Validyne
ENGINEERING CORPORATION

REVISIONS

LTR	ECO	DESCRIPTION	DATE	APPROVED
A		See DCN	5/28/81	RJE

SIGNATURE		DATE
PROD TEST	[signature]	3/26/81
ENGINEERING	[signature]	3/27/81
QUAL CONTROL	L Kamerman	3/27/81

TITLE: PC202-Q2 Buffer Amplifier

NUMBER	REV
ATP449	A

SHEET 1 OF 13

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1.0 SCOPE

This document defines the Acceptance Test Procedure (ATP) for the PC202-Q2 Potentiometric Signal Conditioner. The ATP performs functional checks of all 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
MC1 (Test)	Validyne	--	None
Extender Card (MC1-MC170)	Validyne	--	None
BA Test Cable	Validyne	--	None
DC Source	Validyne	TE-124	None
Digital Multimeter (DMM)(2)	Data Precision	245	Commercial Equivalent
Oscilloscope	B & K	1470	Commercial Equivalent
Function Generator	Exact	100	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 switches and controls on PC202-Q2 as follows:

Switch or Control	Setting
SPAN (R24)	Full CW
GAIN (S4)	X1
FILTER (S2)	200
DC/AC (S3)	DC
IN/OUT (S1A)	OUT
-5V/0 (S1B)	-5V
DIFF/SINGLE ENDED (S1C)	DIFF

3.3 Plug PC202-Q2 into extender card cable connector.

3.4 Refer to figure 1 for location, and visually check that resistors R8 and R12 are each 1 Megohm, 5%.

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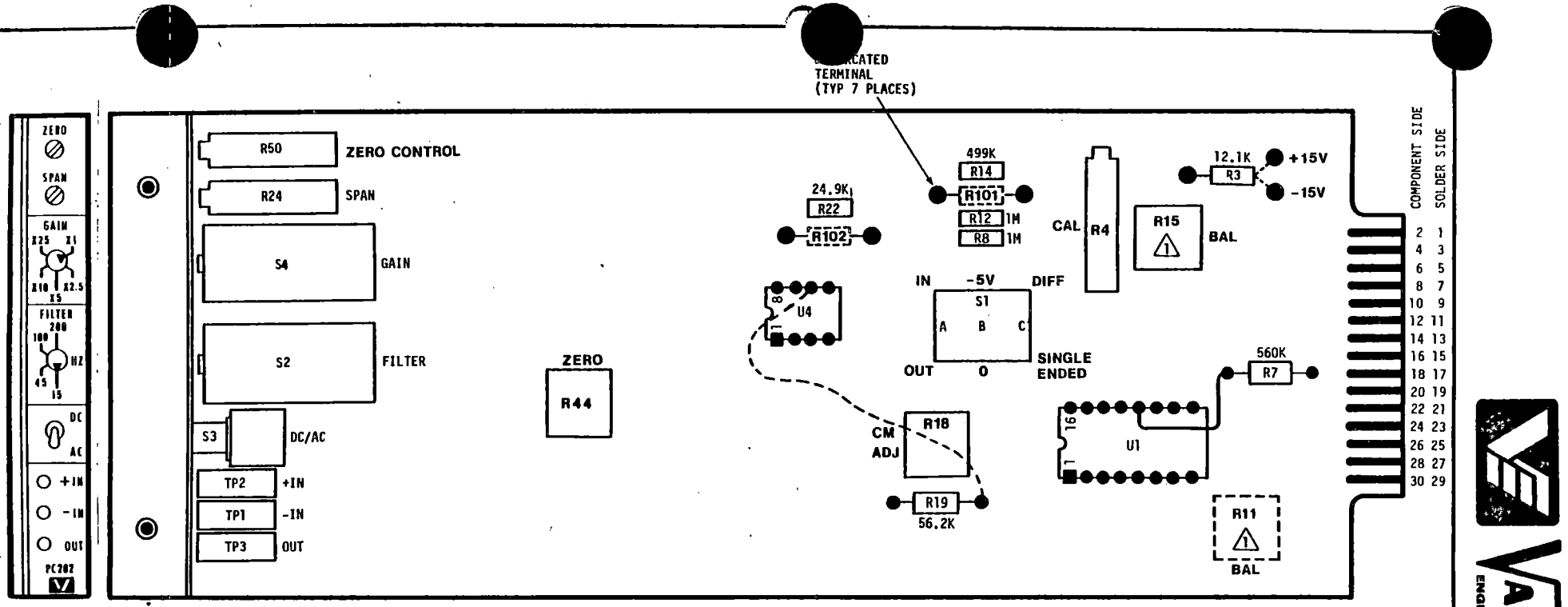
Appendix "A"

