

Fundamentals of Troubleshooting

Basic Tools for Troubleshooting in Ham Radio

By

Greg Wolfe – KI0KK

Troubleshooting Requirements

- * Know in detail how a given electronic equipment or system works under normal conditions.
- * Know the function of and how to manipulate all equipment controls and adjustments.
- * Know how to use test equipment and technical manuals or other performance data.
- * Be able to analyze the information.
- * Apply a systematic and logical troubleshooting procedure.
- * Perform a post repair test of the equipment. There can be multiple problems or you may create new ones.

Troubleshooting Procedure

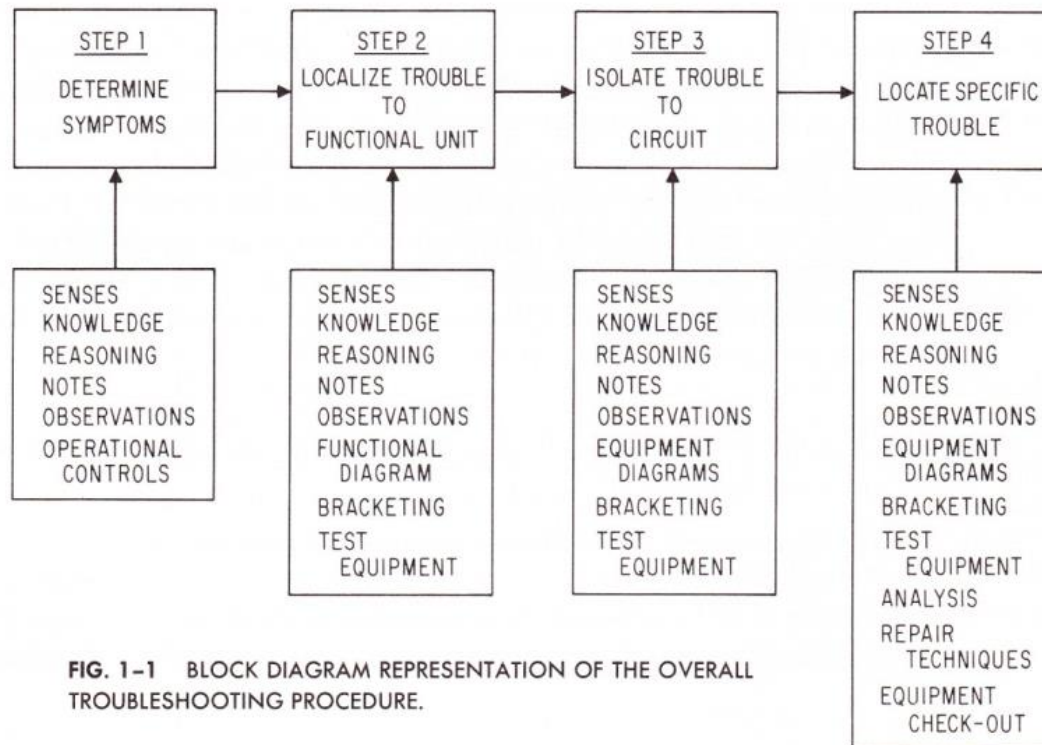
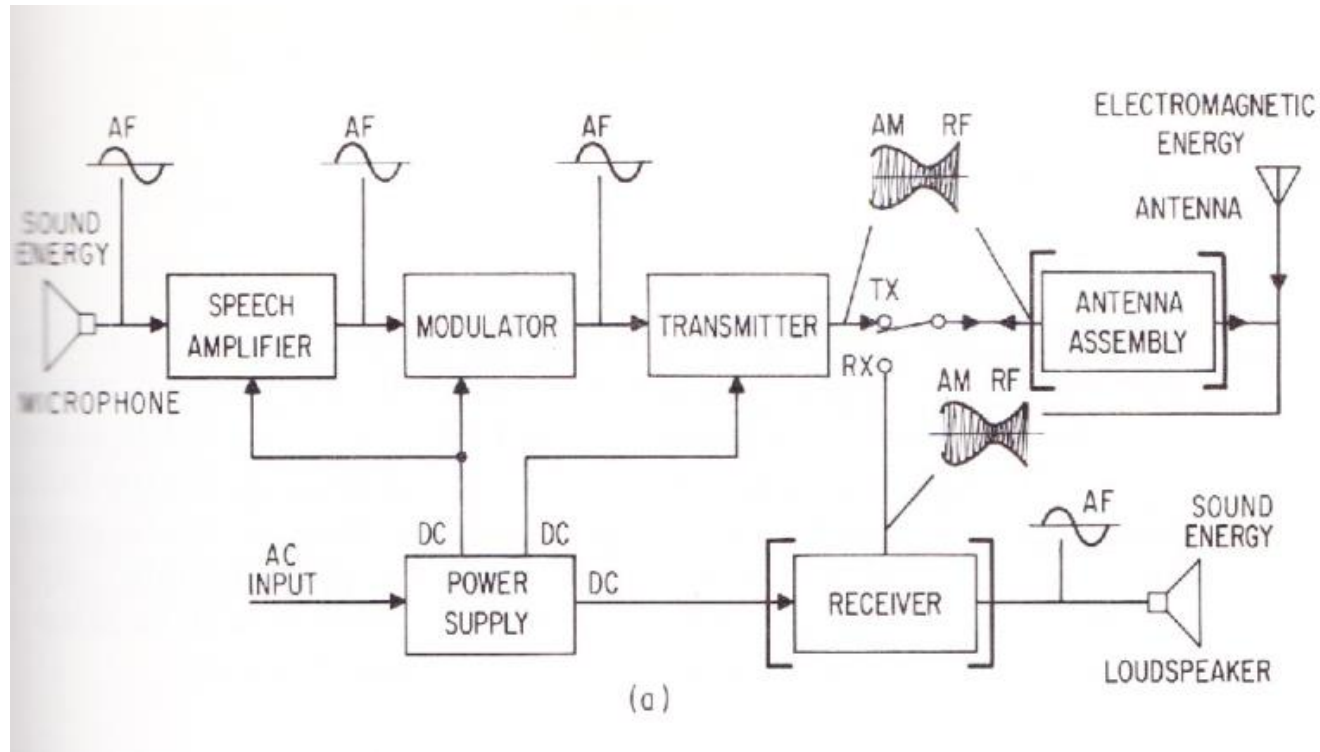


