DEVAR Inc.
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Model 4265

pH TRANSMITTER

Manual No. 900633

DEVAR INC.

MANUAL No.	900633
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INSTRUCTION MANUAL

4265
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2 WIRE ISOLATED
ELECTRODE-TO-ELECTRIC TRANSMITTER
TYPE 18-265
PRODUCT DESCRIPTION

1.0 GENERAL DESCRIPTION

1.1 The Type 18-265 Electrode-to-Electric Transmitter has been designed to accept and amplify a millivolt DC signal from a high-impedance source, such as pH, REDOX, or ION-SELECTIVE electrodes, and to provide a current signal suitable for computation and control. It features compact size and consists of a two-section cast-aluminum housing. The output signal may be either 4/20mA or 10/50mA and is completely isolated from the signal source. It is also designed to operate with only two copper-wire leads between the control room and the field-mounted transmitter. These two leads carry the voltage necessary to operate the transmitter, as well as the transmitter's output current. The current output is inversely proportional (directly proportional for type 18-265R) to the electrode input mV signal and can be used for computation, control or monitoring.

1.2 The input pH or mV span is established by selection of fixed resistors and is set to a specified value by an infinite resolution span adjustor. The standarize adjustor allows offset setting of greater than ±10% of span. Various start of range offset values are accomplished by a fixed resistor and resetting of the standarize adjustor.

2.0 SPECIFICATIONS

2.1 General

a. Linearity	±0.25% typical, ±0.5% max. 10/50 MA Io ±0.1% typical, ± 0.25% max. 4/20 MA Io
b. Supply Voltage Effect on Io Output	0.01% per volt (maximum)
c. Load Resistance Effect on Io Output	0.05% per 300 ohm change (maximum)
d. Environmental Temperature Influence	
1. Recommended Temperature Limits	-25°C to 50°C
2. Amplifier Thermal Error	60uV/°C or 0.001 pH/°C with low Input R 72uV/°C @ 25°C, 100 Megohm Input R 84uV/°C @ 35°C, 100 Megohm Input R 100uV/°C @ 45°C, 100 Megohm Input R

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e.	Amplifier Drift	Less than 100uV, or 0.0017pH per month, nonaccumulative
f.	Electrical Classifications	Circuit designed to meet requirements of intrinsic-safety and ISA RP 12.2
g.	Stray Rejections	Transverse: 20Db at 60Hz Common-Mode At 120VAC,60Hz, less than 0.25% of Span Output Shift

2.2 POWER SUPPLY REQUIREMENTS

$E_{Min.}$	$E_{Max.}$	Output
12.0V + (R_{Load} x 20mA)	70V	4/20mA
14.0V + (R_{Load} x 50mA)	70V	10/50mA

2.3 INPUTS

a.	Input Impedance	10^{12} Ohms
b.	Source Current	Less than 1.pA @ 25 C
c.	Input from pH Electrodes	
1.	pH Span set with fixed resistors and trimmer adjustor.	Between 1.5 and 14 pH
2.	Mid-range of 7pH, set with standarize trimmer adjustor.	Greater than ±10% of span
3.	Elevate or suppress pH with fixed resistor and trimmer adjustor.	0 to 12.5pH
4.	pH Solution Temperature Compensation	Provided with manual temperature compensator (M) or for use with automatic thermo-compensator, such as Uni-Loc #2000150 (B) or Van London #160014 (B)
d.	Input from Redox, Ion-Selective electrodes or other mV Input Source.	Output is directly proportional to input signal (18-265R)
1.	Input Span, set with fixed resistors and trimmer adjustor.	Between 100 to 1000mV
2.	Input signal can be suppressed with fixed resistor and trimmer adjustor. (Ex. Range 500 to 700mV.)	Suppression up to 1000mV Elevation to (-)400mV. Combined span & offset up to 1200mV.

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2.4 OUTPUTS

a. Current Outputs with supply voltage not to exceed 70V DC

1. 4/20mA Requires 12.0V + (R Load x .02)
2. 10/50mA Requires 14.0V + (R Load x .

2.5 HOUSING

a. Rain-Tight Enclosure

1/4-20 Drain Plug
1/4-18 NPT Enclosure Purging Port

b. Outline Dimensions

Drawing No. C-381516

2.6 FIELD WIRING TERMINALS

Screw Size

6-32 Screw Terminals used for all field wiring.

