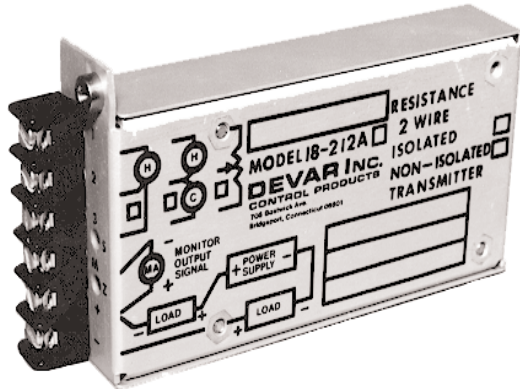


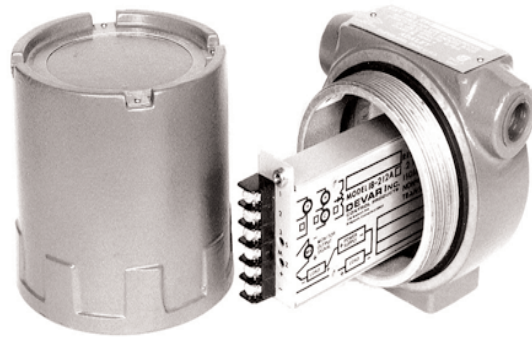
# DEVAR Inc.

706 Bostwick Avenue, Bridgeport, CT 06605  
203-368-6751 FAX 203-368-3747  
<http://www.devarinc.com> e-mail: [info@devarinc.com](mailto:info@devarinc.com)

## Model 18-212A LOOP POWERED RESISTANCE TRANSMITTER



Rack Mount  
-STD



Explosion Proof  
Mount  
-M37



# 18-212 A

## TWO WIRE RESISTANCE TRANSMITTER

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Location of Calibrating Resistors	A514600
P.C. Board Assembly, 18-212A-N (Non-isolated)	B514634
P.C. Board Assembly, 18-212A-I (Isolated)	B514633

## SECTION I

### GENERAL DESCRIPTION

- 1.1 The 18-212A two wire resistance transmitter receives signals from single RTD, dual RTD, or a potentiometer and provides an output current of 4 to 20mA proportional to the input resistance. It is designed to connect with only two copper wire leads that will carry the voltage to operate the transmitter from a power supply, and also the output current. The output current, proportional to the input resistance, is then used for recording, computing, or controlling.
- 1.2 The unit has reverse supply polarity protection. It is designed to operate on a wide range of supply voltages (12 to 44 VDC). An additional transient protection circuit can be provided as an option. This option is recommended when voltage spikes are anticipated on the supply line from motor loads or thunderstorm activity.
- 1.3 The unit has input break detection circuit. The output current can be programmed to go upscale or downscale when any RTD circuits open. For RTD inputs a three segment linearizing circuit can be provided as an option. This circuit linearizes the output current with respect to the sensed temperature of RTD.
- 1.4 The 18-212A is available in an isolated (-I) or non-isolated (-N) versions. In the isolated version, the input is electrically isolated from the current output and power supply.

SECTION II  
SPECIFICATIONS

2.1 GENERAL

Power Requirements	12-44 VDC at power terminals
Accuracy	0.1% of span (Includes combined effects of hysteresis, repeatability and linearity referred to mV input).
Ambient Temperature	-25° C to +85° C
Thermal Zero Shift	Less than 0.01%/°F of span (Span > 10mV) Less than 0.02%/°F of span (Span = 5 to 10mV)
Thermal Span Shift	Less than 0.01%/°F of span
Common Mode Rejection (Isolated)	115 db at 60 Hz
18-212A-I: Isolated Resistance Transmitter	
18-212A-N: Non-isolated Resistance Transmitter	

2.2 INPUT

Sensor	2 or 3 wire RTD-variable resistor (10K ohms max.)
Max. Bridge Current:	
Non-isolated	2 mA
Isolated	1.5 mA
Min. RTD Span:	
Non-isolated	5 ohms
Isolated	6.66 ohms
Input Break Detection	Upscale, downscale or none

2.3 OUTPUT

Current Output	4 to 20 mA
Current Output Limits	3.4 mA to 27 mA, typical
Load Resistance	$RL \text{ (Max.)} = (V_{\text{supply}} - 12)/20$
Load Resistance Effect	0.05% of span per 300 ohms change
Power Supply Effect	0.01% of output span per volt

## SPECIFICATIONS (cont'd)

### 2.4 OPTIONS

- E80: A 10-50 mA current output can be provided.
- E111: Additional transient protection circuit can be provided.  
(Requires 13-33 VDC at power terminals)
  - Max. reverse surge current ( $I_{RSM}$ )  
for  $\leq 10$  us 33 Amps
  - Max. reverse voltage at  $I_{RSM}$  45.7 Volts
  - Response time pico seconds
  - Peak power 1500 Watts
- L: A linearizing circuit can be provided. The output current is proportional to the sensed temperature with a linearity of  $\pm 0.1\%$  plus a 4:1 improvement in RTD curve.

## SECTION III

### INSTALLATION

- 3.1 The 18-212A resistance transmitter can be mounted on our M31 bracket for surface mounting, or to install into a SNAPTRACK mounting rail. The 18-212A transmitter has been miniaturized to allow 10 units per foot length of a snaptrack. Refer to FIG 3.3 for M31 bracket and snaptrack dimensions. In addition, the 18-212A transmitter may be installed in different size racks, such as 34 units in a  $5\frac{1}{2} \times 19$ " rack, or 17 units in a  $3\frac{1}{2} \times 19$ " rack, or 16 units in a  $5\frac{1}{2} \times 10$ " rack. Refer to FIG 3.4 for different rack dimensions and the power distribution panel (PDP). Refer to FIG 3.2 for general dimensions of 18-212A case.
- 3.2 Connect appropriate DC power source in series with load to (+) and (-) PWR terminals. Also connect the RTD to terminals 1, 2, and 3. Refer to FIG 3.1 for detailed wiring instructions.

