



**WARNING!**

*Only qualified technical personnel should attempt this modification. An attempt to perform this task by a person who is not technically qualified could result in a hazardous condition to the installer or other personnel, and/or damage to this device or other equipment. Please ensure that proper safety precautions have been made before working on the system.*

### Intended Audience

The modifications described in this document are easy for someone who is technically knowledgeable and proficient at soldering and de-soldering. If you do not fit this category then you should contact someone who is more suited to the task.

### Description

The procedure described in this document typically improves DTMF (Touch-Tone) detection in the RFC-1/B. It applies to systems that work normally when accessed from the "local phone" that is connected directly to the system but work intermittently or fail when dialing in from a remote location.

### Background

The tone detection IC in the RFC-1/B has no interface for microprocessor control. There are no software adjustments in the RFC-1/B to adjust the tone detector. The following modifications increase the incoming signal to compensate for weak signals.

Transmitter sites are often located in remote areas where landlines are prohibitively expensive. It has become common to connect the RFC-1/B to devices that emulate a landline while connecting to a cellular phone network.

Experience shows that cellular service is not very good at passing strong, clean DTMF tones. The worst case is to use a cell phone to call an RFC-1/B that is connected to a line emulation device. These devices are wonderfully convenient but they attenuate the DTMF tones and make it difficult for the RFC-1 to work effectively.

### Modification Part I

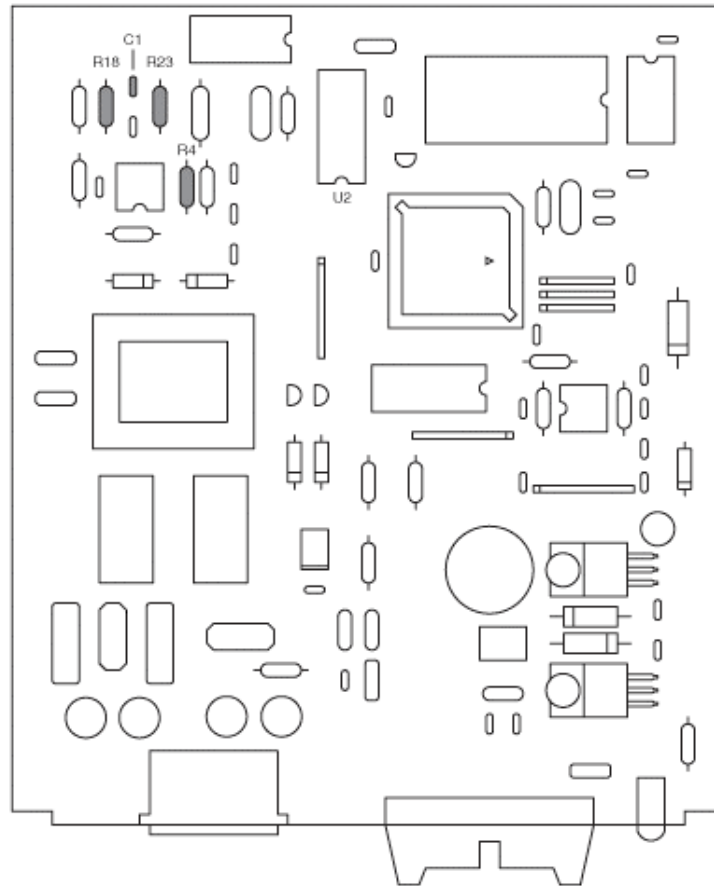
This information applies only to RFC-1/B board revisions where R23 is located where shown in the drawing below. These board revisions will also have an IC labeled CD22202/CD22204 or 75T202/75T203 at position U2. This procedure does not apply and should not be used for other board revisions.

### Board Removal

Unplug the ribbon cable to the RFC-1/B control unit. There are no changes to the RP-8 in this modification so cables to the RP-8 can be left in place. Remove the RFC-1/B from the rack if necessary. Remove the two screws from the rear panel. Remove the rear panel and plastic bezel from the RFC-1/B. Slide the RFC-1/B circuit board from the chassis.

**Inspection**

The board should look like the image below. Look carefully! Performing an incorrect modification will make the problem worse.



*Location of R23*

The IC at location U2 must be labeled CD22202/CD22204 or 75T202/75T203. If it is not then do not continue with this procedure. There is another modification that may help.

Resistor R23 should be located near the upper left corner of the RFC-1 circuit board. It is shaded in the image below. If R23 is not in the same location as shown in this image then this modification is not appropriate for your system.

### *First Adjustment*

The modification is a resistor substitution that involves only R23. Most RFC-1/B systems have a 270K ohm resistor at position R23. Replace this resistor with a 100K ohm, 5-10% tolerance, 1/4 watt resistor.

