Validyne
ENGINEERING CORPORATION

REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPROVED

SIGNATURE		DATE
PROD TEST		
ENGINEERING	RCB	4/6/81
QUAL CONTROL	L Kamerman	4/13/81

TITLE
ACCEPTANCE TEST PROCEDURE 453
TC292-Q2
Thermocouple Conditioner.

NUMBER	REV
ATP 453	

SHEET 1 OF 9

8626 WILBUR AVENUE • NORTHRIDGE, CA 91324 • (213) 886-8488 • Telex No. 65-1303

1.0 SCOPE:

This document defines the acceptance test procedure (ATP) for TC292-Q2, Thermocouple Signal Conditioner. The ATP outlines the functional tests of the operating characteristics. A sample of the test report to be used with this ATP is contained in Appendix A.

2.0 EQUIPMENT REQUIRED:

Table 1 lists the test equipment required to perform the ATP.

TABLE I. Equipment required for ATP.

Description	Manufacturer	Part No. or Model	Alternate
MC1 (TEST)	Validyne		None
Extender Card (MC1-MC170)	Validyne		None
Digital Multimeter	Data Precision	248	Commercial Equivalent.
Oscilloscope	B & K	1470	Commercial Equivalent.
D.C. Signal Source	Datel	8500	Commercial Equivalent.
Cold Junction Compensator	Omega	CJ	Validyne Equiv.
Thermocouple	Validyne	"T"	--------
Signal Generator	EXACT	100	Commercial Equivalent.
Divider 1000:1	Validyne	T1099	None
Thermometer	VWR Scientific Inc	ASTM-63F	Commercial Equivalent

