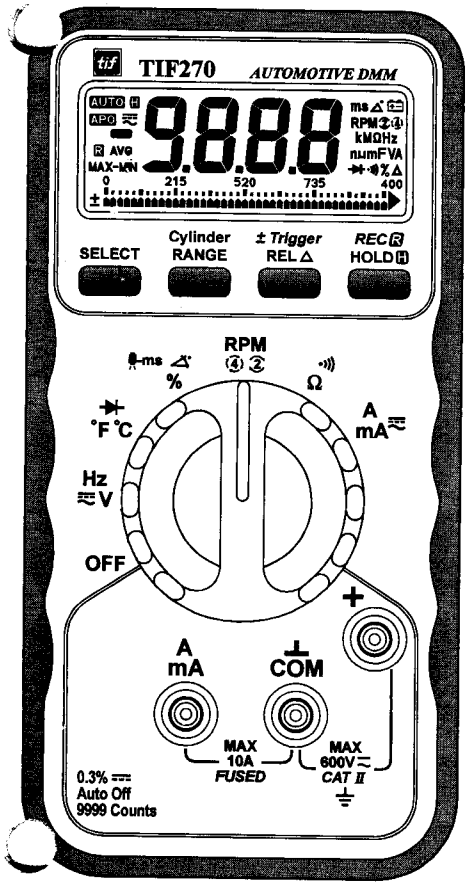

USER'S MANUAL

TIF270

TABLE OF CONTENTS

1) SAFETY

This manual contains information and warnings that must be followed for operating the instrument safely and maintaining the instrument in a safe operating condition. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.

TERMS IN THIS MANUAL

WARNING identifies conditions and actions that could result in serious injury or even death to the user.

CAUTION identifies conditions and actions that could cause damage or malfunction in the instrument.

INTERNATIONAL ELECTRICAL SYMBOLS

⚠ Attention ! Refer to the explanation in Manual

⚠ Dangerous Voltage

⏚ Ground

⧈ Double Insulation

⎓ Fuse

~ AC—Alternating Current

⎓ DC—Direct Current

≂ Either DC or AC

Safety: The instruments meet the requirements for double insulation to IEC1010-1(1995), EN 61010-1(1995), UL3111-1(6.1994), CSA C22.2 NO. 1010-1-92 to:

terminal +: Installation category II, 600V ac & dc.

terminal mA/A: Installation category II, 250V ac & dc.

E.M.C. : The instruments meet EN 55011(3.1991) and EN 50082-1(1992)

WARNING

To avoid electrical shock hazard or damage to the meter, do not exceed the overload level shown in **TABLE 1**

FUNCTION	TERMINALS	OVERLOAD LEVEL
DC VOLTAGE AC VOLTAGE mV MILLI-VOLT Hz FREQUENCY Ω RESISTANCE •)) AUDIBLE CONTINUITY ∠° DWELL ANGLE % DUTY CYCLE -ms INJECTION DETECTOR ℃℉ TEMPERATURE DIODE TEST RPM④②	+ & COM	600VDC or VAC rms
mA A CURRENT	mA A & COM	10A*/250V

* 10A CONTINUOUS; 20A FOR 30 SECONDS MAXIMUM, 5 MINUTES COOL DOWN INTERVAL

TABLE 1

WARNING

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

To avoid electrical shock hazard, observe the proper safety precautions when working with voltages above 60 VDC or 25 VAC rms. These voltage levels pose a potential shock hazard to the user.

Inspect test leads, connectors, and probes for damaged insulation or exposed metal before using the instrument. If any defects are found, replace them immediately. The screw on alligator clips test lead accessory provided is to be used in applications not [redacted] than 30Vrms.

To avoid electrical shock hazard, do not touch test lead tips or the circuit being tested while power is applied to the circuit being measured.

Never attempt a voltage measurement with the test lead inserted into the mA A input jack. You might be injured or damage the meter.

CAUTION

Disconnect the test leads from the test points before changing functions. Always set the instrument to the highest range and work downward for an unknown value if you are using manual ranging mode. Install only the same type of fast acting fuse or equivalent

Do not place the instrument and its accessories near the engine, the exhaust manifold, or inside the car under direct sun light which might be hot and can damage the instrument

2) INTRODUCTION

The TIF 270 is a hand held, battery operated professional quality automotive meter for today's complex automotive electronic system diagnostic and troubleshooting. The measuring functions include DC Voltage, AC Voltage, DC Current, AC Current, Resistance, Frequency, Duty Cycle, RPM, Dwell Angle, Temperature, ms Fuel Injection Detector for both Port Fuel Injector (PFI) & Throttle Body Injector (TBI), Diode Tester, and Continuity Tester.

Pushbutton functions include Data Hold, Auto or Manual Ranging, Relative Zero mode, 50ms Record mode, trigger slope selection, number of cylinders selection, Secondary Functions Selection, as well as RPM for conventional 2 Stroke, 4 Stroke, DIS, or special 2 Stroke waste ignition Engine.

Power on options include Line Filter Frequency 50/60Hz Selection for best noise rejection (normally only available in expensive bench top instruments).

This series is housed inside a gasket sealed heavy duty casing which keeps out grease, oil, dirt and moisture to maintain superb accuracy and reliability. Besides, the casing is made of high impact thick wall fire [redacted] material to maximize durability of the meter, and safety to the user.

3) PRODUCT DESCRIPTION

3-1) PANEL ILLUSTRATION, See FIG 1

1. **LCD display** 4 digit 9999 counts LCD display

2. ***REC*** **HOLD** Pushbutton. Push momentarily to activate HOLD, or Press and Hold for 1 second to activate RECORD function

3. ***± Trigger*** **REL△** Pushbutton. Push momentarily to select Relative Zero, or Press and Hold for 1 second to toggle between positive and negative trigger slopes

4. **Selector** Turn the Power On or Off and Select a function

5. **+** Input Jack for all functions EXCEPT current functions

6. **COM** Common (Ground reference) Input Jack for all functions

7. **mA A** Input Jack for current function

8. **RANGE** Pushbutton to select Auto/Manual ranging in most functions, or number of cylinders on Dwell function

