



## Fitting a Heatspreader to a T889 PA

8th September 2000

### Applicability

This Technical Note (TN) applies to all T889 power amplifiers manufactured prior to 25 August 2000.

### Introduction



**Caution:** This equipment contains CMOS devices which are susceptible to damage from static charges.



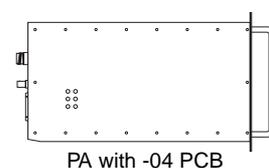
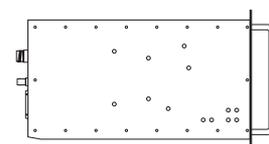
**Caution:** Do not operate the PA with the PCB detached as the heatsink is used for earthing and heat dissipation.

In certain circumstances the T889 may not operate at its full power due to the overheating of the four transistors in the final stage of the RF power amplifier. The installation of a heatspreader will aid in the dissipation of the heat generated by these transistors, and is therefore a recommended procedure.

If you have any questions about this TN or the procedures it describes, please contact your nearest Tait Dealer or Customer Service Organisation. If necessary, you can get additional technical help from Customer Support, Tait Electronics Ltd, Christchurch, New Zealand.

### Parts And Equipment Required

- 1 x Heatspreader: IPN 308-13140-00 for PCB 220-01326-01  
IPN 308-13139-00 for PCB 220-01326-04
- See [Figure 3](#) for the differences between the heatspreaders.
- PAs with an -01 issue PCB have numerous access holes in the side cover. PAs with an -04 issue PCB have only six access holes near the D-range connector.
- Low melting point solder (62% tin, 36% lead, 2% silver).
- 100W soldering iron.



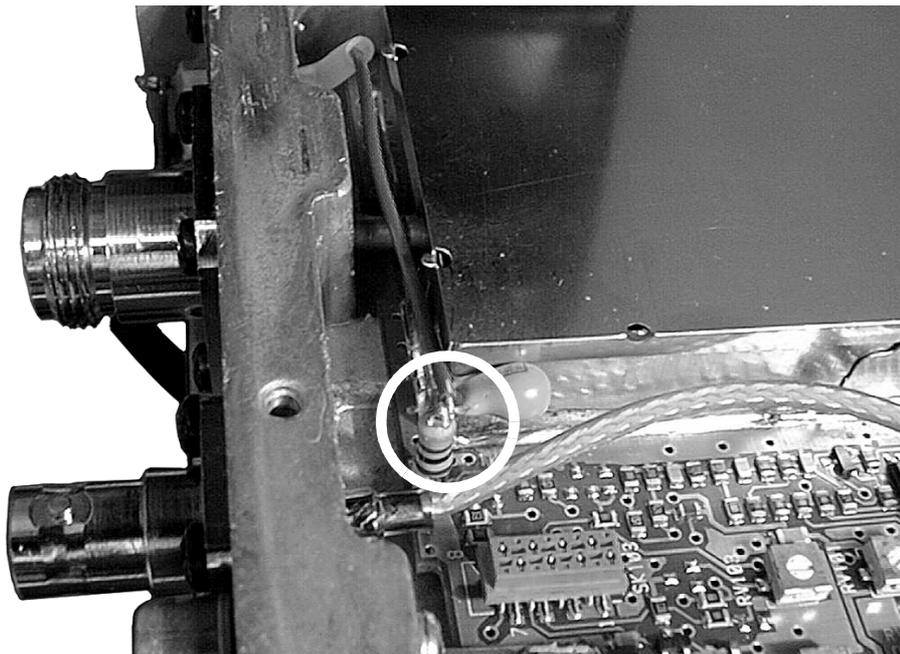
## Method

The circuit references of some components have changed between the two production issues of the T889 PCB. References given will be for the later (-04) issue, with the earlier (-01) issue in square brackets where they are different. These differences are listed in the following table.

PCB 220-01326-01	PCB 220-01326-04
R16	R272
R17/R17A	R274
R18	R275
R7	R276
R8	R277
R9	R278
Q16	Q137
L22	L23
L16	L24

**Table 1 PCB Component Differences**

1. Remove the side cover of the T889 power amplifier.
2. Disconnect the red fan power feed wire from the PCB, or from the fan modification if fitted (junction of 100 $\mu$ H inductor and 10 $\mu$ f tant, see [Figure 1](#)).



