



INSTRUCTION and OPERATIONS MANUAL

for

AC VANE RELAY TESTER

with

PV-250 Type Plugboard

MODEL NUMBER 16397-00

CAUTION

Be sure to read and become thoroughly familiar with the entire contents of this manual before attempting to operate the “**Vane Relay Tester.**”

DOCUMENT NO. 16397-99 Rev A

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GENERAL DESCRIPTION

The “**AC Vane Relay Tester**” is designed to enable an operator to measure the voltage and current characteristics of AC Vane Relays and contact resistance. The relay tester relies on the external AC power at the correct relay operating frequency to provide both Local and Track voltage to the relay under test. The relay tester features its own digital voltmeters and ammeters as well as variacs and a rheostat for voltage adjustments. Rotary switches provide for the selection and configuration of the relay to be tested. Also a rotary switch to select a contact to measure resistance on.

Relay contacts are monitored by LED's and are RED when the contact is OPEN, and GREEN when the contact is CLOSED. A bulls-eye level is provided mounted on the front panel adapter insert for leveling and assurance of consistent readings. The vane relay tester is fully self-contained, and is housed in a durable, weather resistant, carrying case. The digital meters require no connection to the relay under test as they are permanently connected internally inside the tester. Testing of relays with this test equipment is for “**OUT OF CIRCUIT**” relays only. It is for bench testing only.

NOTE: The Vane Relay Tester is for all AC Vane Relays where the TRACK Voltage across the relay coil is below 20 VAC.

(A few Power-Off relays exceed the 20 VAC and cannot be tested with this tester.)

Front Panel Controls

1. **AC POWER Switch:** Turns the AC Power ON or OFF to the test fixture.
2. **CONTACT SELECT switch:** Selects the contact to measure contact resistance on or OFF position.
3. **RELAY SELECT switch:** Selects the contact monitor LED circuit configuration for the contact status LED's for relay to be tested or turns all LED's OFF.
4. **COIL CONFIG. switch:** Selects Series or Parallel configuration of the Track coils. Note that there is a “center” position between markings for isolation during switching.
5. **LOCAL VOLTAGE, ADJUST:** Adjusts the voltage to the Local Coil of relay.
6. **TRACK VOLTAGE, SET:** A voltage range adjustment for Track Coil of the relay.
7. **TRACK VOLTAGE, ADJUST:** Used for setting Track Coil voltage during the measurement of the pull-in and drop-out of the relay.

OPERATION

The basic function of the AC Vane Relay Tester is to make voltage and current measurements of the Local and Track coils of the relay under test. Also contact resistance measurements. LED's indicate which contacts are associated with the test and the status of those contacts, RED indicates contact is OPEN and GREEN indicates contact is CLOSED. To make a basic test of a relay, follow the steps below.

PROCEDURE

1. Open the case and remove the lid. Set the tester on a flat level surface.
2. Turn the **AC Power Switch** to **OFF**.
3. Plug supplied AC cord into the AC POWER connector on the Front Panel and the other end of this cord into a 120 AC outlet that supplies AC voltage with the required frequency (60 or 100 Hz) for the relay to be tested.
4. Level tester utilizing the bulls-eye level mounted above the plugboard and the leveling arm(s). Slide the arm(s) into any of the two leveling brackets on the bottom of the case (front or back) as needed, then adjust the knurled screw(s) to level the plugboard.

Always have one arm installed on the front side of the tester to prevent it from tipping forward.

5. Turn the **CONTACT SELECT** knob to **OFF** position.
6. Turn the **RELAY SELECT** knob to the contact set needed for relay to be tested. There are Three Possible selections and OFF with the installed plugboard. The last two positions are for another plugboard and **NOT USABLE** with this plugboard.

OFF

6F – 4B / COIL 7F – 8F

2F - 2B / COIL 7F – 8F

2F – 2B / COIL 10E – 10F

7F – 3B (Red on white background) **NOT USABLE** with the installed plugboard.

7F – 3B (Blue on white background) **NOT USABLE** with the installed plugboard.