Validyne
ENGINEERING CORPORATION

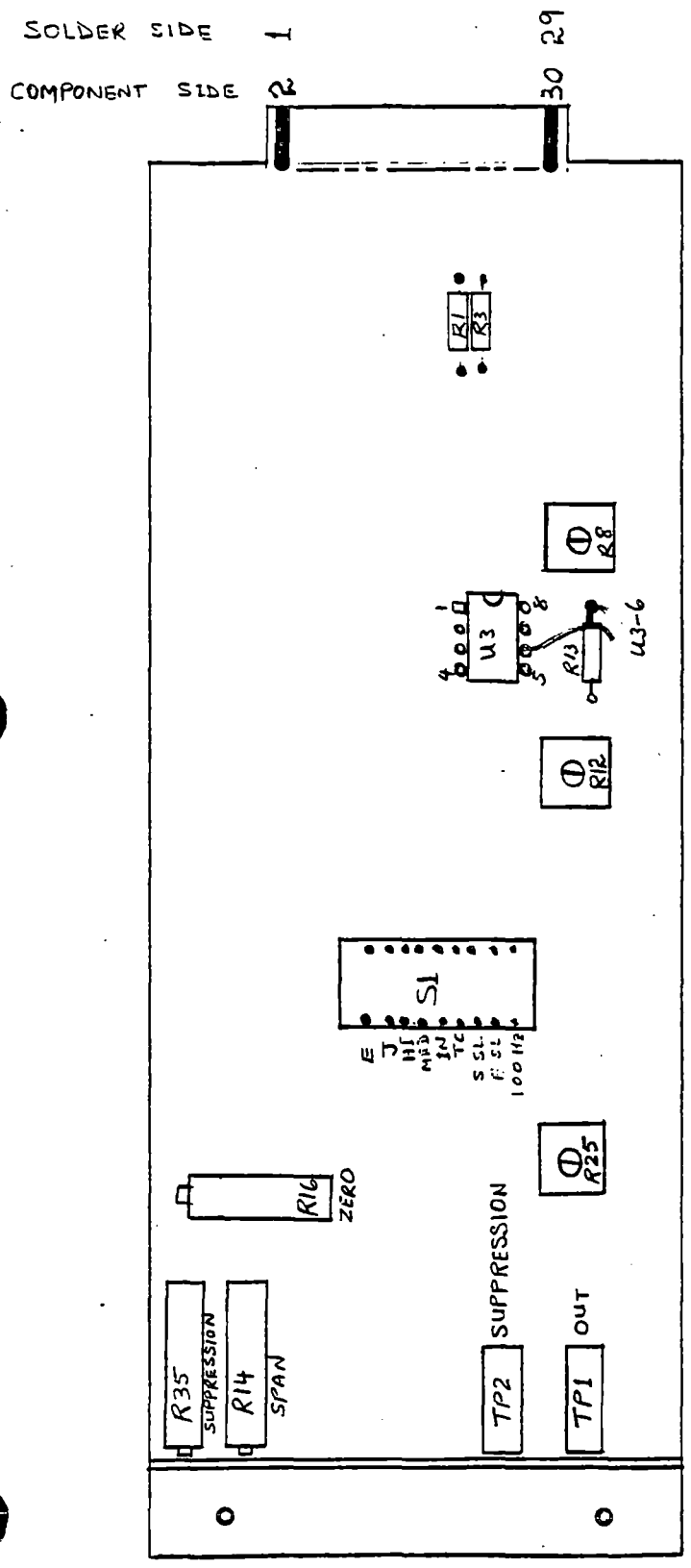


FIGURE 1. TC 292-02 PARTS LOCATIONS.

NUMBER	REV
ATP 453	
SHEET 3 OF 9	

3.0 PRELIMINARY PROCEDURE:

Refer to assembly drawing No.9936 and visually inspect unit for completeness and correctness. The value of R1 and R3 should be 2 Meg ohm each.

3.2 Set the control switches on TC292-Q2 as follows:

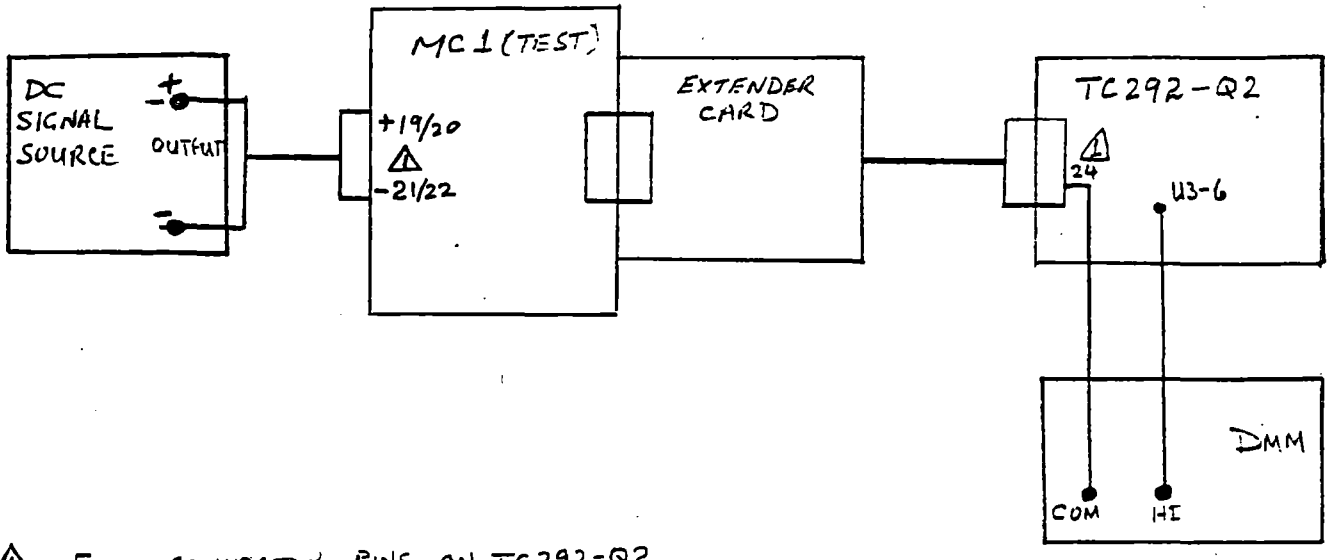
Switch or Control	Setting	Mode Result
S1-1 (E)	Open	NOT E } = K or T
S1-2 (J)	Open	NOT J }
S1-3 (HI)	Closed	Gain = 1000
S1-4 (Med)	Open	Gain NOT 500
S1-5 (IN)	Closed	Supression OFF
S1-6 (TC)	Closed	Non-TC Compensated
S1-7 (S SL)	Closed	Sensor Master
S1-8 (E SL)	Closed	Excitation Master
S1-9 (100 Hz)	Open	100Hz Response

