6 T807/808 Fault Finding

The following test procedures and fault finding flow charts may be used to help locate a hardware problem, however they are by no means a complete fault finding procedure. If the fault still exists after having progressed through them in a logical manner, contact your nearest authorised Tait Dealer or Service Centre. Further assistance may be obtained from the Customer Support Group, Radio Infrastructure Division, Tait Electronics Ltd, Christchurch, New Zealand.

The following topics are covered in this section.

6.1 Visual Checks

Disconnect the power supply from the mains and wait 5 minutes before removing both covers.

Inspect the PCB for damaged or broken components, paying particular attention to the surface mounted devices (SMD's).

Check for defective solder joints. If repair or replacement is considered necessary, refer to Section 3 of Part A.

Check the fuse. If it is blown, check that the correct rating and type was fitted and fit a new fuse of the correct rating.

Note: If the fuse was of a lower rating and there are no signs of component damage, it may be worthwhile fitting a new fuse, replacing the covers and switching the supply on. If the new fuse blows, proceed with fault finding as described in the following sections.

6.2 Component Checks

6.2.1 General

If a transistor is suspected of faulty operation, an indication of its performance can be assessed by measuring the forward and reverse resistance of the junctions. First make sure that the transistor is not shunted by some circuit resistance (unless the device is completely desoldered). A 20k ohm/V or better multimeter should be used for taking the measurements, using only the medium or low resistance ranges.

The collector current drawn by multijunction transistors is a further guide to their performance.

If an IC is suspect, the most reliable check is to measure the DC operating voltages. Due to the catastrophic nature of most IC failures, the pin voltages will usually be markedly different from the recommended values in the presence of a fault. The recommended values can be obtained from either the circuit diagram or the component data catalogue.

6.2.2 Initial Checks

Some components are more likely to be at fault than others and it is recommended that the following are checked first:

D46 (Issue 03)	If short circuited, replace and confirm with a DVM that the impedance on the output terminals is >1k ohm.
Q1 & Q2	Check for shorts between any 2 terminals. If either device is faulty, replace both along with D14, D15, D18 and D19. Also check R17 and R19 - these will often go faulty along with Q1 or Q2, sometimes with no external indication.
Q1, Q2 & D43	Check and confirm that they are isolated from their respective heat-sinks.
R2 & R49	Check their resistance is >1M ohm.
R3	Check and replace if the resistance is >15 ohms.
IC2	Check by applying 20V DC across C37 and measuring for 15V at TP5. If no voltage is present at TP5, measure at IC2 pin 3. If there is still no voltage, replace IC2. If 15V is present, check TC1 connections. Replace if in doubt.
VREF	Check VREF is 5.1V +_1%.

6.3 Common Faults

Switch the T807/808 off, and then on, and check for the following faults:

Symptoms	Possible Causes
No LED's light up No output	**no mains supply low mains supply voltage* thermal cut-out has operated (equipment has overheated)* fuse blown defective switching circuitry**
On standby red "Standby" LED lights up, but no output and no LED's light up when power switch set to *on*	**defective switching circuitry**
Red "Standby" LED lights up Green "on" LED lights up but no output when power switch set to *on*	**short circuit across output overvoltage protection diode has gone short circuit# defective power supply output section**

*The fan in the T808 will continue to run.
#Issue 03 only.

6.4 Further Fault Finding & Run-up Procedure

Warning: **The T807/808 is not a conventional power supply and the potential for lethal accidents is very real.**
It is imperative that the following procedures are followed precisely and under no circumstances must any short cuts be taken.
These procedures have been carefully designed to minimise the danger to service personnel and deviation from them will only compromise the safety of all concerned.
Wear safety goggles while running up or working in close proximity to the T807/808.

Because of the dangers involving off-line power supplies, it is suggested that the following procedures are followed, both after repairs have been carried out and for further fault finding. These procedures should be carried out only by suitably qualified personnel.

Refer to Figure 4.1 for test equipment details, ***paying particular attention to the cautions listed in Chapter 4.1***.