9. **SELECT** Pushbutton to select secondary functions

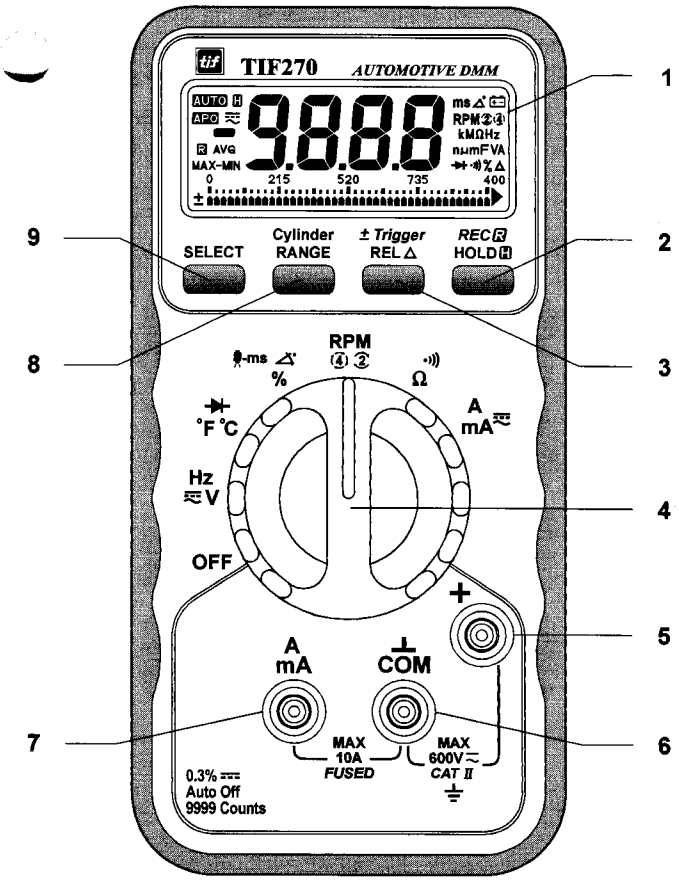

FIG 1. FRONT PANEL LAYOUT

3-2) LCD ILLUSTRATION, See FIG 2

10. Low Battery alert, replace the battery as soon as possible to ensure accuracy
11. △ annunciator indicates relative zero
12. Analog bar graph with overload flag
13. ± Analog bar graph polarity, or ± trigger slope polarity
14. AVG MAX-MIN These annunciators indicate MAX (Maximum), MIN (Minimum), MAX−MIN (Maximum minus Minimum), or AVG (Average) reading is being displayed
15. R This annunciator indicates the RECORD function is activated
16. APO This annunciator indicates Auto Power Off is enabled
17. AUTO This annunciator indicates Autoranging
18. H This annunciator indicates data HOLD function is activated
19. ⎓ ~ ⎓ annunciator indicates direct current (DC) is selected. ~ annunciator indicates alternating current (AC) is selected

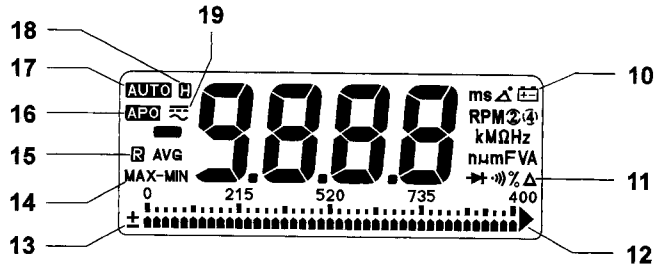

FIG 2. LCD DISPLAY (SHOWN ACTUAL SIZE)

3-3) ANALOG BAR GRAPH

The analog bar graph provides a visual indication of measurement like a traditional analog meter needle. It excellent in detecting faulty contacts, identifying potentiometer clicks, and indicating signal spikes during adjustments.

3-4) NMRR (Normal Mode Rejection Ratio)

NMRR is the DMM's ability to reject unwanted AC noise effect which can cause inaccurate DC measurements.

NMRR is typically specified in terms of dB (decibel). TIF270 has a NMRR specification of >50dB at 50 and 60Hz, which means a good ability to reject the effect of AC noise in DC measurements.

3-5) CMRR (Common Mode Rejection Ratio)

Common mode voltage is voltage present on both the COM and VOLTAGE input terminals of a DMM, with respect to ground. CMRR is the DMM's ability to reject common mode voltage effect which can cause digit rattle or offset in voltage measurements.

TIF270 has a CMRR specifications of >60dB at DC to 60Hz in ACV function; and >100dB at DC, 50 and 60Hz in DCV function. If neither NMRR nor CMRR specification is specified, a DMM's performance will be uncertain.

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4) OPERATION

4-1) DCV, ACV, Hz* functions

1) Set rotary switch to Hz ≂V position
2) Default at **DC**. Press **SELECT** button momentarily to select **AC**, and press again to select **Hz** if required
3) Insert red (+) test lead into + jack and black (−) test lead into **COM** input jack
4) Connect test leads to voltage source and observe the digital display. See **FIG 3**

*Note: 1. 4 trigger levels selectable through the **RANGE** push button for advanced applications in this **Hz** function. Press the **RANGE** button momentarily to display the selected sensitivities, and within 1 second press the **RANGE** button momentarily again to select another sensitivity. The meter will resume Hz measurements automatically 1 second after the **RANGE** button is pressed
Power up default is at 1V for highest sensitivity. If the Hz reading is unstable, select lower sensitivities (higher trigger level) 2V, 20V, or 200V. If the reading shows zero, select higher sensitivities