**Figure 1 Junction Of Fan Power Feed Wire And Fan Modification**

3. Remove the cable ties around the wires coming from the D-range PCB.
4. Remove the D-range assembly.
  - **PCB 220-01326-04:** Disconnect the ribbon cable from SK101 on the D-range PCB.
  - Desolder the black power feed wires and short red power feed wire from the main PA PCB.
  - Desolder the long red power feed wire from the D-range PCB.
  - **PCB 220-01326-01:** Disconnect the brown, purple, blue, green and orange wires from the PA PCB.
  - Remove the screws and latching blocks from the D-range connector.
  - Remove the D-range assembly from the heatsink.
5. Remove the BNC connector.
  - Unplug the input coax cable from socket P1 on the PCB.
  - Remove the screws from the BNC connector.
  - Remove the connector and cable from the heatsink.
6. Remove N-type socket.
  - Remove the harmonic filter shield.
  - Remove the screws from the N-type socket.
  - Using two soldering irons, desolder and remove the N-type socket from the PCB and heatsink.
7. Remove all the screws attaching the PCB to the heatsink, including all transistor, dumpload and wireline plate screws.
8. Push the three front panel LEDs out of their grommets.
9. Carefully remove the PCB from the heatsink.

**Note:** R272-278 [R7-9, R16-18] and Q1-6 may be stuck down with heatsink compound. You may need to carefully prise them away from the heatsink with a small screwdriver.

Steps 10-14 describe the removal of final stage power transistors Q3-6 and their associated components. These components are listed in [Table 2](#), and their locations are shown in [Figure 6](#) [[Figure 5](#)].

Transistor	Base (Chip) Capacitors	Collector Capacitors	Collector Link	Collector Wireline	Base Wireline
Q3	C20, C21	C22, C23	L19	L23 [L22]	L24 [L16]
Q4	C26, C27	C28, C30	L29	L32	L26
Q5	C33, C34	C35, C36	L36	L39 <sup>a</sup>	L33
Q6	C40, C41	C42, C43	L46	L49	L43

a. L39 is screenprinted on the PCB as L37.

**Table 2 Circuit References Of The Final Stage Transistors And Their Associated Components**

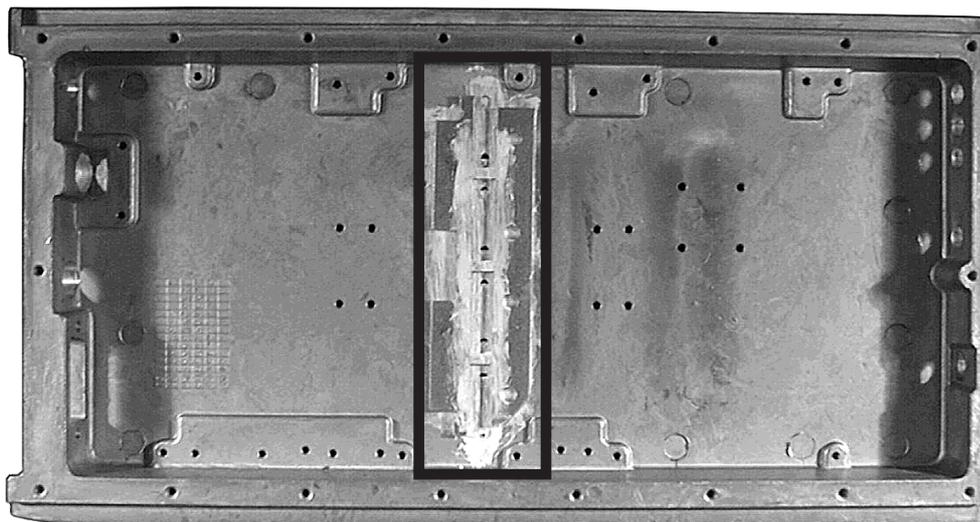
10. Lift the collector supply links L19, L29, L36 and L46 from Q3, Q4, Q5 and Q6 respectively.
11. Remove the capacitors, as listed in [Table 2](#), from transistors Q3-6.

