

HAMTRONICS® R303-137 WEATHER SATELLITE RECEIVER: INSTALLATION, OPERATION, & MAINTENANCE

GENERAL INFORMATION.

The R303-137 is a commercial-grade, four-channel, frequency synthesized vhf fm receiver optimized for operation on the 137 MHz weather satellite channels. All four NOAA satellite frequencies are installed in the receiver. It features wide i-f filters (38 kHz modulation acceptance to accommodate the wide deviation used for APT), low-noise dual-gate FET rf amplifier and mixer stages, and an integrated circuit i-f strip.

The receiver is powered by 12Vdc. An ac adapter is available as an option.

SPECIFICATIONS.

- Channels supplied: 137.100, 137.500, 137.620, & 137.9125MHz NOAA APT Satellites.
- Commercial grade txco for tight frequency accuracy: 2ppm -30 to +60°C.
- Sensitivity (12dB SINAD): 0.2µV
- Squelch Sensitivity: 0.15µV
- Normal satellite signal bandwidth: ±15 kHz deviation
- Modulation Acceptance: ±18 kHz
- Speaker Audio Output: 1 Watt (8 ohms).
- High impedance output for computer sound system input (1Vp-p with 9kHz deviation on input signal)
- Operating Power: +13.6Vdc at 38-100 mA, depending on audio level.
- Size: 4 in. W x 2-1/2 in. D

CHANNELS.

You can select which satellite channel you want to hear with a jumper on the pc board. For convenience, you may want to install a switch on your cabinet, and we will tell you later how to do that.

Following is a quick reference chart showing which pc board terminals to ground for each channel. This scheme allows the most popular channels to be selected with the simplest jumpers. Note that terminals E8 & E9 provide handy ground terminals if you just want to install a jumper on the board.

Note that we can provide programming for other nearby frequencies on special order, with a total of four frequencies possible.

| Channel | Ground Terminal(s) |
|----------|--------------------|
| 137.9125 | None |
| 137.620 | E6 |
| 137.100 | E7 |
| 137.500 | E6 & E7 |

INSTALLATION.

Mounting.

Assuming you will mount the pc board in a cabinet of some sort, the best method is to

use 4-40 screws and threaded standoffs in the mounting holes in the corners of the board. We sell an A26 Mounting Kit which is handy for the purpose. Use metal mounting hardware such as this so that the ground plane of the board is connected well to the cabinet. That way, all your ground returns for power and audio can simply be connected to the metalwork of the cabinet.

Connecting to the Board.

The pc board has pads where wires to external connections can be made. Normally, #22 solid hookup wire should be used with wires soldered on the bottom of the board.

DC Power.

The R303-137 Receiver is designed to operate on +12 to +18Vdc. It requires about 38 mA of current with no audio output and up to 100 mA with audio turned all the way up. Ideally, the receiver only needs 12Vdc. You can operate from any 12Vdc regulated power supply if you wish.

If you purchased a 12Vdc power adapter, the actual voltage will be higher than 12Vdc, but the receiver is designed to accommodate the voltage of the adapter. 12Vdc power adapters are not regulated, and typically put out 18-20Vdc with no load, dropping to 12Vdc only with their full rated load.

The power supply or 12Vdc power adapter should be connected with its positive lead soldered to E3 and its negative lead connected anywhere on the ground plane, such as under a mounting screw. You can also use ground terminals E8 & E9 for ground connections to the board.

If you are using the 12Vdc adapter, cut about an inch off the end of the cable to get to clean copper never exposed to the air. Then, separate the two leads about an inch and strip them 1/8 inch. The lead with the small grooves molded into it is positive, and the smoother lead is negative.

⚠️ WARNING: REVERSE POLARITY WILL DAMAGE THE RECEIVER.

Audio Output.

There are 2 audio output terminals: E1 and E2. As with power, the ground return can be connected to the ground plane at any of the mounting screws; or you can use ground terminals E8 & E9 for that purpose.

E2 is the speaker output, with the volume controlled by VOLUME control R37 on the board. SQUELCH control R25 controls the squelch opening threshold. The output ic in the R303-137 can provide up to 1 watt of audio to a load of 8Ω or more. (A lower load impedance might cause distortion or over-

heating at high volume levels.)

