

BASEWEST

Calibration Manual

Model TS-420 Test Set

Release of April 10, 2007

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25-60-42

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1.0 GENERAL

This manual covers the calibration of the Model TS-420 (rechargeable) test set. Calibration may be performed by the user, a third party calibration facility, or BaseWest – at the user's option. Calibration is recommended to be performed on an annual basis, but user experience and calibration requirements may indicate a different calibration schedule.

2.0 DESCRIPTION

The BaseWest Model TS-420 test set is a rechargeable, handheld instrument with a digital LCD readout designed specifically for testing airline escape slide lighting systems and their components. The Model TS-420 comprises the following functions:

- Voltmeter with built-in load bank - This mode is used to test battery condition. A rotary switch on the instrument panel allows the selection of closed circuit test under selectable resistive loads as well as an open circuit (no load) test.
- Ammeter with integral power supply - This mode is used to verify the current draw of the slide light harness through an internal regulated 5VDC power supply. Current readings can be used to verify proper function of the light harness and, in some cases, can be used as an indicator of a light-out condition. The ammeter function has a built-in timer that allows hands-free, walk-around inspection and automatic instrument shut-down after 20 seconds.



Figure 1. Model TS-420 Test Set with Battery Charger

3.0 GENERAL ARRANGEMENT

The general arrangement of the Model TS-420 test set is shown in the following two figures. References to external switches and input/output connections made in this manual are related directly to these figures.



Figure 2. Model TS-420 Test Set

4.0 EQUIPMENT REQUIRED FOR CALIBRATION

- Power Supply – 0 ~ 9 VDC, 0 ~ 3 A.
- Calibrated Digital Voltmeter, 4 ½ digits, accuracy $\pm 0.05\%$ or better.
- Calibrated Digital Ammeter, 4 ½ digits, accuracy $\pm 0.05\%$ or better.
- $50\Omega \pm 10\%$ 10W load resistor (or combination).
- $5\Omega \pm 10\%$ 10W load resistor (or combination).
- Power Cable, BaseWest P/N 7-6902.
- Test cable, BaseWest P/N 7-6903.
- Test cable, BaseWest P/N 7-6904.

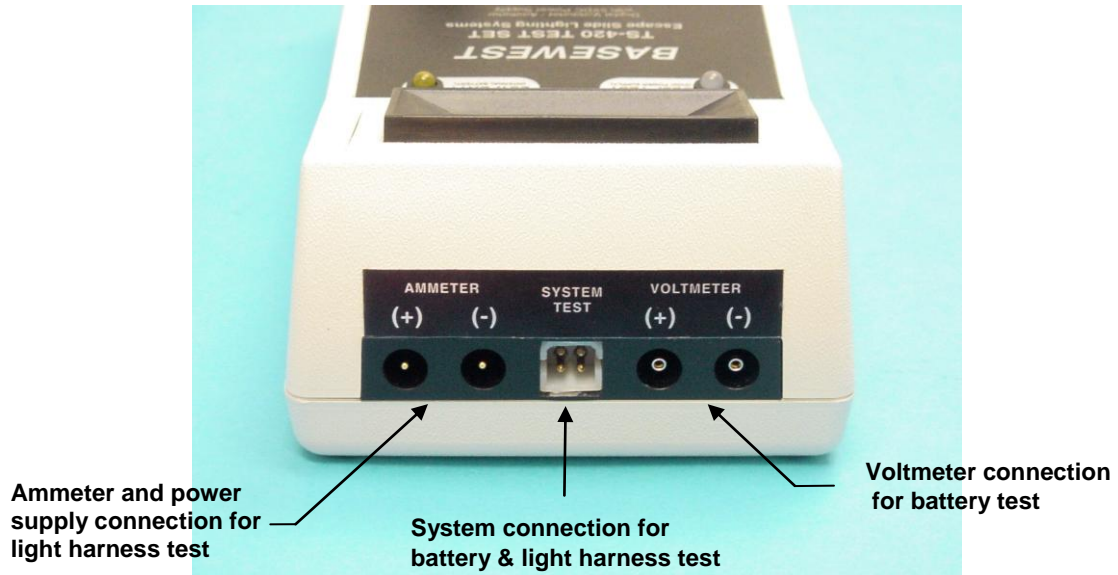


Figure 3. TS-420 Connector Block

5.0 PREPARATION FOR CALIBRATION

- 5.1 Remove all connections to the connector block.
- 5.2 Turn the unit face down and remove the four screws attaching the back of the case. Remove the back of the case and place aside with the screws for later installation.