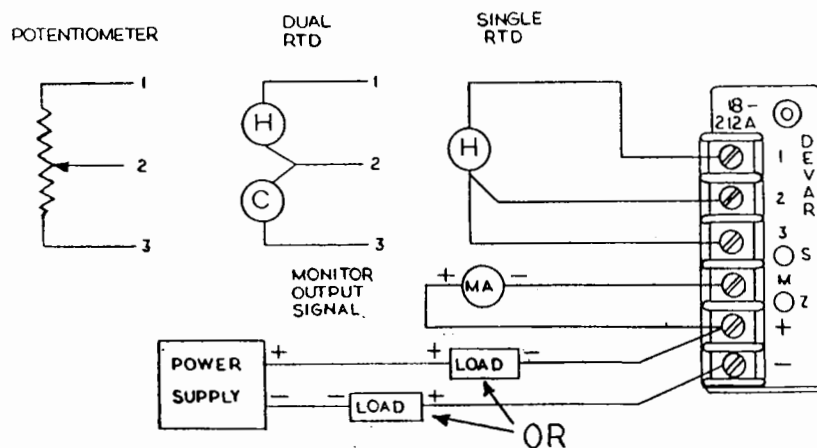


FIG. 3-1 Typical Wiring

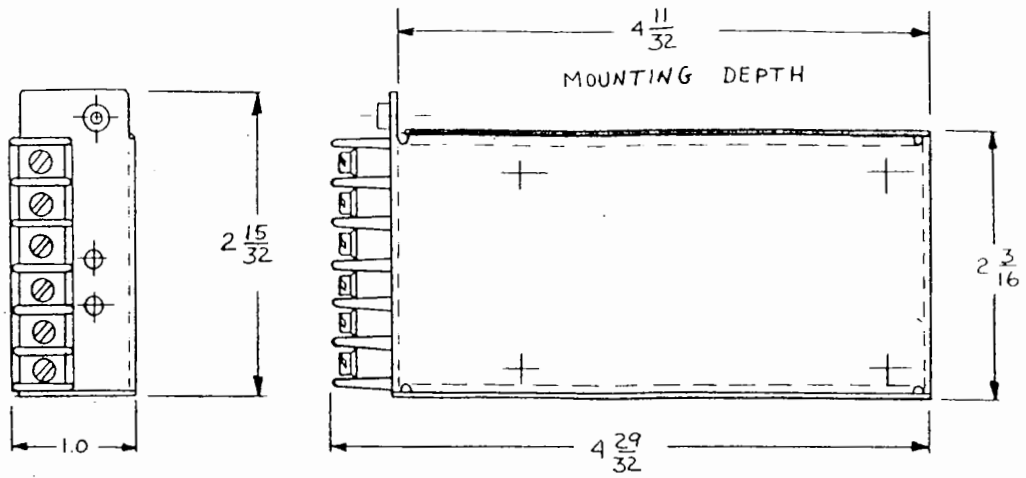
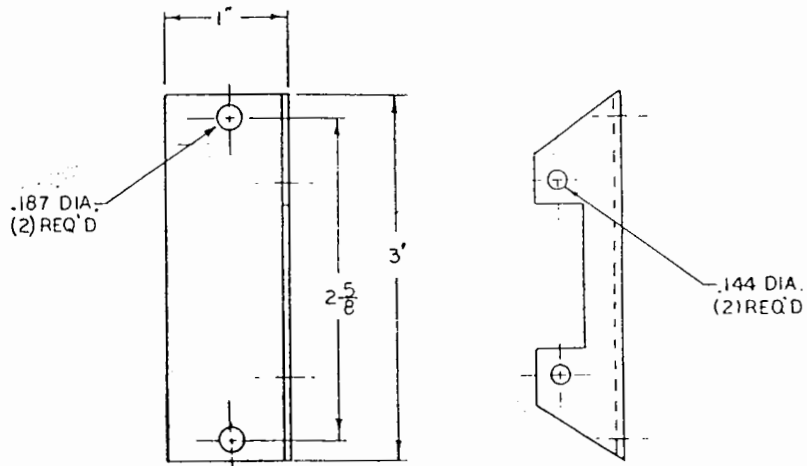
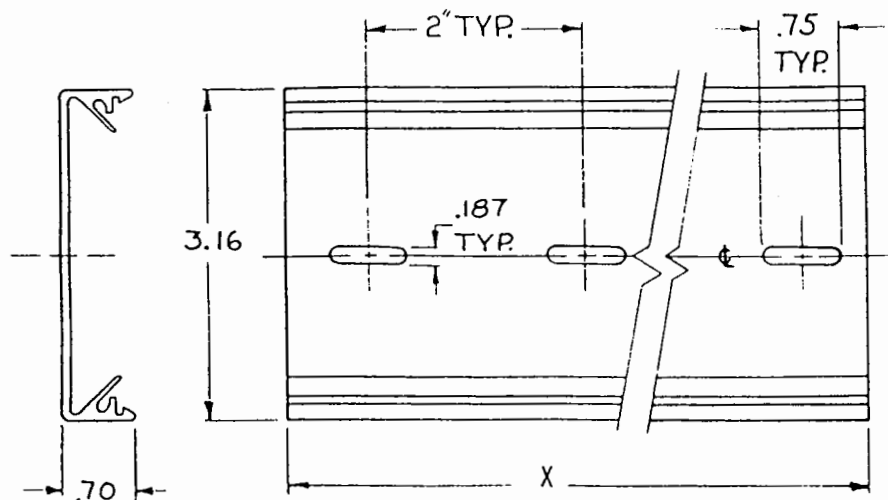


