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POWER PRODUCTS MANUAL No. 375-905-2

TECHNICAL MANUAL
INSTRUMENT VERIFICATION PROCEDURE

HIGH RATE DISCHARGE TESTER

**POWER PRODUCTS
P/N 37512 MODEL ST-375**

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SECTION 1
INTRODUCTION AND DESCRIPTION

- 1.1 The ST-375 (P/N 37512) High Rate Discharge Unit is For testing SLI (Starting, Lighting, Ignition) engine start batteries. It is used to accept or reject reject 12-Volt engine start batteries which have been fully charged prior to testing. The ST-375 is designed to work on batteries that have CCA (Cold Cranking Amps) ratings in the approximate range of 700 CCA to 1,000 CCA. However it will also accurately test batteries with a higher CCA rating such as those used in large commercial trucks and military tactical vehicles. The unit is essentially an SAE (Society of Automotive Engineers) tester which places a 375 Ampere load on the battery for a period of 15 seconds. A digital voltmeter on the unit reads and holds the battery voltage at the end of 15 seconds. If the voltage is at or above 10.0 volts, the battery is ready for issue. If the voltage is below 10.0 volts the battery is rejected. The battery may be recharged for another test depending on circumstances such as if this were a first attempt to condition the rejected battery. The ST-375 has a high wattage resistive load bank. The resistors do not glow during the 15 second test. The control switch has an automatic position which is pressed, released, and tests for 15 seconds. A manual position can be pressed for less then 15 seconds. An internal 500 Ampere Shunt has its test terminals (Kelvin Terminals) connected to a pair of test points on the front panel. The voltmeter also has test points.
- 1.2 This procedure describes the verification of accuracy of Power Products High rate Discharger Tester P/N 37512. The 37512 being verified is referred to herein as the TI (Test Instrument). The TI operates from the battery being tested and does not require any other power.
- 1.3 This procedure includes tests of essential performance parameters only. Any malfunction or out of limit readings noticed during these procedures, whether specifically tested for or not, should be referred to power products.

Table 1. Verification Description

TI Characteristics	Performance Specification	Test Method
Voltmeter	Range: 0 to 13 V (Meter range 99.9 V) Tolerance: 0.2 V	Connect to battery or power supply, keep TI power switch OFF. Compare TI voltmeter reading with multi-meter.
Internal shunt and load current (NOTE: Shunt is 500Amp. 50 Millivolt)	Range: 0 to 38MV/380Amp Tolerance: 1.0 Millivolts/ 10 Amps Actual load tolerance is 375 Amps \pm 10 Amps at 10.5 Volts 10 Seconds of load (.028 Ohms at 10 Seconds)	Load the TI with a battery or high current 12 volt power supply. Use external shunt and 2 multi-meters. Compare TI reading with one multi-meter and with external shunt and second multi-meter. NOTE: Amp reading is 10X millivolt reading
2 internal timers. Timer 1 holds the voltmeter reading at the end of 15 second test.	TIME: tolerance 2 Seconds	Check with Quartz stop-watch or timer.
Timer 2 disconnects load 3 seconds after voltage hold (18 seconds total)	TIME: tolerance 2 Seconds	Check with Quartz stop-watch or timer.

SECTION 2
EQUIPMENT REQUIREMENTS
NOTES

Minimum use specifications are the principal parameters required for performance of the verification, and are included to assist in the selection of alternate equipment, which may be used at the discretion of the using facility. Satisfactory performance of alternate items shall be verified prior to use. The applicable multimeters, and external shunt must bear evidence of current calibration. Timer or Stop watch can be verified with a known accurate timekeeper.

The instruments utilized in this procedure were selected from those known to be available at Naval and Marine Corps facilities and the listing by make or model number carries no implication of preference, recommendation, or approval for use by other agencies. It is recognized that equivalent equipment produced by other manufacturers may be capable of equally satisfactory performance in this procedure.

Table 2. Equipment Requirements for TI

Item	Minimum Use Specifications	Calibration Equipment
2.1 Two Digital multi-meters (DMM)	DC volts to 13V (2)DC millivolts to 40MV	FLUKE 77AN
2.2 Calibrated shunt 10 Amperes per Millivolt Eg. 500Amp 50mv or 1000Amp 100mv Shunt	Range: 0 to 50mV	Local Supply
2.3 Charged Optima battery or power supply capable of 400Amps 12.5V - 10V for 15 Seconds	NA	Local Supply
2.4 Timer	NA	Local Supply

SECTION 3
PRELIMINARY OPERATIONS

3.1 Ensure that power switch is set to OFF to avoid arcing or damage to the battery or power supply terminals or the TI battery clamps.

3.2 Connect the Battery or power supply to the TI. Observe polarity.

SECTION 4
VERIFICATION PROCESS

NOTE: Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met before proceeding.

