

# Field Modification of Ten-Tec model 516 Argonaut to Reduce Potential of SSB TX Distortion.

## About this Modification:

The Argonaut 516 transceiver's microphone gain control setting is critical for transmit signal quality. The procedure for adjusting the microphone gain, as outlined in the manual, may result in excessive microphone gain though there is proper ALC indication. This can result in a distorted transmit audio signal and low transmit audio quality. To prevent this, a modification can be made to the ALC circuit to raise the level at which ALC activation occurs. This makes adjustment of microphone gain less critical and ALC overload less likely.

## Does my Argonaut 516 need this modification?

This modification is not required. If you have not observed distorted transmit audio this modification may not be necessary. If you have experienced SSB transmit audio distortion this modification should be made.

Not all Argonaut 516 transceivers need this modification. In October 2004, this change was incorporated into the Argonaut manufacturing process. In addition, radios received for repair at the factory after October 2004 will have been modified by the Ten-Tec repair department. You can check the manufacturing date of the transceiver by looking at the serial number. The first two digits of the serial number are the month of manufacture and the last digit is the year. For example, serial number **9C10014** was manufactured in September 2004.

## Parts Included with Modification Kit:

1	#30672	Resistor, 6.8k ohms, surface mount (marked 682)
1	#30674	Resistor, 10k ohms, surface mount (marked 103)
1	#30682	Resistor, 47k ohms, surface mount (marked 473)
1	#23196	Capacitor, electrolytic, 2.2mfd. radial leads
1		Short piece of solder-wick braid
1		Short piece of .031 diameter solder.

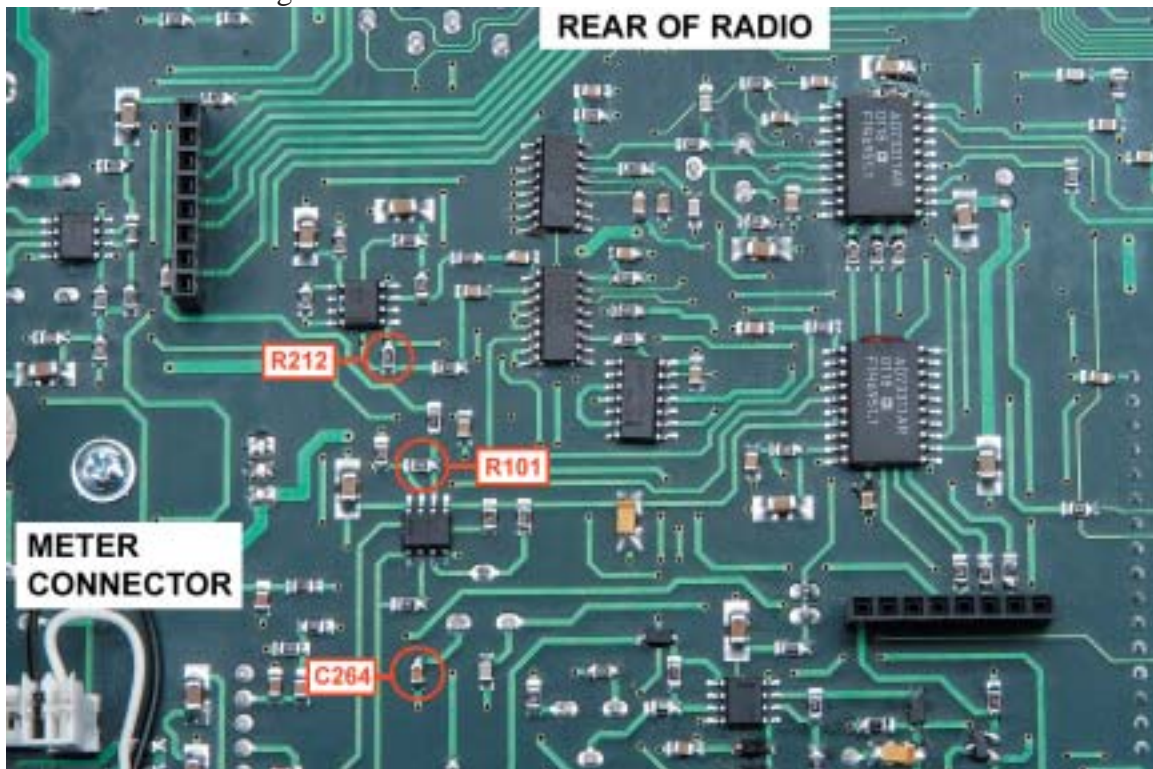
## Tools Required:

