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ARC DATA MONITOR III, PORTABLE MODEL D
OPERATIONS MANUAL

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SECTION 1 - INTRODUCTION

1.0   OVERVIEW

The Arc Data Monitor is a self-diagnostic microprocessor system designed to
provide quality control for critical welding operations. With the appropriate
welding sensors or transducers installed, ADM can monitor a welding system for
the following parameters (units of measurement shown in parentheses):

    ° Gas flow rate (cubic feet/hour)

    ° Elapsed weld time (seconds)

    ° Wire feed speed (inches/minute)

    ° Arc current (amps)

    ° Arc voltage (volts)

    ° Travel speed (inches/minute)

    ° Heat (K joules/inch)

    ° Temperature (Range depends on sensor used)

Where pulse welding techniques are being employed, ADM can also monitor
welding conditions based on these parameters:

    ° Peak pulse current (amps)

    ° Peak pulse voltage (volts)

    ° Background pulse current (amps)

    ° Background pulse voltage (volts)

    ° Pulse Frequency (Hertz)

The definitions of out-of-limit conditions for the various welding parameters
are completely user-programmable and can be changed at any time. Individual
sensors/
parameters can also be enabled or disabled by the operator.

Once a fault condition is identified, ADM can output a signal to automatically
shut down the welding process. Fault conditions are also indicated by a set
of light emitting diode (LED) signals. As an option, fault data can be sent
to an external printer via a Centronics compatible parallel interface.

The ADM determines when a welding parameter is in a fault condition by
comparing the actual measured data, from the external sensor, to the
programmed limit for that parameter. Any time the parameter remains out of
bounds for the programmed period of time the ADM will indicate the faulted

parameter by illuminating the Fault status indicator and setting the fault relay(s), if enabled. During the testing period the individual parameters are sampled and tested at a rate of 100 samples/second. This sample rate is fixed and can not be user programmed. The raw analog welding data is sampled at 25,000 samples/second and is processed by non-linear signal processing algorithms to produce the 100 sample/second tested data. The non-linear processing algorithms are selected by the user and are unique for each welding mode. The user selects the processing algorithms by setting the correct welding mode (i.e. GTAW, GMAW, SAW, etc.).

ADM systems are available as rack mount units, portable units, or as multi-unit cells mounted in a single NEMA 12 enclosure. FIGURE 1-1 (Appendix A) shows the different configurations that are available.

1.1 ADM SENSORS AND OUTPUT FUNCTIONS

Input sensors for the ADM system can include the following:

- ° Gas flow transducer

- ° Current sensor

- ° Voltage sensor

- ° Wire speed transducer

- ° Travel speed transducer

- ° Temperature sensor

- ° Two (2) User programmable analog inputs

NOTE: The ADM system monitors elapsed weld time (and pulse frequency in the case of pulse-welding) by using arc current and voltage readings to determine the start and stop of a welding arc. Welding heat input is a calculated value based on arc current, arc voltage, and weld travel speed.

Output related features for the ADM system include the following:

- ° Four external alarm relays (which are user-definable)

- ° LED fault status lights

- ° Two-line 40-character vacuum fluorescent display

- ° RS-232 serial port

- ° Centronics-compatible parallel port

These types of outputs allow ADM systems to be adapted to a variety of installations using external alarm boxes, PCs, PLCs, welding controllers, or external printers.

For communicating with an IBM PC or compatible using MS-DOS 3.0 or later, ADMSTAT(tm) software (part no. A5Z0023) is available. This package of communications utility programs provides the host computer protocol for communicating with the ADM, allowing for the uploading or welding data from the ADM as well as the storing, retrieval, statistical analysis, and real time graphic display of this data.

1.2 OPERATIONAL MODES

The three operational modes, or principal software functions, of the ADM system include:

- ° Data monitoring -- the normal operational mode of ADM. The system tests the various types of input data and compares them to the welding parameters stored in the program. When a fault condition is encountered, the system outputs a signal to the external alarm relays and stops testing for all parameters.

- ° Data logging -- virtually identical to the data monitoring mode except that a fault signal is not generated and testing is not halted when a fault condition is encountered.

- ° Alter limits -- allows the operator to alter the welding parameters or unit configuration.

There are two separate programs operational at all times on the ADM: a foreground program (either data monitoring or data logging) and a background program (alter limits). The foreground program has priority over the processing resources of the system and is always monitoring/logging inputs regardless of the state of the control panel display or commands entered through the keypad.

The background program can be invoked at any time however, data monitoring/ logging will still be performed by the system every time an arc start is detected.

1.3 USER-DEFINED FEATURES

User-defined features of the ADM system are as follows:

- ° The definitions of any welding parameter (including whether the parameter is to be enabled or disabled).

- ° Unit configuration issues such as the type of welding to be monitored, the definition of external alarm signals, the format of printer reports, the use of user passwords, etc.

As shipped from the factory, the standard ADM unit configuration is designed to be suitable for most common welding applications. (A complete listing of the standard unit configuration can be found in Appendix B).

1.4 OPTIONAL HARDWARE AND SOFTWARE

The basic ADM system consists of an ADM system or multi-unit cell and voltage and current sensors. Optional hardware components for the ADM system include:

    ° Gas Flow

    ° Wire Feed Speed Transducer

    ° Travel Speed Transducer

    ° Infrared sensor for temperature measurement

    ° Thermocouple sensor assembly

            Type "K"
            Type "J"
            Type "T"

    ° Printer
    ° Printer Cable
    ° Remote 8 channel multiplexer

Optional software components include:

    ° ADMSTAT(tm) P.C. Software
    ° RS-232 Cable

SECTION 2 - INSTALLATION

2.0 SINGLE UNIT SYSTEM INSTALLATION

This section contains the following information on the installation of a portable ADM system:

    ° Power-up testing

    ° Installation of system transducers and sensors

    ° Printer installation

    ° External alarm relays and remote fault resets
      installations

2.1 POWER-UP TESTING PROCEDURE

Begin the installation of an ADM system by performing the following procedure.

1. Carefully unpack the unit and associated transducers, sensors, and cables. Inspect the items for possible shipping damage and report any damage to the carrier.

2. Locate the power cable assembly and insert the cable connector into the receptacle on the rear panel of the unit. (Figure 2-1, Appendix A). Plug the power cable into a suitable power source.

NOTE: The ADM unit is capable of operating from either 115 VAC or 240 VAC 50/60 HZ.

3. Apply AC power to the unit.

4. Power up the unit by pressing the power switch on the rear panel. The unit responds as follows:

    ° After approximately 2.5 seconds, the red LED lights on the front control panel illuminate, indicating the unit is performing internal diagnostic tests and the following message is displayed:

    ```
    -------------------------------------------
                   POWER UP SELF TEST
    -------------------------------------------
    ```

    ° Once the internal diagnostic tests have been performed and successfully completed, the green LED lights on the front control panel illuminate and the following message is displayed for approximately 2.5 seconds:

    ```
    -------------------------------------------
                   Self Test Complete
        RAM:  Pass   EPROM:  Pass   ANALOG:  Pass
    -------------------------------------------
    ```

    ° The unit displays the static display and the internal clock will display the current date and time.

5. If the unit fails the power-up sequence as described above, check the following:

    ° Is the unit power cable plugged into a suitable power outlet?

    ° Is the 2-amp fuse located on the rear of the unit chassis operational?

6. If the unit passes the power-up sequence, turn off the power and proceed with the installation.

2.2 CURRENT/VOLTAGE SENSOR INSTALLATION

The current sensor assembly (Figure 2-2, Appendix A) consists of an enclosure housing the current shunt, isolation amplifier, High Frequency filter assemblies and a cable assembly for connection to the unit.

The voltage sensor assembly (Figure 2.3, Appendix A) consists of an enclosure housing the isolation amplifier, High Frequency filter assemblies and a cable assembly for connection to the unit.

2.2.1 Current Sensor Installation

The current sensor must be installed in the negative welding cable lead from the power supply to the work piece. The location of the current sensor is not critical and the welding cables may be as long as required for the application.

The current sensor has two insulated studs labeled "WORK" and "MACHINE NEG" to connect the welding current to the sensor. Remove the existing lead from the power supply and reconnect it to the stud labeled "WORK". Install a new welding cable from the stud labeled "MACHINE NEG" to the negative (work) terminal on the power supply.

After connecting the current sensor to the welding supply, locate the cable assembly and connect the cable to the sensor assembly.

2.2.2 Voltage Sensor Installation

The arc voltage sensor is permanently attached to the connecting cable with two clip leads provided to connect the sensor to the welding torch. Connect the red lead as close as possible to the welding torch in order to assure proper measurement. Attach the black lead to the work piece. If the HIPPO clips provided with the leads are not adequate, any suitable connector can be used.

2.2.3 The Current/Voltage Sensor Cable

To connect the current sensor cable to the unit, locate the connector labeled "CURRENT" on the rear of the unit chassis. Insert the cable plug into this socket.

To connect the voltage sensor cable to the unit, locate the connector labeled "VOLTAGE" on the rear of the unit chassis. Insert the cable plug into this socket.

Both cable connectors are color coded - (Blue = Current) and (Gray = Voltage)

2.3 GAS FLOW INSTALLATION

The gas flow option consists of a transducer assembly (Figure 2-4, Appendix A) and a control cable. The option is designed to measure gas flows with a maximum pressure of 50 psi.

The transducer should be installed with supplied fittings in the welding gas line on the output side of the gas control solenoids. Installation should be as close to the welding torch as practical.

NOTE: To avoid damage to the transducer assembly, do not use any type of pipe dope or teflon tape when making the connection.

The transducer should be placed as far as possible from any source of high frequency interference, such as a GTAW welding power supply.

2.3.1 Gas Flow Control Cable

The gas flow option includes a 25-foot control cable and connector. To connect the processor to the unit, locate the connector labeled "GAS" on the rear of the unit and insert the cable plug into this socket.

Cable connector is color coded "Yellow".

2.4 WIRE SPEED TRANSDUCER INSTALLATION

The wire speed transducer option (Figure 2-5, Appendix A) consists of an optical tachometer, a precision drive wheel, a mounting housing, and a control cable. Designed to clamp directly on the welding wire, the wire speed transducer does not require the removal of the welding wire from the wire feeder during installation. The wire speed transducer may be installed in one of two ways:

   ° Permanently mounted on the wire feeder

   ° Clamped on the welding wire before it enters the wire feeder

Permanently installing the wire feed speed transducer on the wire feeder is the preferred method of installation as it ensures a stable mounting of the assembly. The transducer is electrically isolated from the welding electrode so the transducer can be mounted to any part of the wire feeder. The housing of transducer has four 8-32 tapped holes for mounting purposes, two on the bottom and one on each side.

NOTE: Make sure when permanently mounting the transducer on the wire feeder that the inlet and outlet for the wire through the transducer is in line with the wire guides of the wire feeder.

The wire speed transducer can also be installed by simply clamping it over the welding wire at some point where the wire enters the wire feeder. To install the wire speed transducer using this method, simply depress the handle on the

top of the transducer, slip the assembly over the wire, and release the handle.

2.4.1 The Wire Speed Transducer Control Cable

The wire speed transducer is supplied with a 25-foot control cable and connector. To connect the transducer to the ADM unit, locate the connector labeled "WIRE" on the rear of the unit chassis. Insert the cable plug into this socket.

Cable connector is color coded "Red".

2.5 TRAVEL SPEED TRANSDUCER INSTALLATION

The optional travel speed transducer assembly (Figure 2-6, Appendix A) consists of a tachometer that measures the travel speed of the welding torch and a control cable. The transducer is a surface contact transducer supplied with a spring-loaded hinge to ensure proper surface tension. The hinge provides for a +20 to -10 degree movement of the transducer with respect to the drive carriage of the torch. In order to ensure accurate measurement, the transducer must be rigidly mounted on the drive carriage with the drive wheel perpendicular to the drive surface.

The spring-loaded hinge has two tapped 10-32 holes on the upper bracket for mounting purposes and may be located on either side or on top of the transducer housing. To move the hinge to the other side of the transducer housing, follow these steps:

1. Remove the hinge bolt and slowly release the spring tension.

> **CAUTION: BEFORE REMOVING THE HINGE BOLT, MAKE SURE THE TOP BRACKET OF THE HINGE IS SECURED IN ORDER TO PREVENT THE UNCONTROLLED RELEASE OF THE SPRING TENSION.**

2. Loosen the mounting screws and move the lower hinge bracket to the desired location on the transducer housing. Secure the bracket to the housing.

3. Using a small piece of 1/4-inch tubing to compress the spring, position the spring in the lower bracket and reassemble the hinge.

4. Remove the tubing from the end of the spring once the hinge bolt and lock nut is installed.

2.5.1 The Travel Speed Transducer Control Cable

The travel speed transducer is supplied with a 25-foot control cable and connector. To connect the transducer to the ADM unit, locate the connector labeled "TRAVEL" on the rear of the unit chassis. Insert the cable plug into this socket. Cable connector is color coded "Green".

2.6 TEMPERATURE SENSOR INSTALLATION

The optional temperature sensor assemblies, consist of the following:

2.6.1 Infrared

° Electronics module that processes information gathered by the sensor and
  provides necessary input to ADM.

° Sensor assembly, that is directed at weld location to provide data to
  electronics module.

° Installation is covered in operations manual for this unit.

2.6.2 Thermocouple

Consists of an enclosure housing the necessary electronics to convert data
collected by the appropriate contact (type"K", type "J", or type "T" depending
on desired temperature range) sensor probe and delivers a signal to ADM.

2.6.3 Temperature Sensor Control Cable

To connect the temperature sensor to the ADM, with the supplied 25 foot cable,
the following is required:

° Infrared - connections must be made on sensor end of cable to numbered
  terminal strip on Electronics Module. To connect the sensor to the ADM
  unit, locate the connector labeled "Temp" on the rear of the unit
  chassis. Insert cable plug into this socket.

° Thermocouple - connection to enclosure and ADM unit is accomplished
  with identical connectors on both ends of the cable. To connect sensor
  to the ADM unit, locate the connector labeled "Temp" on the rear of the
  unit chassis. Insert cable plug into this socket.

Cable connector is color coded "Black" in both cases.

2.7 PRINTER INSTALLATION

The ADM system is designed for use with any IBM compatible printer with a
Centronics parallel interface. To connect a printer to the system, a printer
interface cable (part no. X3W5055) is available or an IBM parallel printer
cable may be used. This cable uses an Amphenol PN 57-30360 or equivalent 36-
circuit connector and an Amphenol PN 117D-DB25S with an Amphenol PN17-1589-06
2 piece hood. The pin out of the Centronics parallel interface is as follows:

SIGNAL NAME	PRINTER PIN NUMBER (36 Pin Connector)	ADM PIN NUMBER (25 Pin Connector)
Data Strobe	1	1
Data 1	2	2
Data 2	3	3
Data 3	4	4
Data 4	5	5
Data 5	6	6

```
Data 6                          7                    7
Data 7                          8                    8
Data 8                          9                    9
Acknowledge                     10                   10
Busy                            11                   11
Paper Out                       12                   12
Select Printer                  13                   13
Signal Ground                   19                   19
Signal Ground                   21                   20
Signal Ground                   23                   21
Signal Ground                   25                   22
Signal Ground                   27                   23
Signal Ground                   29                   24
Signal Ground                   30                   25
Signal Ground                   34                   18
Input Prime                     31                   16
Fault                           32                   15
```

To install an external printer for the system, follow these steps:

1. Connect the 25 Pin connector end of the interface cable to the
    connector labeled "PRINTER PORT" on the rear of the unit chassis.

2. Connect the other end of the cable to the Centronics connector
    on the printer, referring to the printer manual for the
    location of the connector, if necessary.

3. Connect the printer to a 115 VAC power source.

NOTE: It may be necessary to consult the printer documentation for
        any special instructions concerning the Centronics interface.
        For example, not all printers of this type use the full Centronics
        handshake or fault signals.

2.8   EXTERNAL ALARM RELAYS AND REMOTE FAULT RESETS INSTALLATION

The ADM unit has four (4) alarm relay outputs, one remote fault reset and
three remote weld schedule select inputs, accessed through the connector
labeled "I/O" on the rear of the unit chassis. (Refer to Figure 2-6 for the
pin out of the connector.)

The four (4) alarm relays are SPDT and rated at one amp 24 VDC. All relays
are activated when the unit is powered up. Any enable parameter fault,
programmed by the user, will de-activate the specified relay when a fault
condition is detected. All of the relays can be configured by the operator
with the RELAY menu, to de-activate only when selected types of faults occur.

NOTE: See Section Five: Altering the Unit Configuration for
        more information about the RELAY menu function.

The fault reset input provides a reset function identical to pressing the [F]
= [Fault Reset] key on the unit keypad. This allows for the remote reset of
the unit when a fault condition occurs. The reset input is optically coupled

and polled when the unit is in the data monitoring mode and awaiting a fault
reset. If a 24 VDC is applied to the reset input a reset signal is detected
and the ADM will reset the fault condition.

Three additional optically isolated inputs can be used to select one of
fifteen (15) weld schedules. This function is selected by enabling the REMOTE
function in the SCHEDULE menu. The desired weld schedule is selected by
setting the binary weld schedule number (0 - 7) on the three remote input
line.

SECTION 3 - OPERATION

3.0 MONITORING WELDING DATA

The monitoring mode is the normal operational mode for the ADM unit. This
operational mode in fact consists of three distinct functional states:

    ° Idling

    ° Monitoring

    ° Fault

Because the state of the unit determines the contents of displays as well as
the functions of individual keys on the front control panel keypad, this
section discusses each possible state separately.

3.1 THE IDLING STATE

As soon as the power-up procedure has been successfully completed and as long
as no welding arc has been detected, the unit maintains an idling state. When
the unit is idling, the program displays the following alternating messages on
the display panel.

    °   The date/time message display without multiplexer:

```
        ------------------------------------------
        dd/mm/yy          ADMIII          hh/mm/ss
        Station No.: xxxxx      Schedule No. #
        ------------------------------------------
```

    Where: mm/dd/yy represents the current system date hh:mm:ss
           represents the current system time xxxxx represents
           the user programmed station ID number # represents the
           currently selected welding schedule.

    °   The date/time message display with external multiplexer:

```
        ------------------------------------------
        dd/mm/yy          ADMIII          hh/mm/ss
        Station No.:  xxxxx   Sensor No.  sssssss
```

```
              ----------------------------------------
```

Where: mm/dd/yy represents the current system date hh:mm:ss
        represents the current system time xxxxx represents
        the user programmed station ID number ssssss represents
        the status and current selected channel for multiplexer
        option if installed or N/A if not installed.

°   The ADM operating status message display:

```
              ----------------------------------------
              ADM III Status:        Testing is #######
              Printer is @@@@@@      Alarms are #######
              ----------------------------------------
```

Where: ####### indicates the status of the parameter (Enabled
        or Disabled) @@@@@@ indicates the current status of
        the printer (ON, Off, Off Line, Faulted)

When the program is in the idling state, the operator may enter commands
through the keypad as follows:

   ° Press [Alter] to alter parameter limits or change the unit
     configuration

   ° Press [Del/Print] to enable or disable the external printer

   ° Press [Cancel] to view alternate display screen

   ° Press "1" – "8" to select multiplexer channel (Only if the
     multiplexer option is installed and is set for manual
     channel select.)

3.2 THE MONITORING STATE

Arc monitoring begins when the ADM unit recognizes the start of a welding arc
based on the current and voltage inputs. By monitoring various types of input
data and comparing them to the welding parameters stored in the program, the
unit is able to recognize when a welding condition exceeds stated limits,
threatening the quality of a weld.

The welding parameters that can be measured and tested for during a weld
include:

   ° Welding gas flow (GAS), measured in cubic feet per hour

   ° Arc Time (TIME), measured in seconds

   ° Wire feed speed (WFS), measured in inches per minute

   ° Welding current (AMP), measured in amps

° Welding voltage (VOLT), measured in volts

° Weld travel speed (TRAVEL), measured in inches per minute

° Temperature (TEMP), measured in degrees Fahrenheit
  In addition to these parameters, the following parameters
  can be collected and displayed for pulse-welding operations:

° Peak pulse current (Ipk), measured in amps

° Background pulse current (Ibk), measured in amps

° Peak pulse voltage (Vpk), measured in volts

° Background pulse voltage (Vbk), measured in volts

° Pulse Frequency (FREQ), measured in hertz.

Another parameter, welding heat input (HEAT), is not actually measured.
Instead, the HEAT parameter is calculated in K joules/inch based on the
voltage, current, and travel speed inputs according to the following formula:

    HEAT INPUT = [(VOL)(AMP)(60)]/[(TVS)(1000)]

NOTE: See Section 4.8 for information on setting a default
       travel speed so that the HEAT parameter can be calculated
       by the program, even if no travel speed sensor is used.

Each basic welding parameter (with the exception of TIME) can be individually
programmed, by the operator, for the desired fault testing parameters. The
following are the definitions of the programmable parameters:

   ° MAX - Specifies the maximum test limits for the parameter.

   ° MIN - Specifies the minimum test limits for the parameter.

   ° ENABLE - Testing for the parameter may be enabled or
     disabled.

   ° FAULT TIME - A sampling period, in seconds, may be
     specified during which the program measures and tests the
     welding parameter at a fixed rate of 100 tests per second.
     Should all the testing cycles within one sampling period
     fail, the parameter is considered to be out of limits and
     the fault relays and indicators are activated.

   ° DELAY - A timing delay from the start of the arc to the
     beginning of the first sampling period for the parameter
     can be specified in order to allow the arc to stabilize
     before testing begins. This delay time can also be used
     to prevent testing during the ramp up welding process
     routines.

For the TIME parameter, a maximum limit, minimum limit, and enabled/disabled
status can be specified. In addition, a time period can be specified after
which no testing of any other parameter occurs and total arc time can be
recorded on a continuing basis.

NOTE: For information about specifying the testing conditions for
        each parameter, refer to Section 4 - Altering Welding
        Parameters.

In addition to the afore mentioned parameters the user can specify two (2)
additional analog parameters to be monitored. The additional parameters are
connected to the ANL1 and ANL2 inputs on the rear of the ADM enclosure. The
user can specify the parameter name, units of measure and the decimal point
location for each of the spare analog inputs. These inputs can be used to
measure an additional voltage, current, gas flow or temperature input using an
additional ADM sensor assembly. The user may also provide a sensor with an
output range of 0 - 10 vdc representing the necessary input value to the ADM.

NOTE: The spare analog inputs are not tested by the ADM. The input value is
        not scaled and the reading will indicate 10 mv increments of the input
        voltage. The user can specify the decimal point location for the
        displayed value.

Once a welding arc has been detected, ADM will measure, display and test the
various enabled parameters. The ADM will display the welding data with one of
three possible screen formats. The normal screen will show the standard
welding parameters as follows:

   °   The standard welding parameter screen:

         TIME= xxx.x   VOLTS= xxx.x   TRAVEL= xxx.x
         GAS= XXX   AMPS= xxxx   WIRE= xxxx

   Where: xxx represents the current value for each parameter

   °   The secondary welding parameter screen:

         TIME= xxxx.x   HEAT= xxx.x   TEMP= xxxx
         ANL1= xxxxx   ANL2= xxx.x

   Where: xxx represents the current value for each parameter.

           ANL1 represents the user defined parameter for ANL1
           sensor input.

           ANL2 represents the user defined parameter for ANL2
           sensor input.

   °   The pulse-welding parameter screen is only active when the unit
         is programmed for the pulse-welding process:

```
-----------------------------------------
TIME=xxxx.x     PKAMP=xxxx     PKVOLT=xxx.x
FREQ=xxx.x      BKAMP=xxxx     BKVOLT=xxx.x
-----------------------------------------
```

    Where: xxx represents the current value for each parameter

To view the secondary parameter screen press the [Cancel] key while the ADM is collecting the welding data. The selected screen will be displayed until the [Cancel] key is pressed again. By using the [Cancel] key the operator can view all of the available parameters.
When the program is in the monitoring mode, the operator may enter commands through the keypad as follows:

    ° Press "ALTER" to alter parameter limits or change the unit
      configuration.

    ° Press "CANCEL" to select alternate parameter screens.

    ° Press "DEL/PRINT" to enable or disable the external
      printer.

