

Model 381270 & 381275 MultiScope™



CAUTION: Read, understand and follow all Safety Rules and Operating Instructions in this manual before using this product.

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WARNING: USE EXTREME CAUTION IN THE USE OF THIS DEVICE. Improper use of this device can result in injury or death. Follow all safeguards suggested in this manual. In addition to the normal safety precautions used in working with electrical circuits. DO NOT service this device, if you are not qualified to do so.

SAFETY INSTRUCTIONS

This meter has been designed to be safe in use, but the operator must use caution in its operation. The rules listed below should be carefully followed for safe operation.

- Avoid Working Alone.
- Do not use Non-Rechargeable Batteries (Alkaline, Carbon Zinc etc.) together with the AC power Adapter.
- Do not turn the Rotary switch to HI-Z/ range while the Test Leads are connected to a High Voltage
- When measuring resistance (OHMS) be sure the circuit is non-powered. Ohms can not be measured if there is voltage in the circuit being measured.
- When using the inductive pick up lead, be sure you keep the inductive clamp away from adjoining high tension spark plugs leads to prevent the clamp from picking up signals from those leads.
- Use a current clamp to measure circuits exceeding 20A.
- When measuring current, turn the power off before connecting the meter to the circuit.
- Select the proper function and range for your measurement.
- Never connect more than one set of test leads to the meter.
- Disconnect the live test lead before disconnecting the common test lead.
- Choose the proper range and function for the measurement.
- Do not try voltage or current measurements that may exceed the ratings marked on the function/range switch or terminal.
- Avoid Electrical Shock. Do not touch the test leads tips or the circuit being tested.
- Never operate the meter unless the back cover and the battery/fuse door are in place and fastened securely

SAFETY SYMBOLS



This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

WARNING

This **WARNING** symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION

This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury or damage to the product or other property.



This symbol advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage, with respect to earth ground, exceeds (in this case) 500 VAC or VDC.



This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, the test leads should not be handled when these terminals are energized.

SPECIFICATIONS

Display	128x64 pixel graphic LCD (view area: 2.8x1.5", 71.7x39mm)
Measurement rate	Digital: 4 times/sec; Bar-Graph: 7 times/sec.
Auto Power Off	After 30 minutes of inactivity
Overrange indication	"OVER"
Display rate	Digital display; 4/second Bargraph; 7/second
Input resistance	10M Ω , >2G Ω on mV range
Power	6 size AA cells, 6 size AA Nicad batteries, 2 Ni-Cad Battery Pack or AC adaptor Operating time: Alkaline (6hrs approx.), Ni-Cad (8hrs approx.) Ni-Cad Charging time (3hrs approx.)
Temperature	Operating: 32 $^{\circ}$ F to 104 $^{\circ}$ F(0 $^{\circ}$ C to 40 $^{\circ}$ C), Storage (Ni-Cad batteries removed): -4 $^{\circ}$ F to 140 $^{\circ}$ F (-20 $^{\circ}$ C to 60 $^{\circ}$ C), Charging: 32 $^{\circ}$ F to 113 $^{\circ}$ F(0 $^{\circ}$ C to 45 $^{\circ}$ C)
RS232 Interface	Baud Rate: 9600, Data bit: 8 bit, Stop bit: 1 bit, Parity: none
Min/Max/Avg.	Records minimum, average and maximum value
Hold	Captures displayed reading
Storage	15 pages (text or graphic)
Dimensions/weight	4.2x8.3x2.2" (107x210x55mm) / 1.77lbs. (800gm)

Digital Storage Oscilloscope

Display	Number of Channels	One
	Bandwidth	DC to 100kHz
	Volt / Division (4 divisions)	150mV to 400V
	Sample Rate	1.0MSPS
Horizontal	Number of Channels	One
	Second / Division (9 divisions)	10usec. to 1 second
	Record length	25 div
Glitch Capture	500nsec. (minimum)	