1	#1 Medium tip Phillips screwdriver
1	Small pair of tweezers for holding chip resistors.
1	Small pair of wire cutters for trimming capacitor leads
1	Grounded tip 60Watt soldering iron with pencil or needle tip
1	Magnifier work lamp to make the job easier

## Disassembly of Model 516 Argonaut:

- ☐ 1) Disconnect all cables from Argonaut.
- ☐ 2) Remove five(5) black Phillips head screws securing Top and Bottom Covers.

- ☐ 3) Remove Top Cover and set it aside.
- ☐ 4) Turn Argonaut upside-down and carefully remove Bottom Cover. Unplug the speaker connector from the circuit board at the rear of the Argonaut. Set the Bottom Cover aside.
- ☐ 5) Turn Argonaut right-side up and unplug all cables going to the RF Board (the one with the two large metal enclosures mounted on it). You will be unplugging cables #14, #15 and #16.
- ☐ 6) Remove and save the five(5) silver Phillips head screws securing the RF Board to the center deck.
- ☐ 7) Starting at the rear edge, carefully pull up on the RF Board and remove it from the radio. Set it aside in a safe place.
- ☐ 8) Remove connector #11 from the front left corner of the underlying Logic Board and place it out of the way.
- ☐ 9) Loosen the two(2) black flat-head Phillips screws securing the right side of the Front Panel. You do not have to remove these, just loosen them to aid in later removal of the center deck.
- ☐ 10) Remove the four(4) silver flat-head Phillips screws securing the aluminum center deck to the left and right side panels. Set the screws aside.
- ☐ 11) Grasp the radio by the left and right side panels, and while gently pulling on these panels invert the radio and allow the center deck to fall free from the radio. Set the deck aside.
- ☐ 12) With the Argonaut in an upright position you should now be able to see the unmodified Logic Board as shown in Figure 1 below.



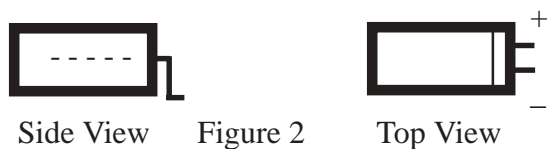
**Figure 1. Unmodified Model 516 Logic Board (Bottom View)**