    ° Press "1" – "8" to select a new multiplexer channel if the
      multiplexer option is installed and is set for manual
      channel scan.

If the weld ends without a fault condition occurring, the program returns to idling status.

3.3 THE FAULT STATE

A fault condition is defined as a welding parameter failing every test during a sampling period. At that point, the program stops testing for all parameters.

When a fault condition is detected during a weld, the ADM activates the fault relays and the red LED light corresponding to the out-of-limits parameter comes on. For normal welding parameters, a fault condition causes the corresponding red LED light to turn on and stay on. The ADM will continue to display the welding parameters until an arc off condition is detected.
The fault LED's and relays will remain active until the ADM is reset. The reset may be activated by an external signal connected to the I/O port or by pressing the
[Fault Reset] key on the keypad. Once a fault condition has been detected the ADM will ignore any further Arc On Conditions until the fault has been reset.

3.4 RESETTING THE UNIT

The ADM continues to display the fault message(s) until an operator presses [Fault Reset] on the keypad. The unit can also be reset by a programmable controller or robot sending a reset signal to the ADM unit.

As long as the ADM unit is awaiting fault reset, the following conditions apply:

° The unit will not log or monitor welding data

° All limits may be altered, however any modifications will
   not take effect until the unit is reset

3.5 DATA MONITORING REPORTS

The operator may produce printed reports while recording the welding data monitored by the ADM unit be pressing the "DEL/PRINT" key on the key pad at any time. These reports can contain all weld data, fault only weld data or summary only weld data.

3.5.1 Weld Data Reports

The weld data report (Figure 3-1, Appendix A) records data continuously, i.e., each print line on the report contains the tested value for the parameter at that point in time during the weld.

In addition to the tested values for each enabled parameter, the following information is contained in each weld data report:

° Report date

° Report time

° Weld station number

° Schedule number

° Operation Name

NOTE: For more information on weld station, schedule numbers and
         operation name, See Section 5: Altering the Unit Configuration.

SECTION 4 - PARAMETERS

4.0 ALTERING WELDING PARAMETERS

For all the welding parameters except TIME, the following limits can be altered by the operator:

° MAX – The maximum limit for the parameter.

° MIN – The minimum limit for the parameter.
° ENABLE – The enabling/disabling of the parameter.

° TEST TIME – The sampling period over which the parameter
   must be continuously out of limits before a fault
   condition occurs.

° DELAY - The amount of delay from the start of welding to
  the beginning of testing for the parameter.

For the TIME parameter, the following limits can be altered by the
operator:

° MAX - The maximum limit for the parameter.

° MIN - The minimum limit for the parameter.

° ENABLE - The enabling/disabling of the parameter.
° END - The total time period (beginning with an arc start)
  for which the testing of all welding parameters will occur.
  Following the expiration of this period, the displaying of
  data continues, but the actual testing for parameters
  ceases.

° TOTAL ARC TIME - Total "Arc On" time will be accumulated on
  a continuing basis. A reset signal from key pad "Fault/Reset"
  key will reset this value to "0".

4.1 THE ALTER LIMITS MENUS

To alter the limits of any parameter, follow these general guidelines:

1. Press "ALTER" on the control panel keypad.

NOTE: Depending on whether or not the unit is configured to
require passwords, the program may ask for a password code
before allowing the operator to continue. If the program
prompts for a password, enter the code using the 0-9 keys
on the control panel keypad.

The program responds by displaying the first alter limits menu:

```
        -------------------------------------
        GAS  TIME  WFS   AMP   VOLT  TRAVEL  MORE
         1    2    3     4     5      6      9
        -------------------------------------
                    1st Alter Limits Menu
```

2. Press the key for the parameter to alter. If the parameter or
    function is not displayed on the screen, press "9" to display
    the second alter limits menu:

```
        -------------------------------------
        HEAT     TEMP    WELD_MODE    CLOCK    MORE
         1        2         3          4       9
        -------------------------------------
                    2nd Alter Limits Menu
```

3. Press the key for the parameter to alter. If the parameter or
    function is not displayed on the screen, press "9" to display

the third alter limits menu:

```
       ------------------------------------------
       REVIEW    PRINTER    ALARMS    RELAYS    MORE
          1         2          3         4       9
       ------------------------------------------
                        3rd Alter Limits Menu
```

4. Press the key for the parameter to alter. If the parameter or
    function is not displayed on the screen, press "9" to display
    the fourth alter limits menu:

```
       ------------------------------------------
       STATION     PASSWORD     OPERATION     MORE
          1           2             3          9
       ------------------------------------------
                        4th Alter Limits Menu
```

5. Press the key for the parameter to alter. If the parameter or
    function is not displayed on the screen, press "9" to display
    the 5th alter limits menu:

```
       ------------------------------------------
       THRESHOLD    SCHEDULE    PARM_TEST    MORE
          1            2            3         9
       ------------------------------------------
                        5th Alter Limits Menu
```

6. Press the key for the parameter to alter. If the parameter or
    function is not displayed on the screen, press "9" to display
    the last alter limits menu:

```
       ------------------------------------------
       MUX_SET   NETWORK   ANALOG   CLEAR_RAM    Last
          1         2         3         4        Menu
       ------------------------------------------
                        Last Alter Limits Menu
```

7. When the parameter is displayed, press the key corresponding
    to the number below the name to begin the procedure.

8. To return to the normal data logging mode, press "ALTER" on
    the keypad.

4.2 ALTER LIMITS PARAMETER DESCRIPTION

The following is a functional description of the Alter limits menu parameters:

First Alter Limits Menu:

GAS - Allows the user to program the testing
limits for the gas sensor input.

TIME - Allows the user to program the maximum
and minimum welding arc time. Also allows the
user to set the maximum testing time for all
parameters and accumulate total "Arc On" time.

WFS - Allows the user to program the testing
limits for the wire feed speed sensor.

AMP - Allows the user to program the testing
limits for the welding current sensor.

VOLT - Allows the user to program the testing
limits for the welding voltage sensor.

TRAVEL - Allows the user to program the
testing limits for the travel speed sensor.
The user may also set a default travel speed
used to determine Heat Input if the travel
speed sensor is disabled.

Second Alter Limits Menu:

HEAT - Allows the user to program the heat
input limits. The Heat Input value is a
calculated parameter using the following
equations:

$$Heat(kj/in)=(Volt \times Amp \times 60)/(Travel \times 1000)$$

TEMP - Allows the user to program the testing
limits for the temperature sensor.

WELD-MODE - Allows the user to select the
signal processing algorithms based on the
welding process.

CLOCK - Allows the user to program the
Day/Date battery back clock. All weld data
printed forms will use this clock to Date-Time
stamp the printed record.

Third Alter Limits Menu:

REVIEW - Allows the user to print the current
programmed parameter configuration of the ADM
to a printer attached to the ADM.

PRINTER - Allows the user to program the print
data cycle time and the format of the printed
data. The user may also select the type of
printer being used with the ADM.

ALARMS - Allows the user to enable or disable
the external alarms, Display Fault data and reset the fault
Counter. When the alarms are enabled the ADM is in the monitor
 mode.

RELAYS - Allows the user to program the
parameter fault conditions for the four (4)
fault relays.

Fourth Alter Limits Menu:

STATION - Allows the user to program an ADM
station number. This number is printed on the
weld data records and is used by the P.C.
software to identify the ADM used to collect
the welding data.
PASSWORD - Allows the user to restrict access
to the alter limits program by setting a
numeric password. If a password is set, then
access to the alter limits program routines
require the user to load the correct password
before granting access to the routines.

OPERATION - Allows the user to program a 40
character ALPHA/NUMERIC name that will be
printed on the weld data banner.

Fifth Alter Limits Menu:

THRESHOLD - Allows the user to program the
following parameters:

      ARC ON VOLTS - The voltage level that
      must be exceeded to indicate a weld on
      condition.

      ARC ON AMPS - The Welding current level
      that must be exceeded to indicate a weld
      on condition.

      PULSE THRESHOLD - The current level that
      must be exceeded to indicate a pulse on
      condition. This value is used to measure
      pulse peak and background parameters when
      using the GTAW or GMAW pulse mode.

SCHEDULE - Allows the user to save or
load weld schedules. A weld schedule consists
of all the limit and enable configurations.
The operator may also enable/disable remote
weld schedule select option.

PARM_TEST - Allows the user to enable or

disable testing of the welding data. If
testing is disabled the fault indicators and
relays will not be activated during fault
conditions.

Sixth (Last) Alter Limits Menu:

MUX_SET - Allows the user to program the
following external multiplexer functions:

> MAN/AUTO - Allows the user to select
> automatic channel scan or manual keypad
> channel selection.
>
> SCAN TIME - Allows the user to set the
> time period to monitor a single channel
> when set for auto scan operation.
> WELDS - The number of welds to collect
> before selecting a new multiplexer
> channel when set for auto scan operation.

NETWORK - Allows the user to enable the
network serial communications port by
setting the network cell ID number. This
number in conjunction with the station
number will allow up to 250 ADM's to be
connected to one P.C. for data collection.

ANALOG - Allows the user to define the following
parameters for the two spare analog inputs:

> DECIMAL POINT - Define the decimal point location
> for the spare sensor input.
>
> PARAMETER NAME - Define the measured parameter
> name.
>
> UNITS - Define the unit of measure for the
> selected sensor input.
>
> ENABLE - Enable/Disable the spare sensor inputs.

CLEAR-RAM - Allows the user to clear all of the
limit parameters, and weld schedules and automatically
reloads factory default parameters.

4.3 ALTERING THE GAS FLOW PARAMETERS (GAS)

The operator can alter the following limits relating to the GAS
parameter menu:

° MAX - Maximum GAS flow limit

° MIN – Minimum GAS flow limit

° ENABLE – Enable/Disable testing of the GAS parameter
° FAULT TIME - Definition of sampling period (Total time that the GAS parameter must be out of limits before activating a fault condition).

° DELAY - Delay from the start of weld to the beginning of parameter testing.

To alter the limits of the GAS parameter, follow these steps:

1. From the first alter limits menu, press "1".

```
         ------------------------------------------------
          GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
           1      2       3      4      5        6        9
         ------------------------------------------------
```

The program responds by displaying the GAS parameter menu:

```
         ------------------------------------------
          GAS Parameter Menu:  1=Min    2=Max    EXIT
          3=Enable   4= Delay    5=Fault Time    (C)
         ------------------------------------------
```

2. From this menu the operator may perform the following actions:

a) Alter the Minimum limit by pressing "1"

The program responds by displaying the following screen:
```
         ------------------------------------------
          Old Min GAS Flow Limit = xxxxx        EXIT
          New Min GAS Flow Limit = ooooo         (C)
         ------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an error is made press the [Back Space] key to remove the last entry. Press [Enter] to store the entered value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum limit for the parameter greater than the current maximum limit. If the value is greater than the maximum limit the ADM will display the following error message for 3 seconds then return to the GAS parameter menu.

```
         ------------------------------------------
          INPUT PARAMETER MUST BE <= xxxxx
         ------------------------------------------
```

Where: xxxxx is the current programmed high limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

b) Alter the maximum limit by pressing "2"

The program responds by displaying the following screen:

```
------------------------------------------
Old Max GAS Flow Limit = xxxxx       EXIT
New Max GAS Flow Limit = ooooo        (C)
------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If
an error is made press the [Back Space] key to back space
the last entry. Press [Enter] to store the entered value
or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter less then the current minimum
limit. If the value is less than the minimum limit the ADM
will display the following error message for 3 seconds then
return to the GAS parameter menu.

```
------------------------------------------
INPUT PARAMETER MUST BE => xxxxx
------------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or
press [Cancel] to cancel the operation.

c) Enable/disable the GAS sensor by pressing "3"

If the GAS sensor is currently enabled, the program responds
with the following display:

```
------------------------------------------
The GAS Sensor is Enabled.          EXIT
Disable the GAS Sensor? (0=No 1=Yes)  (C)
------------------------------------------
```

If the GAS sensor is currently disabled, the program responds
with the following display:

```
------------------------------------------
The GAS Sensor is Disabled.         EXIT
Enable the GAS Sensor? (0=No 1=Yes)   (C)
```

```
          -----------------------------------------
```

Press "0" or "1" to enable or disable the parameter or press
[Cancel] to cancel the operation. If the sensor is
disabled the GREEN/RED LED on the front panel will be OFF.
When the Sensor is enabled the GREEN/RED LED will be illuminated
indicating the Fault status of the parameter.

The program responds by returning to the parameter menu.

d)   Define the Fault time for the parameter by pressing "4"

The program responds with the following display:

```
          -------------------------------------------
          Old GAS Fault Time = xxxx.x          EXIT
          New GAS Fault Time = 0000.0          (C)
          -------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the fault time by pressing the
desired numeric keys. If an error is made, use the
[Back Space] key to remove the last character entered.
Press [Enter] to store the new value or press [Cancel]
to cancel the operation.

The program responds by returning to the parameter menu.

e)   Define the delay period for the parameter by pressing "5"

The program responds with the following display:

```
          -------------------------------------------
          Old GAS Delay Time = xxxxx           EXIT
          New GAS Delay Time = 00000           (C)
          -------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the
desired numeric keys. If an error is made, use the
[Back Space] key to remove the last character entered.
Press [Enter] to store the new value or press [Cancel]
to cancel the operation.

The program responds by returning to the parameter menu.

f)   Exit to the previous menu by pressing [Cancel]

4.4 ALTERING THE ARC TIME PARAMETERS (TIME)

The user can alter the following parameter relating to the Arc time (TIME):

° MAX - Maximum arc time

° MIN - Minimum arc time

° ENABLE - Enable/disable testing for TIME parameter

° END - Total test time for all parameter testing

° TOTAL ARC TIME - Continuing summary of "Arc On" time

To alter the limits of the TIME parameter follow these steps:

1. From the first alter limits menu, press "2".

```
-------------------------------------------------
        GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
         1      2       3      4      5        6         9
-------------------------------------------------
```

The program responds by display the TIME parameter menu:

```
-----------------------------------------
ARC Time (TIME)  Menu: 1=Min   2=Max   EXIT
3=Enable    4=End    5=Total Arc Time    (C)
-----------------------------------------
```

2. From this menu the operator may perform the following actions:

a) Alter the minimum limit by pressing "1"

The program responds by displaying the following screen:

```
-----------------------------------------
Old Min ARC Time (sec)= xxxx.x        EXIT
New Min ARC Time (sec)= 0000.0        (C)
-----------------------------------------
```

Where: xxxxx represents the current value.

Enter A new limit by pressing the desired numeric keys.
If an error is made, use the [Back Space] key to remove
the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum
limit for the parameter greater than the current maximum
limit. If the value is greater than the maximum limit the
ADM will display the following error message for 3 seconds
then return to the parameter entry menu.

```
-----------------------------------------
INPUT PARAMETER MUST BE <= xxxxx
```

```
      -----------------------------------------
```

Where: xxxxx is the current programmed high limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

b)   Alter the maximum limit by pressing "2"

The program responds by displaying the following screen:
```
      -----------------------------------------
      Old Max ARC Time (sec) = xxxx.x      EXIT
      New Max ARC Time (sec) = 0000.0       (C)
      -----------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If
an error is made press the [Back Space] key to back space
the last entry. Press [Enter] to store the entered value
or press [Cancel] to cancel the operation. The program
responds by returning to the TIME parameter menu.

NOTE: The program does not allow the operator to enter a maximum
       limit for the parameter less than the current minimum
       limit. If the value is less than the minimum limit the ADM
       will display the following error message for 3 seconds then
       return to the parameter entry menu.

```
      -----------------------------------------
      INPUT PARAMETER MUST BE => xxxxx
      -----------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

c)   Enable/Disable the ARC Time (TIME) by pressing "3"

If the ARC timer is currently enabled, the program responds
with the following display:

```
      -----------------------------------------
      The ARC Timer is Enabled.            EXIT
      Disable the ARC Timer?  (0=No 1=Yes) (C)
      -----------------------------------------
```

If the ARC Timer is currently disabled, the program responds
with the following display:

```
      -----------------------------------------
      The ARC Timer is Disabled.           EXIT
      Enable the ARC Timer?  (0=No 1=Yes)  (C)
```

```
        -----------------------------------------
```

Press "0" or "1" to enable or disable the parameter or Press
[Cancel] to cancel the operation. If the sensor is disabled
the GREEN/RED LED on the front panel will be OFF. When the
Sensor is enabled the GREEN/RED LED will be illuminated
indicating the Fault status of the parameter.

The program responds by returning to the parameter menu.

d)   Define the total testing time for all other enabled
     parameters by pressing "4"

     The program responds with the following display:

```
        -----------------------------------------
        Old End Test Time (sec) = xxxx.x    EXIT
        New End Test Time (sec) = 0000.0    (C)
        -----------------------------------------
```

     Where: xxxxx represents the current value.

     Enter a new limit by pressing the desired numeric keys. If
     an error is made press the [Back Space] key to back space
     the last entry. Press [Enter] to store the entered value
     or press [Cancel] to cancel the operation.

     The program responds by returning to the TIME parameter menu.

e)   Display the total accumulated arc time by pressing "5".

     The program responds with the following display:

```
        -------------------------------------------
        Total Arc Time:   Reset (1=Yes 0-No)  Exit
        Hr=xxxx    Min=xx      Sec=xx.x          (c)
        -------------------------------------------
```

      Where: xxxx represents the current value.

      The time displayed is the total "Arc On" time since a manual reset
      was last entered into the unit. This value can be reset to 0 from the
      "Fault/Reset" key on ADM key pad.

f)   Exit to the previous menu by pressing [C] = [Cancel]

4.5 ALTERING THE WIRE SPEED PARAMETERS (WFS)

The operator can alter the following limits relating to the WFS parameter
menu:

    ° MAX – Maximum WFS flow limit

º MIN – Minimum WFS flow limit

º ENABLE – Enable/disable testing of the WFS parameter

º FAULT TIME – Definition of sampling period (Total time that
the WFS parameter must be out of limits before activating a
fault condition).

º DELAY – Delay from the start of weld to the beginning of
parameter testing.

To alter the limits of the WFS parameter, follow these steps:

1. From the first alter limits menu, press "3".

```
------------------------------------------------
    GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
     1      2       3      4      5       6         9
------------------------------------------------
```

The program responds by displaying the WFS parameter menu:

```
-----------------------------------------
WFS Parameter Menu:  1=Min    2=Max    EXIT
3=Enable   4= Delay   5=Fault Time    (C)
-----------------------------------------
```

2. From this menu the operator may perform the following
    actions:

a) Alter the Minimum limit by pressing "1"

The program responds by displaying the following screen:

```
-----------------------------------------
Old Min WF Speed Limit = xxxxx        EXIT
New Min WF Speed Limit = 00000        (C)
-----------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If
an error is made press the [Back Space] key to remove the
last entry. Press [Enter] to store the entered value or press
[Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum
limit for the parameter greater than the current maximum
limit. If the value is greater than the maximum limit the
ADM will display the following error message for 3 seconds
then return to the WFS parameter menu.

```
-----------------------------------------
```

```
                 INPUT PARAMETER MUST BE <= xxxxx
                 ------------------------------------------
```

      Where: xxxxx is the current programmed high limit.

      Enter a new limit and press [Enter] to store or press
      [Cancel] to cancel the operation.

b)   Alter the maximum limit by pressing "2"

      The program responds by displaying the following screen:

```
                 ------------------------------------------
                 Old Max WF Speed Limit = xxxxx       EXIT
                 New Max WF Speed Limit = 00000        (C)
                 ------------------------------------------
```

      Where: xxxxx represents the current value.

      Enter a new limit by pressing the desired numeric keys. If
      an error is made press the [Back Space] key to back space
      the last entry. Press [Enter] to store the entered value
      or press [Cancel] to cancel the operation.

      The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
      limit for the parameter less than the current minimum
      limit. If the value is less than the minimum limit the ADM
      will display the following error message for 3 seconds then
      return to the WFS parameter menu.

```
                 ------------------------------------------
                 INPUT PARAMETER MUST BE => xxxxx
                 ------------------------------------------
```

      Where: xxxxx is the current programmed Minimum limit.

      Enter a new limit and press [Enter] to store or press
      [Cancel] to cancel the operation.

c)   Enable/disable the WFS sensor by pressing "3"

      If the WFS sensor is currently enabled, the program responds
      with the following display:

```
                 ------------------------------------------
                 The WFS Sensor is Enabled.           EXIT
                 Disable the WFS sensor?  (0=No 1=Yes) (C)
                 ------------------------------------------
```

      If the WFS sensor is currently disabled, the program responds
      with the following display:

```
          -----------------------------------------
          The WFS Sensor is Disabled.          EXIT
          Enable the WFS Sensor?  (0=No 1=Yes)  (C)
          -----------------------------------------
```

Press "0" or "1" to enable or disable the parameter or press
[Cancel] to cancel the operation. If the sensor is disabled
the GREEN/RED LED on the front panel will be OFF. When the
Sensor is enabled the GREEN/RED LED will be illuminated
indicating the Fault status of the parameter.

The program responds by returning to the parameter menu.

d)   Define the Fault time for the parameter by pressing "4"

The program responds with the following display:

```
          -----------------------------------------
          Old WFS Fault Time = xxxx.x          EXIT
          New WFS Fault Time = 0000.0           (C)
          -----------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the fault time by pressing the
desired numeric keys. If an error is made, use the
[Back Space] key to remove the last character entered.
Press [Enter] to store the new value or press
[Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

e)   Define a new delay period for the parameter by pressing "5"

The program responds with the following display:

```
          -----------------------------------------
          Old WFS Delay Time = xxxxx           EXIT
          New WFS Delay Time = 00000            (C)
          -----------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the desired
numeric keys. If an error is made, use the [Back Space] key to
remove the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation. The program
responds by returning to the parameter menu.

f)   Exit to the previous menu by pressing [Cancel]

4.6   ALTERING THE CURRENT PARAMETERS (AMP)

The operator can alter the following limits relating to the AMP parameter menu:

- ° MAX - Maximum Welding current (AMP) limit

- ° MIN - Minimum Welding current (AMP) limit

- ° ENABLE - Enable/disable testing of the AMP parameter

- ° FAULT TIME - Definition of sampling period (Total time that the AMP parameter must be out of limits before activating a fault condition).

- ° DELAY - Delay from the start of weld to the beginning of parameter testing.

To alter the limits of the AMP parameter, follow these steps:

1. From the first alter limits menu, press "4".

    ```
    ------------------------------------------------
        GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
         1      2       3      4      5       6         9
    ------------------------------------------------
    ```

    The program responds by displaying the AMP parameter menu:

    ```
    -------------------------------------------
    AMP Parameter Menu:  1=Min    2=Max    EXIT
    3=Enable   4= Delay   5=Fault Time   (C)
    -------------------------------------------
    ```

2. From this menu the operator may perform the following actions:

a) Alter the Minimum limit by pressing "1"
    The program responds by displaying the following screen:

    ```
    -------------------------------------------
    Old Min AMP Limit = xxxxx              EXIT
    New Min AMP Limit = 00000              (C)
    -------------------------------------------
    ```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an error is made press the [Back Space] key to remove the last entry. Press [Enter] to store the entered value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum limit for the parameter greater than the current maximum

limit. If the value is greater than the maximum limit the
ADM will display the following error message for 3 seconds
then return to the AMP parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE <= xxxxx
-------------------------------------------
```

Where: xxxxx is the current programmed high limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

b)   Alter the maximum limit by pressing "2"

The program responds by displaying the following screen:

```
-------------------------------------------
Old Max AMP Limit = xxxxx              EXIT
New Max AMP Limit = 00000               (C)
-------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If
an error is made press the [Back Space] key to back space
the last entry. Press [Enter] to store the entered value
or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter less than the current minimum
limit. If the value is less than the minimum limit the ADM
will display the following error message for 3 seconds then
return to the AMP parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE => xxxxx
-------------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

c)   Enable/disable the AMP sensor by pressing "3"

If the AMP sensor is currently enabled, the program responds
with the following display:

```
-------------------------------------------
The AMP Sensor is Enabled.             EXIT
Disable the AMP sensor?  (0=No 1=Yes) (C)
-------------------------------------------
```

If the AMP sensor is currently disabled, the program responds
with the following display:

```
        -----------------------------------------
        The AMP Sensor is Disabled.        EXIT
        Enable the AMP Sensor?  (0=No 1=Yes)  (C)
        -----------------------------------------
```

Press "0" or "1" to enable or disable the parameter or press
[Cancel] to cancel the operation. If the sensor is disabled
the GREEN/RED LED on the front panel will be OFF. When the Sensor
is enabled the GREEN/RED LED will be illuminated indicating the Fault
status of the parameter.

