



Originator of the Digital Voltmeter

non-linear systems, inc.

DEL MAR, CALIFORNIA

DOCUMENT NO. 879

December 1967

MODIFICATION DATA

SERIES X-1

8-RANGE OHMMETER

NON-LINEAR SYSTEMS INC.

Del Mar, California

MODIFICATION DATA
 SERIES X-1
 8-RANGE OHMMETER

This Series X-1 Digital Voltmeter differs from the Series X-1 Digital Voltmeter, described in this manual, in the following respects:

1. The instrument has an eight-range ohms measurement capability.
2. The nomenclature plate on the right hand drawer has been changed to reflect the additional ohms ranges (see Figure 1).
3. Specifications:

Ranges and Accuracy	11. 9999 $\Omega \pm (0.05\%$ of Reading $+0.015\%$ of full scale)
	119. 999 $\Omega \pm (0.03\%$ " " $+0.01\%$ " " ")
	1. 19999 K $\pm (0.01\%$ " " $+0.002\%$ " " ")
	11. 9999 K $\pm (0.01\%$ " " $+0.001\%$ " " ")
	119. 999 K $\pm (0.01\%$ " " $+ "$ " " " ")
	1199. 99 K $\pm (0.03\%$ " " $+ "$ " " " ")
	11999. 9 K $\pm (0.1\%$ " " $+ "$ " " " ")
	119999 K $\pm (0.1\%$ " " $+ "$ " " " ")

Stability	11. 9999 $\Omega \pm (0.02\%$ of full scale)
	119. 999 $\Omega \pm (0.02\%$ " " ")
	1. 19999 K $\pm (0.005\%$ " " ")
	11. 9999 K $\pm (0.005\%$ " " ")
	119. 999 K $\pm (0.005\%$ " " ")

Response Time	Step to 0.01% Final Value	11. 9999 Ω 1 SEC
	" " " " "	119. 999 Ω 200 MS
	" " " " "	1. 19999 K 100 MS
	" " " " "	11. 9999 K 100 MS
	" " " " "	119. 999 K 100 MS
	" " " " "	1199. 99 K 100 MS
	" " 0.1% " "	11999. 9 K 700 MS
	" " 0.1% " "	119999 K 5 Sec.

Each range change to 0.01% Final Value 1 Sec.

polarity
 + - auto remote
 filter
 in out remote
 offset Ω/mv
 offset ac/mv
 offset minus
 function
 mv ac dc
 $k\Omega$
 Ω
 ratio
 remote
 scan mode
 ext. stby.
 int. one
 auto remote
 100000
 10000
 1000
 100
 $dc \times 10$
 $mv \times 10$
 $r \times 100$

Figure 1. Nomenclature Plate, Right Hand Drawer

Test Voltages
& Current

Voltage across unknown:	16 VDC	all Ranges
Current through unknown:	11.9999 Ω	10 MA
	119.999 Ω	10 MA
	1.19999 K	10 MA
	11.9999 K	1 MA
	119.999 K	0.1 MA
	1199.99 K	0.01 MA
	11999.9 K	1 μ A
	119999. K	0.1 μ A

4. OHMS MEASUREMENT CONTROL

- a. With the FUNCTION Switch in the Ω position, the following ranges may be manually or automatically selected:

11.9999 Ω
 119.999 Ω
 1199.99 Ω
 11999.9 Ω
 119999. Ω

- b. With the FUNCTION Switch in the K Ω position, the following ranges may be manually or automatically selected:

11.9999 K Ω
 119.999 K Ω
 1199.99 K Ω
 11999.9 K Ω
 119999. K Ω

5. OHMS CALIBRATION

(Replaces OHMS CONVERTER CALIBRATION in Instruction Manual)

ADDITIONAL EQUIPMENT REQUIRED

1. An ohms standard accurate to 0.01%. The values required are called out in each calibrating step.

INITIAL PREPARATION

1. Ensure that the instrument is properly calibrated in the DC voltage measurement function.
2. Perform steps 1 through 6 under Calibration with Drawers in Outer Chassis.