E1 is a high impedance output with a fixed level (nominal 1Vp-p) which can be used with the line input on your computer's sound system. Or if you prefer, you can use the speaker output from E2 and set the level to whatever works best.

Antenna Connection.

The success of reception is very much dependent on having a good antenna. The ARRL *Weather Satellite Handbook* is a good source of information on building antennas. Good quality, low-loss 50Ω coax should be used between the antenna and the receiver because the satellite signals are weak.

The antenna connection should be made to the pc board with an RCA plug of the low-loss type made for rf. We sell good RCA plugs with cable clamp. See A5 plug on website.

If you want to extend the antenna connection to a panel connector, we recommend using a short length of RG-174/u coax with the plug and keep the pigtailed very short. This allows you to use flexible cable to connect to the board and still use heavier, low-loss coax for the connection to the antenna up on the roof.

If you use a preamp, such as our LNK-137, you can overcome some cable losses by installing the preamp right up at the antenna. This establishes a low noise figure before going through the loss of the cable.

Channel Switching.

If you plan to use only one channel normally, you can simply install jumper(s) on the board as outlined in the table at the left. However, to easily switch channels without jumpers, you may want to add a channel switch on the front panel of your cabinet. The schematic diagram suggests a way to do this. Basically, you need to ground E6 and/or E7 to use channels 2-4. You can do this with a toggle switch for each terminal, or you can use a rotary switch with two 1N4148 diodes for the fourth channel as shown. A suggested switch is Digikey #CKN9450-ND.

ALIGNMENT.

If you do any repairs which require realignment, refer to procedure in the R303 manual on our website. (L1 should be adjusted to +2Vdc with receiver on 137.500 MHz.) Otherwise, do not disturb the factory adjustments. Also refer to that online manual for theory of operation and troubleshooting hints.

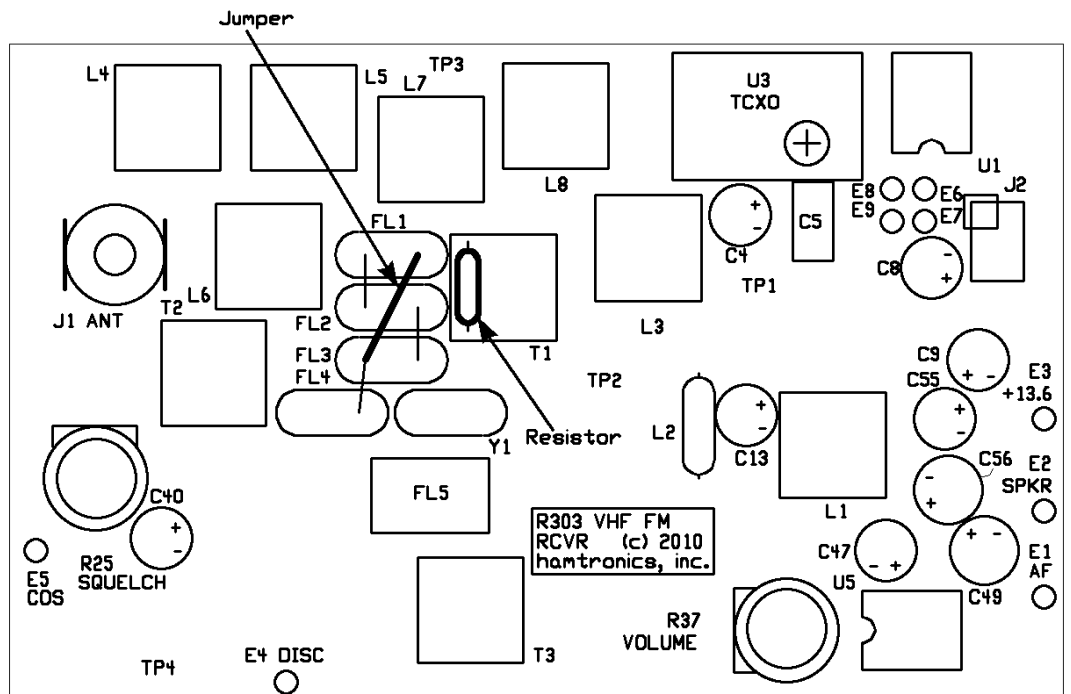
PARTS LIST FOR R303-137.