FIG. 1-1 BLOCK DIAGRAM REPRESENTATION OF THE OVERALL TROUBLESHOOTING PROCEDURE.

Localize to a Functional Unit

AM Transmitter Example



Localize to a Functional Unit

Receiver

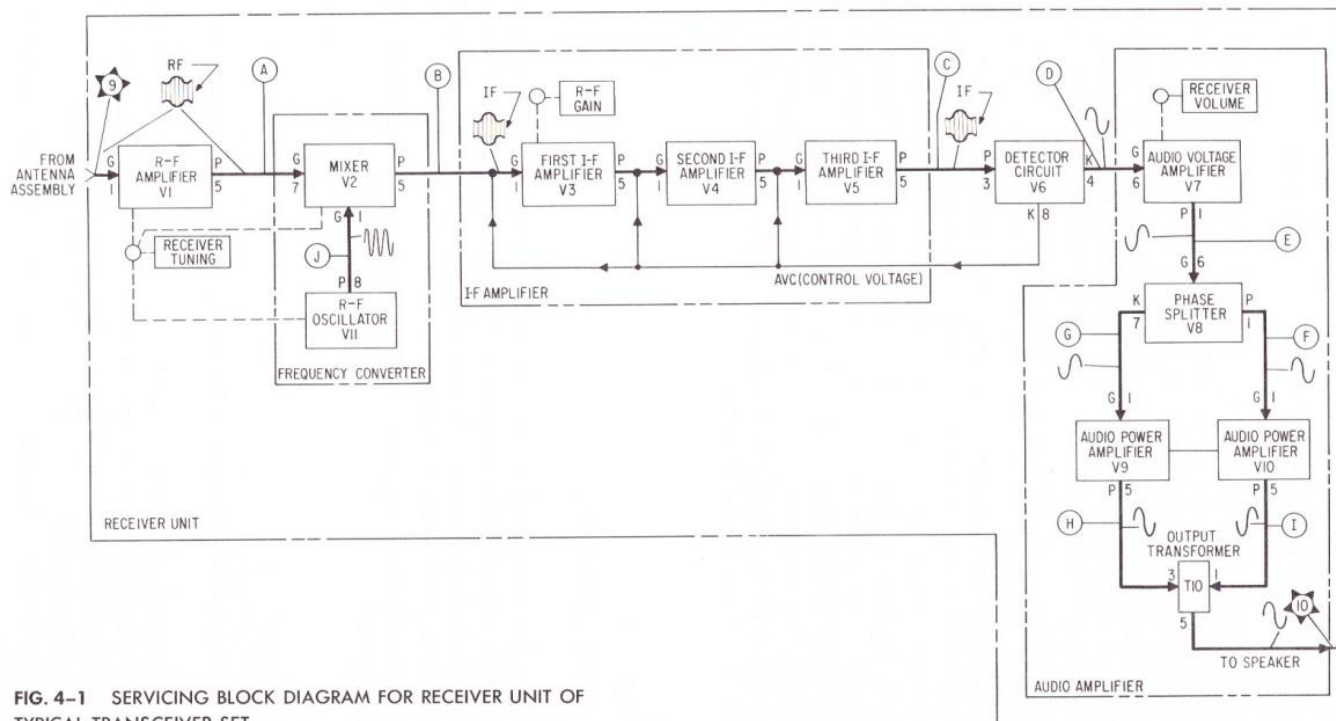
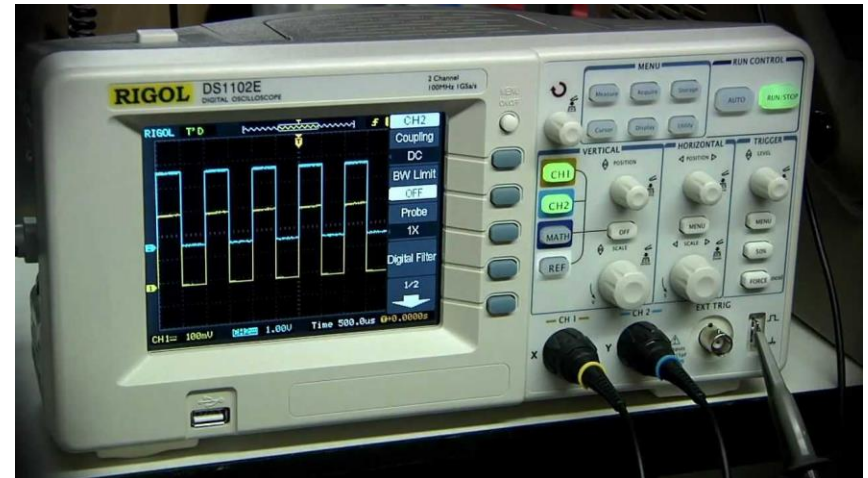