## Modifying the Logic Board:

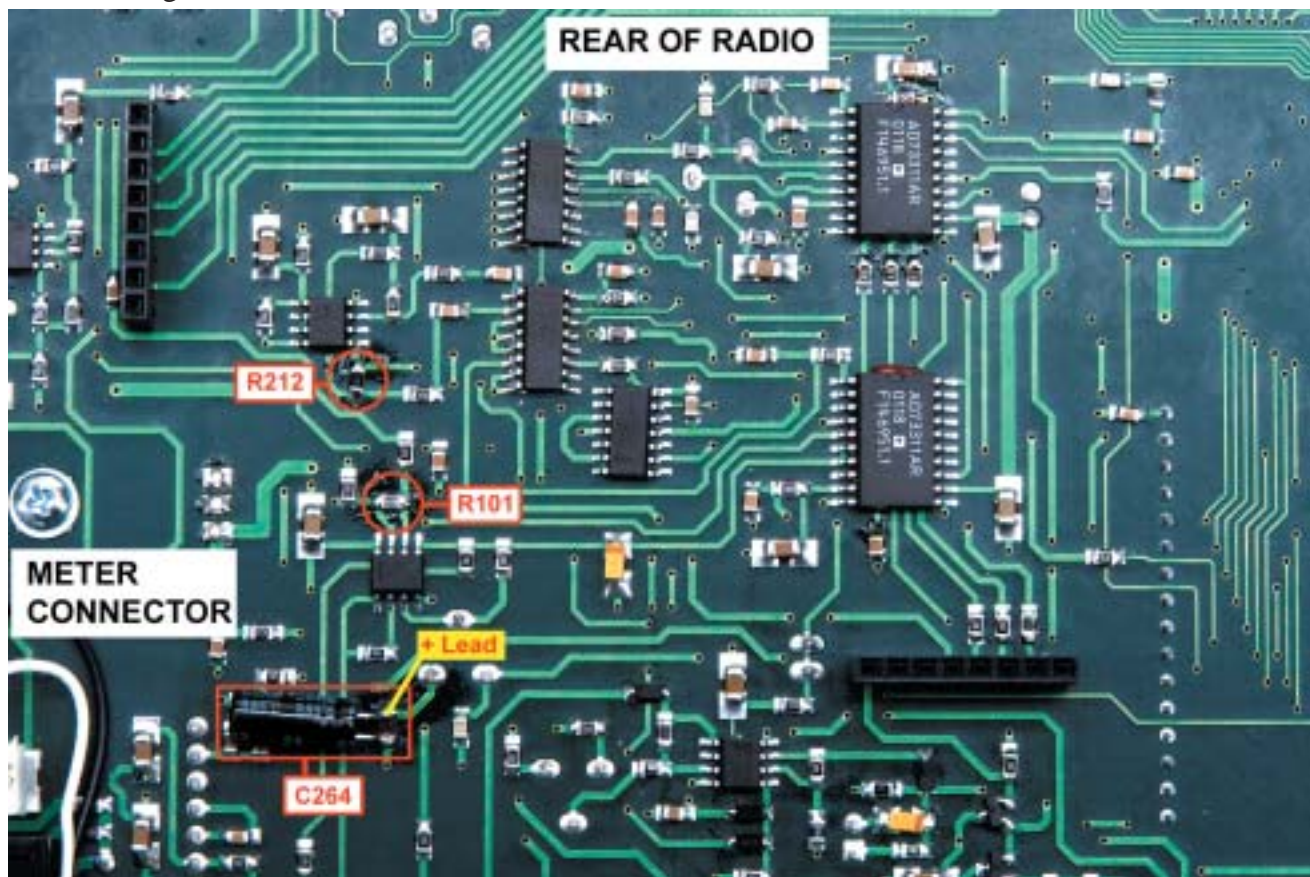
- ☐ 1) Plug in and turn on your soldering iron. Make sure it is at the proper operating temperature before trying to unsolder any parts. Also, to prevent any possible damage to static-sensitive components be sure you are using a soldering iron with a grounded tip or one rated as ESD safe.
- ☐ 2) Locate the short piece of Solder-Wick braid and carefully remove solder from each end of R212. While alternately heating each end of the resistor carefully apply a slight upward pressure with the soldering iron tip to remove the old 4.7K ohm [472] resistor. You will need to break the part loose from the glue holding it in place while the solder is hot. CAUTION: The pads can easily be damaged or lifted from the board. Use the minimum amount of heat and force necessary to remove the part.
- ☐ 3) Clean off the old solder from the pads using the Solder-Wick braid.
- ☐ 4) Locate the small piece of solder and carefully apply a thin coating of fresh solder to the pads.
- ☐ 5) Locate the new 10K ohm [103] resistor, and using a small pair of tweezers, position it across the pads in the same position as the old resistor. While holding it in position, touch the tip of the soldering iron to one end of the resistor and its corresponding pad, letting the solder melt thoroughly before removing the soldering iron tip. In like manner, solder the other end of the resistor to its pad.
- ☐ 6) Carefully inspect the connections with a magnifier and if necessary reheat the connections, applying extra solder if needed.
- ☐ 7) Locate the short piece of Solder-Wick braid and carefully remove solder from each end of R101. While alternately heating each end of the resistor carefully apply a slight upward pressure with the soldering iron tip to remove the old 100K ohm [104] resistor.
- ☐ 8) Locate the small piece of solder and carefully apply a thin coating of fresh solder to the pads. There is no need to re-glue the new parts.
- ☐ 9) Locate the new 47K ohm [473] resistor, and using a small pair of tweezers, position it across the pads in the same position as the old resistor. While holding it in position, touch the tip of the soldering iron to one end of the resistor and its corresponding pad, letting the solder melt thoroughly before removing the soldering iron tip. In like manner, solder the other end of the resistor to its pad.
- ☐ 10) Carefully inspect the connections with a magnifier and if necessary reheat the connections, applying extra solder if needed.
- ☐ 11) Locate the short piece of Solder-Wick braid and carefully remove solder from each end of C264. While alternately heating each end of the resistor carefully apply a slight upward pressure with the soldering iron tip to remove the old chip capacitor.
- ☐ 12) Locate the small piece of solder and carefully apply a thin coating of fresh solder to the pads.