Sample Test Report

NUMBER	
ATP455	
SHEET 1	OF 1



NOTE:

⚠1 ONLY ONE BAL POT IS INSTALLED ON THE BOARD, AND IT IS NORMALLY R15; SOME UNITS MAY HAVE R11 INSTALLED INSTEAD OF R15

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NUMBER	REV
ATP449	A

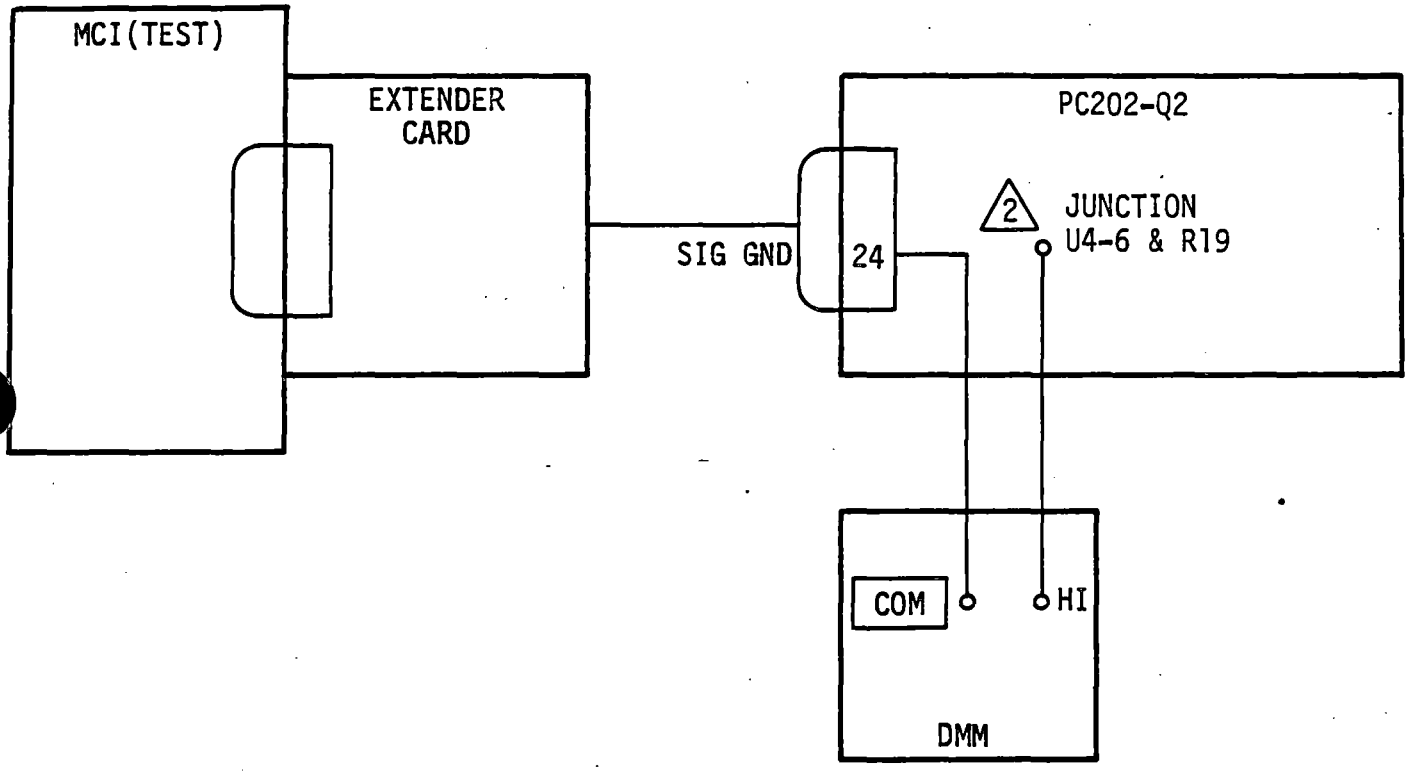
SHEET 3 OF 13

Figure 1. PC202-Q2 Parts Locations

3.5 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 to PC202-Q2 as shown in figure 2.



