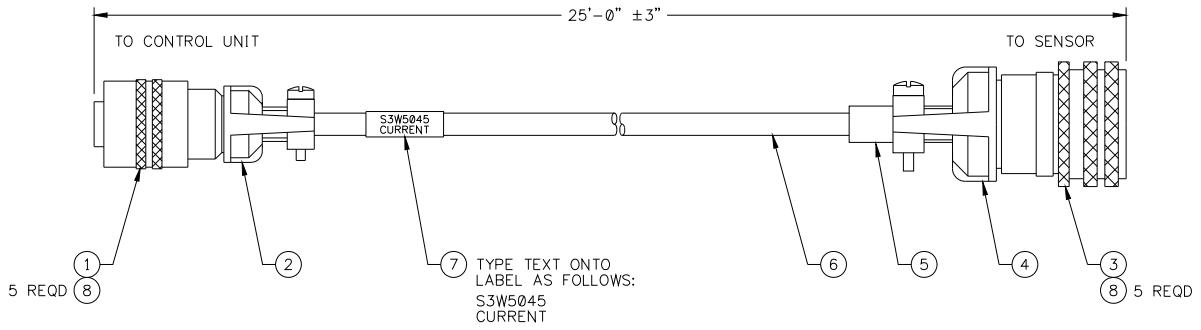| COMPUTER WELD TECHNOLOGY – PARTS LIST			
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	X3P5596	Connector, Plug 12 Circuit – Bendix #PT06A-14-12S
2	1	X3P5586	Connector, Plug 12 Circuit – Bendix #PT06A-14-12P
3	2	X3P5589	Clamp, Cable – Amphenol #97-3057-1008
4	2	X3P5505	Boot, Cable Clamp – Amphenol #9779-513-8
5	**	X3W5080	Cable, CWT Custom
6	1		Sleeve, Cable Heat Shrink – Tyco #RPS-8-4/2.0-S1-9
7	16		Tubing, Heat Shrink ø1/8" x 1/2" long

A.3 VOLTAGE SENSOR CABLE P/N: S3W5044

25'-0" ±3"

TO CONTROL UNIT

"A"

TO SENSOR

S3W5044
VOLTAGE

1 3 REQD 6
2
5 TYPE TEXT ONTO LABEL AS FOLLOWS: S3W5044 VOLTAGE
4
VIEW "A-A"
3 3 REQD 6

X3P5583

X3P5543

A	RED	1	VIN+
B	BLACK	2	NOT USED
C	SHIELD	3	VIN-
		4	CHASSIS GROUND

PARTS LIST			
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	X3P5583	"BENDIX" CONN., PLUG 3 CIRCUIT #PT06A-8-3S
2	1	X3P5587	"APMHENOL" CLAMP, CABLE #97-3057-1003
3	1	X3P5543	"REDEL" CONN., PLUG 4 PIN GRAY #PAG-M04-GLAC52C
4	25'	X3W5025	"BELDEN" CABLE, 3 COND. SHIELDED #8771
5	1		"BRADY" LABEL, CABLE WRAP #THT-75-427-3
6	6		TUBING, HEAT SHRINK ø1/8" X 1/2" LONG

NOTES:
1 – INSTALL HEAT SHRINK TUBING (ITEM 6) ON ALL WIRES SOLDERED TO TERMINALS OF BOTH CONNECTOR (ITEMS 1 & 3).

A.4 CURRENT SENSOR CABLE P/N: S3W5045

25'-0" ±3"

TO CONTROL UNIT

TO SENSOR

S3W5045
CURRENT

① ② ⑦ TYPE TEXT ONTO
LABEL AS FOLLOWS:
S3W5045
CURRENT

⑥ ⑤ ④ ③

5 REQD ⑧   ⑧ 5 REQD

X3P5584   X3P5124

A	RED	D	+SEN
B	WHITE	B	+AIN
C	GREEN	A	−AIN
D	BLACK	C	−SEN
E	SHIELD	E	CHASSIS GROUND

NOTES:
1 – INSTALL HEAT SHRINK TUBING (ITEM 8) ON
ALL WIRES SOLDERED TO TERMINALS OF BOTH
CONNECTOR (ITEMS 1 & 3).