- 13) Locate the new 2.2mfd. electrolytic capacitor. Carefully bend and trim the leads as shown below in Figure 2.



- 14) Referring to Figures 2 and 3 solder the new 2.2mfd. electrolytic capacitor in the same place as the previous C264 chip capacitor. Be sure the positive(+) lead of the capacitor is soldered to the pad which is closest to the rear of the Logic Board.
- 15) Inspect all solder connections and make sure the modified Logic Board looks like that shown in Figure 3.



**Figure 3. Modified Model 516 Logic Board.**

### **Reassembly of Model 516 Argonaut:**

- 1) Place the radio right side up and carefully lower the center deck into position over the bottom of the Logic Board. Be sure the cutouts line up with the PC Board Connectors and that the Meter cable wires are not pinched.
- 2) Secure the center deck with the four(4) silver flat-head Phillips screws removed previously.
- 3) Tighten the two(2) black flat-head Phillips screws securing the right side of the Front Panel.
- 4) Plug cable connector #11 into the mating connector located in the left front corner of the Logic Board..

- ☐ 5) Locate the RF Board, previously removed, and carefully position it over the center deck.
- ☐ 6) Line up the row of pins on the left edge of the RF Board with the mating socket on the Logic Board. Carefully lower the RF Board down towards the center deck, making sure that the other two sets of connector pins line up with their mating connectors. You can visually check to see if these connectors are lined up by looking through the cutouts in the side panels. Also, if these connectors are not aligned correctly the screw holes in the RF Board will not line up with the corresponding holes in the standoffs.
- ☐ 7) Secure the RF Board with the five(5) silver Phillips screws removed previously..
- ☐ 8) Connect cables #14, #15 and #16 to the matching connectors on the RF Board.
- ☐ 9) Check the make sure all connectors are secure and in the right locations.