FIG. 3-2 General Dimensions of 18-212A Case



M31 Mounting Bracket



SNAPTRACK Mounting Rail

FIG. 3-3 General Dimensions of M31 Bracket and SNAPTRACK Mounting Rail



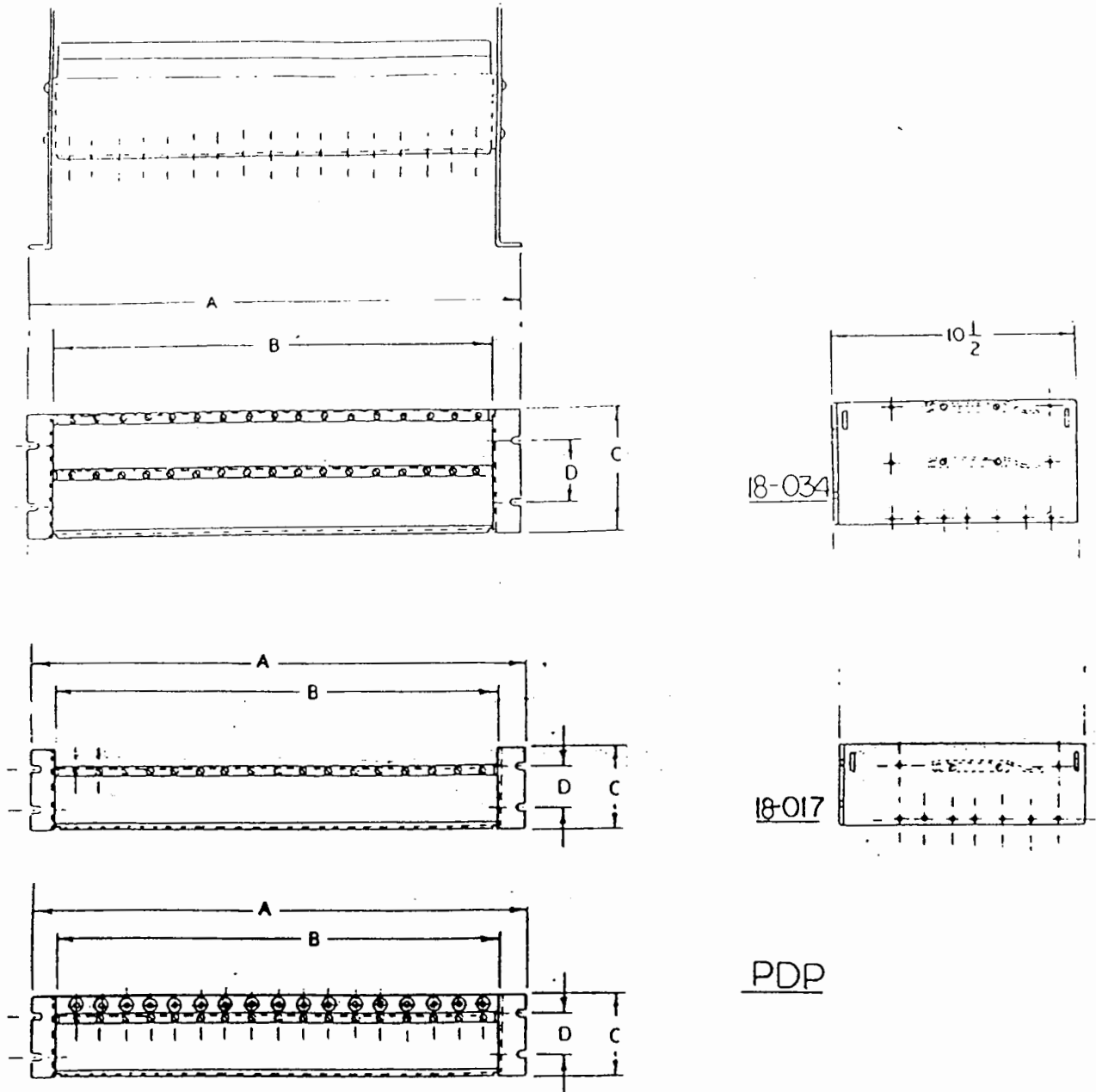
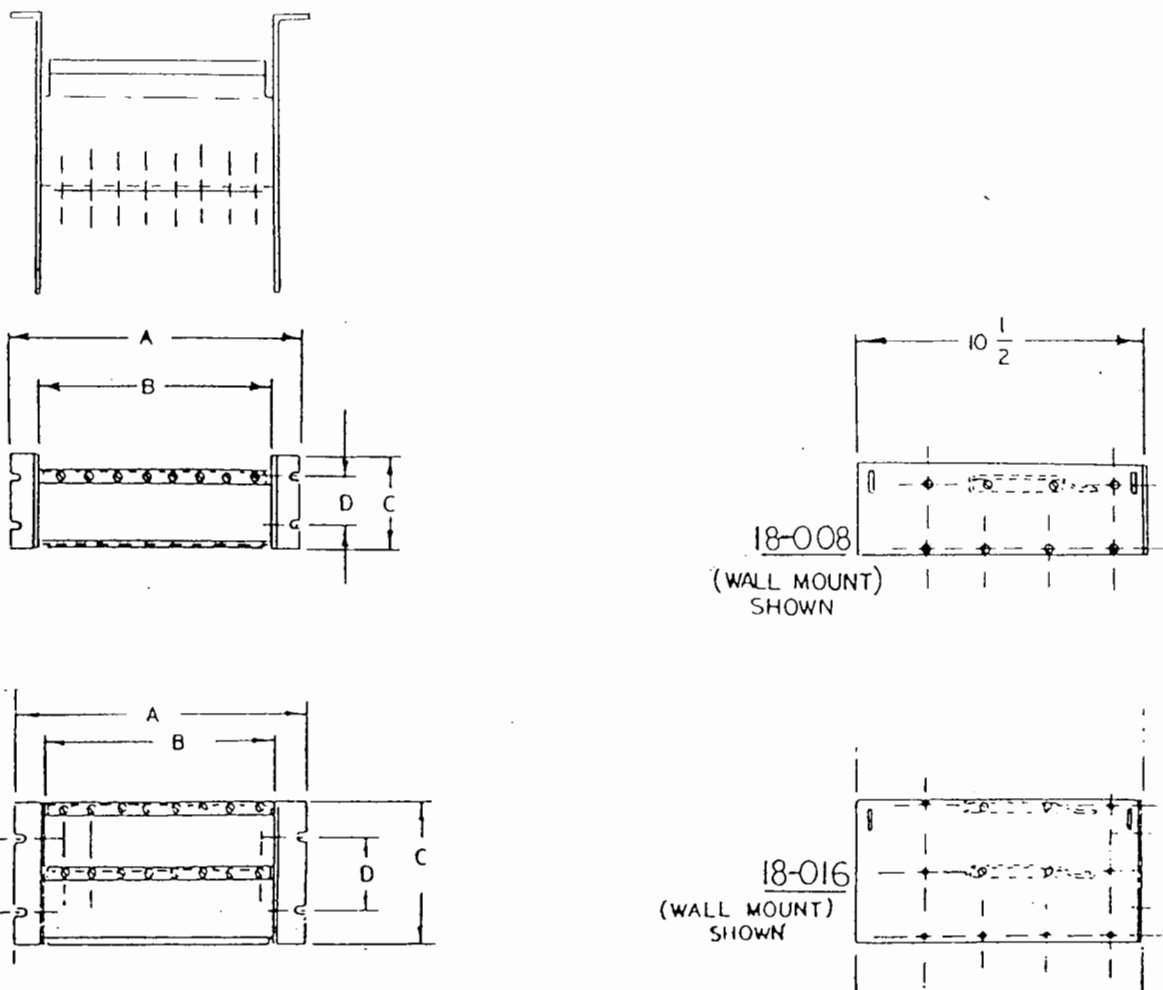