4.1 Voltmeter tests when its power switch is set to OFF.

4.1.1 TI voltmeter reads battery or power supply volts.

4.1.2 Set the DMM to read DC volts.

4.1.3 Connect the DMM as shown in Figure 1.

4.1.4 Compare the reading of the DMM to the TI voltmeter. Per Table 3

Table 3. Tolerance Limits: 0.2V

TI Voltmeter	DMM Tolerance Limit
12.7 (example)	12.5 – 12.9 (± 0.2)

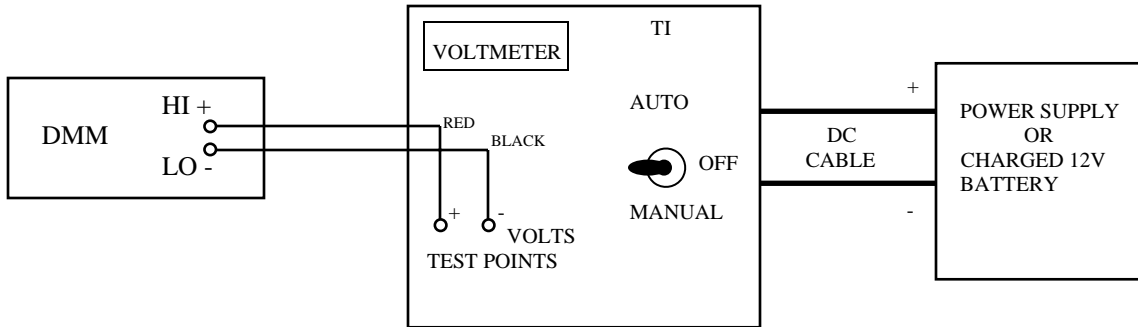


Figure 1. Voltmeter Test Setup

WARNING

HARMFUL CURRENTS AND VOLTAGES MAY BE PRESENT IN THE TI DC BATTERY CABLE LEADS. THE TI ON/OFF/RESET SWITCH MUST BE SET TO THE OFF POSITION BEFORE CONNECTING OR DISCONNECTING THE TI DC BATTERY CABLE TO/FROM THE BATTERY.

4.1.6 LOAD CURRENT TESTS

Connect the equipment as shown in Figure 2.