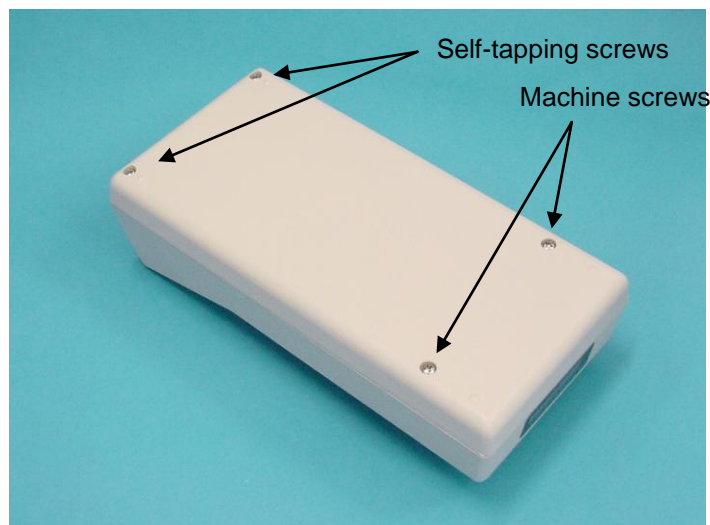


Figure 4. Bottom View – Attachment Screw Locations

- 5.2 Disconnect the battery lead from the main board and connect power cable P/N 7-6902 to the same main board connection
- 5.3 Connect the power cable to a 7.5VDC power supply with current limit set to 150mA.

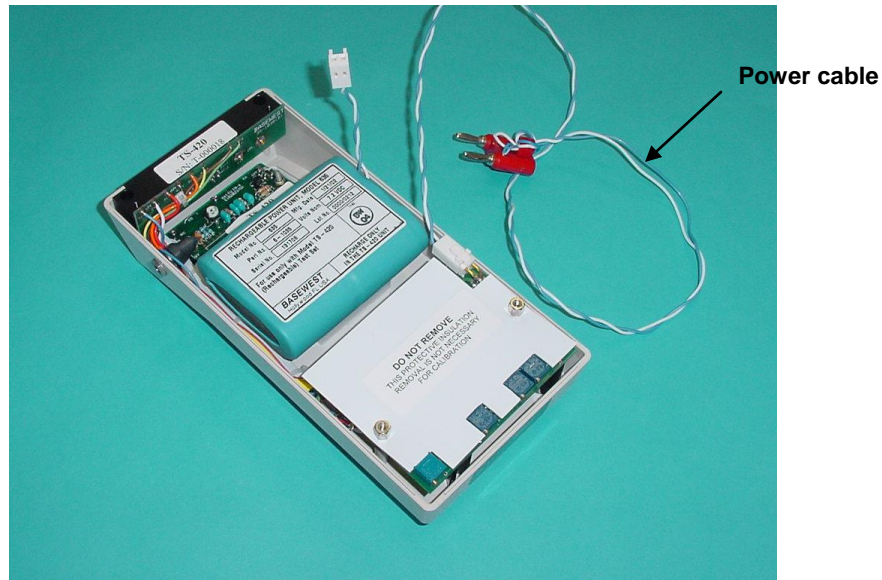


Figure 5. Connection to External Power Supply

- 5.4 Place the Mode Selector switch in the AMMETER position
- 5.5 Press and release the Press-to-Test button and verify current consumption of less than 120mA.

6.0 SELF TEST LED CALIBRATION

Objective: This procedure assures that the “Self Test” LED illuminates GREEN, giving an indication that the TS-420 is operable and has a regulated output voltage of 5.0 VDC \pm 1%.

- 6.1 Adjust the external power supply to 7.5 VDC, 3A.
- 6.2 Connect the dual RED banana plug from test cable P/N 7-6903 to a calibrated DVM (digital voltmeter) capable of reading 5+ VDC, and insert the test cable’s 4-pin connector to the System Test connector at the connector block (see Figure 3).
- 6.3 Set the Mode Selector switch to the AMMETER position. Connect a 5 Ω 10W resistor load to the “Ammeter” pins at the connector block using test cable P/N 7-6904.

Note: Conduct all steps of the “Self Test” LED calibration with this load connected.