NOTES:

1. BOXED CALLOUT [XXX] INDICATES PANEL OR BOARD MARKINGS
2. SEE FIGURE 1 FOR LOCATIONS

Figure 2. Initial Test Setup

NOTE: Unless otherwise indicated, all switches, controls, potentiometers, and test points referred to in the ATP procedures that follow are located on the PC202-Q2; see figure 1 for locations.

5.0 FUNCTIONAL TESTS

Perform all tests and in the order given.

5.1 Null Adjustment

5.1.1 On connector of PC202-Q2 (figure 1), jumper pins 20 and 22 together and connect to signal ground (pin 24).

NOTE

BAL potentiometer R11 may be installed on some units instead of R15. On these units, adjust R11 in step 5.1.2.

5.1.2 Adjust BAL potentiometer R15 for 0.000(±0.002)V DC output on DMM.

5.1.3 Remove the ground from pins 20 and 22 of connector.

5.2 Common Mode Adjustment

5.2.1 On connector of PC202-Q2 (figure 1), jumper together pins 20 and 22 and connect to dc source and DMM as shown in figure 3.

5.2.2 Set polarity switch of dc source to plus (+) and output to +10.000(±0.005)V.

5.2.3 Adjust CM ADJ potentiometer R18 for 0.000(±0.002)V DC output on DMM.

5.2.4 Set polarity switch of dc source to minus (-); output on DMM should be 0.000(±0.005)V DC.

5.2.5 Repeat steps 5.2.2 thru 5.2.4, if necessary.

5.2.6 Remove jumper from pins 20 and 22 and disconnect dc source and DMM from PC202-Q2.

NOTE

Any change in the value of R101 (open circuit to 24.9K range) requires that paragraphs 5.1 and 5.2 be performed.

