User Manual

Tektronix

RFM150
SignalScout

070-9006-00

RFM 150
SignalScout
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Inserts in back of manual:
    C4/295
    C5/495 RV1

User Manual

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SignalScout
070-9006-00

This document applies for firmware version 1.00 and above.

Warning
To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the Safety Summary prior to performing service.

Please check for change information at the rear of this manual.

First Printing: October 1994
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WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of three (3) years from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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C E

Declaration of Conformity

We

Tektronix, Inc.
Television Products Division
P.O. Box 500
Beaverton, Oregon U.S.A.

declare under our sole responsibility that the

RFM 150 SignalScout

to which this declaration relates is in conformity with the
following standards:

> EN50081-1 Generic Emission Standard
> EN50082-1 Generic Immunity Standard
> EN60555-2 Power Line Harmonics Standard

following the provisions of the Directive(s) of the Council of
the European Union: EMC Directive 89/366/EEC.

The original Declaration Of Conformity is on file with:
Tektronix Holland N.V.
Marktweg 73A
8444 AB Heerenveen
The Netherlands

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. *Only qualified personnel should perform service procedures.*

Safety Terms and Symbols

Terms in This Manual
These terms may appear in this manual:

⚠️ **WARNING.** *Warning statements identify conditions or practices that could result in injury or loss of life.*

⚠️ **CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product

These terms may appear on the product:

Danger indicates an injury hazard immediately accessible as you read the marking.

Warning indicates an injury hazard not immediately accessible as you read the marking.

Caution indicates a hazard to property including the product.

Symbols on the Product

The following symbols may appear on the product:

⚠️
ATTENTION
Refer to Manual

▢
Double
Insulated

To Avoid Fire or Shock Hazards:

Use the Proper AC Adapter

Use only the specified AC adapter provided with this product to connect it to the mains (local AC) supply.

Use an Appropriate Power Source

Do not operate this product from any power source that applies more than the specified voltage.

Do Not Open the RFM 150 Case

This instrument contains weatherproofing seals, which, if damaged or not installed properly, may fail to protect the instrument.

Do not open the instrument during the warranty period; return it to a Tektronix Service Center for all service.

After the warranty period, the instrument may be opened by qualified service personnel who have read the instructions in the RFM 150 Service Manual.

Failure to follow these instructions may void the warranty.

Do Not Replace the Battery

The battery pack should not be replaced by the user. This instrument uses a smart charge system, which prolongs battery life.

If the operating time from a full charge seems significantly shortened during the warranty period, contact a Tektronix Service Center to have the battery replaced.

After the warranty period, the battery may be replaced by qualified service personnel who have read the instructions in the RFM 150 Service Manual.

Failure to follow these instructions may void the warranty.

Recharge Batteries Properly

Recharge NiCad batteries only in accordance with the instructions provided in this manual. Do not continue recharging for longer periods than recommended in the instructions.

Observe All Ratings

Observe and follow all ratings and markings on the product. Consult the product manual for further ratings information before making any connections to the product.

This product is intended to be connected to electrical devices with their common voltage at ground potential. Do not connect to elevated or floating common voltages.

Use in a Suitable Environment

This product is designed to resist the effects of rain and moisture, to allow accurate functioning of the product without hazard to the user under conditions of moderately inclement weather. Sealing gaskets and weatherproofing plugs are used to ensure this level of water resistance. Damage to the seals or failure to replace the weatherproofing plugs could allow rain to enter and possibly damage the product.

This product is not designed for use in an explosive atmosphere.

Preface

This manual documents the operation of the RFM 150. It is appropriate for use by anyone who operates this product. For service information, order the optional RFM 150 Service Manual

Getting Started provides a basic product description, including instrument options and accessories. Also appearing here is an operator's familiarization procedure and functional check.

Operating Basics describes the use of controls and connectors, as well as making measurements.

Reference contains detailed menu discussions, arranged in alphabetical order by topic. The section begins with general information on editing, which applies to all of the topics.

Appendix A provides electrical and mechanical specifications.

Appendix B defines the fixed channel tables.

Appendix C describes the RS232 interface, including pin connections.

Appendix D contains instructions for battery recharging and instrument cleaning.

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Documentation Conventions

Front-panel key names and function key labels appear in all capitals when instructions are active. In general discussions, however, menu names may be spelled out in lower case. For example, "Press SEQ," but "The sequence menu is used to activate measurement routines."

The word *press* is used when referring to a front-panel key, and *select* is used when referring to an on-screen label. To select an on-screen label means to press the corresponding function key.

The RFM 150 SignalScout

Getting Started
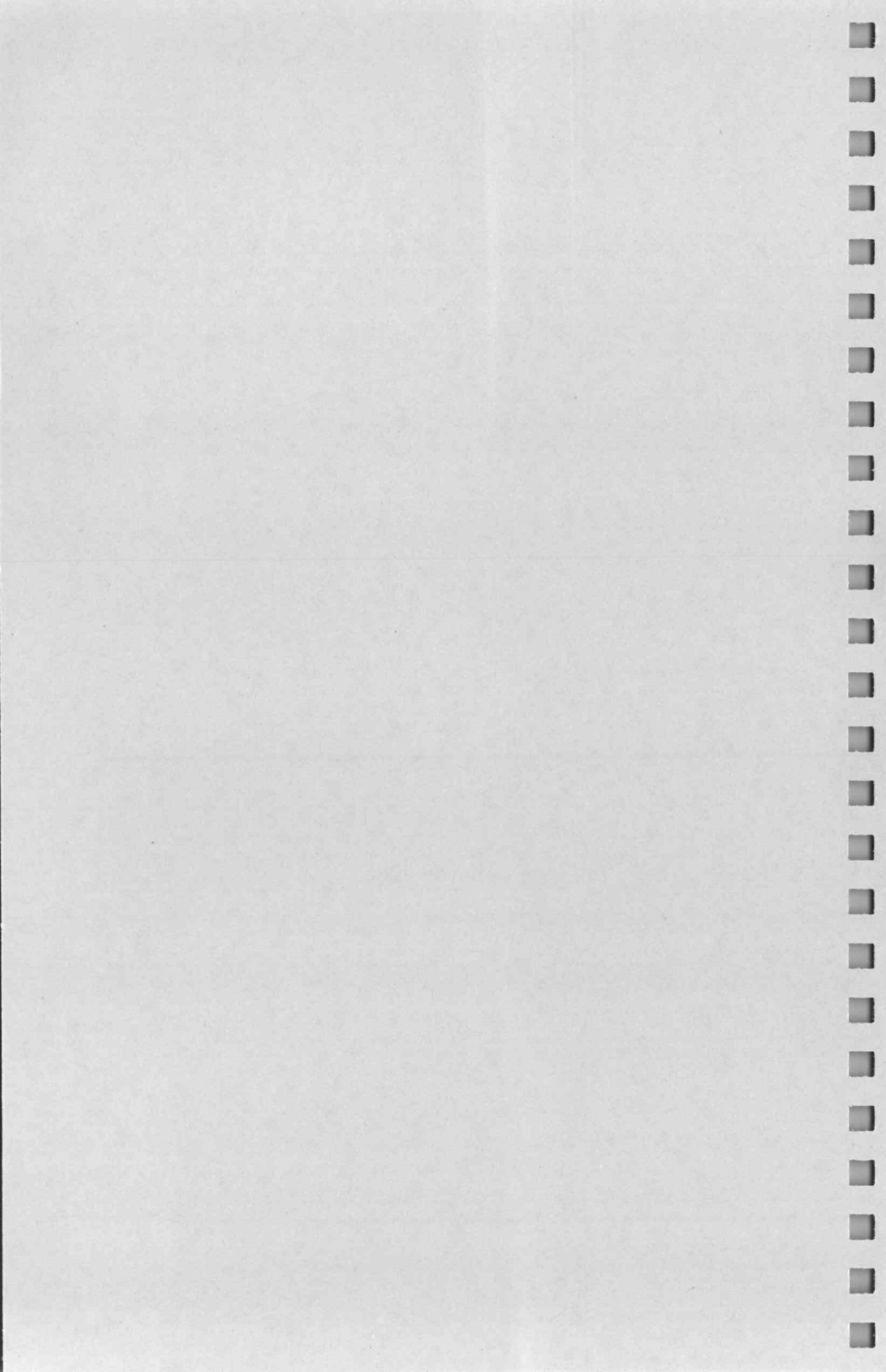
Introduction

The RFM 150 SignalScout is a high-performance RF signal meter designed for cable television applications. The RFM 150 provides level measurement capabilities, as well as other features necessary to install and maintain a cable television system.

Measurements include in-service carrier-to-noise and hum, spectral display, and FM deviation. An FM detector and speaker are also built in.

Features

Level Measurement Modes

The LEVEL key provides access to five modes for making level measurements.

The 1 channel mode displays the visual carrier level (in dBmV or dBuV) as well as the aural carrier difference (in dBc), the channel number, and the frequency.

The pilots mode (2 channel) and the 5 channel mode can be used to measure the level of two or five channels simultaneously.

The analog meter mode provides a general purpose level measurement mode, with the addition of a simulated analog meter display. This mode can be used for peaking and/or nulling adjustments.

All channel mode provides a graphic display of the visual carrier level of all the channels defined in the channel table selected by the user.

Other Operating Modes

Additional measurements are available by pressing the MEAS key. Carrier-to-noise, hum, and FM deviation measurements all display the visual carrier level of the tuned channel in addition to the measurement function selected.

The SPECT key provides access to the spectral display. This measurement mode provides a spectrum of the selected channel using a 30 kHz or 300 kHz resolution bandwidth filter and selectable span. A reference marker can be used to measure the level and frequency of any point in the spectrum. This mode can be used for detailed analysis and troubleshooting of in-channel anomalies.

Reference sweeps can be selected by pressing the SWEEP key. First, a user can measure the carrier levels of a point upstream and store the results as a reference. Then the response of another point downstream can be measured relative to this stored reference.

Context-sensitive help screens are accessed by pressing the HELP key, and scrolled using the knob.

User Interface

The menu keys allow access to selections which can be made with the function keys (F1–F5), with the knob, or with the numeric keypad. The instrument can be tuned by selecting a preset channel that is defined by the user. It can also be tuned by channel or frequency through the knob or numeric keypad.

Compatibility

The RFM 150 is designed to be compatible with NTSC, PAL, and SECAM cable television systems. Channel tables for most countries are built in, and tables for other countries can be loaded from a PC, using the companion CSS150 software, or imported from another RFM 150.

In addition, the RFM 150 can measure the levels of dual carrier sound systems in use throughout the world, including NICAM, analog dual carrier, and Korean dual carrier.

The RFM 150 is designed to meet the requirements of emerging cable television technologies by providing the capability to measure the average level of digitally modulated carriers.

Automated Measurement Sequences

The 24 Hour test is loaded in the RFM 150 when it is shipped. Additional test sequences can be loaded from a PC, using the companion

CSS150 software, or imported from another RFM 150. These sequences can be set to begin immediately, or to begin at a programmed time. The instrument will turn itself on, perform the sequence of measurements, then turn itself off to extend battery life.

Results Storage

Non-volatile memory allows storage of individual measurement results, as well as measurement sequences. Data such as time, date, temperature, and site identification are included with each record. The standard 32 K bytes of nonvolatile memory is sufficient to satisfy the storage needs of most applications. Additional nonvolatile memory can be purchased by ordering Option 01.

Measurement results can also be sent to a PC for long term archiving of maintenance records.

Rugged Construction

The rugged mechanical construction, high-impact material, and internal shock system provide excellent resistance to damage. The included padded carrying case protects the RFM 150 during transport, yet allows use of all functions. The weather-tight construction guarantees operation in varying weather conditions.

Accessories

Standard Accessories

These accessories are included with the product:

- 1   Manual, user: RFM 150 SignalScout (070-9006-00)
- 1   Label, instruction (334-8899-00)
- 1   Carrying case, padded, with shoulder strap (016-1345-00)
- 1   120V AC power pack (119-4855-00)
- 1   Cigarette lighter adapter (119-4860-00)
- 1   RS-232-C DC-9 female-female cable assembly (174-3269-00)
- 1   Precision female-female type F adapter (103-0301-00)

Optional Accessories

These accessories can be purchased to use with the RFM 150:

Manual, modular level service: RFM 150 SignalScout (070-9003-00)

CSS150 software package with CSS150 User Manual (063-2225-00)

Adapter, BNC to F Series (103-0310-00)

Options

Option 01 (Memory Upgrade)

The RFM 150 is equipped with 32K of nonvolatile memory. Ordering Option 01 provides a NVRAM upgrade to 160K (32K + 128K). This provides the capability to store large measurement sequence results and multiple user-programmed channel tables.

Power Plug Options

Option A1   Universal Euro 220 VAC Power Pack (119-4856-00)

Option A2   UK 220 VAC Power Pack (119-4857-00)

Option A3   Australian 220 VAC Power Pack (119-4858-00)

Option A6   Japan 100 VAC Power Pack (119-4859-00)

Operator Familiarization

This procedure will guide a new user through instrument power up, making measurements, and basic configuration. Note that there may be alternate methods for tuning and configuration available in the Making Measurements and Reference sections.

A. Power Up

> **NOTE** To assure proper operation under all conditions, always plug the AC adapter into the RFM 150 before connecting to the AC power source.

1. Connect the supplied power adapter to the RFM 150 power input. Connect the adapter plug to an appropriate AC power source (see Appendix A for power source requirements).
   For battery operation, skip this step.

2. Press the front-panel POWER key to turn on the RFM 150.

3. A beep will signal that the instrument is booting, and the instrument software version information will be displayed momentarily. (More information about the power switch modes, including sleep state, appears on page 3–15.)

4. Using a television signal from either cable feed or antenna, connect the signal to the RF input on the RFM 150.

B. Display Contrast

When using the RFM 150 for the first time, you may want to adjust the LCD setup to provide best viewing in your environment.

1. Press DISP. Three editable fields are displayed on the upper portion of the screen.

2. Press F1 to select BACKLIGHT. (The cursor arrow points to backlight, indicating that field is selected for edit.) Turn the knob to the left or right to turn the backlight ON or OFF. It is usually best to turn the backlight on under low lighting conditions.

3. Using the same method as for backlight, change the CONTRAST MODE setting if desired, based on the type of use and operator preference. If you select AUTO, the instrument continually adjusts the contrast level for best viewing under differing ambient temperature conditions.

4. To use the MANUAL contrast mode, select CONTRAST, turn the knob to adjust the contrast level as desired, between 0% and 100%. A beep will sound if you exceed either end of the range.

C. Channel Table Setup

When making measurements with the RFM 150, it is important to have the correct channel table setup. Nine fixed channel tables are loaded in the RFM 150, and they are defined in Appendix B.

1. Select the Active Table. This is the channel table that will be used when making measurements. (The CATV–STD table is active when shipped.)

   a. Press UTIL, then press F2 (CHAN TABLE). A list of all channel tables is displayed, with the active channel table name displayed above the list.

   b. Use the knob to scroll to and select a table that is appropriate for the RF input signal. Press F1 (MAKE ACTIVE). The selected channel table now becomes the active table.

2. Modifying a Channel Table. You can edit the Skip, Scrambled, Dwell Time, and Amplitude Offset fields of a channel table. You can also import tables from another RFM 150. For information, refer to alphabetical index at the back of this manual.

3. Creating a Custom Channel Table. You can create custom tables, using the companion CSS150 package. For information, refer to the CSS150 User Manual.

D. Using Help Screens

1. As an example, enter the 1 channel mode, then press the HELP key. (Pressing HELP can abort a partial keypad entry in some modes.) The percent of remaining battery charge is indicated in the upper right portion of the help screen. A full 8 hour charge should show up as 99%.

2. Use the knob to scroll through the lines of help, beginning with the help for the measurement portion of the 1 channel display (Mode Help), and ending with the help for the preset keys (Function Keys Help).

3. Press ESC to exit the help screen. Now press the UTIL key, and press HELP again. Since entering the utility menu does not affect the measurement display, the first part of the help screen will be the same as in step 2. The last part of the help screen, however, will now describe the utility menu function keys rather than presets as in 1 channel mode.

4. Exit the help screen by pressing ESC. Now you can apply the information gained while viewing the help screen.

E. **Measurements Overview**

Steps F–J guide a new user through some basic measurements. Please also review pages 2–9 and 2–10, which explain the readouts. Here is a list of the measurements that can be made:

1 CHAN provides the visual and aural carrier levels for one channel selected by the user.

PILOTS mode provides graphic and numeric readouts of the visual levels at two frequencies defined as low and high pilots.

5 CHAN displays the visual levels of the five preset frequencies.

ALL CHAN provides an overview of all the channels in the active channel table (selected through the UTIL menu). All channel mode measurement results are used as sweep references.

METER is a simulated analog display which also allows monitoring of the FM audio signal.

C/N simultaneously displays the carrier level and carrier-to-noise ratio for the tuned channel.

HUM displays the visual carrier level and % of peak-to-peak hum for tuned channel.

FM DEV measures the peak deviation of the aural carrier.

SPECT has a tunable marker and readout of the marker frequency and signal amplitude.

SWEEP provides system referenced sweep measurements, with peak-to-valley readout between two tunable marker frequencies.

SEQ allows execution of automated test sequences.

F. **1 Channel Measurements**

1. Press LEVEL, then press F1 (1 CHAN). The 1 CHAN label should appear in the upper right corner of the screen.

2. Press CHAN. This ensures that the knob is assigned to tune the instrument by channel. It also outlines the channel number (in the upper left corner of the screen) to show that the channel entry mode is selected.

3. Turn the knob until the instrument is tuned to the desired channel.

4. Two measurements are made on the tuned channel. They appear in large type on the left side of the screen, followed by the unit of measure. The measurements vary depending on signal type.

   a. For an analog channel, the measurement near the top of the display is the visual carrier, and the measurement below it is the aural carrier level difference, expressed relative to the visual carrier level. (If the analog channel is a two-carrier sound channel, both of the aural carrier level differences are measured, relative to the visual carrier.)

   b. For a digital channel, the average power is displayed at the top of the screen, and there is no aural carrier measurement.

G. **Pilots Measurement Mode**

1. Press LEVEL, then press F2 (PILOTS). The PILOTS label should appear in the upper right corner of the screen. Tuning is inactive in this mode.

2. Instead of making two measurements on one channel as in the 1 channel mode, the pilots mode provides a graph and numeric readout of the visual carrier level for the high and low pilots. The vertical screen resolution is displayed in the upper right portion of the screen.

3. The REF LVL value in the upper left corner of the screen represents the level at the top of the measurement screen, and is

set automatically by the instrument. The offset below it represents the probe loss value.

You can change the probe loss value and the high and low pilot frequencies through the Measure Setup Menu, which is accessed with the following key sequence: UTIL–CONFIG–MEAS SETUP. After making changes, press ESC as necessary to return to the pilots mode (the function keys will be assigned to the five level measurement modes).

H. 5 Channel Mode

1. From pilots mode, press F3 to select 5 Channel mode. The 5 CHAN label should appear in the upper right corner of the screen.

2. The signal levels for the five preset frequencies are displayed in bar graphs and in numeric readouts. The preset frequencies are displayed under the preset labels across the bottom of the screen. The vertical screen resolution is displayed in the upper right portion of the screen.

3. The REF LVL and offset readouts in the upper left portion of the screen function the same as for pilots mode.

I. All Channel Mode

1. Press LEVEL, then press F4 to enter the ALL CHAN mode. The ALL CHAN label should be displayed in the upper right corner of the screen.

2. All channels in the active channel table are displayed, in the form of a vertical line graph. The vertical screen resolution is displayed in the upper right portion of the screen.

   You can change the active channel table, as described in Step C of this procedure.

3. The REF LVL in the upper left corner of the screen can be set by pressing F1, then turning the knob. Since the reference level represents the value at the top of the measurement screen, changing it will effectively move the graph vertically with respect to the screen.

4. This mode has two markers. Press F2, and toggle the active marker to MKR1. Turn the knob to move marker 1, and note that

it appears as a solid line. Note that the frequency readout in the lower left portion of the measurement screen changes as you tune the marker 1 frequency. Now press F2 again, and toggle the active marker to MKR2. Turn the knob to move marker 2, and note that it appears as a dashed line. The readout for marker 2 is in the bottom right portion of the measurement screen.

J. Meter Mode

1. Press LEVEL, then press F5 to select meter mode. The METER label should be displayed in the upper right corner of the screen.

2. Press CHAN to ensure that the knob is assigned to tune by channel. Turn the knob to tune the instrument, and view the channel number in the upper left corner of the screen. The letter V following the channel number indicates a visual carrier is selected. As you turn the knob 1 click, the instrument tunes to the aural carrier, and the V is replaced by an A.

3. Use function keys F1–F4 to adjust the display components as follows:

   a. Press F1 to assign the knob to control REF level. Turn the knob to adjust the reference level so that the signal on the meter is near the middle of the range.

   b. Press F2, then use the knob to adjust the speaker volume. (Note that the instrument must be tuned to an aural carrier in order to monitor audio.)

   c. Press F3, and note that the RBW (resolution bandwidth) toggles between 30 kHz and 300 kHz.

   d. Press F4 and note that the detector toggles between peak and average.

K. Carrier-to-Noise Measurements

1. Press MEAS, then press F1 to select C/N. The C/N label should be displayed in the upper right corner of the screen.

2. Press CHAN. This ensures that the knob is assigned to tune the instrument by channel. It also outlines the channel number (in the upper left corner of the screen) to show that the channel entry mode is selected.

3. Turn the knob until the instrument is tuned to the desired channel.

4. The display in the upper portion of the screen is the same as the 1 channel display. The lower portion of the screen displays the carrier-to-noise ratio for the tuned channel. These two readings appear in large type.

L. Hum Measurements

1. Press MEAS, then press F2 to select HUM. The HUM label should be displayed in the upper right corner of the screen.

2. Press CHAN. This ensures that the knob is assigned to tune the instrument by channel. It also outlines the channel number (in the upper left corner of the screen) to show that the channel entry mode is selected.

3. Turn the knob until the instrument is tuned to the desired channel.

4. The display in the upper portion of the screen is the same as the 1 channel display. The lower portion of the screen displays the peak-to-peak hum (low frequency disturbance) for the tuned channel. These two readings appear in large type.

M. FM Deviation Measurements

1. Press MEAS, then press F3 to select FM DEV. The FM DEV label should be displayed in the upper right corner of the screen.

2. Press CHAN. This ensures that the knob is assigned to tune the instrument by channel. It also outlines the channel number (in the upper left corner of the screen) to show that the channel entry mode is selected.

3. Turn the knob until the instrument is tuned to the desired channel.

4. The display in the upper portion of the screen is the same as the 1 channel display. The lower portion of the screen displays the peak fm deviation of the aural carrier. These two readings appear in large type. Note that the fm deviation is channel program-content dependent, so the size of the number is proportional to the relative loudness of the signal.

The FM deviation measurement accumulates and displays the highest peak. To restart the measurement, change modes or tune

the instrument. There is no fm deviation measurement for digital or dual carrier audio channels.

N. Sweep Measurements

1. Before making a sweep measurement, store an 'all channel' measurement as the sweep reference.

   a. Press LEVEL, then select ALL CHAN. This will make a measurement in the all channel mode.

   b. Press SWEEP, and select LVL/REF MENU, followed by REF MENU. (This procedure guides you to store a new reference. Note, however, that a previously stored reference can also be used by turning the knob to highlight it, then pressing MAKE ACTIVE.)

   c. Select STORE NEW to add the all channel mode measurement to the end of the list of stored sweep references. Use the knob to select a letter from the on-screen alphabet, then press ENTER. Repeat until the desired reference name is entered. Numbers can also be entered; just press the desired number(s). To correct a mistake, press the backspace key (left arrow), then enter the correct character(s). To cancel the entry entirely, press F5 (ABORT ENTRY). After the sweep reference is entered, press ESC twice.

2. Center the Trace. If the trace is off screen vertically, an arrow will appear next to the CENTER TRACE readout, indicating the direction of the trace. If the trace is off screen or is not well centered vertically, use one of the two following methods to center the trace.

   a. To adjust the center level, Press F1 (LVL), then turn the knob to adjust the center level in 1 dB steps. This will move the trace up and down on the screen.

   b. Or, center the trace and adjust the center level automatically by pressing F3 (LVL/REF MENU), followed by F1 (CENTER TRACE).

3. Viewing the SWEEP Display

   a. A sample display is shown in Figure 1–1.

b. The display plots the difference between the sweep reference and the present signal, with the horizontal axis representing frequency and the vertical axis representing amplitude. Each horizontal line (division) on screen represents 1 dB or 2 dB of amplitude, depending on the vertical resolution setting.

4. Set Vertical Resolution

a. Press F3 (LVL/REF MENU). In this submenu, F2 and F3 control the vertical resolution. The present setting is outlined just above the F2 or F3 key, and is also noted in the upper right corner of the screen.

b. Press F2 or F3 to change the setting, and note the difference in the display. Set the vertical resolution as desired, then press ESC.

5. Using the Markers to Read Amplitude

a. Press F2 until MKR1 is displayed on screen above the F2 key. This selects MKR1 as the active marker, and assigns the knob to tune the marker frequency.

b. Turn the knob until marker 1 (a solid vertical line) is moved to the desired frequency. The signal level at that frequency will be displayed in the lower left portion of the measurement screen, below the marker 1 frequency.

c. Press F2 again to select MKR2. Turn the knob to set marker 2 (a dashed line) as desired. The signal level at the marker 2 frequency will appear in the lower right corner of the measurement screen, below the marker 2 frequency.

Active sweep reference   Marker 1   Arrow indicating direction   Marker 2
                                       of off-screen trace
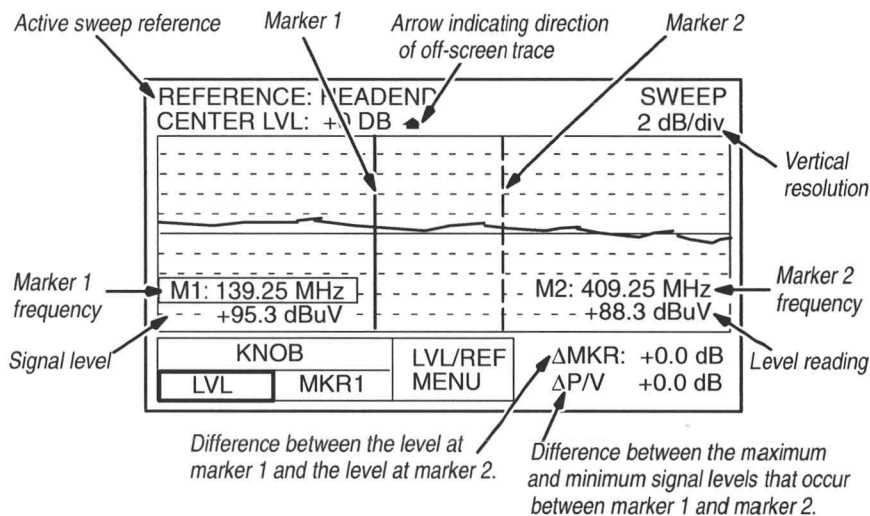
Figure 1–1: The Sweep Display

O. Spectrum Mode

In this mode, the instrument uses very fine steps to plot points and provide a spectrum of the signal frequency on the horizontal axis and amplitude on the vertical axis. One of the applications for this display is spotting signals which should not be present.

1. Press the front-panel SPECT key to access the spectrum mode display, as shown in Figure 1–2.

2. Press F5 to select PEAK or AVG detection. Typically, average will be used for measuring digital signals and noise, and peak will be used when measuring analog modulated video carriers.

