5.3 Cable Fault Testing

The R8000 Cable Fault Locator is used with the Cable Fault Option Kit to determine distance to a fault or termination mismatch in RF cables. The kit contains a resistive RF power splitter, a 50 Ohm load, and two male BNC cables for connecting the splitter to the R8000 analyzer. Figure 5.3-1 shows the connections to the analyzer.

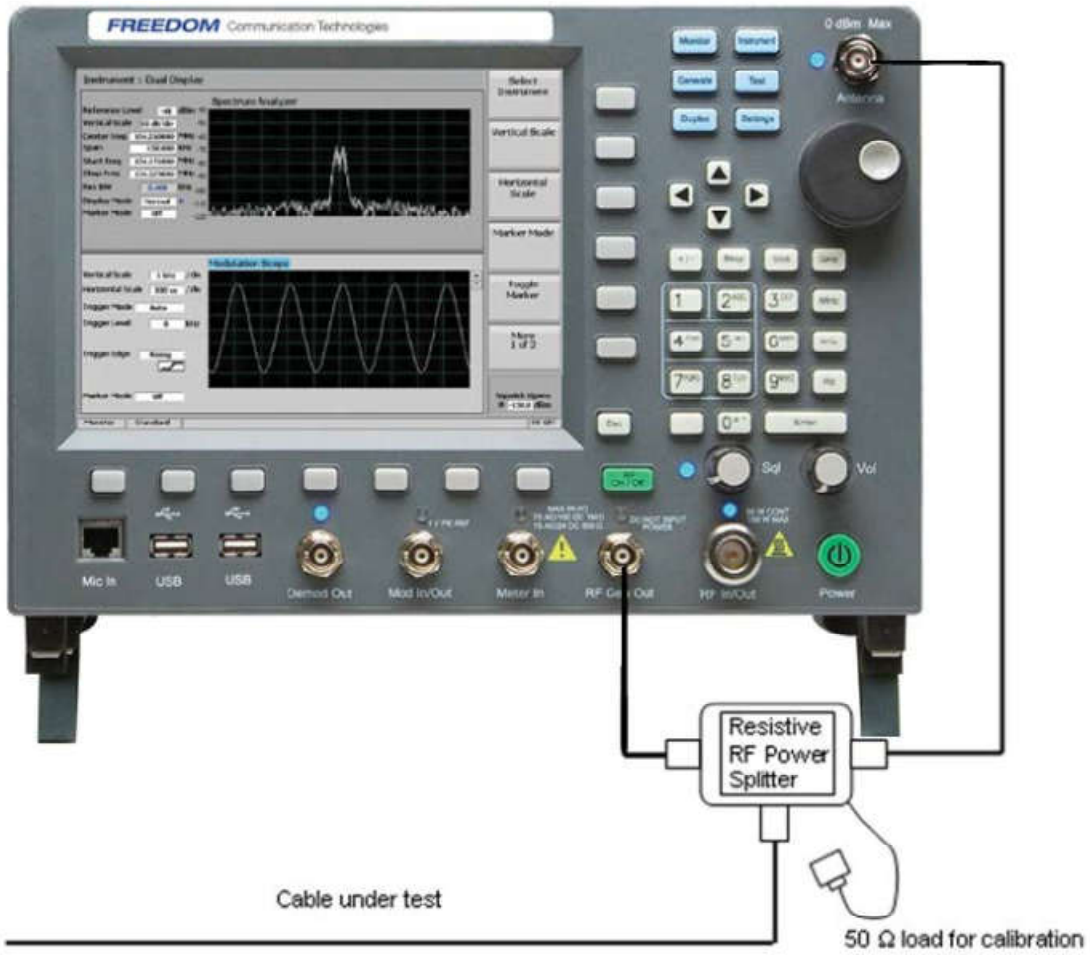

Figure 5.3-1 Connections for Cable Fault testing

5.3.1 Cable Fault Locator Setup and Operation

For accurate results the R8000 Cable Fault Locator must be configured with four cable parameters before testing. These are the Center Frequency, Maximum Length, Cable Loss, and Velocity Factor.

Center Frequency

The Cable Fault Locator analyzes a cable by measuring signal reflections as the R8000 sweeps its generator over a band of frequencies. The Center Frequency defines the center of the band and is ideally the center of the cable's operational frequency.

Maximum Length

This is the maximum expected length of the cable with an additional safety factor. Underestimating the length can cause imperfections to appear at the wrong location. Overestimating reduces the distance resolution.

Cable Loss

The Cable Loss defines the power lost per unit length of cable. The return loss measurement is compensated for by this factor to ensure accuracy.

Velocity Factor

Velocity Factor is the relative velocity of the RF electromagnetic wave traveling through the cable as compared to *c*, the velocity of light. Typical values range between 0.66 and 0.84.

Procedure

Start the Cable Fault Locator by pressing the Instrument key. Select "Cable Fault Locator…" from the vertical submenu; the operator may have to first choose "More 1 of 2." The display should appear as shown in Figure 5.3.1-1.