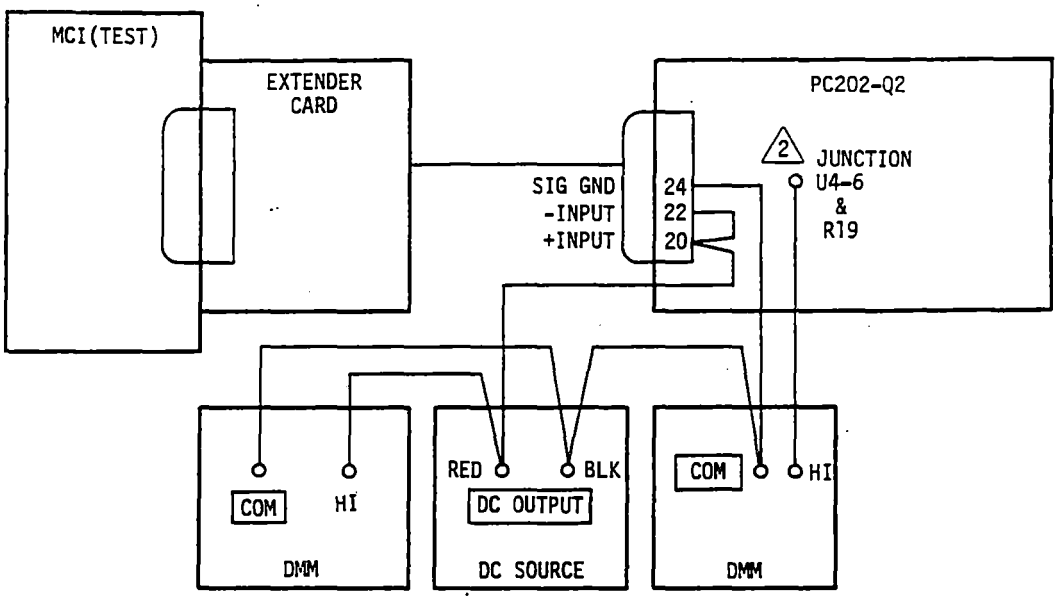
5.3 Linearity, Symmetry, and Noise

5.3.1 Using the BA test cable, connect dc source and DMM to input connector on rear panel of MC1 as shown in figure 4.

5.3.2 Connect DMM to OUTPUT A of MC1 as shown in figure 4.

5.3.3 Set output of dc source to 0.0000(±0.0005)V DC.

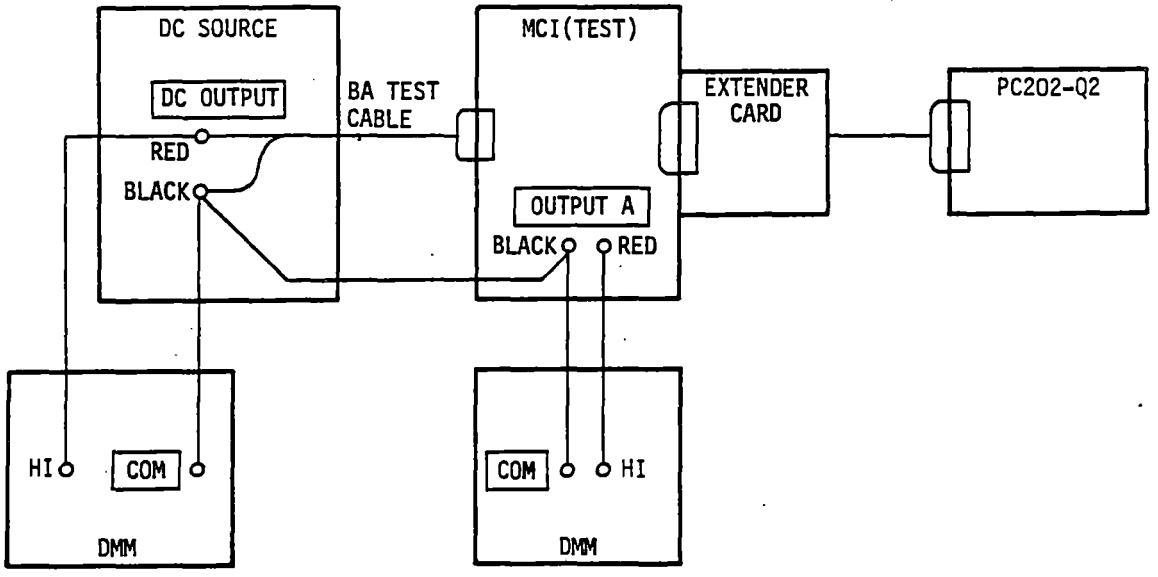
5.3.4 Adjust ZERO potentiometer R44 for 0.000(±0.002)V DC output on DMM.



NOTES:

1. BOXED CALLOUT [XXX] INDICATES PANEL OR BOARD MARKINGS
2. SEE FIGURE 1 FOR LOCATIONS

Figure 3. Common Mode Adjustment Test Setup



NOTES:

1. BOXED CALLOUT [XXX] INDICATES PANEL OR BOARD MARKINGS
2. SEE FIGURE 1 FOR LOCATION

Figure 4. Linearity and Symmetry Test Setup

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5.3.5 Set output of dc source to +10.000(±0.002)V.

5.3.6 Adjust SPAN control R24 for +10.000(±0.005)V output on DMM.

5.3.7 Set DMM to read ACmV; the noise indication on the DMM should be less than or equal to 10 mV AC. Indicate acceptance on test report with checkmark.

5.3.8 Perform the steps in table 2 to check linearity and symmetry of PC202-Q2. For steps 1 thru 5, set POLARITY switch of dc source to plus (+) and input as indicated; for steps 6 thru 10, set POLARITY switch of dc source to minus (-) and input as indicated. Indicate acceptance on test report with checkmark.

Table 2. Linearity and Symmetry Check

Step	DC Source Input (VDC)	Output Specification On DMM (VDC)
1	+10.000	+10.000±0.005
2	+ 7.500	+ 7.500±0.007
3	+ 5.000	+ 5.000±0.007
4	+ 2.500	+ 2.500±0.007
5	+ 0.000	0.000±0.002
6	- 0.000	0.000±0.002
7	- 2.500	- 2.500±0.007
8	- 5.000	- 5.000±0.007
9	- 7.500	- 7.500±0.007
10	-10.000	-10.000±0.007

5.4 Gain

5.4.1 Set POLARITY switch of dc source to plus (+).

5.4.2 Perform the steps in table 3 to check gain of PC202-Q2; for each step, set GAIN switch S4 and input from the dc source as indicated. Indicate acceptance on test report with checkmark.