3. Select SPAN/DIV and RBW.

   a. Press F4 until the label above the F4 key reads: 300 kHz. (The 300 kHz RBW is required to correctly measure visual carrier amplitudes. The 30 kHz RBW is useful when it is desired to resolve closely-spaced signals.)

   b. Press F3 (SPAN) and turn the knob until the span/division readout above the measurement display reads: 4 MHz. (A

beep sounds as you reach the upper and lower limits of the range.)

c. Now turn the knob slowly to the left, and the span/division value will decrease.
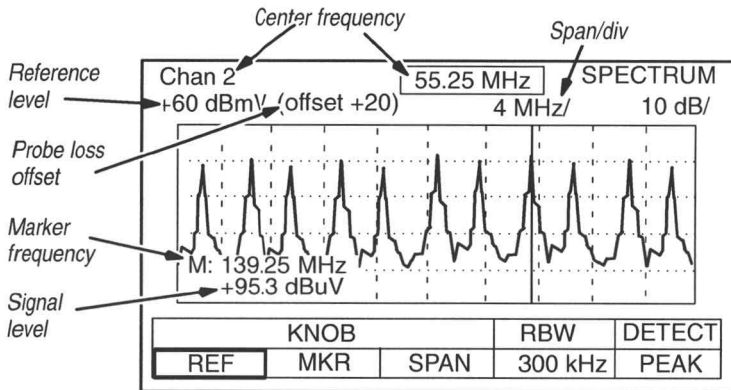
Figure 1–2: Spectrum Display with Knob Assigned to Reference Level.

4. Set the Reference Level (the level at the top of the display).

a. Press F1 until REF is selected (the REF label is outlined).

b. Turn the knob to adjust the reference level, and note that the reference value readout near the upper left corner of the screen changes. Adjusting the reference level effectively moves the trace vertically on the screen. If the signal at the marker frequency is greater than the reference level, the word OVER will be displayed in place of the level readout. If this happens, increase the reference level until the entire signal appears vertically on screen.

5. Select Center Frequency (the frequency at the horizontal center of the display).

a. Press CHAN to assure that the knob is not assigned to REF, MKR, or SPAN. (This also assigns the knob to tune by channel. For frequency tuning, press MHz instead of CHAN.)

      b. Turn the knob and note that the channel readout in the upper left corner of the screen changes. This will effectively move the trace horizontally on the screen.

   6. Use the Marker to Read the Signal Level.

      a. Press F2 until MKR is selected (the MKR label is outlined).

      b. Turn the knob to move the marker (the solid vertical line). Note that this changes the marker frequency readout near the lower left corner of the measurement display. The signal level at the marker frequency is displayed directly below the marker frequency readout.

P. Executing the 24 Hour Test Sequence

A series of measurements can be made by executing one of the automated test sequences that are loaded in the RFM150. The results of the tests will be stored, and can be accessed through the store menu.

This procedure step will show you how to enter the site name and temperature that will be stored with the test results, how to execute the factory-installed 24 Hour test sequence, how to abort the sequence, and how to access the results of the sequence.

For information on creating and importing new sequences, refer to the user manual for the companion CSS150 software.

   1. Press STORE, then press F3 to select SITE NAME. Check the ACTIVE SITE NAME near the upper left corner of the screen. If this is correct, proceed to step 2.

      If it is not correct, turn the knob to highlight the desired site name from the displayed list, then press F1 for MAKE ACTIVE.

      If you require a new site name, press F2 to select NEW SITE. Turn the knob to highlight each desired letter on screen, pressing ENTER after each letter. Numbers can also be entered, using the numeric keyboard. When the new site name appears as desired, press F4 to select ACCEPT ENTRY. Now press F1 to make it active.

   2. Press STORE, then press F4 to select SET TEMP. The temperature and temperature units will be displayed. If they are correct, proceed to step 3. If they are not correct, use the knob or

keypad to enter the current ambient temperature. Keypad entries
must be followed by pressing ENTER; partial keypad entries can
be cancelled by backspacing.

3. Press SEQ to enter the sequence menu. All sequences stored in
   the instrument will be displayed. Turn the knob, if necessary, to
   select the 24 hour sequence.

4. Press F1 (EXEC). The execute sequence menu will appear, with
   the name of the selected sequence displayed at the top of the
   screen.

   (The 24 hour test is always set to start NOW and to repeat 4
   times, in 6 hour intervals. For information about start and repeat
   times for other tests, look up Sequences in the index at the back
   of this manual.)

5. Press F1 for START SEQ.

   a. An 'all channel' measurement will occur, measuring levels for
      all channels that are in the active channel table, except those
      that have been set to skip. When the measurement is
      completed, the screen will go blank.

      (In normal use, the instrument is left alone to repeat the test 4
      times. For this procedure, however, we will interrupt the test
      and view the results of the initial measurement.)

   b. Press the POWER key. A confirmation screen will appear.
      Press F1 to abort.

   c. Press the STORE key, then press F2 to select RSLTS MENU.
      Use the knob to select the result of the test you just executed.
      You can recognize it by the date and time, and because the
      TYPE will be SEQUENCE.

   d. Press F1 to select VIEW. The result of the test will be
      displayed. (All channel measurement results can be
      'expanded' to fill the screen by creating a custom channel
      table. For more information, refer to Making Measurements.)

   e. Press F1 to view the additional data that is stored with the test
      result. Press ESC.

Q. Instrument Configuration

The following configuration items are not necessary for first-time use, but will customize the RFM 150 for special applications.

1. Select Power Up Mode. The instrument can be programmed to power up in any of the 10 measurement modes, or in the last mode used before powering down (LAST).

   a. Press UTIL, then press Press F1 (CONFIG).

   b. Press F2 (PWR UP/DN). Two editable fields are displayed, with POWER UP MODE selected. The current setting for this field is outlined. To change the setting, turn the knob to the left or right until the desired setting is outlined.

2. Disable Auto Power Down. The RFM 150 powers up with the auto power down feature enabled. This powers down the instrument after 10 minutes of no instrument activity, to preserve battery life. This is useful when moving from place to place; however, you may want to disable it when operating on AC power and studying the instrument and manual for the first time.

   a. Continuing from Step 1, press F2 (AUTO PWR DN). The cursor arrow along the left side of the screen will move to show that the auto power down field is selected for edit.

   b. Turn the knob until DISABLE is outlined. Now the instrument will stay on, even if there is no instrument activity.

   c. Press ESC to exit the menu, one level at a time. The new settings will be saved.

3. Set Probe Loss and Power Units. Probe loss is the amount by which the level measurement displays will be offset. Power units determines whether the level measurements will be displayed in units of dBmV or dBuV.

   a. Press UTIL. The function key labels across the bottom of the screen will indicate the utility menu actions, without changing the measurement portion of the screen.

   b. Press F1 (CONFIG), then press F1 again (MEAS SETUP). Four editable fields will be displayed: probe loss, power units, low pilot, and high pilot.

    c. Press F1 (PROBE LOSS) to select the probe loss field for edit. Use the knob to select a probe loss value in the range of −60.0 dB through +60.0 dB. This is the amount by which the level measurement displays will be offset. For example, if you select +20.0 dB probe loss, then go to 1 channel mode, the following label will appear in the upper right portion of the screen: (offset +20.0 dB).

    d. Press F2 (POWER UNITS) to select the power units field for edit. Turn the knob to the right to select dBuV. This setting determines the display in measurement modes. Press ESC until you have exited all levels of the menu (a measurement screen will be displayed). Press LEVEL, then select 1CHAN. Note that the level readout (largest type size) appears in dBuV units. Use the following key sequence to reset the power units to dBmV if desired: UTIL–CONFIG–MEAS SETUP– POWER UNITS.

    e. Press F3 (LOW PILOT) to select low pilot frequency for edit. Use the knob to enter the desired frequency. This frequency will be used to make measurements in the pilots measurement mode. Press F4 (HIGH PILOT) and repeat.

4. Editing the Presets

Pressing a preset key (F1–F5) will tune the instrument in modes where presets are available. You can edit the preset labels and frequencies, or you can set a preset to auto, then program its frequency by the press-and-hold method. For information on how to do this, please refer to page 3–18.

5. Interface Port

The Interface Port is used to interface with the CSS150 for remote control, as well as channel table and sequence creation. It can also link one RFM 150 with another RFM 150 for sharing channel tables, sequences, and configurations. Configure the port to match your system as follows:

    a. Press UTIL, then press F4 (RS232). Five editable fields will be displayed, with the present setting for each field indicated by an outline cursor. (The defaults are: BAUD RATE:9600; PARITY:NONE; FLOW CONTROL: XON/XOFF; TERMINATOR:CRLF; ECHO:OFF.)

    b. Press F1 (BAUD RATE), then turn the knob until the desired baud rate is outlined.

    c. Press F2 (PARITY), then turn the knob until the desired parity setting is outlined.

    d. Continue changing settings for FLOW CONTROL, TERMINATOR, and ECHO, until all settings are satisfactory. Press ESC to exit the menu, one level at a time, until a measurement mode is displayed. The new settings will be saved.

6. Set the Clock

The internal clock is used to tag a stored measurement result with the time and date. It is also used to determine when to start an automated sequence. The clock keeps time whether the instrument power is on or off.

    a. To set the clock, press UTIL, then press F3 (CLOCK). The clock menu will display five editable fields.

    b. Press F1 (HOUR), then turn the knob until the current hour is outlined. A beep sounds if you exceed the range (00 to 23).

    c. Press F2 (MINUTE), then turn the knob until the current minute is outlined. A beep will sound if you exceed the range (00 to 59).

    d. Press F3 (DAY OF WEEK), then turn the knob until today's day is outlined.

    e. Press F4 (DAY–MONTH), then turn the knob until the current date and month are displayed. A beep will sound if you exceed the 1-year range.

    f. Press F5 (YEAR), then turn the knob until the current year is displayed. A beep will sound if you exceed the range (1994 through 2025).

    g. Press ESC until you return to the UTIL menu.

Functional Check

Basic instrument operation can be verified using the following procedure. If you are not familiar with the RFM 150, perform the Operator Familiarization procedure before proceeding. For additional information, look up the desired topic in the index at the back of the manual.

1. Required Equipment: this procedure requires a CW (continuous wave) signal from a generator with the following qualifications:

   a. 75 Ω output impedance.

   b. Output calibrated in dBmV or dBuV.

   c. Meets the Input Signal requirements in Appendix A of this manual.

2. Hook Up and Power Up

NOTE. *To assure proper operation under all conditions, always plug the AC adapter into the RFM 150 before connecting to the AC power source.*

---

   a. Connect the supplied Tektronix AC adapter to the RFM 150 power input. Connect the adapter plug to an appropriate AC power source (see Appendix A for power source requirements).

   b. Press the front-panel POWER key to turn on the RFM 150. A beep will signal that the instrument is booting, and the instrument software version information will be displayed.

   c. Connect the generator signal to the RF input on the RFM 150.

3. Select Measurement Mode

   a. The RFM 150 is factory set to power up in the 1 channel mode.

   b. If the operating mode is not 1 channel, press the LEVEL key, then press F1 (1 CHAN).

4. Check the signal level. If the instrument is operating properly, you should see the same level that is supplied from the generator, ± 1 dB. Note that this performance may not be guaranteed at all temperatures.

Operating Basics
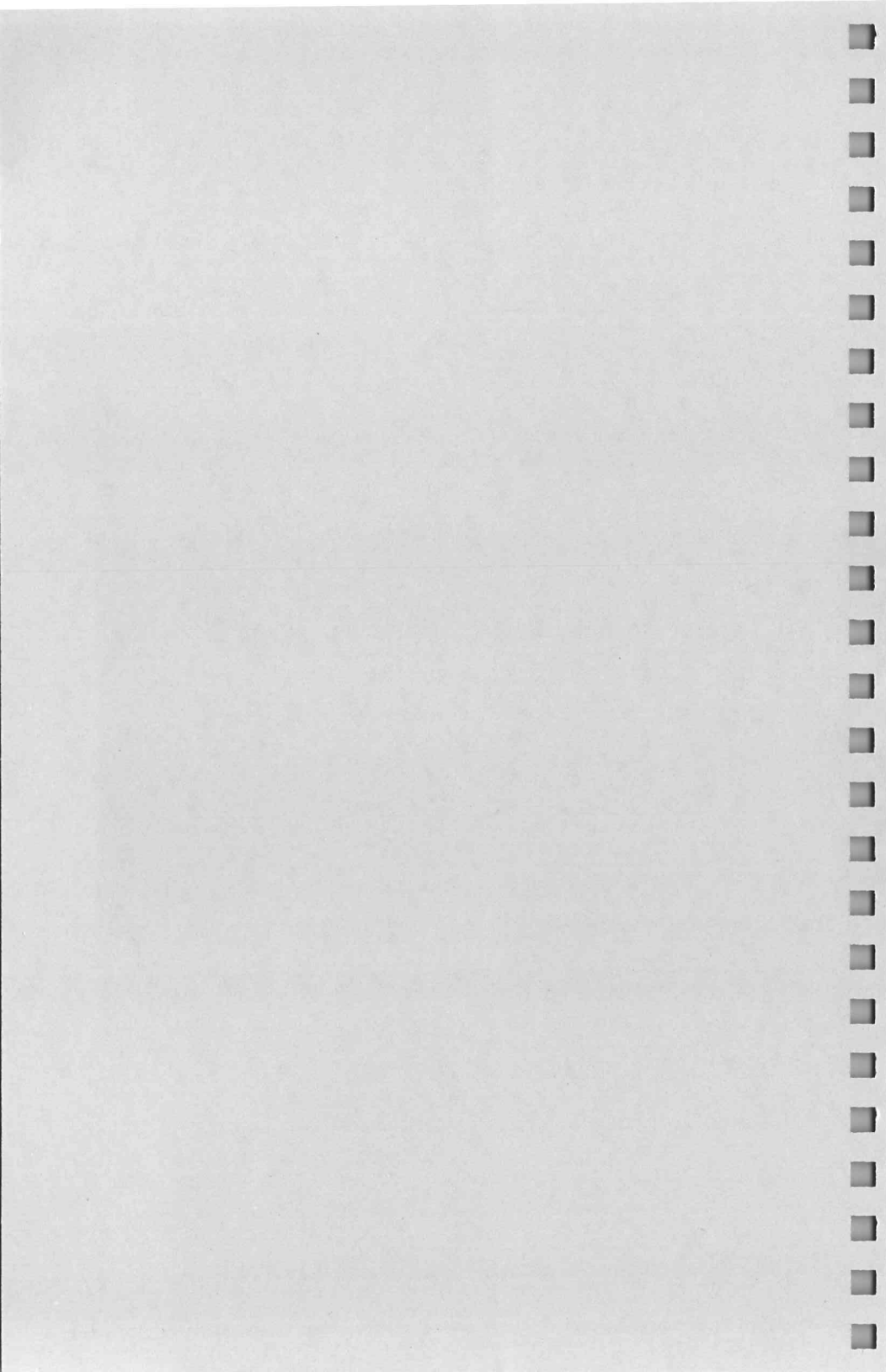
Functional Overview

Connectors
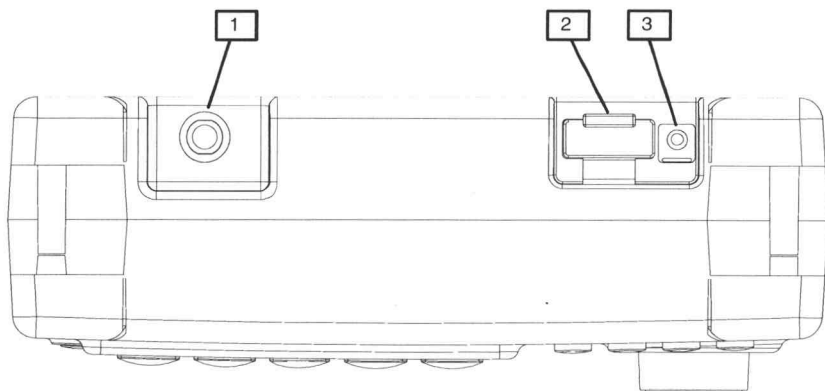
Figure 2–1: Top View of the RFM150, Showing Connector Locations

1. The RF input is a precision 75 Ω F connector with a replaceable F-style or BNC-style adapter.

2. The Interface Port has a 9-pin, subminiature D-type connector that provides a serial interface for remote control. Pin connections appear in Appendix C.

3. The DC Jack input is a 2.5 mm plug that allows recharging of the internal NiCad batteries and operation of the instrument with an external AC/DC adapter. If AC power is connected, and the instrument is turned off or in sleep mode, the battery is charging. Use only the Tektronix adapter supplied with this product.

Controls and Indicators

The action of some front-panel controls varies depending on the mode selection, so this section provides only a general description of each control's function. For more details, refer to the Making Measurements and Reference sections.

1. POWER turns the instrument power on and off. Important information about instrument power up and the power switch appears on pages 1–5, 1–18, and 3–15.

NOTE. *To assure proper operation under all conditions, always plug the AC adapter into the RFM 150 before connecting to the AC power source.*

---

2. The LCD display provides graphic and numeric readouts for selected measurement and menu modes. The display readouts are described on page 2–9. To adjust the display for best viewing, see page 3–12.

3. The knob function varies, based on the selected instrument mode. For detailed information on the knob function in a specific mode, see the description of that mode in the Making Measurements or the Reference section.

   Possible knob functions include incremental adjustment for channel tuning, frequency tuning, speaker volume, reference level, and span. In some modes, the knob is also used to chose from several items displayed on screen. In modes that allow text string entry, the knob can be used to select letters from a displayed alphabet. ENTER must be pressed after each letter. The knob will override a partial keypad entry.

4. In meter mode, the speaker is automatically turned on to monitor FM audio. To control the speaker volume in meter mode, select the function key assigned to KNOB VOL and turn the knob. The speaker also provides a warning for error conditions.

5. The numeric keypad can be used to enter a channel or frequency. Terminate such an entry with CHAN, MHz, or ENTER. The keypad is also used to enter numbers in alpha-numeric text strings, where the alpha characters are selected with the knob.
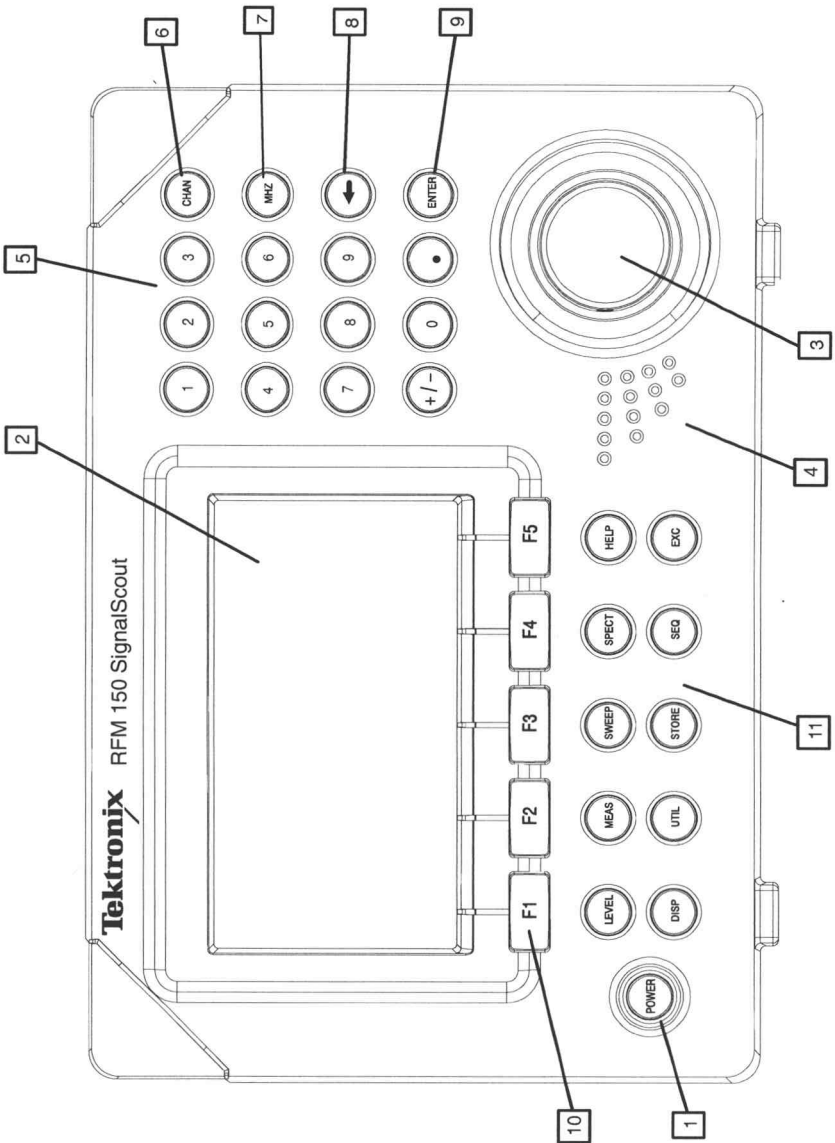
Figure 2–2: The RFM 150 Front Panel, Showing Controls

6. CHAN switches the instrument to channel entry mode. If CHAN is used to terminate a keypad entry, it will also tune the instrument to the keyed channel, if that channel is stored in the instrument's channel tables.

7. MHz switches the instrument to frequency entry mode. If MHz is used to terminate a keypad entry, it will also tune the instrument to the keyed frequency, if that frequency is within the valid frequency range.

8. The backspace key is destructive during a keypad entry. It will erase the character preceding the cursor. A pending keypad entry can be aborted by back spacing 1 click beyond an empty entry.

9. ENTER terminates a keypad entry in the selected mode (either channel or frequency, as indicated on the display).

10. Keys F1 through F5 are referred to as function keys or soft keys because their functions vary, based on the instrument operating mode. For convenience, they may also be referred to as F keys in the product documentation. The present key assignments are displayed along the bottom of the LCD screen. These keys will abort a keypad entry in progress.

11. There are 10 menu keys, which provide access to on-screen menus and submenus. Some menu keys change only the function key labels; others replace the entire display. Selecting any menu key will abort a keypad entry in progress. The following is a general description of the menu functions. Please refer to Making Measurements or the Reference section for further information.

    a. LEVEL accesses the signal level measurements submenu. The five function keys are assigned to: 1 CHAN, PILOTS, 5 CHAN, ALL CHAN, and METER.

    b. MEAS accesses additional measurements such as Hum and C/N ratio.

    c. SWEEP allows referenced sweep measurements with peak-to-valley readout between two tuneable marker frequencies.

d. SPECT provides a spectral display with a tuneable marker and readout of the tuned frequency and signal amplitude.

e. HELP displays context-sensitive help. Use the knob to scroll. Press the ESC key to exit the help screen.

f. DISP allows the user to adjust the display contrast and back light.

g. UTIL accesses menus for instrument configuration such as probe loss, display units, and pilot frequencies. UTIL is also used for channel table editing.

h. STORE allows the user to store and view measurement results. The results can also be used as a reference when making measurements in the sweep mode.

i. SEQ selects and executes sequences that were created using the CSS 150 SignalScout software.

j. ESC causes the instrument to exit a submenu or menu. In effect, it displays one level higher on the menu structure. ESC is also used to exit help screens. ESC aborts a keypad entry in progress, restoring the previous contents of the field.

Making Measurements

Please review pages 2–9 through 2–11 before proceeding to the individual measurement discussions. These pages contain general information that applies to all measurements and is not repeated in each measurement discussion. Figure 2–3 shows the measurement hierarchy for all the measurement modes.

Each measurement mode discussion begins with a small menu hierarchy diagram, showing how to access that mode. The round key at the top of the diagram indicates the front-panel key that must be pressed to enter that menu. If submenus are present, they will be represented by row(s) of rectangular keys. If a key is shaded, it will be used in the accompanying discussion.

Circles =   Front-panel keys
Rectangles =   Function key access to submenus
Plain labels = Function key assignments in measurement modes

Figure 2–3: Menu Hierarchy for Measurement Modes

Explanation of Readouts

Refer to the sample measurement screen in Figure 2–4 while reading this list of commonly-used display readouts and labels.

1. The measurement mode is shown in the upper right corner, and screen scale factor (if applicable) appears below it. The low battery indicator, "LOW BATT," is displayed in the upper right corner of the screen when 10 minutes of battery power remains.

2. The top line of the screen shows the channel number and frequency of the signal being measured.

3. An outline around either the channel number or frequency indicates the entry mode. (A dashed outline indicates that the knob and keypad are 'uncoupled.') In Figure 2–4, the frequency is outlined, so keypad or knob entries will be interpreted as frequency, unless CHAN is pressed to change the entry mode.

4. Typically, this measurement is the visual carrier level. This measurement is displayed in a larger type size than the rest of the display. The units appear to the right of the measured value.

   An asterisk (*) next to a measured level indicates that a channel-specific amplitude offset (as set in the channel table) has been applied to the measured value. To find the actual offsets, press UTIL, then CHAN TABLE and EDIT CHANS. Note that this is different than the probe loss offset.

5. In this example, the second measurement on the screen is the aural carrier level difference. Like the preceding measurement, it is displayed in a larger type size than the rest of the display. Other measurements can appear here, such as C/N and Hum. The units appear next to the measured value.

6. Labels across the bottom of the screen define the function key actions (if any). When the corresponding function key is pressed, the labeled action will occur, or the labeled submenu will be entered. When the function keys are assigned to the presets, as in Figure 2–4, pressing a function key tunes the instrument to the preset frequency. (Programming the Presets is described on page 3–18.)

7. When a function key is selected (F1–F5), its label is highlighted. When the function keys control the knob assignments, the highlighted label indicates the current knob action. If the function keys are assigned to the presets, the highlighted label represents the instrument tuning. The label will also be highlighted if the instrument was tuned to that frequency using the knob or keypad rather than the function key. If additional function keys are set to the same preset frequency, they will also be highlighted.

8. When a remote signal is sent to the RFM150, it places the instrument in remote operating mode. The remote indicator (an outlined R) will appear to the right of the frequency at the top of the display. See Figure 2–4. When any front-panel control is used (other than the POWER key), it will convert the instrument to local operation, and cause the remote indicator to be removed. After that, all front panel controls will be functional.

    When a remote command for local lock-out is sent to the RFM150, the local lock-out indicator (an outlined L) will appear to the right of the frequency. There will be no action when a front-panel control is used, except for the POWER key. This condition will remain until the remote command is sent to remove the local lock-out.
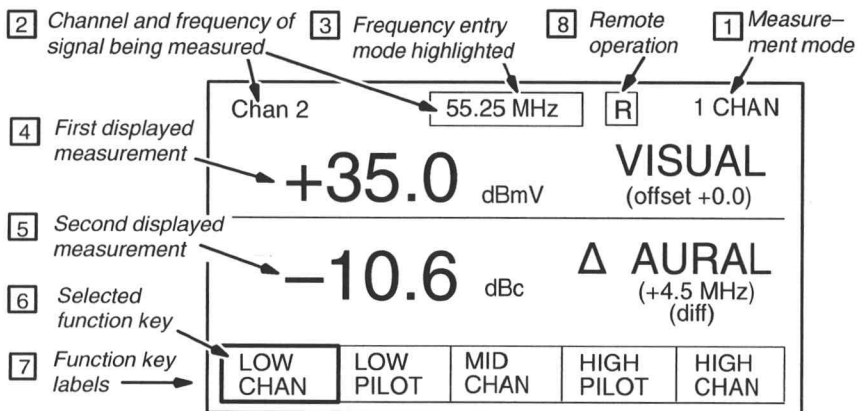
Figure 2–4: Commonly-Used Display Readouts and Labels

Tuning

Some measurement modes provide signal tuning capabilities. Others measure the signal at a frequency that is predetermined by the user through another menu. For example, pilots mode measures high and low pilots, which are set through the utility/configure menu.

Tuning, when available, is accomplished with either the knob or the numeric keypad. Some modes additionally provide tuning by presets. In these modes, each function key is assigned to a preset frequency, which is labeled on screen. Tuning can then be accomplished by turning the knob, by keypad entry, or by pressing the desired function key.

If you attempt to tune out of the instrument's frequency range (5 MHz to 1080 MHz), no change to tuning will occur (if using the keypad, an out-of-range message will be displayed momentarily). If you tune to a frequency that does not correspond to a channel in the active channel table, the channel readout is replaced with '???' and the secondary measurement is not displayed.

Entry mode. Tuning is by channel or frequency, depending on the entry mode, which is selected by pressing CHAN or MHz. The entry mode is indicated by an outline cursor around either the channel or the frequency in the top line of the display. The outline cursor appears dashed if the knob and keypad are uncoupled.

Tuning by knob. In some modes, the function keys control the knob action, and tuning by knob may only be possible when none of the other actions are selected (the labels are not highlighted).

If *channel* entry mode is selected, turning the knob sequences through the channels in the active channel table. If *frequency* entry is selected, turning the knob tunes by frequency.

