Model Z10040B Broadband Norton Amplifier

16 January 2010

Service Bulletin 01

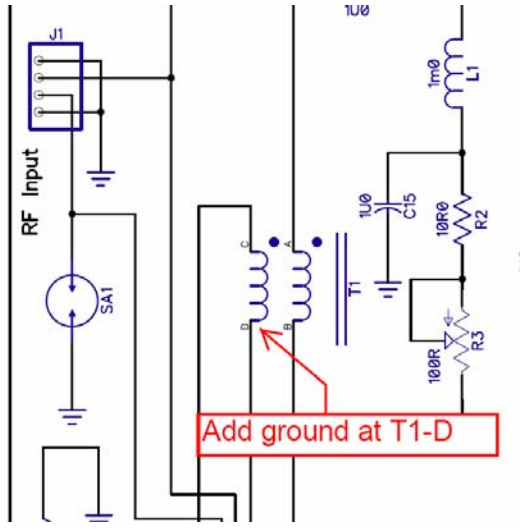
This Service Bulletin covers two topics:

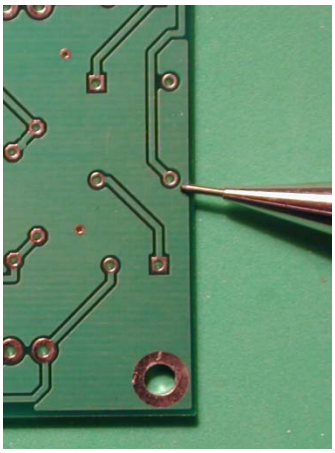
1. Performance improvement for unbalanced operation
2. Stability modification where Q1 & Q2 have unusually high gain at UHF.

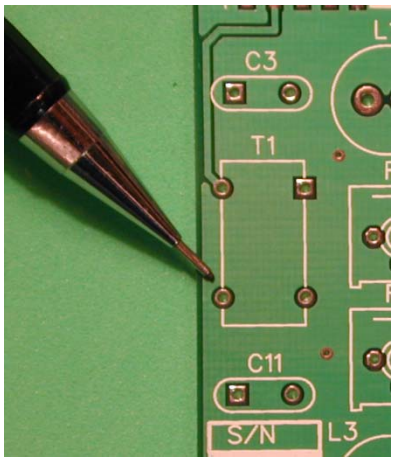
Item 1 applies to all Z10040B amplifiers. Item 2 applies only to Z10040B amplifier shipped after mid-January 2010.

Performance Improvement for Unbalanced Operation

At the request of some customers, the Z10040B added optional balanced input, with the choice between balanced and unbalanced operation being made via input plug location. If the Z10040B is to be used only in unbalanced mode (which is likely to be the vast majority of cases) a slight improvement in performance can be observed by adding a grounding point near T1's pin "D." The top and bottom locations of T1-D are shown in the photographs.







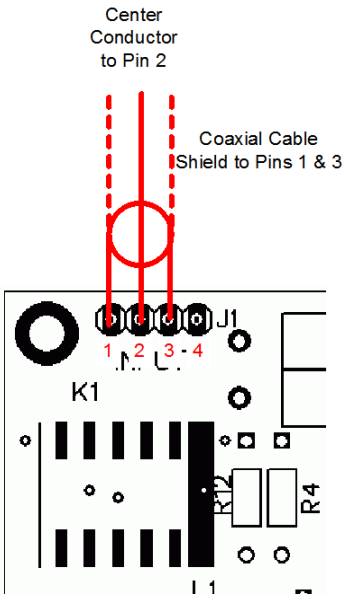
To make the modification, remove the solder mask from a small area of the printed circuit board ground plane on the bottom surface near T1-D. This may be done by gently scraping the solder mask away using a sharp hobby knife. The area removed should be a rough square, approximately 1/8th inch (3mm) on a side. Apply electronic grade solder flux if you have it to the newly exposed copper surface and tin it.

Solder a short length of bare wire from the tinned square to T1-D. If you wish, as an option, the same modification may be made to the top board foil, although it is not necessary.

The benefit obtained from this modification is to reduce the ground side track length and unwanted coupling to other signals.

Note that after this modification is made, only one input at J1 is active, as illustrated at the right.

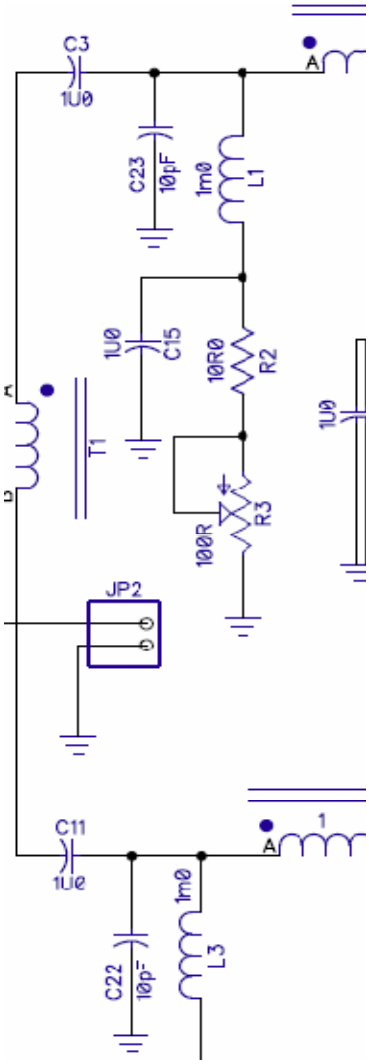
Should it be desired to operate with balanced input at a later date, this modification may be reversed if it is carefully made.



