MOORE INDUSTRIES

INSTRUCTION MANUAL

DLM

Digital Linearizing Module

Form 145-701-00A

September 1985

Description

Introduction

The DLM is a digital linearizing module that converts non-linear or linear input functions to a linearized or non-linearized output, with very high accuracy. The X input to Y output transfer function can be from a set of X, Y coordinates, or from a mathematical expression.

Typically, the application converts the signal from a non-linear transducer to a linear output signal; however, any output Y (within the limits of the transfer function definitions) can be generated as a function of input X. Thus, the DLM can also generate outputs that are functions of equations or discontinuous complex curves.

The input signal in the DLM is resolved into 2047 data point addresses, that control an EPROM. The contents of each address, determined from a user definable transfer function, can be assigned any of 4096 different output data values. The data values condition a digital-to-analog converter whose output through an adjustable amplifier generate the output signal.

If the transfer function is from a mathematical expression, all 2047 values are generated from that expression. If the transfer function is from coordinates, the specified coordinates can be connected by either a quadratic or linear interpolation and extrapolation.

The input and output of the DLM are divided into three segments: underrange, span and overrange. For the input, data point 100 is equivalent to 0% input and data point 1900 is equivalent to 100% input. This defines underrange as data points 0-99, span as data points 100-1900 and overrange as data points 1901-2046.

For the output, data value 200 is equivalent to 0% output and data value 3800 is equivalent to 100% output. This defines underrange as data values 0-199, span as data values 200 through 3800 and overrange as data values 3801-4095.

The data values of the DLM are stored in EPROM and if the transfer function of a DLM needs to be changed or modified, only the EPROM has to be changed.

Input power can be AC or DC, and the DLM provides full isolation between input, output, and power.

The DLM includes the following design features:

- Accepts standard process input signals of 1-5mA, 4-20mA,

10-50mA, 0-1Vdc, and 1-5Vdc.

- Millivolt input levels
- Generates standard process output signals of 1-5mA, 4-20mA, 10-50mA, 0-1Vdc, and 1-5Vdc.
- Input power of 24Vdc, 45Vdc, 117Vac, 220Vac or 240Vac
- Customer specified transfer functions consisting of mathematical expressions or series of X, Y coordinates.
- Transfer functions stored in EPROM.
- Optical coupler for full input and output signal isolation.

Specifications
Characteristics

Front Panel Adjustments
Output Span: Multiturn potentiometer
Output Zero: Multiturn potentiometer

Internal Adjustments
Input Span: Multiturn potentiometer
Input Zero: Multiturn potentiometer

Performance
Calibration Capability: Output ±0.05% of span for linear function
Input ±1 data point
Input resolution: 2047 data points
Underrange: 0 to 99 (-5.5% to 0%)
Span: 100 to 1900 (0% to 100%)
Overrange: 1901 to 2046 (100% to 108%)
Output resolution: 4096 data values
Underrange: 0 to 199 (-5.5% to 0%)
Span: 200 to 3800 (0% to 100%)
Overrange: 3801 to 4095 (100% to 108%)
Output Update: 0.164 seconds nominal
Ambient Temperature Range: 0°C to +70°C (32°F to 158°F)
Ambient Temperature Effect: ±0.01%/°F of span maximum
Isolation: Input, output, and power are isolated from each other with no DC path between them.
Ripple: Output 10mV P/P with maximum span and maximum load
Input ±1 data point maximum
Load Effect: Output ±0.002% of span maximum
Line Voltage Effect: Input ±1 data point maximum
Output ±0.05% of span maximum
Transfer Function: The output can be any single valued function of the input.

Weight 12 to 22 ounces (340 to 623 grams) depending upon

configuration.

Ordering Specifications
Unit DLM

Input
Current: **1-5MA** 1-5mA into 200 ohms
4-20MA 4-20mA into 50 ohms
10-50MA 10-50mA into 20 ohms
Voltage: **0-1DC** 0-1Vdc
1-5DC 1-5Vdc
0-50MV 0-50mV 1 megohm minimum input impedance
0-100MV 0-100mV 1 megohm minimum input impedance
0-200MV 0-200mV 1 megohm minimum input impedance
0-500MV 0-500mV 1 megohm minimum input impedance

Output
Current: **1-5MA** 1-5mA into 4800 ohms maximum series resistance
4-20MA 4-20mA into 1200 ohms maximum series resistance
10-50MA 10-50mA into 480 ohms maximum series resistance
Voltage: **0-1DC** 0-1Vdc, 20K ohm minimum parallel resistance
0-5DC 0-5Vdc, 20K ohm minimum parallel resistance
1-5DC 1-5Vdc, 20K ohm minimum parallel resistance

Power
24DC 24Vdc, ±10%
45DC 45Vdc, ±10%
117AC 117Vac, ±10%, 47-63 Hz
220AC 220Vac, ±10%, 47-63 Hz
240AC 240Vac, ±10%, 47-63 Hz
8 watts maximum

Options

-RF Radio frequency interference suppression. Patented filter assembly for RFI/EMI protection
-TX Two-wire transmitter excitation. Isolated 26Vdc to 35Vdc unregulated, @25mA maximum output.

Housings
AB Angle bracket mounting
CP Conduit plate for use with standard units
EX Explosion-proof aluminum, two conduit hubs
EXT Explosion-proof aluminum, three conduit hubs
EXX Explosion-proof aluminum, four conduit hubs
FG Corrosion resistant fiberglass
GP General purpose enclosure
NB Standard aluminum case-no mounting brackets
OT Oil-tight NEMA 12 enclosures
PA Plug-in standard transmitter with connector

PST Plug-in standard transmitter with connector and wall bracket
PT Plug-in standard transmitter AC or DC power
STD Standard enclosure
TCE Housing option with transparent cover
WT Water-tight NEMA 4 enclosure

When ordering, specify:
Input/Output/Power/Options[Housing]

Model number example:
DLM/4-20MA/4-20MA/24DC/-TX[STD]

Installation

Introduction

Installation information for the DLM has three parts:

- Mechanical installation
- Signal connections
- Power connections

Observe applicable notes and cautions given with the illustration and text. Input and output values for each unit should be checked on site before the unit is placed into service (see Calibration).

Mechanical Installation

The DLM is available in a variety of housing configurations. See unit specifications for a complete listing.

Figure 1 depicts the physical outline of the DLM in the standard (STD) U-bracket mounting. The extruded aluminum housing is attached to the U-bracket by two Phillips head screws flush mounted from the rear. The U-bracket has four, 6.35mm (.250 inch) diameter mounting holes to help support the unit. Figure 2 illustrates the standard housing with conduit plate (CP) mounting. This mounting is similar to the STD, except that an additional extension has been added to the lower brace to provide two 1/2" conduit holes.

Figure 3 shows another variation of the standard housing, the angle bracket (AB) mounting. Angle brackets are field reversible for either recess mounting or surface mounting. Mounting holes on the brackets are for number 10 screws.

The DLM is also available in a PT housing configuration. See

Figure 4. The PT is a two piece aluminum housing that is physically and electrically attached to a circular interconnect card with plug-in pins, keyed to eliminate connection errors. The PST housing is the same as a PT housing but includes a mating bracket-mounted terminal block. See Figure 5. The mounting bracket, secured to the terminal block, is pre-drilled with clearance holes for 10-32 screws. As shown in Figure 6, the PA housing fits into an EX-style explosion-proof enclosure. No mounting bracket is used on the terminal block as with the PST, instead, the terminal block is secured to the base of the explosion-proof enclosure.

Connections

All electrical connections for standard housings are to the terminal block located on the front of the unit. The terminal block is protected by a plastic safety cover. Under the plastic safety cover is a label showing terminal designations. See Figure 7.

Terminal blocks on standard housings are supplied with 6-32 screws, generally long enough to accommodate three spade-lug connectors. Spade-lug connectors are recommended for all wire terminations. Units with protective safety covers have an opening at the bottom of the cover; route all wires to and from the terminals through this opening. Remember to tag wires before removing them from the terminal block.

The external electrical connections for the PA, PST and PT are made to screw terminals of the mating terminal block. A plug-in receptacle arrangement is located in the center of the block to accommodate the keyed interconnect card plug-in pins from the DLM. The terminals are clearly visible and connections are easily made when the DLM is unplugged. (See Figure 7.)

No special wire or cable is required for input and output connections. To avoid transients and noise pick-up, it is recommended that twisted pairs of conductors be used for input and output where they run close to other services, such as power wiring. When installing units, use 14-30 AWG wire for all signal lines. Shielded cables can also be used if needed.

Power Connections

The DLM may be configured to work from either an ac or dc power source. For dc powered units, the DC terminal is connected to the positive (+) side of the power source; the DCC terminal is connected to the negative (-) side.

For ac powered units, the AC terminal is connected to the high side of the power source; the ACC terminal is connected

