

ACCEPTANCE TEST PROCEDURE 444-2

PT174-2-Q2

(Resistance Thermometer Signal Conditioner)

Controlled Distribution

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REVISIONS

LTR	ECO	DESCRIPTION	DATE	APPROVED
A		SEE DCN	4/13/81	

SIGNATURE		DATE	TITLE	
PROD TEST	<i>[Signature]</i>	3/5/81	PT174-2-02 Resistance Thermometer Signal Conditioner	
ENGINEERING	<i>[Signature] RKB</i>	3/5/81	NUMBER	REV
QUAL CONTROL	<i>[Signature]</i>	3/5/81	ATP444- 2	B
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1.0 SCOPE

This document defines the Acceptance Test Procedure (ATP) for the PT174-2-Q2 Resistance Thermometer Signal Conditioner. The ATP performs functional tests of 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 1. Equipment Required for ATP

Description	Manufacturer	Part No. or Model	Alternate
MCI (Test)	Validyne	--	None
Extender Card (MC1-MC170)	Validyne	--	None
PT174-2 Tester	Validyne	T1096	None
Digital Multimeter (DMM)	Data Precision	245	Commercial Equivalent
Oscilloscope	B & K	1470	Commercial Equivalent
Function Generator	Interstate	F47	Commercial Equivalent
Frequency Counter	Hewlett Packard	5314A	Commercial Equivalent

3.0 PRELIMINARY PROCEDURE

3.1 Plug extender card into front panel connector on MC1.

3.2 Refer to figure 1 and set 3W/4W switch S1A/S1B to 4W; ensure resistors R1 and R7 are the correct value for the customer specified probe (nickel or platinum).

3.3 Plug Pt174-2-Q2 into extender card cable connector.

3.4 Using tester cable, connect PT174-2 tester to input connector on rear of MC1; set the 3W/4W switch on PT174-2 tester to 4W.

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

3.6 Set PT174-2 tester FUNCTION switch to LINEARITY.

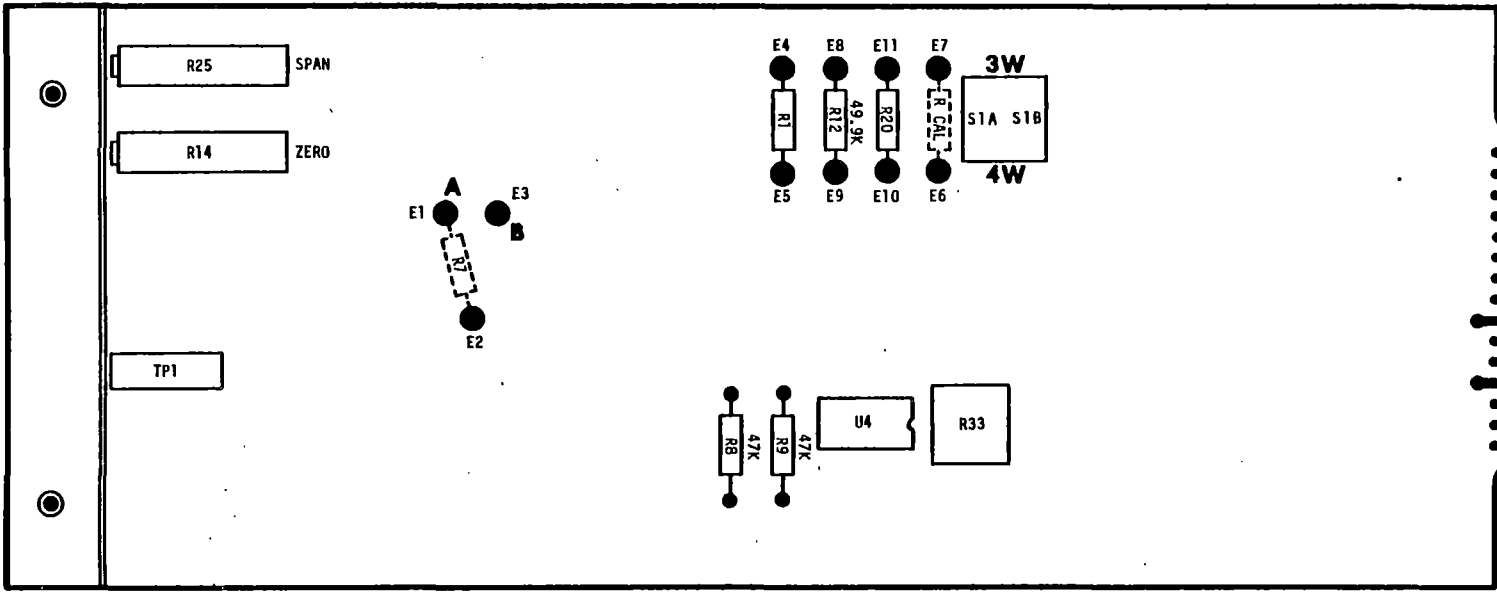
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SPAN