7. Turn the **COIL CONFIG.** selector knob to **Series** or Parallel position as needed for relay to be tested. Note: there is an OFF detent in between Series and Parallel.
8. Turn the **TRACK VOLTAGE, SET** knob fully counter clockwise (min. voltage / max resistance).
9. Turn the **TRACK VOLTAGE, ADJUST** knob fully clockwise (max. voltage).
10. Turn the **LOCAL VOLTAGE, ADJUST** knob fully counter clockwise (min. Voltage).
11. Install the **RELAY TO BE TESTED into plugboard** and insure it is fully seated and latch engaged.

12. Verify that the bulls-eye level is centered. Adjust the level arms if necessary.
13. Press the **AC POWER switch** to **ON (1)** and allow panel meters to “warm-up” for 5 minutes to stabilize before taking and recording measurements.
14. The contact LED status indicators will be lighted only for the contacts under test, all other LED’s will be OFF. RED indicates contact is OPEN. GREEN indicates contact is CLOSED. Verify the condition of the contacts for the relay under test, **FRONT = RED, BACK = GREEN.**
15. Turn the **LOCAL VOLTAGE, ADJUST** up slowly to obtain the Local voltage required for the relay under test. Monitor the **LOCAL VOLT** and **AMP** meters. This is normally either 110 VAC or 115 VAC (+/- 1V).
16. Turn the **TRACK VOLTAGE, SET** knob clockwise to increase the voltage until the vane solidly touches the Top Roller / Front Stop. (Relay will energize). Verify conditions of the contacts, **FRONT = GREEN, BACK = RED.** For the rest of test, the TRACK VOLTAGE, SET knob should not be moved. Control the Track Coil power with the TRACK VOLTAGE, ADJUST control.
17. **NOTE:** If **TRACK CURRENT** exceeds **0.6 Amp.** for a few minutes, shorter time if current is higher. The **OVER CURRENT** will activate, indicated by the **OVER CURRENT LED** coming on (gradually). This will **Remove the Current to Track Coil(s).** This is to protect the internal control resistors from overload. When this happen, turn **TRACK VOLTAGE, ADJUST** knob counter clockwise until the **OVER CURRENT LED** is barely visible. Then wait for a minute or two, it will automatically reset. Indicated by **OVER CURRENT LED** turning **OFF.** (**NOTE:** If the TRACK VOLTAGE ADJUST is turned fully counter clockwise, the OVER CURRENT LED is going OFF right away, but OVER CURRENT is not necessarily reset yet, the OVER CURRENT LED have no power with this setting. Leaving the TRACK VOLTAGE ADJUST knob turned up a bit will power the OVER CURRENT LED, so it can be determined when it resets. Wait a minute after LED is OFF, then continue).
18. Turn the **TRACK VOLTAGE, ADJUST** knob fully counter clockwise. (Relay will de-energize) Then, slowly turn clockwise to increase the voltage until **ALL** the **FRONT** contacts just **Close = GREEN.** This is the **PICK-UP / WORKING value.** Record both the LOCAL and TRACK Voltages and Currents from the meters and verify that the contact LED indicators change their color (**FRONT = GREEN, BACK = RED).**
19. Again slowly turn the **TRACK VOLTAGE, ADJUST** knob clockwise to increase the voltage until the vane jut touches the Top Roller / Front Stop. This is the **FULL STROKE Value.**
20. Slowly turn the **TRACK VOLTAGE, ADJUST** knob counter clockwise to decrease the voltage until **ALL** the **BACK** contacts **just make = GREEN.** This is the **DROP-AWAY** value. Record both the LOCAL and TRACK Voltage and Current from the meters and verify the contact LED indicators change their color (**FRONT = RED, BACK = GREEN).**
21. Divide the DROP-AWAY Value (current) by the PICK-UP / WORKING Value (current) to get the percentage of DROP-AWAY (Min. Drop-Away % of Actual PU). Record this value.