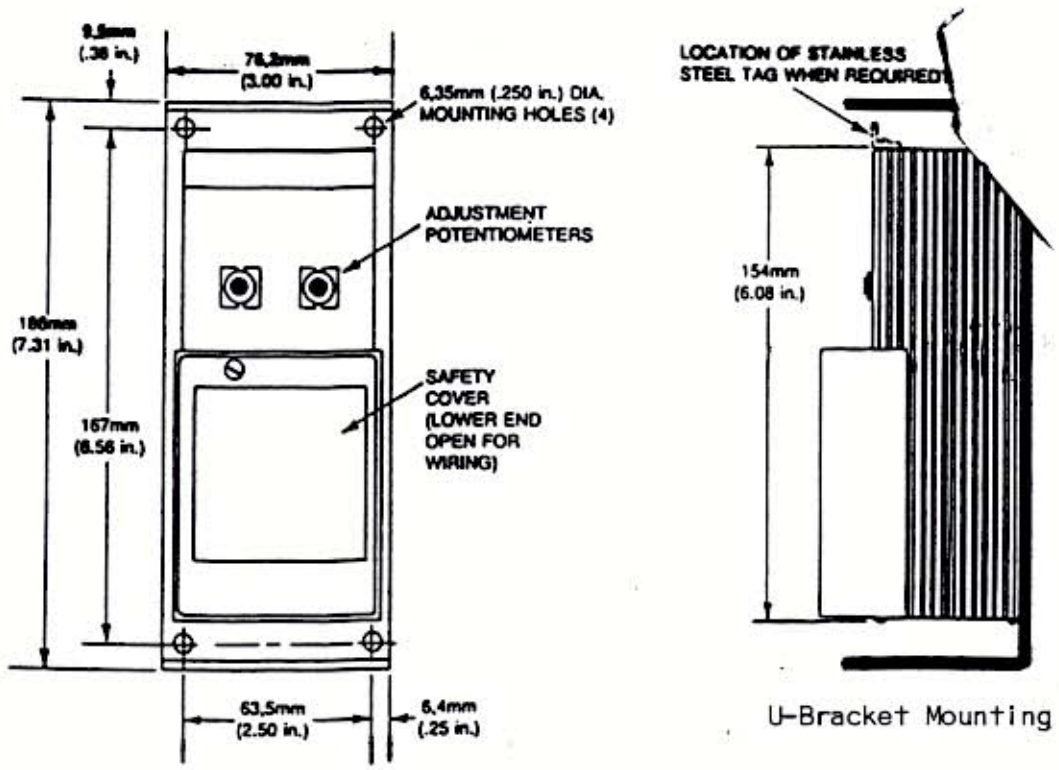


Figure 1 - STD-Standard Housing with U-Bracket Mounting

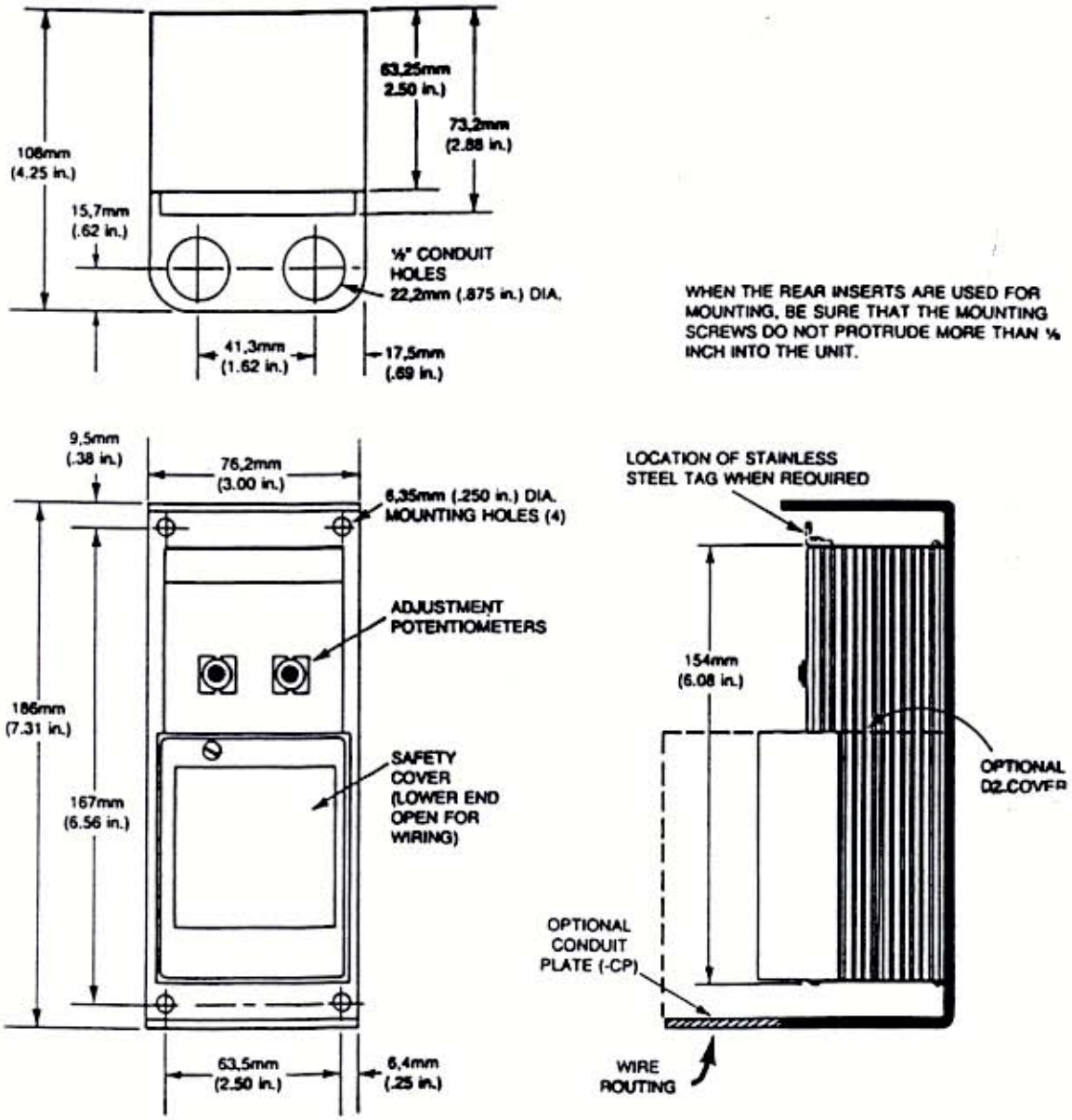


Figure 2 - STD-Standard Housing with Conduit Plate (CP) Mounting

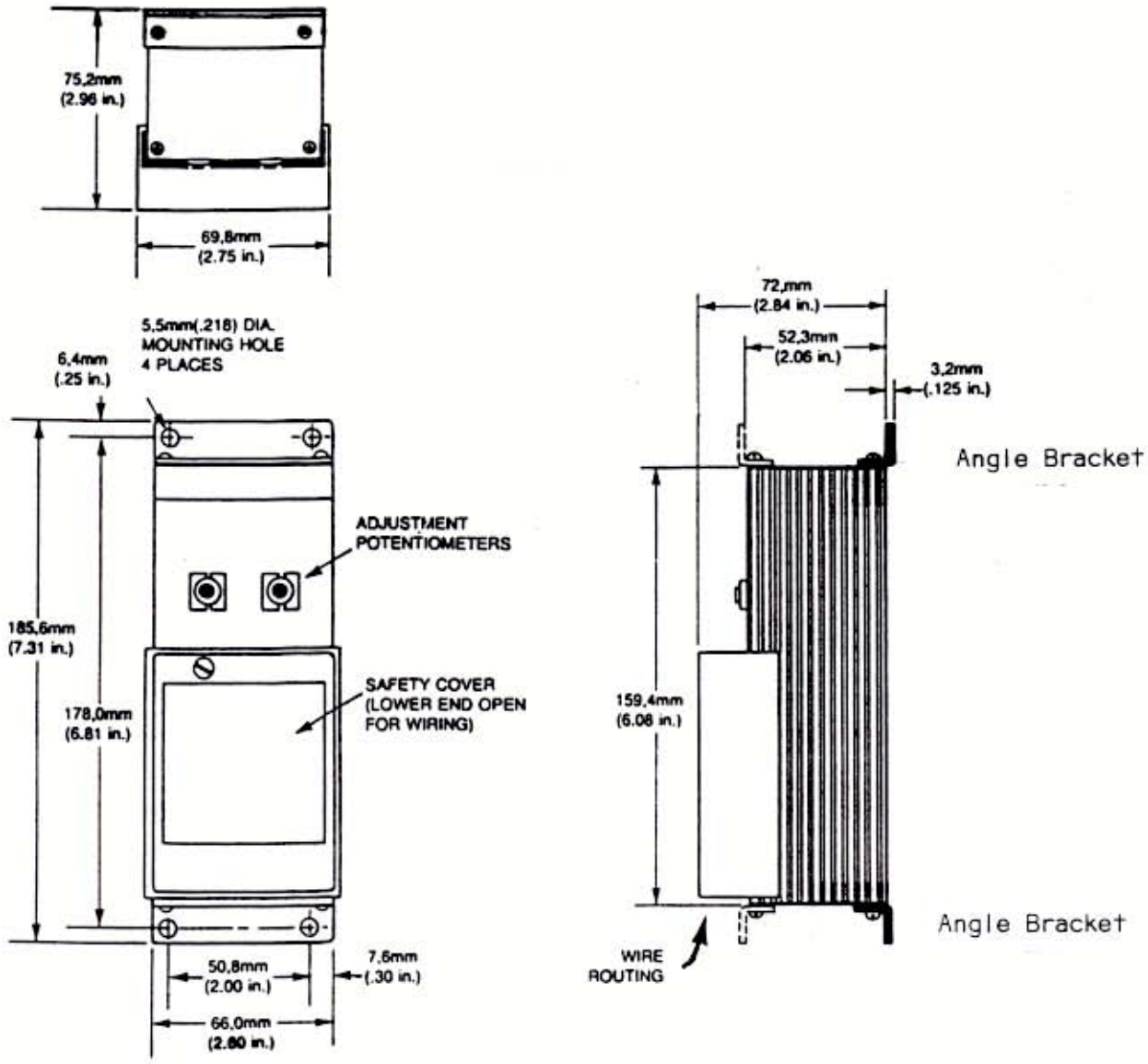


Figure 3 - STD-Standard Housing with Angle Bracket (AB) Mounting

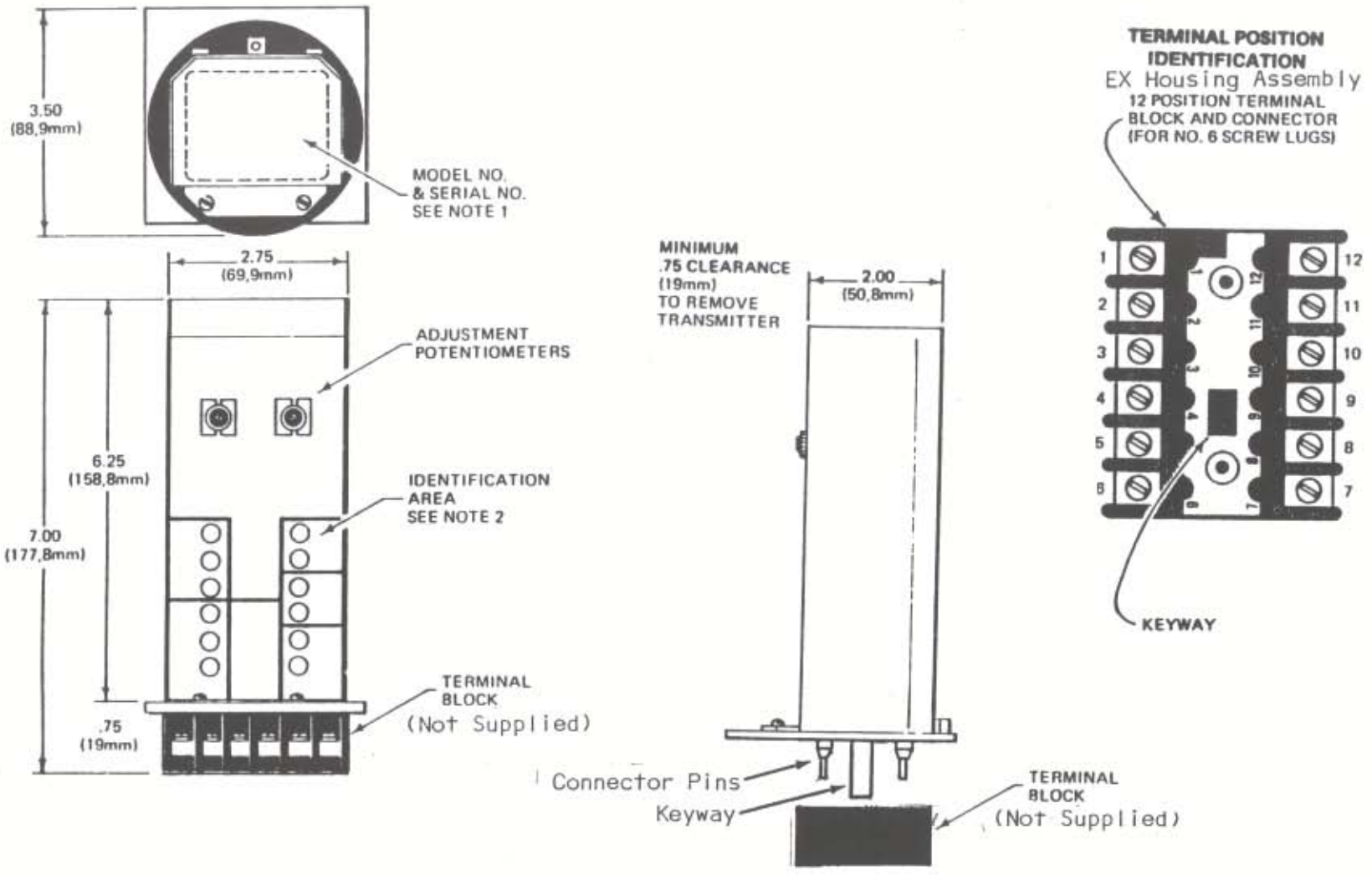


Figure 4 - Replacement Transmitter (PT) for Explosion-Proof Housing

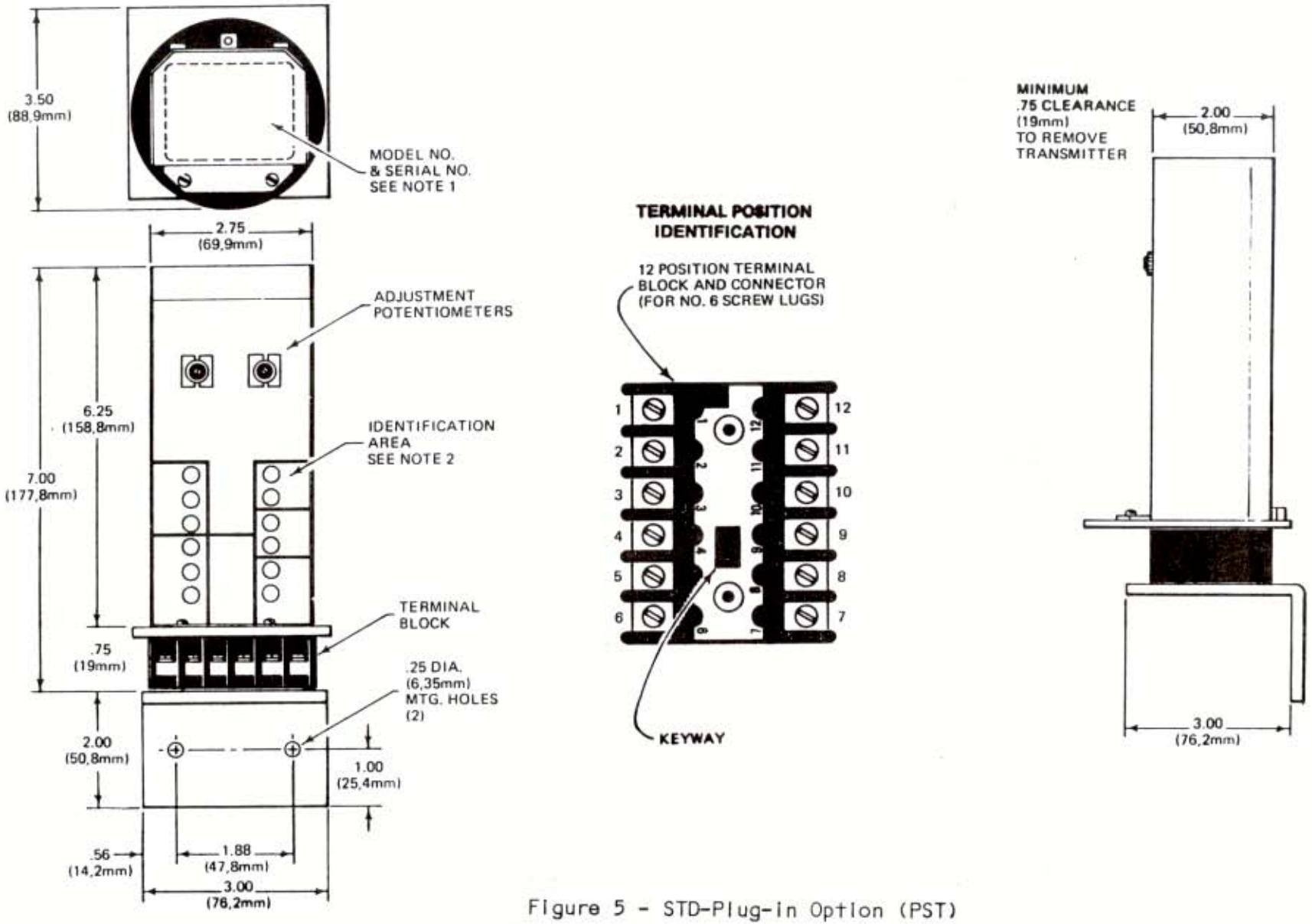


Figure 5 - STD-Plug-in Option (PST)

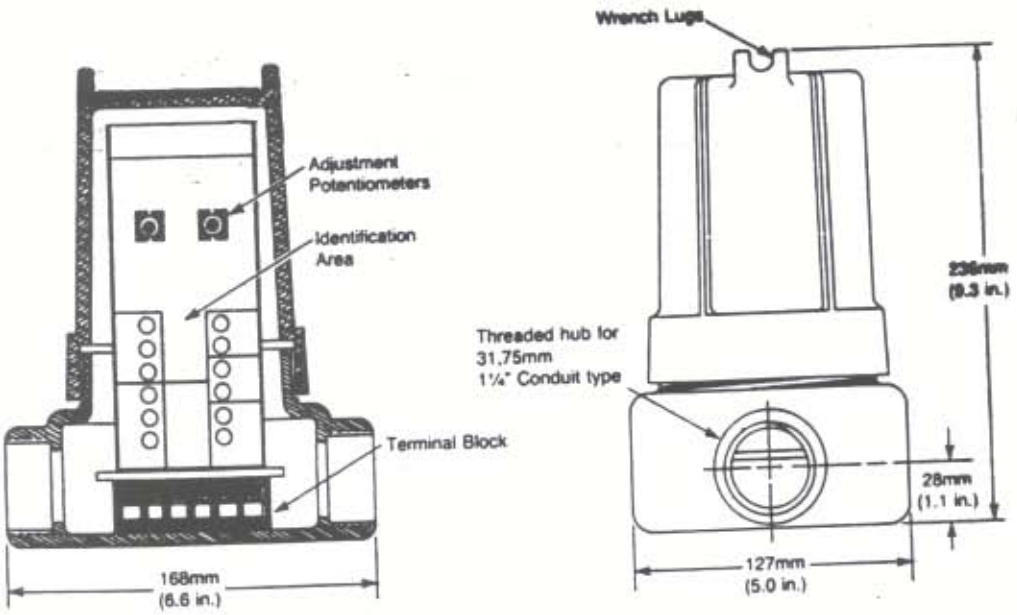
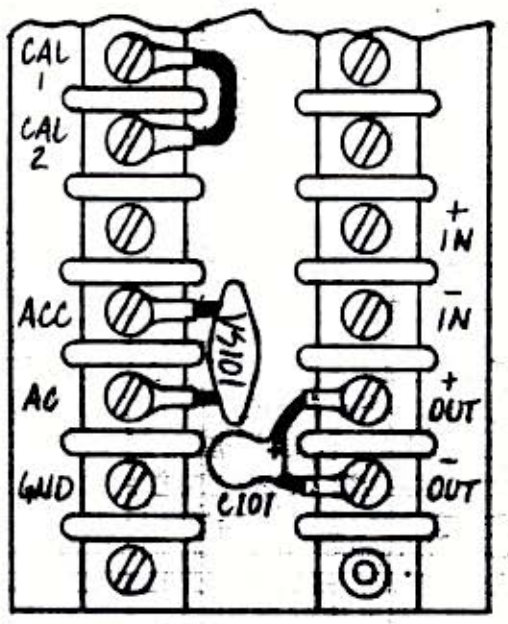
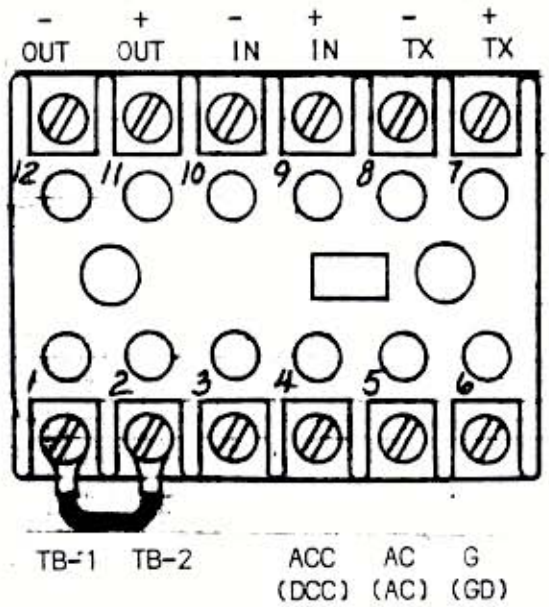


Figure 6 - Explosion-Proof Housing (PA)



Standard Housing Terminal Strip



Plug-in Housing

(Terminal Connector Block)

Figure 7

Standard Housing Terminal Strip

Plug-in Housing (Terminal Connector Block)

to the common or neutral side. The ground (GND) terminal is the mechanical case connection.

The TX optional outputs are from an unregulated and isolated power supply. The TX supply is isolated and can power other modules without affecting DLM operation. Either +TX or -TX can be attached to +IN,-IN, or +OUT,-OUT, to reference the TX supply to operate with other modules.

Calibration

Introduction

This section provides information necessary to calibrate the unit. Each unit is adjusted and checked at the factory for proper performance before shipping.

Control Description And Location

OUTPUT ZERO and SPAN control potentiometers are located on the front panel of the unit. If necessary, the OUTPUT SPAN and ZERO controls should be trimmed. They are interactive with each other. The external controls can be adjusted with a flat-head screwdriver.

Caution
Screwdriver blade should not be more than 0.1 inch (2.54mm) wide. A wider blade may permanently damage the potentiometer mounting.