FIG. 4-1 SERVICING BLOCK DIAGRAM FOR RECEIVER UNIT OF TYPICAL TRANSCEIVER SET.

Tools for Troubleshooting

- * Common tools available to most Hams
 - * Digital VM
 - * RF Probe (easily built)
 - * Power Meter
 - * Signal generator (or over the air signal)
 - * Oscilloscope (very useful but not always available)
- * Know the limitations of your test equipment before you use it
 - * Max voltage input (don't let the blue smoke out)
 - * Output level range
 - * Maximum signal input

Test Equipment

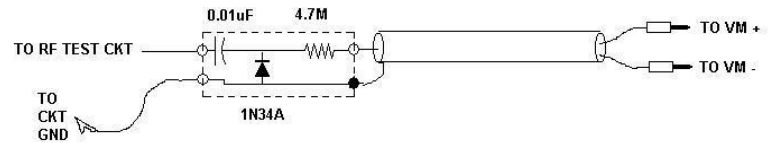


Test Equipment





N5FC 2001



CLASSIC RF PROBE

Reads RMS Equivalent Voltage in test circuit, if Voltmeter is 10-11 Meg Input Impedance;
 Reads 4X RMS Equiv Voltage if VM is 1Meg Input Impedance (Set VM to measure DCV)

[N5ESE RF Probe Article](#)

Check List

- * Understand how the equipment normally functions
- * Define the problem
- * Equipment manual and schematics
- * Test Equipment (based on what you are working on)

Troubleshooting Hands On

Vacuum Tube Based RF Signal Generator

- * Device to be tested – Heathkit IG-102
- * Problem – Distorted RF output
- * Needed test equipment and documentation
 - * DVM
 - * Oscilloscope, Rigol [DS1102E](#)
- * ***Caution – high voltages exist inside this unit (125 V DC, 120 V AC)***

IG-102 Specifications

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SPECIFICATIONS

RF OUTPUT SIGNAL

Frequency Range,	100 kc to 110 mc in six bands (bands A through F), 100 mc to 220 mc (additional band of calibrated harmonics).
Frequency Accuracy,	±2%.
Output Impedance,	50 ohms.
Internal Modulation,	400 cps (30% modulation).
External Modulation,	3 volt signal input for 30% modulation.

AF OUTPUT SIGNAL

Frequency,	400 cps.
Output Voltage,	10 volts (open circuit).

GENERAL

Front Panel Controls,	Variable Frequency control, Band switch, Fine Attenuator control, Coarse Attenuator switch, External Modulation or AF Output control, Modulation switch.
Tube Complement,	12AT7 RF oscillator, 6AN6 amplifier and modulator.
Power Requirements,	105 to 125 volts AC, 50/60 cps, 15 watts.
Cabinet Dimensions,	6-1/2" wide x 9-1/2" high x 5" deep.
Net Weight,	4-1/2 lbs.

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

IG-102 Schematic