- 6.4 Depress and release the Press-to-Test button; a 20-sec. timer cycle is initiated. Check the DVM to verify a reading of 5.005 ± 0.015 VDC.
- 6.5 Adjust trim-pot TP1 to read 4.950VDC on the DVM.
- 6.6 Recycle the unit (let the timer run out and depress the Press to Test button again). The timer may be cancelled at any time by switching the Mode Selector switch to VOLTMETER mode and back to AMMETER mode. If the "Self Test" LED illuminates GREEN move to step 6.8.
- 6.7 If "Self Test" LED illuminates RED, adjust trim-pot TP4 counterclockwise about $\frac{1}{4}$ turn. Repeat step 6.6.

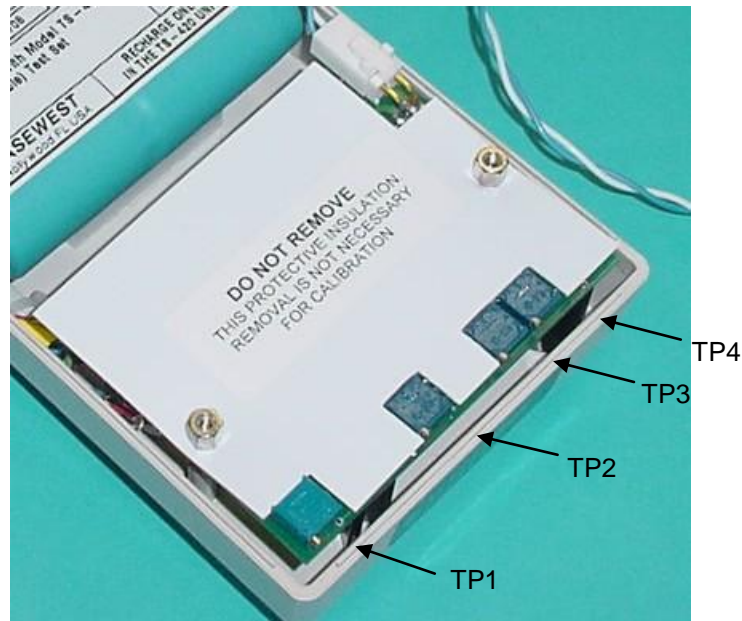


Figure 6. Trim-pot locations

- 6.8 Adjust TP1 to read 4.945VDC on the DVM. Recycle the unit and check the "Self Test" LED. If it illuminates RED proceed to step 6.10.
- 6.9 If "Self Test" LED illuminates GREEN, adjust TP4 clockwise about $\frac{1}{8}$ turn. Repeat step 6.8.
- 6.10 Check calibration by adjusting TP1 to read 4.950~4.955VDC on the DVM and recycle the unit. The "Self Test" LED should illuminate GREEN.
- 6.11 Readjust TP1 to read 4.940~4.945VDC on the DVM and recycle the unit. The "Self Test" LED should illuminate RED. If steps 6.10 and 6.11 are OK, proceed to Section 7.0. Otherwise repeat the entire procedure from step 6.3.

7.0 INTERNAL 5V POWER SUPPLY CALIBRATION

Objective: This procedure assures that the TS-420 operating in the AMMETER mode is capable of supplying a 5VDC (2A max) regulated voltage at the connector block.

- 7.1 Disconnect any loads from the TS-420 connector block.
- 7.2 With the DVM connected to the System Test connector (as on 6.2.), and the Mode Selector switch in the AMMETER position, depress and release the Press-to-Test button.
- 7.3 Adjust TP1 to read 5.005 ± 0.005 VDC on the DVM. Recycle the unit and double-check the reading; readjust if necessary.
- 7.4 Connect a $50\Omega \pm 10\%$ 10W resistor load to the "Ammeter" pins at the connector block using test cable P/N 7-6904, and recycle the unit.
- 7.5 Read the voltage on the DVM. Disconnect and reconnect the load; the voltage drop should be less than 5mV between the "load" and "no-load" condition. (Note: This reading is the true output voltage, since it's taken at the output of the connector block. A reading taken at the load would be lower as a result of a voltage drop that will occur over the test cable.)
- 7.6 Connect a $5\Omega \pm 10\%$ 10W resistor load to the "Ammeter" pins at the connector block using test cable P/N 7-6904, and recycle the unit.
- 7.7 Repeat step 7.5. Again, the voltage drop should be less than 5mV between the "load" and "no-load" condition.