Table 3. Gain Check

Step	Gain Switch S4	DC Source Input (VDC)	Output Specification On DMM (VDC)
1	X1	+10.000	+10.000±0.005
2	X2.5	+ 4.000	+10.000±0.300
3	X5	+ 2.000	+10.000±0.300
4	X10	+ 1.000	+10.000±0.300
5	X25	+ 0.400	+10.000±0.300

5.4.3 Disconnect BA test cable from MC1.

5.5 Zero

5.5.1 Set GAIN switch S4 to X1 and IN/OUT switch S1A to IN; on connector of PC202-Q2 (figure 1), jumper pins 20 and 22 together and connect to signal ground (pin 24).

5.5.2 Adjust ZERO CONTROL R50 maximum counterclockwise (CCW); output on DMM should be -11.000(±1.000)V. Indicate acceptance on test report with checkmark.

5.5.3 Adjust ZERO CONTROL R50 maximum clockwise (CW); output on DMM should be +11.000(±1.000)V. Indicate acceptance on test report with checkmark.

5.5.4 Set IN/OUT switch S1A to OUT.

5.5.5 Remove jumper and ground from pins 20 and 22 of connector.

5.6 Single Ended Input

5.6.1 Set DIFF/SINGLE ENDED switch S1C to SINGLE ENDED.

5.6.2 Reconnect BA test cable to MC1; ensure GAIN switch S4 is set to X1.

5.6.3 Connect negative terminal (black) of dc source to signal ground (pin 24) on the PC202-Q2 connector; set dc source output to 0.0000(±0.0002)V. The output on DMM at OUTPUT A of MC1 should be 0.000(±0.005)V DC. Indicate acceptance on test report with checkmark.

5.6.4 Set output of dc source to +10.000(±0.005)V; the output on DMM at OUTPUT A of MC1 should be +10.000(±0.010)V. Indicate acceptance on test report with checkmark.

5.7 Calibration Circuit

5.7.1 Disconnect BA test cable from dc source and DMM.

5.7.2 On connector of PC202-Q2 (figure 1), connect pin 28 to signal ground (pin 24).

5.7.3 If resistor R3 (figure 1) is connected to +15V, adjust CAL potentiometer R4 for +10.000(±0.100)V output on DMM; if R3 is connected to -15V, adjust R4 for -10.000(±0.100)V on DMM.

5.7.4 Adjust CAL potentiometer R4 full CCW; the output indication on DMM should be 0.000(±0.100)V. Indicate acceptance on test report with checkmark.