**Note:** Using two soldering irons may make the job easier.

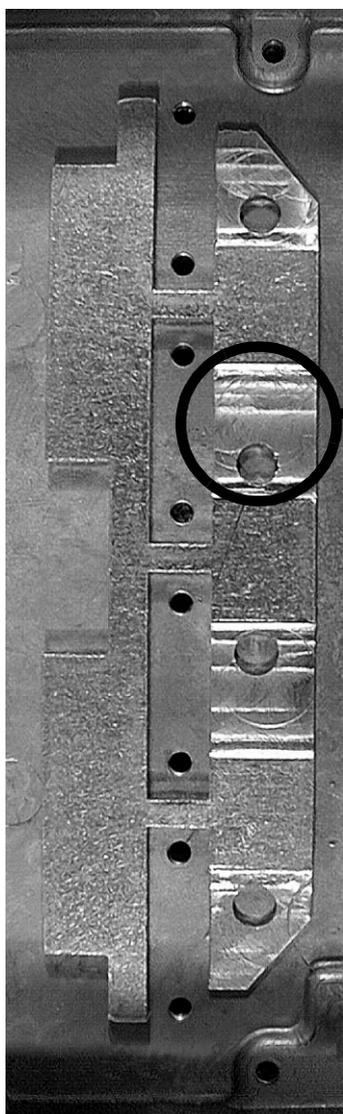
12. Bend up the centre conductor of the transistor base wirelines L24 [L16], L26, L33 and L43, and collector wirelines L23 [L22], L32, L39, and L49.
13. Remove the earthing straps (2 per transistor) from Q3, Q4, Q5, and Q6, and carefully remove the transistors. The recommended method to prevent damage is to heat the leg with a soldering iron and then lift it with a scalpel.
14. Remove any excess solder left on the PCB pads.
15. Ensure the heatsink is free of any dust, solder blobs or other objects. If needed, add silicon grease to the heatsink to ensure good heat transfer from the heat spreader.
16. Evenly coat the heatspreader on both sides with silicon grease.
17. Place the heatspreader on the heatsink as shown in [Figure 2](#) and [Figure 3](#) (PCB 220-01326-01: machined side of heatspreader is placed face up). Ensure that there will be adequate silicon grease between the transistors and the heatsink.



**Caution:** Keep the silicon grease clean while the PCB is detached. Any objects which are caught in the silicon grease underneath the device, preventing effective earthing and/or heatsinking, may cause the device to fail.

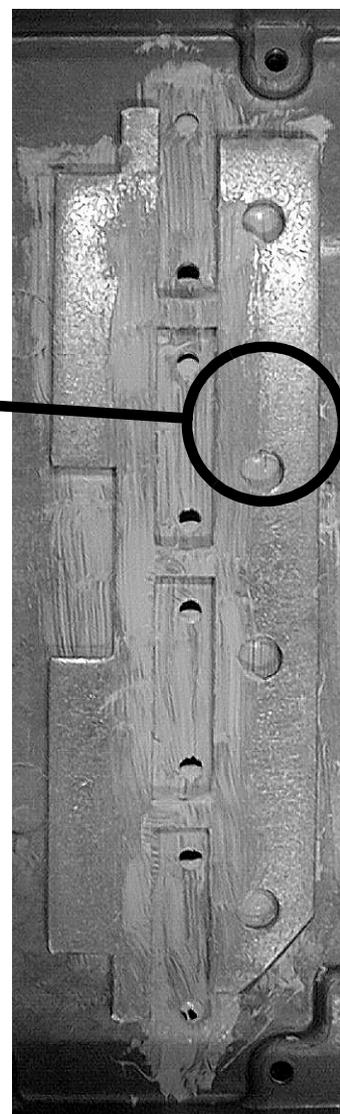


**Figure 2 Correct Placement Of Heatspreader On Heatsink**



Heatspreader 308-13140-00  
for PCB 220-01326-01

Ensure extra machining on heatspreader IPN 308-13140-00 (left) is placed face up.