Note: The figures in brackets [ ] refer to 115V/60Hz versions of the T807/808.

6.4.1 Voltage Control Loop Checks

Ensure that the mains input supply is disconnected from the T807/808 (hereafter referred to as the "PSU") and the "Power" switch is set to ***off***.

Apply 15V from an external power supply (PS1) to the anode of D30 (+) and TP4 (-).

Check that the red "Standby" LED is ***on***.

Check ***on the T808*** that the fan is running.

Switch the PSU on and check that it does not draw excessive current (<400mA) from PS1.

The red "Standby" LED should turn ***off***.

Check that the voltage on pin 1 of IC3 is <0.5V.

If the voltage is high (approximately 15V), momentarily increase the PS1 voltage to 18V and then reduce it to 15V. If the voltage at pin 1 is still high, check for circuit faults.

Using an oscilloscope with the probe ground connected to TP4, check the voltage waveform at TP6 and TP7 is as shown in Figure 6.1.

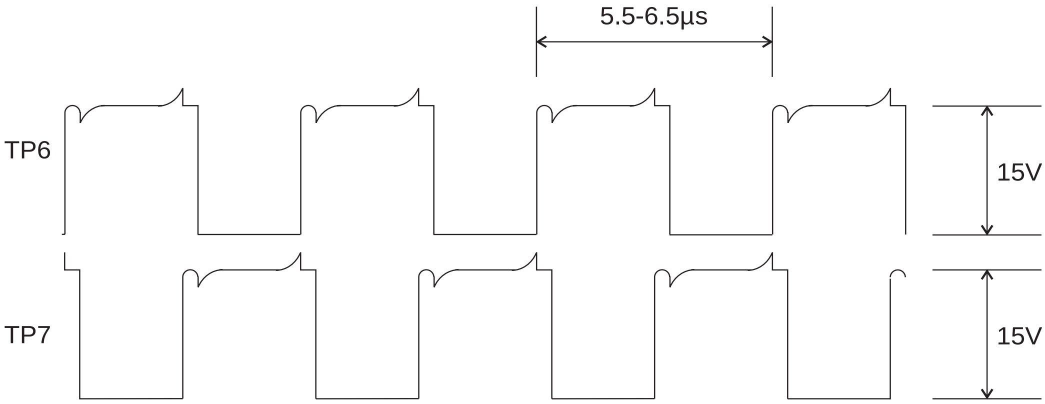

Figure 6.1 TP6 & TP7 Voltage Waveforms

Note: Voltage spikes on the above waveforms are shown for a T807. These spikes appear with larger magnitude on a T808.

Switch the PSU off and on, confirming that the waveform's duty cycle starts at 0 and slowly increases to 50%.

Check that after a short delay (approx. 0.25 seconds), the waveform shows signs of noise jitter (refer to Figure 6.2). This jitter indicates that the noise modulator is operating satisfactorily.

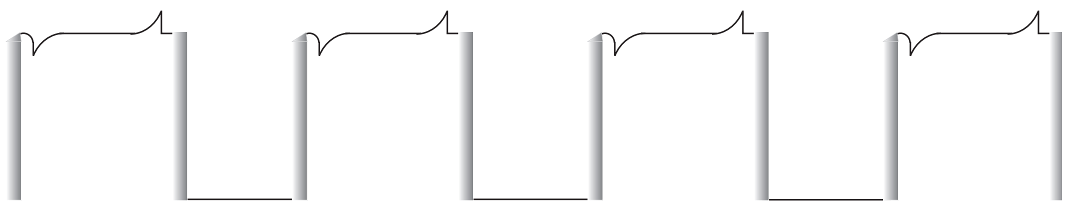

Figure 6.2 Voltage Waveform Noise Jitter

Connect a second variable power supply (PS2) to the ***remote sense*** terminals of the PSU.

Note: **Issues 05 & 07 Only.** Turn RV81 fully clockwise.

Turn RV92 fully clockwise and, whilst observing the waveform at TP6 or TP7, slowly increase the voltage.