5.7.5 Remove ground from pin 28 of connector.

5.8 Input Resistance

5.8.1 Press MC1 power switch; observe that power-on indicator goes out.

5.8.2 Set DIFF/SINGLE ENDED switch S1C to DIFF; set DMM to read resistance on the 10 Megohm range.

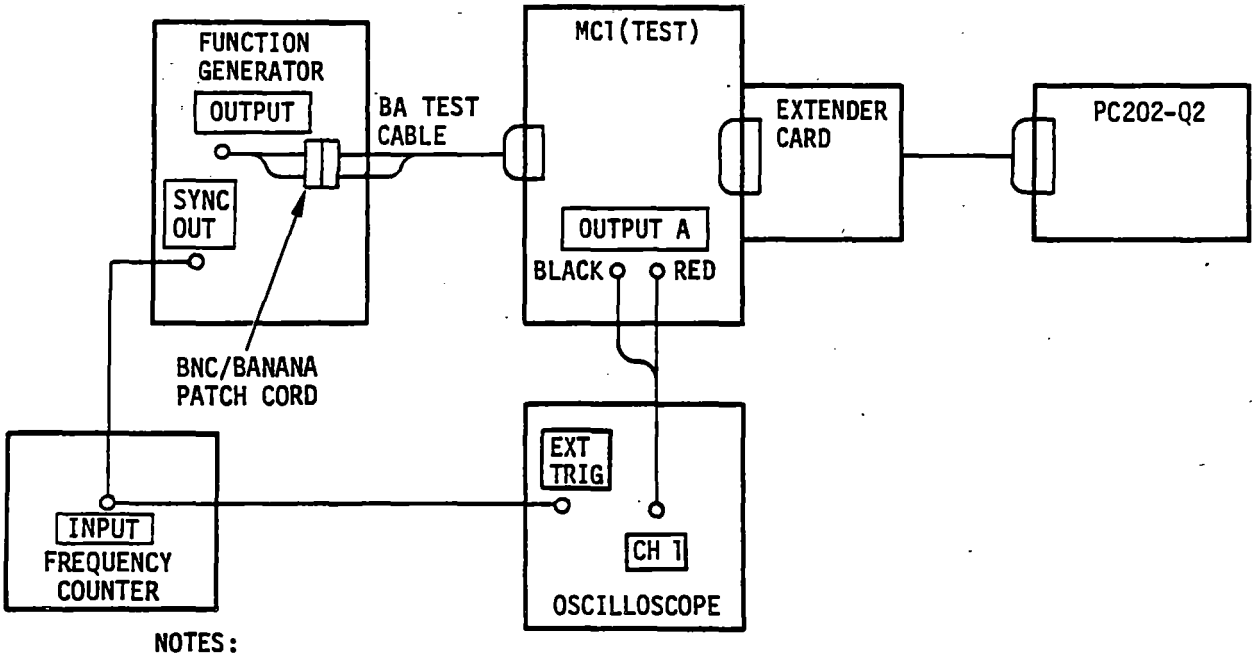
5.8.3 Connect DMM between pin 22 of PC202-Q2 and U1-5 (figure 1); the DMM indication should be between 0.95 and 1.30 Megohms. Indicate acceptance on test report with checkmark; disconnect DMM.

5.8.4 Connect DMM between pin 20 and junction of R7 and U1-12 (figure 1); the DMM indication should be between 0.95 and 1.30 Megohms. Indicate acceptance on test report with checkmark; disconnect DMM.

5.8.5 Press MC1 power switch; observe that power-on indicator lights.

5.9 Filter

5.9.1 Connect function generator, frequency counter, and oscilloscope, as shown in figure 5.



NOTES:

1. BOXED CALLOUT [XXX] INDICATES PANEL OR BOARD MARKINGS

Figure 5. Filter Test Setup

5.9.2 Set oscilloscope for 1V/DIV display, external trigger, and DC coupling.

5.9.3 Set PC202-Q2 switches as follows:

Switch	Setting
GAIN (S4)	X10
FILTER (S2)	15 HZ
DC/AC (S3)	AC
IN/OUT (S1A)	OUT
DIFF/SINGLE ENDED (S1C)	DIFF

5.9.4 15 Hz Test

5.9.4.1 Set function generator for a 1.5 Hz sinewave output, as indicated on the frequency counter; adjust output for a 7-division display on oscilloscope.

5.9.4.2 Increase function generator output frequency until oscilloscope display decreases to 5 divisions; the frequency counter should indicate 15(±2)Hz. Indicate acceptance on test report with checkmark.

5.9.5 45 Hz Test

5.9.5.1 Set FILTER switch S2 to 45 HZ.

5.9.5.2 Increase function generator output frequency until oscilloscope display decreases to 5 divisions; the frequency counter should indicate 45(±7)Hz. Indicate acceptance on test report with checkmark.

5.9.6 100 Hz Test

5.9.6.1 Set FILTER switch S2 to 100 HZ.

5.9.6.2 Increase function generator output frequency until oscilloscope display decreases to 5 divisions; the frequency counter should indicate 100(±15)Hz. Indicate acceptance on test report with checkmark.

5.9.7 200 Hz Test

5.9.7.1 Set FILTER switch S2 to 200 HZ.

5.9.7.2 Increase function generator output frequency until oscilloscope display decreases to 5 divisions; the frequency counter should indicate 200(±30)Hz. Indicate acceptance on test report with checkmark.

5.9.7.3 Disconnect oscilloscope and BA test cable from MC1.

5.10 Excitation

5.10.1 Connect DMM COM lead to signal ground (pin 24) of PC202-Q2 (figure 1); set DMM to read DC.

5.10.2 Using DMM, check that excitation at pin 16 (figure 1) is +5.000(±0.400)V; indicate acceptance on test report with checkmark.