Stability modification where Q1 & Q2 have unusually high gain at UHF

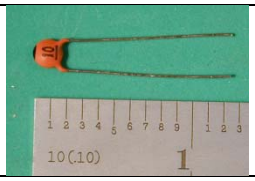
Part of the Z10040B's kitting process is to measure the DC gain (H_{FE} or beta) of all 2N5109 transistors and group them into matched pairs. Usually the measured beta runs between 40 and 80. The lot of 2N5109 transistors received in mid January 2010, however, showed beta values between 120 and 160. The greater DC gain also translated into higher gain at UHF frequencies, with a resulting parasitic oscillation around 900 MHz under certain conditions of input and output termination.

The solution is to roll off the gain by adding capacitors C22 and C23 (10p) to the input circuit. This small capacitance does not alter performance within the Z10040B's normal operating range, but it is sufficient to provide stability with the highest gain 2N5109 transistors available to me (beta > 170.)

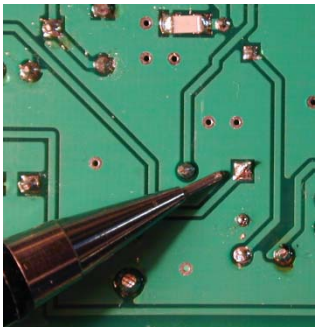


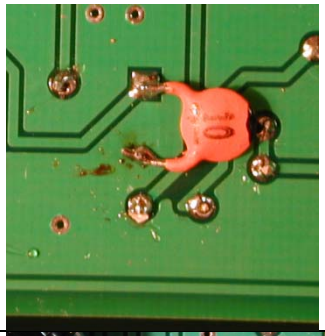
Installing C22 and C23

C22 and C23 are 10pF disc ceramic capacitor capacitors, identified as 10.



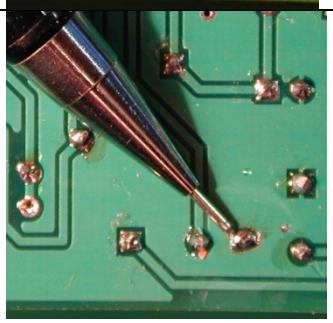
Install C23 between T2-pin A and ground. Trim the leads on C23 to approximately 1/8 inch (3 mm) and tin. On the bottom of the board, locate T2, pin A. Note there is a "solder via" near T2-A as seen in the photo at the right. Tin the via. (Vias are direct connections to the ground foil and a larger soldering iron will be necessary to tin the via.) Orient C23 as illustrated in the photograph and solder it to T2-A and the ground via. After soldering, use an ohmmeter to check T2-A for an inadvertent short to ground. The resistance should be in the 40 – 100 ohm range, depending R2's setting.





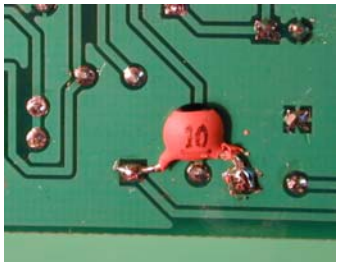
Install C22 between T4-pin A and ground. Unfortunately, there is no convenient ground via, so carefully remove a small area of the solder mask as seen in the photograph at the right. The pencil tip points to the newly created ground point.

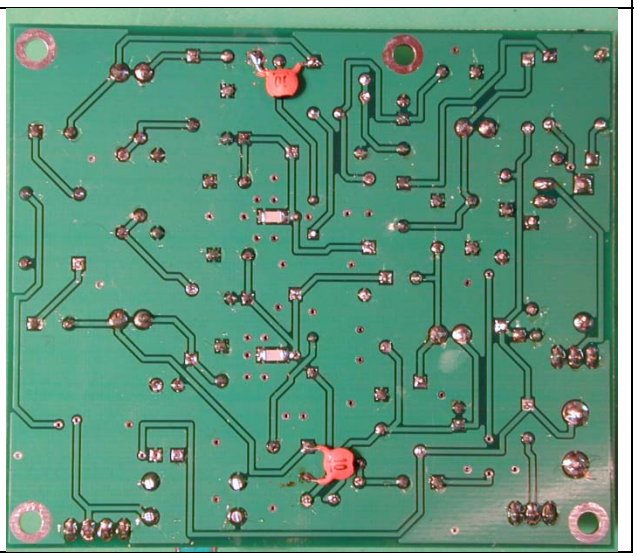
The solder mask may be removed by gently scraping it away with a sharp hobby knife. The area removed should be a rough square, approximately 1/8th inch (3mm) on a side. Apply electronic grade solder flux if you have it to the newly exposed copper surface and tin it.



Trim the leads on C22 to approximately 1/8 inch (3 mm) and tin. Form the leads as seen in the photograph and solder C22 between T4-A and the new ground point.

After soldering, use an ohmmeter to check T2-A for an inadvertent short to ground. The resistance should be in the 40 – 100 ohm range, depending



R8's setting.	
Printed circuit board after C22 and C23 are installed.	

Post Modification Checkout

These changes will not alter the published performance of the Z10040B nor do they require readjusting amplifier balance.

If you have a suitable spectrum analyzer, connect it to the Z10040B's output and observe the spectrum between 10 and 1500 MHz, with 13.8V DC applied. No indications of spurious signals should be seen with or without the input connected.