Multimeter	Range	Resolution	Accuracy
DC Voltage	400mV	0.1mV	$\pm(0.5\%rdg + 10dgt)$
	4V	0.001V	
	40V	0.01V	
	400V	0.1V	
	1000V	1V	
AC Voltage True RMS	400mV	0.1mV	$\pm(0.75\%rdg + 10dgt)$ RMS 50Hz to 1kHz
	4V	0.001V	
	40V	0.01V	
	400V	0.1V	
	700V	1V	
DC Current	400 μ A	0.001mA	$\pm(1.0\%rdg + 10dgt)$
	400mA	0.1mA	
	20A	0.01A	
AC Current	400 μ A	1 μ A	$\pm(1.2\%rdg + 10dgt)$ RMS 50Hz to 1kHz
	400mA	0.1mA	
	20A	0.01A	

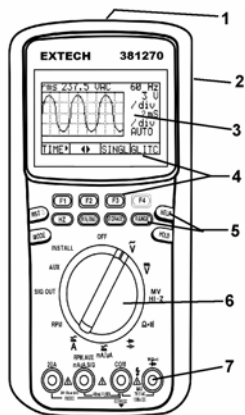
Multimeter	Range	Resolution	Accuracy
Resistance	400Ω	0.1Ω	±(1.0%rdg + 5dgt)
	4kΩ	0.001kΩ	
	40kΩ	0.01kΩ	
	400kΩ	0.1kΩ	
	4MΩ	0.001MΩ	
	40Mohms	10kohms	±(3.0%rdg + 5dgt)
Conductance	0025 to 0999nS	1nS	±(3.0%rdg + 5dgt)
Capacitance	4nF	0.001nF	±(3.0%rdg + 5dgt)
	40nF	0.01nF	
	400nF	0.1nF	
	4μF	0.001μF	
	40μF	0.01uF	
Frequency	1,000Hz	1Hz	±(1.0%rdg + 5dgt)
	100kHz	1kHz	
Diode Test		1mV	±(2.0%rdg + 5dgt)
dB	-80 to +80dB	Reference values: 2, 4, 8, 16, 50, 75, 93, 110, 125, 135, 150, 300, 600, 900, 1000Ω	
RPM	12000rpm	10rpm	±(3.0%rdg + 10rpm)
Period/Pulse Width	4000usec	1usec	±(3.0%rdg + 5dgt)
	1000msec	1msec	
Duty Cycle	1 to 100%	0.1%	±(3.0%rdg + 5dgt)
Signal Out	10Hz – 100Hz	1Hz	±(1.2% + 5 digits)
	100Hz - 1000Hz	10Hz	
	1kHz – 20kHz	1kHz	

OVERLOAD PROTECTION

Input Overload Protection	
Function	Maximum Input
V DC, V AC	1000V DC or AC peak, less than 10 sec
mV AC, mV DC	250V DC or AC peak, less than 10 sec
mA DC/AC	400mA DC / AC, Fused: 0.4A/250V ceramic fast blow
20A DC/AC	20A DC or AC, less than 30 sec with a 15 min cool down period, Fused: 20A/250V ceramic fast blow
RPM	250V Dc or AC rms, less than 10 sec
Period/Pulse Width	250V DC or AC rms, less than 10 sec
Duty Cycle	250V DC or AC rms , less than 10 sec
Capacitance	None
Diode	None
WARNING: To avoid electric shock and damage to the meter, do not test any diode or capacitor that has voltage on it	

BASIC METER FUNCTIONS

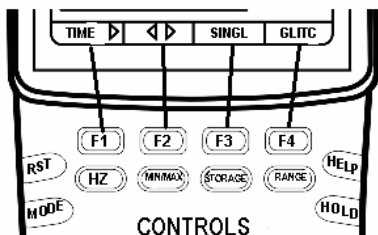
1. RS 232 Computer Interface Socket
2. AC Adapter Input Socket
3. LCD Screen display
4. Soft keys and labels
5. Buttons (Select mode of operation)
6. Rotary Switch (Select function).
7. Input jacks



CONTROLS

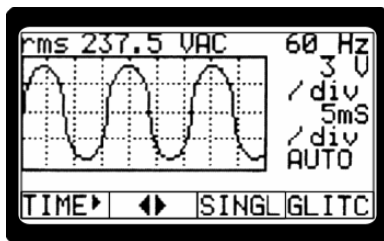
Soft function keys F1, F2, F3, F4

These four keys perform the function indicated on the LCD display. The function will change depending on the position of the rotary switch and the mode of operation.