Tuning by keypad. Key in the channel number or frequency, then press CHAN for channel entries, MHz for frequency entries, or ENTER to use the current entry mode.

Tuning by preset. To tune the instrument to a preset frequency, press and release the function key (F1–F5) below the desired on-screen label. See page 3–18 for instructions on programming the presets.

1 Channel Mode

```
                    ( LEVEL )
                        |
   F1         F2        F3        F4        F5
   |          |         |         |         |
+------+  +-------+  +------+  +------+  +------+
|  1   |  |PILOTS |  |  5   |  | ALL  |  |METER |
| CHAN |  |       |  | CHAN |  | CHAN |  |      |
+------+  +-------+  +------+  +------+  +------+
```
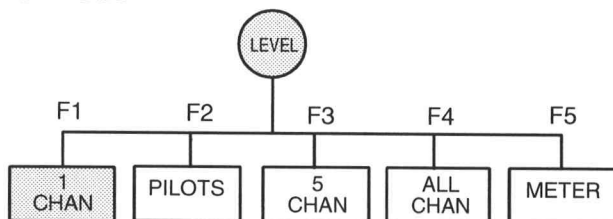
To enter the 1 channel mode, press the front-panel LEVEL key. The
function keys will be assigned to the five signal level measurement
modes, but the measurement portion of the screen will not be af-
fected. Select 1 CHAN; the 1 channel measurement display will
appear (Figure 2–5). The instrument mode (1 CHAN) is displayed in
the upper right corner of the screen, and the function key labels indi-
cate the five presets. Table 2–1 defines the key actions.

Tuning. The signal being measured is determined by instrument
tuning. Use the knob, numeric keypad, or presets to tune by channel
or frequency. (For help, refer to Instrument Tuning on page 2–11.)
The tuned channel number and frequency appear on the top line of
the display.

Measurements. In 1 channel mode, the instrument makes two mea-
surements on the tuned channel (shown in Figure 2–5). For an ana-
log channel, the top portion of the display is the visual carrier (taken
as a sine wave at the peak of the modulating envelope). The lower
portion of the screen displays the aural carrier level difference, ex-
pressed relative to the visual carrier level. If the analog channel is a
two-carrier sound channel, both of the aural carrier level differences
are measured, relative to the visual carrier. For a digital channel, the
average power is displayed on the top portion of the screen. There is
no secondary measurement for digital channels, so aural carrier in-
formation is not shown for them.

Exit. To change to another menu, press the new menu key. Pressing
certain menu keys will reassign the function keys while leaving the
meter mode display on screen (for example, pressing STORE to store
a measurement result). Press ESC to exit the other menu and restore
the 1 channel mode function keys. To change to another level mea-
surement mode, press LEVEL.

Visual carrier
level

Aural carrier level,
relative to visual
carrier level

Outline indicates
which preset is
being measured

The function keys
are assigned to the
presets

Figure 2–5: The 1 Channel Mode

Table 2–1: Key Actions in 1 Channel Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Tunes instrument to preset frequency. Overrides partial keypad entry.
Knob	Tunes instrument according to entry mode. Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
ENTER	Terminates a keypad entry in the active entry mode (channel or frequency, as outlined in the top line of the display).
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Aborts a partial keypad entry without changing the instrument setup. Escape has no function when the preset keys are displayed.

Pilots Mode
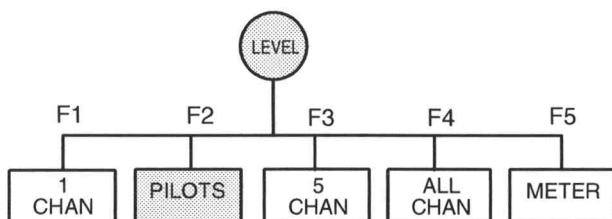
To enter the pilots mode, press the front-panel LEVEL key. The function keys will be assigned to the five signal level measurement modes. The measurement portion of the display will be the last-selected measurement mode, which will be highlighted. Select PILOTS. Now, the pilots measurement screen will appear (Figure 2–6), with the instrument mode (PILOTS) displayed in the upper right corner of the screen. Tuning is inactive in this mode. Table 2–2 defines the key actions.

Instead of making two measurements on one channel as in the 1 channel mode, the pilots mode provides a graph and numeric readout of the visual carrier level for two different channels. The vertical range is 20 dB; 10 divisions at 2 dB per division.

Pressing certain menu keys will reassign the function keys while leaving the pilots measurement display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and return the full pilots display.

To change to another level measurement mode, press LEVEL. To change to another menu, press the desired menu key.

Editing the Pilot Frequencies

The channels being measured are the high and low pilots. To change the high and low pilot frequencies, press UTIL, select CONFIG, then MEAS SETUP. The function keys will be assigned to the four fields available for edit. An arrow cursor along the left edge of the screen will indicate the selected parameter. Select high or low pilot by pressing the corresponding function key, then use the knob or keypad to edit the frequency. A keypad entry must be terminated with

CHAN, MHz, or ENTER. A partial keypad entry can be cancelled by pressing ESC or backspacing one space past an empty field. The previous frequency will be restored, without change.

Exit. To change to another menu, press the new menu key. Pressing certain menu keys will reassign the function keys while leaving the meter mode display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and restore the pilots mode function keys. To change to another level measurement mode, press the corresponding function key.
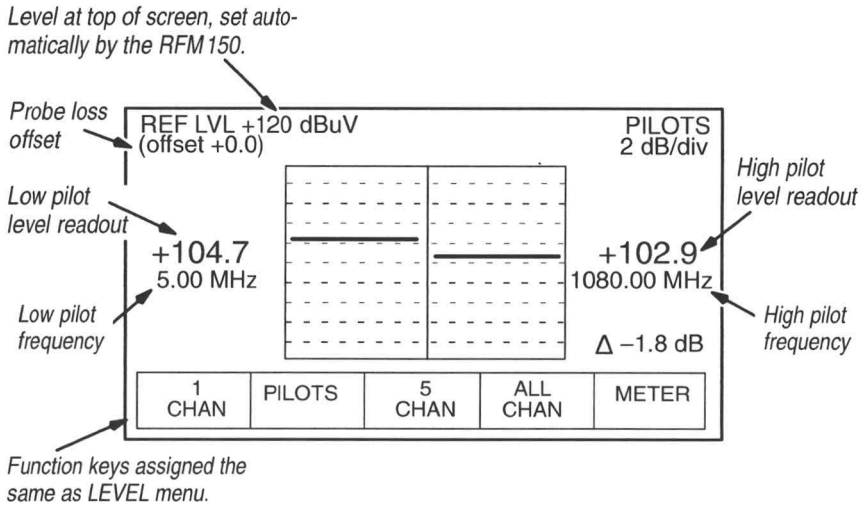
Figure 2–6: The Pilots Mode Display

Table 2–2: Key Actions in Pilots Mode

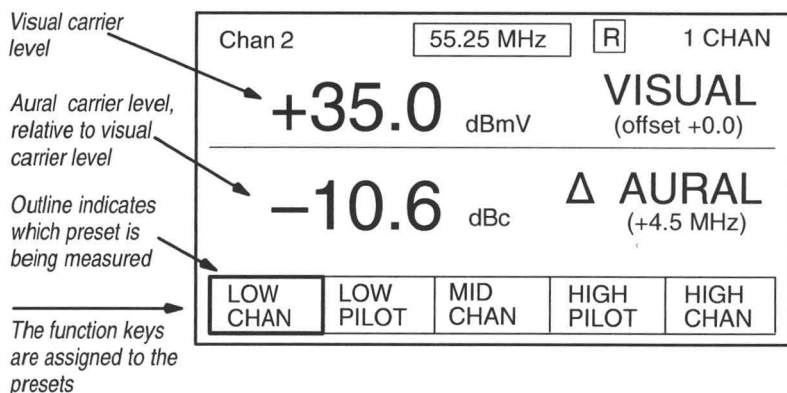| Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Aborts a partial keypad entry without changing the instrument setup.

5 Channel Mode
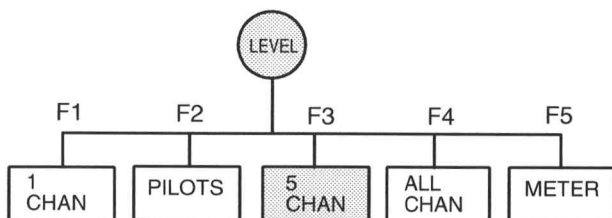
To enter the 5 channel mode, press the front-panel LEVEL key. The function keys will be assigned to the five signal level measurement modes, but the measurement portion of the screen will not be affected. Select 5 CHAN; the 5 channel measurement screen, shown in Figure 2–7, will appear. The instrument mode (5 CHAN) will be displayed in the upper right corner of the screen. The function keys and tuning are inactive in this mode. Table 2–3 defines the key actions.

The 5 channel measurement screen provides a graph and numeric readout of the visual carrier level on five preset frequencies. The vertical range is 30 dB; 6 divisions at 5 dB per division.

Reference level. This is the level at the top of the screen, and is displayed in the upper left corner of the screen (REF LVL). The RFM 150 automatically selects the optimum reference level, based on the five channel level measurements.

Signal frequencies. The five preset names and frequencies are displayed across the bottom of the screen. These are the frequencies of the signals being measured, and they can be reprogrammed through the utility menu or by the press-and-hold method. The auto presets notation is 'C:'. See page 3–18 for instructions on programming the presets.

Exit. To change to another menu, press the new menu key. Pressing certain menu keys will reassign the function keys while leaving the meter mode display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and restore the preset name and frequency labels. To change to another level measurement mode, press LEVEL.

Graphic representation of the five channel levels

Level readouts for the five channels

Preset names and frequencies.

REF LVL +120 dBuV (offset +20)				5 CHAN 5 dB/div
+106.5*	+101.7	+93.4*	+97.8	+102.1
LOW CHAN 43.00	C: 83 576.03	MID CHAN 525.25	HIGH PILOT 903.25	HIGH CHAN 1034.2

The preset at F2 has been set to auto
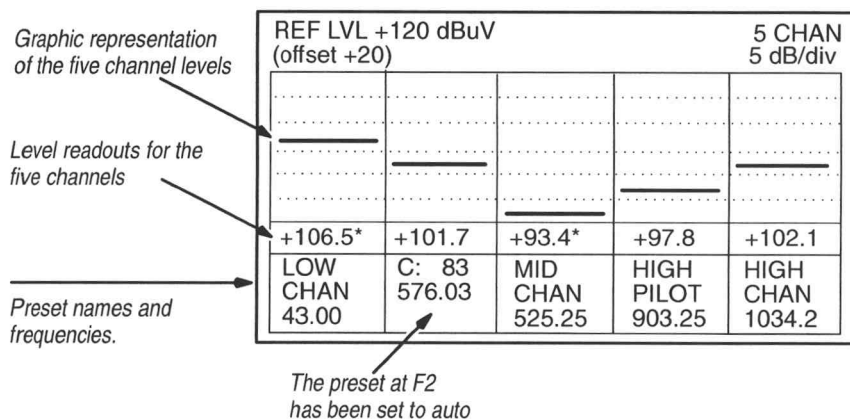
Figure 2–7: The 5 Channel Mode Display

Table 2–3: Key Actions in 5-Channel Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed.
HELP	Displays context-sensitive help screen.

All Channel Mode
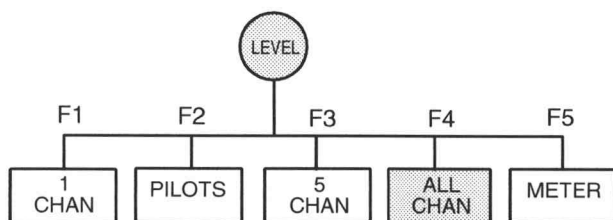
All channel mode gives an overview of all channels in the active channel table. This may be useful as the first measurement made at a new location. For example, if you spot a channel in the graphic display that looks low, you can tune the markers to that channel to check its level. You can check at a glance to see if channels at the high end are rolled off.

To enter the all channel mode, press the front-panel LEVEL key. The function keys will be assigned to the five signal level measurement modes. Select ALL CHAN. The all channel measurement screen, shown in Figure 2–8, will appear, with the instrument mode (ALL CHAN) displayed in the upper right corner of the screen. Table 2–4 defines the key actions.

Display. In the all-channel mode, the instrument continuously scans all the channels in the channel table and produces a graphical display where the visual carrier level of each channel is plotted as a vertical bar. The vertical range is 50 dB; 10 divisions at 5 dB per division.

If the higher frequencies are not used, the all channel display will fill only the left portion of the screen. The companion CSS150 software can be used to create a custom channel table that does not contain unused frequencies. After making this custom channel table active, screen utilization will be significantly improved for most systems.

Markers. The two marker readouts, located in the bottom corners of the measurement display, show the frequency setting of each marker and the signal level reading in the current power units (dBmV or dBuV) at that frequency. No level reading will be given for channels that are set to SKIP through the channel table menu, although the marker can be moved to a 'skipped' channel.

Marker 1 (solid line)   Marker 2 (dashed line)

REF LVL +120 dBuV
(offset +20)

ALL CHAN
5 dB/div

Outline shows
that marker 1
is active

Marker 1
frequency

M1: 139.25 MHz
+95.3 dBuV

M2: 409.25 MHz
+88.3 dBuV

Marker 2
frequency

Level reading

KNOB
REF   MKR1

Δ MKR: +1.8dB

Level reading

Outline indicates knob is as-
signed to control reference level.

Difference between level at marker 1
and level at marker 2.

Figure 2–8: The All Channel Mode Display

If the level reading is replaced by 'OVER,' the reference level
should be increased. The difference between the levels at the two
marker frequencies appears in the lower right portion of the screen.

If F1 is pressed and its on-screen label (REF) is highlighted, the knob
controls the reference level, but the keypad can be used to enter the
active marker frequency. To change the knob action to marker fre-
quency, press F2. The knob and keypad are now "coupled," both
controlling marker frequency. Pressing F2 again selects the active
marker (toggles between 1 and 2). The on-screen label reflects the
active marker name (MKR1 or MKR2), and an outline appears
around the active marker readout. Marker 1 appears on screen as a
solid line, and marker 2 is a dashed line.

Keypad entries must be followed by CHAN for channel entries, or
MHz or ENTER for frequency entries. (In this application, ENTER
is equivalent to MHz.) Tuning is limited to frequencies that corre-
spond to channels in the active channel table. If another frequency is
attempted, an error message will be displayed, and the tuning will
not be changed.

Exit. To change to another menu, press the new menu key. Pressing
certain menu keys will reassign the function keys while leaving the

meter mode display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and restore the all channel mode function keys. To change to another level measurement mode, press LEVEL. If 1 channel or meter mode is entered following all channel mode, the instrument will be tuned to the same frequency as the active marker.

Table 2–4: Key Actions in All-Channel Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function keys (F keys)	F1 assigns the knob to select the reference level. F2 toggles the active marker between marker 1 and marker 2, and assigns the knob and numeric keypad to tune that marker. (The knob and keypad can be "uncoupled.")
Knob	If F1 is selected, turning the knob will select the reference level. If F2 is selected, turning the knob will tune the active marker (1 or 2).
Numeric keypad	Keying in a channel or frequency, followed by CHAN, MHz or ENTER, tunes the active marker if the keyed channel or frequency corresponds to a channel in the active channel table.
CHAN	Terminates a keypad entry as channel.
MHz	Terminates a keypad entry as frequency.
ENTER	Terminates a keypad entry as frequency.
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Aborts a partial keypad entry without changing the instrument setup.

Meter Mode
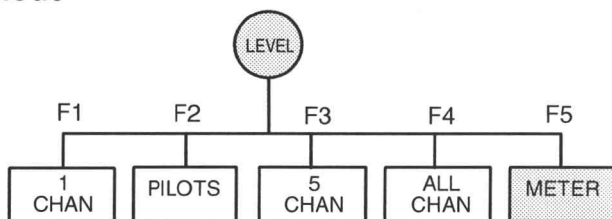
METER provides general purpose level measurement capabilities, with a simulated analog meter and FM signal monitoring. The speaker is driven by the FM-demodulated tuned signal, and is always turned on in the meter mode. Manual configuration of many features in the meter mode provides flexibility for special applications. If you do not require these features, signal level monitoring may be more easily accomplished with the 1 channel mode. The instrument does not autorange in meter mode; the user must select an appropriate reference level. Table 2–5 defines the key actions in this mode.

Using the meter mode. Press the front-panel LEVEL key, then select METER. The meter measurement screen, shown in Figure 2–9, will appear, with the instrument mode (METER) displayed in the upper right corner of the screen. The level readout represents the detected energy within the selected RBW filter, centered at the tuned frequency.

The level readout is the largest type size on the screen. Just below the level readout is the offset value. This represents the probe loss, which can be edited through the utility menu (see page 3–21).

The simulated analog meter displays the same value as the level readout. The value can be read according to the meter's numbered scale. The following paragraph tells how to set the reference level for this scale.

Reference level. Press F1 to assign the knob to REF (the label should be outlined). Use the knob to set the reference level so that the level readout (dark line) is within the central area of the meter scale, not off either end of the scale.

V or A indicates visual
or aural carrier

Dashed outline indicates knob
and keypad are 'uncoupled'

Level reading

* Indicates amplitude
offset is applied (see
channel table)

Chan 2   V   ⌐ 55.25 MHz ⌐   METER

+35.0 +45.0 +55.0   **+45.0***

Level reading   dBmV   dBmV
                                (offset +20)

Offset = probe loss

5.0 MHz   537.5   1080.0

                                        Frequency
                                        plot line

KNOB		RBW	DETECT
REF	VOL 85%	30 kHz	PEAK

Arrow cursor,
showing tuned frequency

Outline indicates knob is as-
signed to control reference level.

Figure 2–9: The Meter Mode Display

Instrument tuning. The keypad controls instrument tuning. If the knob is not assigned to REF or VOL, then the knob also controls instrument tuning (the knob and keypad functions are 'coupled'). The knob assignments can be deselected by pressing CHAN or MHz (without a keypad entry), or by pressing the current knob assignment again. For example, if KNOB REF is selected, pressing F1 again will deselect it and assign the knob to control instrument tuning.

If the knob is assigned to REF or VOL, the keypad still controls instrument tuning. (The knob and keypad functions are 'un-coupled.') Tuning by preset is not available in this mode. General tuning information begins on page 2–11.

In meter mode, the channel number at the top of the screen is followed by a V or an A to indicate whether the instrument is tuned to a visual or an aural carrier.

Volume. In meter mode, FM audio can be monitored. Pressing F2 assigns the knob to control the speaker volume, from 0% to 100%. A beep will sound if you exceed either end of the range. Note that the instrument must be tuned to an aural carrier in order to monitor audio.

Resolution bandwidth. Pressing F4 toggles the resolution band-width between 30 kHz and 300 kHz. Control of RBW can be used in 2-carrier sound systems to resolve the aural carriers.

Detection. Pressing F5 toggles between peak and average detection.

**Exit.** To change to another menu, press the new menu key. Pressing certain menu keys will reassign the function keys while leaving the meter mode display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and restore the meter mode function keys. To change to another level measurement mode, press LEVEL.

Table 2–5: Key Actions in Meter Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Tunes instrument to preset frequency. Overrides partial keypad entry.
Knob	Controls reference level if F1 is highlighted; speaker volume if F2 is selected. If neither of these two functions is highlighted, then the knob controls tuning according to the active entry mode (either channel or frequency, as outlined in the top line of the display). Overrides partial keypad entry.
Knob	Controls reference level or speaker volume, as assigned by function keys. If not assigned, then turning the knob tunes the instrument according to the entry mode (channel or frequency). Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
ENTER	Terminates a keypad entry in the active entry mode (channel or frequency, as outlined in the top line of the display).
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Aborts a partial keypad entry without changing the instrument setup.

Carrier-to-Noise Ratio

```
                    ( MEAS )
                        |
   F1        F2        F3        F4          F5
   |         |         |         |           |
┌──────┐ ┌──────┐ ┌──────┐
│ C/N  │ │ HUM  │ │  FM  │  unassigned   unassigned
└──────┘ └──────┘ │ DEV  │
                  └──────┘
```
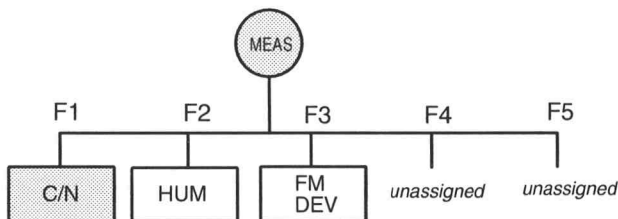
In this mode, the instrument measures both the visual carrier level
and the carrier-to-noise ratio. Table 2–6 defines the key actions in
this mode.

For an analog channel, the measurement on the top of the display is
the visual carrier level. For a digital channel, it is the average signal
power. The bottom measurement is the carrier-to-noise level. When
performing C/N measurements, the RFM150 automatically compen-
sates for the effects of its own equivalent input noise. If the noise at
the RFM150 input is so low that the noise proximity correction can
no longer be accurately applied, then a ">" will precede the C/N
readout.

Making carrier-to-noise measurements. Press MEAS, then select
C/N. The carrier-to-noise measurement screen (Figure 2–10) will be
displayed. The top line of the screen shows the channel number and
frequency of the channel being measured, along with the instrument
mode (C/N). The function key labels indicate the five presets.

Tuning. You can use the knob, the numeric keypad, or the presets to
tune the instrument, which will determine the signal to be measured.
(Instructions for instrument tuning are on page 2–11 and instructions
for programming the presets are on page 3–18.)

Exit. To change to another menu, press the new menu key. Pressing
certain menu keys will reassign the function keys while leaving the
meter mode display on screen (for example, pressing STORE to store
a measurement result). Press ESC to exit the other menu and restore
the C/N mode function keys. To change to the hum or FM deviation
menus, press MEAS again.

Visual carrier level

Carrier-to-noise ratio

Outline indicates that the low channel preset is being measured.

Function keys are assigned to presets

Chan 2		55.25 MHz		C/N

+35.0 dBuV   **VISUAL** (offset +0.0)

43.4 dB   **C/N** (+4.0 MHz BW)

| LOW CHAN | LOW PILOT | MID CHAN | C: 76 534.03 | HIGH CHAN |

The preset at F4 has been set to auto

Figure 2–10: The Carrier-to-Noise Measurement Screen

Table 2–6: Key Actions in Carrier-to-Noise Measurement Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Tunes instrument to preset frequency. Overrides partial keypad entry.
Knob	Tunes instrument according to entry mode. Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
ENTER	Terminates a keypad entry in the active entry mode (channel or frequency, as outlined in the top line of the display).
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Aborts a partial keypad entry without changing the instrument setup.

Hum

Measuring hum. Press the front-panel MEAS key. The function keys are assigned to HUM, C/N, and FM DEV; select HUM. The hum measurement screen (Figure 2–11) is displayed. The top line of the screen shows the channel number and frequency of the channel being measured, along with the instrument mode (HUM). The function key labels indicate the five preset frequencies. Table 2–7 shows the key actions in this mode.

Tuning. The instrument measures both the visual carrier level and the total hum for the tuned channel. You can use the knob, the numeric keypad, or the presets to tune the instrument, which will determine the signal to be measured. (Instructions for instrument tuning are on page 2–11 and instructions for programming the presets are on page 3–18.)

The measurement on the top of the display is the visual carrier level. This portion of the display is the same as the 1 channel signal level mode. The measurement below it is the peak-to-peak hum (low frequency disturbance). There is no hum measurement for digital channels.

Exit. To change to another menu, press the new menu key. Pressing certain menu keys will reassign the function keys while leaving the meter mode display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and restore the C/N mode function keys. To change to the C/N or FM deviation menus, press MEAS again.

Visual carrier level

Total hum

Outline indicates signal being measured is the Mid Chan preset

Function keys are assigned to presets

Chan 71		505.25 MHz		HUM

+36.2 dBmV   **VISUAL** (offset +0.0)

2.0%   **HUM** (peak–peak)

LOW CHAN	LOW PILOT	MID CHAN	HIGH PILOT	HIGH CHAN
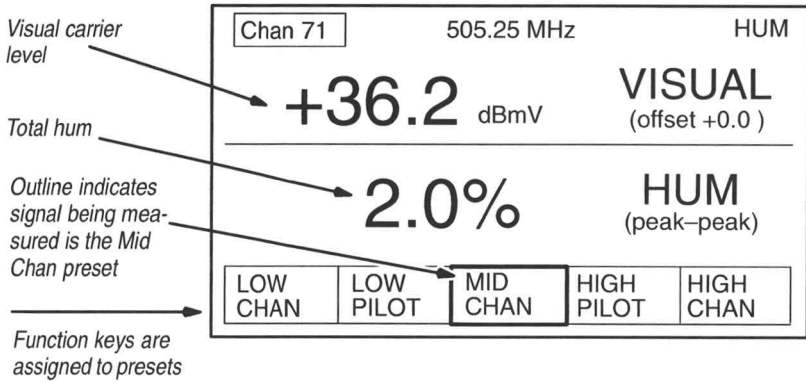
Figure 2–11: The Hum Measurement Mode Display

Table 2–7: Key Actions in Hum Measurement Mode .

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Tunes instrument to preset frequency. Overrides partial keypad entry.
Knob	Tunes instrument according to entry mode. Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
ENTER	Terminates a keypad entry in the active entry mode (channel or frequency, as outlined in the top line of the display).
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Aborts a partial keypad entry without changing the instrument setup.

FM Deviation
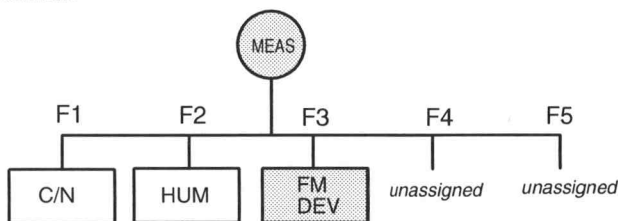
The instrument measures both the visual carrier level and the peak FM deviation of the aural carrier. The FM deviation is the peak deviation of the aural carrier. Note that the FM deviation is dependent on the content of the programming; its value reflects the fluctuating volume of the signal.

Table 2–8 defines the key actions in this mode.

Measuring FM deviation. Press MEAS. The function keys are reassigned to HUM, C/N, and FM DEV. Select FM DEV. The FM deviation measurement screen, illustrated in Figure 2–12, will be displayed. The top line of the display shows the channel number and frequency of the channel being measured, along with the instrument mode (FM DEV). The function key labels will indicate the five presets.

For an analog channel, the top portion of the display is the visual carrier level. The peak FM deviation of the aural carrier is displayed on the bottom portion of the screen. There is no FM deviation measurement for digital or dual carrier audio channels.

Tuning. You can use the knob, the numeric keypad, or the presets to tune the instrument, which will determine the signal being measured. (Instructions for instrument tuning are on page 2–11 and instructions for programming the presets are on page 3–18.)

Exit. To change to another menu, press the new menu key. Pressing certain menu keys will reassign the function keys while leaving the meter mode display on screen (for example, pressing STORE to store a measurement result). Press ESC to exit the other menu and restore the C/N mode function keys. To change to the C/N or hum menus, press MEAS again.
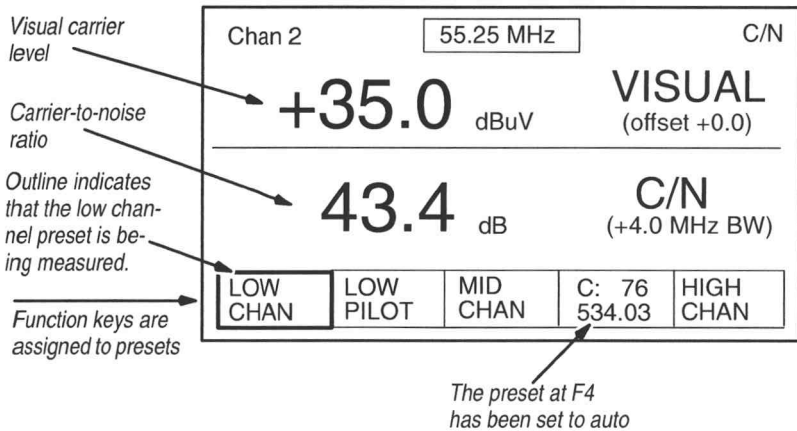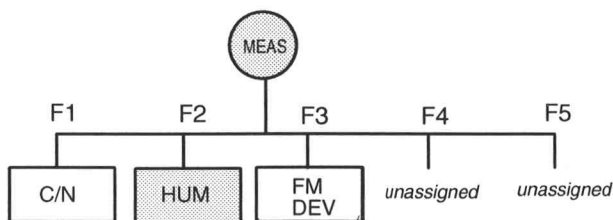
Visual carrier
level

FM Deviation

Outline indicates
that the low chan-
nel preset is be-
ing measured.