PROCEDURE

1. Place SCAN MODE switch in the INT. position.
2. Turn THRESHOLD potentiometer adjustment fully counterclockwise.
3. Place POLARITY switch in AUTO position.
4. Place FILTER switch in OUT position.
5. Place RANGE switch in 100 MV position.
6. Place FUNCTION switch in MV position.
7. Connect red, black and blue leads of DVM input cable together and adjust AC/MV OFFSET potentiometer until readout displays 000.000.
8. Place FUNCTION switch in the Ω position.
9. Place RANGE switch in the 10 position.
10. Connect red, yellow, black, and green leads of DVM together and adjust Ω / MV OFFSET potentiometer until readout displays 00.0000.
11. Connect leads of DVM input cable to ohms standard as shown in Figure 3-8.
12. Place RANGE switch in the 1000 position.
13. Apply approximately 900.00 Ω and adjust R6 of Ohms Converter Assembly until the numerical value displayed in readout is equal to ohmic value applied.

NOTE

Each adjustment point is labeled on the right hand inner cover (e. g. R6 1K).

14. Place range switch in 10 position. Apply approximately 9.0000Ω and adjust R25 of Pre-Amplifier Assembly until numerical value displayed in readout is equal to ohmic value applied.
15. Place range switch in 100 position. Apply approximately 90.000Ω and adjust R 24 of Pre-Amplifier Assembly until numerical value displayed in readout is equal to ohmic value applied.
16. Place range switch in 10000 position. Apply approximately $9.0000\text{ K } \Omega$ and adjust R2 of Ohms Converter Assembly until numerical value displayed in readout is equal to ohmic value applied.
17. Place range switch in 100000 position. Apply approximately $90.000\text{ K } \Omega$ and adjust R4 of Ohms Converter Assembly until numerical value displayed in readout is equal to Ohmic value applied.
18. Place range switch in $\text{K } \Omega$ position.
19. Place range switch in 1000 position. Apply approximately $900.00\text{ K } \Omega$ and adjust R5 of Ohms Converter Assembly until numerical value displayed in readout is equal to ohmic value applied.
20. Place range switch in 10000 position. Apply approximately $9000.0\text{ K } \Omega$ and adjust R3 of Ohms Converter Assembly until numerical value displayed in readout is equal to ohmic value applied.
21. Place range switch in 100000 position. Apply approximately $90000.0\text{ K } \Omega$ and adjust R1 of Ohms Converter Assembly until numerical value displayed in readout is equal to ohmic value applied.

NOTE

When measuring high value resistors, it may be necessary to connect the guard (blue lead) to earth ground and/or turn the filter switch to the IN position.

Step 21 completes the Ohms calibration of the instrument.

6. SCHEMATIC DIAGRAMS

Substitute schematic diagrams accompany this Modification Data.

Kalpro Journal

36-832-36-771-2A2

REVISIONS

LTR	EFFECT	DESCRIPTION	DATE	APPROVED
1	ALL	FUNCTION UNIT ASSY WAS REVISED	11-21-67	8/7/71

REFERENCE
DESIGNATION

DRAWING NO.

