SECTION 3

OPERATION

3-1. INTRODUCTION

3-2. The 371 incorporates two microwave instruments in one package: a wide range frequency counter, and a source locking device (lockbox) operating in conjunction with a frequency source. Essentially all of the operations are completely automatic, however attention should be paid to this section to note the procedures required for optimum performance of the instrument.

3-3. CONTROLS, INDICATORS AND CONNECTORS

3-4. Front panel controls, indicators and connectors are shown in Figure 3-1 and described in Table 3-1. Rear panel controls and connectors are shown in Figure 3-2 and described in Table 3-2.

3-5. NUMERICAL DISPLAY BRIGHTNESS ADJUSTMENT

3-6. Apparent brightness of the 11-digit light-emitting-diode (LED) visual display may be varied by adjustment of A103R20. (R20 is located near the top front of PC board A103, and is accessible by removing the top cover of the counter.) Adjust R20 clockwise to increase display brightness, or counter-clockwise to reduce brightness.

3-7. COUNTER OPERATION

a. Turn counter power on. Counter will automatically select Band III (825 MHz - 18 GHz).

b. Pressing the BAND SELECT button once sets the counter to Band IA (20 Hz - 135 MHz). Pressing the button repeatedly will successively set the counter to Bands IB, II, III, IA, etc.

c. Select the desired operating band. Apply a signal to the appropriate input connector. If the signal is within counter specifications, the counter will automatically display the input frequency. See CAUTION notice regarding input level.

d. Select the desired sample rate and resolution (see Table 3-1).

> CAUTION
>
> DO NOT APPLY A SIGNAL EXCEEDING THE MAXIMUM INPUT SPECIFICATION TO ANY INPUT. EXTENSIVE DAMAGE NOT COVERED BY THE WARRANTY WILL OCCUR, WHETHER COUNTER IS TURNED ON OR OFF, OR APPEARS TO BE INOPERATIVE.

3-8. LOCKBOX OPERATION

a. Set up counter and signal source as described in paragraph 3-7.

b. Tune source within capture range of desired frequency (see Table 1-1, Specifications).

c. Keyboard desired frequency into Auxiliary Display (see Table 3-1). When the LOCK button is pressed, the Auxiliary Display will go out, and the LOCK indicator will glow brightly (during determination of loop polarity and gain). When the loop locks, the Auxiliary Display relights, while the LOCK indicator returns to its normal intensity. If the 371 cannot secure a lock, the LOCK indicator goes out, and the Auxiliary Display shows the programmed frequency. (If this situation occurs, compare the programmed frequency with the displayed input frequency. Check for an error in programming, input signal level or frequency, capture range limits exceeded, etc.)

d. When locking to a Band II input frequency (100 - 850 MHz), the signal source can be locked only at 400 kHz increments (due to Prescaler operation). To avoid the necessity of having the operator compute the valid frequencies, the counter automatically "rounds down" the input to the nearest frequency divisible by four. In Band II then, when the Auxiliary Display reappears after pressing the LOCK button, the frequency programmed may be different from that entered, whether or not a lock was obtained.

3-9. PRESET OPERATION

3-10. The YIG Preset function is available only in Band III (825 MHz - 18 GHz), and serves to initiate the counter's signal search at a higher start frequency than zero. This function serves to minimize signal acquisition time, and allows the Converter to ignore spurious or undesired signals below the one to be measured.

3-11. Keyboard the desired preset frequency into the Auxiliary Display and press the PRESET button. The counter will automatically justify the data entry to a multiple of 200 MHz, and begin its search at the frequency indicated. For example: If 12.5 GHz is entered via the keyboard, and the PRESET button is pressed, the Auxiliary Display will show 12400.0 MHz, the PRESET indicator will light, and the search will begin at 12.4 GHz. NOTE: Because data entries below 100 MHz are invalid, the 371 interprets entries between 1 - 99 MHz as 1 - 99 *GHz*.

(Continued on Page 3-4)

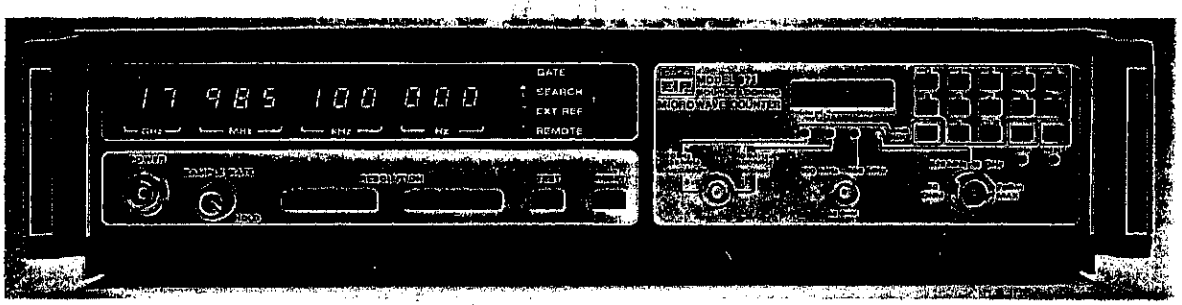

FIGURE 3-1. FRONT PANEL CONTROLS, INDICATORS AND CONNECTORS

POWER On/Off Switch

Turns counter power on and off.

SAMPLE RATE/HOLD Control

Varies time between measurements from 1/10 to 10 seconds (nominal) per reading. (Gate time is added to sample time, thus minimum reading time for 1 Hz resolution is 1.1 sec.) Last reading retained indefinitely in HOLD.

RESOLUTION Switches

Six pushbutton switches allow blanking (turning off) of the six least significant digits in the visual display. Each switch blanks the digit above and all digits to the right of that switch. Four gate times appropriate to the required resolution are also selected. 1 Hz resolution is achieved by partially depressing and releasing one of the switches (this action releases all the switches).