FIG 3-4A General Dimensions of 18-034, 18-017 Racks, and Power Distribution Panel



18-008	10"	8 1/8"	3 1/2"	1 3/4"
18-017	19"	17 7/32"	3 1/2"	1 3/4"
18-016	10"	8 1/8"	5 1/4"	2 1/4"
18-034	19"	17 7/32"	5 1/4"	2 1/4"
MODEL	A	B	C	D
	DIMENSION			

FIG 3-4B General Dimensions of 18-016 and 18-008 Racks

## SECTION IV

### RECALIBRATION

4.1 If a calibration, other than the one originally provided, is desired, changes of several percent can be made quickly by the ZERO and SPAN trimmer adjustments. For a major calibration change refer to FIG 4.1.

STEPS	CONDITION REQUIRED	TYPE OF INPUT		
		SINGLE RTD	DUAL RTD	VARIABLE RESISTOR
1	Offset Resistor	R115 (FIG 4.2)	R115 = JUMPER	
2	Bridge Resistors	R103, R104 (FIG 4.2)		
3	Zero Trim Resistor	R21 (FIG 4.2)		
4	Bridge Current Resistors (No Linearization)	R22 (FIG 4.2) R24 = JUMPER		
5	Span Resistors	R27, R28 (FIG 4.2)		
6	Input Break Detection	Upscale, Downscale or None		
7	Type of Isolation	Isolated version - No jumper Non-isolated version - 2 jumpers Variable resistor input - 1 jumper		
8	Linearization (Option -L)	RL1, RL2, R22, R23, R24		
9	10-50 mA Output Current (Option -E80)	R29, R30, R31 (FIG 4.3)		
10	Transient Protection (Option -E111)	R1, R2, D2, D3 (FIG 4.4)		

FIG 4.1 - SUMMARY OF A MAJOR CALIBRATION CHANGE

RESISTANCE CHANGE OF A SINGLE RTD, DUAL RTD, OR A VARIABLE RESISTOR								
	NON- ISOLATED	ISOLATED						
R103, R104	5/20-OHMS (5/100) LIMIT	6.66/20-OHMS (6.66/100) LIMIT	21/70-OHMS (10/200) LIMIT	71/200-OHMS (50/1000) LIMIT	201/400-OHMS (100/2000) LIMIT	401/1000 OHMS	1001/10,000 OHMS	
	4.99K 514490-4991	6.19K 514490-6191	10K 514490-1002	49.9K 514490-4992	100K 514490-1003	R104 = OPEN R103 = 49.9K 514490-4992	R104 = OPEN R103 = 249K 223737-90	
R22	604 OHMS 223737-265	806 OHMS 223737-20	1.21K 223737-22	6.19K 223737-154	12.4K 223737-193		61.9K 223737-64	
R21	EQ. 4-A						EQ. 4-B	
R115	START OF THE RANGE						EQ. 4-C	18.7K 223737-70
R27, R28	EQ. 4-D						EQ. 4-E	
P1	100 OHMS, 514367-04						5K, 514367-09	

FIG 4.2 - CALIBRATION RESISTOR TABLE

$$R21 = \frac{100S}{200-S} \quad \text{EQ. 4-A}$$

$$R21 = \frac{5000S}{10000-S} \quad \text{EQ. 4-B}$$

$$R115 = \text{START OF THE RANGE} - \frac{S-200}{4} \quad \text{EQ. 4-C}$$

$$R27 = R28 = \frac{R22 (2400)}{S(.6175)} \quad \text{EQ. 4-D}$$

$$R27 = R28 = \frac{R22 (2400)}{S(1.235)} \quad \text{EQ. 4-E}$$

where,

S is the resistance change of an RTD or a variable resistor in ohms.

R21 is the zero trim resistor in ohms.

R22 is the bridge current resistor in K-ohms.

R115 is the offset resistor in ohms.

R27, R28 are the span resistors in K-ohms.

	VALUE	PART NO.
R29	75 OHMS	223198-12
R30	40.2 OHMS	223737-52
R31	49.9 OHMS	223737-166

FIG 4.3 - 10/50mA Output Current  
(Option -E80)

	VALUE	PART NO.
R1, R2	24.9 OHMS	223737-56
D2, D3	ZENER	513952-33

FIG 4.4 - Transient Protection  
(Option -E111)

- 4.2 After all the calibrating resistors are computed, they may be installed according to drawing No. A514600.