DESCRIPTION

36-8 Sheet 2 DECADE COUNTER ASSEMBLY
 36-11 Sheet 2 REFERENCE ASSEMBLY
 36-14 Sheet 2 DECADE (1-4) ASSEMBLY
 36-16 Sheet 2 DECADE (5) ASSEMBLY
 36-26 Sheet 2 COMPARATOR ASSEMBLY
 36-43 Sheet 2 INVERTER ASSEMBLY
 36-249 Sheet 2 PROGRAM COUNTER ASSEMBLY
 674 36-~~472~~ Sheet 2 RANGE COUNTER ASSEMBLY
 36-67 Sheet 2 DECODE ASSEMBLY
 596 36-~~72~~ Sheet 2 RANGE DECISION ASSEMBLY
 36-73 Sheet 2 THRESHOLD & CLOCK ASSEMBLY
 36-553 Sheet 2 BUFFER ASSEMBLY
 36-494 Sheet 2 SCAN CONTROL ASSEMBLY
 560 36-~~55~~ Sheet 2 POLARITY FLIP-FLOP ASSEMBLY
 36-265 Sheet 2 REGULATOR ASSEMBLY
 428 36-~~595~~ Sheet 2 FILTER ASSEMBLY
 684 36-~~405~~ Sheet 2 READOUT UNIT ASSEMBLY
 757 36-~~474~~ Sheet 1 POWER SUPPLY UNIT ASSEMBLY
 852 36-~~655~~ Sheet 2 FUNCTION UNIT ASSEMBLY
 847 36-~~745~~ Sheet 2 ~~REPTER BOARD ASSEMBLY~~
 36-654 Sheet 2 RANGE LIMIT LOGIC ASSEMBLY
 36-495 Sheet 2 RECTIFIER ASSEMBLY
 13004-523 INPUT CABLE ASSEMBLY
 36-868 ~~2. K/Converter~~
 36-686 ~~Preamp Assy~~

A1A8 & A1A9
 A3A5
 A1A10 thru A1A13
 A1A14
 A1A15
 A1A8
 A1A4
 A3A2
 A1A1 thru A1A5
 A1A6
 A1A7
 A3A7
 A3A3
 A3A1
 A2A2
 A3A8
 A1
 A2
 A3
 A3A10 Function switching Assy
 A3A9
 A2A1

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NON-LINEAR SYSTEMS, INC.
 Del Mar, California

THREE ACCESSORY CAPABILITY

Martin Mariette

10565

NOTES:

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
 TOLERANCES ON

DECIMALS ANGLES
 $\pm .010$ $\pm 0^{\circ}30'$

FRACTIONS
 $\pm 1/32$

MATERIAL

CONTR.
NO.

DRAWN

CHECK

APPR

RELEASE DATE

R H 405 12-13-67

12-13-67

12-13-67

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12-13-67



NON-LINEAR SYSTEMS, INC.

DEL MAR, CALIFORNIA

SCHEMATIC LIST

SERIES K-1 DVM

SIZE

CODE IDENT NO.

A

03626

36-771 832

SCALE

WEIGHT

1 SHEET

2

NEXT
ASSY.FINAL
ASSY.NEXT
ASSY.FINAL
ASSY.

APPLICATION

QTY.

36-757

REVISIONS

LTR	EFFECT.	DESCRIPTION	DATE	APPROVED

THIS ASSY SAME AS 36-474 ASSY EXCEPT:
ADD WIRE FROM J16-18 TO J19-18.

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QPL SO # 702 BA220

NON-LINEAR SYSTEMS, INC.
Del Mar, California

UNLESS OTHERWISE SPECIFIED				CONTR. NO.	 NON-LINEAR SYSTEMS, INC. DEL MAR, CALIFORNIA		
DIMENSIONS ARE IN INCHES				DRAWN <i>J. Knapf</i> 6-13-67			
TOLERANCES ON				CHECK			
DECIMALS ± .010		ANGLES ± 0° 30'		APPR <i>J. Knapf</i> 6-13-67			
FRACTIONS ± 1/32				RELEASE DATE 6-13-67 <i>J. Knapf</i>	ASSY, POWER SUPPLY UNIT		
MATERIAL					SIZE A	CODE IDENT NO. 03626	36-757
36-756	36-756	1	1		SCALE	WEIGHT	SHEET 1 OF 1
NEXT ASSY.	FINAL ASSY.	NEXT ASSY.	FINAL ASSY.				
APPLICATION		QTY.					