INPUT ZERO and SPAN control potentiometers are located within the unit. INPUT ZERO and SPAN potentiometers are adjusted during manufacture so that exact zero and full scale input signals access the correct EPROM addresses. It is normally not required to adjust these potentiometers, however, they are accessible by removing the top panel of the standard housing or the cover on plug-in housings.

The EPROM can be exchanged for another EPROM with a different transfer function, without affecting the input or output adjustments.

The potentiometers are equipped with a slip clutch at each end to prevent damage if the controls are turned beyond the wiper stop. Turning the output potentiometers clockwise make the observed signal more positive, less positive if turned counterclockwise.

Test Equipment And Tools

Test equipment and tools needed to adjust the unit are described in Table 1. Required test equipment and tools are

EQUIPMENT OR TOOL	CHARACTERISTIC	PURPOSE
Screwdriver blade	Blade no wider than 0.01 in (2.54mm)	Control adjustment
Adjustable dc signal source	Must be capable of signal ranges defined by INPUT level requirements of purchased unit.	Simulate input signal
Dc voltmeter	Must be accurate to within 0.05% or better	Input and output signal monitoring (voltage inputs only)
Dc milliammeter	Must be accurate to within 0.05% or better	Input and output signal monitoring (current inputs only)
Power source	8 watts maximum	Energize DLM

Table 1 - Calibration Tools and Equipment

not supplied with the unit, and must be provided by the user.

Adjustment Setup

Refer to Figure 8 for test equipment setup to adjust the DLM.

Preliminary Procedures

The units are tested for proper performance at the factory before they are shipped, but users may want to check the module before it is used. Appropriate power and ground connections should be made to terminals 4, 5, and 6. Dummy or actual input signals of zero and full scale are applied at terminals 9 and 10. The output can be measured from terminals 11 and 12.

Calibrating

Calibrating Output Zero and Span

[1] Set input to 0%.

[2] Adjust external ZERO potentiometer, located on the front panel, until the signal defined for +OUT and -OUT is at 0% value.

[3] Set input signal to 100%.

[4] Adjust SPAN potentiometer, located on the front panel, until the signal defined for +OUT and -OUT is set at its 100% value.

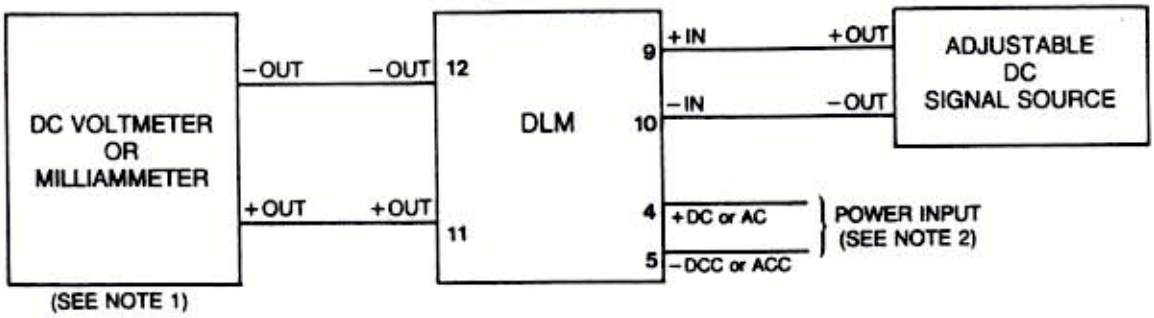
[5] Repeat steps 1 through 4 until 0% and 100% indications are within the desired tolerance.

Internal Adjustments

Ordinarily, input zero and span adjustments are not necessary. If the DLM needs repair, an EPROM change, or the output signal cannot be corrected, it may become necessary to access the internal parts. The procedure for calibrating INPUT ZERO and SPAN is listed below.

The jumper between Cal1 and Cal2 causes the DLM to use transfer function values (that are stored in a different portion of the EPROM) when installed, and calibration values when not installed.

It is not a DLM requirement, of the transfer function, that the 0% input address contain a 0% output data value, or that the 100% input address contain a 100% output data value. As

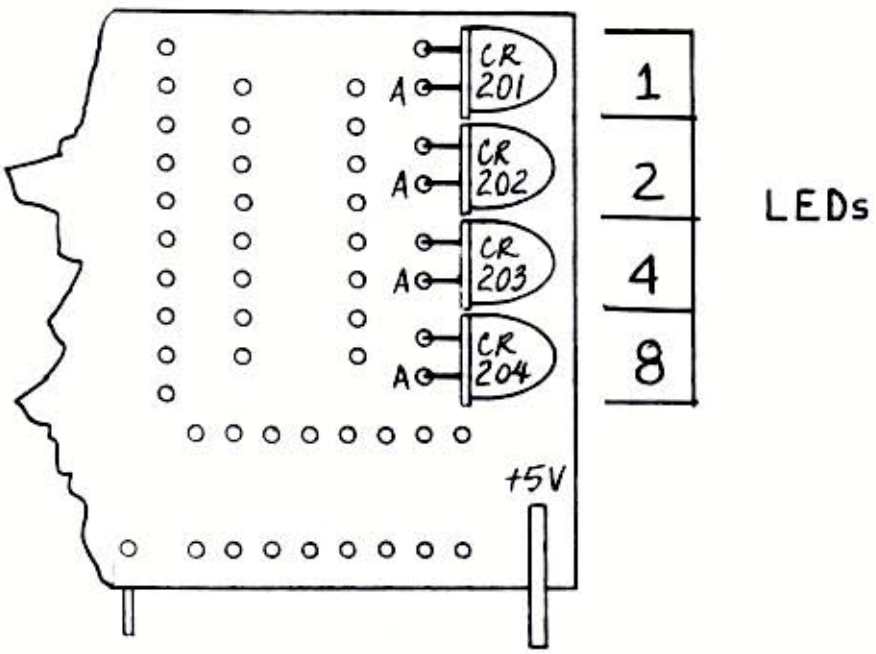


NOTES

1. Dc voltmeter or milliammeter must be accurate to within ±0.05% or better.
2. Either ac power or dc power is supplied, but not both.

Figure 8

DLM Calibration Set-Up



ADDRESSES	LEDs ON			
	8	4	2	1
(0% or 100%) +(3)				X
(0% or 100%) +(2)			X	X
(0% or 100%) +(1)		X	X	X
(0% or 100%)	X	X	X	X
(0% or 100%) -(1)	X	X	X	
(0% or 100%) -(2)	X	X		
(0% or 100%) -(3)	X			

Figure 9

LEDs-Location and Sequence

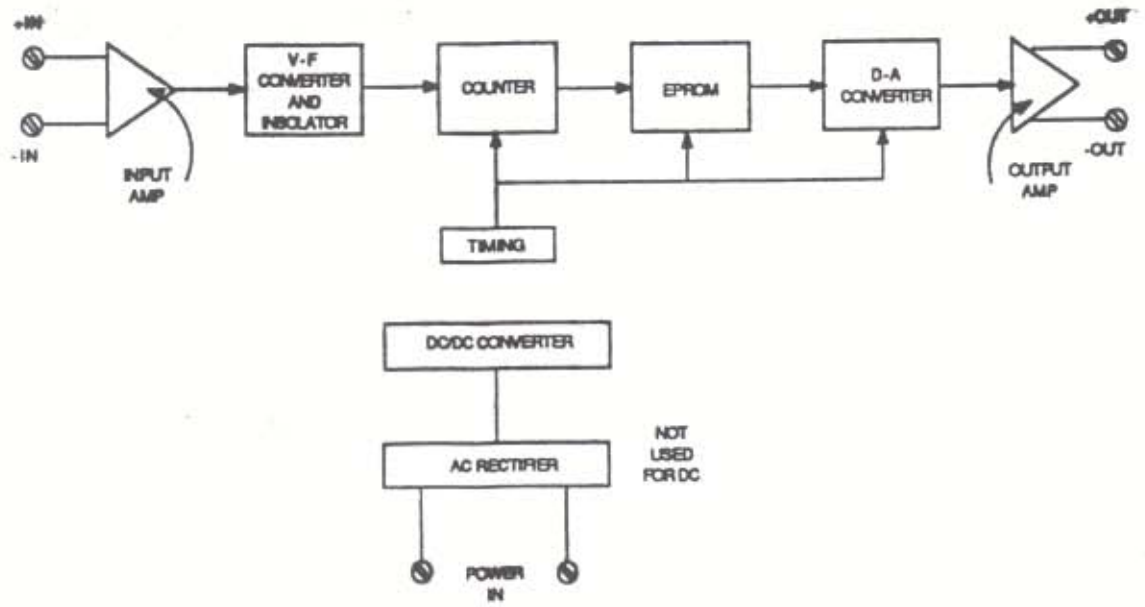


Figure 10

DLM Block Diagram

such, the OUTPUT ZERO and SPAN should not be adjusted using the transfer function values.

The EPROM contains identification codes that control the four address identification LEDs. These codes are the same for 0% and 100%. (refer to Figure 9)

As shown in the "LEDs" column, if the adjustment is below the 0% or 100% address, turning the ZERO and SPAN adjustments clockwise causes the LEDs to come on in sequence and then go off in sequence. Conversely, if the current address is above the 0% or the 100% address, turning the ZERO or SPAN adjustments counterclockwise initiates the ON/OFF sequence in the opposite direction.

The output data value is contained in the calibration portion of the EPROM at the addresses that turn on any LED. The output data value is equal to 0% at the 0% input address and equal to 100% at the 100% input address. The value contained in all other addresses of the calibration portion of the EPROM is the lowest output data value (000 EPROM content).

Calibrating Input Zero and Span

[1] Turn power OFF.

[2] For whichever housing is used, it must be disassembled so that the ZERO and SPAN potentiometers are accessible and the housing covers can be removed.Remove standard housing from bracket mounting. For U-bracket and CP bracket mountings, loosen and remove the two rear Phillips screws holding the housing to the bracket.

[3] To access internal potentiometers and LEDs, of the standard housing, loosen and remove four top hex head screws from the housing. For the plug-in housing, remove one screw on each side of the unit, and three screws at the bottom that secure the unit to the base of the housing. The INPUT ZERO and SPAN potentiometers and the four red LEDs are now visible within the housing.

[4] Loosen and remove the single screw holding the plastic safety cover in place. With safety cover removed and terminal block exposed, remove the jumper between TB-1 and TB-2.

[5] Turn power ON.

[6] Set input signal to 0%.

[7] Adjust the internal INPUT ZERO potentiometer, located on the extreme right corner of PC1, until all four LEDs are ON.

[8] Set input signal to 100%.

[9] Adjust internal INPUT SPAN potentiometer, located to the left of the INPUT ZERO potentiometer, until all four LEDs are on.

[10] Repeat steps 6 through 9 until all four LEDs are on for 0% and 100%. If finding the zero address is difficult, first turn SPAN and ZERO fully counterclockwise and then start at step 6.

Reassembling Unit after Calibration

[1] Turn power OFF.