ZERO

OUT

PT174



COMPONENT SIDE
SOLDER SIDE

2 1
4 3
6 5
8 7
10 9
12 11
14 13
16 15
18 17
20 19
22 21
24 23
26 25
28 27
30 29



Figure 1. PT174-2-Q2 Parts Locations

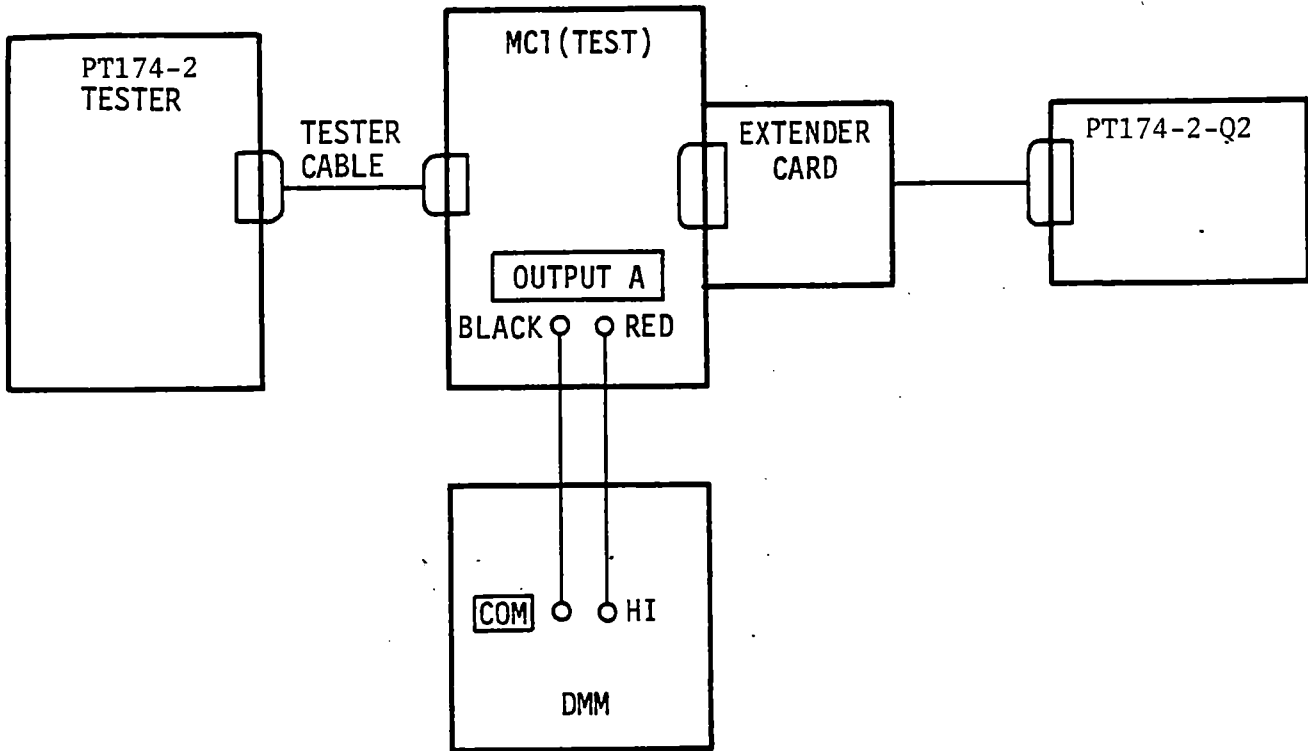
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4.0 INITIAL TEST SETUP

4.1 Connect DMM to MCI as shown in figure 2; set DMM to read DC voltage.



NOTE: BOXED CALLOUT XXX INDICATES PANEL MARKINGS

Figure 2. Initial Test Setup

NOTE: Unless otherwise indicated, controls referred to in the ATP procedures that follow are located on the PT174-2-Q2; see figure 1 for locations.

