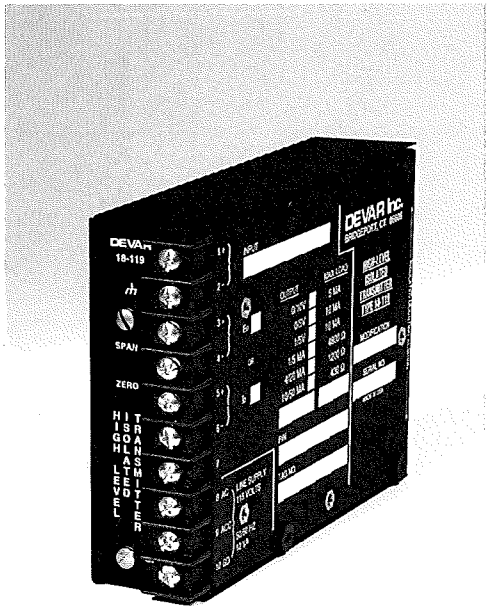
DEVAR Inc.
706 Bostwick Avenue, Bridgeport, CT 06605
TEL: 203-368-6751 FAX: 203-368-3747
1-800-566-6822 www.devarinc.com

Instruction Manual

Type 18-119

High Level
Isolated Transmitter



990559

Section	INDEX	Page No.

Figure	ILLUSTRATIONS	

SECTION I
GENERAL DESCRIPTION

1.1 It is frequently desirable to measure a D-C current or D-C voltage signal whose potential, relative to the receiver circuitry, is uncertain or variable, so that the signal source and receiver must be isolated. The Type 18-119 High-Level Isolated Transmitter provides excellent isolation between its input and other circuits. It functions by modulating the input signal at about 2,500 Hz for transformer coupling to a demodulator and filter for signal conversion back to D-C. This D-C signal is then conditioned for voltage or current outputs.

1.2 The compact modulator design provides high-packing density and ease of installation and service. A miniaturized integral power supply permits operating directly from 115-volt A-C line power.

1.3 To achieve good calibration accuracy, the Type 18-119 Transmitter has highly stable integrated circuit operational amplifiers and silicon chopper-type transistors. The two toroidal transformers needed to achieve isolation, are built with spaced windings to assure maximum resistance between circuits. All units are factory-tested for breakdown by the application of 2,000 volts of A-C potential from input to output, input to line terminals, and input to case.

1.4 Calibrating resistors are installed between solder terminals on the printed circuit board. They are readily accessible, permitting easy range changes, and for selecting either a voltage or current output. The input shunt resistor or divider resistors are calculated on the basis of a 1-volt drop.

1.5 The input circuit is protected against transverse overload in excess of approximately 5.1 volt drop across the basic input (after divider resistors or across shunt resistor) by zener diodes.

SECTION II
SPECIFICATIONS

2.1 GENERAL

a. Linearity, accuracy	±0.1% of span
b. Power Requirements	115V, ±10V, 50/60Hz, 12VA
c. Line Regulation, 115V, ±10V	0.01%/1% change in supply voltage
d. Fuse (OPTION RPF)	1/4A 3AG SLO BLO, accessible at rear of enclosure
e. Environmental Temperature Influence:	
1. Recommended Temperature Limits	-6.7 to 49 degrees C
2. Ambient Temperature Effects	±0.018%/degrees C
f. Frequency Response:	
1. 3dB	2Hz
2. Time Constant	78mS
g. Common-mode Rejection	Greater than 100dB @ 60Hz

2.2 INPUTS

a. Basic Input (±1V D-C):	
1. Sensitivity	16,000 Ohms/V
2. Span	1V D-C
3. Offset	Less than ±50% of Span
4. Other Inputs	May be calibrated for a wider range of current or voltage inputs by use of shunt and divider resistors to obtain basic input of 1V.

b. Input Current Ranges:

Standard current inputs, as determined by value of shunt resistor.