[2] Replace top panel cover, and screw four hex head screws into place. For the STD and CP bracket mountings, replace the two rear Phillips screws that hold the bracket to the housing. The AB is reassembled by replacing the two, top-mounted screws holding unit to the bracket and two on the bottom. To reassemble the plug-in standard, replace the three screws to the DLM cover.

[3] Replace jumper between TB-1 and TB-2.

[4] Replace plastic safety cover over the terminal block. On the plug-in standard, plug the DLM into connector in the base of the enclosure, and replace the housing cover.

[5] Reassemble brackets to standard housing as applicable.

Theory Of Operation

Introduction

This section briefly describes how the DLM operates. A simplified block diagram of the unit is provided to help understand the circuit description (see Figure 10). Detailed schematics are found in Figures 11 and 12 and assembly drawings are included in Figures 13-18.

General Description

Input Amplifier

Current input signals are sensed across a fixed resistor to develop an input voltage; then like voltage inputs, are conditioned in a high impedance pre-amplifier to provide the necessary signal for the voltage-to-frequency converter. ZERO and SPAN potentiometers allow for input calibration.

Voltage-to-Frequency Converter

The input amplifier output controls the voltage-to-frequency converter. The converter provides output pulses of a frequency repetition directly proportional to the input signal. These pulses are transmitted via an opto-isolator into the output section.

Opto-isolator Stage

The optical isolation circuit provides isolation between the input and output circuits. Each converter pulse discharges a short, high current pulse into the input LED of the opto-isolator. The output starts the time base window and is then counted in the address counter.

Time Base Window

A resonant crystal oscillator circuit generates a basic frequency of 100kHz. A time base window duration of .16384 seconds is generated from the oscillator. The window starts on the leading edge of a voltage-to-frequency converter pulse. Counting of the voltage-to-frequency converter output, in the address counter, only occurs during this window.

Logic Control

Various timed reset and control signals are generated in the logic control section.

Address Counter

This counter accumulates an address for the EPROM by counting the voltage-to-frequency pulses that occur during the time base window. Controls inhibit the counter from overflow.

EPROM

The EPROM is 8192 x 8 (64K). In the lower 32K, two addresses hold the 2048 12-bit output data values. The remaining 4-bits are not used. The upper 32K contain calibration data values and address identification codes for unit calibration.

D/A Converter

A 12-bit digital-to-analog converter provides the necessary signal conversion from the EPROM digital data value to an analog signal to be conditioned by the output amplifier.

Output Amplifier

The analog output of the D/A converter is conditioned in the output amplifier to the required voltage or current signal. ZERO and SPAN potentiometers allow for output adjustment.

Power Supply

Incoming ac voltage is reduced by an isolation transformer and then rectified to provide approximately 24Vdc. Incoming dc power is used directly. This dc is fed into a dc to dc converter to provide isolation. Supply voltages are developed separately for input and output sections through separate transformer windings. Another separate winding provides the isolated, unregulated TX output.

Maintenance

Introduction

This section contains maintenance and minor troubleshooting information with unit documentation data. The DLM's maintenance is primarily limited to keeping the input and output terminals and conductors clean and tightly fitted.

Troubleshooting

To troubleshoot the DLM, trace the signal with an oscilloscope and refer to the schematic diagrams to determine what component or device might be causing an abnormal indication.

If the original sympton was a "complete failure of the unit to operate", the most logical components to suspect are those associated with the power supply.

If the unit is producing an incorrect (but not zero) output, check the outputs from the input circuit and trace the resulting signal through the unit.

Return Procedures

Should it become necessary to obtain factory repair of Moore Industries equipment, proceed as follows:

[1] Notify the local Moore Industries sales representative or the factory marketing representative that you are returning equipment for repair. At this time, please furnish the Moore Industries representative with model and serial numbers of the affected equipment.

[2] Carefully pack the equipment to be returned in a sturdy

container with sufficient packing material to insure that no damage will occur.

[3] In a cover letter or note, describe completely:

- The symptoms that indicate the equipment needs repair.
- The environment in which the equipment has been operating (weather, vibration, temperature, dust, etc.)
- Approximate number of operating hours or approximate date of installation, if known.
- Complete shipping information for the return of the equipment to you.
- Name and phone number of person to contact if questions arise.

[4] Enclose cover letter, packing lists, copies of rejection or discrepancy reports, if available, purchase order or purchase order number, and ship the equipment to the nearest address on the back cover.

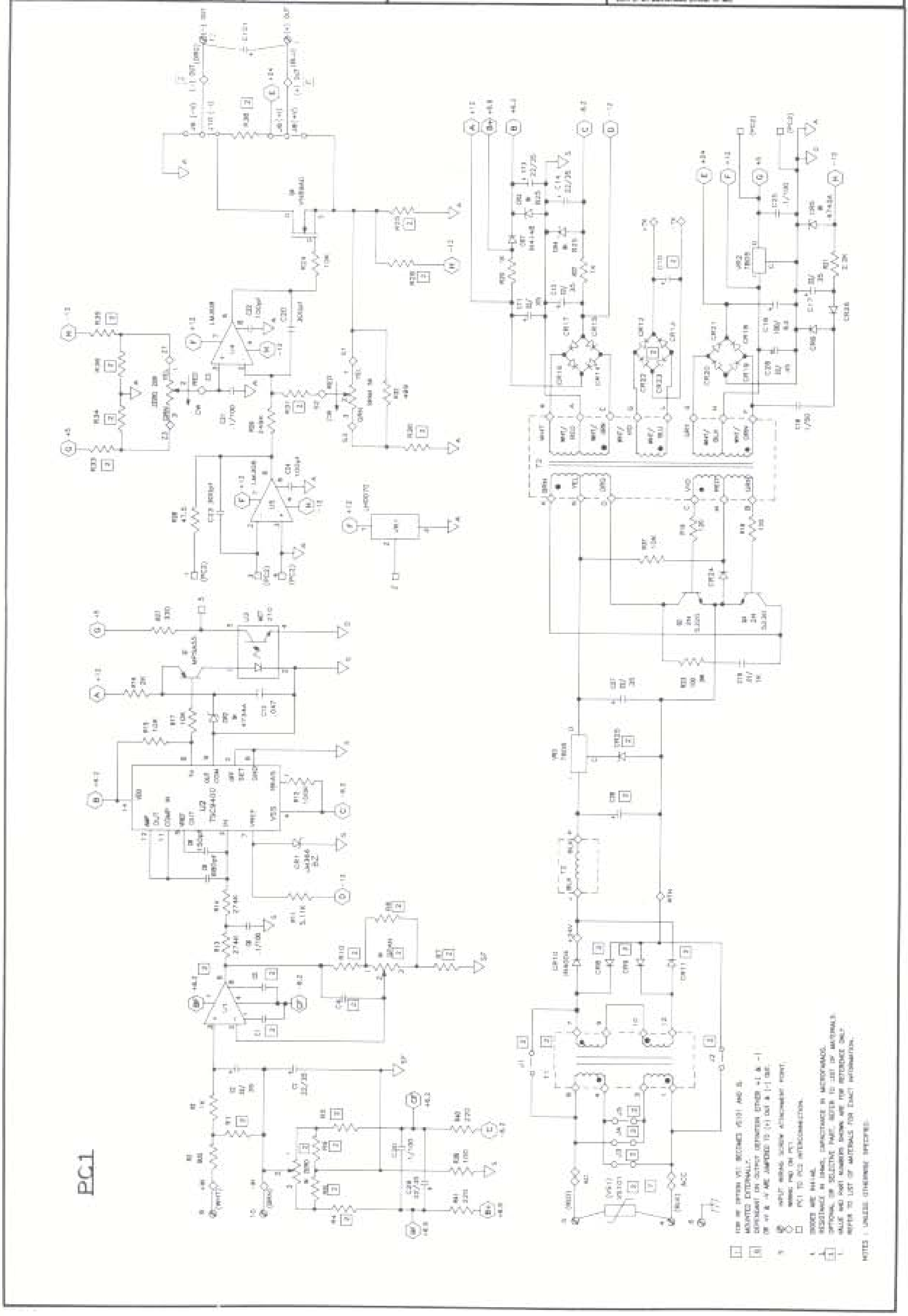
The equipment will be carefully inspected and tested at the factory. You will be contacted by the Moore Industries representative if further information is required.

In case of repair pursuant to Moore Industries return policy, the defective unit will either be repaired, replaced, or the purchase price refunded, at Moore Industries option. The unit or its replacement will be returned to you in accordance with the shipping instructions furnished in your cover letter.

In other cases, the Moore Industries representative will advise you of the repair cost and estimated return date, if this information is requested in your letter. Repair in such in such instances must be authorized by a purchase order number before it can be repaired and shipped.

145-415-00
Schematic

MOORE INDUSTRIES	DO NOT SCALE DRAWING		CATEGORY: SCHEMATIC	DRAWING NUMBER: 145-415-00 SHEET 1 OF 2	REVISION: D
UNITED STATES	TOLERANCES UNLESS NOTED: .X = ±.1, .XX = ±.03, .XXX = ±.010, ANGLES: ±.30', HOLES: PER SAE STANDARD, DIMENSIONS IN INCHES	DRAWN: C.H. Mather 4/28/87; CHECKED; ENGINEER; SCALE: NONE	TITLE: DLM-STD PC1	REVISED BY: ECO 6465; DATE: 8/11/87	APPROVAL