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5.0 FUNCTIONAL TESTS

The nominal resistance and type of probe (nickel or platinum) to be used with each PT174-2-Q2 is specified by the customer. Perform all tests and in order given. See Table 3 for the resistance versus temperature for platinum probe used in standard PT174-2-Q2.

5.1 4-Wire/3-Wire Zero Setting

- 5.1.1 Set PT174-2 tester °F switch to 0 (-17.8°C); adjust ZERO control R14 for 0.000 (±0.002)V DC on DMM.
- 5.1.2 Set PT174-2 tester °F switch to 1000 (538°C); adjust SPAN control R25 for +10.000 (±0.002) V DC on DMM.
- 5.1.3 Repeat steps 5.1.1 and 5.1.2 as necessary to obtain desired readings.
- 5.1.4 Set PT174- 2 tester °F switch to 0, and 3W/4W switch to 3W.
- 5.1.5 On PT174-2 set 3W/4W switch S1A/S1B to 3W.
- 5.1.6 Adjust potentiometer R33 for 0.000 (±0.002) V DC on DMM.
- 5.1.7 On PT174-2 set 3W/4W switch S1A/S1B to 4W; on PT174-2 tester, set the 3W/4W switch to 4W.
- 5.1.8 Adjust ZERO control R14 for 0.000 (±0.002) V DC on DMM.
- 5.1.9 Repeat steps 5.1.4 thru 5.1.8 as necessary to obtain desired readings.

5.2 Output Noise

- 5.2.1 Set DMM to read AC millivolts.
- 5.2.2 Set PT174-2 tester °F switch to 1000; the output indication on the DMM should be 10 mV AC maximum. Indicate acceptance on test report with checkmark.
- 5.2.3 On PT174-2-Q2, set 3W/4W switch S1A/S1B to 3W; set PT174-2 tester 3W/4W switch to 3W. The output indication on the DMM should be 10 mV/ AC maximum. Indicate acceptance on test report with checkmark.

5.3 Linearity

- 5.3.1 On PT174-2-Q2, set 3W/4W switch S1A/S1B to 4W; set PT174-2 tester 3W/4W switch to 4W.
- 5.3.2 Set DMM to read DC volts.
- 5.3.3 Perform the steps in Table 2 to check the linearity of the PT174-2-Q2; for each step set the PT174-2 tester °F switch as indicated, and indicate acceptance on test report with checkmark.

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Table 2. Linearity Check

Step	PT174-2-02 Tester °F Switch	Output Specification on DMM (VDC)
1	-300 (-184°C)	-3.000±0.015
2	0 (-17.8°C)	0.000±0.002
3	500 (260°C)	+5.000±0.012
4	1000 (538°C)	+10.000±0.002

5.3.4 On PT174-2-02, set 3W/4W switch S1A/S1B to 3W; set PT174-2 tester 3W/4W switch to 3W. Adjust, if necessary, the SPAN potentiometer for 10.000 ± 0.002 Vdc on DMM.