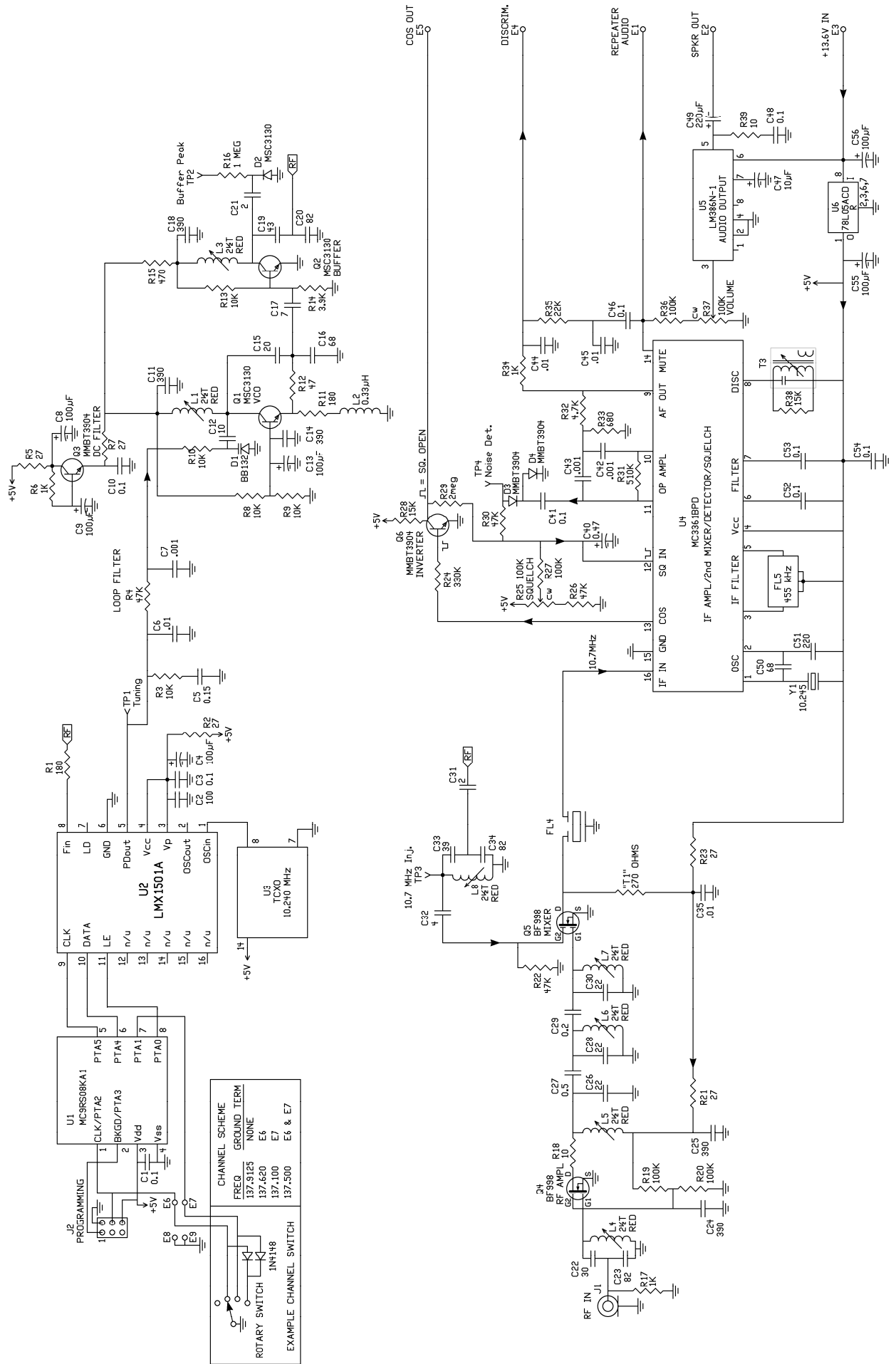
Ref Desig Description (marking)
 ⚡ Caution: IC's are static sensitive. Use appropriate handling precautions to avoid damage.