The modification is complete. Test the system.

If the modification fails to solve the problem then substitute a smaller value resistor, about 47K ohms. If that does not work, try 10K ohms.

### *Second Adjustment*

This modification involves R18 in addition to R23. R18 is located to the left of R23 across the two small capacitors. As before, if the location of the parts does not match the drawings then do not continue with this procedure.

Remove both R23 and R18 from the circuit. Do not replace R18 with anything and do not short it. Replace R23 with a low value resistor anywhere from 1K down to 100 ohms. If a suitable resistor is not available R23 can be shorted.

If you are in the field and do not have a low value resistor available, use the resistor removed from R18. At 33K ohms the value is a little high but with R18 removed from the circuit the value of R23 is less critical.

The modification is complete. Test the system.

If the system works from the local phone but does not work when dialed in, there is another modification. Locate a very small capacitor C1 between R23 and R18 in the drawing above. If it exists in the same location on your board, carefully remove it from the circuit.

The modification is complete. Test the system.

If these modifications are made correctly and the system does not detect tones when dialed in then the tones are at a very low level or something else wrong. If the RFC-1/B works using the local phone then the tone detector is functioning.

## **Modification Part 2**

The information in this section of the document applies to all RFC-1/B board revisions. Boards may have an IC labeled HT9170B at location U2 in addition to ICs labeled CD22202/CD22204 or 75T202/75T203.

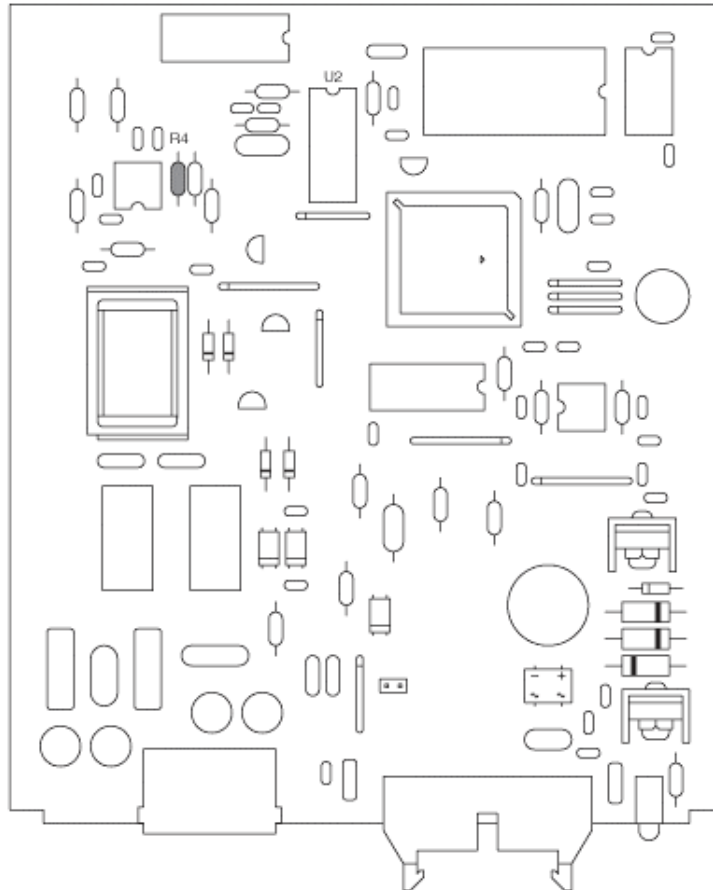
### **Board Removal**

If you have not already done so, unplug the ribbon cable to the RFC-1/B control unit. There are no changes to the RP-8 in this modification so cables to the RP-8 can be left in place.

Remove the RFC-1/B from the rack if necessary. Remove the two screws from the rear panel. Remove the rear panel and plastic bezel from the RFC-1/B. Slide the RFC-1/B circuit board from the chassis.

**Inspection**

Resistor R4 should be located near the upper left corner of the RFC-1 circuit board. It is shaded in the image below. Resistor R4 should be next to the 8-pin IC in all cases. If it is not, do not make any changes.



*Location of R4*

***First Adjustment***

The modification is a resistor substitution that involves only R4. Most RFC-1/B systems have a 20K ohm 1% tolerance resistor at position R4. Replace this resistor with a 27K ohm, 1% tolerance, 1/4 watt resistor.

The modification is complete. Test the system.

***Second Adjustment***

If the modification fails to solve the problem then substitute a slightly larger value resistor, 33K ohms. If that does not work, try 39K ohms.

It is important to be conservative when changing the value of resistor R4. This procedure should solve tone detection problems on remote calls but also may potentially cause tone detection problems on the local phone if adjusted too much.