3.3 Plug TC292-Q2 into extender card cable connector.

3.4 If necessary, connect MC1 to 115 VAC and press MC1 power switch; observe that power-on indicator lights.

4.0 INITIAL TEST SETUP

4.1 Connect DMM, MC1, extender card, & TC292-Q2 as shown in Figure 2.



⚠ EDGE CONNECTOR PINS ON TC292-Q2.

FIGURE 2 - Initial Setup.

4.2 Short input pins 19/20 & 21/22 together.

4.3 Connect DC signal source (+) to pins 19/20 & (-) to pins 17/18 & Set it to 0.000 VDC.

4.4 Set DMM to DC volts & 100mV range.

4.5 Adjust balance potentiometer (R8) for 0.0000 + 0.0005 VDC on DMM.

4.6 Set the DC signal source output to 10.0 VDC. Adjust common mode potentiometer (R12) for minimum change on DMM when polarity of DC signal source is changed from plus to minus or vice versa.

4.7 Set DC signal source to 0.000 VDC & adjust R8, if necessary for 0.0000 $\pm$ 0.0005 VDC on DMM.

4.8 Disconnect DMM (HI) from U3-6 and connect it to TP1. Adjust zero potentiometer (R16) for 0.000 $\pm$ 0.002 VDC on DMM.

4.9 Disconnect DC signal source from pins 19/20 & 17/18. Remove short from input pins 19/20 & 21/22.

4.10 Connect DC signal source to the input of 1000:1 attenuator. Connect the attenuator (+) output to pin 19/20 & (-) to pins 21/22 of TC292-Q2. Connect pin 21/22 to signal ground pins 23/24 of TC292-Q2.

4.11 Set DC signal source output to 10.000 $\pm$ 0.001 VDC and adjust span potentiometer (R14) for 10.000 $\pm$ 0.002 VDC on DMM.

4.12 Set DMM to measure AC mV.

4.13 The DMM reading should be 10mV maximum; indicate acceptance with checkmark on test report.

4.14 Set DMM to measure DCV.

4.15 Set DC signal source to 0.00 VDC, set S1-3 to open (LO gain) & S1-5 to open (SUPPR,in). Adjust suppression potentiometer (R35) to full clockwise (CW) and full counter clockwise (CCW) observing that TP1 output is greater than $\pm$ 10V DC. Indicate acceptance with checkmark on test report.

4.16 Set S1-3 (HI gain), S1-5 (SUPR out) & S1-9 (1Hz filter) to closed.

8626 WILBUR AVENUE • NORTHRIDGE, CA 91324 • (213) 886-8488 • Telex No. 65-1303

5.0 FUNCTIONAL TESTS:

5.1 Span Range

5.1.1 Set DC signal source to 10 VDC. Adjust Span potentiometer (R14) fully CW, output should be greater than 11.000V DC. Indicate acceptance with checkmark on test report.

5.1.2 Adjust Span potentiometer (R14) fully CCW, output should be less than 4.000V DC. Indicate acceptance with checkmark on test report.

5.1.3 Adjust Span Potentiometer (R14) for 10.000 ± 0.001V DC output at TP1.

5.2 Linearity Test

5.2.1 Change polarity of the DC signal source. The output should be -10.000 ± 0.020V DC. Indicate acceptance with checkmark on test report.

5.2.2 Set DC signal source to -5.00V DC. The output at TP1 should be -5.000 ± 0.010V DC. Indicate acceptance with checkmark on test report.