5.10.3 Using DMM, check that excitation at pin 18 (figure 1) is -5.000(±0.400)V; indicate acceptance on test report with checkmark.

5.10.4 Set -5V/0 switch S1B to 0.

5.10.5 Connect DMM COM lead to pin 18 and Hi lead to U7-7 (figure 1); the DMM indication should be -5.000(±0.400)V. Indicate acceptance on test report with checkmark.

5.10.6 Disconnect DMM from PC202-Q2.

5.11 Current Consumption

5.11.1 Connect the DMM leads to the MC1 +15V current and voltage test jacks (figure 6); set DMM to read DCmA.

5.11.2 Set the MC1 +15V I TEST switch (figure 6) to +15; the DMM indication should not exceed 22 mA. Indicate acceptance on test report with checkmark.

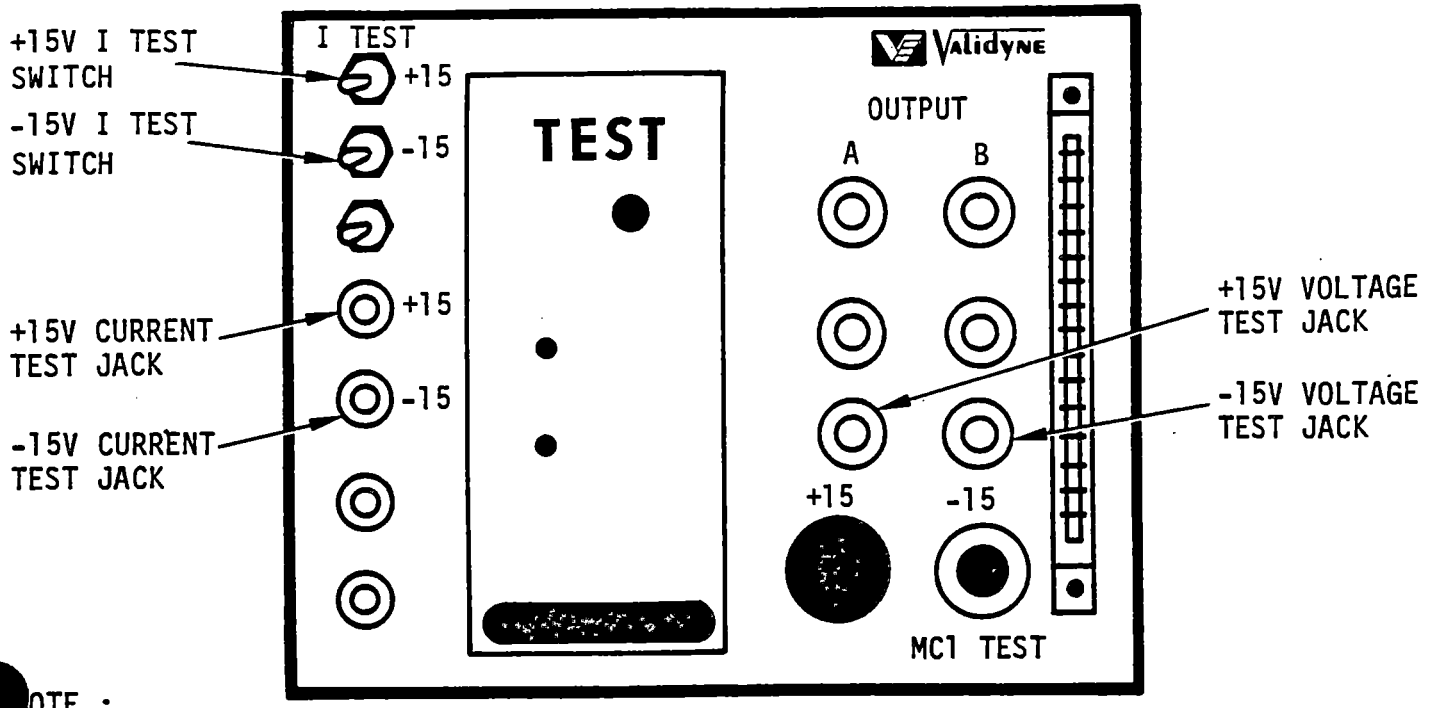
5.11.3 Set the MC1 +15V I TEST switch to the unmarked position; disconnect the DMM leads from the MC1.