The program responds by returning to the parameter menu.

d)   Define the Fault time for the parameter by pressing "4"

The program responds with the following display:

```
        -----------------------------------------
        Old AMP Fault Time = xxxx.x        EXIT
        New AMP Fault Time = 0000.0        (C)
        -----------------------------------------
```
Where: xxxxx represents the current value.

Enter the new value for the fault time by pressing the desired
numeric keys. If an error is made, use the [Back Space]
key to remove the last character entered. Press [Enter]
to store the new value or press [Cancel] to cancel the
operation.

The program responds by returning to the parameter menu.

e)   Define a new delay period for the parameter by pressing "5"

The program responds with the following display:

```
        -----------------------------------------
        Old AMP Delay Time = xxxxx         EXIT
        New AMP Delay Time = 00000         (C)
        -----------------------------------------
```
Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the desired
numeric keys. If an error is made, use the [Back Space]
key to remove the last character entered. Press [Enter]
to store the new value or press [Cancel] to cancel the
operation. The program responds by returning to the parameter menu.

f)   Exit to the previous menu by pressing [Cancel]

4.7   ALTERING THE VOLTAGE PARAMETERS (VOLT)

The operator can alter the following limits relating to the VOLT parameter menu:

 ° MAX - Maximum VOLT flow limit

 ° MIN - Minimum VOLT flow limit

 ° ENABLE - Enable/disable testing of the VOLT parameter

 ° FAULT TIME - Definition of sampling period (Total time that the VOLT parameter must be out of limits before activating a fault condition).

 ° DELAY - Delay from the start of weld to the beginning of parameter testing.

To alter the limits of the VOLT parameter, follow these steps:

 1. From the first alter limits menu, press "5".

```
-----------------------------------------------
   GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
    1       2       3      4      5        6        9
-----------------------------------------------
```

 The program responds by displaying the VOLT parameter menu:

```
-----------------------------------------
VOLT Parameter Menu:  1=Min   2=Max   EXIT
3=Enable   4= Delay   5=Fault Time    (C)
-----------------------------------------
```

 2. From this menu the operator may perform the following actions:

a) Alter the Minimum limit by pressing "1"

The program responds by displaying the following screen:

```
-------------------------------------------
Old Min VOLT Limit = xxxx.x          EXIT
New Min VOLT Limit = 0000.0          (C)
-------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an error is made press the [Back Space] key to remove the last entry. Press [Enter] to store the entered value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum
limit for the parameter greater than the current maximum
limit. If the value is greater than the maximum limit the
ADM will display the following error message for 3 seconds
then return to the VOLT parameter menu.

```
-----------------------------------------
INPUT PARAMETER MUST BE <= xxxxx
-----------------------------------------
```

Where: xxxxx is the current programmed high limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

b)   Alter the maximum limit by pressing "2"

The program responds by displaying the following screen:

```
-----------------------------------------
Old Max VOLT Limit = xxxx.x          EXIT
New Max VOLT Limit = 0000.0           (C)
-----------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an
error is made press the [Back Space] key to back space the
last entry. Press [Enter] to store the entered value of
press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter less than the current minimum
limit. If the value is less than the minimum limit the ADM
will display the following error message for 3 seconds then
return to the VOLT parameter menu.

```
-----------------------------------------
INPUT PARAMETER MUST BE => xxxxx
-----------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

c)   Enable/disable the VOLT sensor by pressing "3"

If the VOLT sensor is currently enabled, the program responds
with the following display:

```
         ------------------------------------------
         The VOLT Sensor is Enabled.          EXIT
         Disable the VOLT sensor? (0=No 1=Yes) (C)
         ------------------------------------------
```

If the VOLT sensor is currently disabled, the program
responds with the following display:

```
         ------------------------------------------
         The VOLT Sensor is Disabled.         EXIT
         Enable the VOLT Sensor? (0=No 1=Yes)  (C)
         ------------------------------------------
```

Press "0" or "1" to enable or disable the parameter or Press
[Cancel] to cancel the operation. If the sensor is disabled
the GREEN/RED LED on the front panel will be OFF. When the Sensor
is enabled the GREEN/RED LED will be illuminated indicating the Fault
status of the parameter.

The program responds by returning to the parameter menu.

d)   Define the Fault time for the parameter by pressing "4"

The program responds with the following display:

```
         ------------------------------------------
         Old VOLT Fault Time = xxxx.x         EXIT
         New VOLT Fault Time = 0000.0          (C)
         ------------------------------------------
```

Where: xxxxx represent the current value.

Enter the new value for the fault time by pressing the desired
numeric keys. If an error is made, use the [Back Space]
key to remove the last character entered. Press [Enter]
to store the new value or press [Cancel] to cancel the
operation.
The program responds by returning to the parameter menu.

e)   Define a new delay period for the parameter by pressing "5"

The program responds with the following display:

```
         ------------------------------------------
         Old VOLT Delay Time = xxxxx          EXIT
         New VOLT Delay Time = 00000           (C)
         ------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the desired
numeric keys. If an error is made, use the [Back Space]

key to remove the last character entered. Press [Enter]
to store the new value or press [Cancel] to cancel the
operation.

The program responds by returning to the parameter menu.

f)   Exit to the previous menu by pressing [Cancel]

4.8   ALTERING THE TRAVEL SPEED PARAMETERS (TRAVEL)

The operator can alter the following limits relating to the TVS parameter
menu:

   ° MAX - Maximum Travel speed (TVS) limit

   ° MIN - Minimum Travel speed (TVS) limit
   ° ENABLE - Enable/disable testing of the TVS parameter

   ° FAULT TIME - Definition of sampling period (Total time
     that the TVS parameter must be out of limits before
     activating a fault condition).

   ° DELAY - Delay from the start of the weld to the beginning
     of parameter testing.

To alter the limits of the TVS parameter, follow these steps:

   1. From the first alter limits menu, press "6"

            GAS   TIME   WFS   AMP   VOLT   TRAVEL   MORE
             1   2   3   4   5   6   9

   The program responds by displaying the TVS parameter menu:

            Travel Menu: 1=Min   2=Max   3=Enable EXIT
            4=Delay 5=Fault Time 6=Default 7=Scale (C)
            ----

   2. From this menu the operator may perform the following
       actions:

a)   Alter the Minimum limit by pressing "1"

   The program responds by displaying the following screen:

            Old Min Travel Spd Limit = xxxx.x   EXIT
            New Min Travel Spd Limit = 0000.0   (C)

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an error
is made press the [Back Space] key to remove the last entry. Press
[Enter] to store the entered value or press [Cancel] to cancel the
operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter greater than the current maximum
limit. If the value is greater than the maximum limit the
ADM will display the following error message for 3 seconds
then return to the TVS parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE <= xxxxx
-------------------------------------------
```

Where: xxxxx is the current programmed high limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

b)   Alter the maximum limit by pressing "2"

The program responds by displaying the following screen:

```
-------------------------------------------
Old Max Travel Spd Limit = xxxx.x    EXIT
New Max Travel Spd Limit = 0000.0    (C)
-------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an error
is made press the [Back Space] key to back space the last entry.
Press [Enter] to store the entered value or press [Cancel] to cancel
the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter less than the current minimum
limit. If the value is less than the minimum limit the ADM
will display the following error message for 3 seconds then
return to the TVS parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE => xxxxx
-------------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

c)   Enable/disable the Travel sensor by pressing "3"

If the Travel sensor is currently enabled, the program
responds with the following display:

```
-----------------------------------------
The Travel Sensor is Enabled.        EXIT
Disable Travel sensor? (0=No 1=Yes)   (C)
-----------------------------------------
```

NOTE: The default travel speed will be used when the travel
speed sensor is disabled. This will allow the ADM to
display and calculate Heat Input values without having
a travel speed sensor.

If the travel sensor is currently disabled, the program
responds with the following display:

```
-----------------------------------------
The Travel Sensor is Disabled.       EXIT
Enable Travel Sensor?  (0=No 1=Yes)   (C)
-----------------------------------------
```

Press "0" or "1" to enable or disable the parameter or Press
[Cancel] to cancel the operation. If the sensor is disabled
the GREEN/RED LED on the front panel will be OFF. When the
Sensor is enabled the GREEN/RED LED will be illuminated indicating
the Fault status of the parameter.

The program responds by returning to the parameter menu.

d)   Define the Fault time for the parameter by pressing "4"

The program responds with the following display:

```
-----------------------------------------
Old Travel Fault Time = xxxx.x        EXIT
New Travel Fault Time = 0000.0         (C)
-----------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the fault time by pressing the desired
numeric keys. If an error is made, use the [Back Space] key to
remove the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

e) Define a new delay period for the parameter by pressing "5"

The program responds with the following display:

```
        -------------------------------------------
        Old Travel Delay Time = xxxxx        EXIT
        New Travel Delay Time = 00000         (C)
        -------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the desired
numeric keys. If an error is made, use the [Back Space] key
remove the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

f) Define a new Default Travel speed parameter by pressing "6"

    The program responds with the following display:

```
        -------------------------------------------
        Old Default Travel Speed = xxxxx     EXIT
        New Default Travel Speed = 00000      (C)
        -------------------------------------------
```

    Where: xxxxx represents the current value.

    Enter the new value for the delay time by pressing the desired
    numeric keys. If an error is made, use the [Back Space] key to
    remove the last character entered. Press [Enter] to store the
    new value or press [Cancel] to cancel the operation.

NOTE: The default travel speed will be used with the Travel speed
        sensor is disabled. This will allow the ADM to display and
        calculate Heat Input values without having a travel speed
        sensor.

    The program responds by returning to the parameter menu.

g) Define a new Travel speed scale factor by pressing "7"

    The program responds with the following display:

```
        -------------------------------------------
        Old TVS Scale (Dweld/Dact) = xx.xxx  EXIT
        New TVS Scale (Dweld/Dact) = 00.000   (C)
        -------------------------------------------
```

        Where: xxxxx represents the current value

    Enter the new value for the scale factor by pressing the desired
    numeric keys. If an error is made, use the [Back Space] key to
    remove the last character entered. Press [Enter] to store the
    new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The scale factor is used to calculate the actual rotational
travel speed when the sensor is not installed directly on
the welding surface. To determine the correct scale value
measure the diameter of drive surface where the sensor is
installed. Measure the actual welding diameter. Use the
following equation to calculate the new scale value:

Scale = (Dia. of actual weld surface) /
(Dia. of measured drive surface)

Setting the scale factor to 0 will disable this function.
h) Exit to the previous menu by pressing [Cancel]

4.9 ALTERING THE HEAT INPUT PARAMETERS (HEAT)

The operator can alter the following limits relating to the HEAT parameter
menu:

° MAX – Maximum HEAT input limit

° MIN – Minimum HEAT input limit

° ENABLE – Enable/disable testing of the HEAT input parameter

° FAULT TIME – Definition of sampling period (Total time
that the HEAT parameter must be out of limits before
activating a fault condition).

° DELAY - Delay from the start of weld to the beginning of
parameter testing.

To alter the limits of the HEAT parameter, follow these steps:

1. From the first alter limits menu, press "9".

```
-------------------------------------------------
GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
 1      2       3      4      5        6         9
-------------------------------------------------
```

The program responds by displaying the 2nd menu screen:

```
-------------------------------------------
HEAT    TEMP    WELD_MODE    CLOCK    MORE
 1       2         3           4        9
-------------------------------------------
```

From the 2nd menu screen press "1" and the program responds

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by displaying the HEAT parameter menu:

```
-------------------------------------------
HEAT Parameter Menu:  1=Min    2=Max   EXIT
3=Enable   4=Delay   5=Fault Time    (C)
-------------------------------------------
```

2. From this menu the operator may perform the following
    actions:

a) Alter the Minimum limit by pressing "1"

    The program responds by displaying the following screen:

```
-------------------------------------------
Old Min HEAT Input Limit = xxxx.x    EXIT
New Min HEAT Input Limit = 0000.0    (C)
-------------------------------------------
```

    Where: xxxxx represents the current value.

    Enter a new limit by pressing the desired numeric keys. If
    an error is made press the [Back Space] key to remove the
    last entry. Press [Enter] to store the entered value or
    press [Cancel] to cancel the operation.
    The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum
        limit for the parameter greater than the current maximum
        limit. If the value is greater than the maximum limit the
        ADM will display the following error message for 3 seconds
        then return to the HEAT parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE <= xxxxx
-------------------------------------------
```

    Where: xxxxx is the current programmed high limit.

    Enter a new limit and press [Enter] to store or press
    [Cancel] to cancel the operation.

b) Alter the maximum limit by pressing "2"

    The program responds by displaying the following screen:

```
-------------------------------------------
Old Max HEAT Input Limit = xxxx.x    EXIT
New Max HEAT Input Limit = 0000.0    (C)
-------------------------------------------
```

    Where: xxxxx represents the current value.

    Enter a new limit by pressing the desired numeric keys. If an

error is made press the [Back Space] key to back space the
last entry. Press [Enter] to store the entered value or press
[Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter less than the current minimum
limit. If the value is less than the minimum limit the ADM
will display the following error message for 3 seconds then
return to the HEAT parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE => xxxxx
-------------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

c)   Enable/Disable the HEAT sensor by pressing "3"

d)   Define the Fault time for the parameter by pressing "4"

The program responds with the following display:

```
-------------------------------------------
Old HEAT Input Fault Time = xxxx.x    EXIT
New HEAT Input Fault Time = 0000.0    (C)
-------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the fault time by pressing the desired
numeric keys. If an error is made, use the [Back Space] key to
remove the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

e)   Define a new delay period for the parameter by pressing "5"

The program responds with the following display:

```
-------------------------------------------
Old HEAT Input Delay Time = xxxxx    EXIT
New HEAT Input Delay Time = 00000    (C)
-------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the desired

numeric keys. If an error is made, use the [Back Space] key to
remove the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

f) Exit to the previous menu by pressing [Cancel]

4.10 ALTERING THE TEMPERATURE PARAMETERS (TEMP)

The operator can alter the following limits relating to the TEMP parameter
menu:

° MIN - Minimum TEMP input limit

° MAX - Maximum TEMP input limit

° ENABLE - Enable/disable testing of the TEMP input parameter

° DELAY - Delay from the start of weld to the beginning of
   parameter testing.

° FAULT TIME - Definition of sampling period (Total time that
   the TEMP parameter must be out of limits before activating
   a fault condition).

° TYPE - Defines type of temp. sensor used.

To alter the limits of the TEMP parameter, follow these steps:

1. From the first alter limits menu, press "9".

```
        ------------------------------------------------
        GAS    TIME    WFS    AMP    VOLT    TRAVEL    MORE
         1      2       3      4      5        6         9
        ------------------------------------------------
```

The program responds by displaying the 2nd menu screen:

```
        -------------------------------------------
        HEAT     TEMP    WELD_MODE    CLOCK    MORE
         1        2          3          4       9
        -------------------------------------------
```

From the 2nd menu screen press "2" and the program responds
by displaying the TEMP parameter menu:

```
        -------------------------------------------
        TEMP Parameter Menu:  1=Min    2=Max   EXIT
        3=Enable 4=Delay 5=Fault Time 6=Type  (C)
        -------------------------------------------
```

2. From this menu the operator may perform the following
    actions:

a)   Alter the Minimum limit by pressing "1"

The program responds by displaying the following screen:

```
------------------------------------------
Old Min Temperature Limit = xxxxx    EXIT
New Min Temperature Limit = 00000    (C)
------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an
error is made press the [Back Space] key to remove the last
entry. Press [Enter] to store the entered value or press
[Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a minimum
limit for the parameter greater than the current maximum
limit. If the value is greater than the maximum limit the
ADM will display the following error message for 3 seconds
then return to the TEMP parameter menu.

```
------------------------------------------
INPUT PARAMETER MUST BE <= xxxxx
------------------------------------------
```

Where: xxxxx is the current programmed high limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

b)   Alter the maximum limit by pressing "2"

The program responds by displaying the following screen:

```
------------------------------------------
Old Max Temperature Limit = xxxxx    EXIT
New Max Temperature Limit = 00000    (C)
------------------------------------------
```

Where: xxxxx represents the current value.

Enter a new limit by pressing the desired numeric keys. If an
error is made press the [Back Space] key to back space the
last entry. Press [Enter] to store the entered value or
press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

NOTE: The program does not allow the operator to enter a maximum
limit for the parameter less than the current minimum limit.

If the value is less than the minimum limit the ADM will
display the following error message for 3 seconds then return
to the TEMP parameter menu.

```
-------------------------------------------
INPUT PARAMETER MUST BE => xxxxx
-------------------------------------------
```

Where: xxxxx is the current programmed Minimum limit.

Enter a new limit and press [Enter] to store or press
[Cancel] to cancel the operation.

c)   Enable/disable the TEMP sensor by pressing "3"

If the TEMP sensor is currently enabled, the program responds
with the following display:

```
-------------------------------------------
The TEMP Sensor is Enabled.         EXIT
Disable the TEMP sensor? (0=No 1=Yes) (C)
-------------------------------------------
```

If the TEMP sensor is currently disabled, the program
responds with the following display:

```
-------------------------------------------
The TEMP Sensor is Disabled.        EXIT
Enable the TEMP Sensor? (0=No 1=Yes)  (C)
-------------------------------------------
```

Press "0" or "1" to enable or disable the parameter or Press
[Cancel] to cancel the operation. If the sensor is disabled
the GREEN/RED LED on the front panel will be OFF. When the
Sensor is enabled the GREEN/RED LED will be illuminated indicating
the Fault status of the parameter.

The program responds by returning to the parameter menu.

d)   Define a new delay period for the parameter by pressing "4"

The program responds with the following display:

```
-------------------------------------------
Old TEMP Delay Time = xxxxx         EXIT
New TEMP Delay Time = 00000          (C)
-------------------------------------------
```

Where: xxxxx represents the current value.

Enter the new value for the delay time by pressing the desired
numeric keys. If an error is made, use the [Back Space] key to
remove the last character entered. Press [Enter] to store the
new value or press [Cancel] to cancel the operation.

The program responds by returning to the parameter menu.

e)   Define the Fault time for the parameter by pressing "5"
     The program responds with the following display:

```
     -------------------------------------------
     Old TEMP Input Fault Time = xxxx.x   EXIT
     New TEMP Input Fault Time = 0000.0   (C)
     -------------------------------------------
```

     Where: xxxxx represents the current value.

     Enter the new value for the fault time by pressing the desired
     numeric keys. If an error is made, use the [Back Space] key to
     remove the last character entered. Press [Enter] to store the
     new value or press [Cancel] to cancel the operation.

     The program responds by returning to the parameter menu.

f)   Define the type of sensor to be used by pressing "6".

     The program responds with the following display:

```
     -------------------------------------------
     Sensor Type Menu:  Current Type=1       Exit
     1=IR   2=Type K   3=Type J   4=Type T     (c)
     -------------------------------------------
```

      Enter the appropriate numeric designation for the type and temper-
      ature range of the sensor being used. The program responds by re-
      turning to the parameter menu.

g)   Exit to the previous menu by pressing [Cancel]

SECTION 5 - CONFIGURATION

5.0 ALTERING THE UNIT CONFIGURATION

In addition to altering the limits of the welding parameters, the operator can
also modify the ADM unit configuration in the alter limits mode with the
following functions:

     ° WELD_MODE -- Set the ADM to monitor one of the following
       types of welding operations:

           -- Gas Tungsten Arc (GTAW)
           -- Gas Metal Arc (GMAW)
           -- Pulse Gas Tungsten Arc (P-GTAW)

```
                    -- Pulse Gas Metal Arc (P-GMAW)
                    -- Submerged Arc Welding (SAW)
                    -- AC Welding (AC)

          ° CLOCK -- Set the system time and date for data
            printouts

          ° REVIEW -- Print a copy of the current unit configuration

          ° PRINTER -- Set the printer cycle rate and the format of
            reports and select the type of printer being used.

          ° ALARMS -- Enable/Disable external alarms, display total number of
            faults and reset fault counts.

          ° RELAYS -- Define relay signals

          ° STATION -- Enter unit station number

          ° PASSWORD -- Enter or change operator passwords

          ° OPERATION -- Set a 40 character operation name to be
            printed on each weld data sheet

          ° THRESHOLD -- Set arc starting current and voltage levels,
            set pulse detection current levels

          ° SCHEDULE -- Load and store multiple unit configurations
            and enable/disable remote schedule selection

          ° PARM_TEST -- Enable/disable parameter testing

          ° MUX_SET -- Program operational sequence for the optional
            external multiplexer.

          ° NETWORK -- Enable network communications and set cell ID
            number.

          ° ANALOG -- Enable, Disable and configure spare analog sensor
            inputs.

          ° CLEAR_RAM -- restore standard unit configuration
```

NOTE: Once the unit configuration has been altered by the user,
this configuration remains in non-volatile memory until
either another alteration takes place, or the standard
configuration is restored using the CLEAR_RAM function.

5.1 THE ALTER LIMITS MENUS

In order to allow access to all the functions possible in the alter limits
mode, the ADM has a six-level menu structure as follows:

```
          ---------------------------------------------
```

```
        GAS    TIME   WFS   AMP   VOLT   TRAVEL     MORE
         1      2      3     4     5       6          9
        --------------------------------------------------
                                                 |
                                                 |
        --------------------------------------------------
        HEAT       TEMP     WELD_MODE      CLOCK       MORE
         1          2           3            4          9
        --------------------------------------------------
                                                 |
                                                 |
        --------------------------------------------------
        REVIEW     PRINTER     ALARMS     RELAYS      MORE
         1           2           3          4          9
        --------------------------------------------------
                                                 |
                                                 |
        --------------------------------------------------
        STATION      PASSWORD     OPERATION       MORE
         1              2             3             9
        --------------------------------------------------
                                                 |
                                                 |
        --------------------------------------------------
        THRESHOLD      SCHEDULE     PARM_TEST       MORE
         1              2              3             9
        --------------------------------------------------
                                                 |
                                                 |
        --------------------------------------------------
        MUX_SET    NETWORK    ANALOG    CLEAR_RAM     Last
         1          2          3          4           Menu
        --------------------------------------------------
```

To move within the alter limits menu system:

    ° Press "9" to move to higher-level menu
    ° Press [Cancel] to move to a lower-level menu

To alter any feature of the unit configuration, follow these general
guidelines:

1. Press [Alter] on the control panel keypad.

NOTE: Depending on whether or not the unit is configured to
        require passwords, the program may ask for a password code
        before allowing the operator to continue. If the program
        prompts for a password, enter the code using the 0-9 keys
        on the control panel keypad.
The program responds by displaying the first alter limits menu:

```
        --------------------------------------------------
        GAS    TIME   WFS   AMP   VOLT   TRAVEL     MORE
         1      2      3     4     5       6          9
```

```
            -------------------------------------------
2.  Press "9" to display the second alter limits menu.

        The program responds with the following display:

                -------------------------------------------
                HEAT     TEMP    WELD_MODE    CLOCK    MORE
                 1        2          3          4       9
                -------------------------------------------
```

3. Press the key for the function to alter. If the function is not
    displayed on the screen, press "9" to display the menu for the next
    level.

4. Continue pressing "9" until the function is displayed on the screen.
    To return to a higher level menu, press [Cancel] on the keypad.

5. When the function is displayed, press the key corresponding to the
    number below the name to select the parameter menu screen.