2.7 PRODUCT CODING

Type 18-265- [-]-[-]	Specify Input Range
[1]-[-]	4/20mA Output Signal
[2]-[-]	10/50mA Output Signal
[M]	pH Input Manual Temperature Compensator
[B]	pH Input Automatic Temperature Compensator "B" rated for use of 3,000 Ohms @ 25°C probe with T.C. 0.0045 Ohms/Ohms/°C
[R]	Redox, Ion-Selective, or other mV signal source where output is directly proportional to input.

C - P.S. WAS 80V, 14.8 + 16.8V ECN 2583 A 1-31-84
B - LINEARITY WAS ±0.1% [illegible] ECN 2205 [illegible]
A - RELEASE ECN 1984 [illegible]

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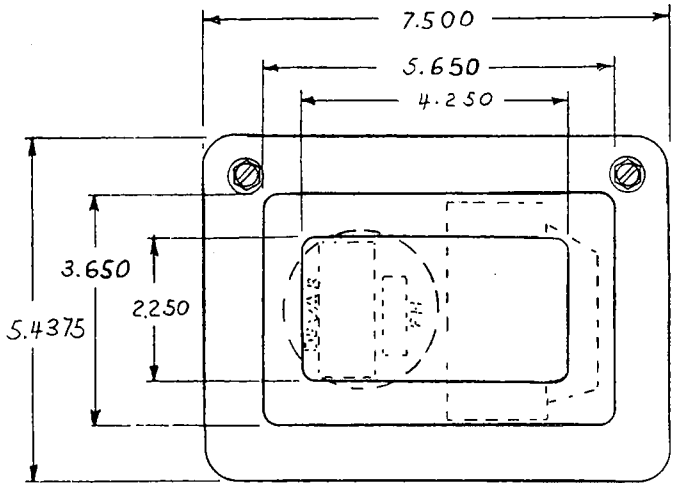
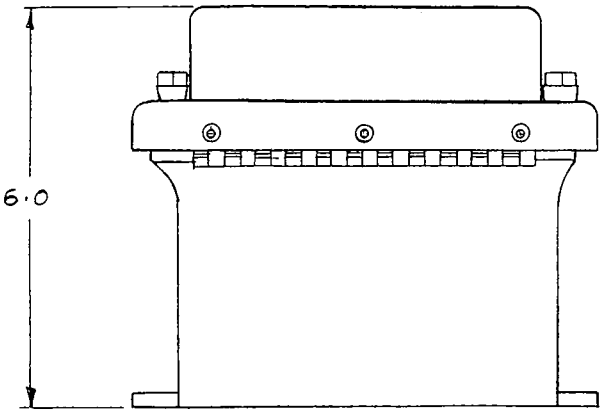
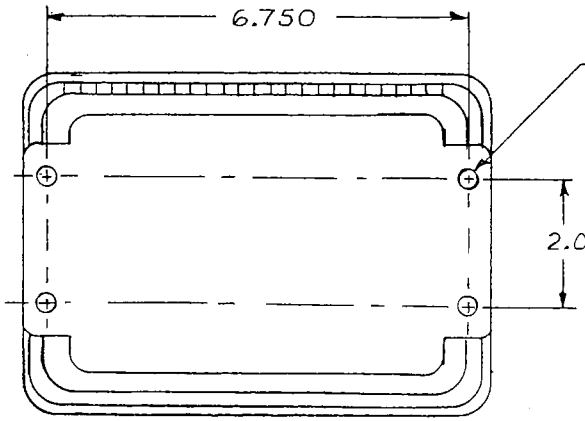
DRAWN:	APPR	ORDER NO.	DRAWING NO.	REV.
5/6/77	[illegible]		513275	C

DWG NO. SH

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	RELEASE ; ECN 3101		







BOTTOM VIEW

FIBERGLASS ENCLOSURE WITH STD. FLUSH MOUNT BONDED WINDOW, STAINLESS STEEL PIANO HINGE, AND COVER SCREWS WITH FIBERGLASS ENCAPSULATED HEADS.