5.2.3 Change polarity of the DC signal source. The output at TP1 should be +5.000 ± 0.007V DC. Indicate acceptance with checkmark on test report.

5.2.4 Disconnect the DC signal source and 1000:1 resistive attenuator from the input.

5.3 Gain Range Accuracy

5.3.1 Connect DC signal source (+) to input pins 19/20 & (-) to input pins 21/22 of TC292-Q2.

5.3.2 Set S1-3 to open, S1-4 to closed (MED gain) and DC signal source to 20mVDC.

5.3.3 Output at TP1 should be 10.00 ± 0.150VDC. Indicate acceptance with checkmark on test report.

5.3.4 Set S1-4 to open (LO gain) and DC signal source to 40.00mVDC. Output at TP1 should be 10.000 ± 0.150V DC. Indicate acceptance with checkmark on test report.

5.3.5 Set S1-3 to close (HI gain).

5.4 Filter Response

5.4.1 Connect oscilloscope and frequency counter as shown in Figure 3.

5.4.2 Set oscilloscope to DC coupling and 1V/Division scale.

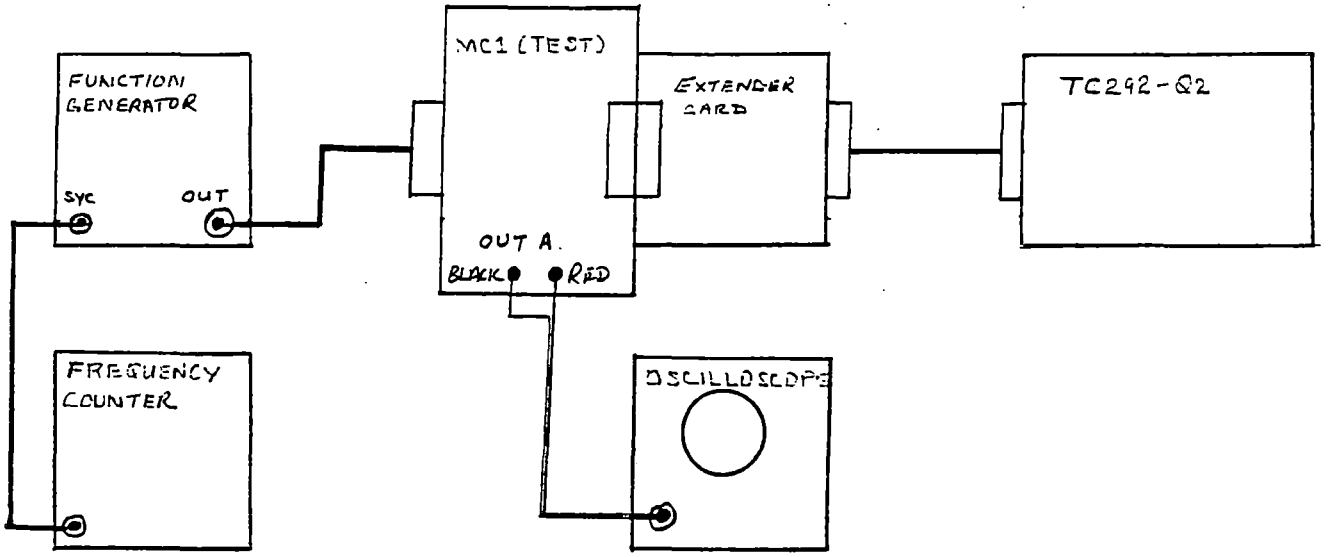
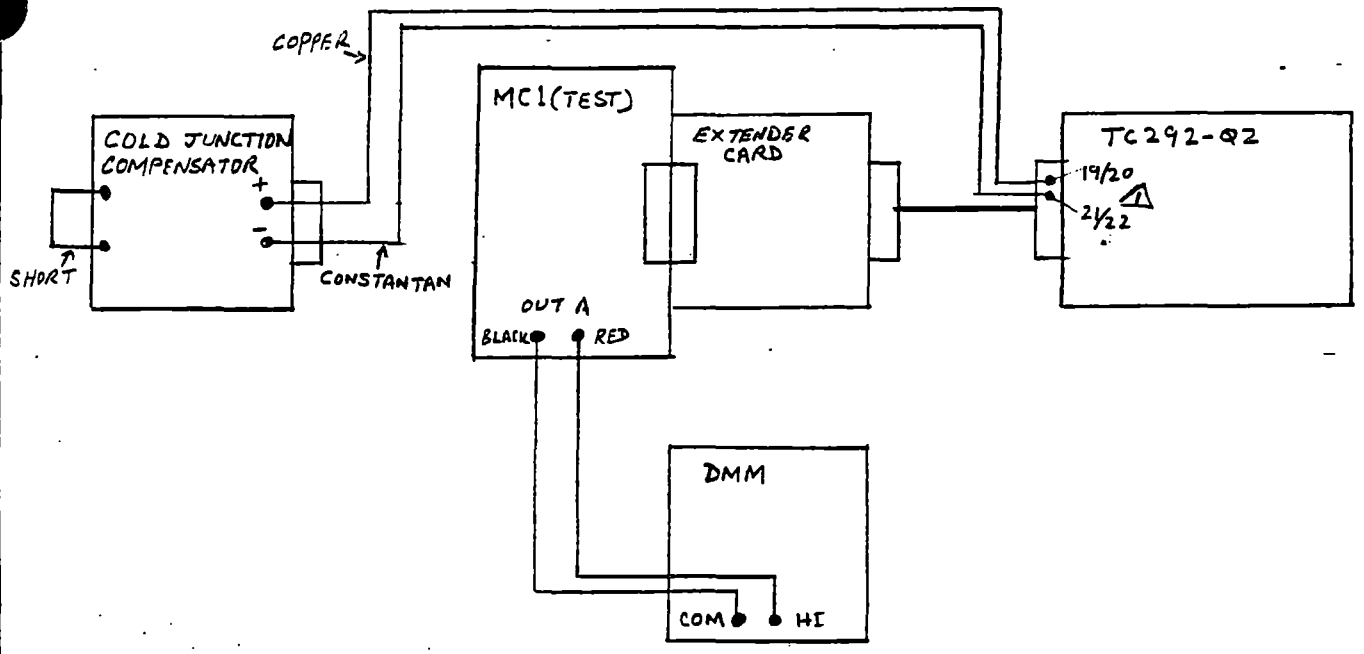