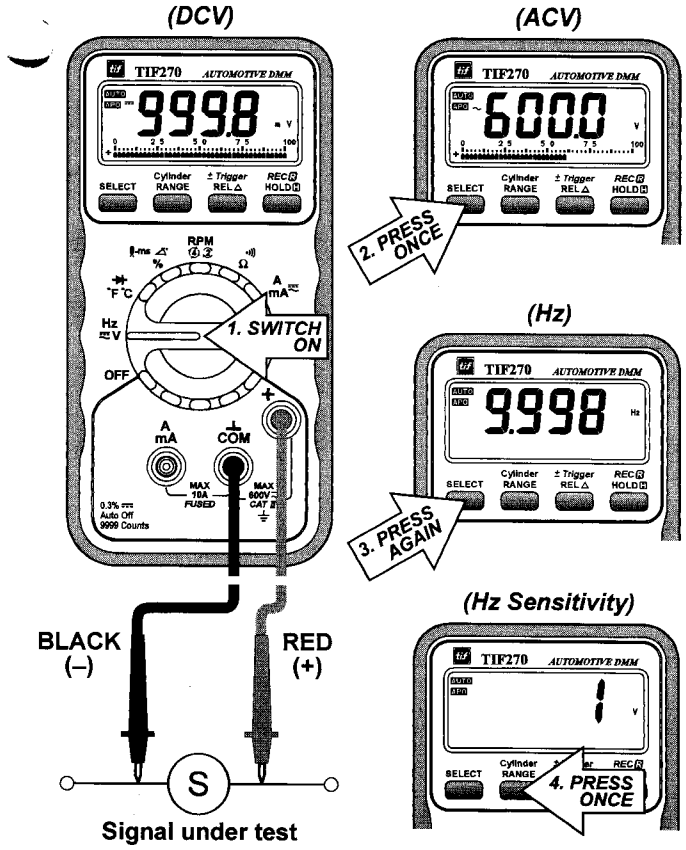


FIG 3. DCV, ACV, Hz FUNCTIONS

4-2) Temperature function

1) Set rotary switch to °F°C position
2) Default at °C. Press **SELECT** button momentarily to select °F readings
3) Insert banana plug K-type temperature bead probe (optional accessory) with positive (+) plug into +jack and negative (−) plug into **COM** input jack. You can also use a plug adapter (optional accessory) with banana pins to K-type socket for the standard K type mini plug temperature probe
4) Touch the end of the temperature probe to the measurement surface and observe the digital display, see **FIG 4**

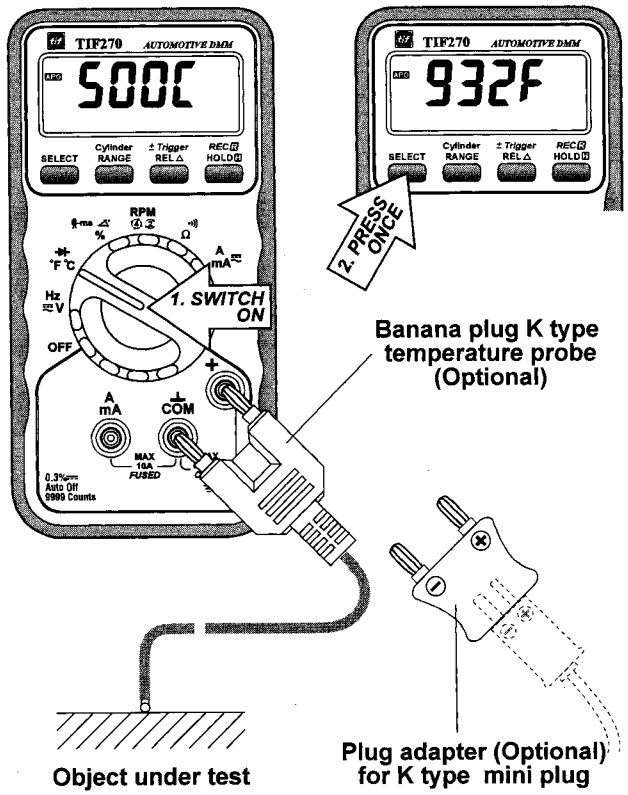


FIG 4. TEMPERATURE FUNCTION

4-3) ⊣⊢ DIODE TEST function

1) Set rotary switch to ⊣⊢ °F°C
2) Default at °C. Press **SELECT** button momentarily 2 times to select ⊣⊢ diode function
3) Insert red (+) test lead into +jack and black (−) test lead into **COM** input jack
4) Connect the test leads as shown in **FIG 5** and observe the digital display
5) Normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). An OL indicates an open diode (defective)
6) Reverse the test leads connections (reverse biased) across the diode
7) The digital display shows OL if the diode is good. Any other readings indicate the diode is resistive or shorted (defective)

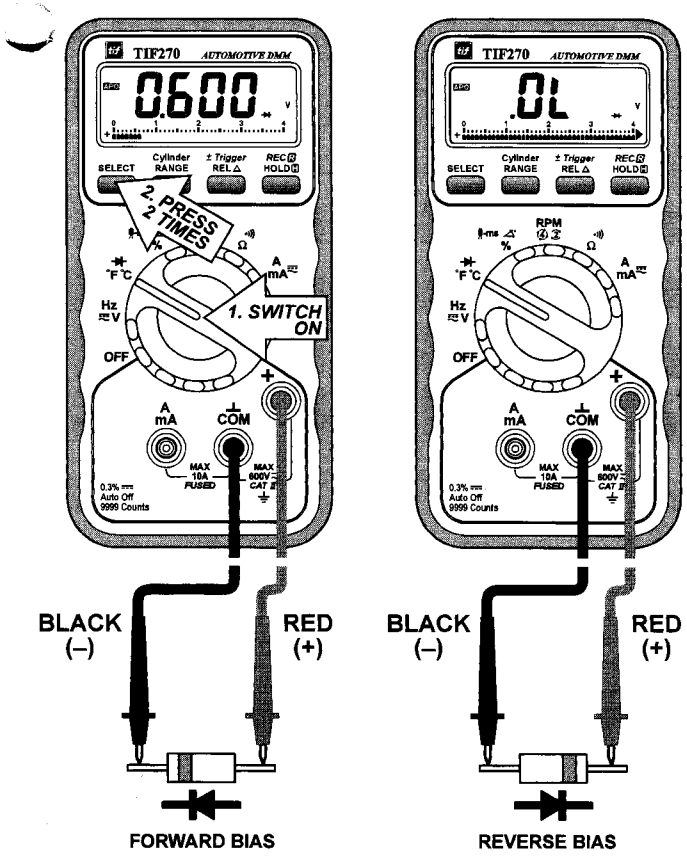


FIG 5. ⊣⊢ DIODE TEST FUNCTION

4-4) -ms FUEL INJECTION DETECTOR function

1) Set rotary switch to **-ms** **%**
2) Insert red (+) test lead into + jack and black (−) test lead into **COM** input jack
3) Connect the test leads as shown in **FIG 6** and observe the digital display
4) Default at **-ms**. Press **SELECT** button momentarily 2 times to display ms reading in terms of percentage (%) if required

Note: 1. This -ms function applies to both Port Fuel Injectors (PFI) which operate with a single on time pulse and Throttle Body Injectors (TBI) which operate with twin pulses

2. Positive & negative trigger slopes are selectable through ***±Trigger*** push button for advanced applications in the **-ms** & **%** functions. Also refer [redacted] Trigger **+** & **−** Selection section for more details