Heatspreader 308-13139-00  
for PCB 220-01326-04

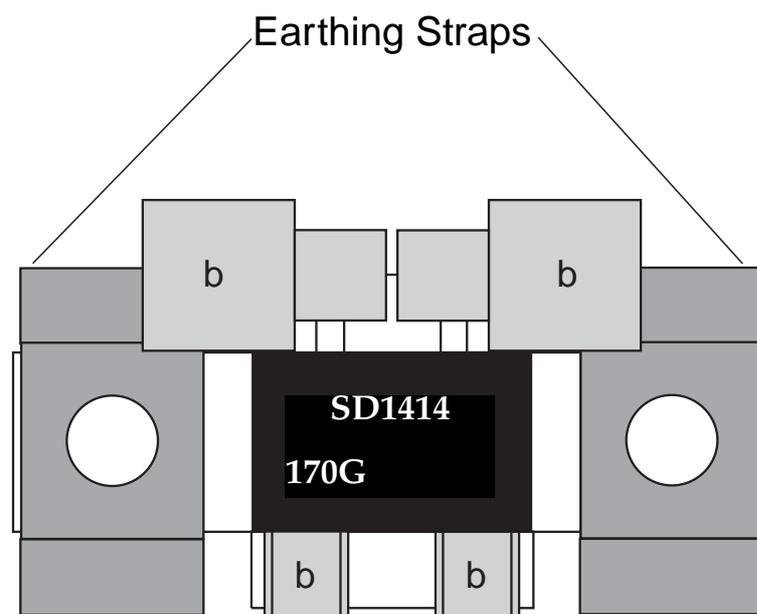
**Figure 3 Identification And Placement Of Heatspreader**

18. Refit the PCB into the heatsink.
19. Refit all screws except the retaining screws for Q3, Q4, Q5 and Q6.
  - When fitting the dumpload screws on R272, R274, R275, R276, R277 and R278 [R16, R17/R17A, R18, R7, R8 and R9], hold the dumploads firmly in place to prevent them cracking.



**Caution:** Do not solder the transistor tabs before torquing down otherwise the device may be broken.

20. Refit the transistors.
  - Remove any excess solder to leave a thin, even layer on the tabs.
  - Refit transistors Q3, Q4, Q5 and Q6, ensuring the collector (SD1414) is facing the harmonic filter (the text reads correctly from front panel end).
  - Replace the transistor earthing straps.
  - Fit and torque the transistor retaining screws to 8 in.lbf.
  - Solder the transistors and earthing straps with low melting point solder and a 100W soldering iron.
21. Refit the capacitors using low melting point solder and a 100W soldering iron.
  - All capacitors should be positioned hard up against their respective transistors, as shown in [Figure 4](#).
  - Solder each pair of chip capacitors (C20 and C21 for Q3, C26 and C27 for Q4, C33 and C34 for Q5, and C40 and C41 for Q6) to the transistor and allow them to cool before soldering them to the PCB with a thin fillet of solder.
  - Refit capacitors C22 and C23 to Q3, C28 and C30 to Q4, C35 and C36 to Q5, and C42 and C43 to Q6.



**Figure 4** T889 Capacitor/Transistor Placement

22. Carefully bend the centre conductor of the transistor base wire lines L24 [L16], L26, L33 and L43, and the collector wire lines L23 [L22], L32, L39, and L49 back into position, and solder.
23. Reconnect the collector supply links L19, L29, L36 and L46 using a low melting point solder and 100W soldering iron.
24. Refit the N-type socket and resolder.
25. Refit the harmonic filter shield.
26. Reconnect the red fan power feed wire to the PCB, or to the fan modification if fitted (junction of 100 $\mu$ H inductor and 10 $\mu$ f tant, see [Figure 1](#)).
27. Refit the BNC connector, and reconnect the coax cable to P1 on the main PCB.
28. Refit the D-range assembly.
  - Ensure that the screws are tight and latching blocks are straight.
  - Resolder the red and black power feed wires.
  - **PCB 220-01326-04:** Reconnect the ribbon cable and replace the cut cable ties.
  - **PCB 220-01326-01:** Reconnect the brown, purple, blue, green and orange D-range PCB wires to the locations on the PA PCB shown in [Table 3](#).