FIGURE 3. FILTER RESPONSE TEST SETUP



⚠ REFERS TO PINS ON TC292-Q2

FIGURE 4. THERMOCOUPLE COMPENSATION AMPLIFIER TEST SETUP.

NUMBER	REV
ATP 453	
SHEET 7 OF 9	

5.4.3 Set the function generator to 0.1Hz and apply sufficient amplitude to get 7V (p-p) from TP1 on oscilloscope. Increase the frequency until the display, on the oscilloscope, decreases to 5V p-p. The frequency should be 1.0 ± 0.25Hz. Indicate acceptance with checkmark on test report.

5.4.4 Set S1-9 to open (100Hz filter).

5.4.5 Increase the function generator frequency until the display, on the oscilloscope decreases to 5 divisions. The frequency should be 100±25Hz. Indicate acceptance with the checkmark on test report.

5.5 Thermocouple Compensation Amplifier Test

5.5.1 Set switch S1-9 to close (1Hz filter) and S1-6 to open (Temperature compensation mode). Connect "T" type thermocouple wires through cold junction compensator as shown in figure 4. Turn cold junction compensator switch to ON.

5.5.2 Adjust R25 (Comp. Adj.) for a 0.000 ± 0.005V DC at TP1 output.

5.5.3 Turn cold junction compensator off, measure ambient temperature with thermometer and call it t°F. The output at TP1 is given by 21.95 X 10^{-3} (t°F-32) ±0.110V DC. Indicate acceptance with checkmark on test report.