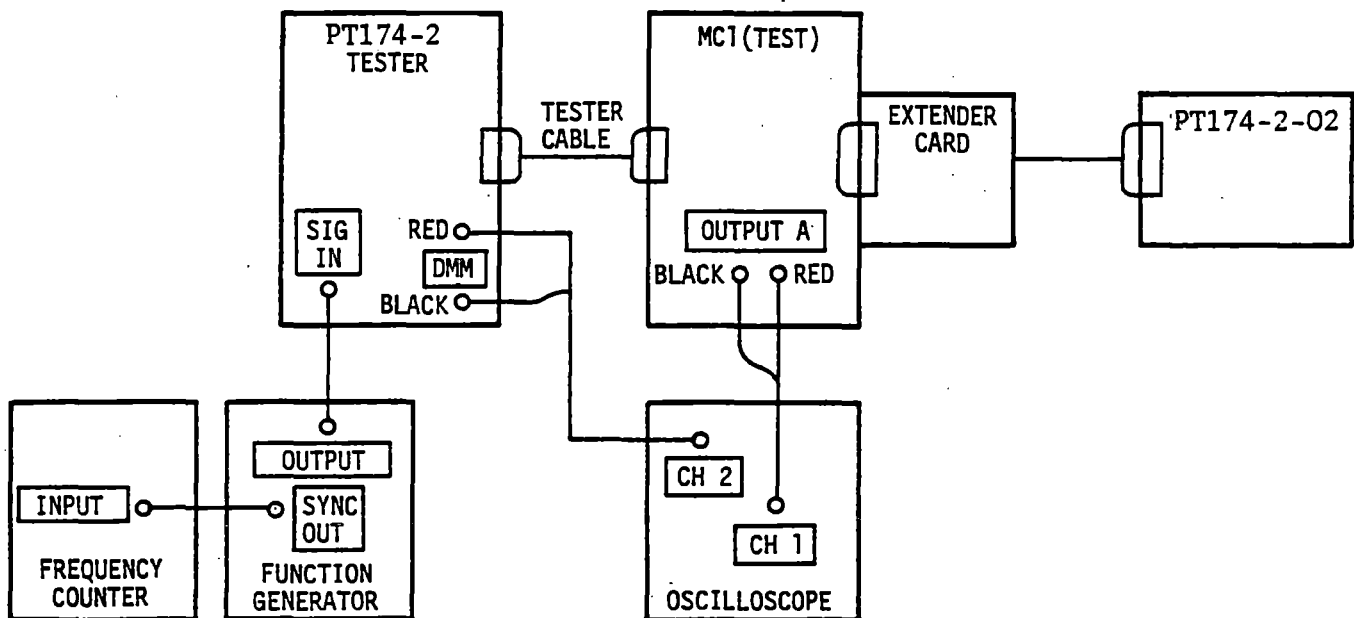
5.3.5 Repeat step 5.3.3.