145-415-00 | INT. 2 OF 2
DLM SCHEMATIC

MOORE INDUSTRIES
UNITED STATES

DO NOT SCALE DRAWING

TOLERANCES UNLESS NOTED
X = ± 1
.XX = ± .03
.XXX = ± .010
ANGLES = ± 30'
HOLES: PER SAE STANDARD
DIMENSIONS IN INCHES

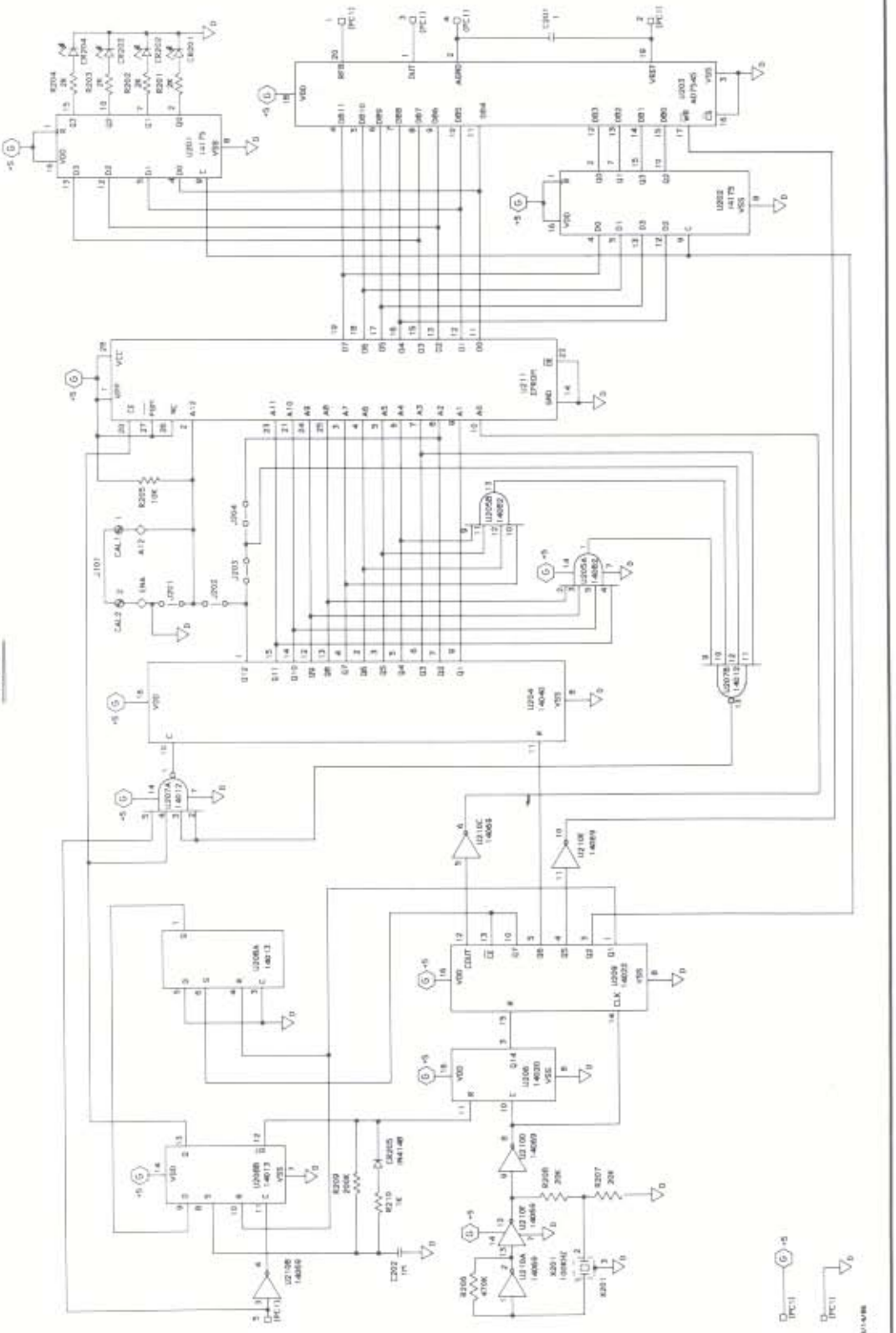
DRAWN: A.P. 10/86
CHECKED:
ENGINEER:
SCALE: NONE

CATEGORY: SCHEMATIC
TITLE: DLM

DRAWING NUMBER: 145-415-00 SHEET 2 OF 2
REVISION: D

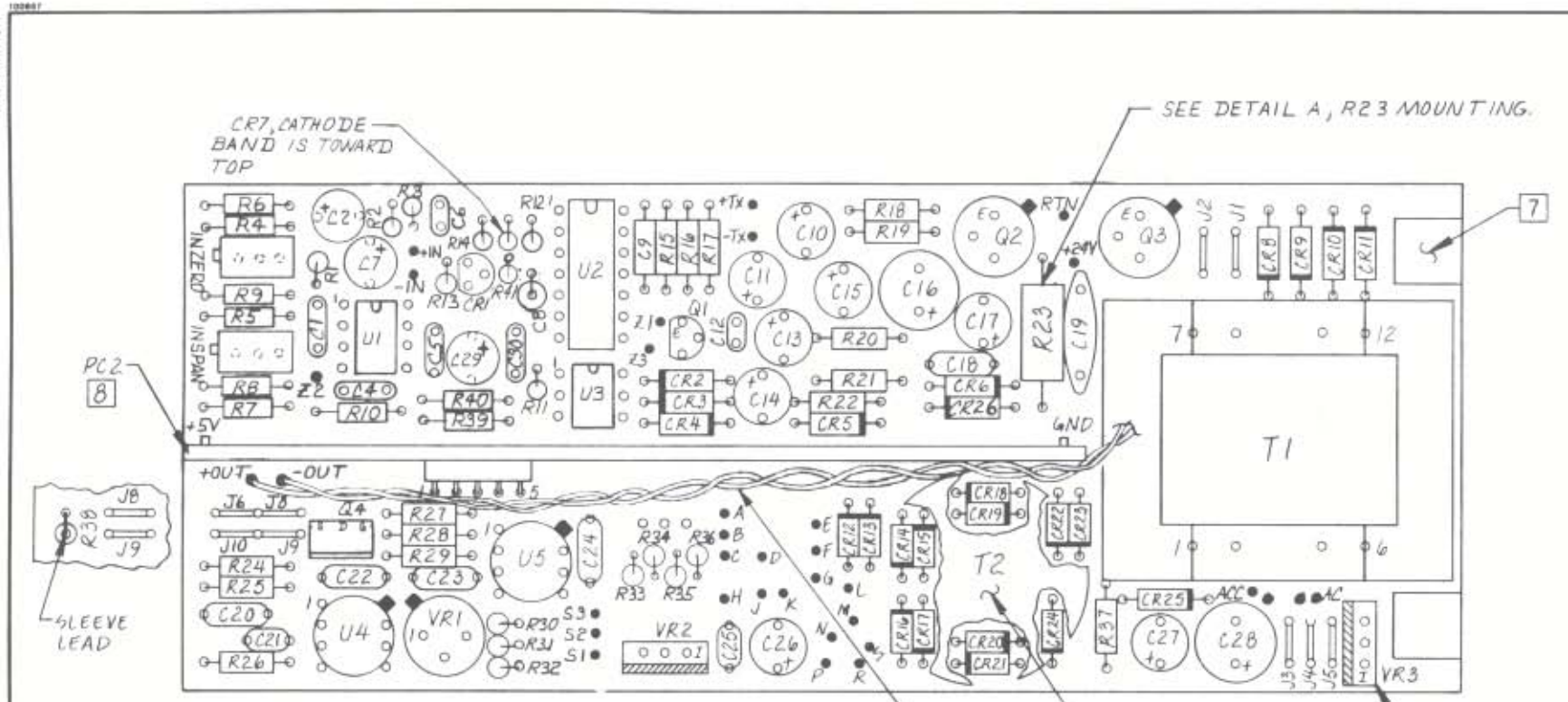
ISSUED BY | DATE | BY | APPROVING

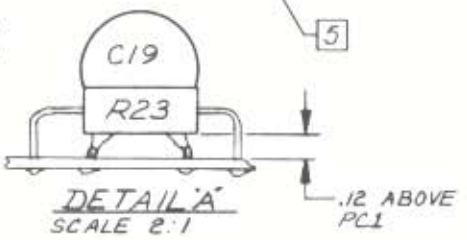
PC2



EASI FILE CORP. IRVINE, CA HANGER EF1436

145-515-00	SHT. 1 OF 4
DLM STANDARD PC1	





DETAIL A
SCALE 2:1

9. SLEEVE LEADS OF ALL STAND-UP COMPONENTS.
8. PC2 MUST BE MOUNTED FLUSH & PERPENDICULAR TO PC1.
7. SWAGE MTG. BLOCKS TO P.C. BOARD BEFORE ADDING PARTS. SEE CASE ASSEMBLY FOR POSITION.
6. SEE SHEET 4 FOR MOUNTING OF T2.
5. SEE SHEETS 3 & 4 FOR MOUNTING OF VR3.
4. SEE SHEET 2 FOR ADDITIONAL COMPONENT LOCATIONS.
3. METAL SIDE OF VR2 & VR3.
2. ALL LEADS MUST BE SOLDERED TO PADS.
1. ALL JUMPERS ARE 22 AWG BUS, TEFLON SLEEVED AS REQ'D.

NOTES: UNLESS OTHERWISE SPECIFIED

9. ALL WIRES TO BE TIE WRAPPED AND ROUTED ON THEIR RESPECTIVE SIDES OF PC2. WIRES ARE NOT TO CROSS OVER TOP OF BOARD.

MOORE INDUSTRIES
UNITED STATES

DO NOT SCALE DRAWING
TOLERANCES UNLESS NOTED
DRAWN D. Hall 4/6
CHECKED JAD
ENGINEER Gough
SCALE 2:1

CATEGORY P.C. ASSEMBLY
TITLE P.C. BD. ASSEMBLY 'DLM' STD. PC1

DRAWING NUMBER 145-515-00
REVISED BY ECO 6465
DATE 5/8/03
BY
APPROVED
REVISION D

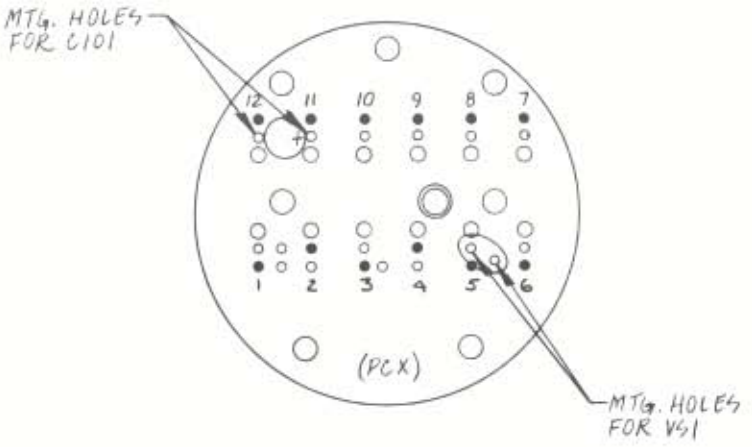
SHT. 1 OF 4

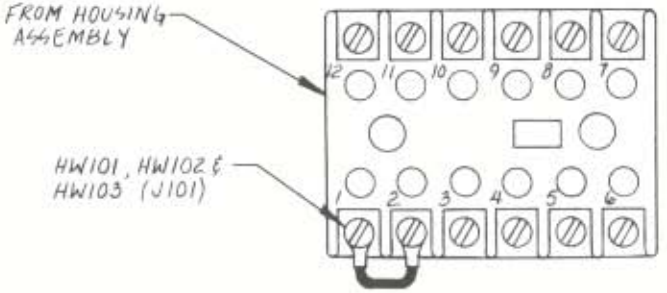
BASI FILE CORP. IRVINE, CA. CHANGER EF1434