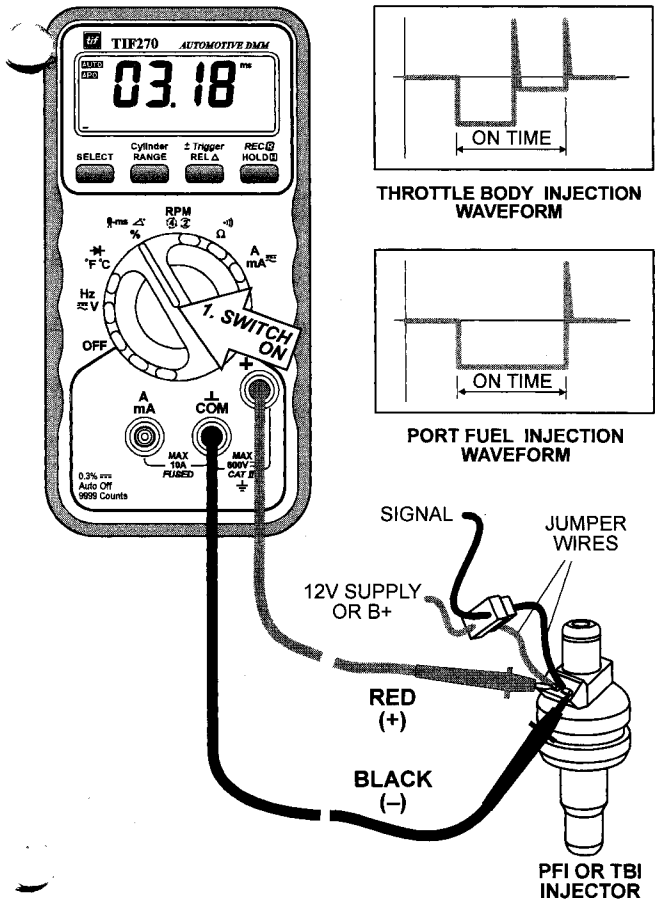


FIG 6. FUEL INJECTION DETECTOR

4-5) ∠ DWELL function

1) Set rotary switch to -ms ∠ %
2) Default at **-ms**. Press **SELECT** button momentarily to select ∠ Dwell function
3) Number of cylinders defaults at 4 cylinders (4-C). Press **Cylinder** (**RANGE**) button momentarily to display the cylinder setting, and press momentarily again within one second to select the number of cylinders from 1 through 12 to match the engine under test
4) Insert red **(+)** test lead into **+** jack and black **(−)** test lead into **COM** input jack
5) Connect the test leads as shown in **FIG 7** and observe the digital display
6) Press **SELECT** button momentarily again to display DWELL reading in terms of percentage (%) if required
7) Adjust the dwell angle according to the procedures outlined in your vehicle service manual

Note: 1. Re-check the timing whenever the dwell angle has been adjusted

2. Positive & negative trigger slopes are selectable through ***±Trigger*** push button for advanced applications in the **-ms** & **%** functions. Also refer [redacted]Trigger **+** & **−** Selection section for more details

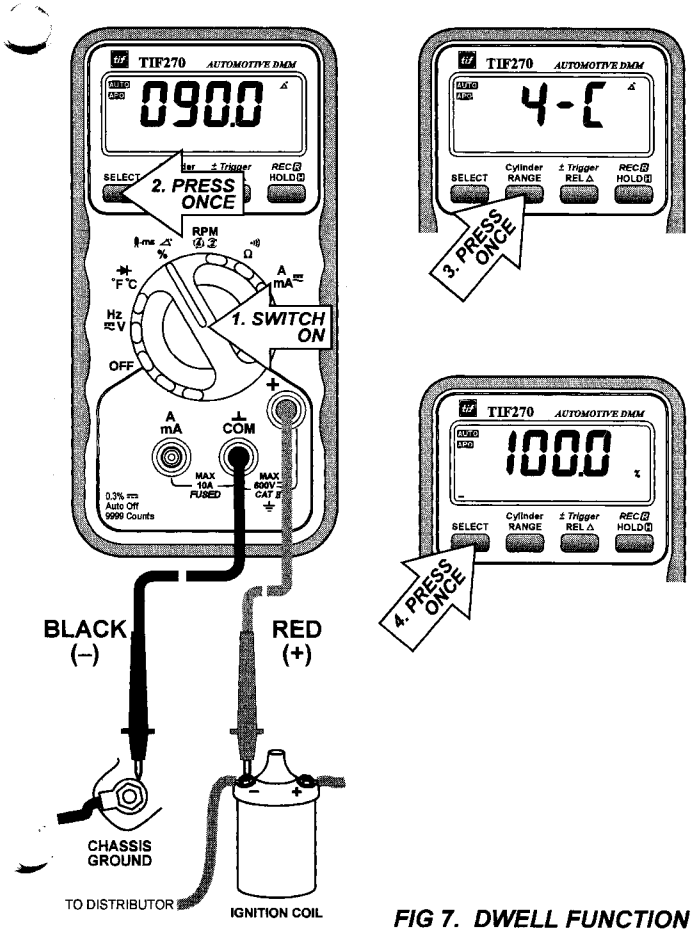


FIG 7. DWELL FUNCTION

4-6) RPM function

1) Set rotary switch to RPM ② ④
2) Press **SELECT** button to select through **RPM④** for 4-stroke, **RPM②** for 2-stroke and DIS, and **RPM② M** for special 2-stroke waste ignition engine
3) Insert output plug of inductive pick up with the positive (red) into **+** jack and the negative (black) into the **COM** input jack
4) Clamp the inductive pick up to a spark plug wire with the arrow sign facing the spark plug. See **FIG 8**. Make sure that the pick up jaws are completely closed
5) Observe the digital display for **RPM** readings