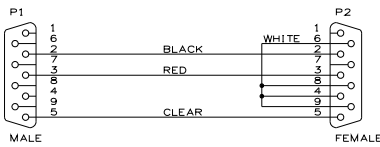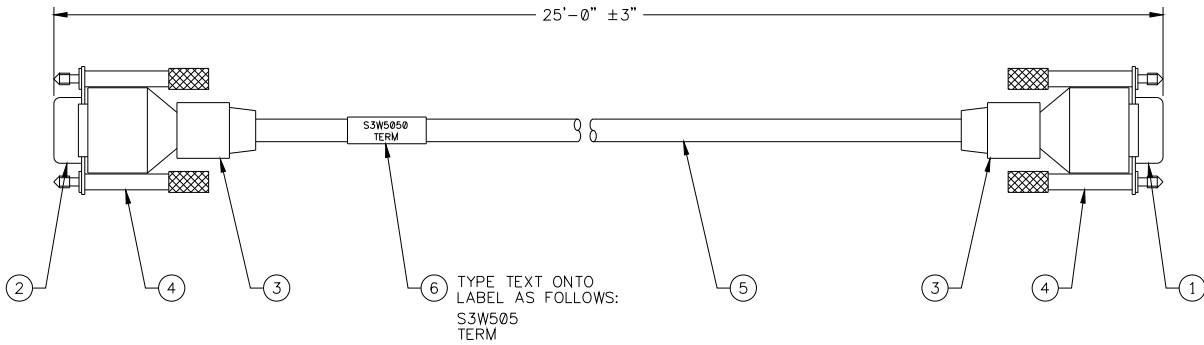|		PARTS LIST	
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	X3P5584	"BENDIX" CONN., PLUG 5 CIRCUIT #PT06A−10−5P
2	1	X3P5588	"APMHENOL" CLAMP, CABLE #97−3057−1004
3	1	X3P5124	"AMPHENOL" CONN., PLUG 5 CIRCUIT #MS3106A−14S−5P
4	1	X3P5126	"AMPHENOL" CLAMP, CABLE #97−3057−1007
5	1	X3P5519	"AMPHENOL" BOOT, CABLE CLAMP #9779−513−6
6	25'	X3W5037	"BELDEN" CABLE, 4 COND. SHIELDED #9940
7	1		"BRADY" LABEL, CABLE WRAP #THT−75−427−3
8	10		TUBING, HEAT SHRINK ⌀1/8"x1/2" LG

A.5 POWER CABLE P/N: S3W5043

6'-7" ±3"

S3W5043

① ② ③ ⑤ USING PERMINATE INK MARKER,
WRITE PART NUMBER ON LABEL
THEN WRAP LABEL AROUND CABLE.

④

X3P5585   X3W5022

A	BROWN	LIVE
B	LIGHT BLUE	NEUTRAL
C	GREEN/YELLOW	GROUND

		PARTS LIST	
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	X3P5585	"BENDIX" CONN., PLUG 3 CIRCUIT #PT06A−12−3S
2	1	X3P5126	"APMHENOL" CLAMP, CABLE #M85049/41−6A
3	1	X3P5519	"AMPHENOL" BOOT, CABLE CLAMP #9779−513−6
4	1	X3W5022	"BELDEN" CABLE, POWER #17534
5	1	X3Z5089	"TYTON" TAG, IDENTIFICATION

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A.6   TERM CABLE P/N: S3W5050

25'-0" ±3"