4.1.7 Ensure that the AUTO-OFF-MANUAL switch is set to OFF

4.1.8 Connect shunt as described in table 2 item 2.2 and power supply or optima battery as described in table 2 item 2.3

4.1.9 Set switch to Manual to obtain Readings. Load will not remain on over 15 seconds. Refer to table 5, par 4.1.16

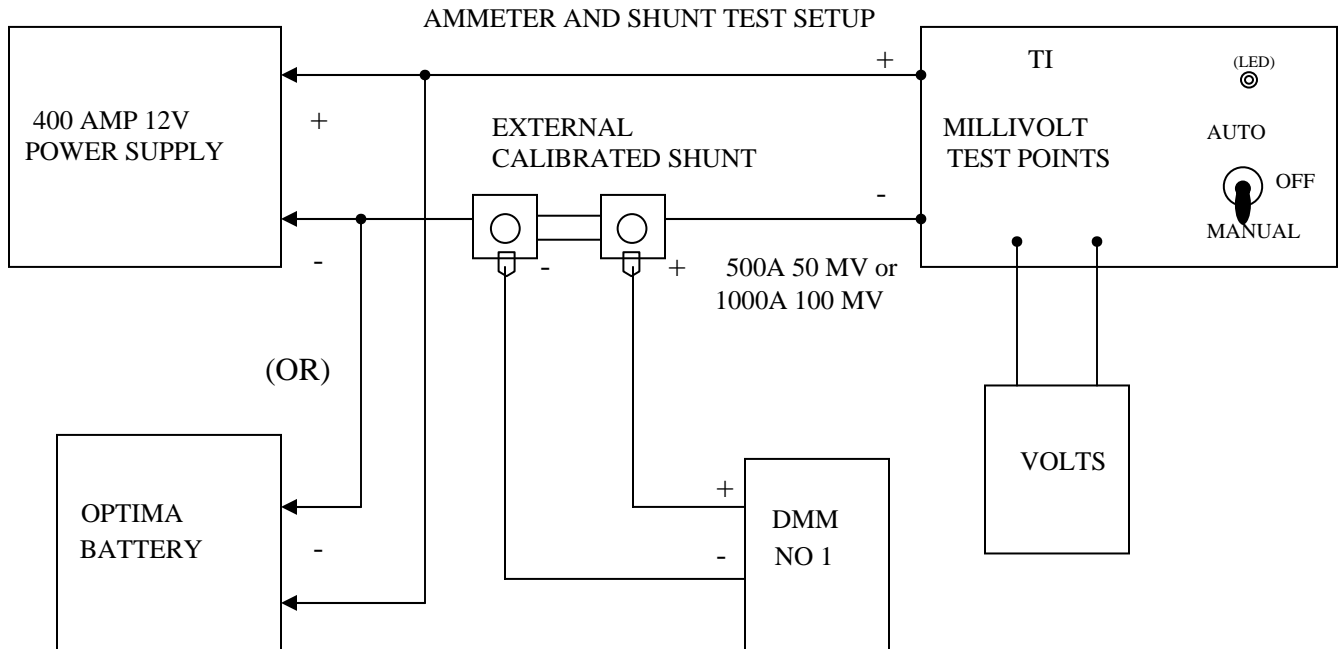


Figure 2. Ammeter Test Setup

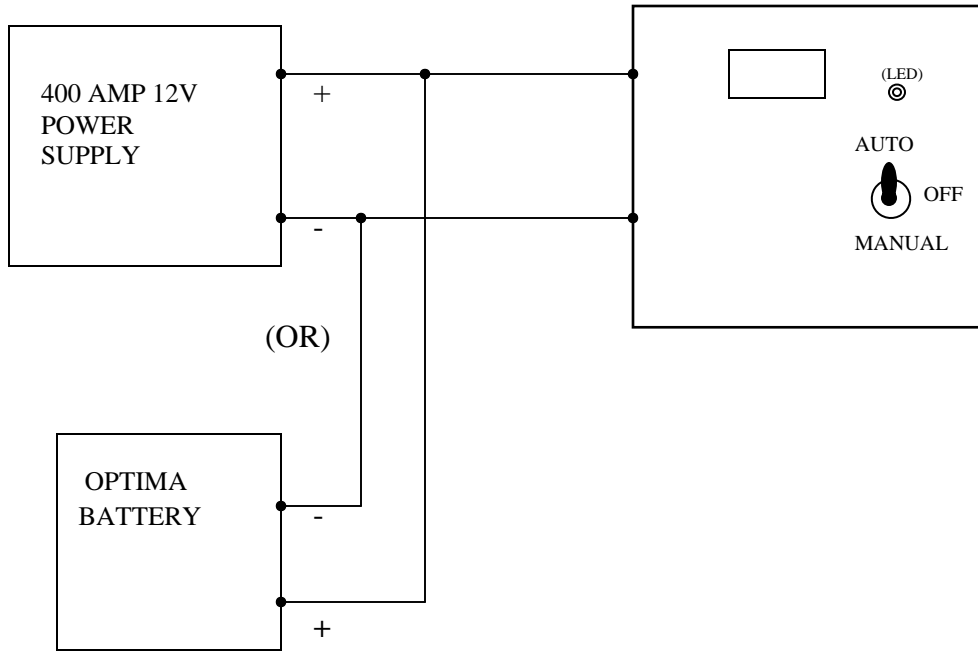


Figure 4. Timing Setup Test

- 4.1.10 TIMING TEST, Connect per Figure 3, refer to table 4 for tolerances.
- 4.1.11 Auto-Off-Manual Switch OFF.
- 4.1.12 Connect the TI to the Power Supply or Optima Battery.
- 4.1.13 Observe the stopwatch or timer. Simultaneously Set the stop watch or note the time and press the TI switch to “AUTO”. The green led illuminates.
- 4.1.14 At the end of 15 seconds, the voltmeter holds (freezes) its voltage. Approximately 3 seconds later a contactor click-out is heard and the green led turns-off.