## SECTION V

### TROUBLESHOOTING

- 5.1 If the transmitter is not working properly, the fault may be a loose connection or improper wiring to external terminals. The transmitter may be checked for other possible causes such as:
- A) Check the polarity of the power source.
  - B) Measure the supply voltage at the power terminals. The voltage should be anywhere from 12VDC to 44VDC.
  - C) Measure the bridge voltage (Terminal strip No. 33-22). It should be 5VDC.
  - D) Measure the reference voltage (Terminal strip No. 22-21). It should be 1.23VDC.

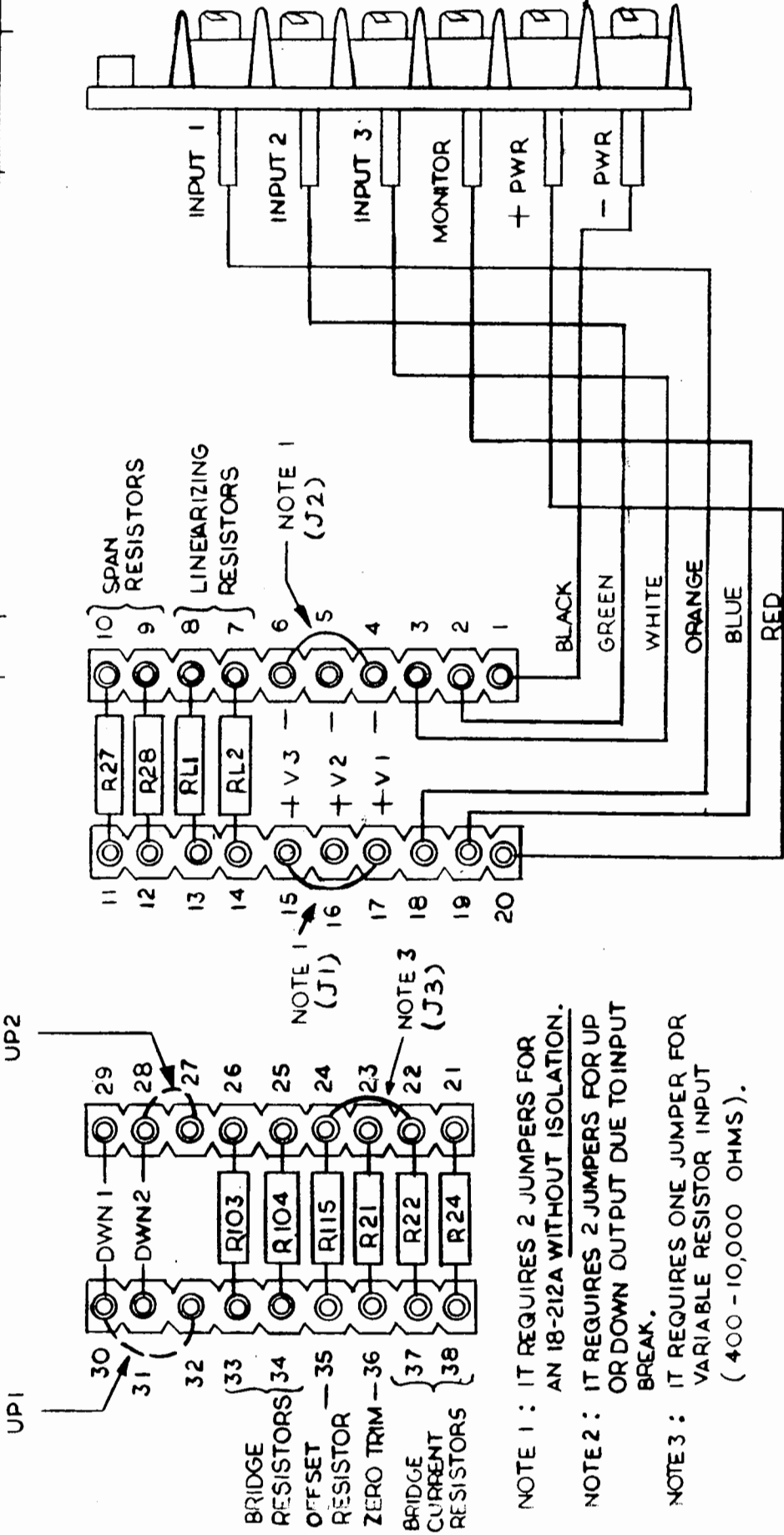
If transmitter is isolated (-I), it may be checked for additional possible causes such as:

- E) Measure V2 (Terminal strip No. 16-5). It should be 11VDC. This voltage should stay constant regardless of any variation on the supply voltage.
- F) Measure V3 (Terminal strip No. 15-6). It should be about 10VDC.

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REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	RELEASE · ECN 2729A	7.15.85	6.02
B	ADD NOTE 3 · ECN 2729D	1.23.86	6.02



- NOTE 1 : IT REQUIRES 2 JUMPERS FOR AN 18-212A WITHOUT ISOLATION.
- NOTE 2 : IT REQUIRES 2 JUMPERS FOR UP OR DOWN OUTPUT DUE TO INPUT BREAK.
- NOTE 3 : IT REQUIRES ONE JUMPER FOR VARIABLE RESISTOR INPUT ( 400 - 10,000 OHMS ).

**DEVAR INC.** - 706 Bostwick Avenue, Bridgeport, Conn. 06605  
**CONTROL PRODUCTS DIVISION**  
 LOCATION OF CALIBRATION RESISTORS 18-212A