8.0 LCD METER ZERO CALIBRATION

- 8.1 Place the Mode Selector switch in the AMMETER mode.
- 8.2 With no load connected to the output of the connector block, depress and release the Press-to-Test button.
- 8.3 Verify the reading on the LCD meter. It should read "0.00" with a blinking (–) sign at the left of the readout.
- 8.4 If adjustment is needed, turn TP3 clockwise to increase the reading, or counterclockwise to decrease the reading, until 8.3 is satisfied.

9.0 AMMETER CALIBRATION

- 9.1 Connect a calibrated external ammeter (capable of reading 1.0+ Amps) in series with the $5\Omega \pm 10\%$ 10W resistor load to the output of the connector block. Use test cable 7-6904 connected to the "Ammeter" pins at the connector block.
- 9.2 Press-to-Test and take the readings at the external ammeter. Verify that the TS-420 LCD reading is within $0.5\% \pm 1$ digit of the external ammeter reading (approximately 1000 mA).
- 9.3 If necessary, adjust the TS-420 reading by turning the trim-pot located on the back of the LCD meter printed circuit board. Repeat steps 9.2 and 9.3 as needed to observe required accuracy.
- 9.4 Confirm calibration by connecting a $50\Omega \pm 10\%$ 10W resistor load. Verify the TS-420 LCD reading within $0.5\% \pm 1$ digit of the external ammeter reading (approximately 100 mA).

10.0 LOW BATTERY CHECK

- 10.1 Connect a calibrated DVM to the output of the external power supply.
- 10.2 Connect a 5Ω 10W resistor load to the "Ammeter" pins at the connector block using test cable P/N 7-6904.
- 10.3 Place the Mode Selector switch in the AMMETER position and press the Press-to-Test switch.
- 10.4 Adjust the external power supply down until the "Low Batt" LED illuminates. The DVM should read 6.9~7.3V. If this condition is not met, the unit must be returned to the factory for servicing.
- 10.5 Remove the load and repeat step 10.4. The "Low Batt" LED should illuminate at a lower voltage than in the previous condition with load (approximately 0.3V~0.5V lower).
- 10.6 Return power supply output to 7.5 VDC.

11.0 VOLTMETER CALIBRATION

- 11.1 Place the Mode Selector switch in the VOLTMETER position.
- 11.2 Select the NO LOAD position on the Load Selector switch (see Figure 7.)
- 11.3 Connect a battery power source (~10VDC) to the "Voltmeter" inputs at the connector block using test cable 7-6904. Using the BLACK dual banana plug of test cable 7-6903, connect a calibrated DVM to the 4-Pin System Test connector on the TS-420 connector block (see Figure 3).

- 11.4 Depress the Press-to-Test¹ switch. The reading at the TS-420 LCD display should be within $0.5\% \pm 1$ digit from the DVM reading.
- 11.5 If needed, adjust the TS-420 reading by turning TP2 clockwise to increase the reading, or counterclockwise to decrease the reading. Repeat steps 11.4 and 11.5 until the required accuracy is observed with the DVM.
- 11.6 Select a load (A through F) on the Load Selector switch and repeat step 11.4. This reading should be lower than the reading recorded in the NO LOAD condition. The difference will vary depending on the load selected and the current capacity of the power source.



Figure 7. No Load position

12.0 LOAD RESISTOR TEST

- 12.1 Connect test leads to a calibrated ohmmeter and “zero” the meter. Connect the test leads to the 4-contact system test connector on the TS-420 using test cable 7-6903. Test internal loads indicated on the “Load Selector” as follows:

No Load	100K Ω
Position A	22.6 +/- 0.23 Ω
Position B	69.8 +/- 0.70 Ω
Position C	80.6 +/- 0.81 Ω
Position D	90.9 +/- 0.91 Ω
Position E	34.8 +/- 0.35 Ω
Position F	49.9 +/- 0.50 Ω

¹ On the VOLTMETER mode, the TS-420 remains ON as long as the Press-to-Test switch is depressed and will go OFF when the switch is released.

13.0 RETURN TO SERVICE

- 13.1 Remove all external connections from the TS-420.
- 13.2 Ensure that the battery pack is properly positioned on its Velcro pad. Reconnect the battery pack to the connector on the main board.
- 13.3 Properly position the back of the case onto the instrument and replace the four screws. Note that the self-tapping screws are replaced in the holes close to the top edge of the instrument, and the machine screws at the two locations over the main board (See Fig 4).

Note: Refer to BaseWest Manual 25-60-41 for maintenance and operating instructions.