Table 4. Timing Requirements

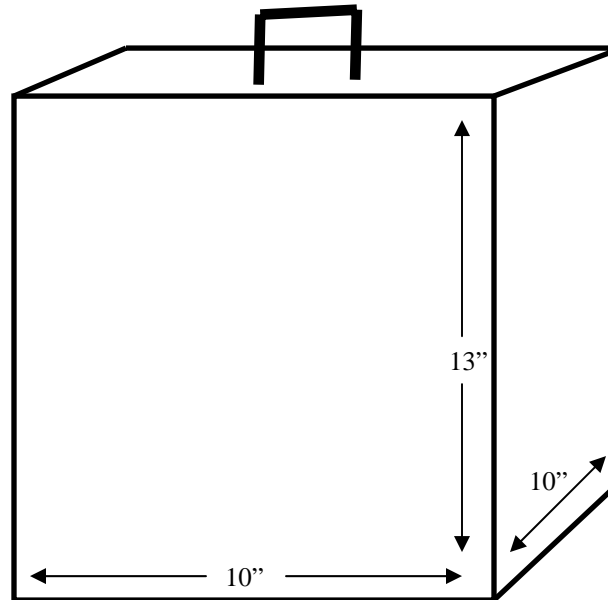
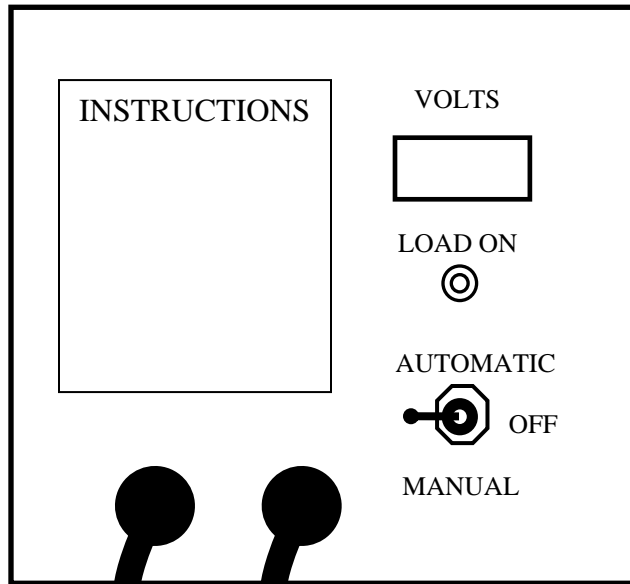
TI	Time Tolerance Limit
“AUTO” test led ON Load ON	START
Voltmeter Holds Battery End Voltage	15 Sec Within 2 Sec
Retains the voltage reading on hold, Load contactor drops out. Green Led goes off.	3 Sec After Hold Within 2 Sec

Table 5. Summary Table of Tolerance Requirements

TI	TOLERANCE
4.1.15 Voltmeter	0.2 Volts
4.1.16 Load current and TI internal shunt accuracy.	<p>375 Amperes \pm 10 Amperes At 10.5V at 10 Seconds. Note: Loaded Battery may not be 10.5 Volts in 10 Seconds. Use following steps when battery voltage differs from 10.5 Volts. (For Ref. Only: $\frac{375A}{10.5V} = 35 \text{ Amps/Volt}$)</p> <p>STEP</p> <ol style="list-style-type: none"> 1. Note Difference From 10.5V 2. Multiply Difference by 35 3. If higher than 10.5, add to 375 4. If lower than 10.5 subtract from 375 5. Acceptable Result must be the actual Amp reading \pm 10 Amperes <p>EXAMPLE STEPS</p> <ol style="list-style-type: none"> 1. Actual voltage reading 10.9, difference is +0.4 2. $0.4 \times 35 \text{ Amps} = +14 \text{ Amps}$ 3. $14 \text{ Amps} + 375 \text{ Amps} = 389 \text{ Amps}$ 4. *** 5. Acceptable: Test reading is $389 \pm 10 \text{ Amps} = 379 \text{ to } 399 \text{ Amperes}$ <p>***(4) If actual volts are 10.1 differences is -0.4 = -14Amps. Subtract from 375 Amps, Acceptable reading is $361 \text{ Amps} \pm 10 \text{ Amps} = 351 \text{ to } 371 \text{ Amps.}$</p>
TIME	13-17 Seconds voltage reading freezes 16-20 Seconds Drop-out of load, led off

DATA SHEET 375-9/05

HIGH DISCHARGE RATE 12V BATTERY TESTER P/N 37512



APPLICATION:
375 AMPERE 15 SECOND LOAD TEST FOR 12V
OPTIMA/HAWKER GSE BATTERIES. SAE TEST FOR ALL
12 V ENGINES START BATTERIES

SPECIFICATIONS:
POWERED BY BATTERY UNDER TEST / FAN COOLED
SAFETY LOAD – LOAD RESISTORS DO NOT GLOW
AUTOMATIC 15 SECOND OR MANUAL TEST
VOLTMETER HOLDS END OF TEST READING UNTIL RESET
WEIGHT: 15 LBS

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Cage Code: 3C8X4
www.power-products.com

BATTERY LOAD TESTER
12 VOLT, 375 AMPERE
MODEL: ST-375 P/N: 37512

INSTRUCTIONS

Check that switch is in center, OFF position

Connect Battery - Red to Positive, Black to Negative
Meter reads Battery Open Circuit voltage.

Toggle switch to "AUTOMATIC" this is a 15 sec. load test
At end of 15 seconds, meter locks-in voltage reading
[Relay click heard after lock-in.]

If voltage is at or above 10.0 volts, Battery is acceptable
Below 10.0 volts, is unacceptable

For Manual test, press and hold switch down. Cuts-Off at 15 sec

Set switch to center OFF before removing battery

When switched to OFF, the locked-in reading will revert to existing battery voltage