Standard Current Ranges	Input Shunt Used
1/5mA	249.0 Ohms
4/20mA	61.9 Ohms
0/20mA	61.9 Ohms
10/50mA	24.9 Ohms

SECTION II-SPECIFICATIONS (CONTINUED)

2.2 INPUTS (Continued)

c. Input Voltage Ranges:

Standard voltage inputs, as determined by value of divider resistors

Standard Voltage Ranges	Approximate Input Resistance
0/1V	16K Ohms
1/5V	4K Ohms
0/5V	5K Ohms
0/10V	10K Ohms

d. Input Isolation
Input circuit tested for breakdown to output, line power and case: 2,000V Breakdown Test

2.3 OUTPUTS

a. Voltage or Current: Install scaling resistors to provide either voltage or current output signal.

b. Output Voltage Ranges:
1. Standard voltage output range is determined by value of scaling resistors

Voltage Range	Maximum Load
0/10V	5mA
0/5V	10mA
1/5V	10mA

2. 120 Hz Output Noise: Less than 10mV P-P

c. Output Current:
1. Standard current output range is determined by value of current range resistor.

Current Range	Load Range at 115V Line
1/5mA	0/4800 Ohms
4/20mA	0/1200 Ohms
0/20mA	0/1200 Ohms
10/50mA	0/430 Ohms

2. 120 Hz Output Ripple: Less than 0.1%

d. Load Regulation: Less than 0.1%

2.4 HOUSING

a. Indoor Type: General Purpose, Anodized Aluminum, 4-11/16 x 6-1/2 x 1-11/16.

b. Channel Mounting (Wall Brackets M31 and M32 Available): (4) Insulated Bushings, 6-32 tapped, Devar Module Spacing, 3-1/2 x 4-1/4.

2.5 FIELD WIRING TERMINALS

a. Terminal Strip (barrier type): 6-32 Screw Terminals used for all field wiring.

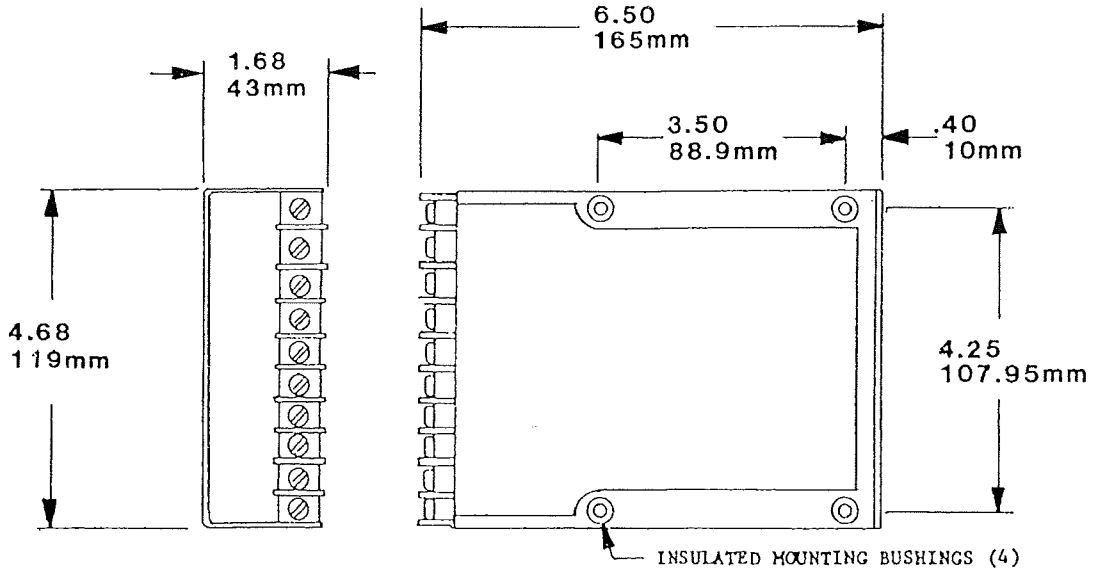


Figure 2-1 - OUTLINE DIMENSIONS-TRANSMITTER CASE

SECTION III
INSTALLATION

3.1 Four (4) plasting mounting bushings (6-32 thread) are part of the Series 18-119 transmitter case. They electrically insulate the mounting screws and, therefore, the mounting surface or mounting rails from the transmitter case. The power transformer shield is wired to the case.

3.2 The mounting bushings for the 18-119 High-Level Isolated Transmitters are spaced according to Devar Inc., module mounting standards. This permits the use of available hardware for installation with Devar Inc. modules and multichannel rack cabinets. It can also be wall mounted by M31 bracket assembly. (See Figure 3-2.)

3.3 Since the transmitter has complete input isolation, either the input source or the output circuit, or both, can be grounded. It is recommended that the signal lead wire be a twisted pair and/or shielded to reduce interference. With a grounded input source, connect the input wire shield to a ground at the input source. When the output load is grounded, connect the output wire shield at the output load.