Function keys are
assigned to presets

| Chan 170 | 1069.25 MHz | FM DEV |

+36.2 dBmV

VISUAL
(offset +0.0)

+/– 0.0 kHz

FM DEV
(peak)

| LOW CHAN | C: 76 534.03 | MID CHAN | HIGH PILOT | HIGH CHAN |

The preset at F2 has been set to auto
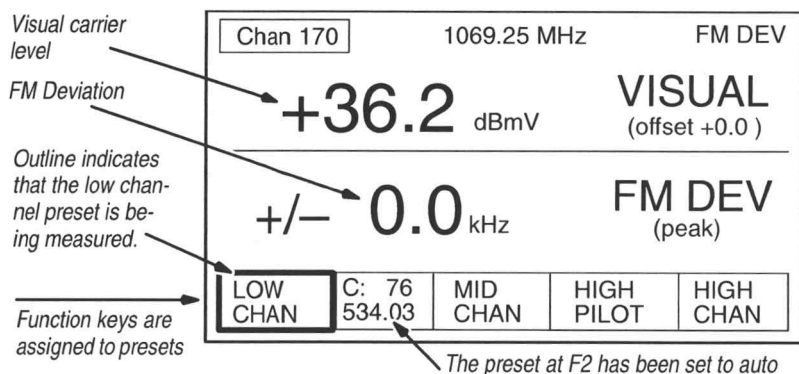
Figure 2–12: The FM Deviation Measurement Mode Display

Table 2–8: Key Actions in FM Deviation Measurement Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Tunes instrument to preset frequency. Overrides partial keypad entry.
Knob	Tunes instrument according to entry mode. Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
ENTER	Terminates a keypad entry in the active entry mode (channel or frequency, as outlined in the top line of the display).
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Exits the submenu or menu, one level at a time. Aborts a partial keypad entry without changing the instrument setup.

Executing Sequences

A series of measurements can be made by executing one of the automated measurement sequences that are loaded in the RFM 150. The results of the measurements will be stored, and can be accessed through the store menu. (To create or import a sequence, refer to page 3–22.)

24 hour test. The 24 hour test sequence is installed in the RFM 150 at the factory and can not be deleted. When the 24 hour test is executed, it will make an all channel measurement, using the active channel table, once every 6 hours. The test is programmed to be performed 4 times. The measurement results will be tagged with the date and time, and stored as SEQUENCE type.

Editing the sequence parameters. Press the front-panel SEQ key, then use the knob to scroll to and select the desired sequence from the list (Figure 2–13).

Select EXEC. A submenu, similar to the one shown in Figure 2–14, will appear. Displayed on this screen are the current site name and temperature values with which stored measurement results will be tagged. If these values are not correct, go to the STORE menu and enter the correct values now.

Press F2 to select START TIME, and use the knob to select now, or the programmed time. Press F3 to select REPEAT TIMES, and use the knob to select repeat 1 time, or the programmed number of times. (CSS 150 software is needed to program the time and repeats.)

Start the sequence. Select START SEQ. If the start time is NOW, the sequence begins immediately. If the start time is other than now, the instrument enters a sleep state until the indicated start time. The RFM 150 will attempt to load the channel table associated with the sequence as the currently active channel table (if it is not already active), and present a confirmation screen. If that channel table is not available, or has been modified, an error message is displayed, and the sequence is aborted.

Interrupting a sequence. While the instrument is in a sleep state, press the POWER key. A menu screen will give you the opportunity to abort the sequence or exit the screen without aborting.

Viewing / archiving the measurement results. After the measurement sequence is complete, press STORE and select RSLTS MENU. Use the knob to scroll to and select the first record created by the sequence. It can be identified by the word SEQUENCE in the TYPE column, and by the date and time displayed next to it. To view a representation of the record, select VIEW. To archive using the CSS 150 software and a PC, refer to the CSS 150 User Manual.

Exit. To exit the menu or submenu, including the viewed result, one level at a time, press ESC.

Total number of sequences stored in the instrument

SEQUENCE MENU			17 seq
SEQ #	NAME	# OF TIMES	DELAY
1	24HOUR	4	6
2	SEQ1	4	1
3	SEQ2	5	1
4	SEQ3	3	1
5	SEQ4	4	1
6	TEST1	5	1
7	TEST2	4	1
8	TEST3	2	1

EXEC	CLONE SEQ		DEL	DEL ALL

Outline cursor indicates selected sequence. This sequence will be acted upon when a function key is pressed.

Function key labels
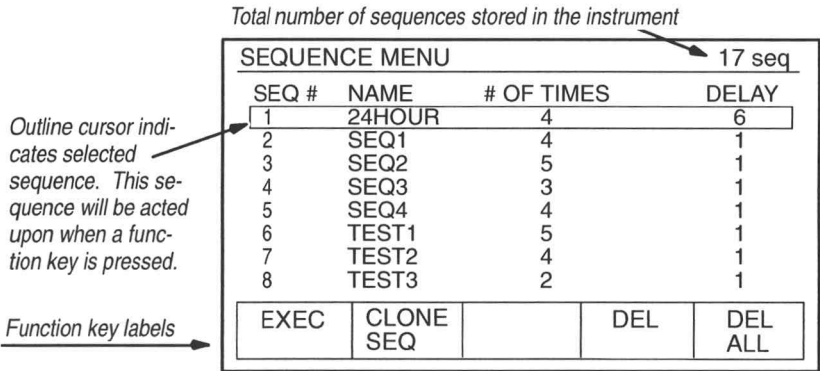
Figure 2–13: Sequence Menu

Arrow cursor indicates that the START TIME field is selected for edit.

Outline indicates that the START TIME field is selected for edit.

Function key labels assigned to sequence actions

Outline cursor indicates current setting

EXECUTE SEQUENCE: 24HOUR
▶ START TIME: NOW
   REPEAT : 1 TIME   4 TIMES @ 6:00

   (REQUIRED NVRAM: 1.5 kB max)
   (Available NVRAM: 139.0 kB)
   Current Site Name = Main 1
   Current Temp = 72°

START SEQ	START TIME	REPEAT TIMES	

Maximum amount of memory required to execute this sequence

Figure 2–14: Execute Sequence Menu

Spectrum Mode

In the spectrum mode, the instrument sweeps a frequency band specified by the center frequency and span/division, then uses very fine steps to plot points and create a graph. It is a limited spectral display, which, among other applications, may be used for spotting signals which should not be present.

Press the front-panel SPECT key to access the spectral display, shown in Figure 2–15. Table 2–9 defines key actions.

Center frequency. If the knob is not assigned to REF, MKR, or SPAN, then the knob (and the keypad) control center frequency. The knob assignments are deselected by pressing CHAN or MHz (without a keypad entry), or by pressing the current knob assignment again. For example, if KNOB REF is selected, pressing F1 again will deselect it and assign the knob to control center frequency.

If the knob is assigned to REF, MKR, or SPAN, the keypad still controls center frequency. See tuning information on page 2–11.

Span/division. The span/div. (displayed above the measurement area) is controlled, in a 1-2-4 sequence, by selecting KNOB SPAN, then turning the knob. Minimum span is 200kHz/div; maximum is 4 MHz/div. (300 kHz RBW), or 400 kHz/div. (30 kHz RBW).

Resolution bandwidth. Pressing F4 toggles the resolution bandwidth between 30 kHz and 300 kHz.

Reference level. The REF level is the level at the top of the screen. The present setting is displayed in the upper left corner of the screen. It can be changed by selecting KNOB REF and turning the knob.

Detection. Pressing F5 toggles between peak and average detection.

Marker. A single marker is available for precise readouts at any frequency. The marker frequency, which is displayed in the lower left corner of the measurement screen, is controlled by selecting KNOB MKR, then turning the knob. Marker frequency is changed in pixel steps, with the value of a step depending on the span.
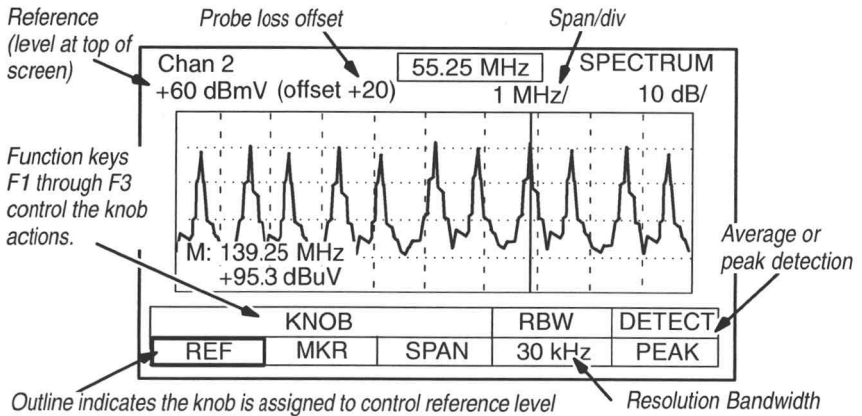
Figure 2–15: The Spectrum Mode Display

Table 2–9: Key Actions in Spectrum Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Performs the action labeled on screen: either assigning knob function or selecting RBW. Overrides partial keypad entry.
Knob	Controls the selected parameter: ref level, marker, or span/div. If none is selected, the knob tunes the center frequency, according to the active entry mode. Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
ENTER	Terminates a keypad entry in the active entry mode (channel or frequency).
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Exits the submenu or menu, one level at a time. Aborts a partial keypad entry without changing the instrument setup.

Sweep Mode
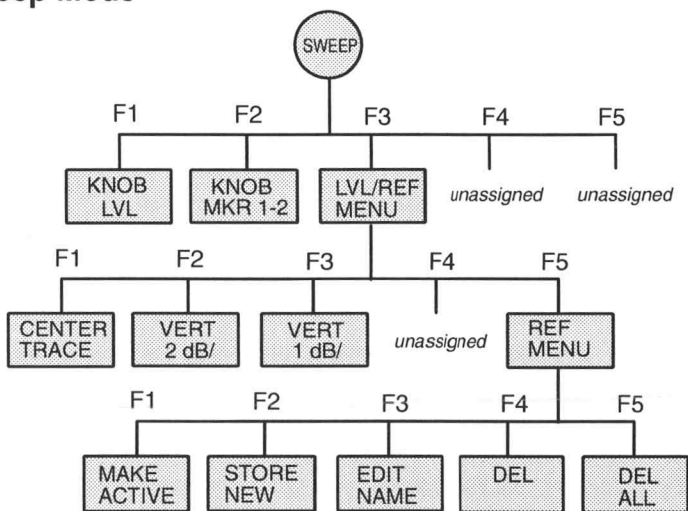
To access the sweep display, shown in Figure 2–16, press the front-panel SWEEP key. The instrument mode (SWEEP) is shown in the upper right corner of the screen. Table 2–10 defines the key actions that are effective for this mode.

Markers. The sweep display has two tunable frequency markers. Readouts in the lower portion of the measurement screen show the marker 1 and marker 2 frequencies and the level (in dB) at those frequencies. Additionally, a readout in the lower right corner of the screen shows the difference between the markers and a peak-to-valley readout.

If F1 is pressed and its on-screen label (LVL) is highlighted, the keypad can be used to enter the active marker frequency, but the knob controls the center level. To change the knob action to marker frequency, press F2. The knob and keypad are now "coupled," both controlling marker frequency. Pressing F2 again selects the active marker (toggles between 1 and 2). The on-screen label reflects the active marker name (MKR1 or MKR2), and an outline appears around the active marker readout. Marker 1 appears on screen as a solid line, and marker 2 is a dashed line.

A marker can be tuned only while it is active. Tune with the knob or by a keypad entry terminated with CHAN for channel and MHz or ENTER for frequency. Tuning is limited to frequencies that correspond to channels in the instrument's channel tables. Entering other frequencies will cause an error message, leaving marker frequency unchanged. The inactive marker is the boundary for tuning the active marker; the active marker can not cross the inactive marker.

Centering the trace. If the trace is off screen, an arrow next to the CENTER LVL readout (upper left corner of the screen) indicates the direction of the trace position (see Figure 2–16).

Selecting KNOB–LVL assigns the knob to control the center level in 1 dB steps. This will effectively move the trace up and down on the screen. The CENTER LVL readout value will indicate the new center screen reference value.

Selecting LVL/REF MENU, then CENTER TRACE will center the trace on screen, and adjust the center level accordingly.

Vertical resolution. The resolution can be set to 1 dB or 2 dB per division. Select LVL/REF MENU, then select 2 dB/ or 1 dB/. The present setting is indicated below the instrument mode in the upper right corner of the display. See Figure 2–17.

Store a sweep reference. The results of 'all channel' measurements are used for the sweep references. For example, you can store an all channel mode record at the head end, and use it as a reference for field measurements.

Press LEVEL, then select ALL CHAN. This will make a measurement in the all channel mode. (The maximum signal level is 5 dB down from the reference level.) Then press SWEEP, and select LVL/ REF MENU, followed by REF MENU. Select STORE NEW to add the most recent all channel mode measurement to the end of the list of stored sweep references (see Figure 2–18).

Select the active sweep reference. You can select any of the stored references to be active. The currently active reference appears above the list of references. To change this, turn the knob to select the reference that you will make active, then select MAKE ACTIVE. The selected reference will become the active reference, and it will now appear above the list. Press ESC to exit the reference menu. Now the sweep menu is displayed, and the reference that you have

just selected will appear as active will appear in the upper left corner of the screen.

Exit. Press ESC to exit the menu or submenus, one level at a time.
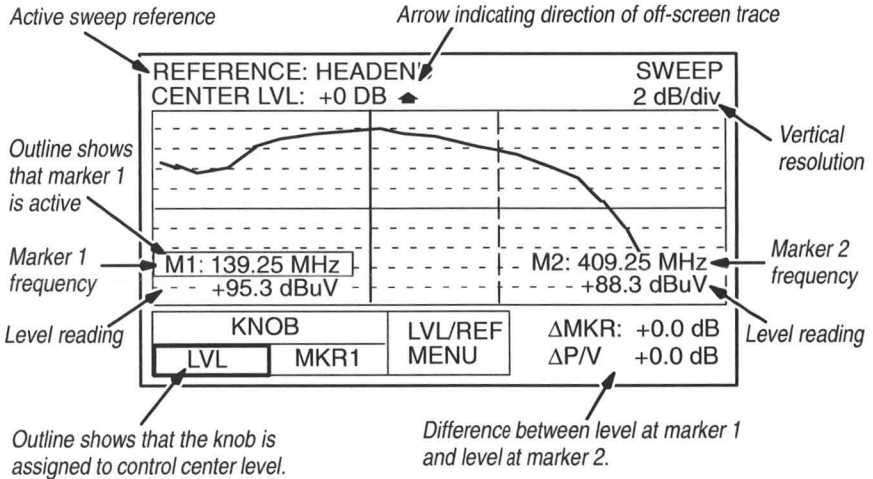
Figure 2–16: The Sweep Display
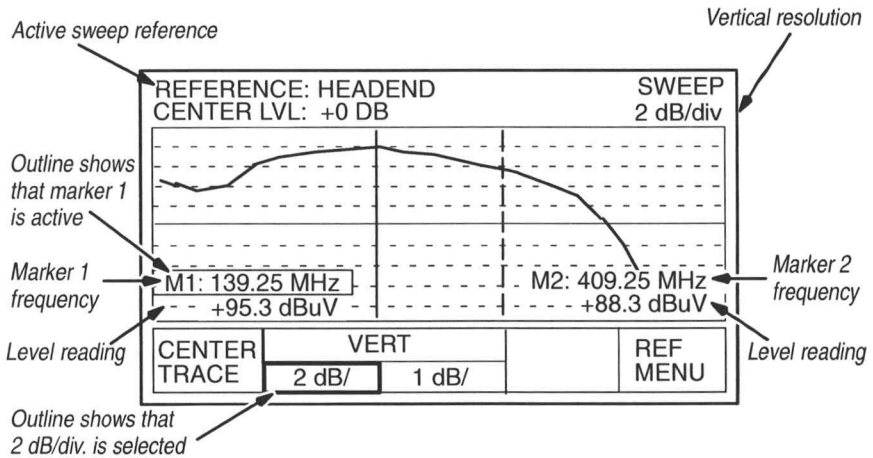
Figure 2–17: The Sweep LVL/REF Submenu Display

The current active reference name.

Channel table that was active when the current active reference was measured.

```
REFERENCE MENU                                    4 refs
ACTIVE REF:   HEADEND    Ch Tbl: CATV–STD
REF #      NAME            REFERENCE SITE
  1        FIRST REF       BEAVERTON
  2        HEADEND         STUDIO AA
  3        STATION 2       411 GREEN ST
  4        STATION 3       PORTLAND



  MAKE      STORE     EDIT       DEL        DEL
  ACTIVE    NEW       NAME                  ALL
```

Outline cursor indicates selected reference. This reference will be acted upon when a function key is pressed.

Function keys ⟶

Figure 2–18: Reference Menu

Table 2–10: Key Actions in Sweep Display Mode

Key	Action
Menu keys	Refer to the documentation for the specific menu key pressed. Pressing any menu key aborts a partial keypad entry.
Function key	Assigns knob to level, marker 1 or marker 2. Can enter the level/reference submenu. Overrides partial keypad entry.
Knob	Tunes the active marker or changes the center level. Overrides partial keypad entry.
Numeric keypad	Keying in either channel or frequency, followed by CHAN, MHz, or ENTER, tunes the instrument – if channel or frequency is in the active channel table.
CHAN	Terminates keypad entry as channel. Switches to channel entry mode.
MHz	Terminates keypad entry as frequency. Switches to frequency entry mode.
←	Pressing backspace during a keypad entry erases the character preceding the cursor. Backspacing 1 click after field is empty aborts partial entry.
HELP	Displays context-sensitive help screen; aborts a partial keypad entry.
ESC	Exits the submenu or menu, one level at a time. Aborts a partial keypad entry without changing the instrument setup.

Reference
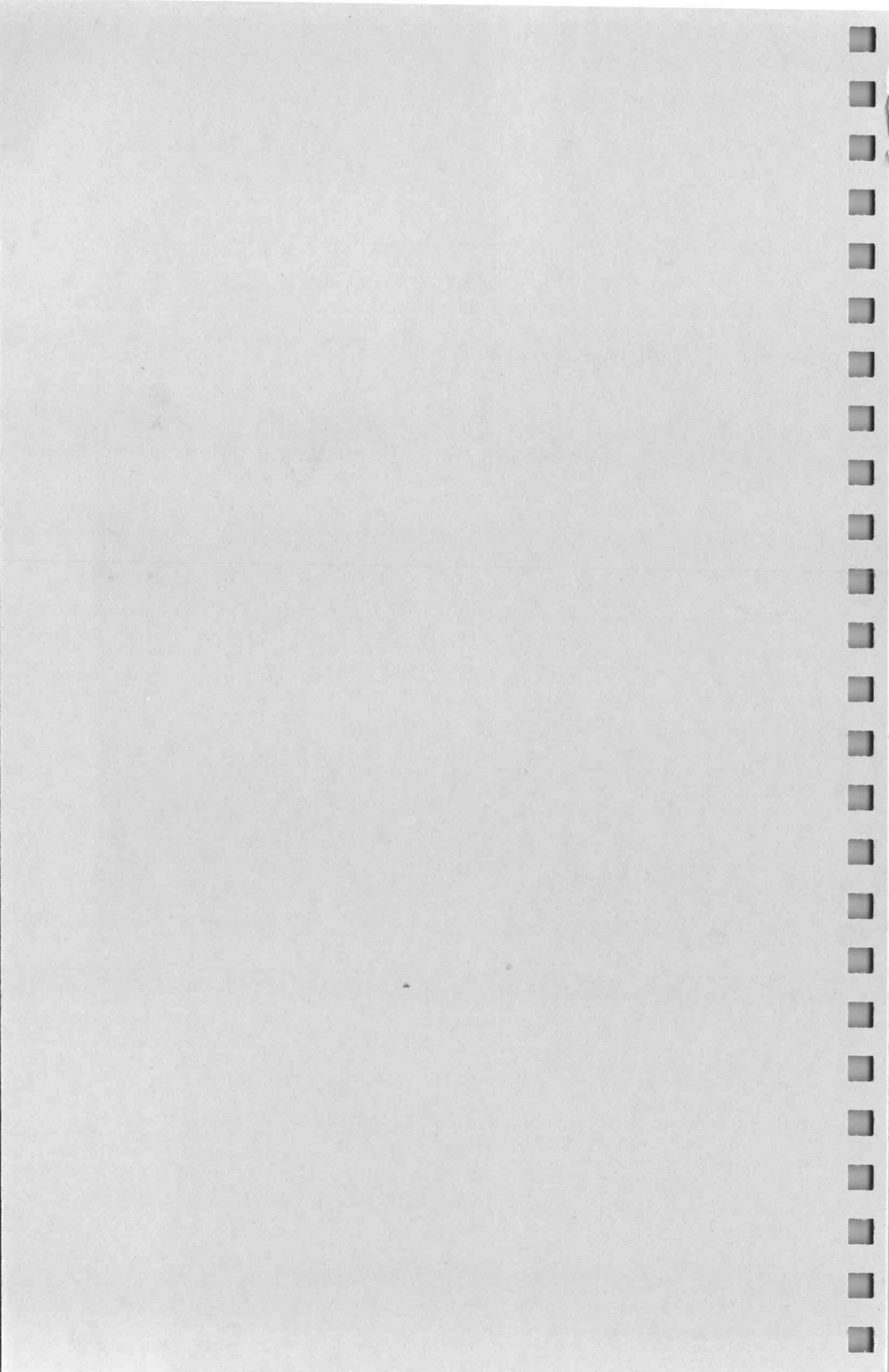
Reference

Reference Topics in Alphabetical Order

Using the Reference Section

Before using this section, you should be familiar with the Getting Started and Operating Basics sections of this manual.

Reference discussions begin with small menu trees. Each tree has a round key at the top, followed by row(s) of rectangular keys. The round keys represent menu keys, and the rectangular keys represent the on-screen labels for the function keys (F1–F5). The labels define the action that will occur, or submenu that will be entered, when the corresponding function key is pressed. If submenus are present, they will be represented by an additional row(s) of rectangular keys in the menu diagram. Keys that pertain to the discussion will be shaded.

The next few pages describe the general editing methods used to change instrument parameters. Refer to the topic heading for more details (for example, Channel Tables).

Selecting Items/Fields to Edit

Selecting an Item. In a list of items, the selected item is highlighted by an outline cursor (see Figure 3–1). This is the item that will be acted upon when a function key (such as delete) is pressed. Turning the knob will allow you to select different item, and scroll the list as needed.

Selecting a Field. In a display with editable fields, the selected field is indicated by a cursor arrow to the left of the field (see Figure 3–2). The function keys select the field to edit. In some menus, each field is assigned to a corresponding function key. In other menus, one key is pressed repeatedly to sequence through the fields. The function key labels along the bottom of the screen will guide you.

Outline cursor indicates selected channel table. This table will be acted upon when any of the five function keys are pressed.

Function keys ⟶

```
CHAN TABLES MENU                           (  9 tables)
ACTIVE TABLE: US STD
         TBL #      NAME        TYPE
           1        US STD      FIXED
          [2        US HRC      FIXED ]
           3        US IRC      FIXED
           4        JAPAN M     FIXED
           5        EUR BG      FIXED
           6        CHINDK      FIXED
           7        MY TBL      CUSTOM
   ┌────────┬────────┬────────┬──────┬──────┐
   │ MAKE   │ EDIT   │ CLONE  │ DEL  │ DEL  │
   │ ACTIVE │ CHANS  │ TABLE  │      │ ALL  │
   └────────┴────────┴────────┴──────┴──────┘
```
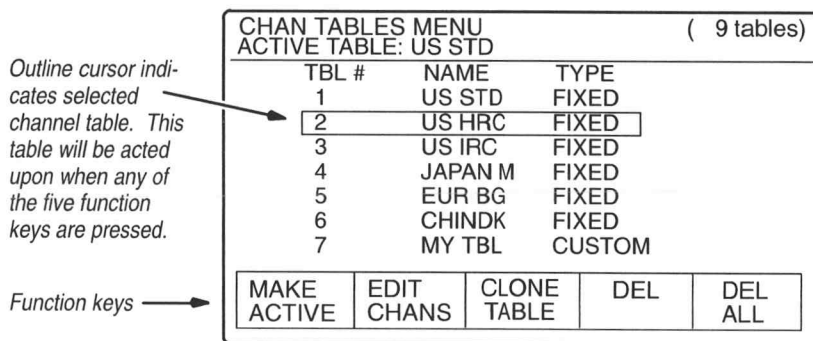
Figure 3–1: Sample Menu Screen Showing Use of the Outline Cursor

Arrow cursor indicates field being edited.   *Preset being edited*   *Entry in progress*

```
   EDIT PRESET KEY: F1
     TOP LABEL:  HIGH                    Underline cursor
 ▶ BOTTOM LABEL: [CHA_]
   FREQUENCY: 1034.25 MHz        The letter "N" has been se-
                                 lected by turning the knob. To
     A  B  C  D  E  F  G  H  I  J [K] L  M   enter "N" at the cursor, ENTER
     N  O  P  Q  R  S  T  U  V W  X Y  Z  <space>    must be pressed.
   ┌────────┬────────┬──────┬────────┬────────┐
   │ TOP    │ BOTTOM │ FREQ │ ACCEPT │ ABORT  │
   │ LABEL  │ LABEL  │      │ ENTRY  │ ENTRY  │
   └────────┴────────┴──────┴────────┴────────┘
```

Function keys select the field to be edited.

Highlighted label indicates field being edited.

Figure 3–2: Sample Menu Screen Showing Text Editing

Editing Alpha-Numeric Text Fields

Some fields contain letters and numbers that can be edited by the operator. Preset name is an example of this type of field.

The back space key (◄━) is used to erase characters.

A partial or incorrect entry can be cancelled by pressing ESC, by selecting ABORT ENTRY or by back spacing one click past an empty field. The stored name will reappear, unchanged.

Entering letters. Use the knob to highlight the desired letter on screen, then press ENTER. The previous name will disappear and the selected letter will appear, followed by an underline cursor. As additional letters are entered, they will appear at the cursor.

Entering numbers. Use the keypad (ENTER is not used for numbers in text strings). When a field has been correctly entered, select ACCEPT ENTRY.

Exit. When all fields on the screen have been correctly entered and accepted by pressing ACCEPT ENTRY, press ESC to exit the menu, one level at a time.

Editing Numeric Fields

A numeric field can be edited using either the knob or the numeric keypad. To use the knob, just turn the knob until the desired value is displayed, and the new value will be automatically entered. To use the keypad, key in the desired value, then terminate the entry with ENTER. If it is a frequency field, CHAN or MHz can also be used to terminate the entry. Partial keypad entries can be aborted by back-spacing or pressing ESC.

Editing Fields With On-Screen Choices

Some fields have on-screen choices, with the current setting indicated by an outline cursor. These fields are edited by turning the knob to the left or right until the desired setting is outlined.