515683-02 WITH WINDOW
515683-01 WITHOUT WINDOW

TOLERANCES UNLESS SPECIFIED DECIMAL DIM. ± .005 FRACT. DIM. ± 1/64 ANGLES ± 1/2°	CONTRACT NO.		
MATERIAL	PREPARED	LH	9-22-95
	CHECKED		
	MECH		
	ELEC		
FINISH	DESIGN		
	APPROVED		
NEXT ASS'Y NO.	APPROVED		

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GENERAL DIMENSIONS
NEMA 4X pH TRANS. ENCLOSURE

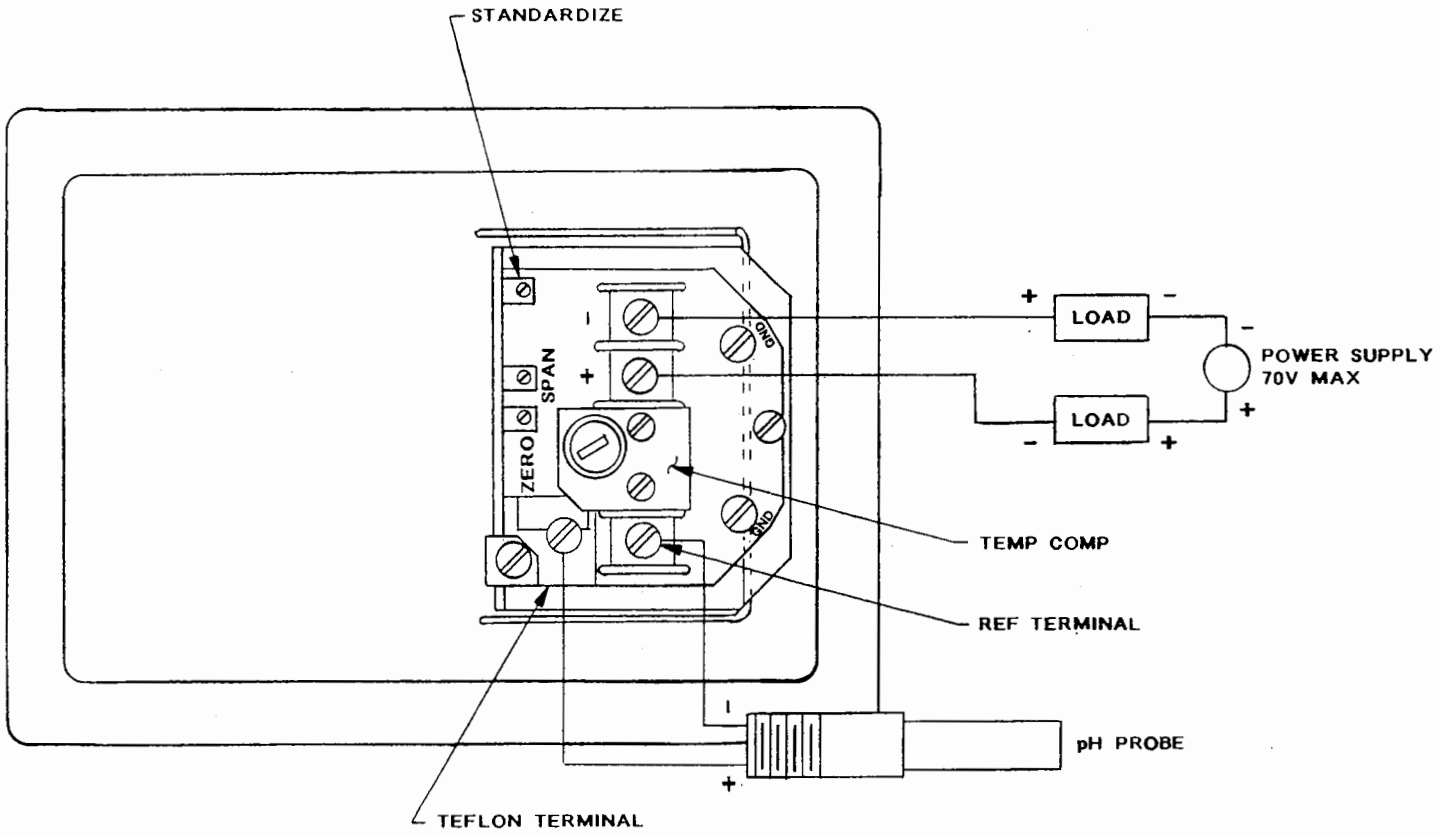
SIZE	DRAWING NO.	REV
B	515814	A

SCALE 1/2 | WT | SHEET 1 OF 1

OGILVIE PRESS 05-893

DWG NO. SH

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	RELEASE; ECN 3101		



TOLERANCES UNLESS SPECIFIED DECIMAL DIM. ± .005 FRACT. DIM. ± 1/64 ANGLES ± 1/2°	CONTRACT NO.		
MATERIAL	PREPARED	LH	12-05-95
	CHECKED		
	MECH		
	ELEC		
FINISH	DESIGN		
	APPROVED		
NEXT ASS'Y NO.	APPROVED		