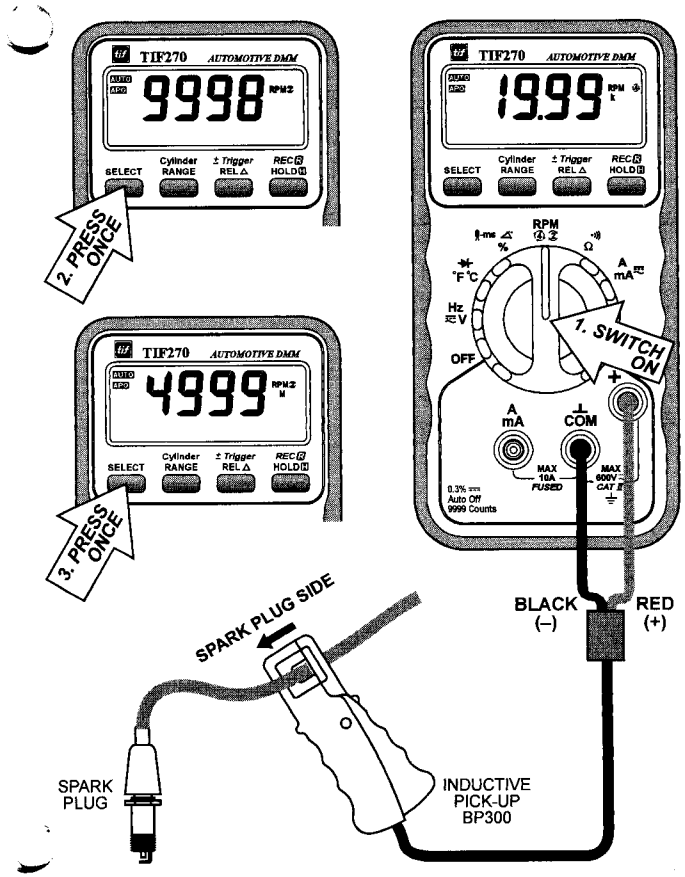


FIG 8. RPM FUNCTION

4-7) Ω RESISTANCE, •)) CONTINUITY functions

1) Set rotary switch to •)) Ω
2) Insert red (+) test lead into + jack and black (−) test lead into **COM** input jack
3) Connect the test leads as shown in **FIG 9** and observe the digital display
4) Default at Ω. Press **SELECT** button momentarily to select •)) Continuity function
5) A continuous beep tone indicates a complete wire. This is useful for checking wiring connections and operation of switches

CAUTION

Using resistance measurement function in a live circuit will produce false results and may damage the instrument. In many cases the suspect component must be disconnected from the circuit to obtain an accurate reading

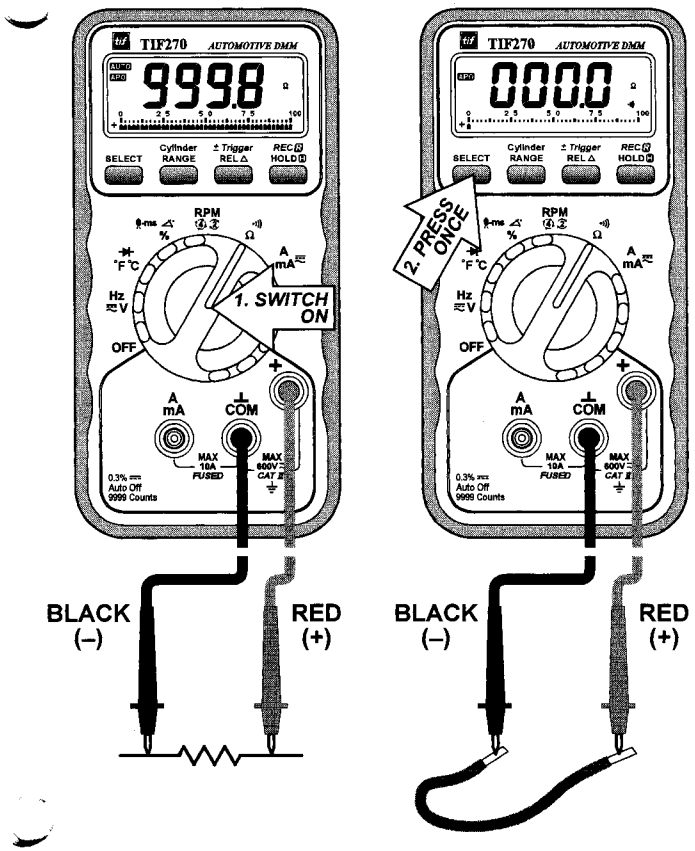


FIG 9. Ω RESISTANCE, •)) CONTINUITY FUNCTIONS

4-8) mA, A functions

1) Set rotary switch to **mA A** ⎓ ≂
2) Insert red (**+**) test lead into **mA A** jack and black (**−**) test lead into **COM** input jack
3) Default at **DC**. Press **SELECT** button momentarily to select **AC**
4) Connect the test leads as shown in **FIG 10** and observe the digital display

WARNING

Do not measure any circuit that draws more than the current rating of the protection fuse. If the fuse blows, replace it with the proper fuse. Failure to do this may result in injury or damage to the meter. Do not attempt a current measurement where the open circuit voltage is above 250V. Suspected open circuit voltage must be checked with voltage functions

Voltage output current clamp adaptors are recommended to use with the meter voltage functions for making high current measurements

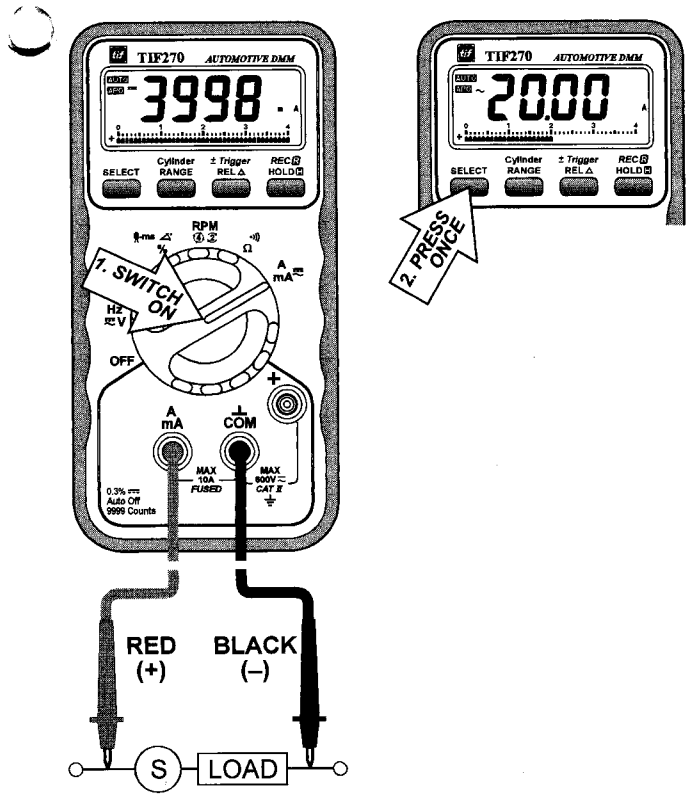


FIG 10. mA, A FUNCTION

4-9) MANUAL OR AUTO RANGING

Press the **RANGE (Cylinder)** button momentarily to select manual-ranging, and the meter will remain in the range it was in, the LCD annunciator AUTO turns off. Press the button momentarily again to step through the ranges. Press and hold the button for 1 second or more to resume auto-ranging.