5.5.4 Set S1-1 to close (E type TC). The output at TP1 is given by 33.3 x 10^{-3} (t°F-32) ±0.160V DC. Indicate acceptance with checkmark on test report.

5.5.5 Set S1-1 to open & S1-2 to close (J type TC). The output at TP1 is given by 28.35 x 10^{-3} (t°F-32) ±0.140V DC. Indicate acceptance with checkmark on test report.

5.5.6 Connect a DMM across R39, set it to 100mV range. The DMM indication should be less than 5mV DC. Indicate acceptance with checkmark on test report.

5.6 Current Consumption

5.6.1 Connect the DMM leads to the +15V current and voltage test jacks as shown in Figure 5. Set DMM to read DC mA.

5.6.2 Set the MC1 + 15V I TEST switch (Figure 5) to +15, the DMM indication should not exceed 22mA. Indicate acceptance with checkmark on test report.

5.6.3 Set MC1 +15V I TEST switch to unmarked position. Disconnect the DMM leads from the MC1.

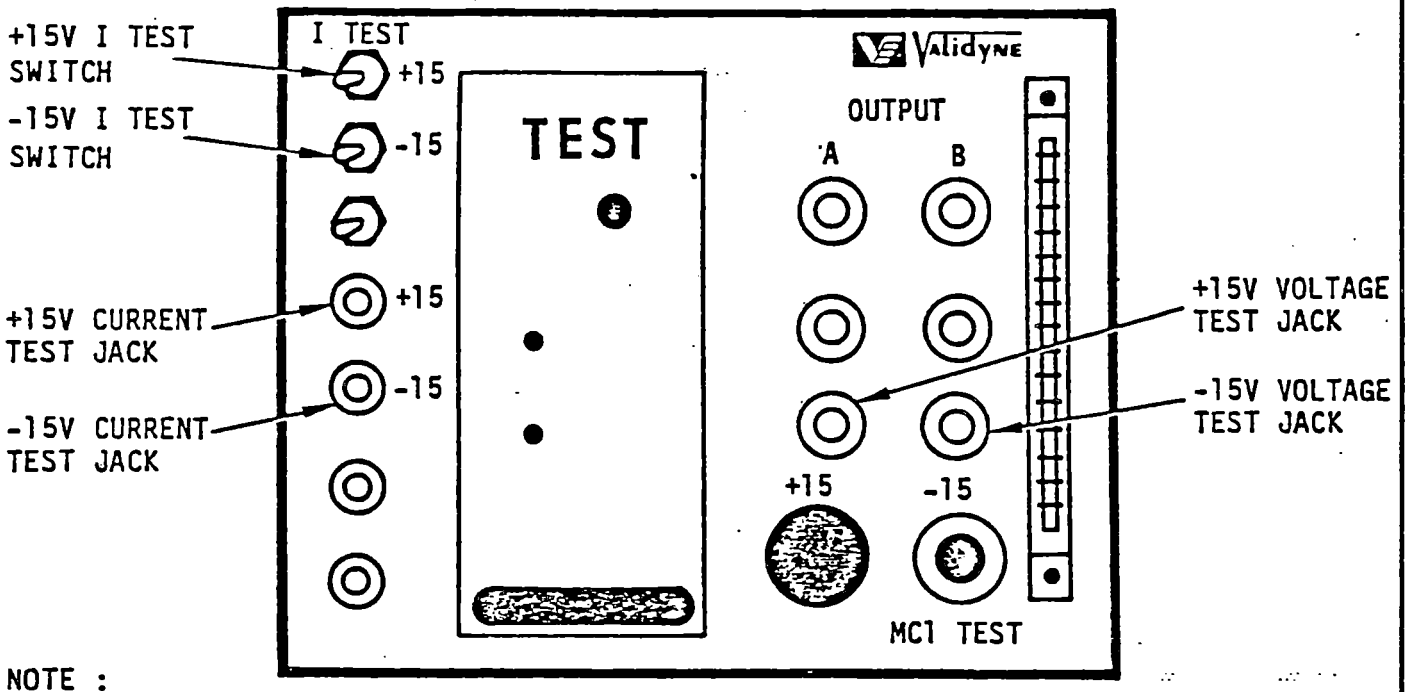
5.6.4 Connect the DMM leads to MC1 -15V current and voltage test jacks (Figure 5).