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FIELD WIRING
4265 pH TRANSMITTER

SIZE B | DRAWING NO. 515836 | REV A

SCALE N.T.S. | WT | SHEET 1 OF 1

OGILVIE PRESS 01489

INPUT SPAN		INPUT SPAN RESISTOR	
pH	mV	R110	DEVAR PART NO.
1.5/2.5	88.71/147.85	38.3K	223737-172
2.5/4	147.85/236.56	23.2K	223737-102
4/6	236.56/354.84	15K	223737-27
6/9	354.84/532.26	10K	221734-07
9/14	532.26/827.96	6.81K	223737-47

SELECTION OF R110 INPUT SPAN RESISTOR

START OF INPUT RANGE (INPUT OFFSET)		INPUT OFFSET NULLING RESISTOR		
pH	mV	R107A	R107B	DEVAR PART NO.
0	+413.98	——	28.7K	223737-173
1	+354.84	——	34.8K	223737-174
2	+295.70	——	45.3K	223737-85
3	+236.56	——	61.9K	223737-175
4	+177.42	——	100K	223737-135
5	+118.28	——	255K	223737-81
6	+59.14	2M	——	380019-02
7	0	499K	——	223737-133
8	-59.14	294K	——	223737-242
9	-118.28	205K	——	223737-89
10	-177.42	158K	——	223737-231
11	-236.56	127K	——	223737-107
12	-295.70	110K	——	223737-225

SELECTION OF R107A OR R107B INPUT OFFSET
NULL RESISTORS

INPUT RANGE CALIBRATING RESISTORS FOR 18-265 ISOLATED
2-WIRE ELECTRODE TRANSMITTER

B CHANGE R107A ECN 2410 10-31-81

A RELEASE ECN 1084 [illegible]

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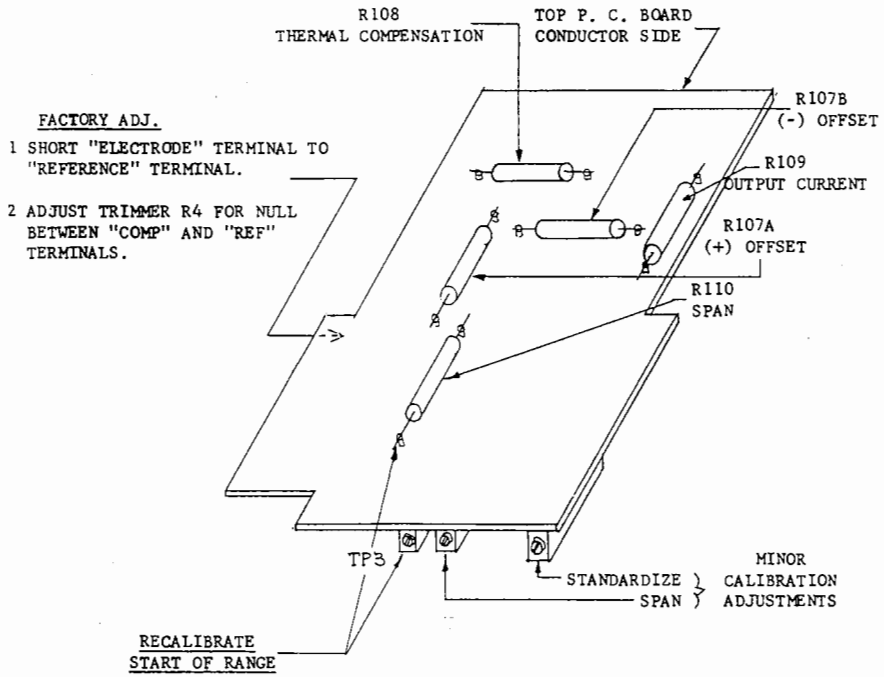
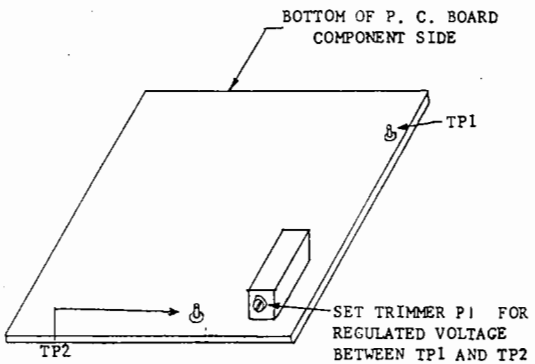
A513286

