

OPERATING INSTRUCTIONS

SAFETY INFORMATION

MODEL 124 DIGITAL MULTIMETER

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.

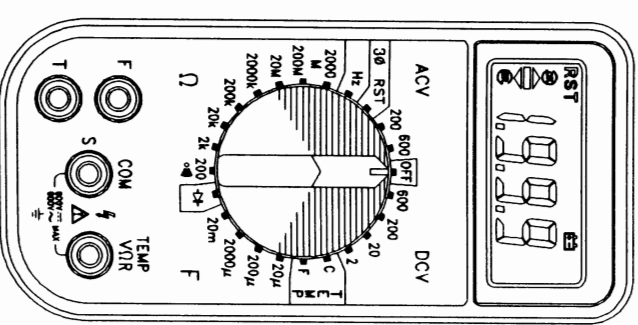
Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.

Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.

Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.

When Using the probes, keep your fingers behind the finger guards on the probes.

Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.



SPECIFICATIONS

Display: 3½ digit liquid crystal display (LCD) with a maximum reading of 1999.

Polarity: Automatic, positive implied, negative polarity indication.

Overrange: (OL) or (-OL) is displayed.

Zero: Automatic.

Low battery indication: The "E3" is displayed when the battery voltage drops below the operating level.

Measurement rate: 2.5 times per second, nominal.

Operating environment: 0°C to 50°C at < 70% relative humidity.

Storage temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.

Accuracy: Stated accuracy at 23°C ± 5°C, < 75% relative humidity.

Power: Single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22.

Battery life: 200 hours typical with carbon-zinc.

Dimensions: 147mm (H) x 70mm (W) x 39mm (D).

Weight: Approx. 340g including holster.

Accessories: One set test leads, 9V battery (installed), One thermocouple probe and Operating Instructions

DC VOLTS

Ranges: 2V, 20V, 200V, 200V, 600V

Resolution: 1mV

Accuracy: ±(1.2% rdg + 1dgt)

Input impedance: 10MΩ

Overload protection: 600VDC or AC rms

AC VOLTS (50Hz - 500Hz)

Ranges: 200V, 600V

Resolution: 100mV

Accuracy: ±(2.0% rdg + 4dgt)

Input impedance: 4.5MΩ

Overload protection: 600VDC or AC rms

RESISTANCE

Ranges: 200Ω, 2KΩ, 20KΩ, 200KΩ, 2000KΩ, 20MΩ, 200MΩ, 2000MΩ

Accuracy:

±(1.0% rdg + 4dgt) on 200Ω to 2000KΩ ranges

±(2.0% rdg + 4dgt) on 20MΩ range

±[(5.0% rdg - 10dgt) + 10dgt] on 200MΩ and 2000MΩ ranges

Open circuit volts: 0.3Vdc

(3.0Vdc on 200Ω, 200MΩ, 2000MΩ ranges)

Overload protection: 500VDC or AC rms

CONTINUITY

Audible indication: Less than 100Ω

Overload protection: 500VDC or AC rms

DIODE TEST

Test current: 1.0mA ± 0.6mA

Accuracy: ±(3.0% rdg + 1dg)

Open circuit volts: 3.0Vdc typical

Overload protection: 500VDC or AC rms

CAPACITANCE

Ranges: 20 μ F, 200 μ F, 2000 μ F, 20mF

Accuracy: ±(4.0% rdg + 10dgt) on all ranges

Test frequency: 21Hz

Test voltage: <3.5V

Input protection: 0.1A/250V fast acting fuse

FREQUENCY (Autorangeing)

Ranges: 10Hz to 100KHz

Accuracy: ±(0.5% rdg + 2dgt) on all ranges

Sensitivity: 2V RMS min.

Overload protection: 500VDC or AC rms

TEMPERATURE

Ranges: -20°C to 400°C, -4°F to 752°F

Accuracy: ±(2.0% rdg + 2°C), ±(2.0% rdg + 4°F)

Sensor type: K-type thermocouple

Overload protection: 500VDC or AC rms

PHASE INDICATOR

Frequency range: 45Hz to 450Hz

Voltage range: 80V to 480V

OPERATION

Voltage Measurements

1. Connect the red test lead to the "V Ω " jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the desired voltage type (AC or DC) and range. If magnitude of voltage is not known, set switch to the highest range and reduce until a satisfactory reading is obtained.
3. Connect the test leads to the device or circuit being measured.
4. For dc, a (-) sign is displayed for negative polarity; positive polarity is implied.