CONTRACT NO.	T.R.S. 6-26-85
PREPARED	SHB 6-26-85
CHECKED	
MECH	
ELEC	
DESIGN	
APPROVED	

SIZE A DRAWING NO. 514600 REV B  
 SCALE \_\_\_\_\_ WT \_\_\_\_\_ SHEET 1 OF 1

TOLERANCES UNLESS SPECIFIED  
 DECIMAL DIM. ± 0.005  
 FRACT. DIM. ± 1/64  
 ANGLES ± 1/2°

MATERIAL \_\_\_\_\_  
 FINISH \_\_\_\_\_

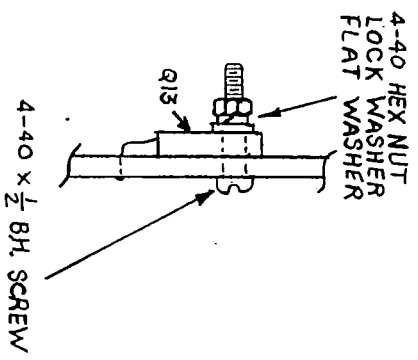
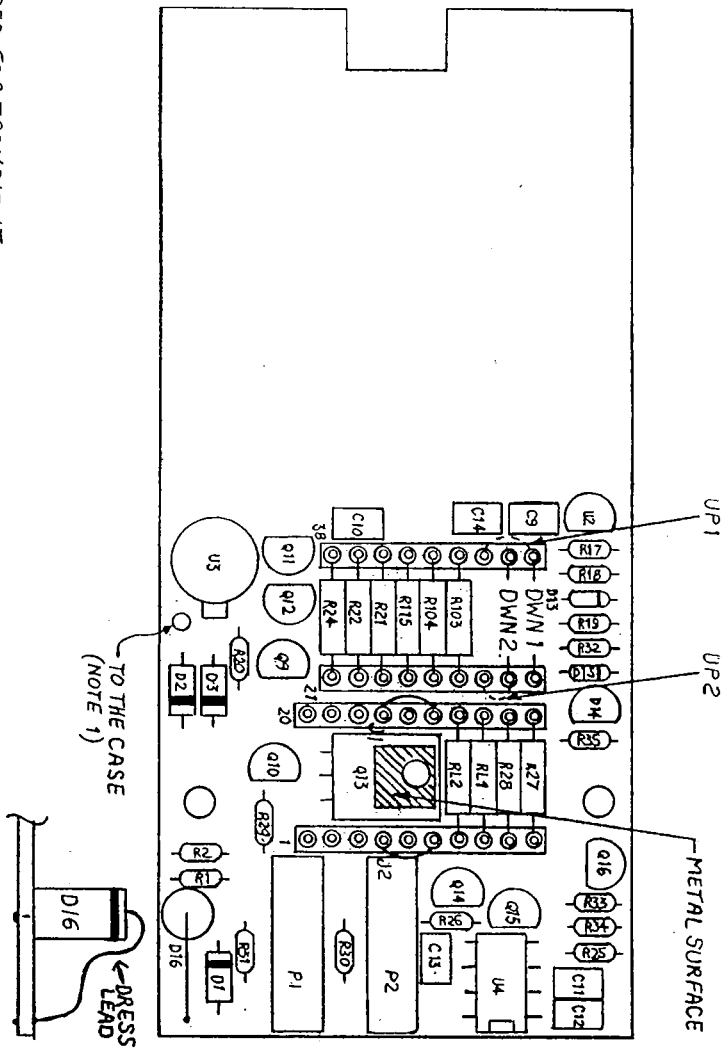
NEXT ASSY NO. B/M 514593-01  
 APPROVED \_\_\_\_\_

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DWG NO: 8-514634

SH 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
E	ECN 2729 A.C.D.E REDRAWN ECN 3022 A	8-31-94	Q.P.



NOTE  
1. THIS CONNECTION IS REQUIRED FOR TRANSIENT PROTECTION OPTION (E111)

NO REVISIONS WITHOUT FACTORY MUTUAL APPROVAL.

TOLERANCES UNLESS SPECIFIED		CONTRACT NO.	
DECIMAL DIM.	± .005	PREPARED	P.M. 6-9-94
ANGLE DIM.	± 1/32	CHECKED	LFC 6-10-94
MATERIAL		MECH	
FINISH		ELEC	
APPROVED		DESIGN	
NEXT ASSY NO. 514593-0-1		APPROVED	8-31-94 Q.P.
SCALE 2X		WT	
SIZE B		DRAWING NO.	514634
SHEET 1 OF 2		REV	E

**DEVAR Inc.** 700 Bostwick Avenue, Bayside, Conn. 06003  
CONTROL PRODUCTS DIVISION

PC BOARD ASSEMBLY 18-212A-I  
(NON-ISOLATED) TRANSMITTER



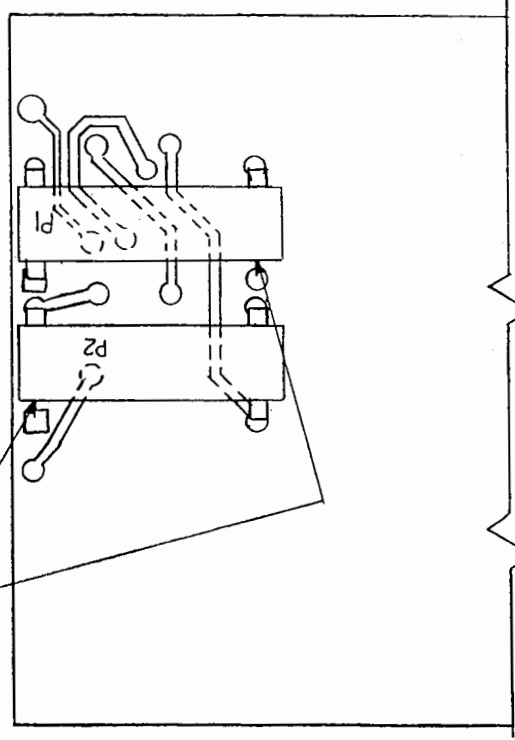
DWG NO. 514634

SH

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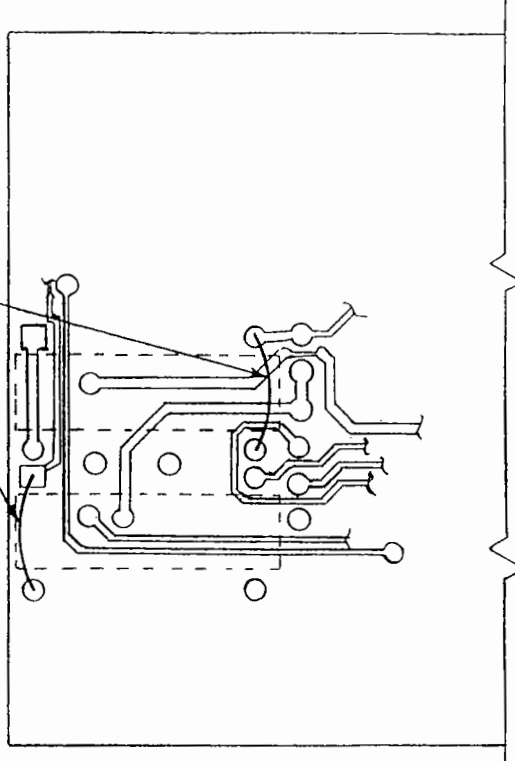
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
	SEE PAGE 1		