- RST:** Power reset key to re-activate power if the auto-shutoff is in effect after 30 minutes of inactivity.
- MODE:** Toggle between the multimeter text mode and the oscilloscope graphics mode. The graphics mode functions in the V, A, and mV modes.
- HOLD:** "Freezes" the reading on the display. Press "Hold" again to resume normal operation. The hold symbol "H" will appear on the display when Hold is selected.
- HELP:** Displays three screens (safety, connections, procedure) for the function selected on the rotary switch. The F4 key steps through the pages. Press "HELP" to exit.
- HZ:** Selects the Frequency mode in V functions.
- MIN/MAX:** Selects the MIN, MAX, Average display.
- STORAGE:** Store and recall measurement data or graphical display.
- RANGE:** Holds and selects a measurement range. Hold the key for 2 seconds to return to auto-range.

BASIC DISPLAYS



Multimeter Mode

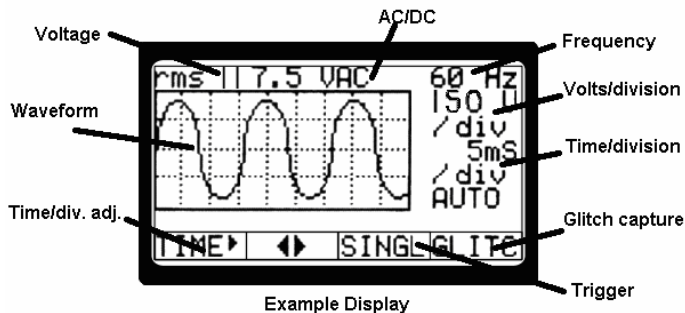
Oscilloscope Mode

DISPLAY SYMBOLS

A	Ampere	RANGE	manual ranging
AC ~	Alternating current	REL	Relative
AUTO	auto ranging	RESET	Reset
Ave	average	RMS	True RMS
BEEPER	Button beeper	RPM	revolution per minute
CALL	Recall stored data	RS232	RS 232 Interface is on
CLEAR	Remove stored data	RUN	Record in "MIN/MAX" mode
dB	Decibel	Singl	Single Waveform
DC —	Direct current	SLEEP	Auto shut-off
div	division (graph mode)	TEST	Self Test (Install function)
DUTY	Duty cycle	Time ►	Time change (graph mode)
F	Farads (capacitance)	TRIG	Frequency Trigger
Glitch	Glitch Waveform	V	Volts
Hi-A	High Current	Ω	ohms (resistance)
Hi-Z	High Impedance	%RH	Relative Humidity
Hz	Hertz (frequency)	2 cyl	2 cycle engine
Max	maximum	4 cyl	4 cycle engine
Min	minimum	🔊	Buzzer, Continuity
nS	Nano Siemens (Conductance)	◀▶	cursor (left or right)
°C	Degrees Centigrade	⬆	cursor (up or down)
°F	Degrees Fahrenheit	🔋	Low Battery Indication
OUT	Signal out	⚡	Overrange on A & V ranges.
PAUSE	Pause in "MIN/MAX" mode	👉	AC adaptor is connected
P-H	Peak Hold		
Psi,kPa	Pressure		

GRAPHICAL DISPLAY DESCRIPTION

1. The graphical mode is entered when the "MODE" key is pressed when the function switch is in the ACV, DCV, mV, ACA or DCA position
2. The amplitude (vertical) and time (horizontal) divisions are selected automatically when in the autoranging mode. The time division will vary to display the best wave pattern in the autoranging mode or can be set manually using the "F1" and arrow keys. The volts/division is determined by the range selected and cannot be varied.



SOFT KEYS AND SUB-MENUS

Function keys **F1**, **F2**, **F3**, and **F4** are located directly below the LCD display and perform multiple operation as indicated on the LCD and determined by the function selected by the rotary switch. Some functions will produce a sub-menu on the display for further selection. Operation of the menus and sub-menus is described in the appropriate operation paragraph.

OPERATING INSTRUCTIONS

WARNING: Risk of Electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

1. **ALWAYS** set the power switch to the **OFF** position when the meter is not in use.
2. If **"OVER"** appears in the display during a measurement in the manual range mode, the value you are measuring exceeds the range you have selected. Change to a higher range.