In ∠ Dwell function, Press the **RANGE (Cylinder)** button momentarily to display the cylinder setting, and within one second press the button momentarily again to select the number of cylinders from 1 through 12 to match the engine under test

Note : When the meter is in Record, Hold, or Relative mode, changing the measuring range manually will cause the meter to exit those features

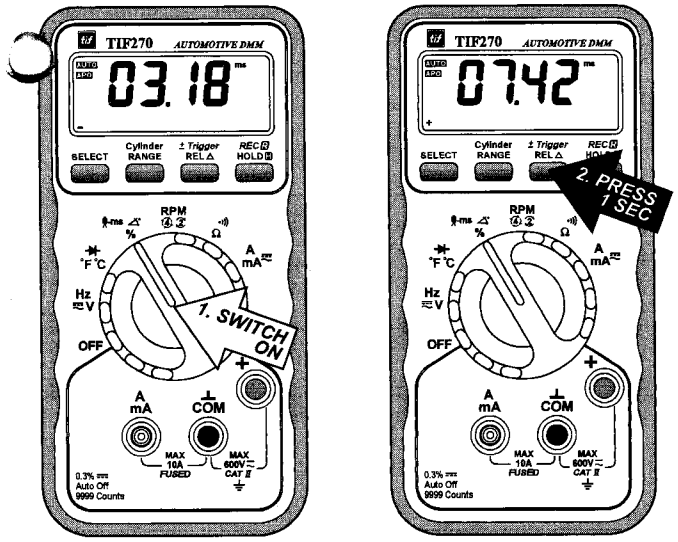
4-10)TRIGGER + − selection

Trigger + or − is to identify whether the on or off portion of the signal under test is of measuring interest. For example, as in duty cycle function, if you get a reading of 10% in the trigger + (on portion), you then will get a reading of 90% in trigger − (off portion)

To toggle between trigger + and −, Press and Hold the ***± Trigger*** (**REL Δ**) button for 1 second. SEE **FIG 11**

4-11)HOLD H

The hold function freezes the display for later view. Press the **HOLD H** button momentarily to activate the hold function, the LCD annunciator H turns on. Press momentarily again to release.



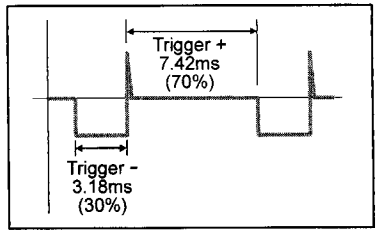


FIG 11. TRIGGER + - SELECTION

4-12) Δ RELATIVE MODE

Press the **REL Δ** button momentarily to enter the Relative Zero (**Δ**) mode, the LCD annunciator **Δ** turns o Relative zero allows the user to offset the meter measurements with a relative reference value. Practically all displaying readings can be set as relative reference value including MAX, MIN, MAX-MIN, and AVG readings of RECORD function

Press the **REL Δ** button again to exit relative mode and resume normal measurements

4-13)RECORD MODE

Press and hold the ***REC*** button for 1 second or more to activate RECORD mode, the LCD annunciators R AVG MAX-MIN turn on. The meter beeps when new maximum or minimum reading is updated. Press the button momentarily to read throughout the Maximum (MAX), Minimum (MIN), Maximum minus Minimum (MAX − MIN), and Average (AVG) readings. Press the button for 1 second or more to exit RECORD mode. See **FIG 12**

With the Auto-Ranging RECORD mode, you can easily track intermittent signals, capture turn-on/turn-off surges, and monitor line voltage changes over a much wider dynamic range with the best resolution. It largely surpasses single range recording which is easily over-flowed, or with insufficient resolution. The meter features a fast single range sampling speed of 50ms for MAX, MIN, MAX-MIN and AVG readings. The faster the sampling speed, the more accurate the measurement of surges, spikes and sags will be. The true average AVG feature calculates all readings taken over time continually

Note : 1. Auto Power Off feature will be disa automatically in this mode

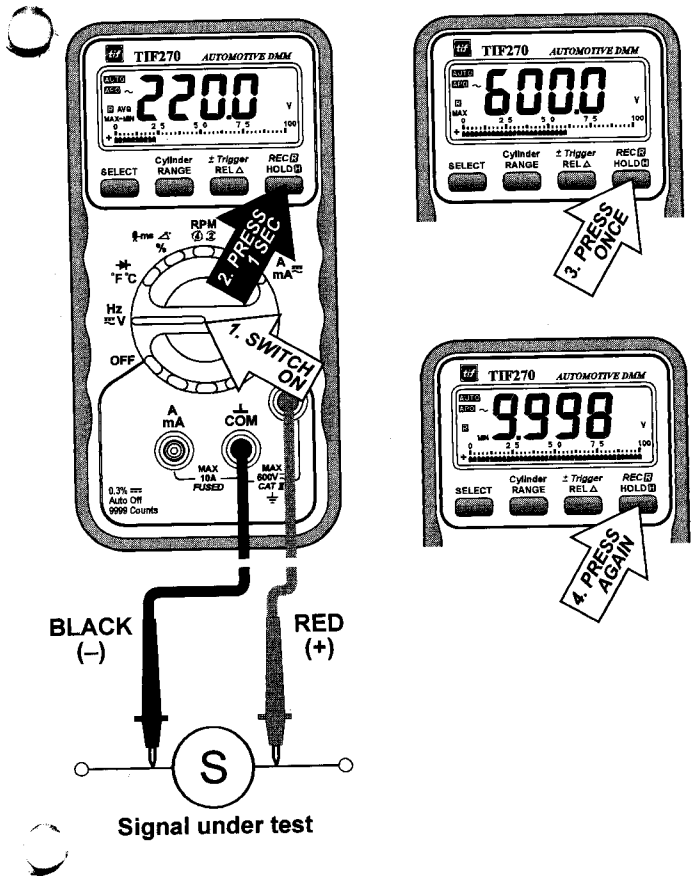


FIG 12. RECORD FUNCTION

4-14) LINE FILTER FREQUENCY 50 Hz OR 60 Hz SELECTION

The line filter frequency can be selected as a power-o[n] option. Press the **SELECT** button while turning th[e] meter on to display the set frequency. Press the **RANGE** button for 50 Hz or press the **REL Δ** button for 60 Hz selection. Then press the **HOLD** button to store the selected frequency. See FIG 13