6. To return to the data monitoring or data logging mode, press
    [Alter] on the keypad.

5.2 CHANGING THE WELDING MODE (WELD_MODE)

The ADM unit can be configured to monitor any of the following types of
welding operations:

    ° Gas Tungsten Arc Welding (GTAW)

    ° Gas Metal Arc Welding (GMAW)

    ° Pulsed Gas Tungsten Arc Welding (P-GTAW)

    ° Pulsed Gas Metal Arc Welding (P-GMAW)

    ° Submerged Arc Welding (SAW)

    ° AC Welding Power Supply (AC)

To set the ADM for the welding process being used, follow these steps:

1. From the first alter limits menu, press "9" until the 2nd alter
    limits menu is displayed:

```
                -------------------------------------------
                HEAT     TEMP    WELD_MODE    CLOCK    MORE
                 1        2          3          4       9
                -------------------------------------------
```

2. Press "3" for the WELD_MODE function.

        The program responds with the following display:

```
           ------------------------------------------
           Weld Process Menu:  1=GTAW  2=GMAW    EXIT
           3=P-GTAW  4=P-GMAW  5=SAW  6=AC        (C)
           ------------------------------------------
```

3. To configure the ADM enter the number corresponding to the type
    of welding being monitored or press [Cancel] to cancel the
    operation.
     The program displays one of the following messages for 3
     seconds. The program will then return to the 2nd menu
     screen. The message that will be displayed depends on the
     mode selected.

    ° Press "1" the following is displayed:

```
           ------------------------------------------
                Enable Gas Tungsten Arc Welding
                     (GTAW) Signal Processing
           ------------------------------------------
```

    ° Press "2" the following is displayed:

```
           ------------------------------------------
                 Enable Gas Metal Arc Welding
                     (GMAW) Signal Processing)
           ------------------------------------------
```

    ° Press "3" the following is displayed:

```
           ------------------------------------------
              Enable Pulse Gas Tungsten Arc Welding
                     (P-GTAW) Signal Processing)
           ------------------------------------------
```

    ° Press "4" the following is displayed:

```
           ------------------------------------------
                Enable Pulse Gas Metal Arc Welding
                     (P-GMAW) Signal Processing
           ------------------------------------------
```

    ° Press "5" the following is displayed:

```
           ------------------------------------------
                     Enable Sub Arc Welding
                     (SAW) Signal Processing
           ------------------------------------------
```

    ° Press "6" and one of the following is displayed depending
       on the current programmed AC parameter:

```
           -------------------------------------------
           The AC Sensor is disabled.          EXIT
           Enable the AC Sensor?  (0=No 1=Yes)  (C)
           -------------------------------------------


           -------------------------------------------
           The AC Sensor is enabled.           EXIT
           Disable the AC Sensor?  (0=No 1=Yes)  (C)
           -------------------------------------------
```

    Press "0", "1" or [Cancel] to cancel the operation. The
program will return to the 2nd menu screen.

5.3 SETTING THE SYSTEM TIME/DATE (CLOCK)

The operator may set the system time and system date for the program to use
for headers on printed reports. The ADM internal clock is battery backed up
and will retain the Date time information when the power is turned off. All
times must be entered in military style (i.e., based on a 24-hour clock).

To set the time and date, follow these steps:

1. From the first alter limits menu, press "9" until the second alter
    limits menu is displayed:

```
              -------------------------------------------
              HEAT    TEMP    WELD_MODE    CLOCK    MORE
               1       2          3          4        9
              -------------------------------------------
```

2. Press "4" for the CLOCK function

    The program responds with the CLOCK menu:

```
              -------------------------------------------
              CLOCK Parameter Menu: 1=Month 2=Day  EXIT
              3=Year  4=Hour  5=Minute  6=Second    (C)
              -------------------------------------------
```

3. From this menu, the operator may perform the following actions:

a) Set the system month by pressing "1"

    The program responds with the display:

```
              -------------------------------------------
               Current Month =xx                    EXIT
               Enter New Month = 00000               (C)
              -------------------------------------------
```

Where: xx is the current month programmed.

Enter the number (01-12) of the current month or press
[Cancel] to cancel the operation.

The program responds by returning the CLOCK menu

b)   Set the system day by pressing "2"

The program responds with the display:

```
     ------------------------------------------
      Current Day =xx                    EXIT
      Enter New Day = 00000              (C)
     ------------------------------------------
```

Where: xx is the current Day programmed.

Enter the number (01-31) for the current day or press
[Cancel] to cancel the operation.
The program responds by returning to the DAY-DATE menu.

c)   Set the system year by pressing "3"

The program responds with the display:

```
     ------------------------------------------
      Current Year = xx                  EXIT
      Enter New Year = 00000             (C)
     ------------------------------------------
```

Where: xx is the current Year programmed.

Enter the number (00-99) for the current year or press
[Cancel] to cancel the operation.

The program responds by returning to the DAY-DATE menu.

d)   Set the system hour by pressing "4"

The program responds with the display:

```
     ------------------------------------------
      Current Hour = xx                  EXIT
      Enter New Hour = 00000             (C)
     ------------------------------------------
```

Where: xx is the current Hour programmed.
Enter the number (00-23) for the current hour press
[Cancel] to cancel the operation.

The program responds by returning to the CLOCK menu.

e)   Set the system minute by pressing "5"

The program responds with the display:

```
--------------------------------------------
 Current Minute = xx                  EXIT
 Enter New Minute = 00000              (C)
--------------------------------------------
```

Where: xx is the current minute programmed.

Enter the number (00-59) for the current minute press
[Cancel] to cancel the operation.

The program responds by returning to the CLOCK menu.

f) Set the system second by pressing "6"

The program responds with the display:

```
--------------------------------------------
 Current Second = xx                  EXIT
 Enter New Second = 00000              (C)
--------------------------------------------
```

Where: xx is the current second programmed.

Enter the number (00-59) for the current second press
[Cancel] to cancel the operation.

The program responds by returning to the DAY-DATE menu.

g) Exit to the previous menu by pressing [Cancel]

5.4 REVIEWING THE CURRENT UNIT CONFIGURATION (REVIEW)

The REVIEW function allows an operator to print out a copy of the current
configuration for the ADM. The review function can only be used when the
Welding Arc is OFF.

NOTE: If the REVIEW function is selected during a weld cycle the
       following error message will be displayed for 3 seconds:

```
--------------------------------------------
 ERROR - Parameter Review can not be
 Printed while the ARC is active.
--------------------------------------------
```

The ADM will then redisplay the third menu screen.
To review the current unit configuration, follow these steps:

1. From the first alter limits menu, press "9" until the third
    alter limits menu is displayed:

```
          ----------------------------------------
          REVIEW   PRINTER   ALARMS   RELAYS   MORE
            1         2         3        4       9
          ----------------------------------------
```

2. Press "1" for the REVIEW function.

The following message will be displayed.

```
          ----------------------------------------
          Press [Del/Print] Key to start Parameter
          Review Print out.
          ----------------------------------------
```

Press the [Del/Print] key and the following message will be displayed:

```
          ----------------------------------------
                  Printing Parameter Review
            to cancel Print Out press [C] Key
          ----------------------------------------
```

The ADM will then print the current parameters to the printer. After printing
the parameters the unit will redisplay the third menu screen.

Table 7-1 shows a sample configuration print out. The parameters are the
Factory Default settings.

ADM(tm) Station Number: 100   Date: 05/15/89   Time: 12:00:00
Operation: Computer Weld Technology, Inc.- Houston TX

PARM	SENSOR	MAX	MIN	DELAY	TIME
Time	ON	5.1	4.9	.0	.0
Gas	ON	45	35	.50	.10
Travel	ON	1.5	.9	.40	.10
Wire	ON	210	190	.40	.10
Volt	ON	20.5	18.5	.40	.10
Amp	ON	300	280	.40	.10
Heat	ON	35.0	33.0	.40	.10
Temp	OFF	200	150	.40	.10

Pulse Threshold Current is 280 amps.
ARC ON Current is 50 amps.

ARC ON Voltage is 10.0 volts.

Welding Mode set for GMAW.

DC Welding Mode is Enabled.

Fault Relays are Disabled.

TABLE 7-1: SAMPLE SYSTEM CONFIGURATION PRINT OUT

5.5 CHANGING THE PRINTER CONFIGURATION (PRINTER)

The PRINTER function allows an operator to perform three operations related to
an external printer:

> ° Set the rate at which the printer prints a line of welding
>   data (CYCLE TIME)

> ° Select the print mode, Print all data, Fault Data only, or Averaged
>   Data.

> ° Select the type of printer being used with the ADM
>   To use the PRINTER function, follow these steps:

1. From the first alter limits menu, press "9" until the third alter limits
    menu is displayed:

```
        -------------------------------------------
        REVIEW    PRINTER    ALARMS    RELAYS    MORE
          1          2          3         4        9
        -------------------------------------------
```

2. Press "2" for the PRINTER function.

    The program responds with the display:
```
        -------------------------------------------
        PRINT Config Menu:  Cycle Time=1      EXIT
        Format=2            Printer Type=3     (C)
        -------------------------------------------
```

3. From this menu the operator may perform the following actions:

a) Change the printer cycle time by pressing "1"

    The program responds with the display:

```
        -------------------------------------------
        Old PRINT Cycle Time (sec)= xxxxx     EXIT
        New PRINT Cycle Time (sec)= 00000      (C)
        -------------------------------------------
```

    Where: xxxxx represents the current print cycle time.

    Enter a new cycle rate and press [Enter] to store or
    press [Cancel] to cancel the operation.

b)   Select the format by pressing "2"

The program responds with one of the following display:

```
------------------------------------------
PRINT Format Menu    Old Format=X      EXIT
1=All   2=Fault Only  3=Average Only   (C)
------------------------------------------
```

Where: x represents current print format.

Enter new print format (1=All Welding Data, 2=Faulted Data Only,
or 3=Averaged Data for entire weld) and press [Enter] to store
or press [Cancel] to cancel operation.

c)   Define printer type by pressing "3"

The program responds by returning to the print config. menu.

```
------------------------------------------
PRINTER Type Menu:  Okidata 182=1     EXIT
Panasonic=2 IBM Pro=3 Epson=4 Star=5  (C)
------------------------------------------
```

Select the type of printer connected to the ADM by pressing
the numeric key 1 - 5. If the printer is not listed select
the IBM proprint as default.

d)   Exit to the previous menu by pressing [Cancel]

5.6   SETTING THE OPERATION MODE (ALARMS)

The operator may change the unit configuration from data monitoring to data
logging and vice-versa with the ALARMS function.

To change the operational mode of the unit, follow these steps:

1.   From the first alter limits menu, press "9" until the third alter limits
menu is displayed:

```
------------------------------------------
REVIEW    PRINTER    ALARMS    RELAYS    MORE
  1          2         3         4         9
------------------------------------------
```

2.   Press "3" for the ALARMS function.

The Program will respond with the following menus screen:

```
--------------------------------------------
ALARM MENU:        1=Alarms On/Off       EXIT
2=Display Fault  3=Reset Fault Count  [c]
```

```
           -------------------------------------------
```

From this display the operator may perform the following actions:

a.   To Enable/Disable to Alarms (Monitor Mode) press the "1" key.
     If the unit is currently in the data monitoring mode, the
     program responds with the display:

```
          -------------------------------------------
          Fault Relays are Enabled:           EXIT
          Disable Fault Relays?  (0=No 1=Yes)   (C)
          -------------------------------------------
```

     Press "1" to change to log mode (collect weld data only)
     Press "0" to remain in monitoring mode (Fault relays active)
     Press [Cancel] to cancel the operation.

     If the unit is currently in the data logging mode, the
     program responds with the display:

```
          -------------------------------------------
          Fault Relays are Disabled:          EXIT
          Enable Fault Relays:  (0=No 1=Yes)    (C)
          -------------------------------------------
```

     Press "1" to change to monitor mode (Fault relays active)
     Press "0" to remain in log mode (collect weld data only)
     Press [Cancel] to cancel the operation.

b.   To display the stored fault summary press the "2" key. The program

```
          -------------------------------------------
          Total Number of Faults = ###        EXIT
          Enter Number to Display = 00000      [c]
          -------------------------------------------
```

will prompt the user for the fault data number to be displayed. The
first line shows the total number of faults stored. Enter the fault
number by pressing the numeric value and pressing the enter key. The
program will respond with the following fault summary screen:

```
          -------------------------------------------
          Fault ##   GVAWTHD       MM/DD/YY  HH:MM:SS
          V=##.#  A=###  W=###  T=##.#  G=###
          -------------------------------------------
```

                  Where: Fault ## is the fault number displayed
                         GVAWTHD indicates the parameters that were faulted:

```
                        G = Gas fault
                        V = Voltage fault
                        A = Current fault
                        W = Wire feed speed fault
                        T = Arc time fault
                        H = Heat input fault
                        D = Temperature Fault
              MM/DD/YY is the month, day and year that the fault
              occurred
              HH:MM:SS is the hour, minute and second that the fault
              occurred.
              V= the arc voltage at the time of the first fault.
              A= the arc current at the time of the first fault.
              W= The wire feed speed at the time of the first fault.
              T= The travel speed at the time of the first fault.
              G= The gas flow rate at the time of the first fault.
         To exit the display press the "CANCEL" key.
```

c.   To reset the fault count to "0", press the "3" key. The program
        responds with the display:

```
         Clear weld fault counter?              EXIT
         0 = No   1 = Yes                       [ C ]
```

        Press "1" to clear fault count
        Press "0" to retain fault count
        Press [cancel] to cancel the operation

3.   Exit to the previous menu by pressing [Cancel].

5.7   CONFIGURING THE EXTERNAL ALARM RELAYS (RELAY)

The ADM unit has four external alarm relay outputs, all of which are activated
when the unit is powered up. All of the fault Relays are software
controllable and can be configured by the operator to signal any parameter or
combination of parameters in a fault condition. The Relays deactivate when a
fault condition is detected for any enabled parameter.

The RELAY function allows the operator to perform the following operations:

    ° Configure the four relays CR1, CR2, CR3 and CR4

    ° Review the current configuration for the four fault relays

To use the RELAY function, follow these steps:

1. From the first alter limits menu, press "9" until the third alter limits
    menu is displayed:

```
            ----------------------------------------
            REVIEW   PRINTER   ALARMS   RELAYS   MORE
              1         2         3        4       9
            ----------------------------------------
```

2. Press "4" for the RELAY function.
    The program responds with the display:

```
            ----------------------------------------
            Fault Relay Configuration Menu:      EXIT
            CR1=1     CR2=2     CR3=3     CR4=4    (C)
            ----------------------------------------
```

3. From this menu the operator can perform the following functions:

    a) Configure parameters for relay 1 (CR1).

    b) Configure parameters for relay 2 (CR2).

    c) Configure parameters for relay 3 (CR3).

    d) Configure parameters for relay 4 (CR4).

    e) Cancel the operation by pressing [Cancel].

NOTE: The following is an example for configuring relay 1 (CR1).
       The same procedure can be used to configure the remaining
       relays:

4. Select relay 1 (CR1) by pressing the "1" key. The following will
    be displayed:

```
            ----------------------------------------
            CR#   Set=xxxxxxxx   Where:  GAS=1  TVS=2
            WIRE=3 VOLT=4 AMP=5 HEAT=6 TIME=7  TEMP=8
            ----------------------------------------
```

    Where: # is the selected relay number and xxxxx is the
     current configuration of selected relay.

5. To select or deselect a parameter press the associated numeric key
    as described on the menu screen. The numbers that appear after the
    equal sign, indicate what parameters will set the selected fault relay.
    If a number is displayed and the user presses the same numeric key the
    number will be turned off. If the number is not displayed and the
    operator presses the numeric key the number will be displayed. The number
    shown after the equal sign will be the parameters that will activate the
    selected relays when they are in a fault condition.

6. Press the [Cancel] key and the ADM will return to the relay configuration
    menu.

7. Exit to the previous menu by pressing [Cancel].

5.8 CHANGING THE STATION ID (STATION)

The STATION function allows the operator to enter or change the station ID for each ADM unit (on networked systems, for example).

To change the station ID for the unit, follow these steps:

1. From the first alter limits menu, press "9" until the fourth alter limits menu is displayed:

```
    ------------------------------------------
    STATION     PASSWORD     OPERATION     MORE
       1            2             3          9
    ------------------------------------------
```

2. Press "1" for the STATION function.

    The program responds with the display:

```
    ------------------------------------------
    Old Station Number = xxxxx          EXIT
    New Station Number = 00000          (C)
    ------------------------------------------
```

    Where: xxxxx represents the current station ID.

3. Enter the new station ID and press [Enter] to store or press [Cancel] to cancel the operation.

    The ADM will respond by returning to the fourth menu screen.

5.9 SETTING UP PASSWORDS (PASSWORD)

The PASSWORD function allows a user to specify that a password must be entered to access the alter limits operational mode.

To set up a password for the unit, follow these steps:

1. From the first alter limits menu, press "9" until the fourth alter limits menu is displayed:

```
    ------------------------------------------
    STATION     PASSWORD     OPERATION     MORE
       1            2             3          9
    ------------------------------------------
```

2. Press "2" for the PASSWORD function.

    The program responds with the display:

```
    ------------------------------------------
    Old Password = xxxxx                EXIT
```

```
        New Password = 00000                    (C)
        -------------------------------------------
```

   Where: xxxxx represents the current password.

3. Enter the new password and press [Enter] to store or press
    [Cancel] to cancel the operation.

NOTE: Setting the password 0000 disables the password routine.

        The program responds by returning to the Fourth Alter Limits
        menu screen.

5.10   ENTERING AN OPERATIONS NAME (OPERATION)

A 40 character alpha-numeric name may be entered into the ADM and will be
printed on all weld data records as an operations name. The operation name
may consist of any ASCII character.
To set up an operation name for the unit, follow these steps:

1. From the first alter limits menu, press "9" until the fourth alter limits
    menu is displayed:

```
        -------------------------------------------
        STATION     PASSWORD     OPERATION     MORE
           1           2            3            9
        -------------------------------------------
```

2. Press "3" for the OPERATION function.

    The program responds with the display:

```
        -------------------------------------------
        Enter Name:  0=Down  1=Up  2=Save   E=End
        xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
        -------------------------------------------
```

   Where: xxxx represents the current operation name.

3. A blinking cursor will be shown at the last blank position of the
    current operation name. To delete the current operation name press
    the [Del/Print] key. To move the cursor to another position press
    the [Back Space] key. To display the next ASCII character press the
    "1" key. Continue to press the "1" key until the desired character
    is displayed at the cursor location. Press the "2" key to save the
    new character. The cursor will automatically advance to the next
    location. To backup to a previous displayed character press the "0"
    key. Continue this process until the desired operations name is entered.

4. To save the new operations name press the [Enter] key. This will save
    the new operation name. To exit the routine without changing the original
    operation name press the [Cancel] key. The ADM will respond by displaying
    the fourth alter limits menu.

5.11   SET THE ARC ON AND PULSE CURRENT THRESHOLD (THRESHOLD)

The user may set the voltage and current levels that are used by the ADM to
determine when a valid arc has been established. The conditions which must be
obtained to indicate an ARC ON status are:

> **ARC ON** - The welding voltage, if enabled, AND the welding
> current, if enabled, must be greater then the voltage and
> current threshold value for a period of 10 msec.

The conditions that must be obtained to determine an ARC OFF status are:

> **ARC OFF** - The welding voltage, if enabled, OR the welding
> current, if enabled, must be less than the voltage and
> current threshold value for a period of 10 msec.

The ADM, when set to the PULSE mode, determines when the welding process is in
the PEAK or BACKGROUND period by comparing the actual current sample with the
programmed PULSE threshold current. A PULSE ON status is determined by the
following condition:

> **PULSE ON** - If the current value is greater than the PULSE
> Threshold current.

A PULSE OFF status is determined by the following condition:

> **PULSE OFF** - If the current value is less than the PULSE
> threshold current.

The ADM will calculate the pulse frequency by measuring the Pulse ON and Pulse
OFF time period.

NOTE: It is important to set the proper pulse current threshold
to collect proper pulse parameters. Set the threshold
current about 25% above the average current level. Adjust
the current threshold value to obtain stable pulse
frequency values.

To select the threshold function, allow these steps:

1. From the first alter limits menu, press "9" until the fifth alter limits
    menu is displayed:

```
        -------------------------------------------
        THRESHOLD    SCHEDULE    PARM_TEST    MORE
            1            2            3          9
        -------------------------------------------
```

2. Press "1" for the THRESHOLD function.

    The program responds with the display:

```
        ------------------------------------------
        Set Threshold values:     ARC ON  Volts=1
        ARC ON Amps=2  PULSE Threshold=3   EXIT=c
        ------------------------------------------
```

a) To set the ARC ON voltage threshold, follow these steps:

    1. Press "1" to select the ARC ON volts function.

    The program responds with the display:

```
        ------------------------------------------
        Old ARC ON Voltage (volts) = xxxx.x  EXIT
        New ARC ON Voltage (volts) = 0000.0   (C)
        ------------------------------------------
```

    Where: xxxx represents the current value.

    2. Enter the new ARC ON voltage and press [Enter] to store
        or press [Cancel] to cancel the operation.

        The program will respond by displaying the THRESHOLD menu.

b) To set the ARC ON current threshold, follow these steps:

```
        ------------------------------------------
        Set Threshold values:     ARC ON Volts=1
        ARC ON Amps=2   PULSE Threshold=3  EXIT=c
        ------------------------------------------
```

    1. Press "2" to select the ARC ON Amps function.

    The program responds with the display:

```
        ------------------------------------------
        Old ARC ON Current (amps) = xxxxx     EXIT
        New ARC ON Current (amps) = 00000     (C)
        ------------------------------------------
```

    Where: xxxx represents the current value.

    2. Enter the new ARC ON current and press [Enter] to store
        or press [Cancel] to cancel the operation.

        The program will respond by displaying the THRESHOLD menu.

c) To set the PULSE current threshold, follow these steps:

```
        ------------------------------------------
        Set Threshold values:      ARC ON Volts=1
        ARC ON Amps=2    PULSE Threshold=3   EXIT=c
        ------------------------------------------
```

   1. Press "3" to select the PULSE Threshold function.

       The program responds with the display:

```
        ------------------------------------------
        Old PULSE Threshold (amps) = xxxxx    EXIT
        New PULSE Threshold (amps) = 00000    (C)
        ------------------------------------------
```

   Where: xxxx represents the current value.

   2. Enter the new ARC ON current and press [Enter] to store
       or press [Cancel] to cancel the operation.

       The program will respond by displaying the THRESHOLD menu.

5.12 SETTING UP MULTIPLE CONFIGURATION SCHEDULES (SCHEDULE)

The Multi Weld Schedule allows an operator to store up to fifteen (15)
separate configurations (or schedules) for an ADM unit using the SCHEDULE
function. In this way, for example, different configuration for GMAW, GTAW,
FCAW and SAW welding can be stored and recalled with only a few key strokes.

With the SCHEDULE function, the operator can perform the following:

   ° Save the current configuration

   ° Load a configuration

   ° Enable/Disable remote selection of weld schedules via the
      I/O port

To use the SCHEDULE function, follow these steps:

1. From the first alter limits menu, press "9" until the fifth
    alter limits menu is displayed.

```
        ------------------------------------------
```

```
           THRESHOLD     SCHEDULE    PARM_TEST   MORE
               1            2            3         9
           -------------------------------------------
```

2. Press "2" for the SCHEDULE function.

    The program responds with the display:

```
           -------------------------------------------
           Weld Schedules Menu: 1=Enable Remote EXIT
           2=Load Schedule    3=Save Schedule    (C)
           -------------------------------------------
```

3. From this menu the operator can perform the following actions:

a) Enable/Disable remote selection of weld schedule via the I/O port
    by pressing "1". If the REMOTE select is currently enabled, the
    program responds with the following display:

```
           -------------------------------------------
           Remote Schedule Select is Enabled.   EXIT
           Disable Remote Select?  (0=No 1=Yes)  (C)
           -------------------------------------------
```

    If the REMOTE select is currently disabled, the program
    responds with the following display:

```
           -------------------------------------------
           Remote Schedule Select is Disabled.  EXIT
           Enable Remote Select?  (0=No 1=Yes)   (C)
           -------------------------------------------
```

    Press "0" or "1" to enable or disable the parameter or press
    [Cancel] to cancel the operation. When the remote select is
    enable the ADM will read the I/O remote inputs and set the
    weld schedule to the selected value. When the remote select
    is disabled the weld schedule is set by the Load schedule
    function.