145-515-00	SHT. 2 of 4
DLM STANDARD PC1	

100857

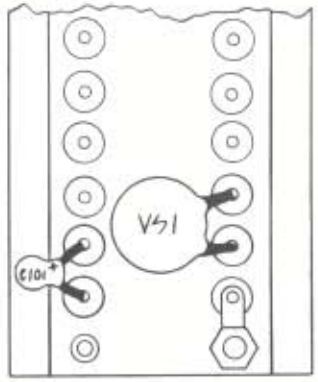
MOUNTING OF C101 & VS1

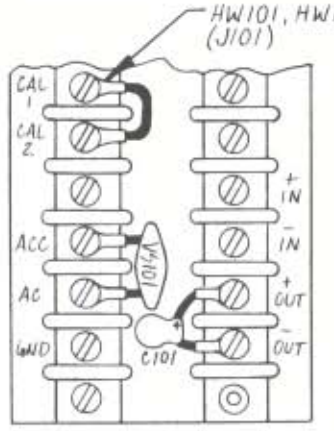




"SP" CASE

MOUNTING OF VS1 & C101 (NON-RF)
(SLEEVE LEADS)





MOUNTING OF VS101 & C101
(RF UNITS)

"SR" CASE

MOORE INDUSTRIES
UNITED STATES

DO NOT SCALE DRAWING

TOLERANCES UNLESS NOTED
DIMENSIONS IN INCHES

SCALE NONE

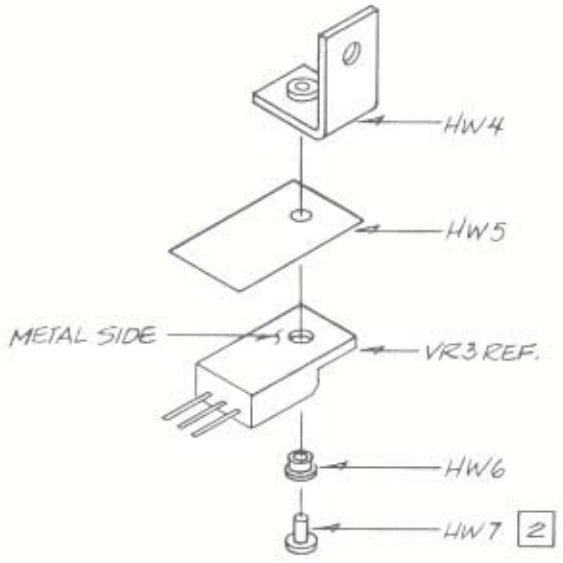
P.C. ASSEMBLY
ADDITIONAL PARTS LOCATION
DLM STANDARD

DRAWING NUMBER 145-515-00
REVISION D

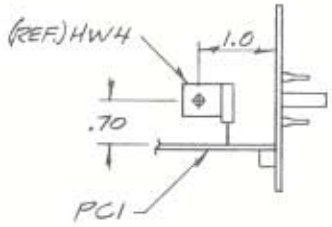
SHT. 2 OF 4

EASI FILE CORP. IRVINE, CA HANGER EF1436

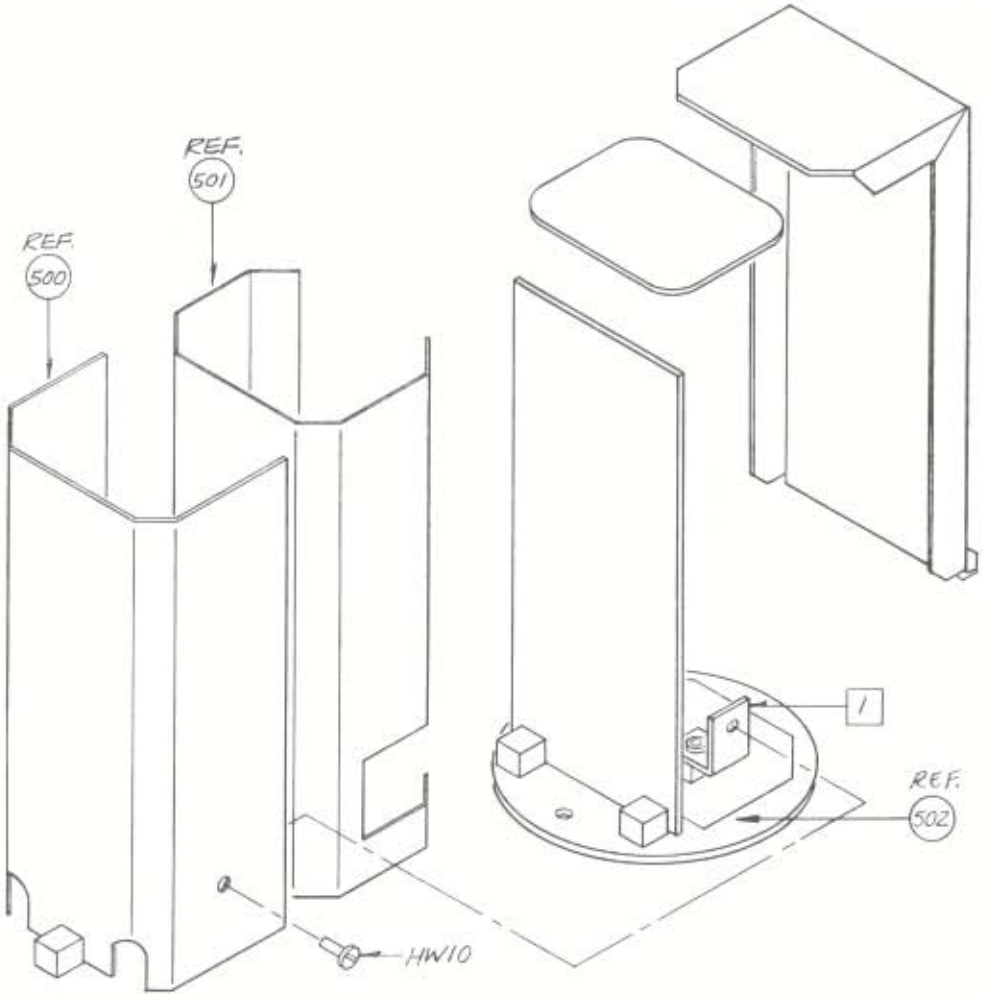
145-515-00	SHT. 3 OF 4
DLM STANDARD PCI	



VR3 SUB ASS'Y. DET. 1



HEAT SINK POS'N. DET. 3



PCI/HOUSING/HEAT SINK SUB ASS'Y. DET. 2

2 FIRMLY TIGHTEN THIS SCREW.

1. USE HEAT SINK POSITIONING FIXTURE TF1, 2.00-213-64 WHEN SOLDERING VR3 SUB. ASS'Y. TO PCI.

NOTES: UNLESS OTHERWISE SPECIFIED

MOORE INDUSTRIES
16650 Schoenborn Street
Sepulveda, California 91343

DO NOT SCALE DRAWING

TOLERANCES UNLESS NOTED
.X ±1
.XX ±.03
.XXX ±.010
ANGLES ±30'

DRAWN J.A. DURE 5/24/93
CHECKED
ENGR
MFG
QUAL

VR3 SUB ASS'Y. "DLM" (EXPLOSION PROOF)

ASSEMBLY

145-515-00

REVISIONS
LTR DESCRIPTION DATE BY APPROVED

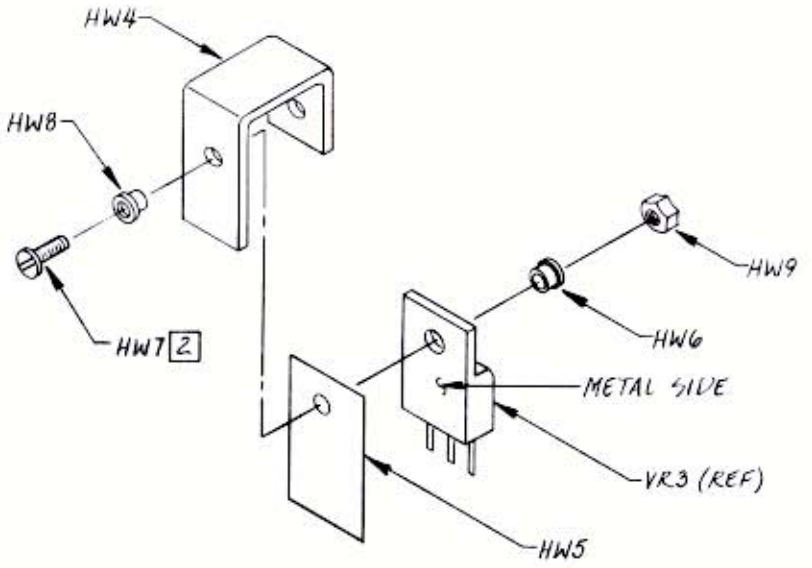
D

SHT. 3 OF 4

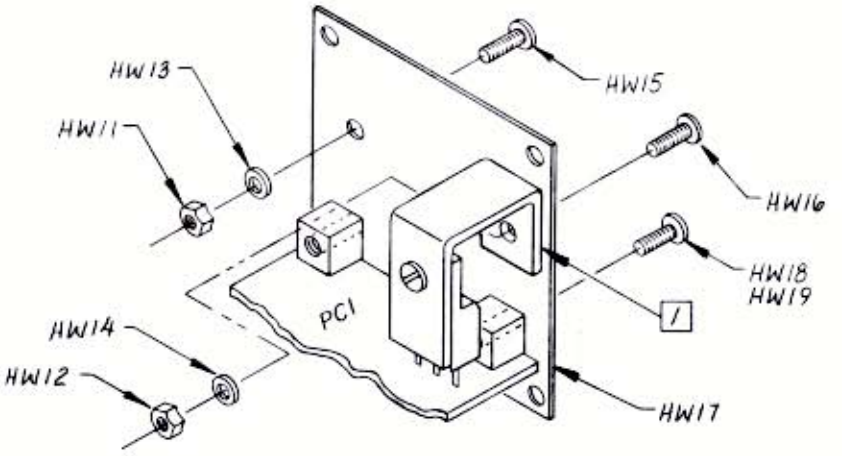
EASI FILE CORP. IRVINE HANGER E7H56

145-515-00 SHT. 4 of 9

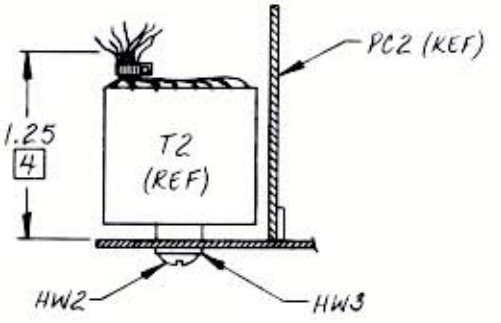
DLM STANDARD PCI



VR3 SUB ASS'Y. DET. 1



PC1 / HEAT SINK SUB ASS'Y. DET. 2



T2 SUB ASS'Y.