CUT PINS OFF OF POTS



COMPONENT SIDE

ADD TWO JUMPERS



SOLDER SIDE

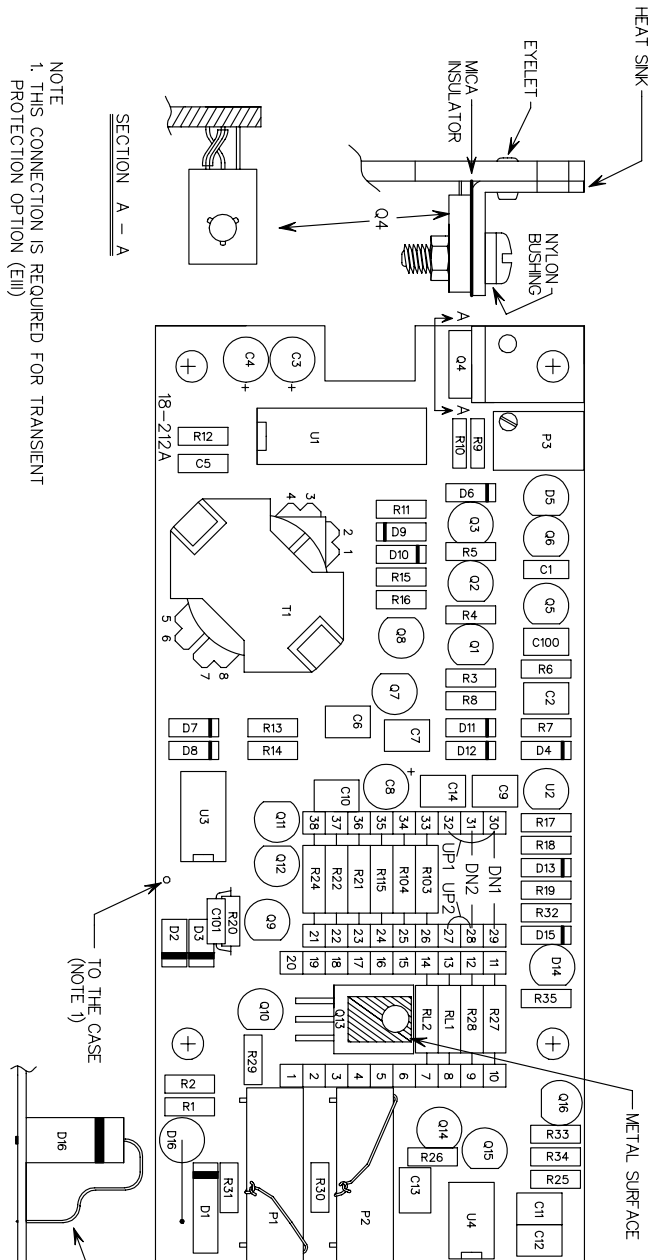
TOLERANCES UNLESS SPECIFIED		CONTRACT NO.	
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ANG. DIM.	± .125	CHECKED	L.F.C. 6-29-94
ANGLES	± .125	MECH	
MATERIAL		ELEC	
FINISH		DESIGN	
		APPROVED	
NEXT		SIZE	B
		DRAWING NO.	514634
		REV.	1

**DEVAR Inc.** 708 Somerset Avenue, Englewood, Conn 06033  
**CONTROL PRODUCTS DIVISION**  
**PC BOARD ASSEMBLY 18-212A -I**  
**(NON ISOLATED) TRANSMITTER**

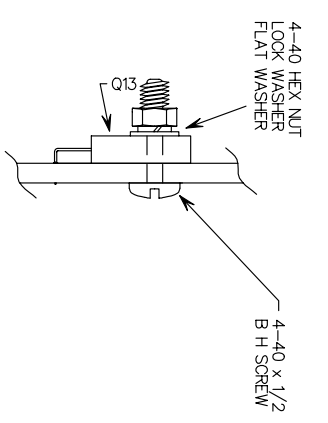
NO REVISIONS WITHOUT FACTORY MUTUAL APPROVAL

DWG NO. 514633

REV	DESCRIPTION	DATE	APPROVED
G	ECN 2729A.C.D.E.2814.3022	06-10-94	AJR
H	ADD PAGE 2: ECN 3022A	06-29-94	AJR
I	USE POT 38276404 AS SUBSTITUTE FOR 51436704, ECN 3022B	08-10-01	AG
J	REDRAWN: ECN 3303	02-25-05	LFG
K	ROTATE Q7 & Q8: ECN 3349A		



NOTE  
1. THIS CONNECTION IS REQUIRED FOR TRANSIENT PROTECTION OPTION (EIII)



UNSPECIFIED DIMENSION TOLERANCE: DECIMAL ±.000" ANGLE ±.12 DEGREE		CONTRACT NO.	
MATERIAL: -N/A-		PREPARED:	RNT
FINISH: -N/A-		CHECKED:	02-17-06
MECH:		ELEC:	
DESIGN:		APPROVED:	
NEXT ASSY NO. BM 514593-02		APPROVED	
SIZE: B		DRAWING NO. 514633	
SCALE: 2X		WT:	SHEET 1 OF 1
REV: K			