    The program responds by returning to the parameter menu.

b) Load a stored configuration by pressing "2"

    The program responds with the display:

```
           -------------------------------------------
           Old Schedule Number = #             EXIT
           Load New Weld Schedule = 00000       (C)
           -------------------------------------------
```

    Where: # is the current active weld schedule.

Enter a number for the schedule to load (1 - 15) and press [Enter].

The program responds with the display:

```
-----------------------------------------
Weld Schedule xx loaded and verified
-----------------------------------------
```

Where: xx is schedule number entered.

c) Save the current unit configuration by pressing "3"

The program responds with the display:

```
-----------------------------------------
Old Schedule Number = #              EXIT
Save New Weld Schedule = 00000        (C)
-----------------------------------------
```

Where: # is the current active weld schedule.

Enter a number for the configuration (1 - 15) and press [Enter].

The program responds with the display:

```
-----------------------------------------
Weld Schedule xx is saved and verified
-----------------------------------------
```

Where: xx is schedule number entered.

NOTE: The program will over write the current save configuration
       if the schedule number entered is a duplicate of an
       existing weld schedule configuration.

d) Cancel the operation by pressing [Cancel].

5.13 ENABLE/DISABLE FAULT PARAMETER TESTING (PARM_TEST)

The operator may enable or disable fault parameter testing. If the testing is
disabled the fault status indicators and fault relays will not be activated
during a fault condition.

To change the testing mode of the unit, follow these steps:

1. From the first alter limits menu press "9" until the fifth alter limits
    menu is displayed:

```
-----------------------------------------
THRESHOLD    SCHEDULE    PARM_TEST    MORE
```

```
             1            2            3         9
        ----------------------------------------
```

2. Press "3" for the PARM_TEST function.

    If parameter testing is currently enabled, the program
    responds with the display:

```
        ----------------------------------------
        Parameter Testing is Enabled:       EXIT
        Disable Testing?  (0=No 1=Yes)       (C)
        ----------------------------------------
```

3. From this menu the operator can perform the following operations:

a) Press "1" to disable Parameter testing.

b) Press "0" to retain current mode (testing enabled).

c) Press [Cancel] to cancel the operation.

    If parameter testing is currently displayed, the program
    responds with the display:

```
        ----------------------------------------
        Parameter Testing is Disabled.      EXIT
        Enable Testing?  (0=No 1=Yes)        (C)
        ----------------------------------------
```

3. From this menu the operator can perform the following operations:

a) Press "1" to enable Parameter testing.

b) Press "0" to retain current mode (testing disabled).

c) Press [Cancel] to cancel the operation.

5.14 SETTING EXTERNAL MULTIPLEXER FUNCTIONS (MUX_SET)

The external multiplexer option (Figure 5-1, Appendix A) allows the ADM to
scan up to eight (8) welding arcs. The multiplexer option can be programmed
to provide manual selection of a sensor channel (selected from the keypad) or
to automatically scan the sensor channels. The auto scan feature allows the
operator to scan the active channels by specifying a fixed time per channel or
the number of welds to collect per channel. If both the scan time and number
of welds are set then the ADM will collect the number of welds specified,
provided that they occur before the scan time has expired. If the scan time
has expired, the ADM will move to the next channel. If scan time is set to
zero (0) then the ADM will wait until the number of welds have been collected
before moving to the next channel.

The MUX_SET menu allows the operator to program the mode of operation for the external multiplexer.

To program the operation of the multiplexer, follow these steps:

1. From the first alter limits menu, press "9" until the last alter limits menu is displayed:

```
--------------------------------------------------
MUX_SET    NETWORK    ANALOG    CLEAR_RAM    Last
   1          2          3          4        Menu
--------------------------------------------------
```

2. Press "2" for the MUX_SET function.

   The following remote multiplexer setup menu will be displayed:

```
------------------------------------------
Remote Multiplexer Setup Menu:      EXIT
1=Man/Auto  2=Scan Time  3=Welds     (C)
------------------------------------------
```

 NOTE: The ADM will automatically detect the installation of the remote multiplexer. If the multiplexer option is not installed or is not functioning the ADm will not allow the operator to enter the MUX_SET menu. The following error message will be displayed for 2 seconds when the "2" key is pressed.

```
------------------------------------------
  ADM can not detect Remote Multiplexer.
     ***** Menu Access Denied *****
------------------------------------------
```

3. From this menu the operator may perform the following operations:

   a) Press the "1" key to set the mode of operation of the external multiplexer.

   ° If the multiplexer is currently set to the manual scan mode the following will be displayed:

```
------------------------------------------
Manual Scanning is enabled.         EXIT
Enable Auto Scan?  (0=No 1=Yes)      (C)
------------------------------------------
```

From this menu the operator can perform the following
operations:

a) Press "1" to enable auto scanning.

b) Press "0" to retain current mode (Manual scanning
    enabled).

c) Press [Cancel] to cancel the operation and return to
    the previous menu.

 ° If the multiplexer is currently set to the auto scan mode
    the following will be displayed:
```
        -----------------------------------------
        Auto Scanning is enabled.           EXIT
        Enable Manual Scanning?  (0=No 1=Yes) (C)
        -----------------------------------------
```

 From this menu the operator can perform the following
 operations:

 a) Press "1" to enable manual scanning.

 b) Press "0" to retain current mode (Auto scanning enabled).
     c) Press [Cancel] to cancel the operation and return to the
         previous menu.

b) Press "2" to set the multiplexer channel scan time.

The following scan time menu screen will be displayed:
```
        -----------------------------------------
        Old Scan Time (seconds) = xxxxx      EXIT
        New Scan Time (seconds) = 00000      (C)
        -----------------------------------------
```

Where: xxxx represents the current value.

Enter the new scan time and press [Enter] to store or press
[Cancel] to cancel the operation. The program will respond by
displaying the MUX_SET menu.

c) Press "3" to set the number of welds to collect from each channel.

The following number of welds menu screen will be displayed:
```
        -----------------------------------------
        Old Number of Welds/Scan= xxxxx      EXIT
        New Number of Welds/Scan= 00000      (C)
        -----------------------------------------
```

Where: xxxx represents the current value.

Enter the new number of welds and press [Enter] to store or
press [Cancel] to cancel the operation. The program will respond
by displaying the MUX_SET menu.

5.15 ACTIVATING NETWORK COMMUNICATION (NETWORK)

The network communication port is used with the ADMSTAT(tm) P.C. software to
allow up to 250 ADM's to communicate with a single P.C. To enable this
feature each ADM must have a unique station number and cell ID number. The
cell ID and station number is used by the network P.C. software to identify an
ADM connected to the network. Each ADM connected to the network must have a
different cell ID and station number. The ADMSTAT(tm) program will test the
network for available ADM's and will establish a library of station numbers
and cell ID's. When using the ADMSTAT(tm) program the user will select the
desired ADM by entering the station number. The Program will then establish
communications with the selected ADM connected to the network.

To enable the operation of the network communications port and set the network
cell ID, follow these steps:

1. From the first alter limits menu, press "9" until the last alter limits
   menu is displayed:

```
         --------------------------------------------------
         MUX_SET     NETWORK     ANALOG    CLEAR_RAM    Last
            1           2           3           4       Menu
         --------------------------------------------------
```

2. Press "2" for the NETWORK function.

    The following network menu screen will be displayed.

```
         ------------------------------------------
         Old Network Cell ID Number = xxx      EXIT
         New Network Cell ID Number = 00000    (C)
         ------------------------------------------
```

    Where: xxxx represents the current value.

    **WARNING - Each ADM connected to the network must have a
            different cell ID and Station number. Failure to
            set different values will result in network
            communication errors.**

    Enter the new cell ID number (1 – 250) and press [Enter] to
    store or press [Cancel] to cancel the operation. The program
    will respond by displaying the last alter limits menu screen.

5.16 PROGRAMMING SPARE ANALOG INPUTS (ANALOG)

The ANALOG menu allows the operator to program the PARAMETER name, UNITS of
measure, DECIMAL point location and to ENABLE/DISABLE the spare analog sensor
inputs. The analog sensor inputs can measure DC analog sensor signals with a

resolution of 10 mv and a range of 0 to 8.50 vdc. The displayed output value
for a input signal 8.50 volts will be 850. The user may set a decimal point
location as indicated from the right most position of the measured data.

                EXAMPLE - Decimal point = 1

                Input = 8.50 vdc   Displayed Value = 85.0

To program the two (2) spare analog sensor inputs, follow these steps:

1. From the first alter limits menu, press "9" until the last alter limits
   menu is displayed:

                MUX_SET   NETWORK   ANALOG   CLEAR_RAM   Last
                   1   2   3   4   Menu
                ----

2. Press "3" for the ANALOG function.

    The following spare analog sensor setup menu will be displayed:

                Spare Analog Input Config Menu: EXIT
                1= Spare ANL1   2= Spare ANL2   [C]
                ----

3. To select the sensor input to define press "1" or "2".

    The following Define sensor menu will be displayed:

                Define ANL# Sensor: 1=Decimal Point   EXIT
                2=Parameter Name 3=Units 4=Enable   (C)

    Where: # is the selected sensor number (1 or 2).

4. To set the displayed decimal point location press "1".

    The following decimal point screen will be displayed:

                The ANL# Sensor Decimal Point is   EXIT
                set to @. Press New Decimal Point Number! (C)

    Where: # is the selected sensor number (1 or 2).
           @ is the current decimal point location.

Press the number key 0 - 3 to set the new decimal point location.
the program will respond by returning to the define sensor menu.

The analog inputs are configured to provide a 10 mv resolution. The sensor connected to the spare inputs must provide the proper scaling to produce a 10 mv signal / unit of measure. The decimal point may be positioned on the display and printer to provide proper units of measure. Example: Voltage sensor provides an output of 10 mv per 0.1 volts input. To display the proper value set the decimal point to 1.

5. The user can define a six character parameter name which will be used to display the sensor measured data. To program the Parameter name press "2" while viewing the Define sensor menu:

    The program responds with the display:

```
        ----------------------------------------
        Enter Name:  0=Down  1=Up  2=Save    E=End
        xxxxxx
        ----------------------------------------
```

    Where: xxxxxx represents the current parameter name.

    a. A blinking cursor will be shown at the last blank position of the current parameter name. To move the cursor to another position press the [Back Space] key. To display the next ASCII character press the "1" key. Continue to press the "1" key until the desired character is displayed at the cursor location. Press the "2" key to save the new character. The cursor will automatically advance to the next location.

        To backup to a previous displayed ASCII character press the "0" key. Continue this process until the desired parameter name is entered.

    b. To save the new parameter name press the [Enter] key. This will save the new parameter name. To exit the routine without changing the original parameter name press the [Cancel] key. The ADM will respond by displaying the define sensor menu.

6. The user can define a six character unit of measure name which will be used to display the sensor measured data. To program the unit of measure name press "3" while viewing the Define sensor menu:

    The program responds with the display:

```
        ----------------------------------------
        Enter Name:  0=Down  1=Up  2=Save    E=End
        xxxxxx
        ----------------------------------------
```

    Where: xxxxxx represents the current unit-of-measure name.

    a. A blinking cursor will be shown at the last blank position of the

current unit-of-measure name. To move the cursor to another
position press the [Back Space] key. To display the next
ASCII character press the "1" key. Continue to press the "1" key
until the desired character is displayed at the cursor location.
Press the "2" key to save the new character. The cursor will
automatically advance to the next location. To backup to a
previous displayed ASCII character press the "0" key. Continue
this process until the desired unit-of-measure name is entered.

   b. To save the new unit-of-measure name press the [Enter] key.
       This will save the new unit name. To exit the routine without
       changing the original unit-of-measure name press the [Cancel]
       key. The ADM will respond by displaying the define sensor menu.

7. To Enable/Disable the selected spare analog input press the "4" key while
    viewing the Define sensor menu. If sensor is currently enabled, the
    program responds with the display:

```
        ----------------------------------------
        The ANL# Sensor is Enabled.         EXIT
        Disable the ANL# sensor? (0=No 1=Yes) (C)
        ----------------------------------------
```

From this menu the operator can perform the following operations:

   a) Press "1" to disable the sensor.

   b) Press "0" to retain current mode (sensor enabled).

   c) Press [Cancel] to cancel the operation.

If parameter testing is currently disabled, the program responds with the
display:

```
        ----------------------------------------
        The ANL# Sensor is Disabled.        EXIT
        Enable the ANL# Sensor? (0=No 1=Yes)  (C)
        ----------------------------------------
```

From this menu the operator can perform the following operations:

   a) Press "1" to enable the sensor.

   b) Press "0" to retain current mode (sensor disabled).

   c) Press [Cancel] to cancel the operation.

5.17 RESTORING THE STANDARD CONFIGURATION (CLEAR_RAM)

The CLEAR_RAM function allows the operator to return the unit configuration to
its original state.

To use the CLEAR_RAM function, follow these steps:

1. From the first alter limits menu, press "9" until the sixth alter limits
   menu is displayed:

```
        ------------------------------------------------
        MUX_SET    NETWORK    ANALOG   CLEAR_RAM   Last
           1          2          3         4       Menu
        ------------------------------------------------
```

2. Press "3" for the CLEAR_RAM function.

    The program responds with the display:

```
        ----------------------------------------
        Clear Ram and load Default Parameters
              Yes = 1            No = 0
        ----------------------------------------
```

3. To continue the operation, press "1".

       ** This message is not displayed. It is supplied in this manual
          for your information.

       WARNING - **Activating the Clear Ram function will clear all
                 previously stored parameters and reset the
                 parameters to the factory default parameters
                 (Appendix B for default values). It will also
                 reset all weld schedules to the factory default
                 settings and the network cell ID will be set to 0.**

    The program responds by returning the unit to the factory-set
    configuration, displaying the message:

```
        ----------------------------------------
                      Clearing Ram !
               Loading Default Parameters !
        ----------------------------------------
```

    And resetting the unit after an interval of three seconds.

SECTION 6 - SPECIFICATIONS

6.0   MECHANICAL SPECIFICATIONS

    Dimensions: 11-1/4"W x 4-7/8"H x 12-1/2"L
                            (285mm W x 124mm H x 318mm L)

    Weight: 10 lbs.

    Power Requirements: 115 vac or 220 vac 50/60 Hz @ 1amp

    Communications: RS-232-C Port
                            Parallel Printer Interface

RS-422 Network Port

NOTE: *Specifications subject to change without notice.*

6.1   SENSOR SPECIFICATIONS

Arc Voltage: 0-80 V± 1% (AC or DC)
                      .1 V Resolution

Arc Current: 0-800 A ± 1% (AC or DC)
                      1 AMP Resolution

Travel Speed: 1 - 100 IMP (.4-42 mm/s) ± 3%
                      .1 IPM (.04 mm/s) Resolution

Wire Speed: 10 - 1000 IPM (4.2-423 mm/s) ± 3%
                      1 IPM (.4 mm/s) Resolution

Gas Flow Rate: 5 - 255 SCFH (2 - 120 LPM) ± 3%
                      1 SCFH (LPM) Resolution
                      50 PSIA (344 KPA) Maximum Operating Pressure

Temperature: Range, Resolution and Accuracy Depend on
                      Sensor Used. Consult Factory For Options.

Note: *Specifications subject to change without notice.*

APPENDIX A

UNIT AND SENSOR

ILLUSTRATIONS
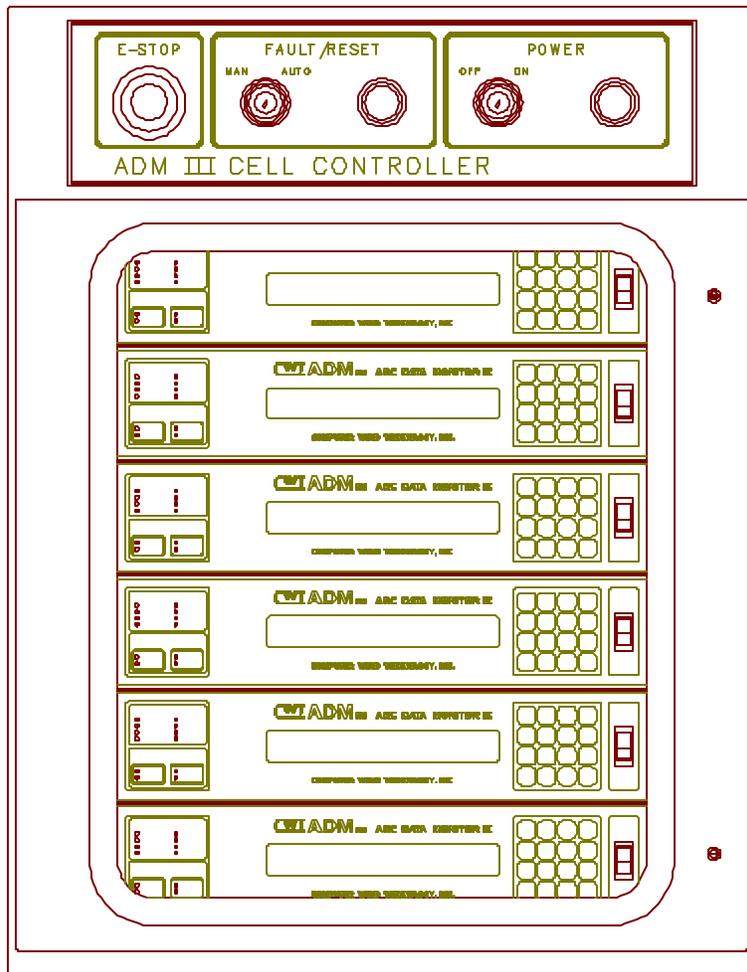
6 Unit NEMA-12 Enclosure
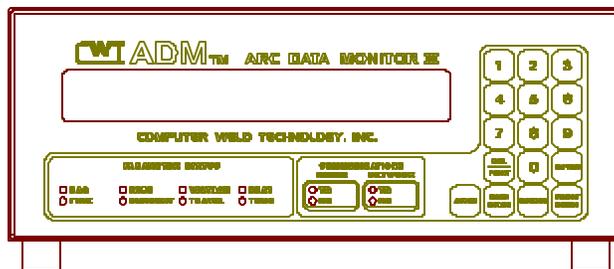
Portable, Model D

Figure 1-1: Available ADMIII Configurations

Front View
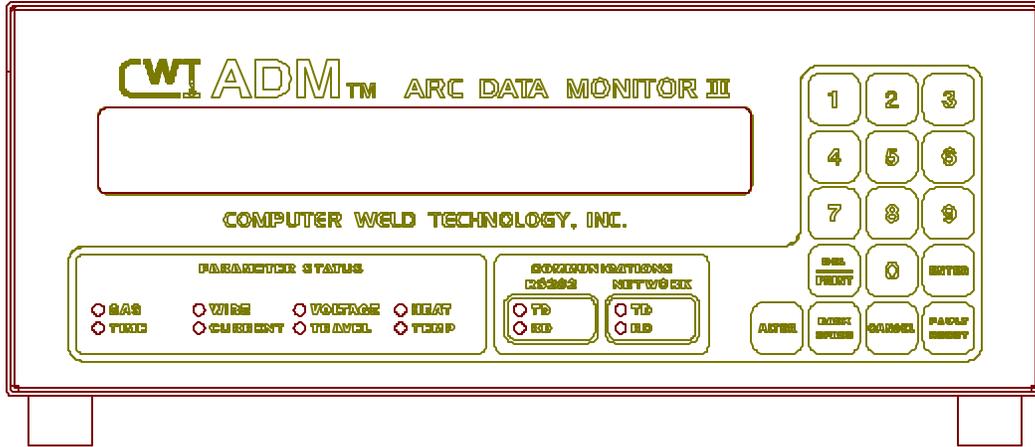
Rear View
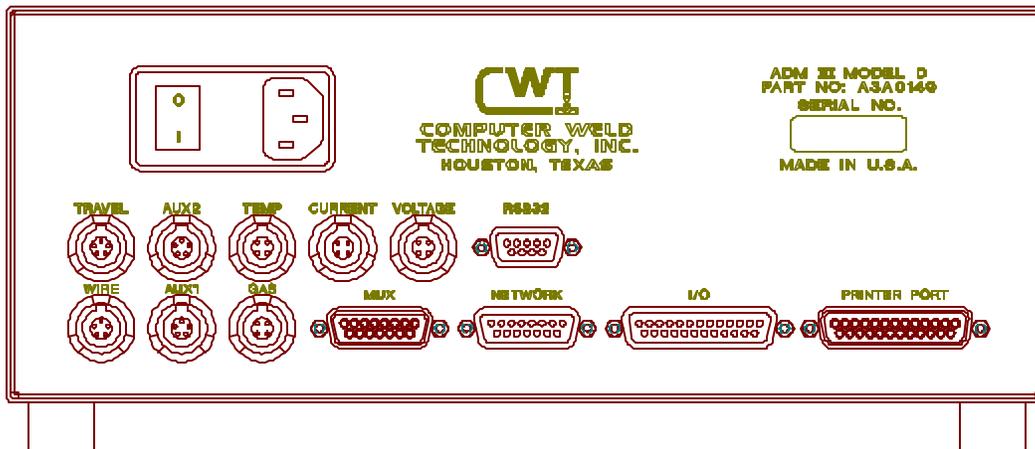
Figure 2-1: ADMIII, Model D, Sensors

FRONT VIEW

CURRENT SENSOR
COMPUTER WELD TECHNOLOGY
WORK   MACHINE NEG.
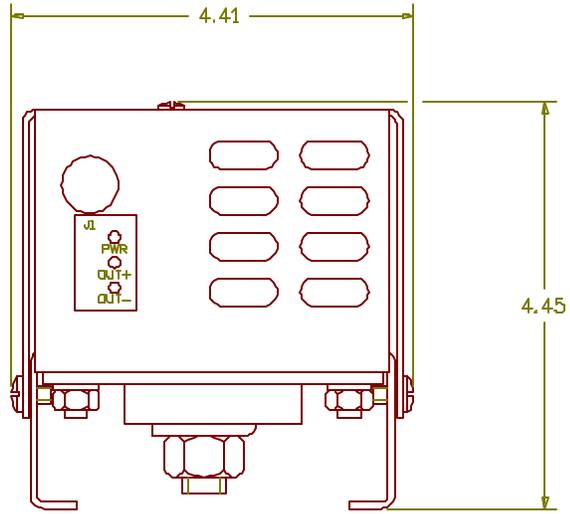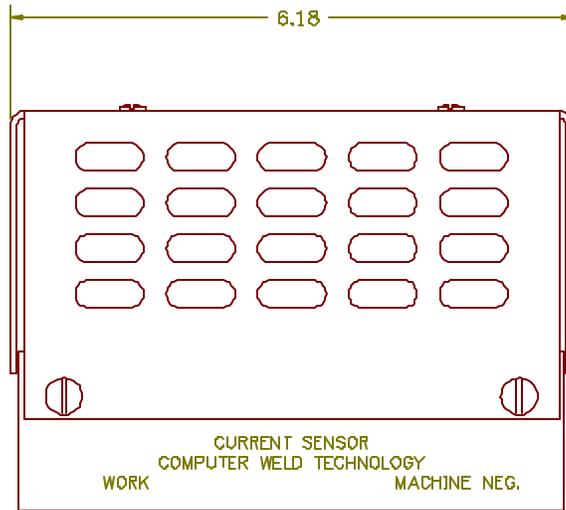
FRONT VIEW