S3W5050
TERM

②   ④   ③

⑥ TYPE TEXT ONTO
LABEL AS FOLLOWS:
S3W505
TERM

⑤   ③   ④   ①

P1   P2

1   1
6   WHITE   6
2   2
7   BLACK   7
3   RED   3
8   8
4   4
9   9
5   CLEAR   5

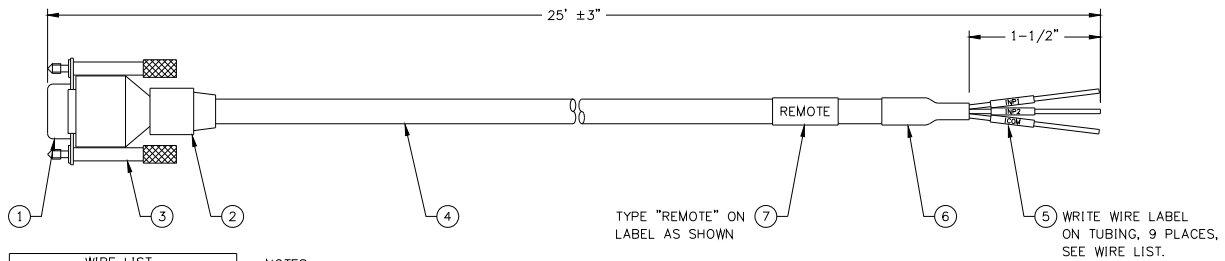MALE   FEMALE

NOTES:
1 – USE 22 AWG WHITE WIRE TO JUMPER PINS
     4, 6, 8 AND 9 AT FEMALE CONNECTOR.
1 – SOLDER CABLE SHIELD AT BOTH ENDS TO
     D-SUB SHELL.

PARTS LIST

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	X3P5484	"SPC TECH" CONN., 9 SOCKET D-SUB #DE-9SSP
2	1	X3P5479	"SPC TECH" CONN., 9 PIN D-SUB #DE-9PMP
3	2	X3Z5081	"3M" SHELL, D-SUB #3357-9209
4	2	X3Z5084	"3M" KIT, THUMB SCREW D-SUB #3341-7
5	25'	X3W5025	"BELDEN" CABLE, 3 COND. SHIELDED #8771
6	1		"BRADY" LABEL, CABLE WRAP #THT-75-427-3
7	0.2'		WIRE, 22 AWG WHITE TEFLON COATED

A.7   REMOTE I/O CABLE P/N: E3W5045

25' ±3"

1-1/2"

REMOTE

INP1
INP2
COM

①   ③   ②

④

TYPE "REMOTE" ON
LABEL AS SHOWN   ⑦

⑥

⑤ WRITE WIRE LABEL
ON TUBING, 9 PLACES,
SEE WIRE LIST.

WIRE LIST

WIRE TYPE	PIN NO.	LABEL
BROWN	1	INP1
RED	2	INP2
ORANGE	3	ICOM
YELLOW	4	INP3
GREEN	5	INP4
BLUE	6	CR1-A
VIOLET	7	CR1-B
GRAY	8	CR2-A
WHITE	9	CR2-B

NOTES:
1 – BLACK WIRE IS NOT USED.
2 – SOLDER CABLE SHIELD TO D-SUB SHELL (ITEM 2).
     AT OTHER END OF CABLE, THE SHIELD IS TO BE
     CUT OFF AND COVERED WITH 1/4" HEAT SHRINK
     TUBING (ITEM 6).

COMPUTER WELD TECHNOLOGY – PARTS LIST

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	X3P5484	"AMP" CONN., 9 CIRCUIT SOCKET D-SUB #747905-2
2	1	X3Z5081	"3M" SHELL, D-SUB #3357-9209
3	1	X3Z5084	"3M" KIT, THUMB SCREW D-SUB #3341-7
4	25'	X3W5072	"BELDEN" CABLE, 10 COND. SHIELDED #9946
5	9		TUBE, HEAT SHRINK WHT ⌀1/16 x 1/2" LONG
6	1		TUBE, HEAT SHRINK BLK ⌀1/4 x 1" LONG
7	1		"BRADY" LABEL, CABLE WRAP #THT-75-427-3