22. At any time during the test, the Contact Resistance can be measured by turning the **CONTACT SELECT** knob to the desired contact to be measured. If an Open contact is selected the **CONTACT LED** is turning **RED** and the **CONTACT RESISTANCE** meter displays "1" on the left in the display. If the contact is closed, the **CONTACT RESISTANCE** meter display contact resistance in milli ohm. The Contact Resistance is measured with 1 Amp. thru the contacts.
NOTE: When contact resistance is measured, ALL contact status LED's are OFF, except for the selected contact status LED will be ON RED if contact is OPEN.
Use the TRACK VOLTAGE, ADJUST to energize and de-energize the relay during this test.
23. Turning the 0.050 ohm **TRACK SHUNT** switch **ON shall drop-out the relay** if energized.
24. Turn the **TRACK VOLTAGE, SET** knob fully counter clockwise (min. voltage / max. resistance).
25. Turn the **TRACK VOLTAGE, ADJUST** knob fully clockwise (max. voltage).
26. Turn the **LOCAL VOLTAGE, ADJUST** knob fully counter clockwise.
27. Remove the tested relay from the plugboard socket.
28. To test another relay, return to Step # 6.
29. If all testing is completed, press the **AC POWER** switch to **OFF (0)**.
30. Verify all recorded readings / values per the specifications of the relay under test.

Specifications:

Physical

Height: 16.9" with Carrying Handle folded.
Height: 19.5 with Carrying Handle raised.
Depth: 8.6"
Length: 20.75"
Weight: 26 lbs.

Electrical

Power Input: 110-130VAC @ required relay testing frequency of 60 or 100 Hz.

Fused for 2 Amps

3 ½ Digit, 0.5 inch High LCD Display:

200 VAC True RMS Volt Meter Accuracy @ 77 F: \pm (0.5 % of reading plus 5 counts).

2 AAC True RMS Current Meter Accuracy @ 77 F: \pm (0.5 % of reading plus 5 counts).

2 VDC Volt Meter Accuracy @ 77 F: \pm (0.1 % of reading plus 1 count).

4 ½ Digit, 0.5 inch High LCD Display:

20 VAC True RMS Volt Meter Accuracy @ 77 F: \pm (0.5 % of reading plus 50 counts).

Environmental

Operating Temperature:	-20 to +50 degrees C
Relative Humidity:	0 to 80%
Storage Temperature:	-40 to 70 degrees C
Relative Humidity:	0 to 95%

WARRANTY

Ultra-Tech Enterprises, Inc. (the "Company"), will repair or replace, at the Company's option, its products free of charge if such products are found to be defective in material or workmanship, for the period of one year from the date of purchase, except as follows:

Transportation charges to the Company's designated repair station for defective and replacement parts or service are the responsibility of the purchaser. This warranty does not apply, if: (i) the product has been damaged by improper connection or disconnection with any electrical device; (ii) the product has been damaged in shipping; (iv) the product has been damaged due to an act of God, accident, misuse, abuse, negligence or any other use than the product's intended use as set forth in the specifications; or (v) the device has suffered damage from an external blow or trauma. This warranty does not cover cosmetic damage and may not be transferred to any person or entity. The Company will provide warranty service as provided herein as soon, as is commercially reasonable.

THE SOLE REMEDY UNDER THIS WARRANTY IS THE REPAIR OR REPLACEMENT OF THE PRODUCT AS PROVIDED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. IN ANY EVENT, IF DAMAGES ARE AWARDED, THEY WILL BE LIMITED TO THE COST OF THIS PRODUCT.

EXCEPT TO THE EXTENT PROHIBITED BY ANY APPLICABLE STATE OF FEDERAL LAW, ALL IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.

Some states do not allow the exclusion or limitation of incidental, indirect, or consequential damages, or allow limitations to the length of an implied warranty, in which case the foregoing warranty shall be extended to conform to the minimum requirement of such applicable law.

To obtain service under this warranty, it is necessary to obtain a Return Merchandise Authorization (RMA) from the Company prior to returning equipment for service. RMA numbers must be clearly marked on the outside of the shipping package in which the merchandise is returned. Failure to follow the Company's RMA procedure may result in delays in obtaining requested service and or refusal of the Company to accept packages not marked clearly with the appropriate RMA number.