Figure 2-2: Current Sensor Assembly

1.56

2.55

4.72

Figure 2-3:   Voltage Sensor
                        Assembly

0.25 (TYP) 2.78 1.31

5.00

10-32 X 9/32" DP
2 PLACES

1.86

3/8 NPT

1.35

0.39 2.00

0.96

1.81
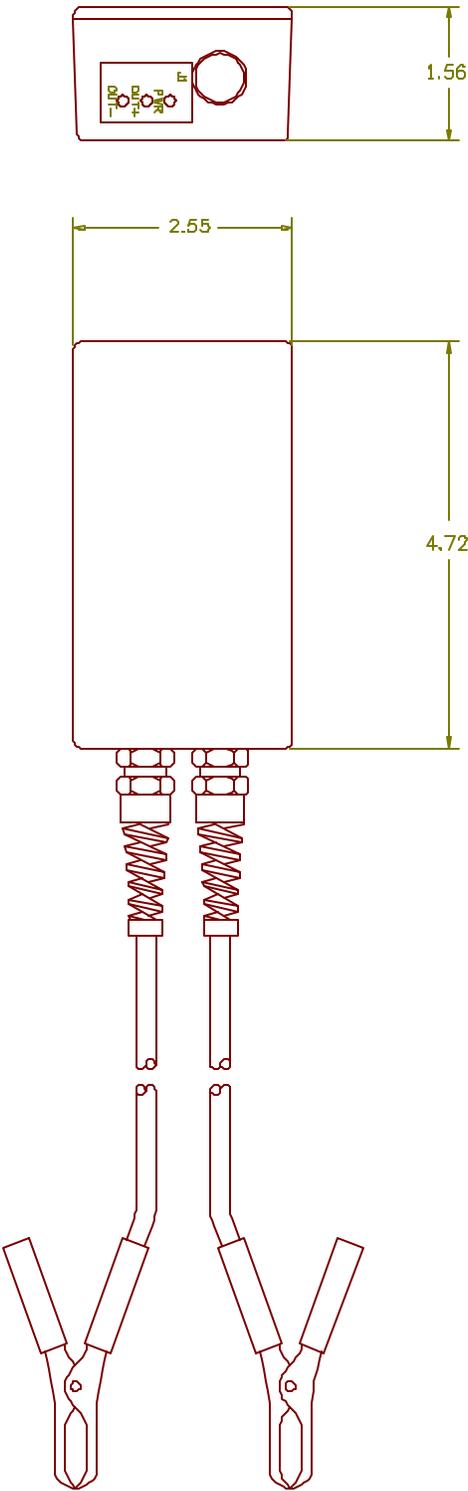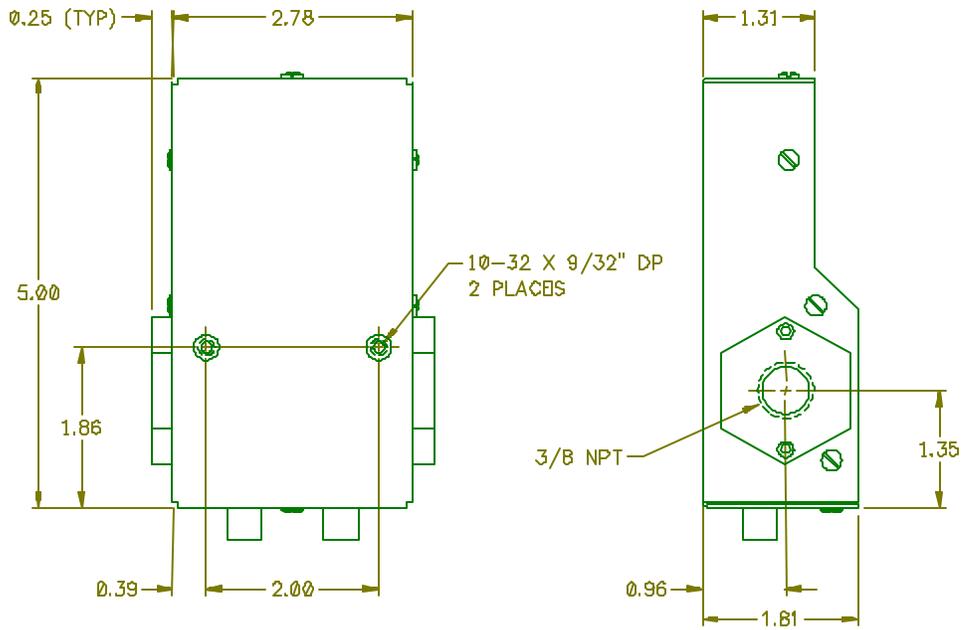
Rear View

Side View

Installation with Threaded Inserts

2.78 0.16 1.31

5.00

Ø5/16" THRU
2 PLACES

1.85

3/8 NPT

1.35

0.60

0.96

4.00

1.81
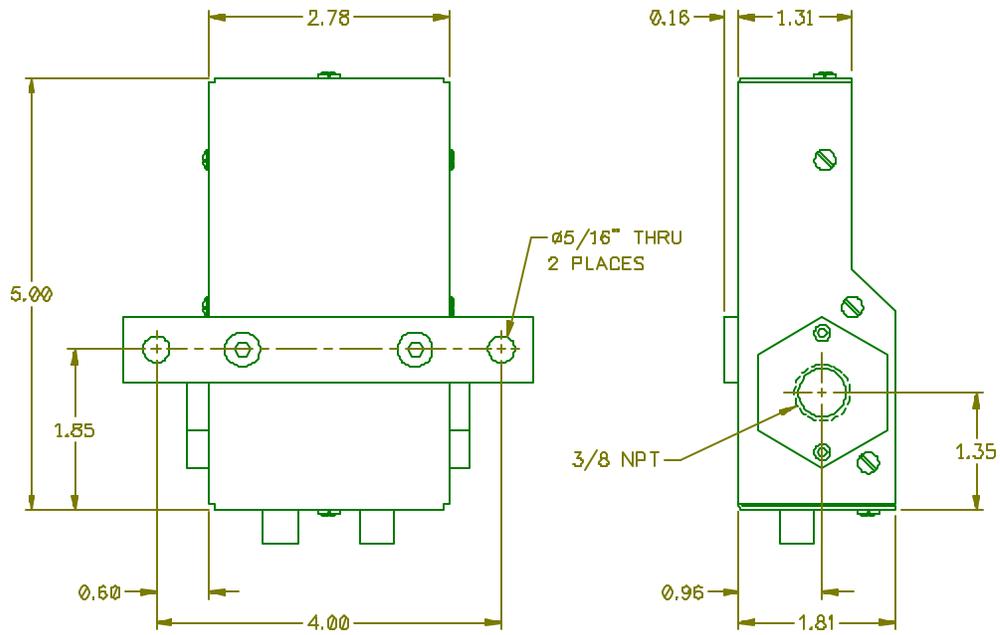
Rear View

Side View

Installation with Mounting Bar

Figure 2-4: Gas Flow Transducer

WELD WIRE
CENTER LINE

2.07 1.860
1.020
.075

2.00

WELD WIRE
CENTER LINE

8-32 UNC 2B
BOTH SIDES

FRONT VIEW

.62

.625

.500

3.100

RIGHT SIDE VIEW

REAR VIEW

2X 8-32 UNC 2B ↧.31

.250

1.500

.500
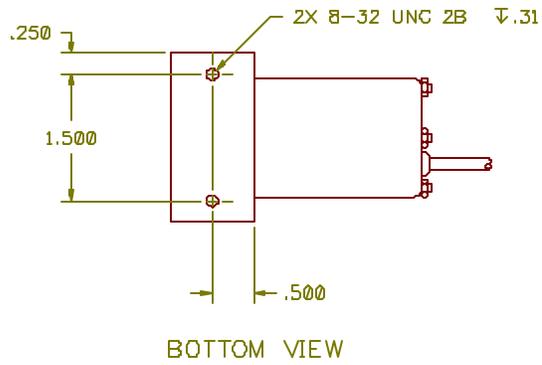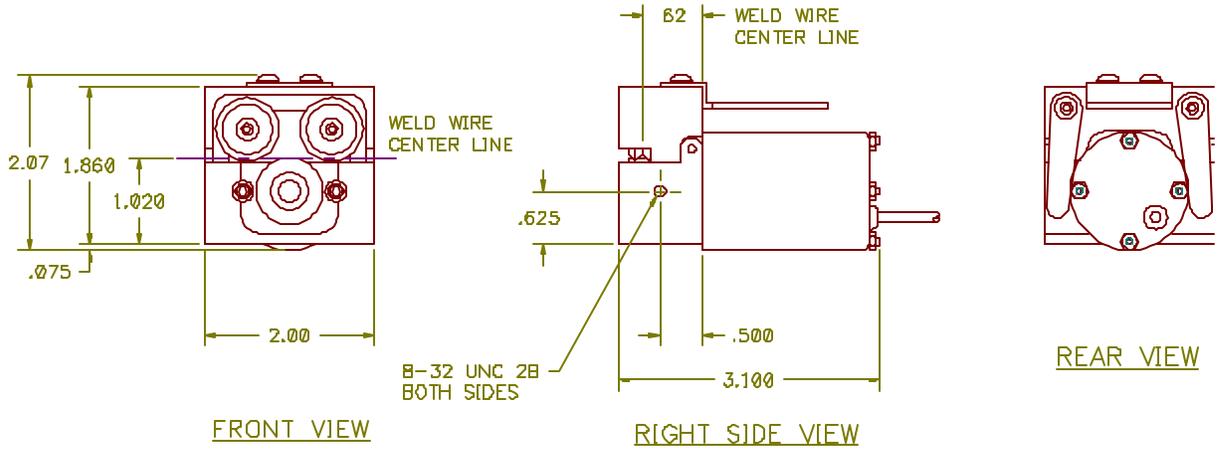
BOTTOM VIEW

Figure 2-5: Wire Speed Transducer

LEFT SIDE VIEW

3.56

2.25

FRONT VIEW

3.60

1.07

.09

.75

1.500

2X 10-32
MOUNTING HOLES
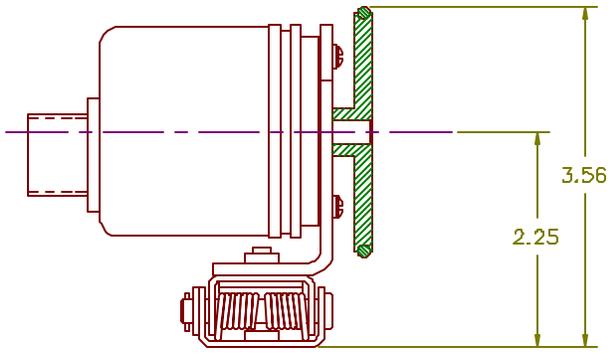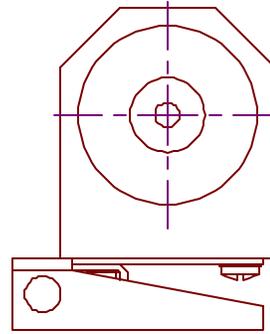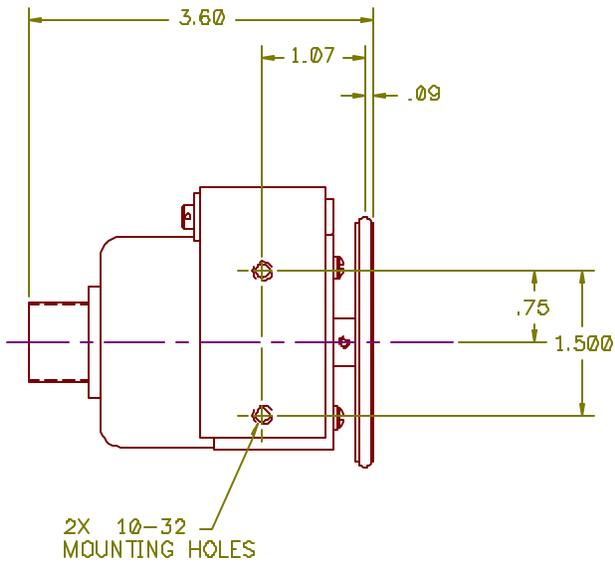
BOTTOM VIEW
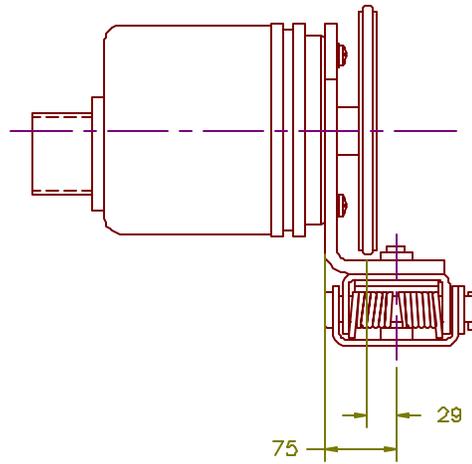
OPTIONAL MOUNTING

29

75

Figure 2-6: Travel Speed Transducer
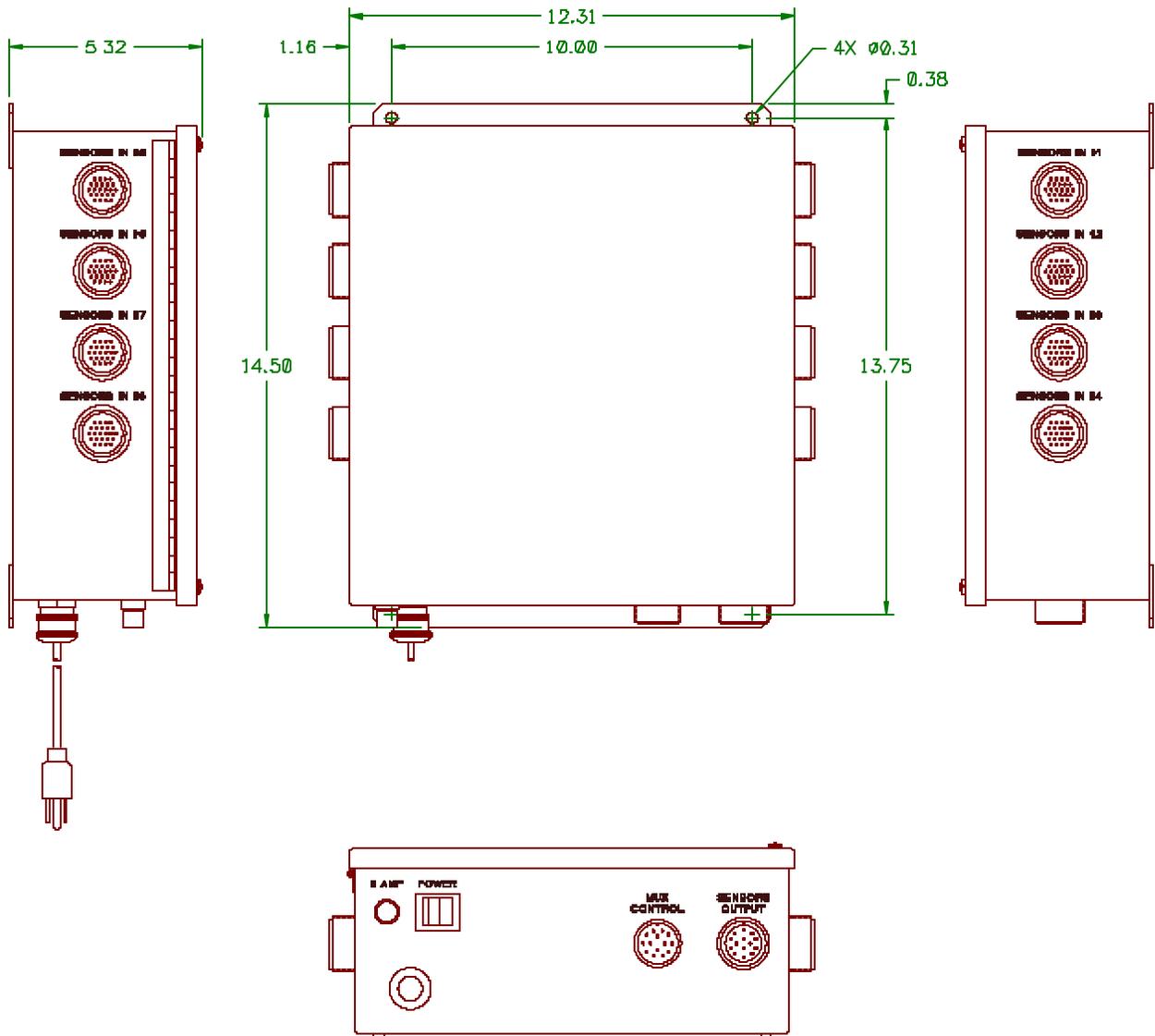
Figure 5-1: Multiplexer Option

6.37

1.21

4.00

6.75 7.50

0.37

4X Ø0.31

SENSOR
OUTPUTS

WIRE   TRAVEL VOLTAGE

CURRENT GAS TEMP

CRC-EVANS AUTOMATIC WELDING
HOUSTON, TEXAS

4.35
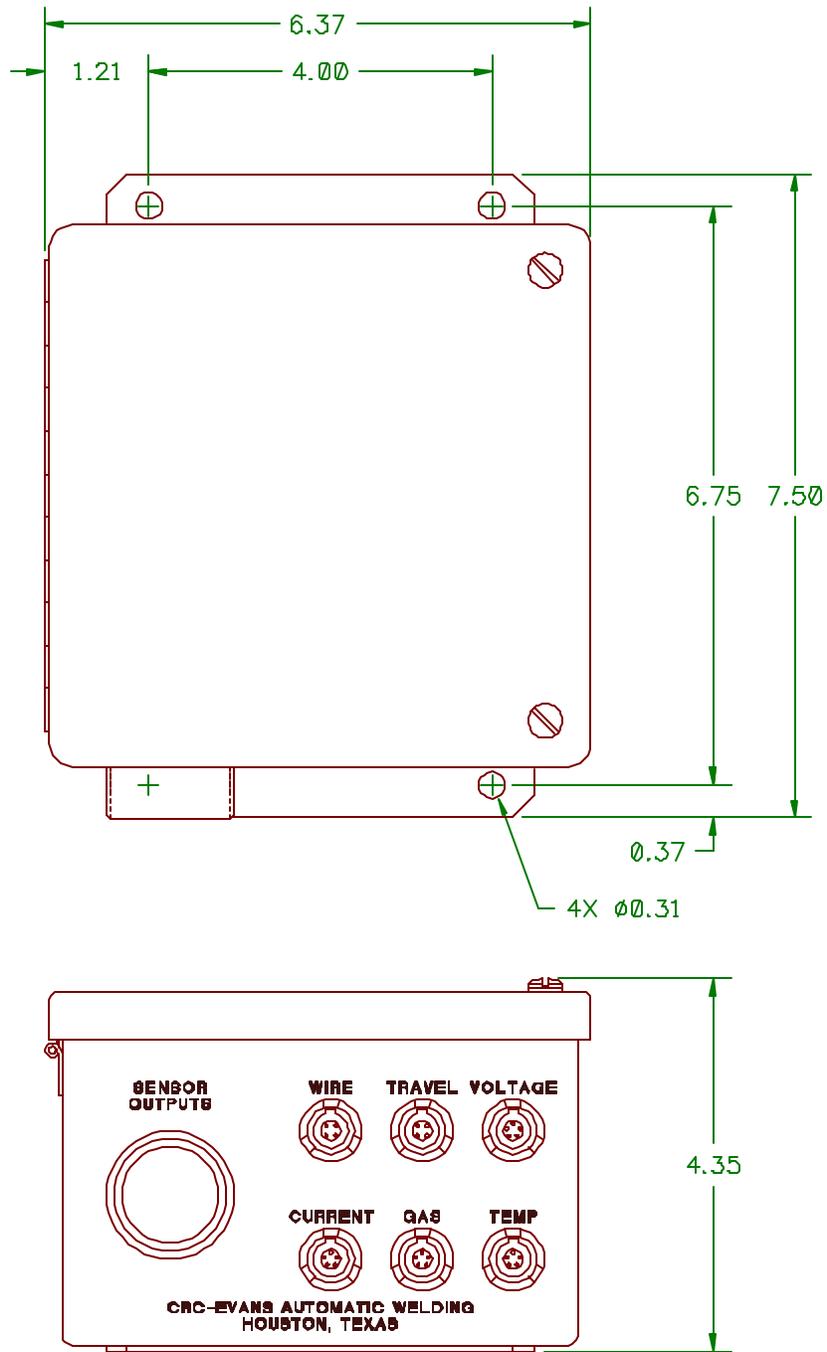
Figure 5-2: Sensor Junction Box
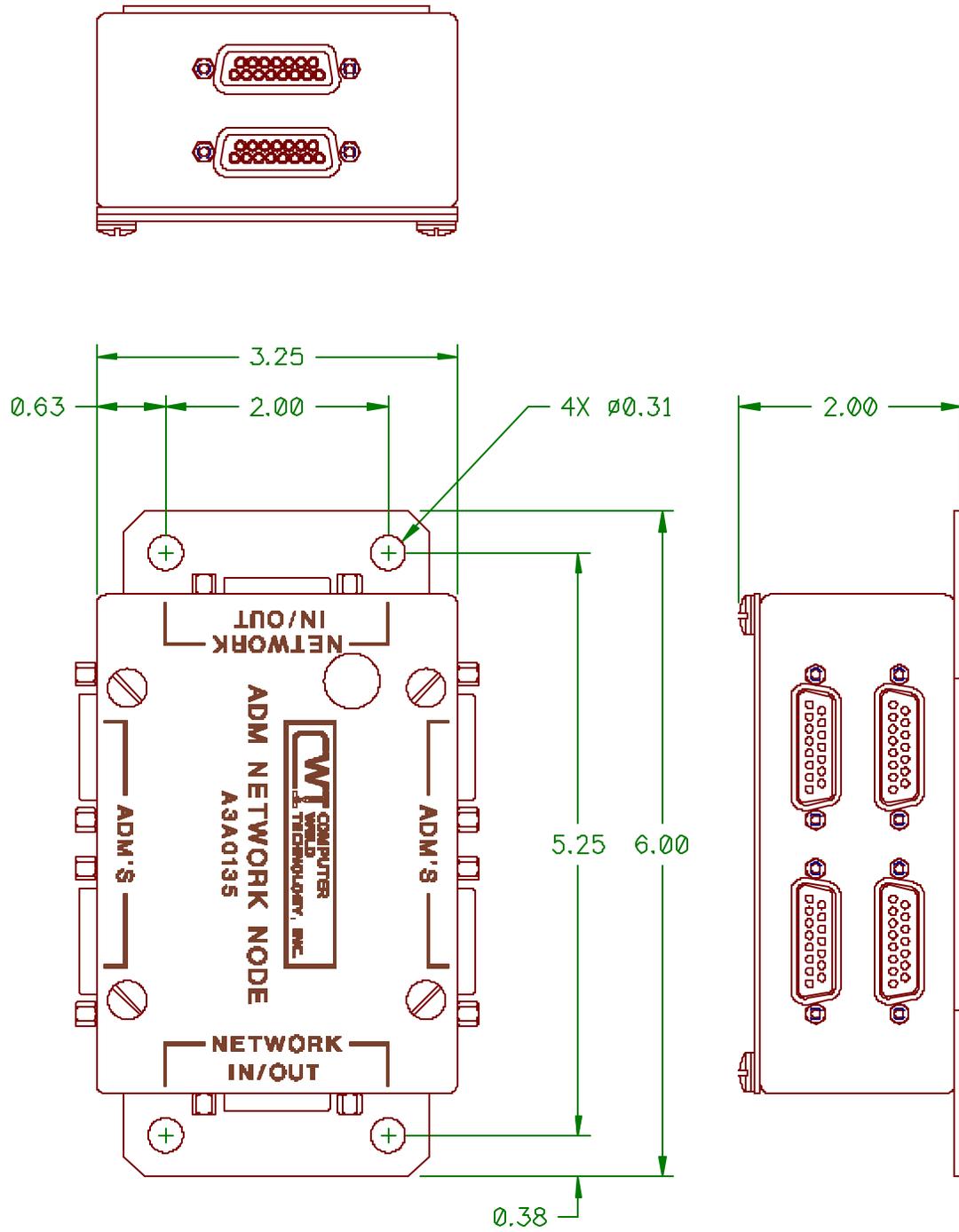
Figure 5-3: Network Node

APPENDIX B

STANDARD UNIT DEFAULT CONFIGURATION

 ADM(tm) Station Number: 100
Date: 05/15/90   Time: 12:00:00
Operation: Computer Weld Technology, Inc. - Houston, Tx

PARM	SENSOR	MAX	MIN	DELAY	TIME
Time	ON	5.1	4.9	.0	.0
Gas	ON	45	35	.50	.10
Travel	ON	1.5	.9	.40	.10
Wire	ON	210	190	.40	.10
Volt	ON	20.5	18.5	.40	.10
Amp	ON	300	280	.40	.10
Heat	ON	35.0	33.0	.40	.10
Temp	OFF	200	150	.40	.10

Pulse Threshold Current is 280 amps.

ARC ON Current is 50 amps.