3.4 Connect three wires from line power source to terminals marked AC, ACC and GD (⏚). Attach input leads to terminals marked + and - input. Connect appropriate output load to terminals marked + and - output. Follow label instructions for correct output polarities and required load limits.

```
          #1 + )
               ) - HIGH-LEVEL INPUT SIGNAL
          #2 - )

          #3 + )
               ) - VOLTAGE OUTPUT SIGNAL
          #4 - )
                     OR
          #5 + )
               ) - CURRENT OUTPUT SIGNAL
          #6 - )

          #7     -  NOT USED

          #8 AC)
               )
          #9ACC) - CONNECT TO LINE SUPPLY
               )   115V, 50/60 Hz, 12VA
GD        #10 GD)
```

Figure 3-1 - FIELD WIRING TERMINALS

SECTION III - INSTALLATION (CONTINUED)

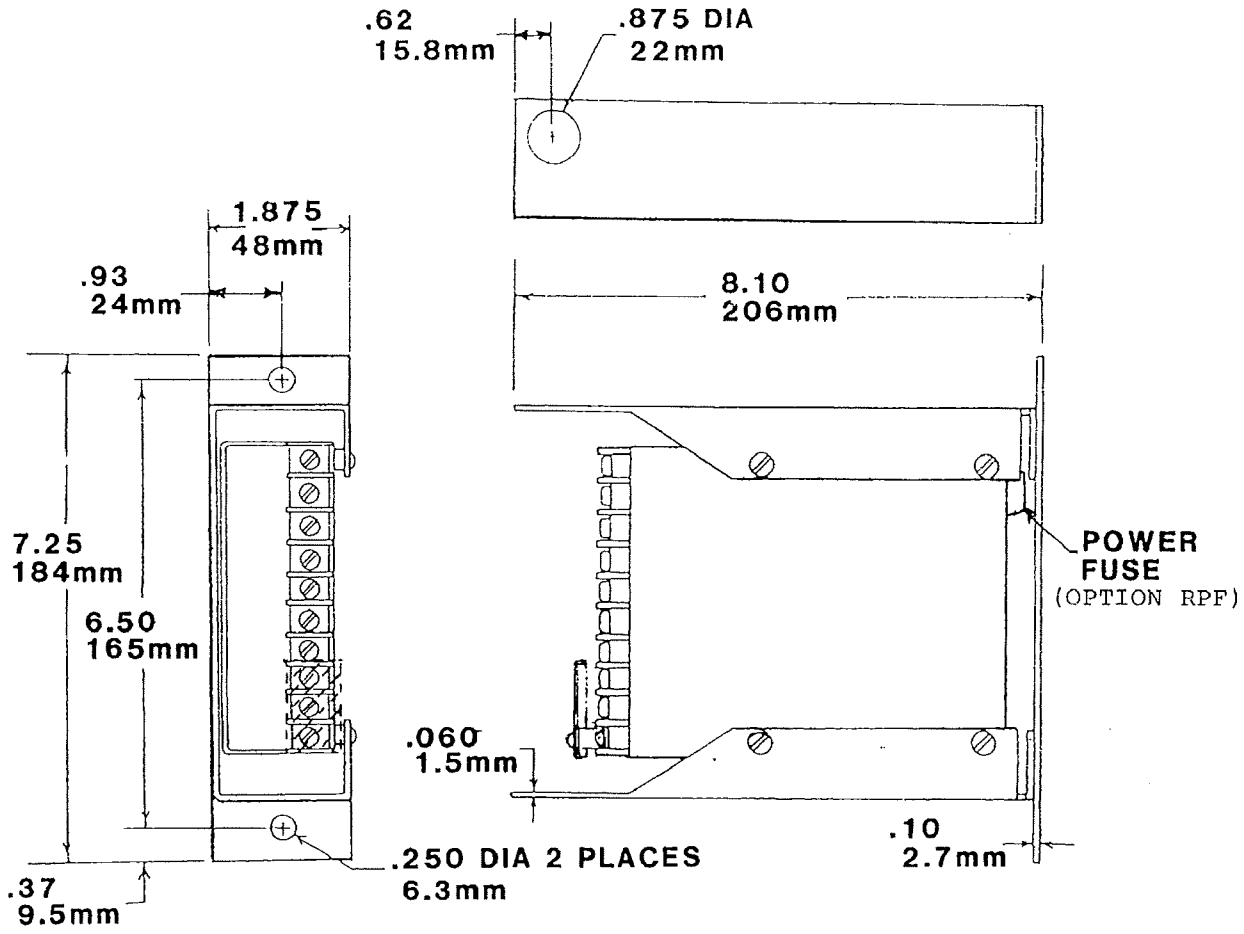


Figure 3-2

OUTLINE DIMENSIONS - TRANSMITTER CASE WITH MOUNTING BRACKET (M31)