REV [illegible]





1 APPLY MINIMUM RANGE SIGNAL BETWEEN "ELECTRODE" AND "REF" TERMINALS.

2 MEASURE VOLTAGE BETWEEN TP3 AND "REF" TERMINAL.

3 ADJUST TRIMMER R6 FOR NULL.

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18-265 LOCATION OF CALIBRA
RESISTORS AND POTENTIOMETE

B-513422 REV

FINAL CALIBRATION PROCEDURE

18-265 ISOLATED 2 WIRE ELECTRODE TRANSMITTER

1. Connect 24 V power supply and decade box (set to 250 ohms) in series, between output terminals (+) 4 and (-) 5.

2. Measure voltage across test points (+) TP1 and (-) TP2 on voltage regulator (bottom) board. Adjust POT R21 for 10.9V between the test points.

3. Short electrode terminal to input reference terminal.

4. Measure voltage between compensation terminal (+) 3 and input reference terminal (-) 1. Adjust null POT R4 (top board) for zero volts between terminals 3 and 1.

5. Apply minimum input signal between (+) electrode terminal and reference terminal (-) 1.

6. Measure voltage between test point (+) TP3 (top board) and reference terminal (-) 1. Adjust zero POT R6 (top board) for zero volts at TP3.

7. Adjust standardize POT R12 (top board) for 4 mA at the output.

8. Apply maximum input signal adjust span POT R9 (top board) for 20 mA out.

9. Repeat steps 7 and 8 until unit is calibrated.

10. Set input to midrange verify output equals 12 mA ±.04 mA.

11. Connect a 100 megohm resistor between the input voltage source and the electrode terminal. Verify that the output does not change by more than $\frac{.027}{\text{INPUT SPAN}}$ mA.

    EXAMPLE: For an input of 2 to 12 pH

    Δ OUTPUT = $\frac{.027}{10}$ = .0027 mA

12. Adjust the input for 20 mA at the output. Increase the resistance of the decade box from 250 to 600 ohms. Verify that output does not change by more than .008 mA.

14. With the output at 20 mA and the load at 600 ohms, momentarily break the output current loop then reconnect it. Verify that the output returns to 20 mA and that the transmitter does not begin to oscillate.

REFERENCE DRAWINGS:
SCHEMATIC C513273
CALIBRATION COMPONENT LOCATION B513422
ASS'Y AMPLYFIER (TOP) BOARD B513259
ASS'Y ISOLATION (CENTER) BOARD B513452
ASS'Y REGULATOR (BOTTOM) BOARD A514232

REVISIONS	B ECN 2874A 7-5-88 a.r. A ECN 2874 3-18-88 a.r.	DEVAR Inc. 706 Bostwick Avenue, Bridgeport, Conn. 06605	
PREPARED	LFG 3-14-88 APPROVED	DRAWING NO. 514921	REV. B

SWITCH SELECTION PROCEDURE FOR THE CALIBRATION BOARD FOR THE 18-265 Ph TRANSMITTER

The calibration board for the Model 18-265A pH transmitter provides a means of calibrating the transmitter for various pH ranges without having to solder calibration resistors to the transmitters circuit board. All calibration components are mounted on the calibration board and are selected through the use of DIP switches.

The input span is selected by setting switch 1 positions 1 through 5. The span is defined as the bottom of the input range subtracted from the top of the input range. For example, if the input to produce a 4 to 20 mA output is 7 to 10 pH, the input span would be 3 pH units.