D-range PCB Wire	PA PCB Location
Brown	FWD-PWR-ALM
Purple	REV-PWR-ALM
Blue	TX-KEY
Green	FWD-PWR METER
Orange	REV-PWR-MET

**Table 3 D-range PCB wire connections**

29. Refit the front panel LEDs by pushing them into their grommets with a small screwdriver or spike.
30. Refit the side cover.
31. Test the T889 power amplifier to ensure correct operation.

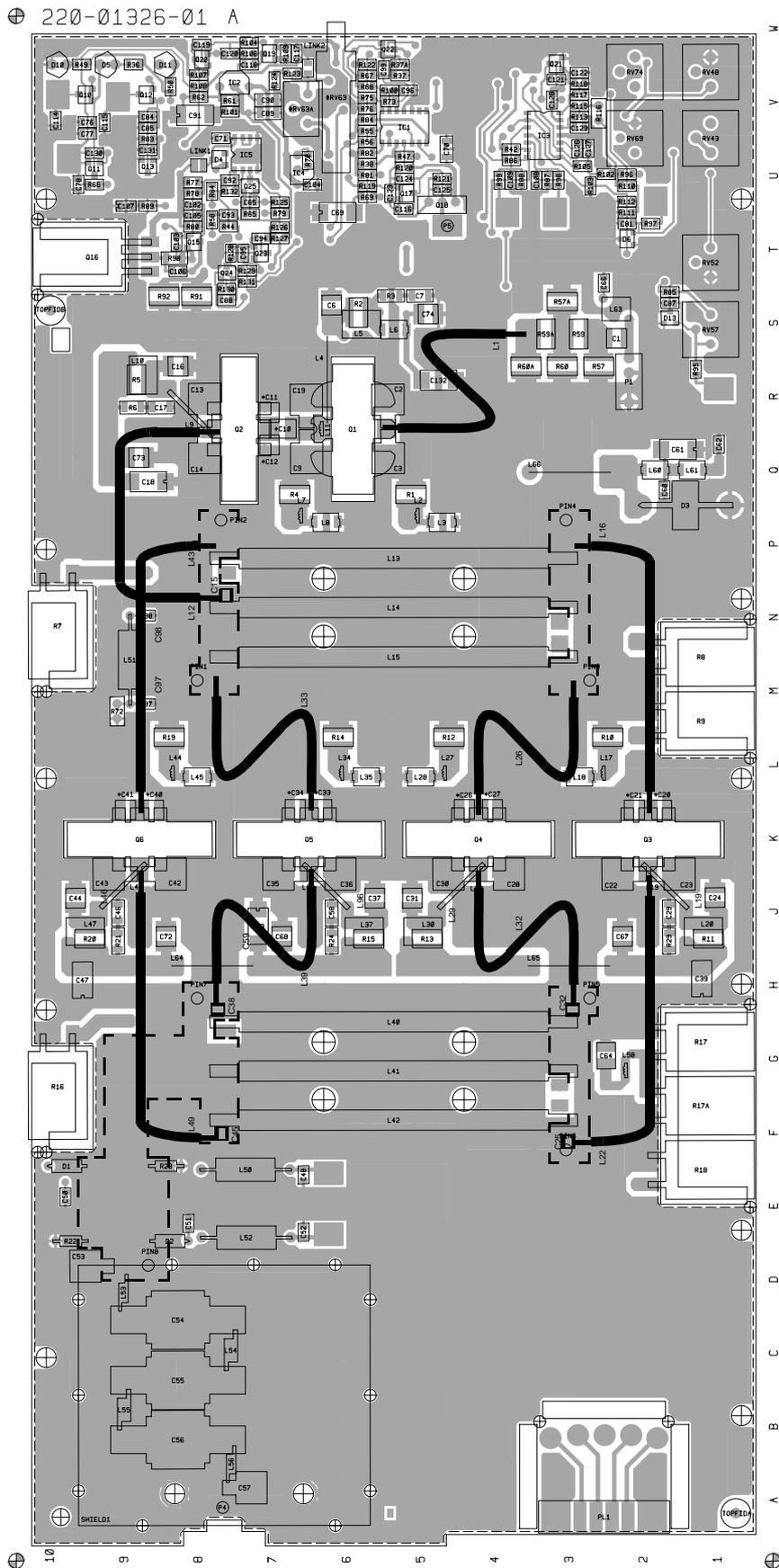


Figure 5 T889 PA (IPN 220-01326-01)

