Cahaba Technology Product Detector v1.0

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Thank you for purchasing the Cahaba Technology Product Detector v1.0. We hope it provides a substantive improvement in your receiver's performance. If you are not satisfied within 30 days of the purchase and you have used reasonable care in installing it, you can return it for a refund less shipping.

Below is a description of the circuit, parts values, and installation instructions. We have used the product detector in various receivers and our suggestions are based on that experience. However, every installation is unique. If you get stumped, email us and we will do the best we can to get you going.

We are always interested in how the circuit is used. Please drop us an email describing your installation and any hurdles you had to overcome.

Even though the circuit uses relatively low voltage, there is always a possibility of injury. We assume no responsibility implied or otherwise for any injuries or consequential damage to others or property resulting from the use of this product.

Description

The Cahaba Technology Product Detector module v1.0 uses a circuit suggested by the manufacturer, Motorola, in their technical documentation (Figure 1). The layout of the printed circuit board is shown in Figure 2. The component values are indicated in the accompanying text.

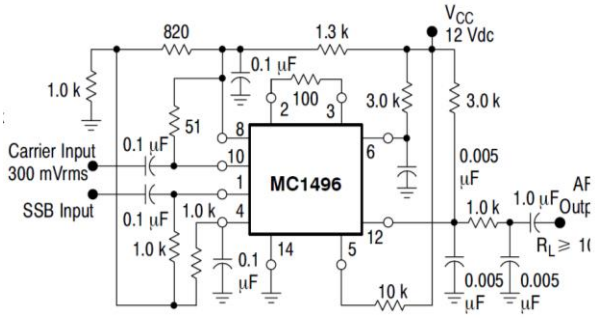

Figure 1. Product detector schematic (Source: MC1496,MC1496B, Balanced Modulators/Demodulators, Semiconductor Components Industries, LLC, 2006, October, 2006-Rev. 10)

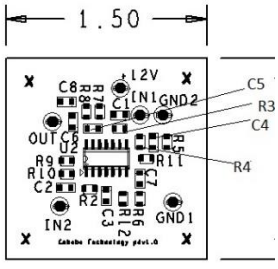

Figure 2. Top view of PCB

Component Values

C1-C4 .1uf	R2 100 ohm	R5 1.27k	R12 10k
C5-C7 5000pf	R3 51 ohm	R6-R7 3.01k	U2 MC1496
C8 1.0uf	R4 820 ohm	R8-R11 1k	

Installation and Operation

Voltage: The specs for the 1496 chip indicate a maximum of 30vdc. We have used 7vdc to 13vdc from either a battery or a regulated supply with good results. The current draw is around 70ma; so, you could get about 10 hours from a standard 9-volt battery or about 125 hours from a UPC, 12-volt battery. One of these might be a good choice while experimenting with deployment in your receiver. Once you have nailed down the deployment, then decide how to power the circuit from the receiver, e.g., tapping 6.3vac filament voltage through a voltage doubler and zener diode. Be sure to use as much filter capacitance as you can muster such as 2000uf after the zener.

Ground: The two grounds (GND1 and GND2) on the module should be connected to the common ground of the receiver. GND2 is connected to GND1 and is included as a convenience for connecting the shield of the BFO coax connection (see below). If power is not being drawn from the receiver, e.g., from a battery, ensure the ground of the power supply is common with the receiver ground.

Beat Frequency Oscillator (BFO): Connect the BFO output from the receiver to IN1 and GND2 using shielded wire such as RG174 coax. Keep this connection as short as possible with a good ground connection at both ends. Problems such as insufficient BFO signal and BFO leakage such that the BFO can be heard as a background signal are usually traceable to this BFO-to-product detector connection. The specs indicate a BFO signal of 300mV rms and this recommendation agrees with our experience. We have also found that a signal of at least 40mV rms is required. As the signal gets stronger, it may swamp the IF signal resulting in no audio output from the product detector. The best way we have found to adjust the BFO signal is with a coupling capacitor between the receiver BFO and IN1. Something between 5pf and 36pf has worked in our experience. A simple “gimmick” capacitor such as wrapping the BFO input lead around the IN1 pin does not work. Note there is a coupling capacitor on the board (C2) so your external capacitor is in series.

SSB Input: Connect the output from the last intermediate frequency (IF) amplifier to IN2. Depending on your receiver, this connection might be direct or through a coupling capacitor, e.g., 100 pf. Try a direct connection first. We have usually found the direct connection to work fine. Note there is a coupling capacitor built into the board (C1) so your external capacitor is in series.

AF Out: Connect OUT to the input of the receiver audio amplifier. This connection will likely be at the point the diode detector in your receiver connects to the audio amplifier. Be sure to connect upstream of the volume control and noise limiter so these functions are retained. This connection should also be made using shielded cable.

You may be able to make the above connections to the BFO, IF and audio amplifier without disconnecting any of the original receiver connections. However, if there is insufficient audio gain after installing the product detector, it may be necessary to sever the IF-to-diode detector connection when the product detector is in use.