TEST Switch▲

Pressing the TEST switch places the counter in the self-test mode, with the test signal derived from the internal 10 MHz Time Base. Proper display is: 10 000 000 (10 MHz).

RESET Switch▲

This switch manually over-rides all controls, resets the counter and converter, and initiates a new reading.

Visual Display (left side of panel)

The 11-digit LED (light-emitting-diode) display provides a direct numerical readout of the input frequency. The display is sectionalized into GHz, MHz, kHz, and Hz.

GATE Indicator

Lights when signal gate is open.

SEARCH Indicator

Provides visual indication that the Converter is *not* locked to an input signal.

EXT REF Indicator

Lights when counter is set to EXT REF (External Time Base Reference) via rear panel switch. CAUTION: Lamp does not indicate level of external reference signal.

REMOTE Indicator

Used only with Option 07 (Remote Programming) and 17 (General Purpose Interface Bus). See Option section.

Keyboard Switches

Switches 0-9 enter numerical data into auxiliary display. Pressing the BAND SELECT pushbutton sets the counter to the next higher band, then repeats from the lowest band (e.g. II, III, IA, IB, II, etc.). Decimal point button designates the end of MHz data entry; following digit entered in .1 MHz position. LOCK button tells counter to lock the source being controlled to the frequency shown on the auxiliary display. PRESET button sets Band III start frequency to that shown on auxiliary display.

Auxiliary Display (right side of counter)

Six digit LED display indicates frequencies set by LOCK and PRESET buttons.

BAND SELECT Indicators

Indicate the operating range of the counter as determined by the keyboard BAND SELECT pushbutton switch.

LOCK and PRESET Indicators

Refer to Lockbox operation paragraphs in this section for a description of various indicator conditions.

Band I and Band II Input Connectors

Type BNC female. For measurements in the 20 Hz - 135 MHz (Band IA), 10 MHz - 300 MHz (Band IB), and 100 MHz - 850 MHz (Band II) frequency ranges.

Band III Input Connector

Type N precision female. For measurements in the 825 MHz - 18 GHz frequency range. See CAUTION notice in Section 3 regarding maximum input levels.

▲VISUAL DISPLAY TEST: Pressing *both* TEST and RESET switches simultaneously, will cause all numeric display digits to show the numeral "8" (all segments lighted).

TABLE 3-1. FRONT PANEL CONTROLS, INDICATORS AND CONNECTORS

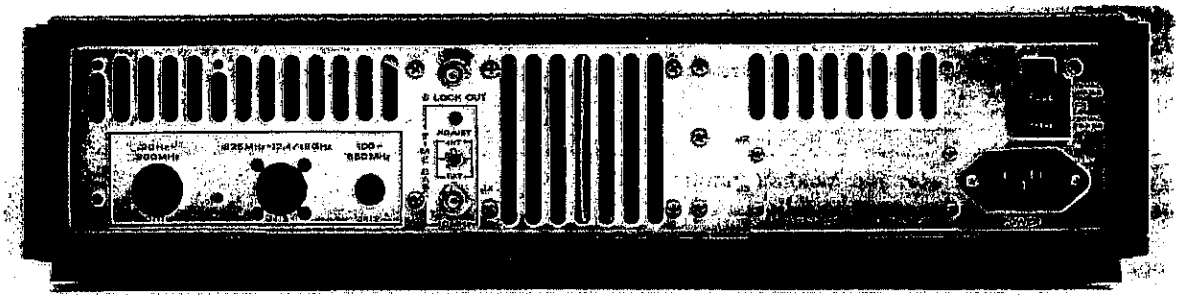

FIGURE 3-2. REAR PANEL CONTROLS AND CONNECTORS

Rear Panel Inputs

Openings allow simple modification for rear inputs.

ϕ LOCK OUT Connector

Provides output control signal to external frequency source when locking source to keyboard programmed frequency.

TIME BASE ADJUST Control

Used with Options 03, 04, or 05 only. Screwdriver adjustment allows tuning of the internal 10 MHz Oven Oscillator used with these options. Refer to Section O for complete description.

TIME BASE INT/EXT Switch

Allows use of internal Time Base Oscillator (TCXO or optional oven unit), or external 10 MHz reference.

TIME BASE 10 MHz Connector

Type BNC female. Allows monitoring of internal 10 MHz Time Base, or connection to external 10 MHz reference (3 V p-p maximum reference input level).

BCD OUTPUT Connector

Used with Option 08 - BCD Output. Refer to Section O - Options, for complete description.

REMOTE PROGRAMMING Connector

Used with Option 06 - Programmable Offsets, and Option 07 - Remote Programming. Refer to Section O - Options for complete descriptions.

AC POWER Connector

Accepts AC power cord supplied with counter.

FUSE Holder

Fuse provides overload protection for the counter. Use only a 1.5 A, Slow-Blow, 3AB/MDX type fuse for nominal 115 Vac operation, or 0.75 A, Slow-Blow, 3AB/MDL type fuse for nominal 230 Vac operation.

115/230 Switch

Sets operating voltage of counter to match power line. **CAUTION:** Be sure 115/230 switch setting and fuse rating match power line voltage.

TABLE 3-2. REAR PANEL CONTROLS AND CONNECTORS

IMPORTANT: Erroneous readings may result for signals within 275 MHz above and below the YIG Preset frequency. Set YIG Preset at least 275 MHz *below* lowest desired frequency to be counted.

3-12. To utilize both YIG Preset and lockbox functions of the counter simultaneously, proceed as follows:

a. Program YIG Preset frequency. Press PRESET button.

b. Wait for SEARCH indicator to go out.

c. Source may now be locked as described in paragraph 3-8c.

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