8626 WILBUR AVENUE • NORTHRIDGE, CA 91324 • (213) 886-8488 • Telex No. 65-1303

5.6.5 Set the MC1 -15V I TEST switch (Figure 5) to -15; the DMM indication should not exceed 22mA. Indicate acceptance with checkmark on test report.

5.6.6 Set MC1 -15V I TEST switch to the unmarked position; disconnect the DMM leads from the MC1.

5.6.7 Unplug TC292-Q2 from extender card cable connector.



NOTE :

1. CONNECT DMM COM LEAD TO CURRENT TEST JACK AND HI LEAD TO VOLTAGE TEST JACK

FIGURE 5. MC1(TEST) ±15 V CURRENT TEST SWITCH AND JACK LOCATIONS

NUMBER	REV
ATP 453	
SHEET 9 OF 9	

Validyne
ENGINEERING CORPORATION

APPENDIX A

NUMBER	REV
ATP 453	
SHEET 1 OF 1	

8626 WILBUR AVENUE • NORTHRIDGE, CA 91324 • (213) 886-8488 • Telex No. 65-1303

Validyne ENGINEERING CORPORATION

TEST REPORT

ASSY TC292-Q2 Thermocouple Conditioner

S/O _____ CUSTOMER _____

W/O _____ SERIAL NO. _____

TESTED BY _____ DATE _____

Paragraph/Step		Accepted	Specification
4.0	Initial Test Setup		
4.13	Noise (DMM)	_____	10mV rms max.
4.15	Suppression	_____	±10 VDC min.
5.0	Functional Tests		
5.1.1	Output at TP1 (DMM)	_____	11.00 VDC min.
5.1.2	Output at TP1 (DMM)	_____	4.000 VDC max.
5.2	Linearity Test		
5.2.1	Output (DMM)	_____	-10.00±0.020 VDC
5.2.2	Output (DMM)	_____	-5.000±0.010 VDC
5.2.3	Output (DMM)	_____	5.000±0.007 VDC
5.3	Gain Range Accuracy		
5.3.3	Output (DMM)	_____	10.000±0.150 VDC
5.3.4	Output (DMM)	_____	10.000±0.150 VDC
5.4	Filter Response		
5.4.3	Frequency (Hz)	_____	1.0±0.25Hz
5.4.5	Frequency (Hz)	_____	100±25Hz
5.5	Thermocouple Compensation		
5.5.3	Output (DMM)	_____	21.95×10^{-3}($t^{o}F-32$)±0.110VDC
5.5.4	Output (DMM)	_____	$33.3 \times 10^{-3}(t^{o}F-32)$ ±0.160VDC
5.5.5	Output (DMM)	_____	$28.35 \times 10^{-3}(t^{o}F-32)$ ±0.140VDC
5.5.6	R39 Voltage	_____	5mV max.

QC _____

NUMBER	REV
ATP 453	
SHEET 1 OF 2	

8626 WILBUR AVENUE • NORTHRIDGE, CA 91324 • (213) 886-8488 • Telex No. 65-1303

Validyne ENGINEERING CORPORATION

TEST REPORT

ASSY TC292-Q2 Thermocouple Conditioner

S/O _____ CUSTOMER _____

W/O _____ SERIAL NO. _____

TESTED BY _____ DATE _____

Paragraph/Step		Accepted	Specification
5.6	Current Consumption		
5.6.2	15V Current	_____	22mA max.
5.6.3	-15V Current	_____	22mA max.

QC _____

NUMBER	REV
ATP 453	

SHEET 2 OF 2

8626 WILBUR AVENUE • NORTHRIDGE, CA 91324 • (213) 886-8488 • Telex No. 65-1303