Resistance and Continuity Measurements

1. Set the Function/Range switch to the desired resistance range or continuity position.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "V Ω " jack and the black test lead to the "COM" jack.
4. Touch the probes to the test points. In ohms, the value indicated in the display is the measured value of resistance. In continuity test, the beeper sounds continuously, if the resistance is less than 100 Ω .

Note when using 2000M Ω Range

The 2000M Ω range has a fixed 10-count offset in the reading. When the test leads are shorted together in this range, the meter will display 010. This residual reading must be subtracted from the reading. For example, when measuring 1100M Ω on the 2000M Ω range, the display will read 1110, from which the 10 residual is subtracted to obtain the actual resistance of 1100M Ω .

Diode Tests

1. Connect the red test lead to the "V Ω " jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the "♦" position.
3. Turn off power to the circuit under test.
4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. Reverse probes. If the diode is good, "OL" is displayed. If the diode is shorted, ".000" or another number is displayed.
6. If the diode is open, "OL" is displayed in both directions.

Capacitance Measurements

1. Set the Function/Range switch to the desired Cx (capacitance) range.
2. Connect the red test lead to the "F" jack and the black test lead to the "COM" jack.
3. Touch the probes to the capacitor. Observe polarity when measuring polarized capacitors.
4. Read the capacitance directly from the display.

Temperature Measurements

1. Set the Function/Range switch to the desired temperature range: °C or °F.
2. Connect a Type K thermocouple probe to the "TEMP" and "COM" input jacks. Jack on meter accepts a banana plug thermocouple probe.
3. Take temperature measurement using the thermocouple probe and read the temperature from the display.

Frequency Measurements

1. Set the Function/Range switch to the "Hz" position.
2. Connect the red test lead to the "V Ω " jack and the black test lead to the "COM" jack.
3. Connect the test leads to the point of measurement and read the frequency from the display.

Phase Indicator

1. Set the Function/Range switch to the "3 ϕ RST" position.
2. Connect the red test lead to "R" jack, the black test lead to "S" jack and the yellow test lead to "T" jack.
3. Turn OFF power before connecting the test leads to the device or 3-phase power source, then turn ON the power being measured.
4. If the connection of Phase Sequence is correct, the R,S,T, and \odot symbols will appear on the display and the beeper sounds continuously.
5. If the connection of Phase Sequence is incorrect, the R,S,T, and \ominus symbols will appear on the display. In this case, please change the connection of test leads until the \odot symbol appears on the display.

Battery Replacement

Power is supplied by a 9 volt "transistor" battery. (NEDA 1604, IEC 6F22). The "☑" appears on the LCD display when replacement is needed. To replace the battery, remove the three screws from the back of the meter and lift off the front case. Remove the battery from case bottom.

124 CALIBRATION PROCEDURES

EQUIPMENT REQUIREMENTS

Before removing the 124 from service check that the necessary calibration equipment is available, the equipment requirements listed as following:

A: DATRON 4700 . AUTOCAL MULTIFUNCTION CALIBRATOR

OMEGA TRC III ice point cell, TRP(K) REFERENCE PROBE

1. Perform calibration at $23 \pm 2^\circ\text{C}$ at relative humidity of $< 70\%$. Allow the meter to stabilize at this temperature for at least 30 minutes prior to performing the calibration procedure.

2. Select the 2 V DC range on the meter. Apply $1900\text{V} \pm 0.005\%$ (from DATRON 4700) to the V- Ω -Hz and the COM input connectors of the meter.