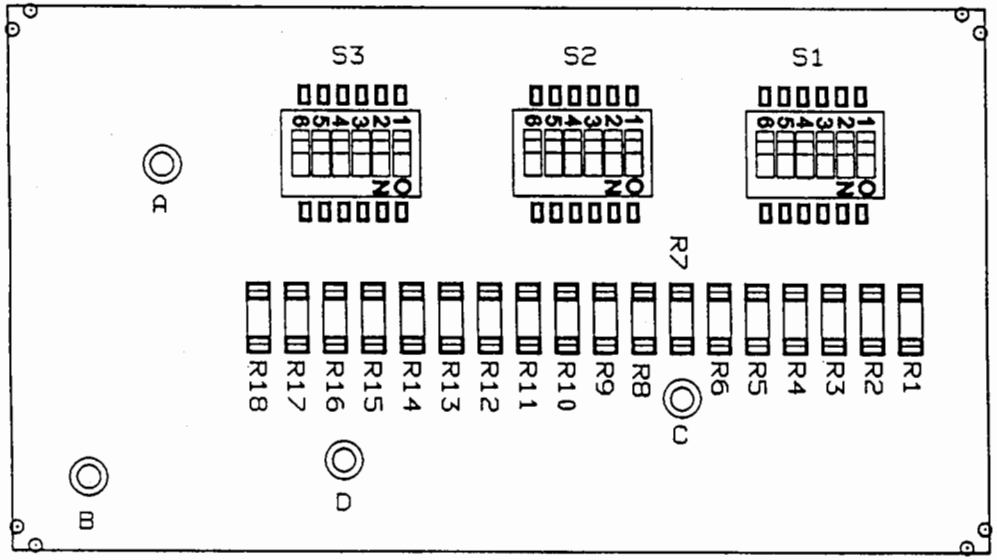
The start of range, or input offset, is selected by setting the remaining 13 DIP switch positions. The start of range is the input value which produces a 4 mA output.

Example: For an input range of 5 to 12 pH the span would be 7 pH and the start of range would be 5 pH. Switch 1 position 4 would be on for a span range of 6 to 9 pH and switch 2 position 5 would be on for a start of range of 5 pH. All other switches would be off.

SWITCH	RES.	RESIST.	INPUT SPAN pH	INPUT SPAN mV	START OF RANGE pH	START OF RANGE mV
SW1-1	R1	38.3K	1.5 / 2.5	88.7 / 147.8		
SW1-2	R2	23.2K	2.5 / 4	147.8 / 236.6		
SW1-3	R3	15K	4 / 6	236.6 / 354.8		
SW1-4	R4	10K	6 / 9	354.8 / 532.3		
SW1-5	R5	6.81K	9 / 14	532.3 / 828		
SW1-6	R6	28.7K			0	+ 413.98
SW2-1	R7	34.8K			1	+ 354.84
SW2-2	R8	45.3K			2	+ 295.70
SW2-3	R9	61.9K			3	+ 236.56
SW2-4	R10	100K			4	+ 177.42
SW2-5	R11	255K			5	+ 118.28
SW2-6	R12	2M			6	+ 59.14
SW3-1	R13	499K			7	.00
SW3-2	R14	294K			8	- 59.14
SW3-3	R15	205K			9	- 118.28
SW3-4	R16	158K			10	- 177.42
SW3-5	R17	127K			11	- 236.56
SW3-6	R18	11.1K			12	-295.70

REV	ECN	PREPARED	APPROVED	DEVAR Inc. 706 BOSTWICK AVE. BRIDGEPORT, CT. 06605			
A	3147	L.F.G	11-11-97	NEXT ASSY B/M 5-0058-01	PAGE 1 OF 1	DRAWING NO. 516063	REV A

V	DESCRIPTION	DATE	APPROVED
A	RELEASE ECN 3147A	12-8-97	a.r.



TOLERANCE UNLESS SPECIFIED DECIMAL +/- .005 FRACTION +/- .005 ANGLE 1/2 degree	CONTRACT NO.		DEVAR Inc. 70 BOSTWICK AVE, BRIDGEPORT CT 06605
MATERIAL	PREPARED	L RC 12.4.97	CALIBRATION BOARD ASSEMBLY FOR THE 18-265A
	CHECKED		
	MECH		
	ELEC		
FINISH	DESIGN		
	APPROVED	a.r. 12-8-97	SIZE A / DRAWING NO. 516061 / REV A
NEXT ASSY NO. BM 516058-01	APPROVED		SCALE 2 TO 1 / WT / SHEET 1 OF 1