AUTORANGE / MANUAL RANGE SELECTION

The meter will turn on in the autoranging mode. For most applications this is the easiest and most accurate method of measurement. For measurements that require the range to be held:

1. Press the **"RANGE"** key. The display will change from **"AUTO"** to **"RANGE"** (manual range) with the full scale value displayed.
2. Each time the **"RANGE"** key is pressed, the next available range will be set.
3. To return to **"AUTO"** range, hold the **"RANGE"** key for 4 seconds.

DATA HOLD

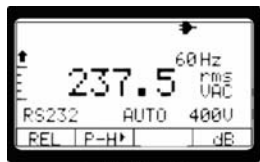
The meter will freeze the reading in the display when the **HOLD** key is pressed. **"H"** will appear in the display when **HOLD** is activated. Press **HOLD** again to resume normal operation.

AUTO POWER OFF

The meter will automatically shut off after 30 minutes if a push button is not pressed or the rotary switch is not moved. The symbol in the upper left of the display indicates the time left to shut off.

AC VOLTAGE MEASUREMENT

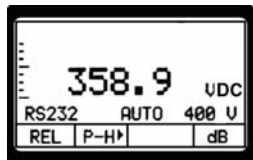
1. Turn the rotary switch to the **ACV** position.
2. Press the **HELP** key and then the **F4** key to display procedures, cautions and connection diagrams regarding ACV measurements.
3. Press the **HELP** key again to exit the HELP screens.



AC VOLTAGE

DC VOLTAGE MEASUREMENT

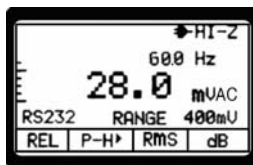
1. Turn the rotary switch to the **DCV** position.
2. Press the **HELP** key and then the **F4** key to display procedures, cautions and connection diagrams regarding DCV measurements.
3. Press the **HELP** key again to exit the HELP screens.



DC VOLTAGE

mV HI-Z AC AND DC VOLTAGE MEASUREMENTS

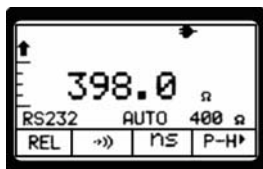
1. Turn the rotary switch to the **mV/HI-Z**.
2. Press **F3** to toggle between AC and DC measurement.
3. Press the **HELP** key and then the **F4** key to display procedures, cautions and connection diagrams regarding DCV measurements
4. Press the **HELP** key again to exit the HELP screens



mV

RESISTANCE, CONDUCTANCE AND CONTINUITY MEASUREMENTS.

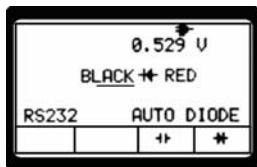
1. Turn the rotary switch to the " **Ω** " position.
2. The meter will turn on in the resistance autoranging mode.
3. Press the **HELP** key and then the **F4** key to display procedures, cautions and connection diagrams regarding resistance measurements
4. Press **F2** to activate the continuity beeper. The meter will beep if the resistance measurement is less than 40Ω .
5. Press F3 to enter the conductance (nS) mode. Conductance = $1/\Omega$ and is displayed in nS (nano Siemens) from 0025nS to 0999nS (1 to 40M Ω)



RESISTANCE

CAPACITANCE AND DIODE MEASUREMENTS.

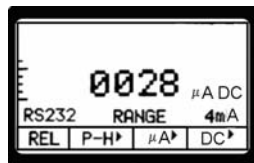
1. Turn the rotary switch to the **▶ / -|-** position.
2. Press the **HELP** key and then the "**F4**" key to display procedures, cautions and connection diagrams regarding diode or capacitance measurements
3. The meter will turn on in the capacitance autoranging mode.
4. Press F4 to enter the diode mode.
5. In diode check, the meter will display a diode symbol and indicate the forward voltage drop across the diode



DIODE

mA / μ A AC AND DC CURRENT MEASUREMENTS.

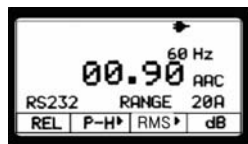
1. Turn the rotary switch to the **mA/ μ A** position.
2. Press the **HELP** key and then the "**F4**" key to display procedures, cautions and connection diagrams regarding current measurements
3. The meter will turn on in the DC μ A mode.
4. Press F4 to change to AC measurements.
5. Press F3 to change to the mA mode.



mA

AC AND DC CURRENT MEASUREMENTS.