### **Updating the Model 516 Argonaut Firmware to Version 1.08:**

- ☐ 1) With the Power Switch on the Argonaut turned OFF, connect a Power Supply, Antenna, Key and RS232 Serial Cables to the Argonaut..
- ☐ 2) Software for updating the Argonaut to Version 1.08 can be found either on the enclosed program disc (if you ordered the upgrade kit) or downloaded from the Ten-Tec website at: <http://www.rfsquared.com/>
- ☐ 3) Install the software located on the disc or downloaded from the website.
- ☐ 4) Locate the Folder: **Ttflash** on your computer hard drive, this is where the update program and data files should be located.
- ☐ 5) Place the Argonaut into Flash Update Mode by holding down the **MODE** button on the Argonaut while turning on the **AF/Power** Switch. Release the **MODE** button and the words “**FLASH**” should appear in the display.
- ☐ 6) Locate the *Update.exe* file in the **Ttflash** folder and double click on it to start the update program.
- ☐ 7) Select “Setup” under the Settings menu and make sure the program is set to the correct COM port on your computer.
- ☐ 8) Select “Update Radio” under the Process menu to initiate the update.
- ☐ 5) Select the file “516v108.ruf” from the popup window and click OPEN.
- ☐ 6) A window should then open which shows the progress of the update.
- ☐ 7) Follow instructions in the window and when the update is finished click on the button on the screen to terminate the update.

- ☐ 8) Next you should perform a RESET on the Argonaut by first turning OFF the **AF/Power** switch and then turning it back on while holding down the **FUNC** button.
- ☐ 9) The display should briefly show (Fb. 1.08) followed by (14.000.000).
- ☐ 10) Release the **FUNC** button and the display will show (14.250.000) and you are ready to go.

### **Resetting the Mic Gain After the 1.08 Update:**

- ☐ 1) Connect a dummy load (preferred) or antenna to the ANT connector on the rear of the radio.
- ☐ 2) Place the Argonaut on the 20M band and in USB mode.
- ☐ 3) Connect a microphone to the MIC jack on the Front Panel.
- ☐ 4) Set the Front Panel MIC Gain control at about the 9 O'clock position.
- ☐ 5) While talking into the mike at a normal volume level, adjust the MIC Gain trimpot, located on the top side of the Logic Board, until the ALC light on the Front Panel lights on voice peaks.

### **Checking QRP CW Transmitter Output Levels:**

- ☐ 1) Place the radio into CW Mode using the MODE button.
- ☐ 2) Turn the PWR control fully counter-clockwise to set the transmitted power level to minimum QRP level.
- ☐ 3) Plug your keyer into the CW jack on the Rear Panel of the Argonaut.
- ☐ 4) Turn the PWR control fully counter-clockwise to set the transmitted power level to minimum QRP level.
- ☐ 5) While sending a string of "dits", press the KEYR button and set the keyer speed to "OFF". This will allow you to send a continuous carrier while the "dit" key is held down.
- ☐ 6) While sending a carrier, as described above, press the V/M button to place the Meter into low power range. The meter will now read 5 Watts full scale until the key is released. Each time you wish to use the low power scale you must press the V/M button while the radio is keyed.
- ☐ 7) Check the output reading on each band to ensure that the output is less than or equal to 2 Watts. NOTE: It is normal for the output to vary from band to band. The 40M and 30M bands in particular will be higher than the rest of the bands.
- ☐ 8) If all bands check out OK, proceed to **Finishing UP**. If one or more bands QRP level is higher than you would like to see, this can be lowered further by changing the value of R212, which was modified earlier in step #5 under "Modifying the Logic Board". Most radios will work fine with the 10k ohm resistor installed in this step, however, due to manufacturing tolerance variations you may have to replace the 10k ohm with a 6.8k ohm resistor to get the minimum QRP levels down further. Just follow the same procedures used previously to replace the 10k ohm resistor with the 6.8k ohm. Check the QRP output levels again after making this change.

### **Finishing UP:**

- ☐ 1) If everything seems to be working correctly, turn OFF the **AF/Power** switch and disconnect all cables.
- ☐ 2) Place the Argonaut upside-down and while holding the Bottom Cover over the radio, carefully plug the speaker cable into the connector board on the Rear Panel.
- ☐ 3) Carefully lower the Bottom Cover into position on the radio.
- ☐ 4) Turn the Argonaut right-side up and install the Top Cover. Secure with the five(5) black Phillips head screws previously set aside.