5.4 Filter

5.4.1 Connect function generator, frequency counter, and oscilloscope as shown in figure 3.

5.4.2 Set PT174-2 tester FUNCTION switch to FILTER CHECK.

5.4.3 Set function generator output to 1.0 Hz, as indicated on the frequency counter; set oscilloscope for DC coupling.



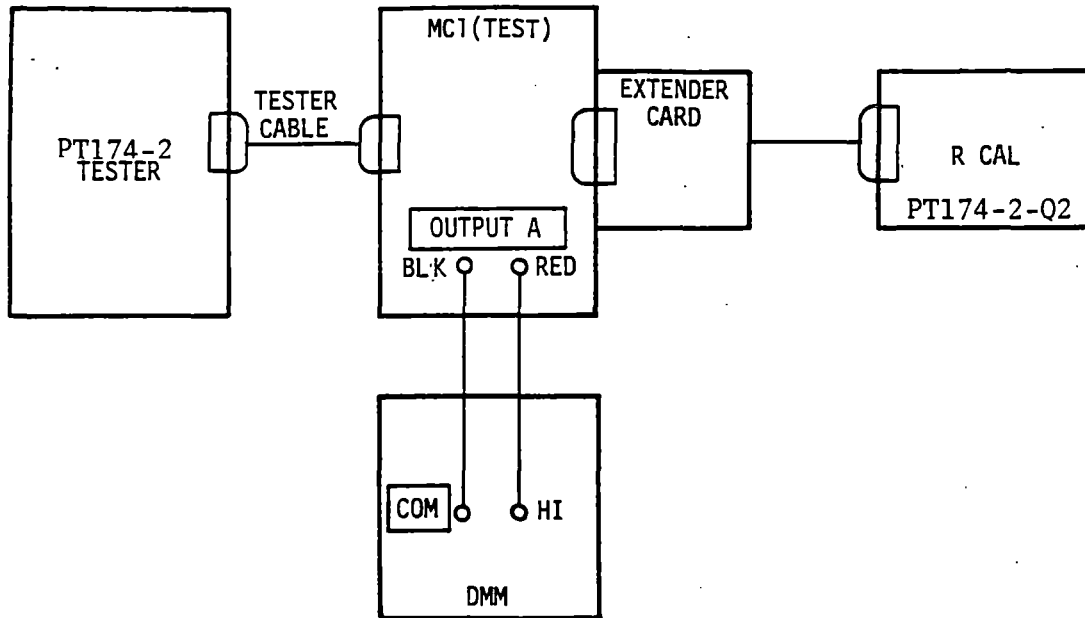
NOTE: BOXED CALLOUT **XXX** INDICATES PANEL MARKINGS

Figure 3. Filter Test Setup



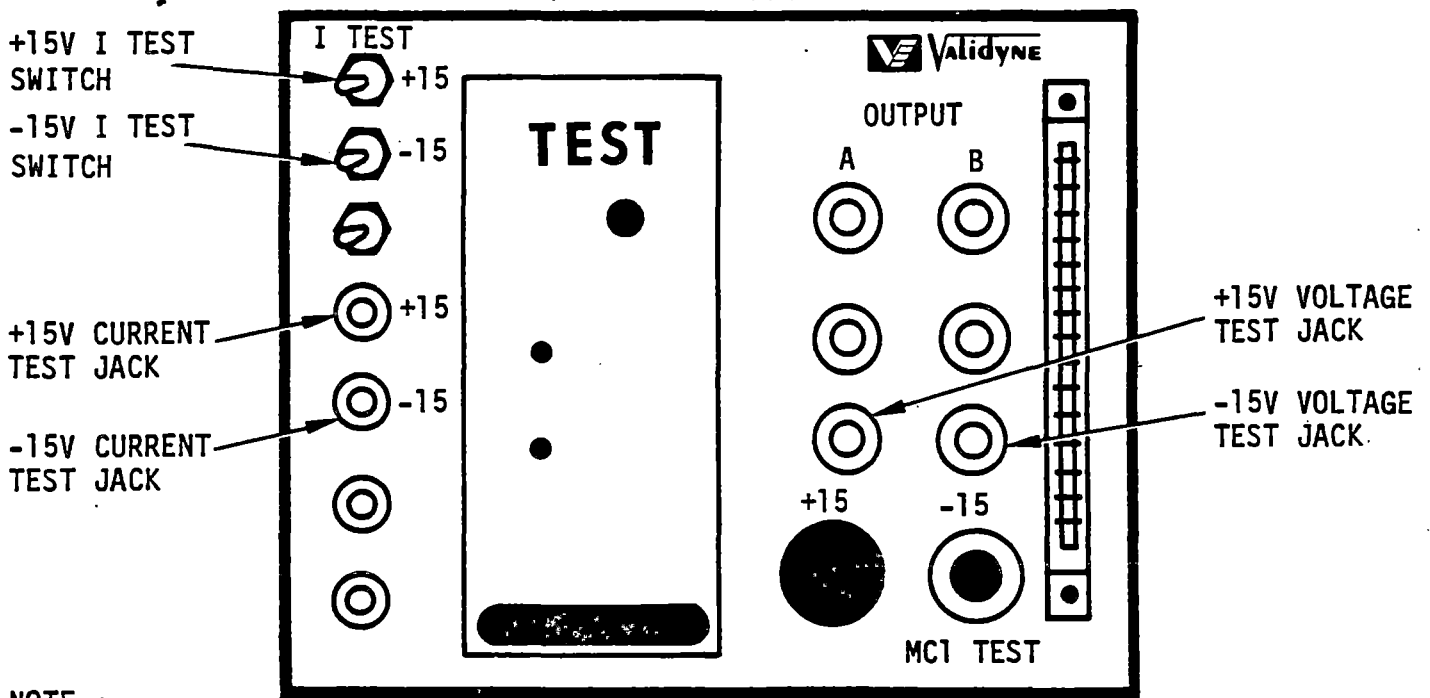
- 5.4.4 Adjust the amplitude of the function generator output for a 16V peak-to-peak display on CH 1 of oscilloscope; note amplitude of display on CH 2 of oscilloscope.
- 5.4.5 Raise the frequency of the function generator until the display is 11.3V peak-to-peak on CH 1 of oscilloscope. (Make sure amplitude on CH 2 is the same as in step 5.4.4) this should occur at 10 ± 2.5 Hz. Indicate acceptance on test report with checkmark.
- 5.4.6 Set function generator output to 30 Hz, as indicated on the frequency counter; adjust the amplitude of the function generator output until the CH 2 display on oscilloscope is the same as noted in 5.4.4., and observe that the display on CH 1 of oscilloscope is 930 ± 300 mV peak-to-peak. Indicate acceptance on test report with checkmark.
- 5.5 Remote Calibration Circuit
- 5.5.1 Connect DMM to MC1 OUTPUT A and set DMM to read DC volts.
- 5.5.2 On PT174-2-Q2, connect pin 28 of connector (Figure 1) to signal ground (Pin 24); the output indication on DMM should be 5.884 ± 0.220 V. Indicate acceptance on test report with checkmark.
- 5.5.3 Remove Ground from pin 28 of PT174-2-Q2 connector.
- 5.6 Current Consumption
- 5.6.1 Connect the DMM leads to the MC1 +15V current and voltage test jacks (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 22 mA. Indicate acceptance with checkmark on test report.
- 5.6.3 Set the MC1 +15V I TEST switch to the unmarked position; disconnect the DMM leads from the MC1.
- 5.6.4 Connect the DMM leads to the MC1 -15V current and voltage test jacks (Figure 5).
- 5.6.5 Set the MC1 -15V I TEST switch (Figure 5) to -15; the DMM indication should not exceed 22 mA. Indicate acceptance with checkmark on test report.
- 5.6.6 Set the MC1 -15V I TEST switch to the unmarked position; disconnect the DMM leads from the MC1.
- 5.6.7 Unplug PT174-2-Q2 from extender card cable connector.