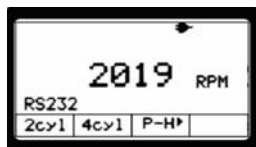
1. Turn the rotary switch to the **AC/DC A** position.
2. Press the **HELP** key and then the **"F4"** key to display procedures, cautions and connection diagrams regarding current measurements
3. Maximum allowed current is 20 Amps. Use a current clamp for larger currents.
4. Press F3 to change from DC to AC current.
5. Press F4 to change to dB.



Amps

RPM MEASUREMENTS.

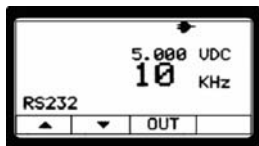
1. Turn the rotary switch to the RPM position.
2. Press the **HELP** key and then the **"F4"** key to display procedures, cautions and connection diagrams regarding rpm measurements
3. Connect the optional inductive pickup as described.
4. Press F1 for 2 cycle engines and F2 for 4 cycle engines..



RPM

SIG.OUT

1. Turn the rotary switch to the SIG.OUT position.
2. Press the **HELP** key and then the **"F4"** key to display procedures, cautions and connection diagrams regarding the SIG.OUT function.
3. Press F1 to increase the frequency and F2 to decrease the frequency.
4. Press F3 to initiate the output. Press again to disable the output.



SIGNAL OUT

AUX

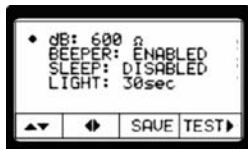
The AUX selection allows direct display of °C, °F, %RH, psi or High current in the correct units when the meter is used with an optional adaptor.

1. Turn the rotary switch to the AUX position.
2. Press the **HELP** key and then the **F4** key to display procedures, cautions and connection diagrams regarding the AUX function.
3. Press F1 to F4 to select the units that match the adaptor being used

INSTALL

The Install function provides a means to set three default Power-on conditions (dB reference, key beeper, auto-shutoff) and also enable self-test.

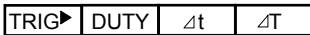
1. Turn the rotary switch to the **INSTALL** position.
2. Press the F1 key to select one of the three features.
3. Press F2 to enable or disable the feature or to set the dB reference level.
4. Press F3 to save the changes.
5. Press F4 to run the self test.



INSTALL

HZ FREQUENCY MEASUREMENTS

1. Press the **HZ** key in the ACV, DCV, mV, or Amp function to change to the frequency display. The frequency related soft keys will appear on the display.
2. Frequency display soft-keys

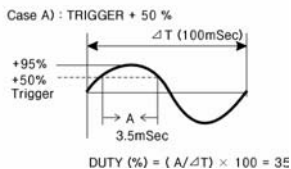


F1 "TRIG" trigger level

- a) The Trigger Level allows adjustment of the trigger level from 0 to 95% of the peak of the measured signal.
- b) Press **F1** to change the polarity of the trigger.
- c) Press **F2** or **F3** to adjust the % trigger level
- d) Press **F4** to exit the trigger level menu.

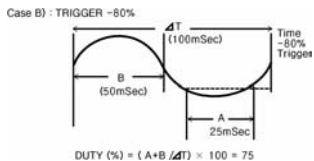
F2 "DUTY" duty ratio

- a) The Duty function changes the display from frequency to duty ratio.
- b) Press **F2** to enter the duty function. The display will change to % if a signal is present.
- c) In the duty function, "DUTY" will blink.
- d) Press **F2** to exit the mode.



F3 "Δt" pulsewidth

- a) The pulse width function changes the display from frequency to pulse width.
- b) Press **F3** to enter the pulse width function. The display will change to mS if a signal is present.
- c) In the pulse width function, Δt will blink.
- d) Press **F3** to exit the mode.

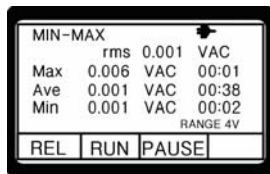


F4 "ΔT" period

- a) The period function changes the display from frequency to period.
- b) Press **F4** to enter the period function. The display will change to mS if a signal is present.
- c) In the period function, "ΔT" will blink.
- d) Press **F4** to exit the mode.