990559RPF

SECTION IV
RECALIBRATION PROCEDURE

4.1 The 18-119 High-Level Isolated Transmitter has been designed to maintain accuracy of calibration for long periods of time. However, when necessary, small changes of calibration can be made quickly by adjusting the ZERO and SPAN trimmer adjustments from the front of the instrument case.

4.2 When a major calibration change is required, either for another standard or a special range, refer to Figure 4-1 - SUMMARY OF CALIBRATION STEPS for an outline of calibration steps to consider. Reference should be made to applicable figures in parenthesis and Figure 4-6 - LOCATION OF CALIBRATING RESISTORS. All calibrating resistors are soldered to terminals located on top of printed circuit board.

Steps	Resistors for Standard	
		Figure No.
1	R1,R2 & R3	(4-2)(4-5)
2	R109 & R110	(4-3)
3	R107	(4-4)

Figure 4-1 - SUMMARY OF CALIBRATION STEPS

4.3 Where current input and output desired are equal, and in the range of 0/5, 0/20 or 0/50mA, follow the indicated calibration procedure for 1/5, 4/20 or 10/50mA range. The unit when calibrated to one of the latter milliampere ranges, will also operate down to zero milliampere.

4.4 Once the required calibrating resistors have been inserted or removed, recalibrate the unit for the desired input and output range by adjustment of the ZERO and SPAN trimmer potentiometers.

Standard Input Signal	R1, ±1%		R2, ±1%		R3, ±1%	
	Value	Part #	Value	Part #	Value	Part #
0/1V	Jumper	-	Jumper	-	Omit	-
1/5V	1500 ohms	223737-59	1500 ohms	223737-59	1070 ohms	223737-53
0/5V	2000 ohms	223737-58	2000 ohms	223737-58	1070 ohms	223737-53
0/10V	4530 ohms	223737-49	4530 ohms	223737-49	1070 ohms	223737-53
1/5mA	Jumper	-	Jumper	-	249 ohms	223737-54
4/20mA	Jumper	-	Jumper	-	61.9 ohms	223737-55
10/50mA	Jumper	-	Jumper	-	24.9 ohms	223737-56

Figure 4-2 - STANDARD INPUT SCALING RESISTORS

SECTION IV - RECALIBRATION PROCEDURE(CONTINUED)

Standard Output Signal	R110A, ±1 %		R110B, ±1 %		R109, ±1 %	
	Value	Part No.	Value	Part No.	Value	Part No.
1/5 V	8,060 ohms	223737-50	-	-	-	-
0/5 V	10 K ohms	221734-07	-	-	-	-
0/10 V	20 K ohms	221734-08	-	-	-	-
1/5 mA	-	-	3,240 ohms	223737-44	402 ohms	223737-14
4/20 mA	-	-	3,240 ohms	223737-44	100 ohms	223737-41
10/50 mA	-	-	3,240 ohms	223737-44	40.2 ohms	223737-52

Figure 4-3 - STANDARD OUTPUT GAIN SCALING RESISTORS

Input Signal Offset (% of span)	R107B, ±1%			R107A, ±1%	
	OUTPUT SIGNAL				
	0/10V	0/5V	1/5V; 1/5 4/20, 10/50mA	1/5V	1/5, 4/20, 10/50mA
0% (Ex.0/10V)	442K Ohms 223737-251	649K Ohms 223763-08	-	100K Ohms 221734-11	100K Ohms 221734-11
25% (Ex.1/5mA)	80.6K Ohms 223737-43	118K Ohms 223737-11	909K Ohms 223764-10	-	-

Figure 4-4
OFFSET RESISTOR R107A OR R107B FOR STANDARD INPUT/OUTPUT RANGES

Special Input Range	R1	R2	R3
Voltage	Equation I	Equation I	1,070 Ohms, 223737-53
Current	Jumper	Jumper	Equation II

Equation 1: R1, R2 = 500 (Input Span Volts) - 500

Equation 2: $R3 = \frac{1{,}000}{\text{Current Span mA}}$

Use closest MIL Value, ±1%, Metal-Film Resistor
T.C. 50PPM

Figure 4-5
CALCULATION OF INPUT SCALING RESISTORS R1, R2, & R3
FOR SPECIAL INPUT RANGES

SECTION IV - RECALIBRATION PROCEDURES (CONTINUED)