5.11.4 Connect the DMM leads to the MC1 -15V current and voltage test jacks (figure 6).

5.11.5 Set the MC1 -15V I TEST switch (figure 6) to -15; the DMM indication should not exceed 22 mA. Indicate acceptance on test report with checkmark.

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

5.11.7 Unplug PC202-Q2 from extender card cable connector.



NOTE :

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

Figure 6. MC1 (Test) ±15V Current Test Switch and Jack Locations

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APPENDIX A

SAMPLE TEST REPORT

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TEST REPORT

ASSY PC202-Q2 Potentiometric Signal Conditioner

S/O _____ CUSTOMER _____

W/O _____ SERIAL NO. _____

TESTED BY _____ DATE _____

Paragraph/Step			Accepted	Specification
5.3	Linearity and Symmetry			
5.3.7	DMM Indication		_____	≤10 mV
5.3.8	Table 2			
	Step	Indication On		
	1	DMM	_____	+10.000(±0.005)V
	2	DMM	_____	+ 7.500(±0.007)V
	3	DMM	_____	+ 5.000(±0.007)V
	4	DMM	_____	+ 2.500(±0.007)V
	5	DMM	_____	0.000(±0.002)V
	6	DMM	_____	0.000(±0.002)V
	7	DMM	_____	- 2.500(±0.007)V
	8	DMM	_____	- 5.000(±0.007)V
	9	DMM	_____	- 7.500(±0.007)V
	10	DMM	_____	-10.000(±0.007)V

QC _____

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TEST REPORT

ASSY PS324-Q2 Remote 24VDC Power Supply

S/O _____ CUSTOMER _____

W/O _____ SERIAL NO. _____

TESTED BY _____ DATE _____

Paragraph/Step		Accepted	Specification
5.1.2	Regulated voltage output	_____	24±1.5VDC
	Load Regulation	_____	250mV max.
5.2.1	Line Regulation	_____	300mV max.
5.3.1	Output Ripple	_____	10mV rms max.

QC _____

NUMBER	REV
ATP455	
SHEET 1 OF 1	

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TEST REPORT

ASSY PC202-Q2 Potentiometric Signal Conditioner

S/O _____ CUSTOMER _____

W/O _____ SERIAL NO. _____

TESTED BY _____ DATE _____

Paragraph/Step			Accepted	Specification
5.4	Gain Check			
5.4.2	Table 3 Step	Indication On		
	1	DMM	_____	+10.000(±0.005)V
	2	DMM	_____	+10.000(±0.300)V
	3	DMM	_____	+10.000(±0.300)V
	4	DMM	_____	+10.000(±0.300)V
	5	DMM	_____	+10.000(±0.300)V
5.5	Zero			
5.5.2	DMM Indication		_____	-11.000(±1.000)V
5.5.3	DMM Indication		_____	+11.000(±1.000)V
5.6	Single Ended Input			
5.6.3	DMM Indication		_____	0.000(±0.005)V
5.6.4	DMM Indication		_____	+10.000(±0.010)V
5.7	Calibration Circuit			
5.7.4	DMM Indication		_____	0.000(±0.100)V
5.8	Input Resistance			
5.8.3	DMM Indication		_____	0.95-1.30M

QC _____

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TEST REPORT

ASSY PC202-Q2 Potentiometric Signal Conditioner

S/O _____ CUSTOMER _____

W/O _____ SERIAL NO. _____

TESTED BY _____ DATE _____

Paragraph/Step		Accepted	Specification
5.8.4	DMM Indication	_____	0.95-1.30M
5.9	Filter		
5.9.4.2	Frequency Counter Indication	_____	15(±2)Hz
5.9.5.2	Frequency Counter Indication	_____	45(±7)Hz
5.9.6.2	Frequency Counter Indication	_____	100(±15)Hz
5.9.7.2	Frequency Counter Indication	_____	200(±30)Hz
5.10	Excitation Check		
5.10.2	DMM Indication	_____	+ 5.000(±0.400)V
5.10.3	DMM Indication	_____	- 5.000(±0.400)V
5.10.5	DMM Indication	_____	- 5.000(±0.400)V
5.11	Current Consumption		
5.11.2	DMM Indication	_____	22 mA max.
5.11.5	DMM Indication	_____	22 mA max.

QC _____