MIN/MAX DISPLAY

1. Press the "MIN/MAX" key to enter this function.
2. The display will indicate the maximum value, the average value, and the minimum value since the mode was initiated and the relative time for each value is displayed next to the value.
3. The time format is MIN:SEC (00:00).
4. Press **F1** to reset the time and begin recording a new series.
5. Press **F3** to pause the recording.
6. Press **F2** to resume recording after **F3** is pressed.



MIN/MAX

STORAGE FUNCTIONS

1. Press the **STORAGE** key to enter this feature.
2. The display will list four memory locations and indicate what type of data is stored in each location. Locations with no data will be left blank.
3. Press **F1** to scroll the diamond cursor down through the 15 memory locations.
4. At the selected memory location, press **F2** to store the last text or graphical display or press **F3** to RECALL the stored data.
5. At the selected memory location, press **F4** to clear the memory.
6. Press **STORAGE** to exit the feature.

RANGE

The meter will turn on in the autoranging mode. For most applications this is the easiest and most accurate method of measurement. For measurements that require the range to be held:

1. Press the **RANGE** key. The display will change from **"AUTO"** to **"RANGE"** (manual range) with the full scale value displayed.
2. Each time the **RANGE** key is pressed, the next available range will be set.
3. To return to **"AUTO"** range, hold the **RANGE** key for 4 seconds.

RELATIVE (text soft key)

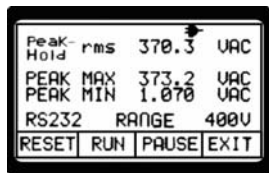
The relative mode displays of the difference between a reference value and the measured value

REL	P-H▶		
-----	------	--	--

1. Press the **F1** soft key when the measured reference value is on the display.
2. The **"REL"** label will blink when the relative mode is active.
3. Press **F1** to exit relative mode.

PEAK-HOLD (text soft key)

1. Press the **P-H** soft key.
2. The LCD will display the Peak rms value of the measured parameter, the peak max and peak min values.
3. Press **F3 PAUSE** to hold the min and max values.
4. Press **F2 RUN** to continue measuring.
5. Press **F1 RESET** to reset the values for a new run.
6. Press **F4** to **EXIT**.



Peak- rms	370.3	UAC
Hold		
PEAK MAX	373.2	UAC
PEAK MIN	1.070	UAC
RS232	RANGE	400V
RESET	RUN	PAUSE EXIT

PEAK HOLD

DB (text soft key)

1. Press **F4 "dB"** to display dB. This feature is available in the voltage, millivolt and amp functions.
2. The reference impedance is set in the install function.

TIME (graphical soft key)

The TIME function is used to adjust the horizontal display rate in time/division.

1. Press **F1 "TIME"**
2. Press the **F1** or **F2** up/down arrow keys to adjust the time.
3. Press **F4 "EXIT"** to return to auto-time.

◀▶ (graphical soft key)

The **F2** left/right arrow key will “freeze” the waveform on the display and open a sub-menu which allows time scrolling.

1. Press **F2** to freeze the graphical display.
2. Press the sub-menu **F1** or **F2** arrow keys to shift the waveform in time.
3. Press the sub-menu **F4** “EXIT” to return to the graphical display.



SINGLE (graphical soft key)

The **F3** “SINGL” key will trigger a single measurement when the key is pressed. and open a sub-menu which allows time expansion or compression for enhanced waveform viewing.

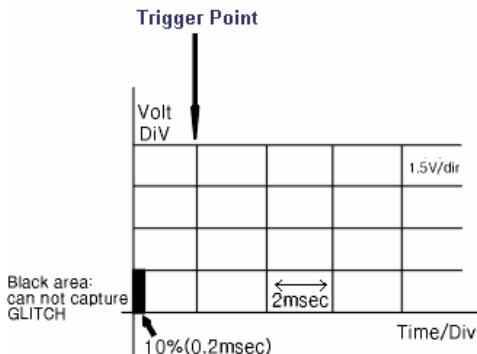
1. Press **F3** to trigger a single measurement.
2. Press the sub-menu **F2** or **F3** arrow keys to change the time/division.
3. Press the sub-menu **F1** key to trigger a new measurement.
4. Press **F4** “EXIT” to return to the graphical display.