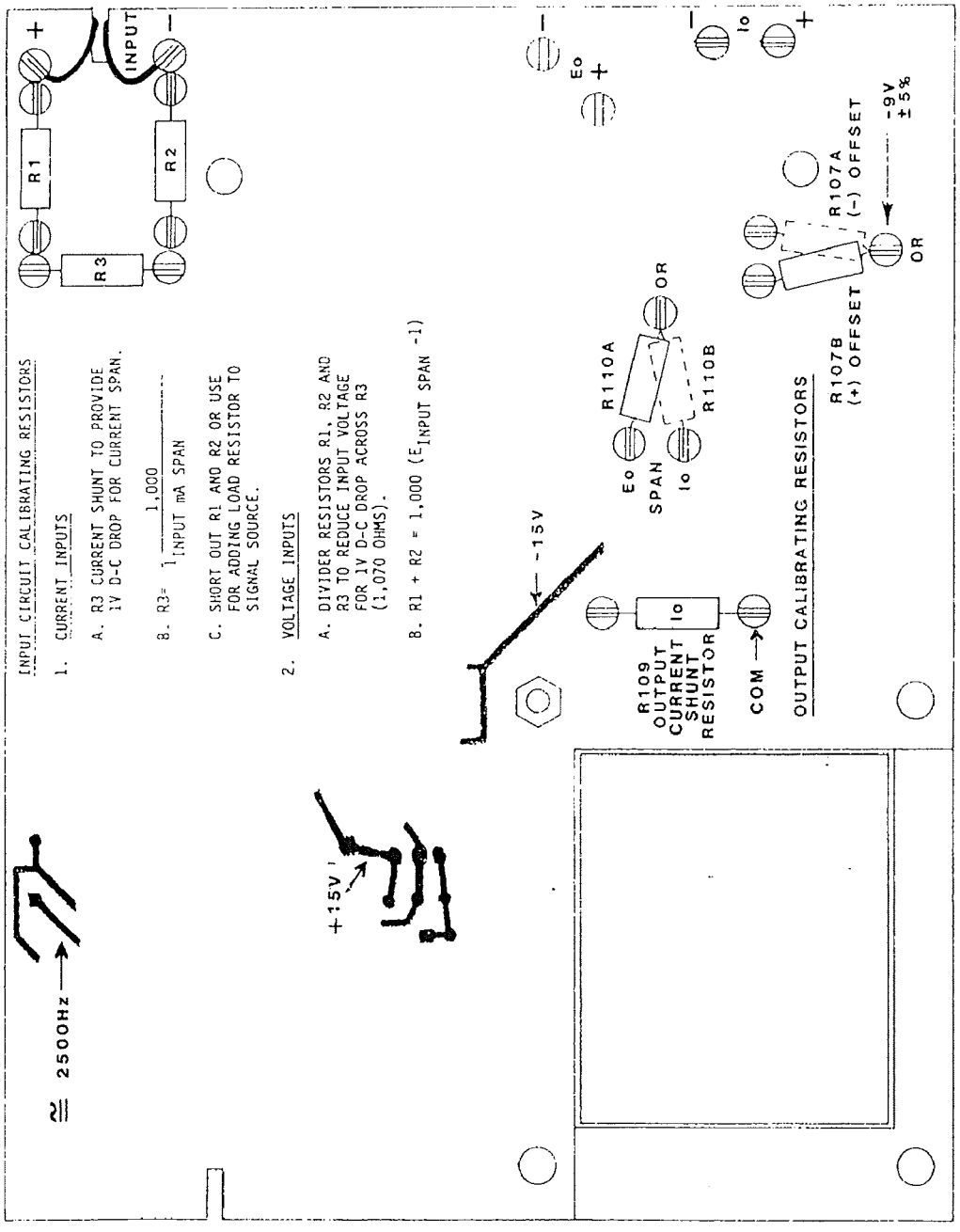


FIGURE 4-6 LOCATION OF CALIBRATING RESISTORS

SECTION V

TROUBLESHOOTING

5.1 If the transmitter is not working properly, the fault may be a loose connection, improper terminal connections, or incorrect value of input signal.

Check external connections to line power, input source and output load.