UTIL

CONFIG

MEAS SETUP — PWR UP/DN — ASSIGN PRESET — CLONE CONFIG

PROBE LOSS — POWER UNITS — LOW PILOT — HIGH PILOT

AUTO PWR DN — PWR UP MODE

EDIT PRESET — AUTO PRESET

Knob or key pad entry — dBmV or dBuV — Knob or key-pad entry — Knob or keypad entry

TOP LBL — BOT LBL — FREQ — ACCEPT ENTRY — ABORT ENTRY

CHAN TABLE

MAKE ACTIVE — EDIT CHANS — CLONE TABLE — DEL — DEL ALL

YES/NO — YES/NO

NEXT CHAN — PREV CHAN — SELECT CHAN — SELECT FIELD

Knob or key-pad entry

CLOCK

TIME — DAY OF WEEK — MONTH — DAY — YEAR

SEQ — *Displays List of Sequences – use knob to select sequence to be executed, sent, or deleted.*

RS232

BAUD RATE — PARITY — FLOW CONTROL — TERM — ECHO

EXEC — START TIME — REPEAT TIMES

CLONE SEQ

DEL — YES/NO

DEL ALL — YES/NO

STORE

STORE RSLT — *Stores current measurement mode results at end of list of stored results.*

RSLTS MENU — *Displays list of stored results–use knob to select result.*

VIEW — DEL — DEL ALL

YES/NO — YES/NO

SITE NAME — *Displays list of site names–use knob to select name to edit or delete.*

MAKE ACTIVE — NEW SITE — EDIT NAME — DEL — DEL ALL

YES/NO — YES/NO

ACCEPT/ABORT ENTRY

SET TEMP

TEMP — TEMP UNITS

Knob or key-pad entry — °F / °C

DISP

BACKLIGHT — ON/OFF

CONTRAST MODE — AUTO/MANUAL

CONTRAST — Knob or keypad entry

Figure 3–3: Reference Menu Hierarchy

Channel Tables

UTIL

F1   F2   F3   F4   F5

CONFIG   CHAN TABLE   CLOCK   RS232   *unassigned*

F1   F2   F3   F4   F5

MAKE ACTIVE   EDIT CHANS   CLONE TABLE   DEL   DEL ALL
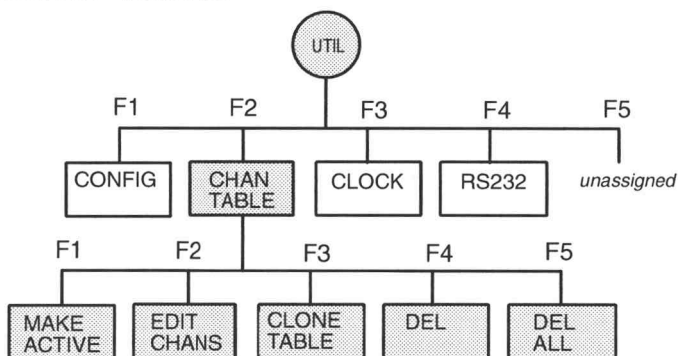
The RFM 150 uses fixed and custom channel tables. Each instrument is loaded with the nine fixed channel tables, which can be edited, but can not be deleted. These tables are defined in Appendix C, with space allowed in the tables for you to write in modifications. A blank table is also provided for you to photocopy and document custom channel tables.

Channel numbers entered in measurement modes will be interpreted in terms of the active channel table. For example, in the 1 channel measurement mode, with CATV–STD channel table active and the instrument tuned to channel 2, the frequency will be 55.25 MHz.

Selecting the active channel table. Press UTIL, then select CHAN TABLE. The list of channel tables (Figure 3–4) is displayed. Use the knob to scroll to and select the channel table to become active, then press MAKE ACTIVE. The new active channel table will appear above the list of channel tables.

Editing Channel Tables

To edit channel tables, press the front-panel UTIL key, then select CHAN TABLE. A list of all channel tables that are loaded in the instrument will appear (Figure 3–4). Using the knob, select the channel table to be edited, then select EDIT CHANS. This provides the edit channels menu display, shown in Figure 3–5, which allows editing of either fixed or custom tables in the following fields: *scrambled, amplitude offset, dwell time,* and *skip.* (With the compan-

ion software product, CSS150, additional fields can also be edited.) Table 3–1 defines all the fields that can be edited through this menu as well as those that are edited through the CSS150.

Select channel. Channel tables are edited one channel at a time. To change the channel being displayed/edited, select SELECT CHAN. The arrow cursor will move up to the channel line, and the channel number can be tuned with the knob or by keypad entry followed by CHAN, MHz, or ENTER. You can only tune to channels that are stored in that channel table. If other entries are attempted, an error message is displayed and the present channel does not change.

Select field. In the edit channel menu, an arrow cursor along the left side of the screen indicates the selected field. This field can be edited with the knob (or keypad for amplitude offset). To change the selected field, select SELECT FIELD, repeating as necessary to reach the desired field.

Copy to end. Selecting COPY TO END copies the value of the selected field (indicated by the arrow cursor position) to all channels from the current channel to the end of the table. After the key is pressed, a confirmation screen will appear. You must select YES to copy. To return to the edit channels menu without copying, select NO or press ESC.

Active channel table

*Outline cursor indi-
cates selected
channel table. This
table will be acted
upon when a func-
tion key is pressed.*

Function key labels

CHAN TABLES MENU				9 tbls
ACTIVE TABLE: US STD				
TBL #	NAME	TYPE		
1	US STD	FIXED		
2	US HRC	FIXED		
3	US IRC	FIXED		
4	JAPAN M	FIXED		
5	EUR BG	FIXED		
6	CHINDK	FIXED		
7	MY TBL	CUSTOM		
8	YOUR TBL	CUSTOM		
MAKE ACTIVE	EDIT CHANS	CLONE TABLE	DEL	DEL ALL

Figure 3–4: Channel Tables Menu

Active channel table,
selected through the
channel tables menu

Channel line

Cursor arrow, indi-
cating the field that
is selected for edit

Editable fields

```
EDIT CHANNEL MENU
TABLE: US STD
▶CHAN: 2      55.25 MHz            NTSC

  SCRAMBLED: YES  NO
  AMPLITUDE OFFSET:  6.9 dB
  DWELL TIME:  SHORT  LONG
  SKIP:  YES  NO

  PREV    NEXT    SELECT  SELECT  COPY
  CHAN    CHAN    CHAN    FIELD   TO END
```

Changes the channel
selection to previous
or next channel in the
active channel table

Moves cursor ar-
row to the channel
line, and allows
channel selection
by knob or keypad

Selects field to
be edited.

Copies the value of
the selected field to
all channels from the
current channel to
the end of the table

Figure 3–5: Editing Channel Tables

Deleting Channel Tables

Only custom channel tables can be deleted. If you attempt to delete
a fixed channel table, an error message will be displayed and the
table will not be deleted. Stored measurement results are dependent
on the channel table that was active when they were stored. When
you delete a channel table, be sure there are no records dependent on
that table. If there are, they will be labeled as 'orphans.'

Delete a (custom) channel table. Press the front-panel UTIL key,
then select CHAN TABLE. A list of all channel tables that are
loaded in the instrument will be displayed, with the selected table
outlined. Use the knob to select the table that will be deleted, then
select DEL. A confirmation screen will appear. Select YES to de-
lete. To cancel the request, select NO or press ESC.

Delete all (custom) channel tables. Press the front-panel UTIL key,
select CHAN TABLE, then select DEL ALL. A confirmation screen
will appear. Select YES to delete. To cancel the request, select NO
or press ESC.

Exit. Press ESC to exit the menu, one level at a time.

Importing Channel Tables

Channel tables can be imported from another RFM 150 or from a PC. The number of channel tables that can be stored is limited only by the instrument's available non-volatile memory. Note that adding channel tables reduces the available non-volatile memory.

Using the CSS 150 software package. A fixed table can be used as the basis for creating a custom table. Custom channel tables are created with the companion software, CSS150; refer to the CSS150 User Manual for instructions.

Using another RFM 150. Connect the two instruments according to the instructions on page C–2. With the source instrument, press the front-panel UTIL key, then select CHAN TABLE. A list of all channel tables that are loaded in the instrument will be displayed, with the selected table highlighted by an outline cursor. Using the knob, select the channel table that will be sent. Select CLONE TABLE. The table will now be sent to the destination RFM 150 and placed at the end of the list of tables. To display this list on the destination instrument, press UTIL, then select CHAN TABLE. Use the knob if needed to scroll. To edit or delete the table, select EDIT CHAN or DEL.

Exit. Press ESC to exit the menu, one level at a time.

Table 3–1: Channel Table Fields for Editing

Field	Units	Range	Editing	Description
Number	None	0–511	CSS150	Maximum of 200 total channels allowed.
Primary Freq	MHz	4.50–1080.00 (10 kHz min. resolution)	CSS150	Can be the analog visual carrier or the digital carrier.
Aural Offset	MHz	4.5, 5.5, 6.0, or 6.5 only	CSS150	Offset to the aural carrier (from visual carrier). N/A for digital channels.

Table 3–1: Channel Table Fields for Editing (Cont.)

Field	Units	Range	Editing	Description
Second Aural Offset	MHz	None, 4.72, 5.74, 5.85, or 6.55 only	CSS150	Offset to the second aural carrier (from visual carrier). N/A for digital channels.
Type	None	NTSC, PAL, SECAM, or DIGITAL only	CSS150	
C/N Bandwidth	MHz	.1 to 25.5	CSS150	Per channel to accommodate mixed channel systems.
Channel Edge	MHz	± 327.6 (10 kHz min. resolution)	CSS150	Frequency offset from primary carrier to the channel edge (guard band). Used to locate the noise measurement point in C/N measurement.
Scrambled	None	Yes/No	CSS150 or RFM150	Provided for documentation purposes only.
Amplitude Offset	dB	± 12.5	CSS150 or RFM150	Value added to absolute visual carrier level measurements. Usually used to correct for scrambled channel levels.
Dwell Time	None	Short/Long	CSS150 or RFM150	Time to dwell at visual and aural carriers to get level reading: short for NTSC/PAL, long for SECAM and some scrambling types. N/A for digital channels.
Skip	None	Yes/No	CSS150RFM 150	If yes, channel is skipped in all channels and sweep mode.

Clock
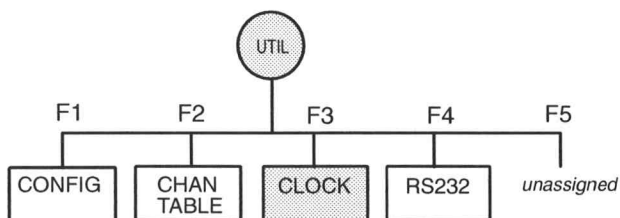
The clock determines the date and time that will be associated with a stored measurement result. It is also used to begin timed sequences, such as the 24 hour test. To display the clock menu (Figure 3–6), press UTIL, then select CLOCK. To select a field for edit, press the corresponding function key. An arrow points to the selected field.

The HOUR, MINUTE, and YEAR fields can be edited either with the knob or with the keypad followed by ENTER. A partial keypad entry can be aborted by pressing ESC or by backspacing. In the hour and minute fields, enter the current time using a 24-hour day. HOUR can be 00 to 23, and MINUTE can be 00 to 59. In the YEAR field, enter the current year as a four-digit number (1994 through 2025).

The DAY OF WEEK field has an outline cursor showing the current setting. Turn the knob left or right to select the correct day, and the outline cursor moves to show the new choice. The DAY–MONTH field is controlled by turning the knob to select the correct date.

Exit. After editing, press ESC to exit the menu, one level at a time. The new settings will be saved.
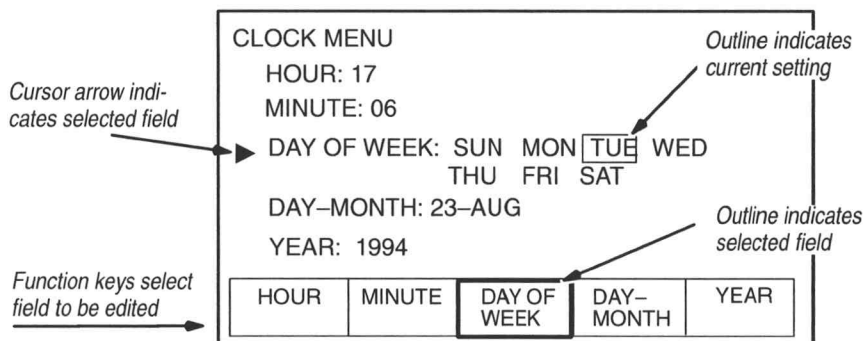
Figure 3–6: The Clock Menu

Clone Configuration

A quick way to configure an instrument is to copy the configuration of another RFM 150.

Enter the RS232 menu by pressing UTIL, then F4 (RS232). Make sure both instruments are set up the same. Connect the supplied RS232 cable between the two instruments.

On the source instrument, press UTIL, followed by F1 (CONFIG), then F5 (CLONE CONFIG). The following instrument parameters will be sent to the destination instrument:

Active channel table
Active site name
Backlight mode (on/off)
Center level for sweep mode
Center level sensitivity (1 dB/2 dB) for sweep mode
Channel
Detection (average/peak) for meter and spectrum modes
Frequency
High and low pilot frequencies
Measurement mode currently selected
Power down mode
Power units
Power up mode
Preset labels and frequencies
Probe loss
Reference for all channels, meter, and spectrum modes
Resolution bandwidth (RBW) for meter and spectrum modes
Screen contrast level
Screen contrast mode (manual/auto)
Span for spectrum mode
Speaker volume in meter mode
Temperature units

Display Adjustment

```
                    ┌──────┐
                    │ DISP │
                    └──────┘
                        │
   F1          F2       │      F3        F4           F5
    │           │       │       │         │            │
┌────────┐ ┌────────┐ ┌────────┐
│  BACK  │ │ CNTRST │ │ CNTRST │  unassigned   unassigned
│ LIGHT  │ │  MODE  │ │        │
└────────┘ └────────┘ └────────┘
    │           │          │
Use knob to  Use knob to  Use knob or
select ON or select MANUAL keypad to se-
OFF          or AUTO      lect value from
                          0% to 100%
```
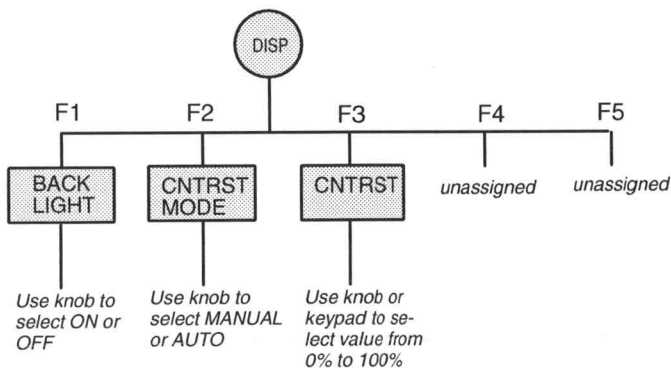
The front-panel LCD screen provides measurement and menu dis-
plays. Through the DISP menu, the display can be adjusted for opti-
mal viewing under different conditions.

To adjust the display, press the front-panel DISP key. The function
keys will be assigned to: backlight, contrast mode, and contrast.

Selecting BACKLIGHT moves the arrow cursor to BACKLIGHT.
The present condition (ON or OFF) will be outlined. Turning the
knob will toggle the backlight condition between ON and OFF. It
may be desirable to turn the backlight on under low ambient light
conditions.

Selecting CONTRAST MODE moves the arrow cursor to CON-
TRAST MODE. The selected condition (MANUAL or AUTO) will
be outlined. Turning the knob will toggle the contrast mode between
MANUAL and AUTO.

The auto mode continually adjusts the display for optimum contrast
under varying ambient temperature conditions.

The manual mode is used by selecting CONTRAST, then using
either the knob or keypad to select a contrast value between 0% and
100%. If the instrument is set to auto mode when a contrast value is
selected, it will automatically switch to manual mode.

Help

The RFM 150 is equipped with context-sensitive help screens. If you require additional information after reading the help screen, look up the subject in the alphabetical index at the end of the user manual.

Organization of Help Screens

During normal instrument operation, measurements or configuration parameters appear on the top portion of the screen. Function key labels (if any) appear across the bottom of the screen. The help screens follow that basic organization.

Each help screen describes the upper and lower portions of the screen that were displayed at the time HELP was pressed. Help for the top portion of the screen appears first (Mode Help). Turning the knob will scroll to help for the bottom portion of the screen (Function Keys Help).

Note that combinations sometimes occur, such as having 1 channel measurement mode displayed on the top portion of the screen, and the store menu displayed across the bottom. In this case, the help screen would consist of Mode Help for 1 channel mode, followed by Function Keys Help for the store menu.

Using the Help Screens

Help screens are accessed by pressing the front-panel HELP key. Note that pressing HELP can abort a partial keypad entry in some modes.

Mode Help. Help for the top portion of the screen is referred to as Mode Help. For example, if HELP is pressed during 1 channel mode operation, the help screen that will appear is entitled: "1 Channel Mode Help."

Immediately below the title are reminders to use the knob to scroll to additional lines of help, and to press ESC to exit the help screen. Turning off the instrument power will also exit the help screen.

In the upper right of every Mode Help screen is a battery charge indicator. This is the percent of charge remaining in the battery, with 100% indicating a full charge.

The following lines of help tell you how to use the instrument mode that was displayed when HELP was pressed. When you are instructed to perform a key or knob action, press the ESC key first.

Use the knob to scroll through all lines of Mode Help, then continue on to the Function Keys Help, if there is a function key assignment for that display.

Function Keys Help. After scrolling past the Mode Help, the title for the function keys portion of the help screen will appear. For example, the title for the store menu will be "Store Function Keys Help." This portion of the help screen will describe the action of the function keys (F1 through F5). When you are instructed to press a function key, press the ESC key first.

Exit. When you are finished with the help screen, press the ESC key to exit. A help screen will also be exited if the instrument power is turned off.

Powering Up From an AC Source

Use only the AC adapter that is supplied with the RFM 150. When powering up the instrument, follow this sequence to assure proper operation under all conditions:

- Attach the AC adapter to the RFM 150 power input connector.

- Connect the adapter plug to an appropriate AC power source (see Appendix A for power source requirements).

- Press the front-panel POWER key to turn on the RFM 150. A beep will signal that the instrument is booting, and the software version will be displayed momentarily.

- Connect the television signal to the RF input on the RFM 150, and proceed with normal instrument operation.

Power Mode

The RFM 150 has three basic power modes: on, off, and sleep. Table 3–2 gives the possible combinations of instrument state and power switch actions.

Sleep State. During automated sequences, the instrument waits for the scheduled time to begin a measurement, and this is called the sleep state. If the instrument is in a sleep state, pressing POWER will provide a query screen. The query screen (shown in Figure 3–7) identifies the sequence and its scheduled start time, and provides an opportunity to abort the sequence.

After performing a scheduled measurement sequence, the instrument will either power down or return to the sleep state to wait for the next sequence.

```
┌─────────────────────────────────────────────────────┐
│              The SLM is in SLEEP state,               │
│               Executing the sequence                  │
│                     24HOUR                            │
│            The next iteration is scheduled for        │
│                    Mon @ 15:36                        │
│                                                       │
│            Do you want to ABORT this sequence?        │
├────────┬────────┬────────┬────────┬───────────────────┤
│  YES   │        │        │        │           NO      │
└────────┴────────┴────────┴────────┴───────────────────┘
```

Aborts sequence,
and instrument will
be powered up

Does not abort sequence, and
instrument will return to sleep mode
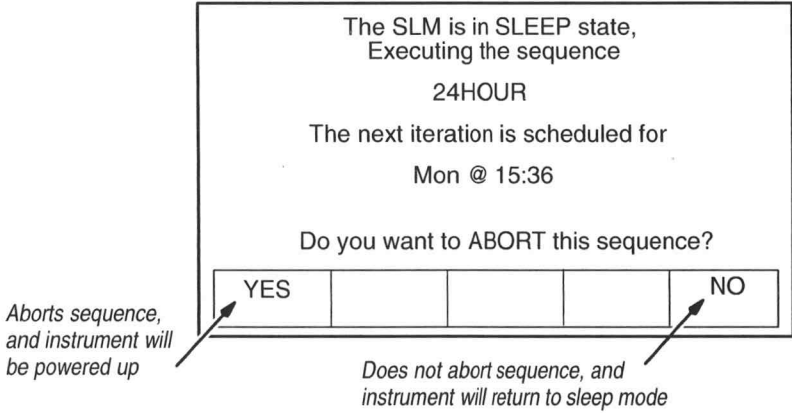
Figure 3–7: The Sleep State Query Screen

Table 3–2: POWER Key Modes

State	Event	Destination State
OFF	POWER key is pressed	ON
ON	POWER key is pressed	OFF
	Timeout (no activity for 10 minutes)	OFF
	Select sequence with delayed start time	SLEEP
	Loss of power	OFF
SLEEP	POWER key is pressed	QUERY
	Programmed repeat of the sequence	ON
QUERY	ABORT	ON
	Don't abort	SLEEP
	Timeout (no activity for 10 minutes)	SLEEP

Power Up / Power Down Modes
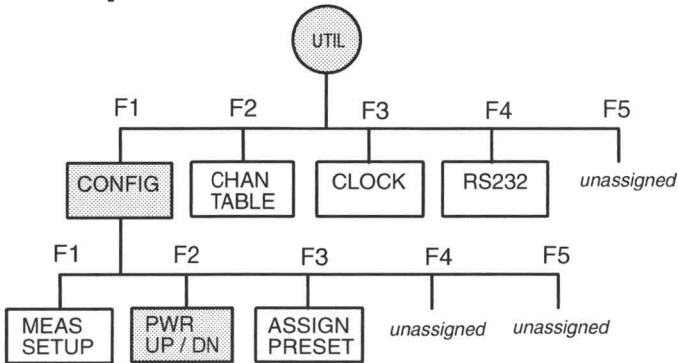
Power up mode. The RFM 150 can be set to power up in any of the 10 measurement modes, or in the last measurement mode that was used before power down. When auto power down is enabled, LAST is useful because the instrument will power up in the same mode.

Auto power down. If this feature is enabled, the instrument powers down after 10 minutes with no activity, to preserve battery life.

Changing the modes. Press UTIL, then select CONFIG followed by PWR UP/DN. The power up / down parameters are displayed (Figure 3–8). Press F1 or F2 to select the field, then turn the knob to change the setting. The outline cursor moves to the new setting.

Exit. Press ESC to exit the menu, one level at a time. The new settings will be saved.
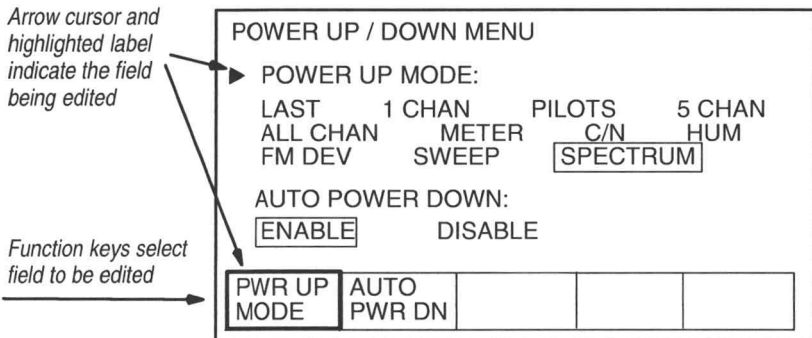
Figure 3–8: The Power Up / Down Menu

Presets
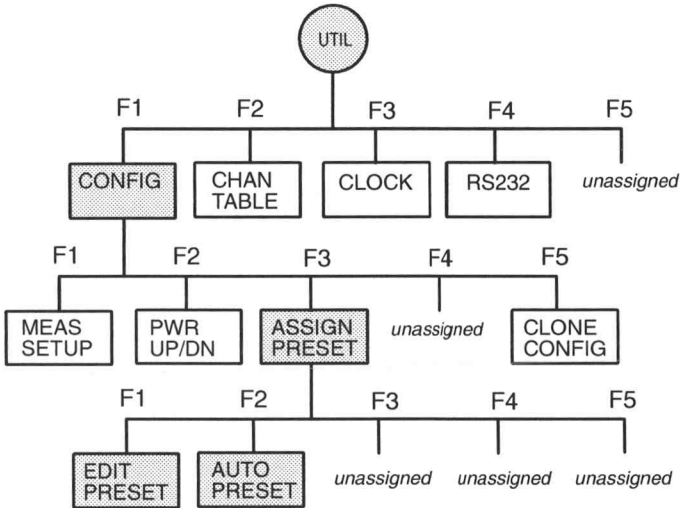
There are five presets, corresponding to the five function keys, which are available to tune the instrument in certain measurement modes, such as 1 channel mode. The preset labels are displayed along the bottom of the screen.

To tune the instrument to a preset frequency, press and release the function key below the desired on-screen label. When the key is pressed, nothing appears to change. When the key is released, instrument tuning will occur: the channel and frequency readouts in the top line of the display will change, and the function key label will be highlighted. Any other function keys set to the same frequency will also be highlighted. A function key label will be highlighted even if you tune to its preset frequency using the knob or keypad.

You can define the on-screen labels that will be displayed when the presets are available, and you can choose the frequencies to which the instrument will be tuned when one of those keys is pressed.

You can also set the preset to auto, allowing its preset channel and frequency to be programmed by the press-and-hold method. When auto is used, the on-screen labels will be controlled by the RFM 150.

While the preset key assignments are displayed, pressing another menu key displays the new menu. ESC has no function.

Editing the Presets

Press the front-panel UTIL key, then select CONFIG and ASSIGN PRESET. A list of the five presets will be displayed (Figure 3–9). Use the knob to select the preset to be edited. (The selected preset will be indicated by an arrow cursor along the left side of the screen.) Now you can either edit the selected preset or set it to auto.

- To edit the preset, select EDIT PRESET. An editing menu similar to Figure 3–10 will be displayed. An arrow cursor along the left side of the screen indicates the selected field. Use the function keys to select the field to be edited: TOP LABEL (the top line of the on-screen label), BOTTOM LABEL (the bottom line of the label), or FREQ (frequency to which the preset will tune the instrument). Edit the fields as desired, using the standard editing techniques, which are described on page 3–1.

- To set the preset to auto, select AUTO PRESET. This will allow that preset key to be programmed by the press-and-hold method. Note that internally generated auto channel/frequency labels will replace the previous labels for this preset.

Press-and-Hold Method of Programming

If a preset has been set to auto, it can be programmed with the press-and-hold method. This method is similar to tuning an automobile radio. Note that only presets set to auto, as shown in Figure 3–9, can be tuned in this manner.

To use the press-and-hold programming method, enter a mode that has presets available, such as 1 channel mode. The five presets will be labeled along the bottom of the screen; choose which preset you will be programming, and locate the function key (F1–F5) that is assigned to it. Use the knob or keypad to tune the instrument to the desired channel or frequency, then press and hold your chosen function key for 3 seconds. When the preset is programmed, the RFM 150 will automatically change the on-screen channel / frequency label. If you release the key in less than 3 seconds, it will not be programmed; instead, it will tune the instrument as usual.

ASSIGN PRESET MENU

Arrow cursor indicates selected preset

F1:	LOW	CHAN	55.25 MHz
▶ F2:	C: <ch>	<freq>	57.75 MHz
F3:	MID	CHAN	505.25 MHz
F4:	HIGH	PILOT	825.25 MHz
F5:	HIGH	CHAN	1034.25 MHz

Function keys act on selected preset

| EDIT PRESET | AUTO PRESET | | | |
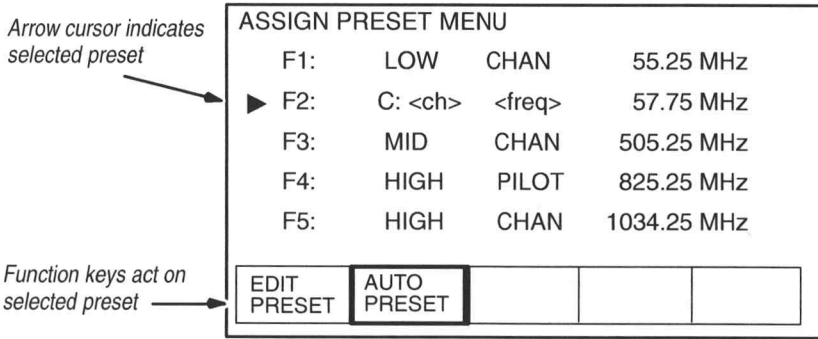
Figure 3–9: Assign Preset Menu

Preset being edited   Entry in progress

EDIT PRESET KEY: F1

TOP LABEL: HIGH   Underline cursor

▶ BOTTOM LABEL: CHA_

The letter "N" has been se-
lected by turning the knob. To
enter "N" at the cursor, ENTER
must be pressed.