GLITC (graphical soft key)

The **F4** “GLITC” key sets the meter to trigger a measurement on any signal which causes an overrange indication or is greater than one vertical division or is greater than 10% of one horizontal division.

1. Press **F4** to set the glitch mode.
2. Any glitch will trigger a measurement.
2. Press the sub-menu **F2** or **F3** arrow keys to change the time/division and reset the glitch trigger..
3. Press the sub-menu **F1** key to reset the glitch trigger..
4. Press **F4** “EXIT” to return to the graphical display.



SOFTWARE INSTRUCTIONS

INSTALLATION

1. Start Windows 95/98.
2. Insert the program disk into drive A:.
3. Select "**START**" and then "**RUN**" from the Windows menu bar.
4. Type "A:\SETUP.EXE" in the OPEN box and select "OK"
5. Follow the installation instructions on the screen.

OPERATION

1. Connect the RS-232 cable between the serial ports of the meter and the PC.
2. Select the "**Mscope**" icon in the START / PROGRAM menu.
3. In the MultiScope opening screen select "**Setup / Comm Port**". Select the proper COM port and click "OK".
4. Select "**Setup / Sampling Time**" to set the sampling (data record) time for each measurement.
5. Select "**Setup / dB**" to set the dB reference level.
6. Turn the meter ON and select "**Run** (on the menu bar) **and Start**". The PC display will indicate the measured value on the large display and also in a list format with the associated time of measurement.
7. Select "**Run / Stop**" to stop the data recording.
8. Select "**Graph / Bar or Line**" to plot the data in graphical format.
9. Select "**File / Save**" to save the recorded data.
10. Select "**File / Open**" to open an existing file.
11. Select "**File / Print**" to print the file.
12. When the meter is in the graphical mode, press "**MIN/MAX**" to capture a waveform display to the PC screen.

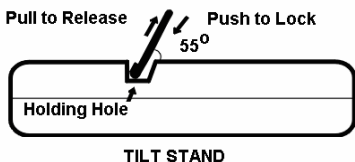
NOTE: Capturing a waveform will delete any active recorded data. To save any recorded data, save it before using "MIN/MAX" to capture or capture the screen to the MultiScope memory for later recall.

CAUTION: Always observe the MultiScope LCD display for overload conditions. If an overload occurs, the MultiScope software displays the maximum value for the range selected. It does not indicate an overload on the PC screen. i.e. If the 40V range was held and a voltage greater than 40V was applied to the test leads, the PC display will indicate "40.00", not "OL" or the actual voltage. To avoid this condition, Autoranging is recommended

TILT STAND

The tilt stand can be placed either in the locked stand position for flat surface use or in the hinged position for hanging use.

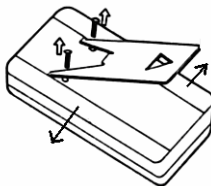
1. For use on a flat surface, lift the stand to approximately a 55 degree angle and push in until the stand locks in the holding hole.
2. To hang the meter, squeeze the legs of the stand and remove it from the meter. Turn the stand 180 degrees and replace in the holder. The stand will now swing free over the top of the meter.



BATTERY REPLACEMENT

Caution: Do not use non-rechargeable batteries (alkaline, carbon-zinc, etc.) with the optional AC power adaptor. The AC power adaptor may be used when the optional rechargeable Ni-Cd batteries are installed.

1. Lift the tilt stand and remove the two screws.
2. Lift the two battery covers up to remove them.
3. Replace the six batteries. Observe the proper polarity as indicated in the compartment.



MULTISCOPE BATTERY TUBES

Contained within this package you will find two hollow cardboard tubes. The purpose of these tubes is to hold the batteries in place in the battery compartment. Directions for proper installation: Remove the battery cover screw and then remove the battery cover itself. Insert three AA 1.5V batteries into each tube (observing proper polarity). Now insert the full tube into the battery compartment (observing proper polarity). Replace the battery cover and then replace the screw.

FUSE REPLACEMENT

1. Lift the tilt stand and remove the two screws.
2. Lift the two battery covers up to remove them.
3. Remove the batteries.
4. Lift to remove the fuse cover.
5. Replace any defective fuse with a fuse of the same type.