3. Adjust VR1 (VR 200Ω) as shown to obtain a reading of 1900 in the digital display.

4. Set the Range selector switch to the " 0°C " position

5. Connect a K-type T/C probe to the "COM V Ω " jack then immerse the probe tip into ice reference cell 30 seconds.

6. Adjust VR2 (VR 200Ω) until the display reads 000°C .

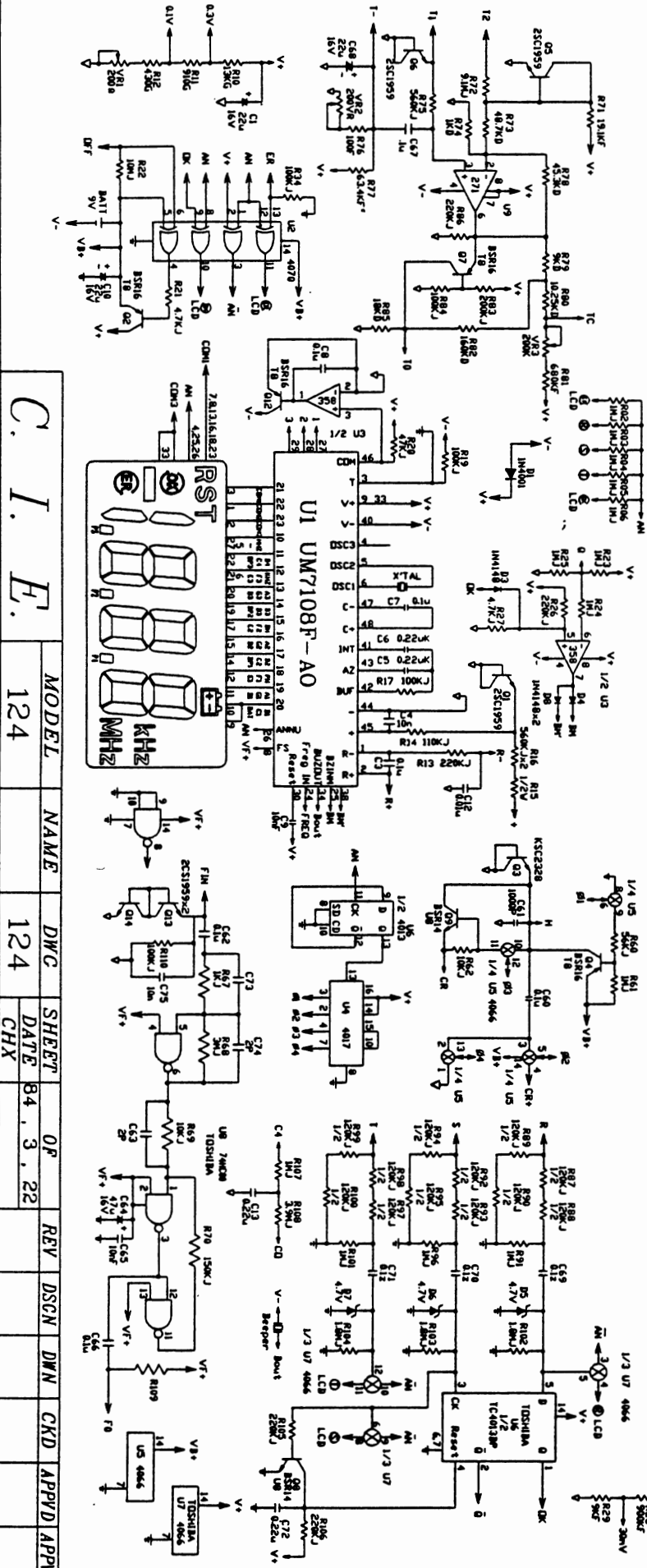
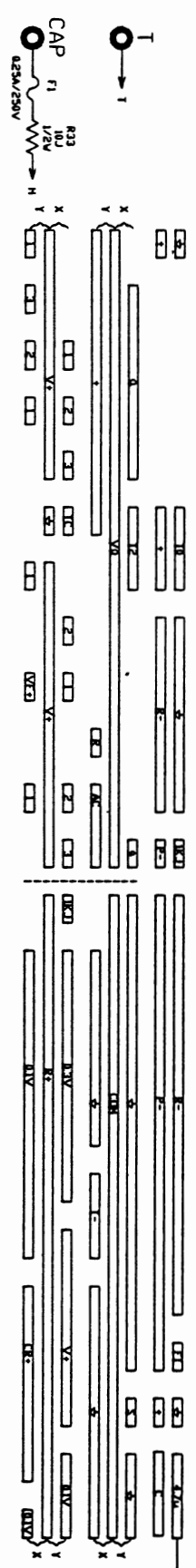
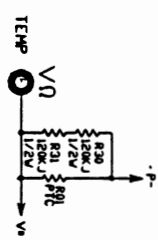
7. Set the Range selector switch to the " $^\circ\text{F}$ " position.

8. Adjust VR3 (VR $200\text{K}\Omega$) until the display reads 032°F .

1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 Y

— DCV — °C °F 20u 200u 20m — CX — 200 2K 20K 200K 200K 20M 200M 2000H 2Z RST 200 600V

— ACV —



C. I. E.		MODEL	NAME	DWG	SHEET	DATE	REV	DSGN	DWN	CKD	APPVD	APPVD
		124		124	CHX	84.3.22						