FREQUENCY: 1034.25 MHz

A B C D E F G H I J [K] L M
N O P Q R S T U V W X Y Z <space>

| TOP LABEL | BOTTOM LABEL | FREQ | ACCEPT ENTRY | ABORT ENTRY |

Function keys se-
lect the field to be
edited.

Arrow cursor and highlighted la-
bel indicate field being edited.

Figure 3–10: Editing Preset F1

Probe Loss
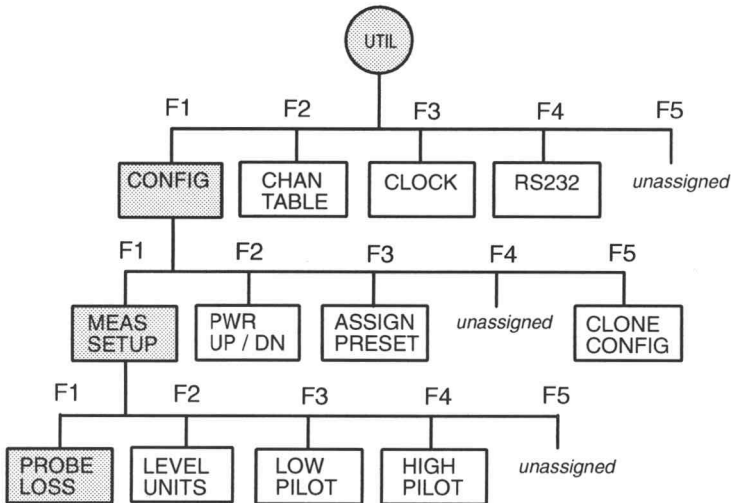
The offset value for probe loss can be set through the measure setup menu as follows:

Press UTIL, select CONFIG, then MEAS SETUP. An arrow cursor along the left edge of the screen, as well as a highlighted function key label, will indicate the field that is presently selected for edit. If probe loss is not already selected, press the corresponding function key (F1) to select probe loss for edit. Probe loss can be entered using either the knob or the keypad.

Using the keypad. If using the keypad, ENTER must be pressed following the entry. A partial keypad entry can be cancelled by pressing ESC or backspacing one space past an empty field. This will restore the previous frequency.

Using the knob. The knob changes the value in increments of 0.1 dB. A knob entry is not cancelled by pressing ESC.

Exit. When edit is complete, press ESC to exit the menu, one level at a time.

Sequences (Adding and Deleting)

```
                    ( SEQ )
                       |
   F1         F2       | F3        F4          F5
 ┌──────┐  ┌────────┐     ┌────────┐   ┌────────┐
 │ EXEC │  │ CLONE  │  unassigned  │  DEL   │   │  DEL   │
 │      │  │  SEQ   │     │        │   │  ALL   │
 └──────┘  └────────┘     └────────┘   └────────┘
```
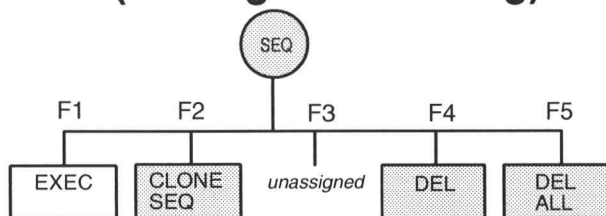
Sequences are automated routines that can perform tests at pro-
grammed times. The number of sequences that can be stored is lim-
ited only by the instrument's available non-volatile memory; adding
sequences reduces that memory. Executing sequences is described in
the Making Measurements section.

Adding Sequences

24 hour test. The 24 hour test sequence is installed in the RFM 150
at the factory and can not be deleted. Additional sequences can be
imported using either another RFM 150 or the CSS150 software
package.

Using another RFM 150. Connect the two instruments, using the
instructions on page C–2. On the source instrument, press SEQ to
display the list of sequences (Figure 3–11). Turn the knob to select
the sequence to be sent, then select CLONE SEQ. The sequence is
sent to the destination RFM 150 and placed at the end of the list of
sequences. To display this list on the destination monitor, press SEQ.
Use the knob to scroll if needed.

Using the CSS150 software package. Predefined sequences can
easily be selected and imported to the RFM 150, and other sequences
can be quickly set up by turning fields on or off with the mouse.
Refer to the CSS 150 User Manual for instructions.

Deleting Sequences

Delete all. To delete all sequences stored in the instrument, press
SEQ, then select DEL ALL. A confirmation screen will appear;
select YES to delete all sequences. Selecting NO or ESC will cancel
the request.

Delete a selected sequence. To delete a specific sequence, press SEQ, then turn the knob to scroll to and highlight the desired sequence. Select DEL. A confirmation screen will appear; select YES to delete all sequences. Selecting NO or ESC will cancel the request.

Exit. Press ESC to exit the menu, one level at a time.

Total number of sequences stored in the instrument

SEQUENCE MENU			17 Seqs
SEQ #	NAME	# OF TIMES	DELAY
1	24HOUR	4	6
2	SEQ1	4	1
3	SEQ2	5	1
4	SEQ3	3	1
5	SEQ4	4	1
6	TEST1	5	1
7	TEST2	4	1
8	TEST3	2	1

Outline cursor indicates selected sequence. This sequence will be acted upon when a function key is pressed.

EXEC	CLONE SEQ		DEL	DEL ALL

Function key labels

Figure 3–11: Sequence Menu

Site Name

```
              ( STORE )
                  |
   F1      F2     |  F3      F4        F5
┌───────┬───────┬───────┬───────┐
│ STORE │ RSLTS │ SITE  │ SET   │  unassigned
│ RSLT  │ MENU  │ NAME  │ TEMP  │
└───────┴───────┴───┬───┴───────┘
                    |
   F1      F2       |  F3      F4      F5
┌───────┬───────┬───────┬───────┬───────┐
│ MAKE  │ NEW   │ EDIT  │  DEL  │  DEL  │
│ACTIVE │ SITE  │ NAME  │       │  ALL  │
└───────┴───────┴───────┴───────┴───────┘
```

The results of measurements made with the RFM 150 can be stored in the internal non-volatile memory. The active site name is attached to results as they are stored.

Selecting the active site name. Press STORE, then select SITE NAME. A list of site names will be displayed (Figure 3–12). Use the knob to select the site name to become active, then select MAKE ACTIVE. The new active site name appears above the list.

Entering site name. Press STORE, then select SITE NAME. If entering a new site name, select NEW SITE now. If editing an existing site name, use the knob to select the name to be edited, then select EDIT NAME.

After selecting either EDIT NAME or NEW SITE, an underscore cursor appears. To enter the site name, use the standard editing techniques, which are described on page 3–1. A site name can contain numbers and letters, up to 20 characters. New site names are added to the end of the list of site names. The number of site names that can be stored is limited only by the amount of available non-volatile memory.

Delete a site name. Press the front-panel STORE key, then select SITE NAME. A list of all site names that are stored in the instrument will be displayed. Using the knob, highlight the site name that will be deleted. Select DEL. A confirmation screen will appear. Select YES to delete. To cancel the delete request, select NO or press ESC.

Delete all site names. To delete all site names, press the front-panel STORE key, then select SITE NAME. Select DEL ALL. A confirmation screen will appear. Select YES to delete all site names. To cancel the delete request, select NO or press ESC.

Note that stored measurement results are tagged with a site name. As a site name is deleted, the site information will also be deleted from any stored measurement records that were tagged with that site name.

Exit. Press ESC to exit the menu, one level at a time.

Active site name. This will be replaced with SITE C if MAKE ACTIVE is selected.

Outline cursor indicates selected site name. This site name will be acted upon when any of the five function keys are pressed.

Function keys

SITE NAME MENU				1 sts
ACTIVE NAME: SITE_A				

SITE #	SITE NAME
1	SITE A
2	SITE B
3	SITE C
4	HEADEND 1
5	HEADEND 2
6	1578 CEDAR STREET
7	13520 NW DOUGLAS STREET
8	12750 SW ELM AVENUE

MAKE ACTIVE	EDIT NAME	NEW SITE	DEL	DEL ALL

Figure 3–12: Site Name Menu

Stored Measurement Results
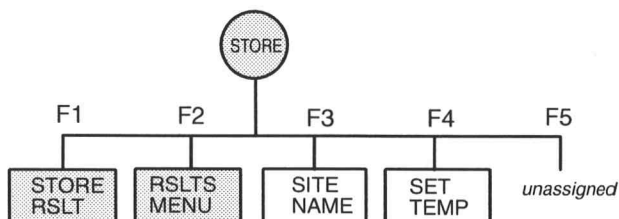
The results of measurements made with the RFM 150 can be stored in intermediate non-volatile memory, or archived to a PC.

Store a measurement result. After making a measurement, press STORE, then select STORE RSLT. This stores the most recent measurement result from the current measurement mode. The result will be numbered, time and date stamped, and stored at the end of the list of stored measurement results. The message, 'Result Storage Complete,' will appear briefly to indicate that the record has been stored.

View a measurement result. Press STORE and select RSLTS MENU. A list of all stored measurement results will be displayed (Figure 3–13). Use the knob to highlight the desired measurement result. The list will scroll as you turn the knob, if needed.

Select VIEW to view the highlighted measurement result. The display components will be the same as the normal measurement display, except that the function keys will be reassigned as shown above. If the viewed result is part of a sequence of measurement results, turning the knob will advance through the sequence, one measurement at a time. Pressing ESC will exit the view screen.

From the view screen, selecting STORED INFO displays additional information about the stored result, such as the site name and temperature (Figure 3–13). If the stored result is part of a sequence, the repetition number is also displayed. Pressing ESC will exit the additional stored information screen.

Delete all stored measurement results. Press STORE and select RSLTS MENU to enter the results menu. Select DELETE ALL. A confirmation screen will appear. Select YES to delete. To cancel the request without deleting any records, select NO or press ESC.

Delete a selected measurement result. Press STORE and select RSLTS MENU to enter the results menu. A list of all stored measurement results will be displayed (Figure 3–13). Use the knob to move the outline cursor to the desired measurement result. The list will scroll, if needed, as you turn the knob. Select DELETE to delete the selected result. A confirmation screen will appear. Select YES to delete. To cancel the request without deleting any records, select NO or press ESC. When a result is deleted, the list is automatically compacted and the records are renumbered.

Outline cursor indicates selected measurement result. This result will be acted upon when one of the function keys are pressed.

Function keys

STORED RESULTS MENU			7 recs
REC	TYPE	DATE	TIME
1	1 CHAN	29–JUN–94	09:54
2	1 CHAN	29–JUN–94	10:01
3	METER	30–JUN–94	13:15
4	METER	30–JUN–94	13:21
5	ALL CHAN	02–JUL–94	08:37
6	C/N	02–JUL–94	08:42
7	C/N	03–JUL–94	08:23

VIEW			DEL	DEL ALL

Figure 3–13: Results Menu

Measurement mode of stored result.

Appears only if result is part of a sequence.

Date and time the result was stored

Active site name when result was stored.

Five lines of data that vary depending on result type.

ADDITIONAL STORED INFO
Result Type: 5 CHAN   Ch Tbl: 5 CHAN
Sequence Repetition: 3
16–MAR–94   17:32   44° F
Site: 1st and Main Street
F1 Frequency =   55.25 MHz
F2 Frequency =   83.25 MHz
F3 Frequency =   05.25 MHz
F4 Frequency =   1080.00 MHz
F5 Frequency =   1069.25 MHz

Press ESC to Exit

Temperature stored in RFM 150 at time of measurement

Figure 3–14: Additional Information Screen for 5 CHAN Type

Temperature
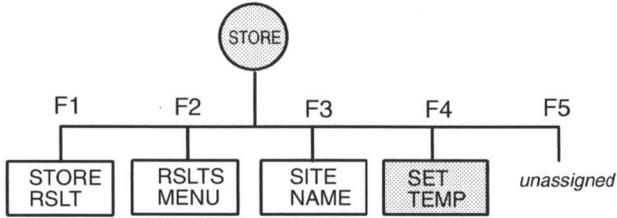
Stored measurement results are tagged with a user-entered tempera-ture. To enter the temperature menu, press STORE, then select SET TEMP. The two editable fields are displayed (Figure 3–15), with the arrow cursor pointing to the field that is selected for edit.

Temperature units. Press F2 to select the temperature units field, then turn the knob to toggle between degrees Fahrenheit and degrees Celsius, with the outline cursor indicating the current selection.

Temperature. Press F1 to select the temperature field, then enter the present ambient temperature, either with the knob, or by keypad entry followed by ENTER. A partial keypad entry can be aborted by pressing ESC or by backspacing one click after the field is empty.

Exit. When editing is complete, press ESC to exit the menu, one level at a time. The new settings will be saved.
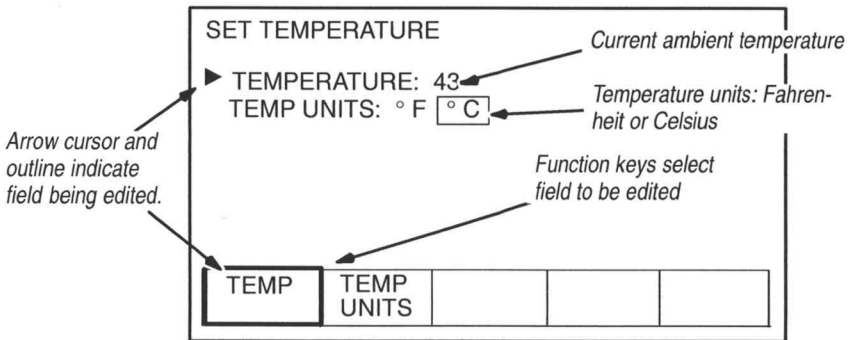
Figure 3–15: Set Temperature Menu

Units
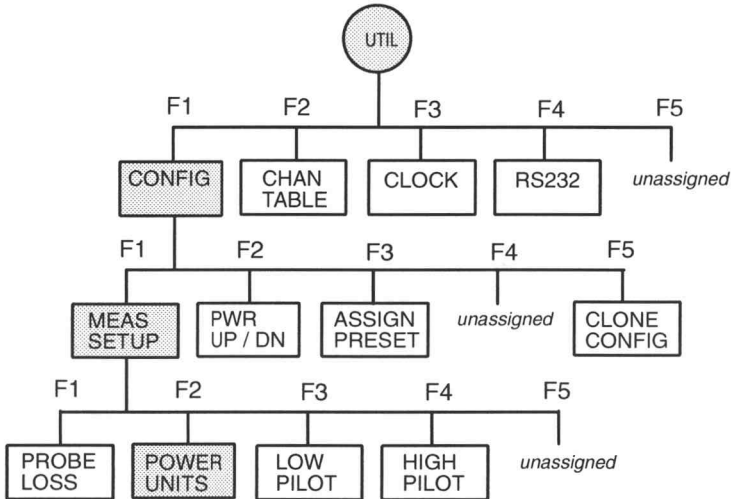
The power units can be set to dBmV or dBuV. This determines the readout units for the visual carrier in the measurement modes.

To change the power units, press UTIL and select CONFIG, followed by MEAS SETUP. The function keys will be assigned to the four fields available for edit in this mode. The upper portion of the screen will display the present settings for these four fields. An arrow cursor along the left edge of the screen, as well as a high-lighted function key label, indicate which field is selected for edit.

Press F2 to select power units for edit. The present setting for power units is indicated by an outline cursor. Turning the knob back and forth toggles the setting between dBmV and dBuV.

Exit. After editing the level units as desired, press ESC to exit the menu, one level at a time. The new setting will be saved.

Reference

Appendices
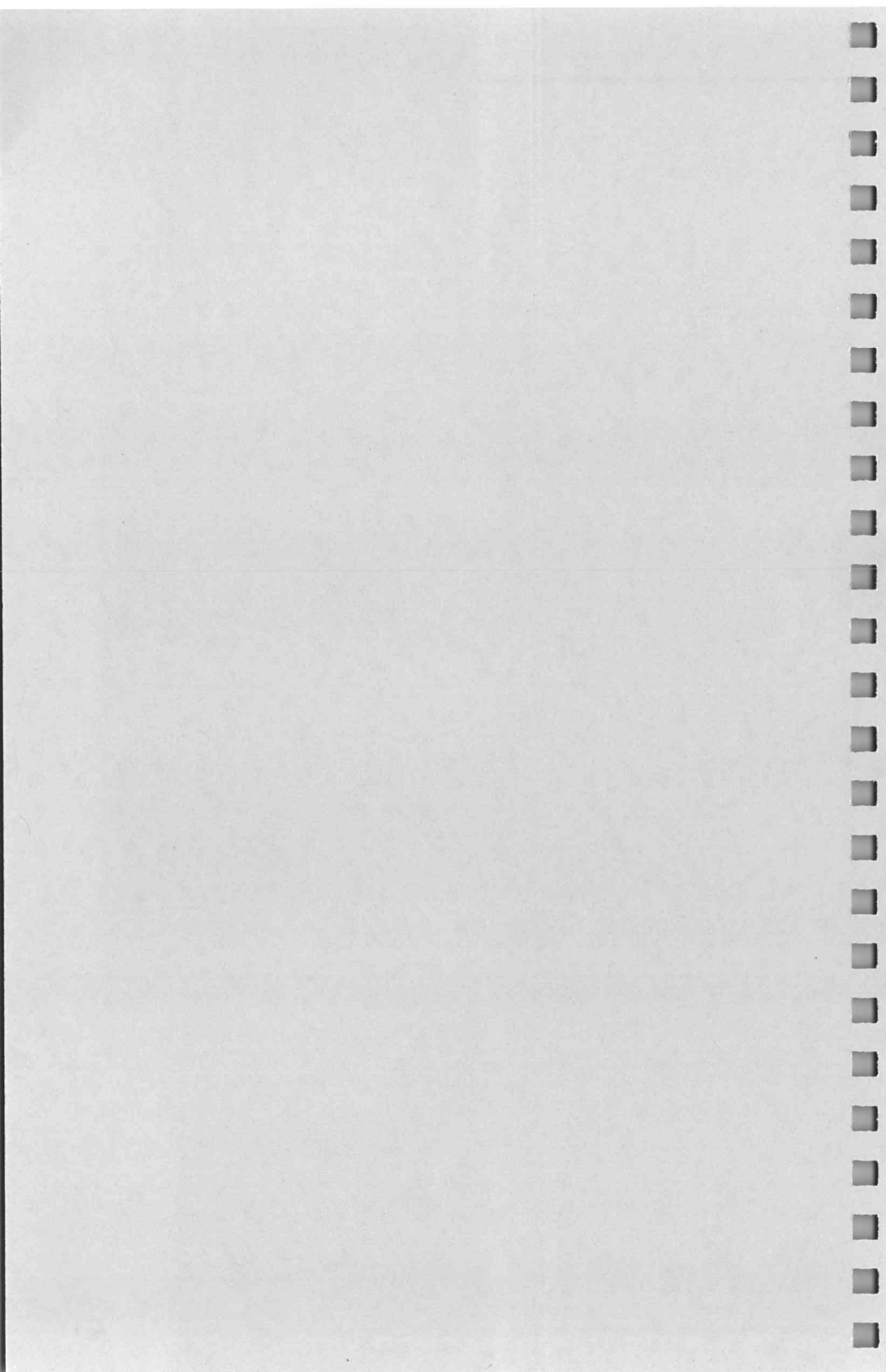
Appendix A: Specification

Terms Used in Specifications

Characteristic. A characteristic refers to a property of the product.

Performance Requirement [REQ]. Performance Requirements define characteristics that are essential to the intended application of the product, usually in limit form.

Reference Information [REF]. Reference Information explains the performance requirements or stipulates conditions under which the performance requirements are effective. Reference information is not considered to be a statement of guaranteed performance.

Specification. A specification is a document or a section of a document that lists and describes characteristics and performance requirements of a product. A specification also may contain reference information.

Typical. Typical refers to instrument performance that can be expected, but is not guaranteed.

Performance Conditions

The Performance Requirements listed in the Electrical Specification apply over an ambient temperature range of 0° C to +50° C. The rated accuracies are valid over the entire 0 to 50° C range, and become "typical" for temperatures from –10 to 0° C. Test equipment used to verify Performance Requirements must be calibrated and working within the limits specified under the Service Manual Equipment Required List.

Installation Requirements

This is a portable unit, and has no special installation requirements.

Electrical Specification

Table A–1: Input Signal Requirements

Name	Description	
Frequency Range	**REQ:**	5 MHz to 1080 MHz
	REF:	Using a precision 75 Ω connector
Amplitude Range	**REQ:**	−35 dBmV to +60 dBmV (+25 dBuV to +120 dBuV)
Maximum Input Power	**REQ:**	+68 dBmV
	REF:	Total input power sum of all channels

Table A–2: Measurement Accuracy

Name	Description	
Carrier Amplitude	**REQ:**	± 1 dB −20 dBmV to +60 dBmV. Visual carrier-to-noise ≥ 25 dB. [1, 2]
		± 1.5 dB −35 dBmV to − 20 dBmV. Visual carrier-to-noise ≥ 25 dB. [1]
	REF:	Carrier amplitude is rms voltage of a channel's visual carrier at the peak of the modulation envelope, measured across a termination impedance that matches the internal impedance of the cable system.

[1] In order to meet measurement accuracy specifications, the system visual carrier amplitude variation must be less than 10 dB over 300 MHz plus1 dB for each additional 100 MHz up to 17 dB total.

[2] For input signals > 50 dBmV and > 500 MHz, the input must be disconnected during self calibration.

Table A–2: Measurement Accuracy (Continued)

Name	Description
Carrier Difference	**REQ:** ± 1 dB. Aural carrier-to-noise ≥ 15 dB (300 kHz bandwidth). **REF:** Specification applies to visual-to-aural carrier difference on any channel, where the amplitude of the aural carrier is greater than –20 dBmV.
Carrier–to–Noise	**REQ:** ± 2 dB up to 48 dB (50 dB typical) for carrier amplitude ≥ 0 dBmV. [3, 4, 5] **REF:** C/N ratio is the ratio of the rms voltage of the carrier, measured at the peak of the modulation envelope, divided by the average noise voltage in a 4.0 MHz bandwidth.
Hum	**REQ:** ± 1 % for visual carrier amplitude ≥ 0 dBmV, visual carrier-to-noise ≥ 25 dB. [3] **REF:** Range: 1% to 5%. **REF:** Hum is the peak-to-peak variation in visual signal level caused by undesired low frequency disturbances. It is expressed as the percentage of the level of the peak-to-peak interference compared to the peak level of the RF signal.

[3] Performance verified by measuring according to NCTA recommended practice.

[4] For channel video bandwidths greater than 4 MHz, carrier-to-noise range is decreased by 10 log (video bandwidth / 4 MHz).

[5] For system B/G, with the lower adjacent channel carrying NICAM, C/N measurement accuracy guaranteed for out-of-service measurements only.

Table A–2: Measurement Accuracy (Continued)

Name	Description
Average Power Digitally Modulated Carriers	**REQ:** ± 1 dB. Signal-to-noise ratio ≥ 25 dB. [6] **REF:** This is the power measured at band center referenced to a user-defined "information" bandwidth.
FM Deviation	**REQ:** 10% of peak deviation of main aural carrier, ± 2 kHz. [7] **REF:** Rates: 20 Hz to 7.5 kHz Deviations: 5 kHz to 25 kHz

Table A–3: Measurement Repeatability

Name	Description
Carrier Amplitude	**REQ:** ± 0.5 dB **REF:** For external temperature changes of less than ± 5° C.
Carrier Difference	**REQ:** ± 0.5 dB **REF:** For external temperature changes of less than ± 5° C.

[6] Assumes signals are random or closely resemble truly random data streams, have a voltage amplitude spectral density between −74 dBmV/Hz and −4 dBmV/Hz, and have a signaling rate greater than 300 K symbols/sec.

[7] Measurement Accuracy guaranteed from 10° to 50° C.

Table A–4: Spectral Display Mode

Name	Description
Display Dynamic Range	**REQ:** 50 dB **REF:** The vertical scale for the Spectral Display mode is five divisions at 10 dB / div.
Display Reference Level Range	**REQ:** 0 dBmV to +60 dBmV **REF:** Variable in 1 dB steps.
Spurious Free Dynamic Range	**REQ:** −50 dBc (20 MHz to 1080 MHz) −45 dBc (5 MHz to 20 MHz) **REF:** WIth equal visual carrier levels or with external preselection filter of 3 channels or less. (−40 dBc, 5 MHz to 1080 MHz, no preselection. [8])
Frequency Accuracy	**REQ:** ± 5 kHz, ±10^{-5} of tuned frequency **REF:** From 5 MHz to 1080 MHz

Table A–5: RF Input

Name	Description
Input Impedance	**REQ:** 75 Ω, nominal
Return Loss	**REQ:** > 14 dB **REF:** From 5 MHz to 1080 MHz with internal attenuation set to 0 dB. Using precision 75 Ω connector.

[8] In order to meet measurement accuracy specifications, the system visual carrier amplitude variation must be less than 10 dB over 300 MHz plus 1 dB for each additional 100 MHz up to 17 dB total.

Table A–6: DC Jack Input

Name	Description
Nominal Power	**REF:** Typically 10 watts at 12 volts

Table A–7: AC Power Source

Name	Description
Mains Voltage Range	
Std – US	**REQ:** 108 – 132 volts
A1 – Universal Euro	**REQ:** 198 – 242 volts
A2 – UK	**REQ:** 216 – 264 volts
A3 – Australia	**REQ:** 216 – 264 volts
A6 – Japan	**REQ:** 90 – 110 volts

Table A–8: Internal NiCad Battery

Name	Description
Nominal Battery Life: Operating	**REQ:** 3.5 hours
	REF: Backlight off, typical use
Non-Operating	**REQ:** 6 months
Sleep State	**REQ:** 36 hours
	REF: No connection to the Interface Port
Charge Time	**REQ:** 8 hours
	REF: Battery temp. between +10° and +45° C

Table A-9: Environmental Characteristics

Name	Description
Operating Temperature	**REQ:** 0 to +50° C (32 to 122° F) **REF:** Electrical specifications are guaranteed when the instrument is operated in this temperature range.
Operating Temperature: Typical	**REQ:** −10 to 0° C (14 to 32° F) **REF:** Electrical specifications are considered "typical" when the instrument is operated in this temperature range.
Storage Temperature	**REQ:** −20 to +60° C (−4 to +140° F) **REF:** Limited by LCD display
Altitude (Operating)	**REQ:** 15,000 feet
Altitude (Non−operating)	**REQ:** 50,000 feet
Humidity	**REQ:** Meets Tektronix Class 3 (062-2853-00) 5% to 95% over 0 to 50° C
Shock (Operating)	**REQ:** Meets Tektronix Class 3 (062−2853−00) **REF:** Three drops on each face of 50 g, 11 msec duration, half-sine pulse shape. There is a total of 18 drops.
Package Drop	**REQ:** Meets Tektronix 062−2858−00
Water Resistance	**REQ:** The RFM150 is designed to resist the effects of rain and moisture, to allow accurate functioning of the product without hazard to the user under conditions of moderately inclement weather. **REF:** Sealing gaskets and weatherproofing plugs ensure this level of water resistance. Damage to the seals or failure to replace the weatherproofing plugs could allow rain to enter and possibly damage the product should such exposure occur.

Table A–9: Environmental Characteristics (Continued)

Name	Description
Shock & Vibration (Non-operating)	**REQ:** Meets Tektronix 062–2858–00 Repetitive Shock Test (Loose Load Vibration): Platform vibration frequency adjusted until package repeatedly leaves the platform about 1/8" or until acceleration of platform is 1.1 g. Resonance Vibration Test: Vibrate package vertically at .75 g, sweeping from 5 to 100 to 5 Hz two times at a slow sweep rate, such as 1/2 octave/minute. Resonance Dwell: Dwell for 20 minutes at each of the resonance frequencies.