Selecting the appropriate line filter frequency to cope with your line frequency can maximize the meter's noise rejection ability. This is normally only available in expensive bench top multimeter[s]

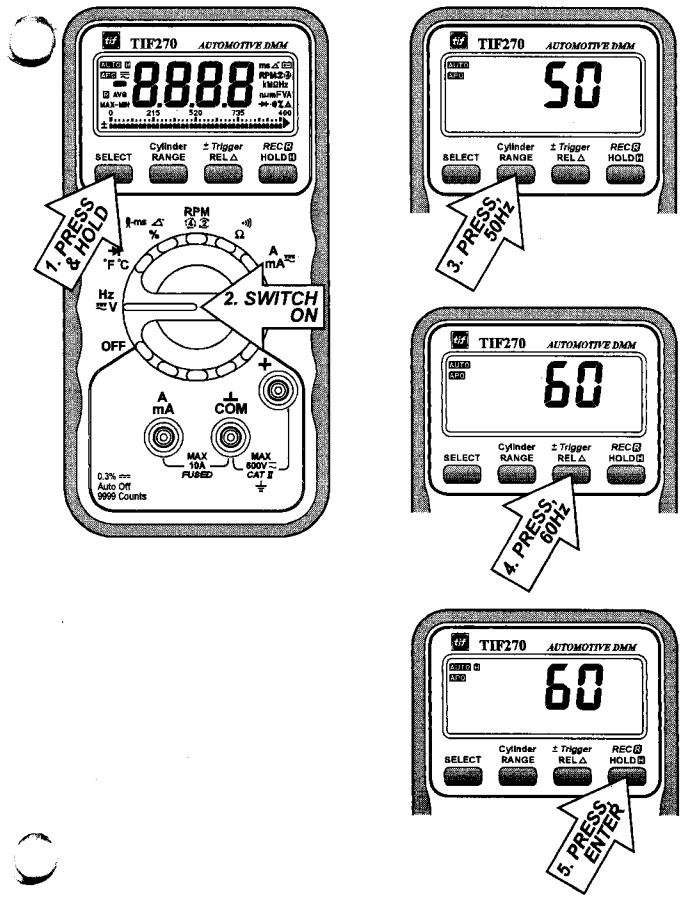


FIG 13. LINE FREQUENCY SELECTION

4-15)AUTO POWER OFF (APO)

The Auto Power Off (APO) mode turns the meter off automatically to extend battery life after 4 minutes of inactivities. The meter turns back on if the rotary switch is turned. Activities are specified as :

1) Rotary switch or push button operations
2) Significant measuring data readings

When the meter enters the RECORD mode, the Auto Power Off will be disabled automatically, and the LCD annunciator APO will be off

Note : 1. Always turn the rotary switch to the OFF position when the meter is not in use. The meter will produce a beep sound to alert the user of APO operation.

5) SPECIFICATIONS

GENERAL SPECIFICATIONS

Display : 4 digits 9999 counts LCD

Polarity : Automatic

Update Rate :

Data: 4 per second nominal;

42 Segments Bar graph: 20 per second max

Low Battery: Low battery indicator appears when the battery voltage drops below approx. 7.2VDC

Operating Temperature : 0℃ to 35℃, 0-80% R.H.; 35℃ to 40℃, 0-70% R.H.

Storage Temperature : -20℃ to 55℃, 0-80% R.H. (with battery removed)

Temperature Coefficient : nominal 0.15 x (specified accuracy)/℃ @ 0℃-18℃ or 28℃-40℃

Power Supply : Single 9V battery; NEDA1604, JIS006P or IEC6F22

APO Timing : Idle for 4 minutes

APO Consumption : 30 μA Typical

Overload Protections :

mA & A : 10A/250V Fast Acting Fuse;

Others : 600VDC/VAC rms

Safety: The instruments meet the requirements for double insulation, pollution degree 1, to IEC1010-1(1995), EN 61010-1(1995), UL3111-1(6.1994), CSA C22.2 NO. 1010-1-92 to:

terminal V/R: Installation category II, 600V ac and dc

terminal mA/A: Installation category II, 250 Volts ac and dc.
E.M.C. : Meets EN55011(3.1991) and EN50082-1(1992)
Sensing : Average responding
Dimension : L150mm X W75mm X H34mm (without holster); L160mm X W82mm X H48mm (with holster)
Weight : approx. 252 gm (without holster); approx. 345 gm (with holster)
Power Consumption : 3.5 mA Typical
Accessories : RPM inductive pick up, Test leads (pair), battery installed, and user's manual
Special Features : Autoranging Record (Max, Min, Max-Min, Avg), Autoranging Relative (Zero), ±Trigger slope, and Data Hold

ELECTRICAL SPECIFICATIONS

ACCURACY IS ±(% READING DIGITS + NUMBER OF DIGITS) OR OTHERWISE SPECIFIED, AT 23℃±5℃ & LESS THAN 75% R.H.

DC Voltage

Range	Accuracy
999.9 mV, 9.999 V, 99.99 V	0.3%+3d
600.0 V	0.3%+5d

NMRR : >50dB @ 50/60Hz
CMRR : >100dB @ DC, 50/60Hz, Rs=1kΩ
Input Impedance : 10MΩ, 30pF nominal (16MΩ nominal for 999.9mV range)

AC Voltage

Range	Accuracy
3Hz – 200Hz	
999.9mV	2.5% + 5d*
50Hz – 500Hz	
9.999V, 99.99V, 600.0V	2.5% + 5d

CMRR : >60dB @ DC to 60Hz, Rs=1kΩ
Input Impedance : 10MΩ, 30pF nominal (16MΩ nominal for 999.9mV range)

*Specified from 5mV

DC Current

Range	Accuracy
4000mA	1.2% + 6d
10.00A*	0.8% + 4d

Burden Voltage : 0.03V/A
*10A Continuous; 20A for 30 Second Max with 5 minutes cool down interval

AC Current

Range	Accuracy
50Hz – 500Hz	
4000mA	2.5% + 10d
10.00A*	1.2% + 3d

Burden Voltage: 0.03V/A
*10A Continuous; 20A for 30 Second Max with 5 minutes cool down interval

Ohms

Range	Accuracy
999.9Ω	0.5%+6d
9.999kΩ, 99.99kΩ	0.5%+2d
999.9kΩ, 4.000MΩ	0.8%+2d
40.00MΩ	1.5%+5d

Open Circuit Voltage : Typical 1.3VDC (2.7VDC @ 999.9Ω Range)