4 MAXIMUM HEIGHT OF T2 ASS'Y. DIMENSION INCLUDES TY-WRAP & WIRE BUNDLE. (DRESS WIRE BUNDLE AS REQ'D. TO MAINTAIN DIM.)

3 WIRES TO BE TIE WRAPPED AT TOP OF TRANSFORMER AS SHOWN. DO NOT ROUTE WIRES AROUND SIDES OF T2 DURING INSTALLATION.

2 FIRMLY TIGHTEN THIS SCREW.

1 USE HW17 (END PLATE 200-236-13) FOR HEAT SINK POSITIONING WHEN SOLDERING VR3 SUB ASS'Y. TO PC1.

NOTES: UNLESS OTHERWISE SPECIFIED

MOORE INDUSTRIES
UNITED STATES

DO NOT SCALE DRAWING

TOLERANCES UNLESS NOTED

SCALE NONE

P.C. ASSEMBLY

VR3 & T2 SUB ASS'Y. 'DLM' STANDARD

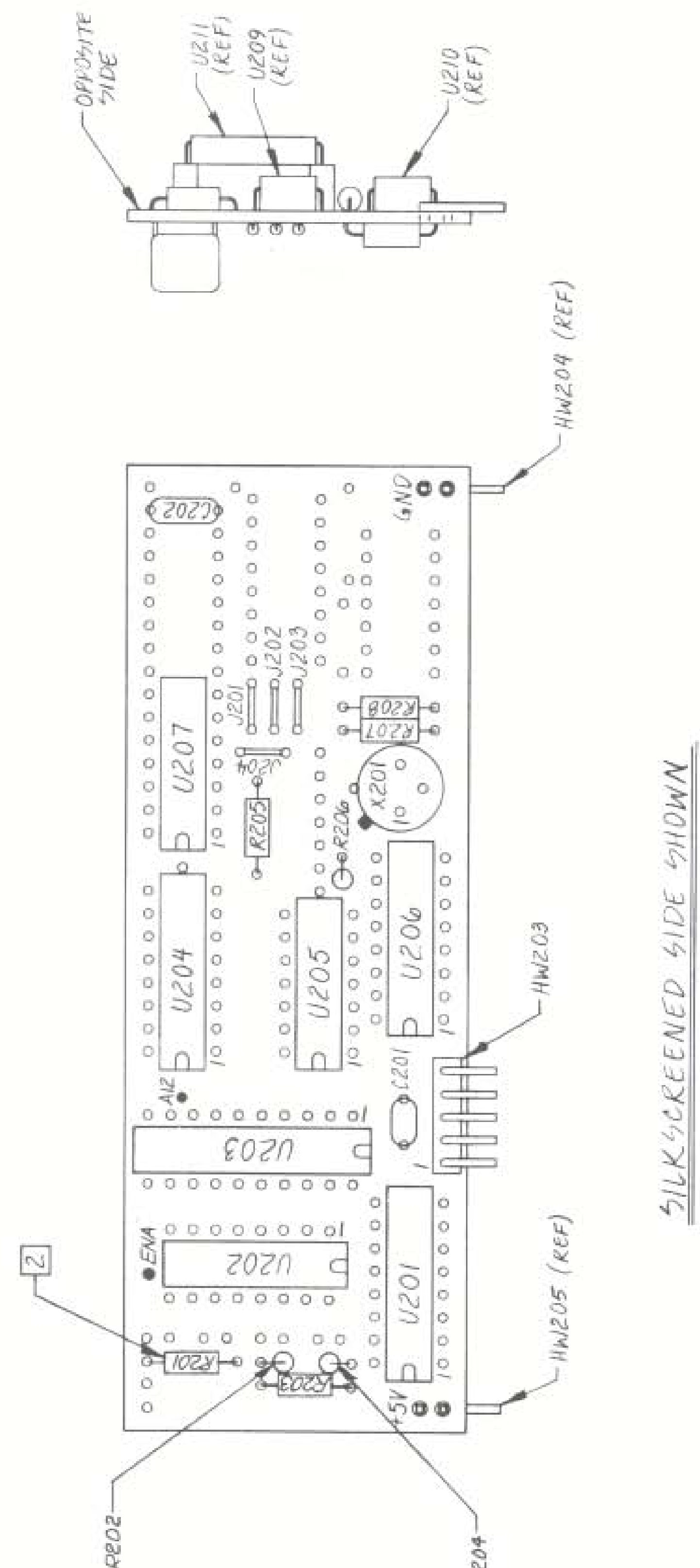
DRAWING NUMBER 145-515-00

REVISION D

SHT. 4 OF 4

SHT. 1 OF 2

MOORE INDUSTRIES UNITED STATES	DO NOT SCALE DRAWING	CATEGORY: P.C. ASSEMBLY	DRAWING NUMBER: 145-516-00	REVISION: D
	TOLERANCES UNLESS NOTED: .X = ±.1, .XX = ±.03, .XXX = ±.010, ANGLES: ±.50°, HOLES: PER SAE STANDARD, DIMENSIONS IN INCHES	TITLE: P.C. BD. ASSEMBLY 'DLM' STD. PC2	REVISED BY: ECO 6465	DATE / BY / APPROVAL
	DRAWN: C. Whan 9-25-86; CHECKED: JAD; ENGINEER: Gough; SCALE: 2:1		NOTICE RE PROPRIETARY INFORMATION: This drawing and the information contained herein are the proprietary property of Moore Industries - International, Inc. (MII) and should not be reproduced or disclosed to any third party without the written consent of an authorized officer of MII.	



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL LEADS TO BE SOLDERED TO PADS.

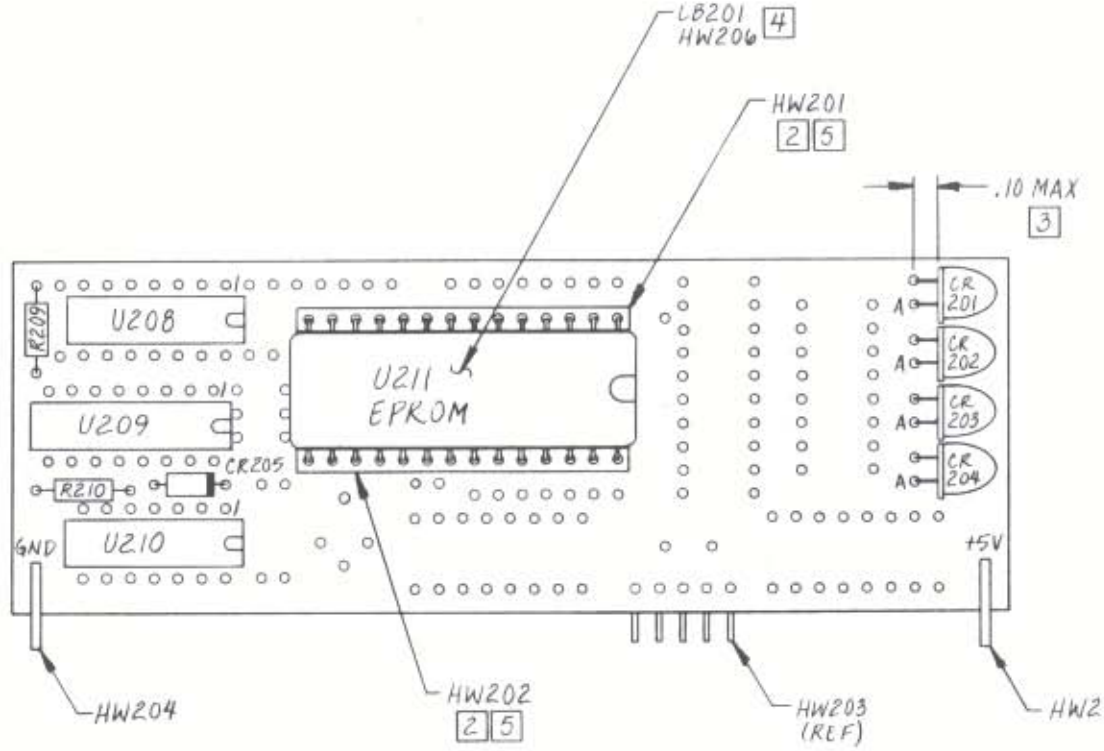
2 R201-R204 ALONG WITH HW201 & HW202 (OPPOSITE SIDE, SEE SHEET 2) MUST BE INSTALLED BEFORE ANY OTHER COMPONENTS.

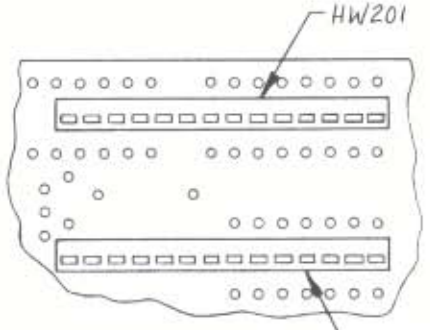
145-516-00 SHT. 1 of 2
DLM PC2 ASSEMBLY

CLEARPRINT 1000-10

BASI FILE CORP. IRVINE, CA HANGER 57HBS

145-516-00	SHT. 2 of 2
DLM PC2 ASSEMBLY	





DETAIL 'A'

5 SEE DETAIL 'A' FOR INSTALLATION OF HW201 & HW202.

4 INSTALL U211 EPROM INTO HW201 & HW202 AFTER IT HAS BEEN PROGRAMMED AND LABELED ACCORDING TO DWG. 145-216-00.

3 BEND LEADS OF CR201-CR204 AT RIGHT ANGLES AS SHOWN.

2 HW201 & HW202 ALONG WITH R201-R204 (OPPOSITE SIDE, SEE SHEET 1) MUST BE INSTALLED BEFORE ANY OTHER COMPONENTS.

1. ALL LEADS TO BE SOLDERED TO PADS.

NOTES: UNLESS OTHERWISE SPECIFIED

MOORE INDUSTRIES
UNITED STATES

DO NOT SCALE DRAWING

TOLERANCES UNLESS NOTED

SCALE 2:1

P.C. ASSEMBLY
'DLM' STD. PC2

145-516-00

D

SHT. 2 OF 2

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

   Warranty Repair –
   If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

   Non-Warranty Repair –
   If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
   a) A note listing the symptoms that indicate the unit needs repair
   b) Complete shipping information for return of the equipment after repair
   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

MOORE INDUSTRIES

WORLDWIDE • www.miinet.com

United States • info@miinet.com
Tel: (818) 894-7111 • FAX: (818) 891-2816

Belgium • info@mooreind.be
Tel: 03/448.10.18 • FAX: 03/440.17.97

China • sales@mooreind.sh.cn
Tel: 86-21-62491499 • FAX: 86-21-62490635

Australia • sales@mooreind.com.au
Tel: (02) 8536-7200 • FAX: (02) 9525-7296

The Netherlands • sales@mooreind.nl
Tel: (0)344-617971 • FAX: (0)344-615920

United Kingdom • sales@mooreind.com
Tel: 01293 514488 • FAX: 01293 536852