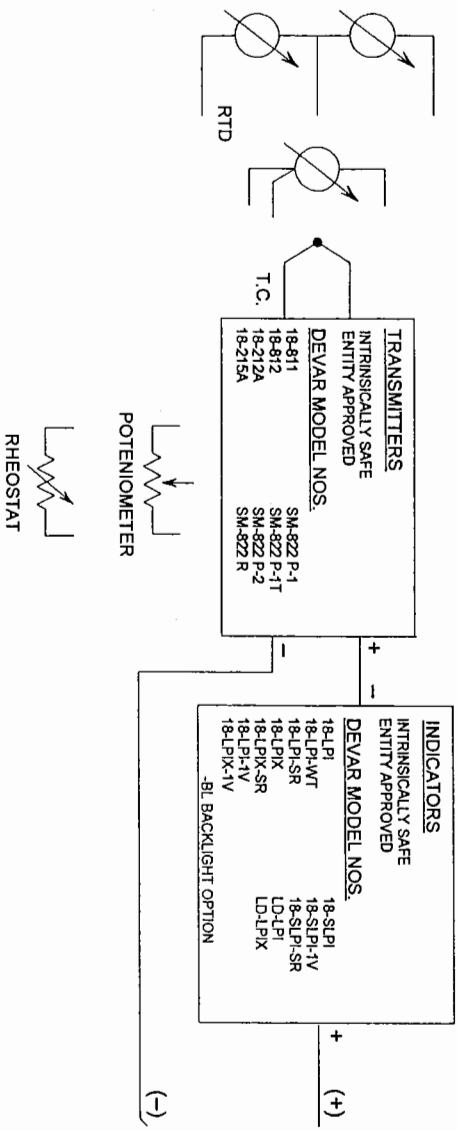
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**DEVAR Inc.**  
708 Bristow Avenue, Reddipport, Conn. 06895  
TEL: (203) 386-6751 FAX: (203) 386-5747

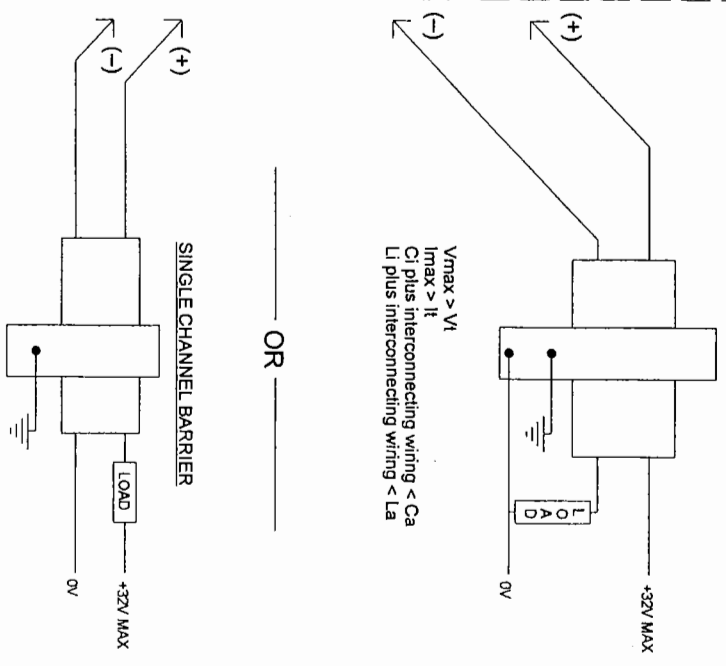
**PC BOARD ASSEMBLY 18-212A-1 (ISOLATED) TRANSMITTER**

DWG NO.		515107		SH 1		DATE		APPROVED
H	ADD 18-SLPI, 18-SLPI-IV AND 18-SLPI-SR, ECN 3081A	02-28-95	AG	REV		04-22-91	AG	
I	ADD LD-LPI, ECN 3154	01-22-98	AG	F	RELEASE ECN 28268	02-28-92	AG	
J	ADD SM-822P-1, SM-822P-1T, SM-822P-2 & SM-822R, ECN 3208	09-09-99	AG	F	ADD 18-LPI-WT, ECN 3027	02-28-92	AG	
K	ADD LD-LPIX & -BL BACKLIGHT OPTION, ECN 3319	7-13-05	LT	G	32V WAS 30V, ECN 3081	02-07-96	AG	

### HAZARDOUS LOCATION



### NON-HAZARDOUS LOCATION



- NOTES:**
- HAZARDOUS LOCATION RATINGS: CLASS I, DIVISION 1, GROUPS A, B, C, D
  - ENTRY PARAMETERS:  $V_{max} = 32V$ ,  $I_{max} = 150mA$ ,  $C_i = 0\mu F$ ,  $L_i = 0mH$
  - INSTALLATION OF THE SYSTEM MUST BE IN ACCORDANCE WITH ANSI/ISA RP12.6
  - CONTROL ROOM INSTRUMENTATION TO OPERATE AT LESS THAN 250V rms
  - DO NOT CONNECT mA METER TO TRANSMITTER MONITOR TERMINALS UNLESS AREA IS KNOWN TO BE SAFE
  - THE ABOVE UNITS ARE NONINCENDIVE FOR CLASS I, DIVISION 2, GROUPS A, B, C, D LOCATIONS WITH A  $V_{max}$  OF 32V. BARRIERS ARE NOT REQUIRED FOR DIVISION 2 OPERATION.
  - NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL

This Drawing is the sole property of DEVAR Inc., and is submitted on the understanding that the contents hereof are not to be disclosed to third persons without prior permission.

UNDESIGNED DIMENSION TOLERANCE	CONTRACT NO
SECTION 1/32" ± .005"	PREPARED
SECTION 1/16" ± .010"	DRAWN
SECTION 1/8" ± .015"	CHECKED
SECTION 3/16" ± .020"	APPROVED

**DEVAR Inc.**  
706 Boswick Avenue, Bridgeport, Conn. 06605  
TEL: (203) 368-6751 FAX: (203) 368-5747

**INTERCONNECTING DIAGRAM TO INTRINSICALLY SAFE APPARATUS**

REV	DATE	BY	CHKD
1	05/15/07	515107	1 OF 1



APPROVED