ARC ON Voltage is 10.0 volts.

Welding Mode set for GMAW.

DC Welding Mode is Enabled.

Fault Relays are Disabled.

```
ADM(tm) Station Number: 100   Date: 05/15/89   Time: 13:58:35
      Operation: Computer Weld Technology, Inc. - Houston, Tx

      TIME    GAS    TRAVEL    WIRE    VOLTS    AMPS    HEAT    TEMP
      sec     cfh    ipm       ipm     vdc      amp     kj/in   Deg F

      0.0     31     12.0      523     17.9     246     22.02   0
      0.2     33     12.1      533     19.5     273     26.40   0
      0.3     33     12.2      523     20.3     276     27.55   0
      0.4     33     12.0      529     20.6     277     28.53   0
      0.5     33     11.9      528     20.9     276     29.08   0
      0.6     33     12.1      526     21.5     274     29.21   0
      0.8     33     11.9      525     21.8     273     30.01   0
      0.9     33     12.1      531     21.8     273     29.51   0
      1.0     33     11.8      535     21.8     272     30.15   0
      1.1     32     11.8      530     21.9     274     30.51   0
      1.2     33     11.9      531     21.9     273     30.14   0
      1.3     33     12.0      534     21.9     271     29.67   0
      1.4     33     12.1      532     22.0     272     29.67   0
      1.8     33     11.9      528     21.9     274     30.26   0
      1.9     33     12.0      531     21.9     274     30.00   0
      2.3     33     11.9      536     21.9     274     30.26   0
      2.4     33     12.0      533     21.8     274     29.87   0
      2.5     31     12.0      529     20.6     276     28.43   0
      2.6     33     12.0      525     20.1     278     27.94   0
      2.7     33     12.1      528     20.3     278     27.98   0
      2.8     33     12.1      528     20.6     277     28.30   0
      3.0     33     11.9      528     20.7     277     28.91   0
      3.3     33     11.9      526     21.9     271     29.92   0
      3.4     33     12.0      531     21.9     271     29.67   0
      3.5     32     11.8      534     21.9     273     30.40   0
      3.6     32     11.9      532     21.9     274     30.26   0
      3.7     33     12.0      532     21.9     273     29.89   0
      3.9     33     12.0      532     21.9     271     29.67   0
      4.0     33     12.1      529     22.0     273     29.78   0
      4.1     33     12.1      529     21.9     273     29.65   0
      4.2     33     12.0      531     21.9     274     30.00   0
      4.4     33     12.0      531     21.9     274     30.00   0
      4.5     33     11.9      533     21.9     274     30.26   0
      4.6     33     11.8      532     21.9     271     30.18   0
      4.7     33     11.9      538     22.0     273     30.28   0
```

Figure 3-1: Sample Weld Data Report

APPENDIX C

ADM III CONNECTOR PIN OUT

C1.0 ADMIII ANALOG INPUT SENSOR'S

The analog input sensor's are used for the following parameters:

    CONNECTOR   FUNCTION

    VOLTAGE   Input sensor for welding voltage
    CURRENT   Input sensor for welding current
    TEMP   Input sensor for gas flow
    GAS   Input sensor for temperature
    AUX1   Not Used - Spare input
    AUX2   Not Used - Spare input

The following is a list of the part numbers for the mating connectors used for
the analog inputs:

    CONNECTOR   REDEL P/N   CWT P/N

    VOLTAGE   PAG-M05-GLAC52G   X3P5457
    CURRENT   PAG-M05-GLAC52A   X3P5458
    GAS   PAG-M05-GLAC52J   X3P5459
    TEMP   PAG-M05-GLAC52N   X3P5460
    AUX1   PAG-M05-GLAC52R   X3P5461
    AUX2   PAG-M05-GLAC52V   X3P5462

The following is the pin out for the VOLTAGE, CURRENT, TEMP, AUX1 AND AUX2
connectors:

    CONNECTOR   DESCRIPTION

    PIN 1   +24 vdc output @ 300 ma.
    PIN 2   + Sensor input signal (0 - 10 vdc)
    PIN 3   - Sensor input signal (0 - 10 vdc)
    PIN 4   24 vdc common
    PIN 5   Chassis ground

The following is the pin out for the GAS connector:

    CONNECTOR   FUNCTION

    PIN 1   +12 vdc output @ 300 ma.
    PIN 2   + Sensor input signal (0 - 10 vdc)
    PIN 3   - Sensor input signal (0 - 10 vdc)
    PIN 4   12 vdc common
    PIN 5   Chassis ground

C1.1 ADMIII DIGITAL INPUT SENSOR'S (WIRE, TRAVEL)

The digital input sensor's are used for the following parameters:

```
CONNECTOR              FUNCTION

WIRE                   Input sensor for Wire Feed speed
TRAVEL                 Input sensor for Travel speed
```

All of the digital input connectors are pined out identically. The following is a list of the part numbers for the mating connectors used for the digital inputs:

```
CONNECTOR              REDEL P/N              CWT P/N

WIRE                   PAG-M04-GLAC52R        X3P5463
CURRENT                PAG-M05-GLAC52V        X3P5464
```

The following is the pin out for the digital sensors (P7-8):

```
CONNECTOR              DESCRIPTION

PIN 1                  +5 vdc @ 100 ma.
PIN 2                  TTL level input pulse from sensor
PIN 3                  5 vdc common
PIN 4                  Chassis ground
```

C1.2 EXTERNAL MULTIPLEXER PORT (MUX)

The multiplexer port is used to operate the remote 8 channel multiplexer option (PN A3A0113). This port provides the channel selection and error detection I/O. The port is configured as a RS-422 driver port. The connector requires a 15 pin DB male plug (Amphenol P/N 117D-DA15P or equivalent). The following is the pin out for the multiplexer connector:

```
CONNECTOR              FUNCTION

PIN 1                  A0 + output
PIN 2                  A0 - output
PIN 3                  A1 + output
PIN 4                  A1 - output
PIN 5                  A2 + output
PIN 6                  A2 - output
PIN 7                  A3 + output
PIN 8                  A3 - output
PIN 9                  READY + input
PIN 10                 READY - input
PIN 11                 FAULT + input
PIN 12                 FAULT - input
PIN 13-15              Not used
```

C1.3 ADM NETWORK COMMUNICATION PORT (NETWORK)

The network communications port is used to network multiple ADM's to a single Host computer. The connector is used to daisy chain multiple ADM's on the network. The port is a RS-422 current loop. There are duplicate pin outs for

the network to allow two cables to be connected to the port. This allows the
ADM's to be daisy chained together. The connector requires a 15 pin DB male
plug (Amphenol P/N 117D-DA15P or equivalent). The following is the pin out
for the ADM NETWORK connector:


```
   CONNECTOR              FUNCTION

   PIN 1                  + SDI - Network serial data in +
   PIN 2                  - SDI - Network serial data in -
   PIN 3                  + SDO - Network serial data out +
   PIN 4                  - SDO - Network serial data out -
   PIN 5                  + SDI - Network serial data in +
   PIN 6                  - SDI - Network serial data in -
   PIN 7                  + SDO - Network serial data out +
   PIN 8                  - SDO - Network serial data out -
   PIN 9-15               Not used
```

The following is the connections required from a P.C. serial port to the ADM
network driver and the individual ADM's connected to the network:

         Connection for 25 Pin P.C. Serial Port:

```
   +---------+ +--------------+  +----------+   +----------+
   | DB25S   | |Network Driver|  |ADMIII (1)|   |ADMIII (2)|
   | (Female)| | P1      P2   |  |   P10    |   |   P10    |
   | Pin No. | | Pin     Pin  |  |   Pin    |   | Pin No.  |
   |    2 ----+-+- 3       1 --+--+-- 1   5 --+---+-- 1   5 --+-->
   |    3 ----+-+- 2       2 --+--+-- 2   6 --+---+-- 2   6 --+-->
   |    7 ----+-+- 5       4 --+--+-- 3   7 --+---+-- 3   7 --+-->
   |   20 --+ | |          3 --+--+-- 4   8 --+---+-- 4   8 --+-->
   |    5 --+ | |(DB9P) (DB15P)|  |  (DB15S) |   |  (DB15S) |
   |    6 --+ | |(male) (male) |  | (Female) |   | (Female) |
   |    8 --+ | |              |  |          |   |          |
   +---------+ +--------------+  +----------+   +----------+
```

         Connection for 9 Pin P.C. Serial Port:

```
   +---------+ +--------------+  +----------+   +----------+
   |  DB9S   | |Network Driver|  |ADMIII (1)|   |ADMIII (2)|
   | (Female)| | P1      P2   |  |   P10    |   |   P10    |
   | Pin No. | | Pin     Pin  |  |   Pin    |   | Pin No.  |
   |    3 ----+-+- 3       1 --+--+-- 1   5 --+---+-- 1   5 --+-->
   |    2 ----+-+- 2       2 --+--+-- 2   6 --+---+-- 2   6 --+-->
   |    5 ----+-+- 5       4 --+--+-- 3   7 --+---+-- 3   7 --+-->
   |    4 --+ | |          3 --+--+-- 4   8 --+---+-- 4   8 --+-->
```

```
| 6 --+ | |(DB9P) (DB15P)| | (DB15S) | | (DB15S) |
| 8 --+ | |(male) (male) | | (Female) | | (Female) |
| 9 --+ | |              | |         | |          |
+--------+ +-------------+ +---------+  +----------+
```

C1.4 ADM SERIAL COMMUNICATION PORT (RS232)

The RS-232 port is used to provide data communications between an IBM or
compatible PC. The port is configured as a DCE RS-232-C port. It is designed
to be used with the CWT ADMSTAT(tm) PC software program (P/N A5Z0023). The
port requires a 9 pin DB male plug (Amphenol P/N 117D-DE9P or equivalent) and
a 8 conductor 22 awg cable (do not exceed 50 ft in total length). The
following is the pin out for the RS-232 connector (RS232):

```
    CONNECTOR              FUNCTION

    PIN 1                 Data Carrier Detect - DCD output
    PIN 2                 Serial Data out - TD output
    PIN 3                 Serial Data in - RD input
    PIN 4                 Not used
    PIN 5                 Common
    PIN 6                 Data Set Ready - DSR output
    PIN 7                 Ready to send - RTS output
    PIN 8                 Clear to send - CTS input
    PIN 9                 Not used
```

The following shows the connections require for communications to a IBM PC or
compatible serial communications port:

    Connection for 25 Pin P.C. Serial Port

```
 +---------+           +----------------------+
 | DB25S   |           | ADM P11  (DB9P)      |
 | (Female)|           | (Male)               |
 | Pin No. |           | Pin No.  ADM Function |
 | 2 ------+---------+- 3      RD Input       |
 | 3 ------+---------+- 2      TX Output      |
 | 7 ------+---------+- 5      Signal Common  |
 |20 --+   |         |                        |
 | 5 --+   |         |                        |
 | 6 --+   |         |                        |
 | 8 --+   |         |                        |
 +---------+           +----------------------+
```

  Connection for 9 Pin P.C. Serial Port

```
 +---------+           +----------------------+
```

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```
| P.C DB9S|           | ADM P11  (DB9P)       |
| (Female)|           | (Male)                |
| Pin No. |           | Pin No.  ADM Function |
| 3 ------+---------+- 3     RD Input        |
| 2 ------+---------+- 2     TX Output       |
| 5 ------+---------+- 5     Signal Common   |
| 1 --+   |           |                       |
| 6 --+   |   |       |                       |
| 4 --+   |   |       |                       |
| 8 --+   |   |       |                       |
+--------+           +-----------------------+
```

C1.5 ADMIII REMOTE I/O CONNECTOR (I/O)

The REMOTE I/O connect provides a means of interfacing the ADMIII fault
relays, remote reset, and remote weld schedule input to external control
systems. The connector is a 25 pin male DB connector (Amphenol P/N 117DB-25P
or equivalent). The input circuit to the ADMIII is a 24 vdc opto-isolated
input. The circuit will require 24 vdc @ 20 ma from the remote device. The
relay outputs are SPDT contacts rated at 1 amp 120 vac resistive. The relay
contacts are operated in a fail safe mode (i.e. on power up the N.O. will be
N.C). The following is then pin out for the REMOTE I/O connector:

     CONNECTOR   FUNCTION

     PIN 1   +24 vdc Remote Bit 0 input (anode 1)(Fault Reset)
     PIN 2   +24 vdc Remote Bit 1 input (anode 2)
     PIN 3   +24 vdc Remote Bit 2 input (anode 3)
     PIN 4   +24 vdc Remote Bit 3 input (anode 4)
     PIN 5   +5 vdc output @ 0.5 amp
     PIN 6   -12 vdc output @ 0.1 amp
     PIN 7   Power Common
     PIN 8   Relay CR4 N.O. contact
     PIN 9   Relay CR4 N.C. contact
     PIN 10   Relay CR4 common
     PIN 11   Relay CR3 N.O. contact
     PIN 12   Relay CR3 N.C. contact
     PIN 13   Relay CR3 common
     PIN 14   Remote Bit 0 input common (cathode 1)(Fault Reset)
     PIN 15   Remote Bit 1 input common (cathode 2)
     PIN 16   Remote Bit 2 input common (cathode 3)
     PIN 17   Remote Bit 3 input common (cathode 4)
     PIN 18   +12 vdc output @ .1 amp
     PIN 19   Power common
     PIN 20   Relay CR1 Common
     PIN 21   Relay CR1 N.C. contact
     PIN 22   Relay CR1 N.O. contact
     PIN 23   Relay CR2 common
     PIN 24   Relay CR2 N.C. contact

```
        PIN 25                    Relay CR2 N.O. contact
```

The weld schedule routine will allow up to fifteen (15) weld schedules to be
selected and stored. The weld schedule routine will also store an OPERATION's
name with each schedule. The remote I/O input pins have been defined to
provide the selection of 1 - 15 weld schedules by setting the correct binary
value on remote input 0 - 3. To reset the ADM while using the remote weld
schedule selection option set all inputs high (Decimal 15 or Hex 0F). If the
Remote Weld schedule function is DISABLED Bit 0 input will reset the ADM fault
relays. If the Remote Weld Schedule function is ENABLED all remote inputs
must be active to reset the ADM fault relays (Decimal 15 or Hex 0F).

                    Remote Input Weld Schedule Table

            CR1   CR2   CR3   CR4   SCHEDULE
             0   0   0   0   1
             1   0   0   0   2
             0   1   0   0   3
             1   1   0   0   4
             0   0   1   0   5
             1   0   1   0   6
             0   1   1   0   7
             1   1   1   0   8
             0   0   0   1   9
             1   0   0   1   10
             0   1   0   1   12
             1   1   0   1   13
             0   0   1   1   14
             1   0   1   1   15
             1   1   1   1   Reset

The following examples can be used as a guideline to interface the ADM to PLC
or robotic controlled.

EXAMPLE 1 - User Supplied Isolated relay interface

**P1
DB-25**

P12

P1	P12	
1	1	REMOTE SCHED BIT 0
2	2	REMOTE SCHED BIT 1
3	3	REMOTE SCHED BIT 2
4	4	REMOTE SCHED BIT 3
5	5	+5 VDC @ 0.5 AMP
6	6	-12 VDC @ 0.1 AMP
7	7	POWER COMMON
8	8	FAULT RELAY (N.O.) CR4
9	9	FAULT RELAY (N.C.) CR4
10	10	FAULT RELAY (COM) CR4
11	11	FAULT RELAY (N.O.) CR3
12	12	FAULT RELAY (N.C.) CR3
13	13	FAULT RELAY (COM) CR3
14	14	REMOTE SCHED BIT 0 COM
15	15	REMOTE SCHED BIT 1 COM
16	16	REMOTE SCHED BIT 2 COM
17	17	REMOTE SCHED BIT 3 COM
18	18	+12 VDC @ 0.1 AMP
19	19	POWER COMMON
20	20	FAULT RELAY (COM) CR1
21	21	FAULT RELAY (N.C.) CR1
22	22	FAULT RELAY (N.O.) CR1
23	23	FAULT RELAY (COM) CR2
24	24	FAULT RELAY (N.C.) CR2
25	25	FAULT RELAY (N.O.) CR2

CR1
CR2
CR3
CR4

2.7K

TYPICAL
SCHEDULE
INPUT

TYPICAL
RELAY
OUTPUT

ADM III I/O

EXAMPLE 2 - User Supplied 24 VDC interface (Pull-

P12

P1
DB-25

BIT 0 (+24 VDC)
BIT 1 (+24 VDC)
BIT 2 (+24 VDC)
BIT 3 (+24 VDC)

ROBOT/PLC I/O (PULL-UP)

24 VDC COM

Pin	Signal
1	REMOTE SCHED BIT 0
2	REMOTE SCHED BIT 1
3	REMOTE SCHED BIT 2
4	REMOTE SCHED BIT 3
5	+5 VDC @ 0.5 AMP
6	-12 VDC @ 0.1 AMP
7	POWER COMMON
8	FAULT RELAY (N.O.) CR4
9	FAULT RELAY (N.C.) CR4
10	FAULT RELAY (COM) CR4
11	FAULT RELAY (N.O.) CR3
12	FAULT RELAY (N.C.) CR3
13	FAULT RELAY (COM) CR3
14	REMOTE SCHED BIT 0 COM
15	REMOTE SCHED BIT 1 COM
16	REMOTE SCHED BIT 2 COM
17	REMOTE SCHED BIT 3 COM
18	+12 VDC @ 0.1 AMP
19	POWER COMMON
20	FAULT RELAY (COM) CR1
21	FAULT RELAY (N.C.) CR1
22	FAULT RELAY (N.O.) CR1
23	FAULT RELAY (COM) CR2
24	FAULT RELAY (N.C.) CR2
25	FAULT RELAY (N.O.) CR2

2.7K

TYPICAL
SCHEDULE
INPUT

TYPICAL
RELAY
OUTPUT

ADM III I/O

EXAMPLE 3 - User Supplied 24 VDC interface (Pull-Down)

P12

P1
DB-25

+24 VDC COM

ROBOT/PLC I/O (PULL-UP)

BIT 0 (24 VDC)
BIT 1 (24 VDC)
BIT 2 (24 VDC)
BIT 3 (24 VDC)

Pin	Signal
1	REMOTE SCHED BIT 0
2	REMOTE SCHED BIT 1
3	REMOTE SCHED BIT 2
4	REMOTE SCHED BIT 3
5	+5 VDC @ 0.5 AMP
6	-12 VDC @ 0.1 AMP
7	POWER COMMON
8	FAULT RELAY (N.O.) CR4
9	FAULT RELAY (N.C.) CR4
10	FAULT RELAY (COM) CR4
11	FAULT RELAY (N.O.) CR3
12	FAULT RELAY (N.C.) CR3
13	FAULT RELAY (COM) CR3
14	REMOTE SCHED BIT 0 COM
15	REMOTE SCHED BIT 1 COM
16	REMOTE SCHED BIT 2 COM
17	REMOTE SCHED BIT 3 COM
18	+12 VDC @ 0.1 AMP
19	POWER COMMON
20	FAULT RELAY (COM) CR1
21	FAULT RELAY (N.C.) CR1
22	FAULT RELAY (N.O.) CR1
23	FAULT RELAY (COM) CR2
24	FAULT RELAY (N.C.) CR2
25	FAULT RELAY (N.O.) CR2

2.7K

TYPICAL
SCHEDULE
INPUT

TYPICAL
RELAY
OUTPUT

ADM III I/O

APPENDIX D

ADMIII(tm) SERIAL LINK PROTOCOL

D1.0 Data Format:

  NOTE: *SEE NOTIFICATION OF ADMIII SOFTWARE MODIFICATION (PAGES D5, D6 & D7)*

The ADMIII(tm) serial communication data link requires the following serial data format:

  1 START BIT, 1 STOP BIT, 8 DATA BITS, NO PARITY

The communications baud rate is set at 9600 baud. The ADMIII(tm) uses a full duplex transmission format and is capable of being a TALKER and LISTENER.

D-1.1 ADMIII(tm) Command Phrase:

The ADMIII(tm) uses a simple HEX code format for communication. The communication cycle is initiated by the host system. The first byte sent to the ADMIII(tm) will determine whether the ADMIII(tm) will receive data or transmit data and the number of bytes that are to be read or write. The second byte is the MSB of the parameter address and the third Byte is the LSB of the parameter address. The following is the format and bit functions for the three byte command:

>   *BYTE 1 - Read/Write data and number of bytes.*
>   *BIT 7 - 1 Read, 0 = Write*
>   *BIT 6-0 - Number of bytes to R/W in*
>   *HEX (2 bytes/parameter)*
>   *BYTE 2 - Start Address High Byte*
>   *BYTE 3 - Start Address Low Byte*

The ADMIII(tm) operates in a full duplex mode. While receiving the first 3 bytes, the ADMIII(tm) will echo each byte. If the read functions has been selected, the ADMIII(tm) will then respond with the first byte of data pointed to by the two byte start address. The ADMIII(tm) will then wait for the return echo before sending the next byte. The echo must occur within 100 msec or the ADMIII(tm) will abort the communication routine. The ADMIII(tm) will send the total number of bytes requested in the lower nibble of the first byte. If the ADMIII(tm) was set to the received mode, then the ADMIII(tm) will store the first byte received at the start address location specified, and echo the data back to the host. The ADMIII(tm) will then index the internal address pointer to the next location and wait for the next byte. The next byte must be received within 100 msec. or the ADMIII(tm) will terminate the communication routine. The process will be repeated until the total number of bytes specified in the first byte have been received. The command phrase can be aborted by placing a serial break command on the serial port. The break most be a mark condition for greater then 2 msec and less then 4 msec. The ADM will clear the command phrase and will ignore further serial transmissions for a period of 20 msec following the serial break command.

D1.2 ADMIII(tm) Read Command:

The following is an example of reading an ADMIII(tm) parameter with a host
computer. Read the wire feed speed. This is a two byte data string located in
memory at location 3C07 hexadecimal.

```
 DATA FROM ADMIII(tm)                     COMMAND FROM HOST


               +-------------< 82
               +------------->
               +------------< 3C
               +------------->
               +------------< 07
               +------------->
         MSB >-------------+
               <------------+
         LSB >-------------+
               <------------+
```

D1.3 ADMIII(tm) Write Command:

The following is an example of writing to a ADMIII(tm) parameter with a host
computer:

    Write into the memory the ADMIII(tm) a new high limit for
    wire feed speed. This is a two byte data string located in
    memory at location 3C27 hexadecimal.