Check that at approximately 10-11V the waveform suddenly reduces in duty cycle and disappears altogether.

Turn RV92 anticlockwise and check that the waveform reappears.

Turn RV92 fully anticlockwise and increase the voltage until the waveform disappears. At this point the voltage should not exceed 16.5V. Reducing the voltage should always make the waveform reappear.

Turn RV92 fully clockwise.

This confirms the basic operation of the voltage control loop. Remove the second variable power supply from the PSU remote sense terminals and disconnect the oscilloscope (refer to Note 1 on page 6.5).

6.4.2 Start Up Voltage Checks

Ensure the switch (or link) is set to the correct mains voltage.

Turn RV25 fully clockwise.

Connect the Variac output (set to minimum output voltage) to the PSU AC input socket.

Increase the Variac output slowly whilst monitoring the AC current which should remain low at this point.

Continue increasing the voltage to approximately 60V AC [30V AC].

Check that approximately 3V is now present at the PSU output and that the "On" LED is glowing.

Check with a multimeter that the DC voltage between TP1 and TP4 is approximately 80V and between TP2 and TP4 is half of that figure ±5V.

Note: If the voltage difference is outside tolerance, disconnect the Variac from the PSU, ***wait for the voltages to drain away***, and inspect the circuitry for the cause.

Warning: **Do not proceed until the cause is found, rectified and satisfactory results obtained.**
High voltages and therefore high energies exist on C9-C12 that can result in spectacular if not harmful explosions of the capacitors and/or transistors (Q1 & Q2).

Increase the AC input and check that RLY1 activates at approximately 8V output. If the relay has not activated at 9V, investigate and rectify before proceeding.

Note: To prevent R3 overheating, it is essential to check that RLY1 has activated ***before*** proceeding any further.

Connect a variable DC load to the PSU output and monitor the output current.

Increase the load and check that the current limits to approximately 10A (T807) or 17A (T808).

Adjust RV25 to observe the operation of the current limit circuitry.

Return RV25 to the fully clockwise position and remove the load.

Increase the AC voltage and check that at approximately 120V AC [60V AC] the PSU output voltage stabilises at approximately 10V DC.

Check with a multimeter that the DC voltage between TP1 and TP4 is approximately 160V and between TP2 and TP4 is half of that figure ±5V.

Note: If the voltage difference is outside tolerance, disconnect the Variac from the PSU, ***wait for the voltages to drain away***, and inspect the circuitry for the cause.

Continue increasing the AC voltage.

Check that at approximately 180V AC [90V AC] the current supplied by the external 15V supply (PS1) begins to reduce as the internal supply starts taking over.

Continue increasing the voltage to 200V AC [100V AC] and disconnect the external power supply.

Check that the PSU continues to function normally. If not, check the components associated with T4.

Fit the top cover loosely in place.

6.4.3 Current Limit Checks

Apply a load of approximately 1A to the output terminals.

Check that the AC input current is within acceptable limits.

Increase the current through the load and check that the current limit is still functioning.

Adjust the current limit for 16A (+0, -0.5A) in the T807, or 27A (+0, -1A) in the T808.

Note: **Issues 05 & 07 Only.**

Check "Overload" LED illuminates when the load is increased to current limit set point -0.5A ±0.5A.

Adjust load current to 15A (T807) or 25A (T808).

Adjust RV92 for 15V DC output.

Slowly adjust RV81 so that the power supply just trips out. The "On" LED and "Overload" LED will flash on and off.

Reduce the current through the load to 1A and adjust RV92 for 13.8V output.

Check the current limit again and adjust slightly if necessary.

Check also that the short circuit current limit is functioning.

Check that the AC current is within limits at full output and run the PSU for a few minutes at 200-260V AC (230V typical) [100-130V AC (115V typical)].

Switch off, disconnect from the mains and inspect for any signs of overheating.

Reassemble as described in Section 3.2.4.

This completes the run-up and fault finding of the T807/808.