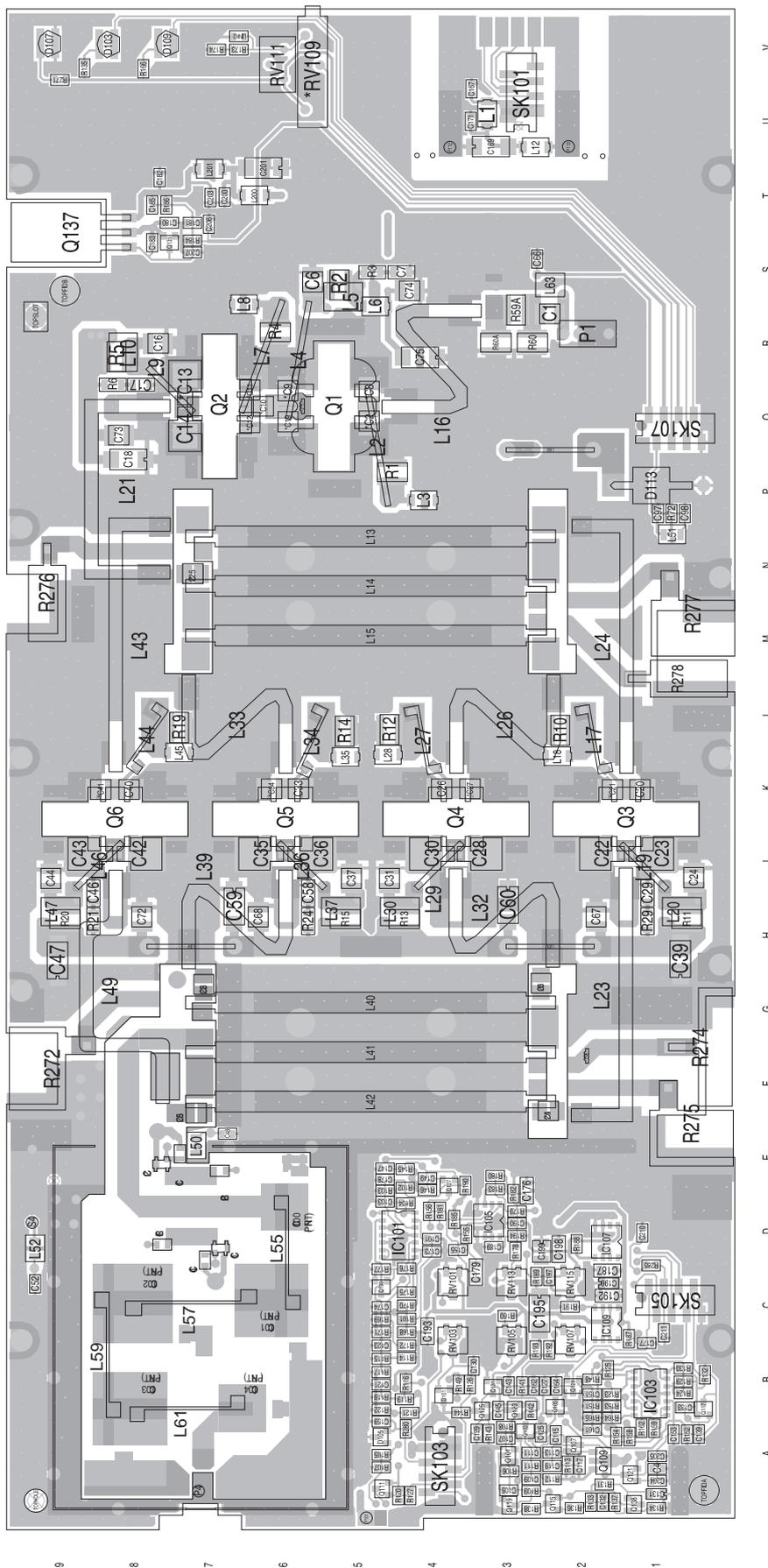


Figure 6 T889 PA (IPN 220-01326-04)

## Issuing Authority

This TN was issued by:      John Crossland  
   Documentation Manager

## Publication History

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8th September 2000	D Brown