5.2 Measure the regulated D-C supply voltage of + and - 15 volts, ±5%, at R16 for +15V, and R17 for -15V. Check for -9V, ±5%, at Common terminal between R107A and R107B. Observe with oscilloscope for a square wave of approximately 2,500 Hz, 25V P-P, at "ORN" lead of Toroid T3. All measurements are made in reference to Common. (Refer to Figure 4-6 in Section IV for the location of test points described above.)

5.3 A schematic (Figure 5-1) and parts locations (Figure 6-1, 6-2) and parts list in Section VI identify the components used.

SECTION V - TROUBLESHOOTING (CONTINUED)

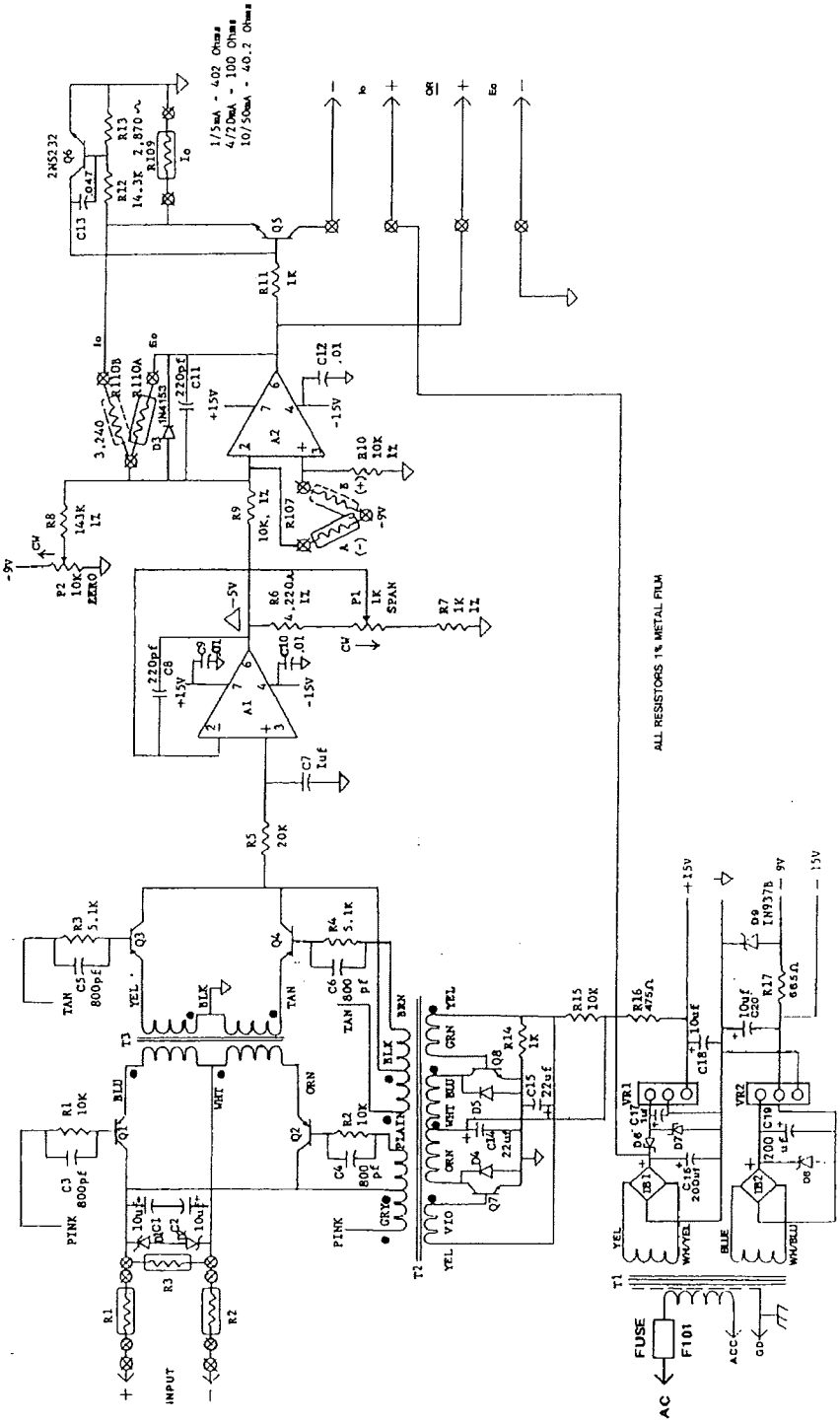


FIGURE 5-1 SCHEMATIC FOR THE 18-119 HIGH-LEVEL ISOLATED TRANSMITTER

SECTION IV
PARTS LIST

6.1 Parts relating to calibration are identified in "Recalibration Procedure," Section IV. Whenever possible, specify items by part number. To order spare or replacement parts, contact your local DEVAR Inc., Control Products Division representative.