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NOTE: BOXED CALLOUT **XXX** INDICATES PANEL MARKINGS

Figure 4. Remote Calibration Circuit Test Setup



NOTE :

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

Figure 5. MCI (Test) $\pm 15V$ Current Test Switch and Jack Locations

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TABLE 3

Platinum Resistance Versus Temperature in °F
International -DIN 43760(0.00385Ω/Ω/°C)

Temperature °F	Ohms
-300	25.21
-250	36.94
-200	48.46
-150	59.79
-100	70.98
- 50	82.06
0	93.03
32	100.00
50	103.90
100	114.68
150	125.37
200	135.97
250	146.48
300	156.90
350	167.23
400	177.47
450	187.62
500	197.69
550	207.66
600	217.55
650	227.36
700	237.07
750	246.70
800	256.23
850	265.68
900	275.04
950	284.31
1000	293.49

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APPENDIX A
SAMPLE TEST REPORT

NUMBER ATP444-2	REV B
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TEST REPORT

PT174-2-Q2 Resistance
 Thermometer Signal Conditioner

S/O _____

CUSTOMER _____

W/O _____

SERIAL NO. _____

TESTED BY _____

DATE _____

<u>Paragraph/Step</u>		<u>Accepted</u>	<u>Specification</u>
5.2	<u>Output Noise</u>		
5.2.2	DMM Indication	_____	10 mV AC max.
5.2.3	DMM Indication	_____	10 mV AC max.
5.3	<u>Linearity</u>		
5.3.3	Table 2 Step Indication		
	1 DMM	_____	-3.000(±0.015)V
	2 DMM	_____	0.000(±0.002)V
	3 DMM	_____	+5.000(±0.012)V
	4 DMM	_____	+10.000(±0.002)V
5.3.5	Table 2 Step Indication		
	1 DMM	_____	-3.000(±0.015)V
	2 DMM	_____	0.000(±0.002)V
	3 DMM	_____	+5.000(±0.012)V
	4 DMM	_____	+10.000(±0.002)V
5.4	<u>Filter</u>		
5.4.5	3 dB frequency	_____	10±2.5Hz
5.4.6	Output at 30Hz	_____	930 ± 300 mV p-p

QC _____

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TEST REPORT

PT174-2-Q2 Resistance
Thermometer Signal Conditioner
ASSY

S/O _____

CUSTOMER _____

W/O _____

SERIAL NO. _____

TESTED BY _____

DATE _____

Paragraph/Step

Accepted

Specification

5.5 Remote Calibration Circuit

5.5.2 DMM Indication

+5.884(±0.220)V

5.6 Current Consumption

5.6.2 DMM Indication

22 mA max.

5.6.5 DMM Indication

22 mA max.

QC _____

NUMBER

ATP444 -2

REV

B

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