Table A–10: Certification

Name	Description
Electromagnetic Compatibility (EMC)	**Designed to meet or exceed:** EN 50081–1 Emission Standard EN 50082–1 Immunity Standard EN 60555–2 Disturbances In Supply Systems 47 CFR, Chapter 1 (FCC Rules), Part 15, Class A

Table A–11: Physical Characteristics

Name	Description
Dimensions	**REQ:** Height: 8" Nominal Width: 11.2" Nominal Depth: 4" Nominal
Weight	**REQ:** Weight: < 8 pounds

Appendix B: Channel Tables

The RFM 150 contains nine fixed channel tables, which can be
edited, but can not be deleted. The four fields that can be edited
through the RFM 150 menus are: skip (yes/no), scrambled (yes/no),
dwell time (short or long) and amplitude offset (in dB). The com-
panion CSS150 package allows editing of additional fields, as well
as the creation of custom channel tables. Fixed tables can be used as
a basis for creating these custom channel tables. Refer to the
CSS 150 User Manual for instructions. Another way of setting up
channel tables is to "clone" the configuration of another RFM 150.

This appendix section defines the nine fixed channel tables. The
information given above each table represents data that is the same
for every channel in that table. This includes the defaults for the
four editable fields. Blanks are provided to fill in new values when
the fields are edited. A blank table appears at the end of the section,
to allow for custom channel tables.

RFM 150 SignalScout

Table B–1: CATV–Standard

```
Editable Fields – Defaults
Amplitude Offset: 0.0 dB      Scrambled: No      Dwell Time: Short      Skip: No

Fixed Fields
Aural Offset: 4.5 MHz      Second Aural Offset: None      C/N Bandwidth: 4.0 MHz
```

CATV–Standard Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
2	55.25	NTSC	−1.25				
3	61.25	NTSC	−1.25				
4	67.25	NTSC	−1.25				
5	77.25	NTSC	−1.25				
6	83.25	NTSC	−1.25				
95	91.25	NTSC	−1.25				
96	97.25	NTSC	−1.25				
97	103.25	NTSC	−1.25				
98	109.25	NTSC	−1.25				
99	115.25	NTSC	−1.25				
14	121.25	NTSC	−1.25				
15	127.25	NTSC	−1.25				
16	133.25	NTSC	−1.25				
17	139.25	NTSC	−1.25				
18	145.25	NTSC	−1.25				
19	151.25	NTSC	−1.25				
20	157.25	NTSC	−1.25				
21	163.25	NTSC	−1.25				
22	169.25	NTSC	−1.25				
7	175.25	NTSC	−1.25				
8	181.25	NTSC	−1.25				
9	187.25	NTSC	−1.25				
10	193.25	NTSC	−1.25				
11	199.25	NTSC	−1.25				
12	205.25	NTSC	−1.25				
13	211.25	NTSC	−1.25				
23	217.25	NTSC	−1.25				
24	223.25	NTSC	−1.25				

CATV–Standard Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
25	229.25	NTSC	−1.25				
26	235.25	NTSC	−1.25				
27	241.25	NTSC	−1.25				
28	247.25	NTSC	−1.25				
29	253.25	NTSC	−1.25				
30	259.25	NTSC	−1.25				
31	265.25	NTSC	−1.25				
32	271.25	NTSC	−1.25				
33	277.25	NTSC	−1.25				
34	283.25	NTSC	−1.25				
35	289.25	NTSC	−1.25				
36	295.25	NTSC	−1.25				
37	301.25	NTSC	−1.25				
8	307.25	NTSC	−1.25				
39	313.25	NTSC	−1.25				
40	319.25	NTSC	−1.25				
41	325.25	NTSC	−1.25				
42	331.25	NTSC	−1.25				
43	337.25	NTSC	−1.25				
44	343.25	NTSC	−1.25				
45	349.25	NTSC	−1.25				
46	355.25	NTSC	−1.25				
47	361.25	NTSC	−1.25				
48	367.25	NTSC	−1.25				
9	373.25	NTSC	−1.25				
50	379.25	NTSC	−1.25				
51	385.25	NTSC	−1.25				
52	391.25	NTSC	−1.25				
53	397.25	NTSC	−1.25				
54	403.25	NTSC	−1.25				
55	409.25	NTSC	−1.25				
56	415.25	NTSC	−1.25				
57	421.25	NTSC	−1.25				
58	427.25	NTSC	−1.25				
59	433.25	NTSC	−1.25				
60	439.25	NTSC	−1.25				
61	445.25	NTSC	−1.25				

CATV–Standard Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
62	451.25	NTSC	−1.25				
63	457.25	NTSC	−1.25				
64	463.25	NTSC	−1.25				
65	469.25	NTSC	−1.25				
66	475.25	NTSC	−1.25				
67	481.25	NTSC	−1.25				
68	487.25	NTSC	−1.25				
69	493.25	NTSC	−1.25				
70	499.25	NTSC	−1.25				
71	505.25	NTSC	−1.25				
72	511.25	NTSC	−1.25				
73	517.25	NTSC	−1.25				
74	523.25	NTSC	−1.25				
75	529.25	NTSC	−1.25				
76	535.25	NTSC	−1.25				
77	541.25	NTSC	−1.25				
78	547.25	NTSC	−1.25				
79	553.25	NTSC	−1.25				
80	559.25	NTSC	−1.25				
81	565.25	NTSC	−1.25				
82	571.25	NTSC	−1.25				
83	577.25	NTSC	−1.25				
84	583.25	NTSC	−1.25				
85	589.25	NTSC	−1.25				
86	595.25	NTSC	−1.25				
87	601.25	NTSC	−1.25				
88	607.25	NTSC	−1.25				
89	613.25	NTSC	−1.25				
90	619.25	NTSC	−1.25				
91	625.25	NTSC	−1.25				
92	631.25	NTSC	−1.25				
93	637.25	NTSC	−1.25				
94	643.25	NTSC	−1.25				
100	649.25	NTSC	−1.25				
101	655.25	NTSC	−1.25				
102	661.25	NTSC	−1.25				
103	667.25	NTSC	−1.25				

CATV–Standard Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
104	673.25	NTSC	−1.25				
105	679.25	NTSC	−1.25				
106	685.25	NTSC	−1.25				
107	691.25	NTSC	−1.25				
108	697.25	NTSC	−1.25				
109	703.25	NTSC	−1.25				
110	709.25	NTSC	−1.25				
111	715.25	NTSC	−1.25				
112	721.25	NTSC	−1.25				
113	727.25	NTSC	−1.25				
114	733.25	NTSC	−1.25				
115	739.25	NTSC	−1.25				
116	745.25	NTSC	−1.25				
117	751.25	NTSC	−1.25				
118	757.25	NTSC	−1.25				
119	763.25	NTSC	−1.25				
120	769.25	NTSC	−1.25				
121	775.25	NTSC	−1.25				
122	781.25	NTSC	−1.25				
123	787.25	NTSC	−1.25				
124	793.25	NTSC	−1.25				
125	799.25	NTSC	−1.25				
126	805.25	NTSC	−1.25				
127	811.25	NTSC	−1.25				
128	817.25	NTSC	−1.25				
129	823.25	NTSC	−1.25				
130	829.25	NTSC	−1.25				
131	835.25	NTSC	−1.25				
132	841.25	NTSC	−1.25				
133	847.25	NTSC	−1.25				
134	853.25	NTSC	−1.25				
135	859.25	NTSC	−1.25				
136	865.25	NTSC	−1.25				
137	871.25	NTSC	−1.25				
138	877.25	NTSC	−1.25				
139	883.25	NTSC	−1.25				
140	889.25	NTSC	−1.25				

CATV–Standard Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
141	895.25	NTSC	−1.25				
142	901.25	NTSC	−1.25				
143	907.25	NTSC	−1.25				
144	913.25	NTSC	−1.25				
145	919.25	NTSC	−1.25				
146	925.25	NTSC	−1.25				
147	931.25	NTSC	−1.25				
148	937.25	NTSC	−1.25				
149	943.25	NTSC	−1.25				
150	949.25	NTSC	−1.25				
151	955.25	NTSC	−1.25				
152	961.25	NTSC	−1.25				
153	967.25	NTSC	−1.25				
154	973.25	NTSC	−1.25				
155	979.25	NTSC	−1.25				
156	985.25	NTSC	−1.25				
157	991.25	NTSC	−1.25				
158	997.25	NTSC	−1.25				
159	1003.25	NTSC	−1.25				
160	1009.25	NTSC	−1.25				
161	1015.25	NTSC	−1.25				
162	1021.25	NTSC	−1.25				
163	1027.25	NTSC	−1.25				
164	1033.25	NTSC	−1.25				
165	1039.25	NTSC	−1.25				
166	1045.25	NTSC	−1.25				
167	1051.25	NTSC	−1.25				
168	1057.25	NTSC	−1.25				
169	1063.25	NTSC	−1.25				
170	1069.25	NTSC	−1.25				

Table B–2: Broadcast Channel Table

Editable Fields – Defaults
Amplitude Offset: <u>0.0 dB</u>   Scrambled: <u>No</u>   Dwell Time: <u>Short</u>   Skip: <u>No</u>

Fixed Fields
Aural Offset: <u>4.5 MHz</u>   Second Aural Offset: <u>None</u>   C/N Bandwidth: <u>4.0 MHz</u>

Broadcast Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
2	55.25	NTSC	−1.25				
3	61.25	NTSC	−1.25				
4	67.25	NTSC	−1.25				
5	77.25	NTSC	−1.25				
6	83.25	NTSC	−1.25				
7	175.25	NTSC	−1.25				
8	181.25	NTSC	−1.25				
9	187.25	NTSC	−1.25				
10	193.25	NTSC	−1.25				
11	199.25	NTSC	−1.25				
12	205.25	NTSC	−1.25				
13	211.25	NTSC	−1.25				
14	471.25	NTSC	−1.25				
15	477.25	NTSC	−1.25				
16	483.25	NTSC	−1.25				
17	489.25	NTSC	−1.25				
18	495.25	NTSC	−1.25				
19	501.25	NTSC	−1.25				
20	507.25	NTSC	−1.25				
21	513.25	NTSC	−1.25				
22	519.25	NTSC	−1.25				
23	525.25	NTSC	−1.25				
24	531.25	NTSC	−1.25				
25	537.25	NTSC	−1.25				
26	543.25	NTSC	−1.25				
27	549.25	NTSC	−1.25				
28	555.25	NTSC	−1.25				
29	561.25	NTSC	−1.25				

Broadcast Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
30	567.25	NTSC	−1.25				
31	573.25	NTSC	−1.25				
32	579.25	NTSC	−1.25				
33	585.25	NTSC	−1.25				
34	591.25	NTSC	−1.25				
35	597.25	NTSC	−1.25				
36	603.25	NTSC	−1.25				
37	609.25	NTSC	−1.25				
38	615.25	NTSC	−1.25				
39	621.25	NTSC	−1.25				
40	627.25	NTSC	−1.25				
41	633.25	NTSC	−1.25				
42	639.25	NTSC	−1.25				
43	645.25	NTSC	−1.25				
44	651.25	NTSC	−1.25				
45	657.25	NTSC	−1.25				
46	663.25	NTSC	−1.25				
47	669.25	NTSC	−1.25				
48	675.25	NTSC	−1.25				
49	681.25	NTSC	−1.25				
50	687.25	NTSC	−1.25				
51	693.25	NTSC	−1.25				
52	699.25	NTSC	−1.25				
53	705.25	NTSC	−1.25				
54	711.25	NTSC	−1.25				
55	717.25	NTSC	−1.25				
56	723.25	NTSC	−1.25				
57	729.25	NTSC	−1.25				
58	735.25	NTSC	−1.25				
59	741.25	NTSC	−1.25				
60	747.25	NTSC	−1.25				
61	753.25	NTSC	−1.25				
62	759.25	NTSC	−1.25				
63	765.25	NTSC	−1.25				
64	771.25	NTSC	−1.25				
65	777.25	NTSC	−1.25				
66	783.25	NTSC	−1.25				

Broadcast Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
67	789.25	NTSC	−1.25				
68	795.25	NTSC	−1.25				
69	801.25	NTSC	−1.25				
70	807.25	NTSC	−1.25				
71	813.25	NTSC	−1.25				
72	819.25	NTSC	−1.25				
73	825.25	NTSC	−1.25				
74	831.25	NTSC	−1.25				
75	837.25	NTSC	−1.25				
76	843.25	NTSC	−1.25				
77	849.25	NTSC	−1.25				
78	855.25	NTSC	−1.25				
79	861.25	NTSC	−1.25				
80	867.25	NTSC	−1.25				
81	873.25	NTSC	−1.25				
82	879.25	NTSC	−1.25				
83	885.25	NTSC	−1.25				

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Table B–3: CATV–HRC Channel Table

Editable Fields – Defaults			
Amplitude Offset: <u>0.0 dB</u>	Scrambled: <u>No</u>	Dwell Time: <u>Short</u>	Skip: <u>No</u>

Fixed Fields		
Aural Offset: <u>4.5 MHz</u>	Second Aural Offset: <u>None</u>	C/N Bandwidth: <u>4.0 MHz</u>

CATV–HRC Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
2	54.00	NTSC	−1.25				
3	60.00	NTSC	−1.25				
4	66.00	NTSC	−1.25				
1	72.00	NTSC	−1.25				
5	78.00	NTSC	−1.25				
6	84.00	NTSC	−1.25				
95	90.00	NTSC	−1.25				
96	96.00	NTSC	−1.25				
97	102.01	NTSC	−1.25				
98	108.01	NTSC	−1.25				
99	114.01	NTSC	−1.25				
14	120.01	NTSC	−1.25				
15	126.01	NTSC	−1.25				
16	132.01	NTSC	−1.25				
17	138.01	NTSC	−1.25				
18	144.01	NTSC	−1.25				
19	150.01	NTSC	−1.25				
20	156.01	NTSC	−1.25				
21	162.01	NTSC	−1.25				
22	168.01	NTSC	−1.25				
7	174.01	NTSC	−1.25				
8	180.01	NTSC	−1.25				
9	186.01	NTSC	−1.25				
10	192.01	NTSC	−1.25				
11	198.01	NTSC	−1.25				
12	204.01	NTSC	−1.25				

CATV–HRC Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
13	210.01	NTSC	−1.25				
23	216.01	NTSC	−1.25				
24	222.01	NTSC	−1.25				
25	228.01	NTSC	−1.25				
26	234.01	NTSC	−1.25				
27	240.01	NTSC	−1.25				
28	246.01	NTSC	−1.25				
29	252.01	NTSC	−1.25				
30	258.01	NTSC	−1.25				
31	264.01	NTSC	−1.25				
32	270.01	NTSC	−1.25				
33	276.01	NTSC	−1.25				
34	282.01	NTSC	−1.25				
35	288.01	NTSC	−1.25				
36	294.01	NTSC	−1.25				
37	300.01	NTSC	−1.25				
38	306.02	NTSC	−1.25				
39	312.02	NTSC	−1.25				
40	318.02	NTSC	−1.25				
41	324.02	NTSC	−1.25				
42	330.02	NTSC	−1.25				
43	336.02	NTSC	−1.25				
44	342.02	NTSC	−1.25				
45	348.02	NTSC	−1.25				
46	354.02	NTSC	−1.25				
47	360.02	NTSC	−1.25				
48	366.02	NTSC	−1.25				
49	372.02	NTSC	−1.25				
50	378.02	NTSC	−1.25				
51	384.02	NTSC	−1.25				
52	390.02	NTSC	−1.25				
53	396.02	NTSC	−1.25				
54	402.02	NTSC	−1.25				
55	408.02	NTSC	−1.25				
56	414.02	NTSC	−1.25				
57	420.02	NTSC	−1.25				
58	426.02	NTSC	−1.25				

CATV–HRC Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
59	432.02	NTSC	−1.25				
60	438.02	NTSC	−1.25				
61	444.02	NTSC	−1.25				
62	450.02	NTSC	−1.25				
63	456.02	NTSC	−1.25				
64	462.02	NTSC	−1.25				
65	468.02	NTSC	−1.25				
66	474.02	NTSC	−1.25				
67	480.02	NTSC	−1.25				
68	486.02	NTSC	−1.25				
69	492.02	NTSC	−1.25				
70	498.02	NTSC	−1.25				
71	504.02	NTSC	−1.25				
72	510.03	NTSC	−1.25				
73	516.03	NTSC	−1.25				
74	522.03	NTSC	−1.25				
75	528.03	NTSC	−1.25				
76	534.03	NTSC	−1.25				
77	540.03	NTSC	−1.25				
78	546.03	NTSC	−1.25				
79	552.03	NTSC	−1.25				
80	558.03	NTSC	−1.25				
81	564.03	NTSC	−1.25				
82	570.03	NTSC	−1.25				
3	576.03	NTSC	−1.25				
84	582.03	NTSC	−1.25				
85	588.03	NTSC	−1.25				
86	594.03	NTSC	−1.25				
87	600.03	NTSC	−1.25				
88	606.03	NTSC	−1.25				
89	612.03	NTSC	−1.25				
90	618.03	NTSC	−1.25				
91	624.03	NTSC	−1.25				
92	630.03	NTSC	−1.25				
93	636.03	NTSC	−1.25				
94	642.03	NTSC	−1.25				

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Table B–4: CATV–IRC Channel Table

Editable Fields – Defaults
Amplitude Offset: <u>0.0 dB</u>   Scrambled: <u>No</u>   Dwell Time: <u>Short</u>   Skip: <u>No</u>

Fixed Fields
Aural Offset: <u>4.5 MHz</u>   Second Aural Offset: <u>None</u>   C/N Bandwidth: <u>4.0 MHz</u>

CATV–IRC Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
2	55.25	NTSC	−1.25				
3	61.25	NTSC	−1.25				
4	67.25	NTSC	−1.25				
5	79.25	NTSC	−1.25				
6	85.25	NTSC	−1.25				
95	91.25	NTSC	−1.25				
96	97.25	NTSC	−1.25				
97	103.25	NTSC	−1.25				
98	109.25	NTSC	−1.25				
99	115.25	NTSC	−1.25				
14	121.25	NTSC	−1.25				
15	127.25	NTSC	−1.25				
16	133.25	NTSC	−1.25				
17	139.25	NTSC	−1.25				
18	145.25	NTSC	−1.25				
19	151.25	NTSC	−1.25				
20	157.25	NTSC	−1.25				
21	163.25	NTSC	−1.25				
22	169.25	NTSC	−1.25				
7	175.25	NTSC	−1.25				
8	181.25	NTSC	−1.25				
9	187.25	NTSC	−1.25				
10	193.25	NTSC	−1.25				
11	199.25	NTSC	−1.25				
12	205.25	NTSC	−1.25				
13	211.25	NTSC	−1.25				
23	217.25	NTSC	−1.25				
24	223.25	NTSC	−1.25				

CATV–IRC Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
25	229.25	NTSC	−1.25				
26	235.25	NTSC	−1.25				
27	241.25	NTSC	−1.25				
28	247.25	NTSC	−1.25				
29	253.25	NTSC	−1.25				
30	259.25	NTSC	−1.25				
31	265.25	NTSC	−1.25				
32	271.25	NTSC	−1.25				
33	277.25	NTSC	−1.25				
34	283.25	NTSC	−1.25				
35	289.25	NTSC	−1.25				
36	295.25	NTSC	−1.25				
37	301.25	NTSC	−1.25				
38	307.25	NTSC	−1.25				
39	313.25	NTSC	−1.25				
40	319.25	NTSC	−1.25				
41	325.25	NTSC	−1.25				
42	331.25	NTSC	−1.25				
43	337.25	NTSC	−1.25				
44	343.25	NTSC	−1.25				
45	349.25	NTSC	−1.25				
46	355.25	NTSC	−1.25				
47	361.25	NTSC	−1.25				
48	367.25	NTSC	−1.25				
49	373.25	NTSC	−1.25				
50	379.25	NTSC	−1.25				
51	385.25	NTSC	−1.25				
52	391.25	NTSC	−1.25				
53	397.25	NTSC	−1.25				
54	403.25	NTSC	−1.25				
55	409.25	NTSC	−1.25				
56	415.25	NTSC	−1.25				
57	421.25	NTSC	−1.25				
58	427.25	NTSC	−1.25				
59	433.25	NTSC	−1.25				
60	439.25	NTSC	−1.25				
61	445.25	NTSC	−1.25				

CATV–IRC Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
62	451.25	NTSC	−1.25				
63	457.25	NTSC	−1.25				
64	463.25	NTSC	−1.25				
65	469.25	NTSC	−1.25				
66	475.25	NTSC	−1.25				
67	481.25	NTSC	−1.25				
68	487.25	NTSC	−1.25				
69	493.25	NTSC	−1.25				
70	499.25	NTSC	−1.25				
71	505.25	NTSC	−1.25				
72	511.25	NTSC	−1.25				
73	517.25	NTSC	−1.25				
74	523.25	NTSC	−1.25				
75	529.25	NTSC	−1.25				
76	535.25	NTSC	−1.25				
77	541.25	NTSC	−1.25				
78	547.25	NTSC	−1.25				
79	553.25	NTSC	−1.25				
80	559.25	NTSC	−1.25				
81	565.25	NTSC	−1.25				
82	571.25	NTSC	−1.25				
83	577.25	NTSC	−1.25				
84	583.25	NTSC	−1.25				
85	589.25	NTSC	−1.25				
86	595.25	NTSC	−1.25				
87	601.25	NTSC	−1.25				
88	607.25	NTSC	−1.25				
89	613.25	NTSC	−1.25				
90	619.25	NTSC	−1.25				
91	625.25	NTSC	−1.25				
92	631.25	NTSC	−1.25				
93	637.25	NTSC	−1.25				
94	643.25	NTSC	−1.25				

Table B–5: China–DK Channel Table

> **Editable Fields – Defaults**
> Amplitude Offset: 0.0 dB   Scrambled: No   Dwell Time: Short   Skip: No
>
> **Fixed Fields**
> Aural Offset: 6.5 MHz   Second Aural Offset: None   C/N Bandwidth: 6.0 MHz

China–DK Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
101	49.75	PAL	−1.25				
102	57.75	PAL	−1.25				
103	65.75	PAL	−1.25				
104	77.25	PAL	−1.25				
105	85.25	PAL	−1.25				
1	112.25	PAL	−1.25				
2	120.25	PAL	−1.25				
3	128.25	PAL	−1.25				
4	136.25	PAL	−1.25				
5	144.25	PAL	−1.25				
6	152.25	PAL	−1.25				
7	160.25	PAL	−1.25				
106	168.25	PAL	−1.25				
107	176.25	PAL	−1.25				
108	184.25	PAL	−1.25				
109	192.25	PAL	−1.25				
110	200.25	PAL	−1.25				
111	208.25	PAL	−1.25				
112	216.25	PAL	−1.25				
8	224.25	PAL	−1.25				
9	232.25	PAL	−1.25				
10	240.25	PAL	−1.25				
11	248.25	PAL	−1.25				
12	256.25	PAL	−1.25				
13	264.25	PAL	−1.25				
14	272.25	PAL	−1.25				
15	280.25	PAL	−1.25				

China–DK Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
16	288.25	PAL	−1.25				
17	296.25	PAL	−1.25				
18	304.25	PAL	−1.25				
19	312.25	PAL	−1.25				
20	320.25	PAL	−1.25				
21	328.25	PAL	−1.25				
22	336.25	PAL	−1.25				
23	344.25	PAL	−1.25				
24	352.25	PAL	−1.25				
25	360.25	PAL	−1.25				
26	368.25	PAL	−1.25				
27	376.25	PAL	−1.25				
28	384.25	PAL	−1.25				
29	392.25	PAL	−1.25				
30	400.25	PAL	−1.25				
31	408.25	PAL	−1.25				
32	416.25	PAL	−1.25				
33	424.25	PAL	−1.25				
34	432.25	PAL	−1.25				
35	440.25	PAL	−1.25				

Table B–6: Europe–DK Channel Table

```
Editable Fields – Defaults
Amplitude Offset: 0.0 dB      Scrambled: No      Dwell Time: Short      Skip: No

Fixed Fields
Aural Offset: 6.5 MHz      Second Aural Offset: None      C/N Bandwidth: 6.0 MHz
```

Europe–DK Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
101	49.75	PAL	−1.25				
102	59.25	PAL	−1.25				
103	77.25	PAL	−1.25				
104	85.25	PAL	−1.25				
105	93.25	PAL	−1.25				
1	111.25	PAL	−1.25				
2	119.25	PAL	−1.25				
3	127.25	PAL	−1.25				
4	135.25	PAL	−1.25				
5	143.25	PAL	−1.25				
6	151.25	PAL	−1.25				
7	159.25	PAL	−1.25				
8	167.25	PAL	−1.25				
106	175.25	PAL	−1.25				
107	183.25	PAL	−1.25				
108	191.25	PAL	−1.25				
109	199.25	PAL	−1.25				
110	207.25	PAL	−1.25				
111	215.25	PAL	−1.25				
112	223.25	PAL	−1.25				
9	231.25	PAL	−1.25				
10	239.25	PAL	−1.25				
11	247.25	PAL	−1.25				
12	255.25	PAL	−1.25				
13	263.25	PAL	−1.25				
14	271.25	PAL	−1.25				
15	279.25	PAL	−1.25				

Europe–DK Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
16	287.25	PAL	−1.25				
17	295.25	PAL	−1.25				
18	303.25	PAL	−1.25				
19	311.25	PAL	−1.25				
20	319.25	PAL	−1.25				
21	327.25	PAL	−1.25				
22	335.25	PAL	−1.25				
23	343.25	PAL	−1.25				
24	351.25	PAL	−1.25				
25	359.25	PAL	−1.25				
26	367.25	PAL	−1.25				
27	375.25	PAL	−1.25				
28	383.25	PAL	−1.25				
29	391.25	PAL	−1.25				
30	399.25	PAL	−1.25				
31	407.25	PAL	−1.25				
32	415.25	PAL	−1.25				
33	423.25	PAL	−1.25				
34	431.25	PAL	−1.25				
35	439.25	PAL	−1.25				
36	447.25	PAL	−1.25				
37	455.25	PAL	−1.25				
38	463.25	PAL	−1.25				
121	471.25	PAL	−1.25				
122	479.25	PAL	−1.25				
123	487.25	PAL	−1.25				
124	495.25	PAL	−1.25				
125	503.25	PAL	−1.25				
126	511.25	PAL	−1.25				
127	519.25	PAL	−1.25				
128	527.25	PAL	−1.25				
129	535.25	PAL	−1.25				
130	543.25	PAL	−1.25				
131	551.25	PAL	−1.25				
132	559.25	PAL	−1.25				
133	567.25	PAL	−1.25				
134	575.25	PAL	−1.25				

Europe–DK Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
135	583.25	PAL	−1.25				
136	591.25	PAL	−1.25				
137	599.25	PAL	−1.25				
138	607.25	PAL	−1.25				
139	615.25	PAL	−1.25				
140	623.25	PAL	−1.25				
141	631.25	PAL	−1.25				
142	639.25	PAL	−1.25				
143	647.25	PAL	−1.25				
144	655.25	PAL	−1.25				
145	663.25	PAL	−1.25				
146	671.25	PAL	−1.25				
147	679.25	PAL	−1.25				
148	687.25	PAL	−1.25				
149	695.25	PAL	−1.25				
150	703.25	PAL	−1.25				
151	711.25	PAL	−1.25				
152	719.25	PAL	−1.25				
153	727.25	PAL	−1.25				
154	735.25	PAL	−1.25				
155	743.25	PAL	−1.25				
156	751.25	PAL	−1.25				
157	759.25	PAL	−1.25				
158	767.25	PAL	−1.25				
159	775.25	PAL	−1.25				
160	783.25	PAL	−1.25				
161	791.25	PAL	−1.25				
162	799.25	PAL	−1.25				
163	807.25	PAL	−1.25				
164	815.25	PAL	−1.25				
165	823.25	PAL	−1.25				
166	831.25	PAL	−1.25				
167	839.25	PAL	−1.25				
168	847.25	PAL	−1.25				
169	855.25	PAL	−1.25				

RFM 150 SignalScout

Table B–7: Europe–BG Channel Table

```
Editable Fields – Defaults
Amplitude Offset: 0.0 dB     Scrambled: No     Dwell Time: Short     Skip: No

Fixed Fields
Aural Offset: 5.5 MHz     Second Aural Offset: None     C/N Bandwidth: 5.0 MHz
```