6.2 Resistors

R1,2,9,10,15	10K 1% Metal Film 50 PPM	221734-07
R3,4	5.11K 1% Metal Film 50 PPM	223737-149
R5	20K 1% Metal Film 50 PPM	223737-126
R6	4.22K 1% Metal Film 50 PPM	223737-295
R7,11,14	1K, 1% Metal Film 50 PPM	223737-21
R8	143K 1% Metal Film 50 PPM	223737-45
R12	14.3K 1% Metal Film 50 PPM	223737-196
R13	2.87K 1% Metal Film 50 PPM	221734-54
R16	475 1% Metal Film 100 PPM	221734-48
R17	665 1% Metal Film 50 PPM	223737-170

6.3 Capacitors

C1,2,18,19,20	10uF, 20WV Tantalum	380767-01
C3,4,5,6	800pF Disc Ceramic	220589-03
C7	1uF, 100 WV Mylar	221282-07
C8,11	220pF Disc Ceramic	220589-02
C9,10,12	.01uF Disc Ceramic	220589-10
C13	.047uF Monolytic	382437-01
C14,15	22uF, 35WV Tantalum	223862-01
C16,19	220uF, 63WV Electrolytic	381097-05
C17	1uF, 50 WV Tantalum	380767-09

6.4 Semiconductors

Q1,2,3,4	Transistor MPSA17	514587-01
Q5	Transistor MPSU45	380511-03
Q6,7,8	Transistor 2N5232	380668-02
D1,2,6	Zener 1N751A (5.1V)	221663-01
D3	Diode IN4153	222095-01
D4,5	Diode IN456	221780-01
D7,8	Zener IN5257B (33V)	381071-07
D9	Zener IN937B (9V)	221799-01
DB1,DB2	Diode Bridge	380766-02

6.5 Integrated Circuits

A1,A2	Operational Amplifier	381072-12 381072-13
VR1,VR2	15V Regulators	381584-01

SECTION VI - PARTS LIST (CONTINUED)

6.6 Potentiometers

P1	1K Ceramic Trimmer	381098-07
P2	10K Ceramic Trimmer	381098-10

6.7 Transformers

T1	Power Transformer	381608-03
T2	Toroid Oscillator	381725-01
T3	Toroid Coupling	381726-01

6.8 Fuse (OPTION RPF)

F101	Fuse 3AG 1/4A Slow Blow	382743-01
F101	Fuse Holder	511284-03

Replacements parts may be ordered by the part number from Devar Inc., Control Products Division. Most capacitors, diodes and resistors are readily obtainable from your electronc distributors.

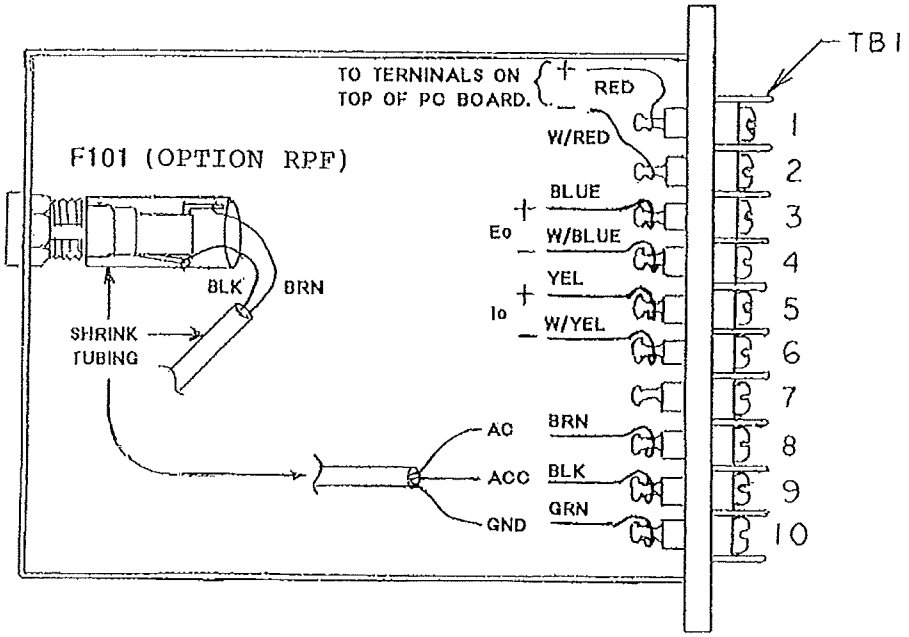


Figure 6-1 - Fuse Location

SECTION VI - PARTS LIST (CONTINUED)