Temperature

Range	Accuracy
-20℃ to 300℃ / 0°F to 572°F	±(3℃+1d) / ±(6°F+2d)
301℃ to 500℃ / 573°F to 932°F	±(2%+1d) / ±(2%+2d)

Sensor : "K" Type Thermocouple, sensor accuracy not included

Dwell

RANGE*	Accuracy
0.0° – 360.0°	1.2° /krpm + 1d
0.0% – 100.0%	0.04% /krpm/cyl + 2d

9 selectable number of cylinders 1, 2, 3, 4, 5, 6, 8, 10, & 12

*Specifed ranges depend on engine rpm and number of cylinders (cyl)

RPM

	RANGE	Accuracy
RPM 4	120 –20000 RPM	2 RPM
RPM 2	60 –10000 RPM	2 RPM
RPM 2 M	30 –5000 RPM	2 RPM

Fuel Injection Detector (Both TBI & PFI)

RANGE*	Accuracy
Multi-Point-Injection	
0.05ms – 250.0ms	0.05ms + 1d
0.0% – 100.0%	0.04% /krpm + 2d
Single-Point-Injection	
0.05ms – 250.0ms	0.05ms + 1d
0.0% – 100.0%	0.04% /krpm/cyl + 2d

selectable ± trigger slopes

*Specifed ranges depend on ± trigger slopes, engine rpm and number of cylinders (cyl)

Frequency

Range	Accuracy
9.999Hz, 99.99Hz, 999.9Hz, 9.999kHz, 20.00kHz	0.01%+2d

Selectable Sensitivities : 1Vrms, 2Vrms, 20Vrms, & 200Vrms (by RANGE button)

Input Signal : Sine wave, or Square wave with duty cycle >40% & < 70%

Diode Tester

Range	Test Current (Typical)	Open Circuit Voltage
9.999V	0.2mA	< 3.5 VDC

Audible Continuity Tester

Audible threshold : the beeper sounds if the measured resistance is lower than 100 Ω, and turns off when greater than 700 Ω.
Response time <500 ms

Special Features

Record : High speed 50ms Autoranging Max, Min, Max-Min, Avg readings

Relative : Autoranging Relative zero readings

±Trigger : Selectable positive & negative trigger slopes

Cylinder : 9 Selectable number of cylinders in Dwell

Hold : Freezes the display data for later view

Range : Manual / Auto ranging selection

RPM 4 : For RPM of 4-stroke engines which have 1 ignition on every 4 engine strokes

RPM 2 : For RPM of DIS & 2-stroke engines which have 1 ignition on every 2 engine strokes

RPM 2 M : For RPM of 2-stroke waste ignition engines which have 1 ignition on every engine stroke

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6) MAINTENANCE

WARNING

To avoid electrical shock, remove test leads and any input signals before opening the case. Do not operate with open case. Install only the same type of fast acting fuse or equivalent

6-1)Battery replacement procedure

When the battery symbol ⊞ on the display is on, replace the battery as soon as possible to ensure accuracy. The meter uses a single standard 9V battery (NEDA1604, JIS006P, IEC6F22)

1) Disconnect the meter from any circuit and remove the test leads from the input jacks
2) Turn the meter OFF
3) Loosen the three captive screws from the case bottom
4) Lift the end of the case bottom nearest the input jacks until it unsnaps from the case top, see **FIG 14**
5) Disconnect the battery from the battery connector
6) Snap the battery connector to the terminals of the replacement battery. Dress the battery leads so that they are properly seated and will not be pinched between the case top and case bottom
7) Replace the case bottom, ensuring that all the gaskets are properly seated and the two snaps on the case top (near the LCD side) are engaged
8) Re-fasten the 3 captive screws

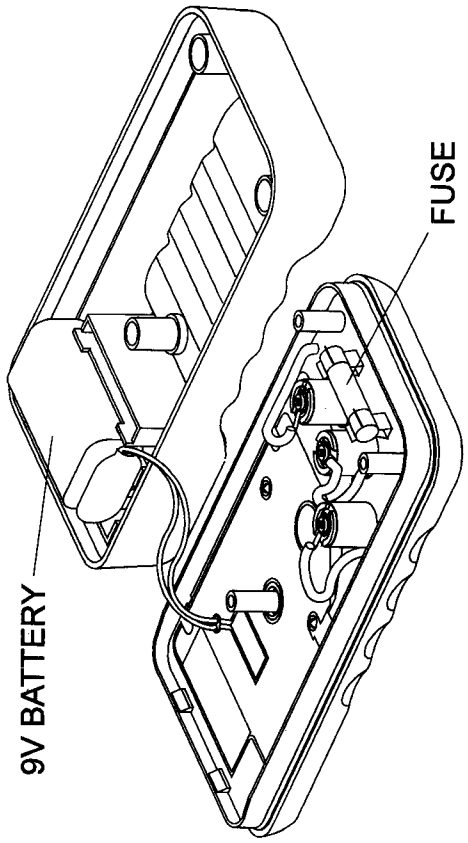

FIG 14. BATTERY & FUSE REPLACEMENT

6-2)Fuse replacement procedure

The meter uses a 250V/10A fast acting fuse for current inp protection

1) Perform steps 1) through 4) of the battery replacement procedure
2) Replace the blown fuse
3) Perform step 7) through 8) of the battery replacement procedure

6-3)Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for periods of longer than 60 days, remove the battery and store it separately

6-4)Trouble Shooting

If the instrument fails to operate, check battery, fuse(s), leads, etc. and replace as necessary. Double check operating procedure as described in the user's manual

If the instrument voltage / resistance input terminal has subject to high voltage transient (~~can be up to several thousand volts~~), the series fusible resistors will be blown (become high impedance) like fuses to block further damage to the instrument. Most measuring functions through this terminal will then be open circuit. The series fusible resistors should be replaced by qualified technician

Refer to the LIMITED WARRANTY section for obtaining warranty service

7) LIMITED WARRANTY

warrants to the original product purchaser that each product it manufactures will be free from defects in material and workmanship under normal use and service within a period of one year from the date of purchase. TIF's warranty does not apply to accessories, fuses, batteries or any product which, in TIF's opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service, contact your nearest TIF authorized agent or send the product, with proof of purchase and description of the difficulty, postage and insurance prepaid, to TIF Instruments, Inc. TIF assumes no risk for damage in transit. TIF will, at its option, repair or replace the defective product free of charge. However, if TIF determines that the failure was caused by misuse alteration neglect, or damage by accident or abnormal conditions of operation or handling, you will be billed for the repair.

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