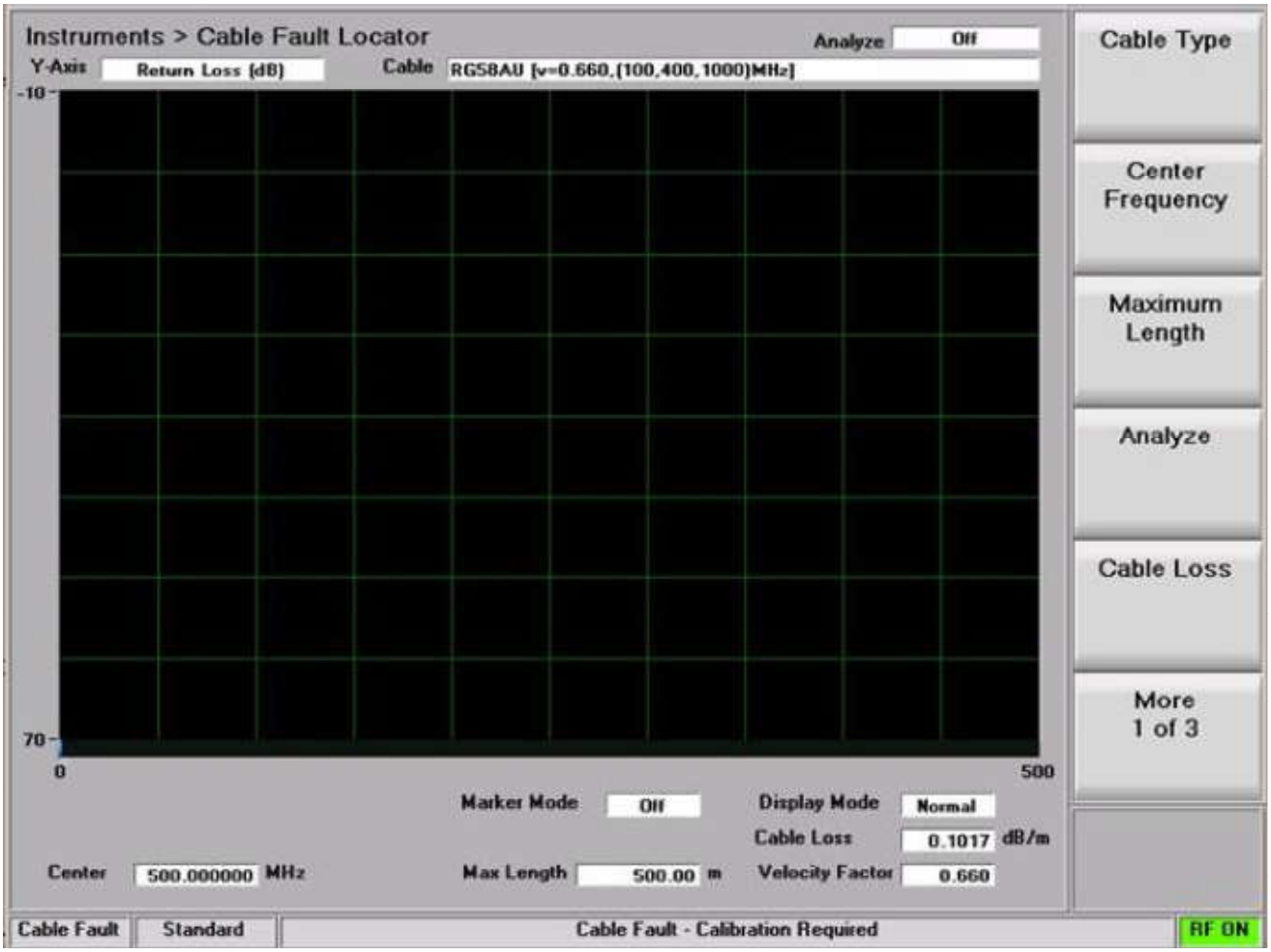

Figure 5.3.1-1 Cable Fault Instrument Display

Enter the Center Frequency, Maximum Length, Cable Loss, and Velocity Factor for the cable under test.

Note: *For frequent tests or multiple frequencies, it is advantageous to save these parameters using the "Add Cable Type" soft key function. This action allows custom parameter entry for a user-defined cable not on the standard selection list. A submenu allows entering a "Cable Description" and associated cable specifications, including attenuation factors for three separate frequencies. "Next" advances the menu to each successive Frequency/Nominal Attenuation entry, and "Back" returns to the previous entry menu. Once the third frequency point is populated with data, "Save New Cable" stores the entry in R8000 memory. The user-defined cable will now appear in the "Cable Type" selection window.*

Connect the Power Splitter to the R8000 as shown in Figure 5.3-1, but leave the Cable Under Test disconnected.

Note: *The Power Splitter has a symmetrical internal configuration, so connections from the R8000 and cable under test can be made to any port on the Power Splitter. In other words, all Power Splitter ports are interchangeable. However, it may be physically convenient to connect them as follows: R8000 RF Gen Out to Power Splitter port 1; R8000 Antenna to Power Splitter port 2; Cable under test to Power Splitter port S.*

Connect the 50 Ohm load to the open port on the Power splitter, and start a calibration sweep by pressing "Analyze" then "Calibrate." The calibration sweep takes approximately one minute to complete. **Note:** *Whenever the Center Frequency, Maximum Length, or Velocity Factor is changed, the Cable Fault instrument will force a recalibration before performing an analysis sweep.*

Remove the 50 Ohm load, and connect the cable to be tested; choose either Single Sweep or Continuous in the "Analyze" submenu. Each sweep takes approximately one minute to complete, and the display will update with a plot of return loss vs. distance.

5.4 ITCR Interoperable Train Control Radio (Positive Train Control)

Positive Train Control (PTC) is a system of functional requirements for monitoring and controlling train movements.

System Highlights:

- Train separation or collision avoidance
- Line speed enforcement
- Temporary speed restrictions
- Rail worker wayside safety
- Regulation of train separation
- Avoidance of train-to-train collisions at track crossover locations
- Enforcement of continuous line speed including temporary speed restrictions
- Protection of rail worker wayside safety zones
- Regulation of out-of-service grade crossings
- Prevention of a train running over a mainline switch set in the wrong position

PTC system involves two basic components:

- A speed display and control unit on the locomotive