| Ref Desig | Value (marking) |
|-----------|--------------------|
| C1 | 0.1µf |
| C2 | 100pf |
| C3 | 0.1µf |
| C4 | 100µf electrolytic |
| C5 | 0.15µf mylar (red) |
| C6 | .01µf |
| C7 | .001uf |
| C8-C9 | 100µf electrolytic |
| C10 | 0.1µf |
| C11 | 390pf |
| C12 | 10pf |
| C13 | 100µf electrolytic |
| C14 | 390pf |
| C15 | 20pf |
| C16 | 68pf |
| C17 | 7pf |
| C18 | 390pf |
| C19 | 43pf |
| C20 | 82pf |
| C21 | 2pf |
| C22 | 30pf |
| C23 | 82pf |
| C24-C25 | 390pf |
| C26 | 22pf |
| C27 | 0.5pf |
| C28 | 22pf |
| C29 | 0.2pf |
| C30 | 22pf |
| C31 | 2pf |
| C32 | 4pf |
| C33 | 39pf |
| C34 | 82pf |
| C35 | .01µf |
| C36-C39 | not used |

| | |
|---------|---|
| C40 | 0.47µf electrolytic |
| C41 | 0.1µf |
| C42-C43 | .001µf |
| C44-C45 | .01µf |
| C46 | 0.1µf |
| C47 | 10µf electrolytic |
| C48 | 0.1µf |
| C49 | 220µf electrolytic |
| C50 | 68pf |
| C51 | 220pf |
| C52-C54 | 0.1µf |
| C55-C56 | 100µf electrolytic |
| D1 | BB132 varactor diode |
| D2 | MSC3130 (used as diode) |
| D3-D4 | MMBT3904 (used as diode) |
| FL1-FL3 | replaced with jumper wire (see diagram) |
| FL4 | 10.7MA ceramic filter |
| FL5 | LT455BW ceramic filter |
| J1 | RCA Jack |
| J2 | 6 pin header |
| L1 | 2½ t. ,slug tuned (red) |
| L2 | 0.33µH RF choke (red-sil-orn-orn) |
| L3-L8 | 2½ t. ,slug tuned (red) |
| Q1-Q2 | MSC3130 |
| Q3 | MMBT3904 |
| Q4-Q5 | BF998 MOS FET |
| Q6 | MMBT3904 |
| R1 | 180Ω |
| R2 | 27Ω |
| R3 | 10K |
| R4 | 47K |
| R5 | 27Ω |
| R6 | 1K |
| R7 | 27Ω |
| R8-R10 | 10K |
| R11 | 180Ω |

| | |
|---------|------------------------------|
| R12 | 47Ω |
| R13 | 10K |
| R14 | 3.9K |
| R15 | 470Ω |
| R16 | 1meg |
| R17 | 1K |
| R18 | 10Ω |
| R19-R20 | 100K |
| R21 | 27Ω |
| R22 | 47K |
| R23 | 27Ω |
| R24 | 330K |
| R25 | 100K trim pot |
| R26 | 47K |
| R27 | 100K |
| R28 | 15K |
| R29 | 2meg |
| R30 | 47K |
| R31 | 510K |
| R32 | 4.7K |
| R33 | 680Ω |
| R34 | 1K |
| R35 | 22K |
| R36 | 100K |
| R37 | 100K trim pot |
| R38 | 15K |
| R39 | 10Ω |
| T1 | replaced by 270Ω CF resistor |
| T2 | not used |
| T3 | 455kHz IF xfmr (T1003) |
| U1 | ⚡ MC9RS08KA1CP µP |
| U2 | ⚡ LMX1501A PLL |
| U3 | ⚡ 10.240 MHz TCXO |
| U4 | MC3361BPD IF ampl |
| U5 | LM386N-1 AF output |
| U6 | 78L05ACD regulator |
| XU1 | 8 pin ic socket |
| Y1 | 10.245 MHz crystal |





R303-137 Weather Satellite Receiver, Schematic Diagram.