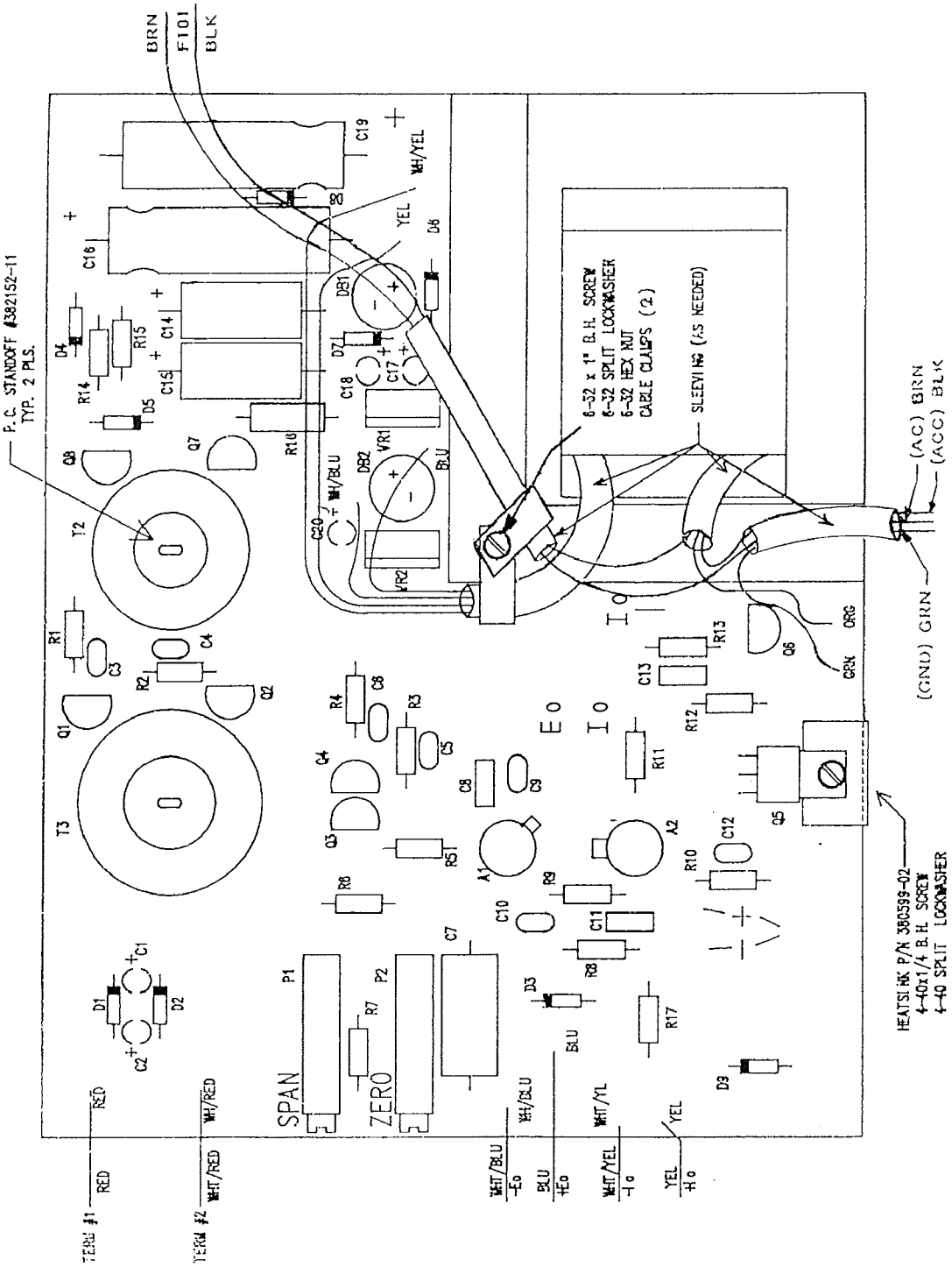


FIGURE 6-2 PARTS LOCATION

990559RPF