```
    DATA FROM ADMIII(tm)                     COMMAND FROM HOST


               +-------------< 02
               +------------->
               +------------< 3C
               +------------->
               +------------< 27
               +------------->
               +------------< MSB
               +------------->
               +------------< LSB
               +------------->
```

D1.4 ADMIII(tm) Parameter Memory Map:

The ADMIII(tm) welding parameters are stored as two byte values (16 Bit
number). The following is an example of parameter storage memory locations:

```
            ADDRESS    PARAMETER


            3C42/3     Maximum wire feed speed Limit
            3C42       MSB of wire speed parameter
            3C43       LSB of wire speed parameter
```

To set the Maximum wire speed limit to 453 inches/minute, the data would be
stored as such:

```
              453 decimal equals 01C5 hex

              ADDRESS    DATA

              3C42       01
              3C43       C5


The following table shows the address locations for the various ADM III
Welding Parameter:


ADMIII Welding Variables Memory Location


ADMIII Read only Parameters


ADDRESS NAME     BYTE's  PARAMETER


3C00h   ARCON    1       Arc on flag
3C01h   ARCTME   2       Arc On timer value
3C03h   GAS      2       Gas Flow rate value
3C05h   TVS      2       Travel Speed value
3C07h   WFS      2       Wirefeed speed value
3C09h   VOLT     2       Average arc voltage value
3C0Bh   AMP      2       Average arc current value
3C0Dh   PKAMP    2       Peak arc current value
3C0Fh   BKAMP    2       Background current value
3C11h   PKVOLT   2       Peak arc voltage value
3C13h   BKVOLT   2       Background arc voltage value
3C15h   FREQ     2       Pulse Frequency
3C17h   DEGREE   2       Temperature input value
3C19h   POWER    2       Calculated heat input value
3C1Bh   ANL1     2       Spare channel 1
3C1Dh   ANL2     2       Spare channel 2
3C1Fh   PRMFLT   1       Faulted parameters
3C20h   NETADR   2       Address pointer - Network Comm
3C22h   NETRWD   1       Read Write and parameter count -
                          Network Comm
3C23h   SUMRDY   1       Weld summary data ready flag
3C24h   MUXRDY   1       Multiplexier Ready flag
3C25h   MUXFLT   1       Multiplexier Fault flag


ADMIII Read/Write Parameters


ADMIII Parameter Testing Limits


3C26h   ETMENB   1       Enable arc time parameter
3C27h   ETMMAX   2       Maximum arc time
3C29h   ETMMIN   2       Minimum arc time
3C2Bh   ETMDLY   2       Delay test arc time parameter
3C2Dh   ETMTME   2       Not used

3C2Fh   GASENB   1       Enable GAS Parameter Flag
3C30h   GASMAX   2       Maximum Limit GAS
```

```
3C32h   GASMIN   2        Minimum Limit GAS
3C34h   GASDLY   2        Start test delay time for GAS
3C36h   GASTME   2        Sample test time for GAS Fault
                           Condition


3C38h   TVSENB   1        Enable TVS Parameter Flag
3C39h   TVSMAX   2        Maximum Limit TVS
3C3Bh   TVSMIN   2        Minimum Limit TVS
3C3Dh   TVSDLY   2        Start test delay time for TVS
3C3Fh   TVSTME   2        Sample test time for TVS Fault
                           Condition


3C41h   WFSENB   1        Enable WFS Parameter Flag
3C42h   WFSMAX   2        Maximum Limit WFS
3C44h   WFSMIN   2        Minimum Limit WFS
3C46h   WFSDLY   2        Start test delay time for WFS
3C48h   WFSTME   2        Sample test time for WFS Fault
                           Condition


3C4Ah   VOLENB   1        Enable VOLT Parameter Flag
3C4Bh   VOLMAX   2        Maximum Limit VOLT
3C4Dh   VOLMIN   2        Minimum Limit VOLT
3C4Fh   VOLDLY   2        Start test delay time for VOLT
3C51h   VOLTME   2        Sample test time for VOLT Fault
                           Condition


3C53h   AMPENB   1        Enable AMP Parameter Flag
3C54h   AMPMAX   2        Maximum Limit AMP
3C56h   AMPMIN   2        Minimum Limit AMP
3C58h   AMPDLY   2        Start test delay time for AMP
3C5Ah   AMPTME   2        Sample test time for AMP Fault
                           Condition


3C5Ch   PWRENB   1        Enable PWR Parameter Flag
3C5Dh   PWRMAX   2        Maximum Limit PWR
3C5Fh   PWRMIN   2        Minimum Limit PWR
3C61h   PWRDLY   2        Start test delay time for PWR
3C63h   PWRTME   2        Sample test time for PWR Fault
                           Condition


3C65h   TMPENB   1        Enable TEMPERATURE Parameter
                           Flag
3C66h   TMPMAX   2        Maximum Limit TEMPERATURE
3C68h   TMPMIN   2        Minimum Limit TEMPERATURE
3C6Ah   TMPDLY   2        Start test delay time for
                           TEMPERATURE
3C6Ch   TMPTME   2        Sample test time for TEMPERATURE
                           Fault Condition


ADM Configuration Parameters


3C6Eh   PULSE    1        Pulse Mode Flag 1=Pulse 0=normal
3C6Fh   GTAW     1        Tig welding Flag
3C60h   GMAW     1        Mig welding Flag
```

```
3C71h    AC      1        AC welding mode
3C72h    VTHR    2        Arc start voltage
3C74h    ITHR    2        Arc start current
3C76h    CR1     1        parameter mask Fault Relay 1
3C77h    CR2     1        parameter mask Fault Relay 2
3C78h    CR3     1        Parameter mask Fault Relay 3
3C79h    CR4     1        Parameter mask Fault Relay 4
3C7Ah    MODE    1        Mode of operation 0=monitor
                           1=log
3C7Bh    ENBTST  1        Enable Parameter Testing
3C7Ch    PLSTHR  2        Pulse mode Threshold current
3C7Eh    NETCNT  1        Write or Read Data - RS422 Comm
3C7Fh    ADRPTR  2        Address Pointer - RS422 Comm
3C81h    RMTPLS  1        Remote PULSE ON flag
3C82h    RMTON   1        Remote arc on switch
3C83h    RSTFLG  1        Remote Fault Reset
3C84h    METRIC  1        Hardware Enable Flag
3C85h    MUXNUM  1        Multiplexier Channel

ADMIII Operational Setup parameters

3C86h    PRNCFG  1        Print Mode configuration
3C87h    PRNTIM  2        Print cycle time in seconds
3C89h    PASSWD  2        Alter limits password
3C8Bh    STATNO  2        Station Number
3C8Dh    MUXWLD  2        Multplexier number of welds to
                           collected
3C8Fh    MUXTME  2        Multiplexier scan time
3C91h    MUXENB  1        Auto/Manual scan flag -
                           (0=Manual 1=Auto)
3C92h    OPBUF   41       Operation name buffer
```

**** <u>NOTIFICATION OF ADMIII SOFTWARE MODIFICATION</u> ****

The ADMIII firmware version 3.63 has been updated with an additional ASCII
serial protocol. This protocol is enabled when a shorting jumper is installed
on E6 header on the ADMIII main P.C. Board P/N A5A0062. This new protocol
replaces the standard binary protocol as described in the ADMIII manual. When
the jumper is removed the ADMIII will use the old serial protocol.

> <u>NOTE</u>:   *This new protocol only applies to the RS-232 Serial port.*
> *It is not available through the Network port.*

The new ASCII protocol consist of a three byte ASCII command string followed
by a binary string representing the requested data. The command string
consist of three bytes. The first byte is the ASCII command, the second byte
is the Read / Write command and the third is the command terminator, an ASCII
(CR) carriage return. The following is an example of the command to read
welding parameters from the ADMIII:

<div align="center">A ? [cr]</div>

```
        where:  A   =  ASCII  command for arc data
                ?   =  Read data from ADMIII
                [cr]    =  ASCII carriage return (0D HEX)
```

When the ADM receives the CR it will send the Host a 31 Byte Binary string
representing the arc data. The host can terminate a command by sending as
ASCII ^C command. The number of bytes sent by the ADM will depend on the
ASCII command issued. The same command byte is used to read or write data to
the ADM. The second byte of the command determines the direction of data
flow. A ASCII '?' indicates an ADM read function. An ASCII '=' indicates
an ADM write function. The following is an example of how to read the Gas
flow limits set in the ADMIII.

```
                            G  ?  [cr]
```

```
        where:  G   =  ASCII command for ADMIII gas limit
                ?   =  ASCII read data from ADMIII command
                [cr]    =  ASCII carriage return to terminate command
```

The ADMIII would respond by sending a 9 byte binary string to the host.
The following is an example of how to write a new set of Gas flow limits to
the ADMIII:

```
                            G  =  [cr]
```

```
        where:  G   =  ASCII command for ADMIII gas limit
                =   =  ASCII write data to ADMIII command
                [cr]    =  ASCII carriage return to terminate command
```

The host would respond by sending a 9 byte binary string to the ADMIII. The
ADMIII serial port is configured for 9600 baud, 8 data bits, 2 stop bits and
full duplex operation. In the full duplex operation the ADM will echo all
received data from the host.

The following is the ASCII commands and byte definitions:

```
    ASCII           NUMBER                  DATA FORMAT
   COMMAND          BYTES                   DESCRIPTION
     A               31        Loads all welding parameters and ARCON flag
                               byte:
                               Byte          Function
                               0             ARC flag (1=ARC on, 0=ARC off)
                               1-2           ARC Time in 0.1 sec
                               3-4           Gas Flow in CFH
                               5-6           Travel Speed in 0.1 ipm
                               7-8           Wire Feed Speed in ipm
                               9-10          Arc Voltage in 0.1 Vdc
                               11-12         Arc Current in Amps
                               13-14         Peak Amps
                               15-16         Background Amps
                               17-18         Peak Volts
                               19-20         Background Volts
                               21-22         Pulse Frequency in 0.1 Hz
                               23-24         Temperature in Degrees
```

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```
                         25-26        Heat INput in 0.1 Kj / in
                         27-28        Spare Analog 1 input
                         29-30        Spare Analog 2 input
        S           2    ADM Station Number 2 BYTE value
        O          41    ADM Operation Name (ASCII string)
        I           9    AMP Limit Parameters
                         Byte         Function
                         0            Sensor Enable
                         1-2          Max Limit
                         3-4          Minimum Limit
                         5-6          Test Delay Time
                         7-8          Fault Test Time
        V           9    Volt Limit Parameters


     ASCII         NUMBER                     DATA FORMAT
    COMMAND        BYTES                      DESCRIPTION


        E           9    Arc Time Limits Parameters
        G           9    Gas Flow Limits
        T           9    Travel Speed Limits
        W           9    Wire Feed Limits
        H           9    Heat Input Limits
        D           9    Temperature Limits
        R           1    Read ADM self test status.  (0 - Self test in
                         progress 6 = Self test Ok, 1 = Self test fail).
       ^C          n/a   Reset Serial Command
       ^R          n/a   Reset ADM and perform power up test
        a          13    Basic Arc Welding D
                         Byte         Parameter
                         0            ARC flag (1-ARC on, 0=ARC off)
                         1-2          ARC Time in 0.1 sec
                         3-4          Gas Flow in CFH
                         5-6          Travel Speed in 0.1 ipm
                         7-8          Wire Feed Speed in ipm
                         9-10         Arc Voltage in 0.1 Vdc
                         11-12        Arc Current in Amps
        F           1    Flag Fault Status
                         Byte         Parameter
                         0            Gas Fault
                         1            ETM Fault
                         2            Wire Feed Speed Fault
                         3            Amp Fault
                         4            Voltage Fault
                         5            Travel Speed Fault
                         6            Heat Fault
                         7            Temperature Fault
```

NOTE: *Each command must be followed with an ASCII '?' (read from
      ADM III) or ASCII '=' (write to ADMIII) and a ASCII [cr].*

The Host serial port should be set for 9600 baud, 9 data bits, 2 stop bits and
no parity. The ADM ASCII protocol does support XON / XOFF hand shaking.

APPENDIX E:
ADMIII Model D CALIBRATION
PROCEDURE

1.0 REQUIRED EQUIPMENT

1.1 The following procedure should be used to verify calibration of the
     ADMIII and associated analog sensors. To performed this calibration
     the following equipment is required:

              0-80 mv Adjustable Source
              0-80 vdc Adjustable Power Supply
              TTL Level adjustable Frequency Generator
              TTL Level Frequency Counter
              4 1/2 Digit DVM with 0.1% accuracy
              Pulse Test Cable - See DWG 1.1
              Analog Test Cable - See DWG 1.2

1.2 The DVM and Frequency Counter should have proper calibration certifi-
     cation. They will be used to monitor the calibration inputs and compared
     to the actual values displayed on the ADMIII.

1.3 To perform a calibration test of the wire and travel transducers it will
     be necessary to fabricate a Pulse test sensor cable. This cable will be
     used to connect the frequency generator to wire and travel sensor inputs.
     This cable will be used for both wire and travel calibration. The fol-
     lowing is a connection diagram for this test cable.

```
 WIRE/TRAVEL
 PIN NUMBER
                              +------------------------------+
    1 >                       |       FUNCTION GENERATOR      |
    2 >----------------->  |TTL  Output      +--+   +--+   |
    3 >----------------->  |TTL  Common    --+  +---+  +--  |
    4 >                       |                              |
                              +------------------------------+
  REDEL CONN
  PN PAG-M04-GLAC52R
  CWT PN X3P5463
```

         DWG 1.1 - Pulse Test Cable Wiring Diagram

1.4 To calibrate the GAS and TEMPERATURE inputs the following analog test
     cable is required:

```
 GAS/TEMP
 PIN NUMBER
                              +------------------------------+
    1 >                       |      0-10 vdc Power Supply    |
    2 >----------------->  |+Vdc Output                   |
    3 >----------------->  |-VDC Output (common)          |
    4 >                       |                              |
```

```
   5 >                        +------------------------------+
```

REDEL CONN
PN PAG-M05-GLAC52J
CWT PN X3P5459
        DWG 1.2 - Analog Test Cable Wiring Diagram

1.5 To continuously display all of the sensor inputs for the following
     calibration routines, turn the ADM power switch "ON". Press the
     [ALTER] key to enter the "Alter Limits Menu". Press [4], to select AMP,
     press [3] to disable the amp sensor. Press [CANCEL] to return to the
     main menu. Press [5], to select VOLT, press [3] to disable the voltage
     sensor. Press [ALTER] to return to the data screen. Disabling the VOLT
     and AMP sensor will force the ADM to display all the sensor inputs.

2.0 VOLTAGE SENSOR CALIBRATION

2.1 To calibrate the voltage sensor disconnect the voltage from the welding
     power source. Connect the 0-80 vdc adjustable power source to the vol-
     tage sensor input leads (+ to Red, - to Black). Set the DVM to measure
     0-80 vdc.   Set the 0-80 vdc power supply to values indicated in Table
     2.1. Note the readings for the VOLT parameter on the display. The
     readings should be within +- 1% of input.

             INPUT   DISPLAY VALUE
             VOLTAGE   MIN   MAX
             00.0   00.0   00.1
             10.0   9.9   10.1
             20.0   19.8   20.2
             30.0   29.7   30.3
             40.0   39.6   40.4
             50.0   49.5   50.5
             60.0   59.4   60.6
             70.0   69.3   70.7
             80.0   79.2   80.8

     TABLE 2.1 - Voltage Sensor Calibration Table

2.2 If the above readings are not obtained the voltage sensor can be recal-
     ibrated. To calibrate the voltage sensor remove the four screws on the
     cover of the voltage sensor assembly. There are two adjustable pot's on
     the P.C. board assembly (see Figure 1). R8 is the zero adjust and R7 is
     the gain adjust. Perform the following steps to calibrate the sensor:

     1. Set the input voltage to 0.0 volts. Adjust R8 to
         obtain a 0.0 reading.

     2. Set the input voltage to 80.0 vdc and adjust the
         gain pot R7 for a reading of 80.0.

     3. Repeat steps 1 and 2 until both readings are
         obtained.

     4. Recheck voltage calibration using Table 2.1.

Replace the sensor cover and four attachment screws. This completes the
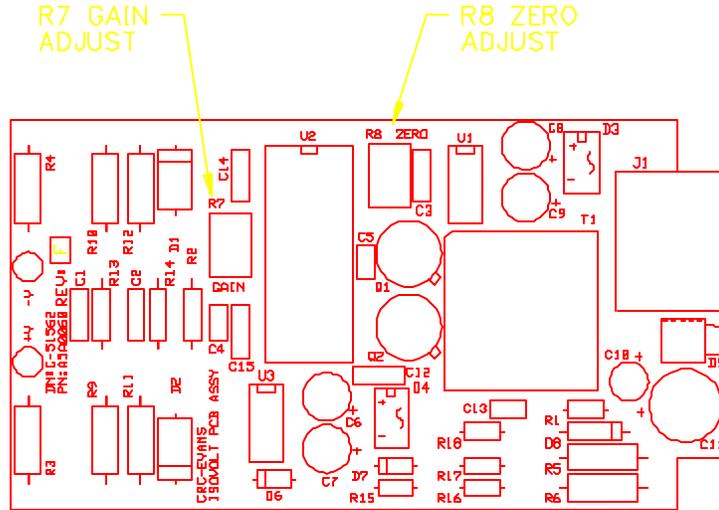voltage sensor calibration.

R7 GAIN ADJUST

R8 ZERO ADJUST

Figure 1: Voltage Sensor PCB
Revision A, B, C or D

3.0 CURRENT SENSOR CALIBRATION

3.1 To calibrate the current sensor disconnect the current sensor from the
     welding power source. Remove the cover from the current sensor assembly.
     Disconnect the RED lead from the current shunt. Connect the 0-80 mvdc
     adjustable power source to the current sensor input leads (+ to Red, - to
     Black). Set the DVM to measure 0-80 mvdc. Set the 0-80 mvdc power
     supply to values indicated in Table 3.1. Note the readings for the AMP
     parameter on the display. The readings should be within +- 1% of input.

INPUT	DISPLAY	VALUES
mvdc	MIN	MAX
00.0	0	1
10.0	99	101
20.0	198	202
30.0	297	303
40.0	396	404
50.0	495	505
60.0	594	606
70.0	693	707
80.0	792	808

TABLE 3.1 - Current Sensor Calibration Table

3.2 If the above readings are not obtained the current sensor can be recal-
     ibrated. To calibrate the current sensor remove the two screws on the
     cover of the current sensor assembly. There are two adjustable pot's on
     the P.C. board assemble (see Figure 2 or 3).

     NOTE: There are two versions of the current sensor
             P.C. Board. Use figure 2 if you have a
             revision A or B P.C. Board. Use Figure 3 if
             you have a revision C P.C. Board. The revision
             level is indicated on the P.C. board above the
             sensor cable connector.

R8 is the zero adjust and R9 is the gain adjust. Perform the following steps
to calibrate the sensor:

     1.   Set the input mvdc to 0.0 volts. Adjust R8 to
          obtain a 00 reading.

     2.   Set the input mvdc to 80.0 mv and adjust the
          gain pot R9 for a reading of 800.

     3.   Repeat steps 1 and 2 until both readings are
          obtained.

     4.   Recheck current calibration using Table 3.1.

3.3 Reinstall the P.C Board mounting plate. Visually inspect the current
     shunt. Check the plates between the brass mounting bars for signs of
     physical damage. Replace the sensor cover and four attachment screws.
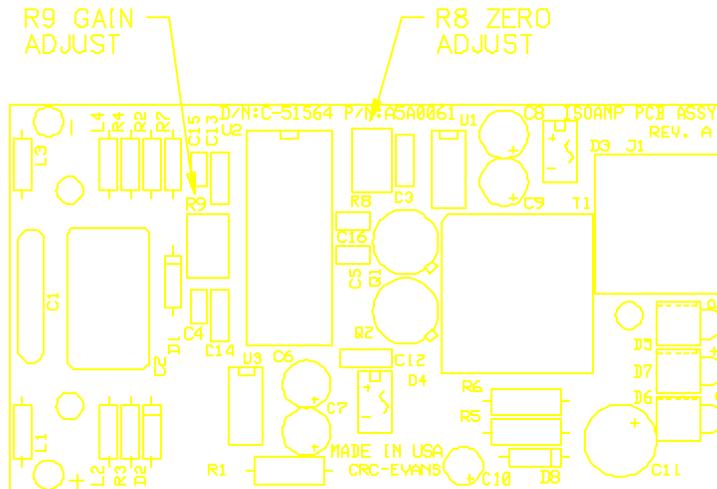   This completes the current sensor calibration.
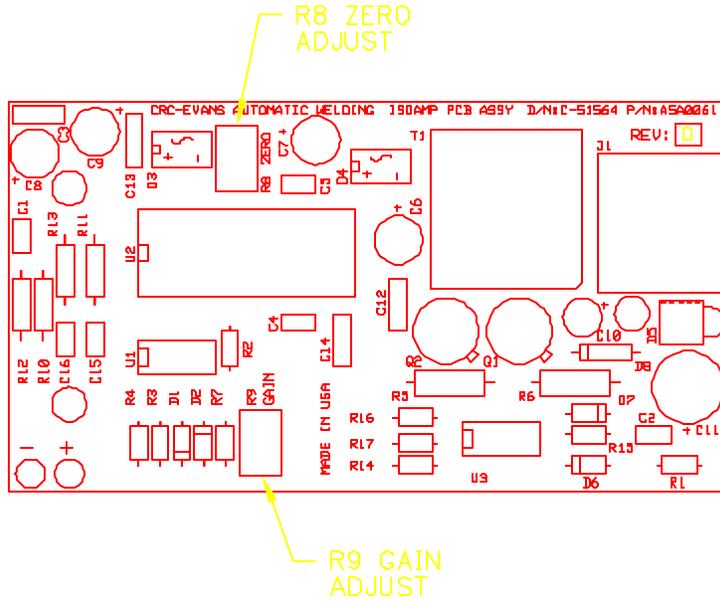
Figure 2: Current Sensor PCB
Revision A or B

RB ZERO
ADJUST

R9 GAIN
ADJUST

Figure 3: Current Sensor PCB
Revision C

4.0 WIRE FEED SENSOR CALIBRATION

4.1 The wire feed sensor is an optical encoder with a TTL level output.
     The output from the encoder is 100 pulses per inch of wire.The following
     equation can be used to convert inch/min wire feed speed to encoder
     output frequency:

              Freq (hz) = (100 * IPM)/60

         Where: IPM = Inch per minute wire feed speed

4.2 Connect the TTL level frequency generator to the wire feed sensor connec-
     tor using the test sensor cable. Connect a calibrated frequency counter
     to the frequency generator sync output. Set the frequency generator to
     values indicated in Table 4.1. Note the readings for the WIRE parameter
     on the display. The readings should be within +- 3% of input or 1 digit
     which ever is greater.

              INPUT   DISPLAY VALUE
              hz   MIN   MAX

```
              16.66      9          11
              166.66     97         103
              333.32     194        206
              500.00     291        309
              666.66     388        412
              833.33     485        515
              1000.00    582        618
              1166.66    679        721
              1333.33    776        824
              1500.00    873        927
              1666.66    970        1030
```
     TABLE 4.1 - Wire Feed Sensor Calibration Table

4.3 After performing the above test check the wire feed encoder wheel for
     wear and/or physical damage. There are no adjustments for the wire feed
     sensor.

5.0 TRAVEL SPEED SENSOR CALIBRATION

5.1 The travel speed sensor is an optical encoder with a TTL level output.
     The output from the encoder is 240 pulses per inch of travel. The fol-
     lowing equation can be used to convert inch/min travel speed to encoder
     output frequency:

              Freq (hz) = (240 * IPM)/60

          Where: IPM = Inch per minute travel speed

5.2 Connect the TTL level frequency generator to the travel speed sensor
     connector using the test sensor cable. Connect a calibrated frequency
     counter to the frequency generator sync output. Set the frequency gen-
     erator to values indicated in Table 5.1. Note the readings for the
     TRAVEL parameter on the display. The readings should be within +- 3% of
     input or 1 digit which ever is greater.

```
              INPUT      DISPLAY VALUE
              hz         MIN        MAX

              4.00       0.9        1.1
              40.00      9.7        10.3
              80.00      19.6       20.6
              120.00     29.1       30.9
              160.00     38.8       41.2
              200.00     48.5       51.5
              240.00     58.2       61.8
              280.00     67.9       72.1
              320.00     77.6       82.4
              360.00     87.3       92.7
              400.00     970.0      1030.0
```
     TABLE 5.1 - Travel Speed Sensor Calibration Table

5.3 After performing the above test check the travel speed encoder wheel for

wear and/or physical damage. There are no adjustments for the travel
speed sensor.

6.0 GAS/TEMPERATURE SENSOR CALIBRATION

6.1 The Gas and Temperature sensors are designed to provide an output voltage
equal to the measured value. The full scale voltage output for the gas
sensor is 2.55 vdc which represents 255 CFH. The various temperature
sensors provide an output voltage of 1.00 vdc equal 100 degrees.

6.2 To calibrate the GAS and Temperature sensor inputs connect the 0-8 vdc
adjustable power supply to the GAS/TEMP input connector. The GAS and
Temperature input has a conversion accuracy of +- 1 percent.

NOTE: The Gas flow sensor has an accuracy of +- 3%
            and should be calibrated by the factory. The actual
            Temperature sensor accuracy will depend on the
            type of sensor used (ie. IR,TC, ect).

Connect the DVM to the power supply output. Set The DVM to measure 0-10 vdc.

Table 6.1 shows the input value and associated display value range:

INPUT	DISPLAYED	VALUE
VOLTAGE	MIN	MAX
0.00	00	00
1.00	99	101
2.00	198	202
3.00	297	203
4.00	396	404
5.00	495	505
6.00	594	606
7.00	693	707
8.00	792	808

TABLE 6.1 - GAS/TEMP Sensor Calibration Table