Europe–BG Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
2	48.25	PAL	−1.25				
3	55.25	PAL	−1.25				
4	62.25	PAL	−1.25				
81	105.25	PAL	−1.25				
82	112.25	PAL	−1.25				
83	119.25	PAL	−1.25				
84	126.25	PAL	−1.25				
85	133.25	PAL	−1.25				
86	140.25	PAL	−1.25				
87	147.25	PAL	−1.25				
88	154.25	PAL	−1.25				
89	161.25	PAL	−1.25				
90	168.25	PAL	−1.25				
5	175.25	PAL	−1.25				
6	182.25	PAL	−1.25				
7	189.25	PAL	−1.25				
8	196.25	PAL	−1.25				
9	203.25	PAL	−1.25				
10	210.25	PAL	−1.25				
11	217.25	PAL	−1.25				
12	224.25	PAL	−1.25				
91	231.25	PAL	−1.25				
92	238.25	PAL	−1.25				
93	245.25	PAL	−1.25				
94	252.25	PAL	−1.25				
95	259.25	PAL	−1.25				
96	266.25	PAL	−1.25				

Europe–BG Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
97	273.25	PAL	−1.25				
98	280.25	PAL	−1.25				
99	287.25	PAL	−1.25				
100	294.25	PAL	−1.25				
21	471.25	PAL	−1.25				
22	479.25	PAL	−1.25				
23	487.25	PAL	−1.25				
24	495.25	PAL	−1.25				
25	503.25	PAL	−1.25				
26	511.25	PAL	−1.25				
27	519.25	PAL	−1.25				
28	527.25	PAL	−1.25				
29	535.25	PAL	−1.25				
30	543.25	PAL	−1.25				
31	551.25	PAL	−1.25				
32	559.25	PAL	−1.25				
33	567.25	PAL	−1.25				
34	575.25	PAL	−1.25				
35	583.25	PAL	−1.25				
36	591.25	PAL	−1.25				
37	599.25	PAL	−1.25				
38	607.25	PAL	−1.25				
39	615.25	PAL	−1.25				
40	623.25	PAL	−1.25				
41	631.25	PAL	−1.25				
42	639.25	PAL	−1.25				
43	647.25	PAL	−1.25				
44	655.25	PAL	−1.25				
45	663.25	PAL	−1.25				
46	671.25	PAL	−1.25				
47	679.25	PAL	−1.25				
48	687.25	PAL	−1.25				
49	695.25	PAL	−1.25				
50	703.25	PAL	−1.25				
51	711.25	PAL	−1.25				
52	719.25	PAL	−1.25				
53	727.25	PAL	−1.25				

Europe–BG Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
54	735.25	PAL	−1.25				
55	743.25	PAL	−1.25				
56	751.25	PAL	−1.25				
57	759.25	PAL	−1.25				
58	767.25	PAL	−1.25				
59	775.25	PAL	−1.25				
60	783.25	PAL	−1.25				
61	791.25	PAL	−1.25				
62	799.25	PAL	−1.25				
63	807.25	PAL	−1.25				
64	815.25	PAL	−1.25				
65	823.25	PAL	−1.25				
66	831.25	PAL	−1.25				
67	839.25	PAL	−1.25				
68	847.25	PAL	−1..25				

Table B–8: Europe–I Channel Table

Editable Fields – Defaults

Amplitude Offset: 0.0 dB   Scrambled: No   Dwell Time: Short   Skip: No

Fixed Fields

Aural Offset: 6.0 MHz   Second Aural Offset: None   C/N Bandwidth: 5.5 MHz

Europe–I Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
21	471.25	PAL	−1.25				
22	479.25	PAL	−1.25				
23	487.25	PAL	−1.25				
24	495.25	PAL	−1.25				
25	503.25	PAL	−1.25				
26	511.25	PAL	−1.25				
27	519.25	PAL	−1.25				
28	527.25	PAL	−1.25				
29	535.25	PAL	−1.25				
30	543.25	PAL	−1.25				
31	551.25	PAL	−1.25				
32	559.25	PAL	−1.25				
33	567.25	PAL	−1.25				
34	575.25	PAL	−1.25				
35	583.25	PAL	−1.25				
36	591.25	PAL	−1.25				
37	599.25	PAL	−1.25				
38	607.25	PAL	−1.25				
39	615.25	PAL	−1.25				
40	623.25	PAL	−1.25				
41	631.25	PAL	−1.25				
42	639.25	PAL	−1.25				
43	647.25	PAL	−1.25				
44	655.25	PAL	−1.25				
45	663.25	PAL	−1.25				
46	671.25	PAL	−1.25				
47	679.25	PAL	−1.25				

Europe–I Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
48	687.25	PAL	−1.25				
49	695.25	PAL	−1.25				
50	703.25	PAL	−1.25				
51	711.25	PAL	−1.25				
52	719.25	PAL	−1.25				
53	727.25	PAL	−1.25				
54	735.25	PAL	−1.25				
55	743.25	PAL	−1.25				
56	751.25	PAL	−1.25				
57	759.25	PAL	−1.25				
58	767.25	PAL	−1.25				
59	775.25	PAL	−1.25				
60	783.25	PAL	−1.25				
61	791.25	PAL	−1.25				
62	799.25	PAL	−1.25				
63	807.25	PAL	−1.25				
64	815.25	PAL	−1.25				
65	823.25	PAL	−1.25				
66	831.25	PAL	−1.25				
67	839.25	PAL	−1.25				
68	847.25	PAL	−1.25				

Table B–9: France–L Channel Table

```
Editable Fields – Defaults
Skip: No    Scrambled: No    Dwell Time: Short if DIGITAL    Amplitude Offset: 0.0 dB
                             Dwell Time: Long if SECAM
Fixed Fields
Aural Offset: 6.5 MHz        Second Aural Offset: None        C/N Bandwidth: 6.0 MHz
```

France–L Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
120	120.00	SECAM	–1.25				
128	128.00	SECAM	–1.25				
136	136.00	SECAM	–1.25				
144	144.00	SECAM	–1.25				
160	160.00	SECAM	–1.25				
168	168.00	SECAM	–1.25				
5	176.00	SECAM	–1.25				
6	184.00	SECAM	–1.25				
7	192.00	SECAM	–1.25				
8	200.00	SECAM	–1.25				
9	208.00	SECAM	–1.25				
10	216.00	SECAM	–1.25				
224	224.00	SECAM	–1.25				
232	232.00	SECAM	–1.25				
240	240.00	SECAM	–1.25				
248	248.00	DIGITAL	–1.25				
256	256.00	DIGITAL	–1.25				
264	264.00	DIGITAL	–1.25				
272	272.00	DIGITAL	–1.25				
280	280.00	DIGITAL	–1.25				
288	288.00	DIGITAL	–1.25				
303	303.00	DIGITAL	–1.25				
315	315.00	DIGITAL	–1.25				
327	327.00	DIGITAL	–1.25				
339	339.00	SECAM	–1.25				
351	351.00	SECAM	–1.25				
363	363.00	SECAM	–1.25				

France–L Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
375	375.00	SECAM	−1.25				
387	387.00	SECAM	−1.25				
399	399.00	SECAM	−1.25				
420	420.00	SECAM	−1.25				
21	471.25	SECAM	−1.25				
22	479.25	SECAM	−1.25				
23	487.25	SECAM	−1.25				
24	495.25	SECAM	−1.25				
25	503.25	SECAM	−1.25				
26	511.25	SECAM	−1.25				
27	519.25	SECAM	−1.25				
28	527.25	SECAM	−1.25				
29	535.25	SECAM	−1.25				
30	543.25	SECAM	−1.25				
31	551.25	SECAM	−1.25				
32	559.25	SECAM	−1.25				
33	567.25	SECAM	−1.25				
34	575.25	SECAM	−1.25				
35	583.25	SECAM	−1.25				
36	591.25	SECAM	−1.25				
37	599.25	SECAM	−1.25				
38	607.25	SECAM	−1.25				
39	615.25	SECAM	−1.25				
40	623.25	SECAM	−1.25				
41	631.25	SECAM	−1.25				
42	639.25	SECAM	−1.25				
43	647.25	SECAM	−1.25				
44	655.25	SECAM	−1.25				
45	663.25	SECAM	−1.25				
46	671.25	SECAM	−1.25				
47	679.25	SECAM	−1.25				
48	687.25	SECAM	−1.25				
49	695.25	SECAM	−1.25				
50	703.25	SECAM	−1.25				
51	711.25	SECAM	−1.25				
52	719.25	SECAM	−1.25				
53	727.25	SECAM	−1.25				

France–L Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
54	735.25	SECAM	−1.25				
55	743.25	SECAM	−1.25				
56	751.25	SECAM	−1.25				
57	759.25	SECAM	−1.25				
58	767.25	SECAM	−1.25				
59	775.25	SECAM	−1.25				
60	783.25	SECAM	−1.25				
61	791.25	SECAM	−1.25				
62	799.25	SECAM	−1.25				
63	807.25	SECAM	−1.25				
64	815.25	SECAM	−1.25				
65	823.25	SECAM	−1.25				
66	831.25	SECAM	−1.25				
67	839.25	SECAM	−1.25				
68	847.25	SECAM	−1.25				
69	855.25	SECAM	−1.25				

Table B–10: Japan–M Channel Table

Editable Fields – Defaults			
Amplitude Offset: 0.0 dB	Scrambled: No	Dwell Time: Short	Skip: No
Fixed Fields			
Aural Offset: 6.5 MHz	Second Aural Offset: None	C/N Bandwidth: 6.0 MHz	

Japan–M Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
1	91.25	NTSC	−1.25				
2	97.25	NTSC	−1.25				
3	103.25	NTSC	−1.25				
4	171.25	NTSC	−1.25				
5	177.25	NTSC	−1.25				
6	183.25	NTSC	−1.25				
7	189.25	NTSC	−1.25				
8	193.25	NTSC	−1.25				
9	199.25	NTSC	−1.25				
10	205.25	NTSC	−1.25				
11	211.25	NTSC	−1.25				
12	217.25	NTSC	−1.25				
13	471.25	NTSC	−1.25				
14	477.25	NTSC	−1.25				
15	483.25	NTSC	−1.25				
16	489.25	NTSC	−1.25				
17	495.25	NTSC	−1.25				
18	501.25	NTSC	−1.25				
19	507.25	NTSC	−1.25				
20	513.25	NTSC	−1.25				
21	519.25	NTSC	−1.25				
22	525.25	NTSC	−1.25				
23	531.25	NTSC	−1.25				
24	537.25	NTSC	−1.25				
25	543.25	NTSC	−1.25				
26	549.25	NTSC	−1.25				
27	555.25	NTSC	−1.25				

Japan–M Channel Table

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
28	561.25	NTSC	−1.25				
29	567.25	NTSC	−1.25				
30	573.25	NTSC	−1.25				
31	579.25	NTSC	−1.25				
32	585.25	NTSC	−1.25				
33	591.25	NTSC	−1.25				
34	597.25	NTSC	−1.25				
35	603.25	NTSC	−1.25				
36	609.25	NTSC	−1.25				
37	615.25	NTSC	−1.25				
38	621.25	NTSC	−1.25				
39	627.25	NTSC	−1.25				
40	633.25	NTSC	−1.25				
41	639.25	NTSC	−1.25				
42	645.25	NTSC	−1.25				
43	651.25	NTSC	−1.25				
44	657.25	NTSC	−1.25				
45	663.25	NTSC	−1.25				
46	669.25	NTSC	−1.25				
47	675.25	NTSC	−1.25				
48	681.25	NTSC	−1.25				
49	687.25	NTSC	−1.25				
50	693.25	NTSC	−1.25				
51	699.25	NTSC	−1.25				
52	705.25	NTSC	−1.25				
53	711.25	NTSC	−1.25				
54	717.25	NTSC	−1.25				
55	723.25	NTSC	−1.25				
56	729.25	NTSC	−1.25				
57	735.25	NTSC	−1.25				
58	741.25	NTSC	−1.25				
59	747.25	NTSC	−1.25				
60	753.25	NTSC	−1.25				
61	759.25	NTSC	−1.25				
62	765.25	NTSC	−1.25				

Table B–11: Custom Channel Table Worksheet

Skip: _____   Scrambled: _____   Dwell Time: _____   Amplitude Offset: _____

Aural Offset: _____MHz   Second Aural Offset: _____   C/N Bandwidth: _____MHz

Custom Channel Table _____

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset

Custom Channel Table _____

Channel Number	Frequency (MHz)	Channel Type	Channel Edge (MHz)	Skip Y/N	Scrambled Y/N	Dwell Time	Amplitude Offset
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____
_____	_____	_____	_____	____	_____	_____	_____

Appendix C: Interface Port

Connector

The RFM 150 has a serial interface with RS-232 drive, using a 9-pin sub-miniature D-type connector. The serial interface has a driver built in for RS-232 serial binary data interchange.

The connector is configured to use a standard AT-compatible PC interconnecting cable. A standard cable is included as a standard accessory with the RFM 150. The connector location is shown in Figure C–1, and the pin assignments are shown in Table C–1.
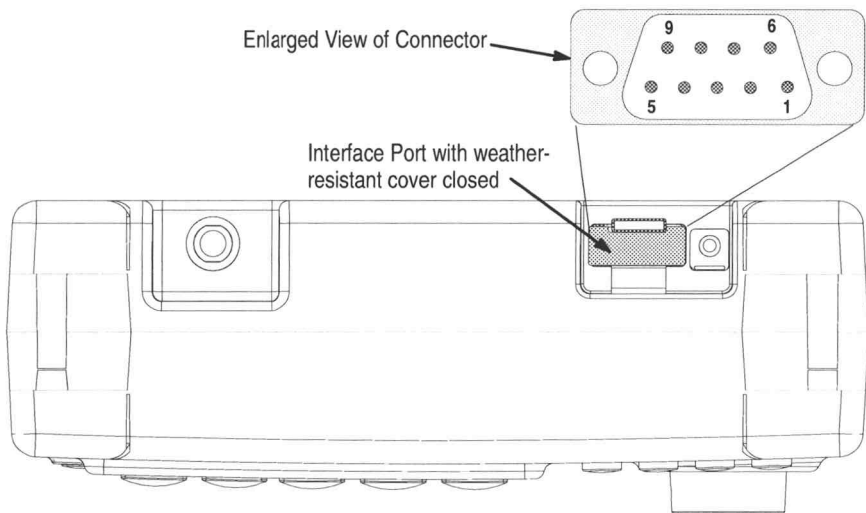
Figure C–1: Top View of RFM 150, Showing Connector Pin Numbers

Connecting Two Instruments

Before communication can occur between two instruments, they must be connected as follows:

- Configure the interfaces of the two instruments identically, according to the following procedure. This is essential.

- Connect the supplied RS232-C cable between the source and destination instruments.

Configuring the Interface

```
                            (UTIL)

        F1          F2          F3          F4          F5

     CONFIG       CHAN        CLOCK       RS232      unassigned
                  TABLE

        F1          F2          F3          F4          F5

      BAUD        PARITY       FLOW        TERM        ECHO
      RATE                     CNTRL
```
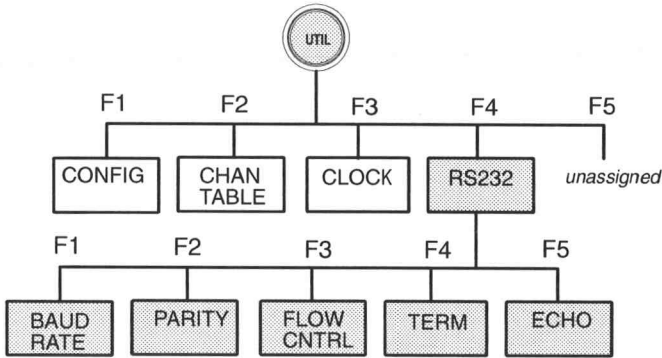
Press UTIL, then select RS232. The RS232 menu will be displayed. Figure C–2 shows the RS232 menu, with the factory shipped condition indicated by outline cursors.

The function keys are assigned to the five editable fields. Press a function key to select the corresponding field for edit, then turn the knob to the left or right to change the setting.

Exit. After all fields have been edited as desired, press ESC to exit the menu, one level at a time. The new settings will be saved.

RS232 MENU

→ BAUD RATE: 300 1200 2400
                4800 9600

Outline cursor indicates current setting

Arrow cursor and highlighted label indicate field being edited

PARITY: EVEN ODD NONE

FLOW CONTROL: NONE   XON / XOFF

TERMINATOR: CR LF CRLF LFCR

ECHO: ON OFF

| BAUD RATE | PARITY | FLOW CNTRL | TERM | ECHO |

Function keys select the parameter to be modified and move the arrow cursor.
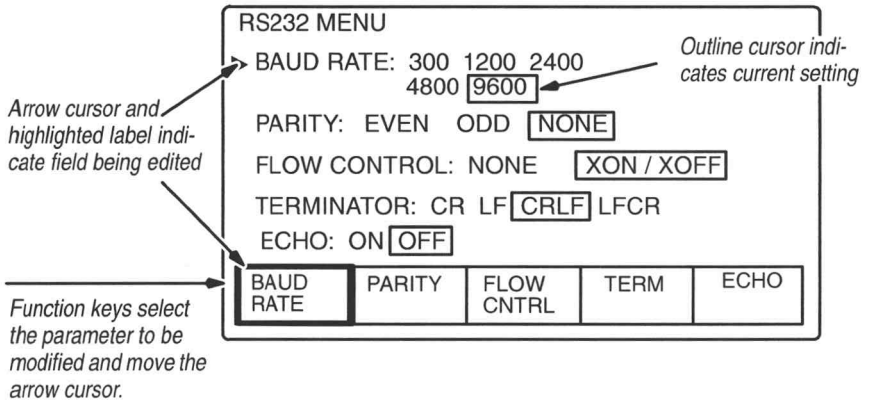
Figure C–2: RS232 Menu Showing Factory Settings

Table C–1: Pin Assignments for Interface Port

Pin Number	Signal Name	RS-232C Name
1	Not connected	
2	RX (Receive Data)	BB
3	TX (Transmit Data)	BA
4	DTR (Data Terminal Ready)	CD
5	GND (Signal Ground)	AB
6	DSR (Data Set Ready)	CC
7	RTS (Request to Send)	CA
8	CTS (Clear to Send)	CB
9	Reserved	

Remote Applications

Using the Interface Port, channel tables, sequences, and instrument configuration can be imported from another RFM 150. With the addition of the companion CSS150 software, the following applications are also possible:

- Remote control of all front-panel functions.

- Import channel tables or sequences from a PC.

- Archive stored measurement results to a PC.

Importing from another RFM 150

Instructions for importing channel tables, sequences, and instrument configuration are given in the Reference section under the topic headings of Channel Tables, Sequences, and Clone Configuration.

Remote Operation

The RFM 150 front-panel functions can be controlled from a PC, using the optional CSS150. The hookup and operational instructions are in the CSS150 User Manual.

Archiving Stored Records to a PC

The results obtained while making measurements with an RFM 150 can be stored in the RFM 150, through the STORE menu. To save memory space, these stored records can be archived, using the companion CSS150 software. The hookup and operational instructions are in the CSS150 User Manual.

Appendix D: User Maintenance

⚠️ **CAUTION.** *Do not open the RFM 150 during the warranty period. After the warranty period, it can be opened by qualified service personnel who have read the instrument disassembly/assembly instructions in the RFM 150 Service Manual. The instrument contains weatherproofing seals, which, if not installed properly, may fail to protect the instrument.*

Failure to follow these instructions may void the warranty.

Cleaning the Exterior of the RFM 150

⚠️ **CAUTION.** *Do not allow water to get inside any enclosed assembly or component. Do not clean any plastic materials with benzene, toluene, xylene, acetone, or similar compounds, because they may damage the plastic.*

1. Do not open the instrument case; the inside of the instrument should not be cleaned. You will need the following supplies for cleaning the exterior of the instrument.

    a. A clean, lint-free, non-abrasive cloth.

    b. A non-abrasive liquid glass cleaner.

    c. A soft brush may also be used.

2. Clean the LCD display with a soft, lint-free cloth dampened in non-abrasive glass cleaner. Do not use tissue or paper products. Do not use abrasive cleaners.

3. Clean the outside of the instrument by wiping with a soft, dry cloth. You may use a brush to remove dust from around control buttons, knobs, and connectors. Hardened dirt may be removed with a cloth dampened in water that contains a mild detergent or non-abrasive glass cleaner. Do not use abrasive cleaners.

Recharging the Battery

⚠ **CAUTION.** *The battery should not be replaced by the user. Failure to follow these instructions may void the warranty.*

NOTE. To assure proper operation under all conditions, always plug the AC adapter into the RFM 150 before connecting to the AC power source.

1. Connect the supplied Tektronix AC adapter to the RFM 150 power input. Connect the adapter plug to an appropriate AC power source (see Appendix A for power source requirements).

2. With the instrument power off, allow the RFM 150 to charge for eight hours. Note that the battery will not charge if the instrument is turned on or in the sleep mode.

3. Turn the instrument power on, and press the HELP key. The percent of remaining battery charge is indicated in the upper right portion of the help screen. The reading after a full eight hour charge should be 99%.

4. Refer to Table A–8 for specifications on how long a battery charge should last.

   If the operating time from a full charge seems significantly shortened during the warranty period, contact your nearest Tektronix Service Center to have the battery replaced.

   After the warranty period, the battery may be replaced by qualified service personnel who have read the instructions in the RFM 150 Service Manual.

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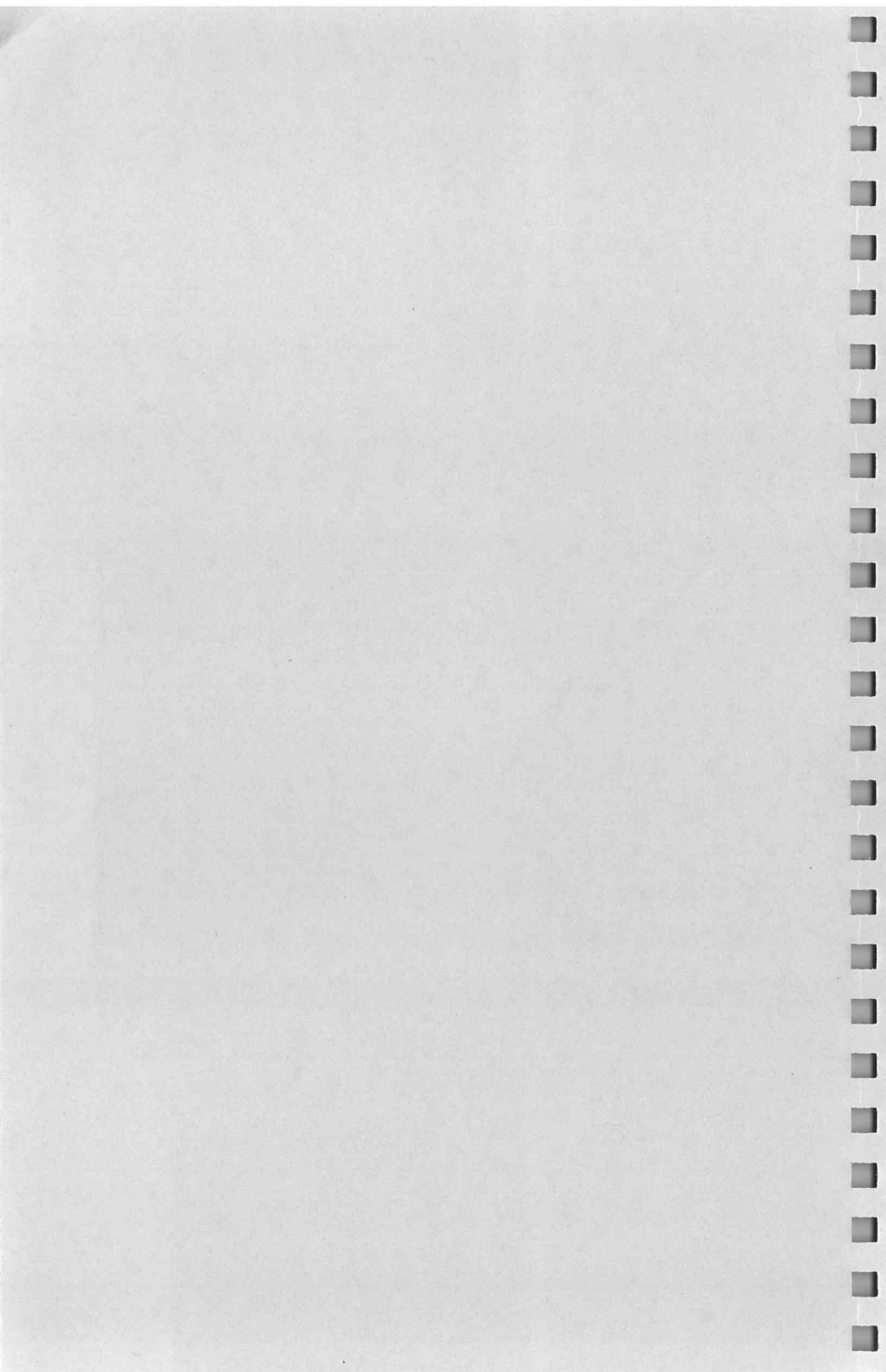
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Manual Change Information

At Tektronix, we continually strive to keep up with the latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on the following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.

Tektronix

MANUAL CHANGE INFORMATION

Date: 2/13/95 **Change Reference**: C4/295

Product: RFM150 SignalScout

Manual Part No: 070-9006-00

CHANGE TO READ:

Page 1–5, Change step A to read as follows:

A. Power Up

> *NOTE.* To assure proper operation under all conditions, always plug the AC adapter into the RFM150 before connecting to the AC power source.

1. Connect the supplied power adapter to the RFM150 power input. Connect the adapter plug to an appropriate AC power source. (For battery operation, skip this step.)

2. Press the front-panel POWER key to turn on the RFM150.

3. A beep will signal that the instrument is booting, and the instrument software version information will be displayed momentarily. (More information about the power switch modes, including sleep state, appears on page 3–15.)

4. Using a television signal from either cable feed or antenna, connect the signal to the RF input on the RFM150.

CHANGE TO READ:

Page 2–2, Change paragraph number 1 to read as follows:

1. POWER turns the instrument power on and off. Important information about the power switch appears on pages 1–5, 1–18, and 3–15.

NOTE. *To assure proper operation under all conditions, always plug the AC adapter into the RFM 150 before connecting to the AC power source.*

ADD:

Page 3–15, Add the following:

Powering Up From an AC Power Source

Use only the power adapter that is supplied with the RFM 150. When powering on the instrument, follow this sequence to assure proper operation under all conditions:

■ Attach the AC adapter to the RFM 150 power input connector.

■ Connect the adapter plug to an appropriate AC power source.

■ Press the front-panel POWER key to turn on the RFM 150. A beep will signal that the instrument is booting, and the software version will be displayed momentarily.

■ Connect the television signal to the RF input on the RFM 150, and proceed with normal instrument operation.

CHANGE TO READ:

Beginning on Page A–7, renumber Tables A–7 through A–10 to be Tables A–8 through A–11.

ADD:

Page A–7, Add the following new specification table:

Table A–1: AC Power Source

Name	Description
Mains Voltage Range	
Std – US	**REQ:** 108 – 132 V
A1 – Universal Euro	**REQ:** 198–242 V
A2 – UK	**REQ:** 216–264 V
A3 – Australia	**REQ:** 216–264 V
A6 – Japan	**REQ:** 90–110 V

Tektronix   MANUAL CHANGE INFORMATION

Date: 4/3/95   Change Reference: C5/495 RV1

Product(s):   RFM 150

Manual Part No: 070-9006-00

Electrical Specification

Add footnote #1 to Table A-1:

Table A–1: Input Signal Requirements

Name	Description
Frequency Range	**REQ:** 5 MHz[1] to 1080 MHz
	REF: Using a precision 75 Ω connector
Amplitude Range	**REQ:** −35 dBmV to +60 dBmV (+25 dBuV to +120 dBuV)
Maximum Input Power	**REQ:** +68 dBmV
	REF: Total input power sum of all channels

Change Table A–5 to read as follows:

Table A–5: RF Input

Name	Description
Input Impedance	**REQ:** 75 Ω, nominal
Return Loss	**REQ:** > 14 dB
	REF: From 10 MHz to 1080 MHz with internal attenuation set to 0 dB. (Specification is typical between 5 MHz and 10 MHz.) Using precision 75 Ω connector.

[1]   Amplitude accuracy and return loss specifications below 10 MHz are typical.