MFJ

BOX APPEARANCE

1. Check appearance of box in the following areas: a. Missing or partly missing letters and numbers. b. Scratches.
c. Deformed bends
d. Missing pin nuts
e. Bad paint
f . Uneven cuts *of impressions*
g. SWR and Resistance indicators for correctness and scratches.
h. UTC 150 Counter Module for scratches.

Tightness Check

1. Check the following for tightness.
   a. Seven (7) screws on the box face.
   b. Six (6) screws on back *of* circuit board.
   c. Four (4) screws on back of UTC 150 Counter Module, (under main circuit board)
   d. Antenna S0239 bolts and nuts (2), and nuts on the two (2) "Input" & "Gate" push button switches.
   e. Knobs (Check for alignment, proper height, and tightness). *f . SWR* & Resistance indicators bracket screws.

Circuit Board inspection 1.

Check circuit board for the following:
a. Excess flux.
b. Bridged solder joints.
c. Cold solder joints.
d. Loose wiring.
e. Ball type solder joints.
f . Unsoldered joints.
2. Inspect Antenna jack and push button switches solder connections.

Adjusting Counter Module.

1. Make sure unit is Off and insert power plug into power jack. (Power = 12 vdc, Plug center is positive)
2. Set Frequency switch to 113 --170 range and tuner to maximum clockwise position.
3. Turn unit on. Display should show some frequency. Usually around 170 to 174 MHz. Tough a hole in the back of the board adjust R32 until display reads it highest frequency, (will vary according to how L6 is set).
4. Hook up an external frequency counter to the antenna jack.
5. Check to see if the module frequency matches the external frequency counter frequency. Module frequency should be stable to within .00 digits.

Setting the A.G.C. voltage.

1. Range switch should be in the 113 – 17 range.
2. Tune display to read 165 - 166 MHz.
3. On back side of board measure the voltage on pin 2 of ICI. It should be 300 - 400 mV.

4 Check voltage on pin 3 of ICI and adjust R18 till voltage matches pin 2 or is within .003 mV of it Voltage on pin 3 shouldn't drop below that of pin 2 because unit may become unstable.

Setting Ranges

1. Set range 113 -170 by adjusting L6. You must spread or close L6 to obtain frequency. Ideal range would be: 112 -174 MHz.
2. Set range 62.5 -113 by adjusting L5. You must spread or close the coils on L5 to obtain frequency. Ideal frequency would be: 61.8 - 114.8 MHz.
3. Set range 26.2 - 62.5 by adjusting L4. You must use a alignment tool for this inductor. Ideal range would be: 25.5 - 63.25 MHz
4. Set range 10 - 26.2 by adjusting L3. You must use a alignment tool for this inductor. Ideal range would be: 9.97 - 27.00 MHz.
5. Set range 4 -10 by adjusting L2. You must use a alignment tool for this inductor. Ideal range would be: 3.97 -10.12 MHz
6. Set range 1.8 -4 by adjusting L1. You must use a alignment tool for this inductor. Ideal range would be: 1.76 - 4.12 MHz
7. Recheck both top and bottom of all ranges.

Note: When the back is put on the box all top ranges will drop in frequency and also battery lead placement will change frequencies due to added inductance of the metal and wire. If any doubt, mark box with a sticker and have unit returned to you for inspection when back is put on. Each unit has a different spread in ranges. The top of the ranges has the biggest drop when the back cover is put on.

SWR & Resistance meters adjustment

1. Set range switch to 1.8 - 4.00 MHz range. Plug a 100 ohm dummy load into the antenna jack.
2. Adjust R17 for a "2" reading on the SWR meter. Exact reading should be -. obtained. Meter should be stable.

3. Replace the 100 ohm dummy load with a 50 ohm dummy load.
4. Adjust R31 till resistance meter reads 50 ohms. Exact reading should be obtained. Meter.should be stable.
5. Replace 50 ohm dummy load with the 100 ohm dummy load again and check to see if resistance meter reads close to 100 ohms.

Note: The upper scale of the resistance meter is less accurate then the lower end of the scale. Getting the 50 ohm reading when the 50 ohm load is in place is more important. Most Hams use 50 ohm loads more often and will notice any variation.

Checking "Input & Gates "

1. Check Input to unit by inputting a signal from another 2491259 Analyzer into the Frequency Input BNC. Press input button till a "B" appears in the upper right corner of the display module. This is the input mode and the display should display the input frequency from the external frequency generator. Leave in the mode for about 15 seconds to be sure it doesn't fade out or disappear.

Warning: The frequency counter has a CMOS input device that can be easily damaged. To avoid damage, observe the following:
Never exceed 5 volts peak input voltage.
Never input a signal with unit off.

2. Test "Gate" button to be sure they change in order. The following should be displayed as button is depressed; 0.01, 0.1, 1.0, 10. In that order. Make sure they don't skip order.

Battery Leads Test

1. Place a short across one of battery connectors.

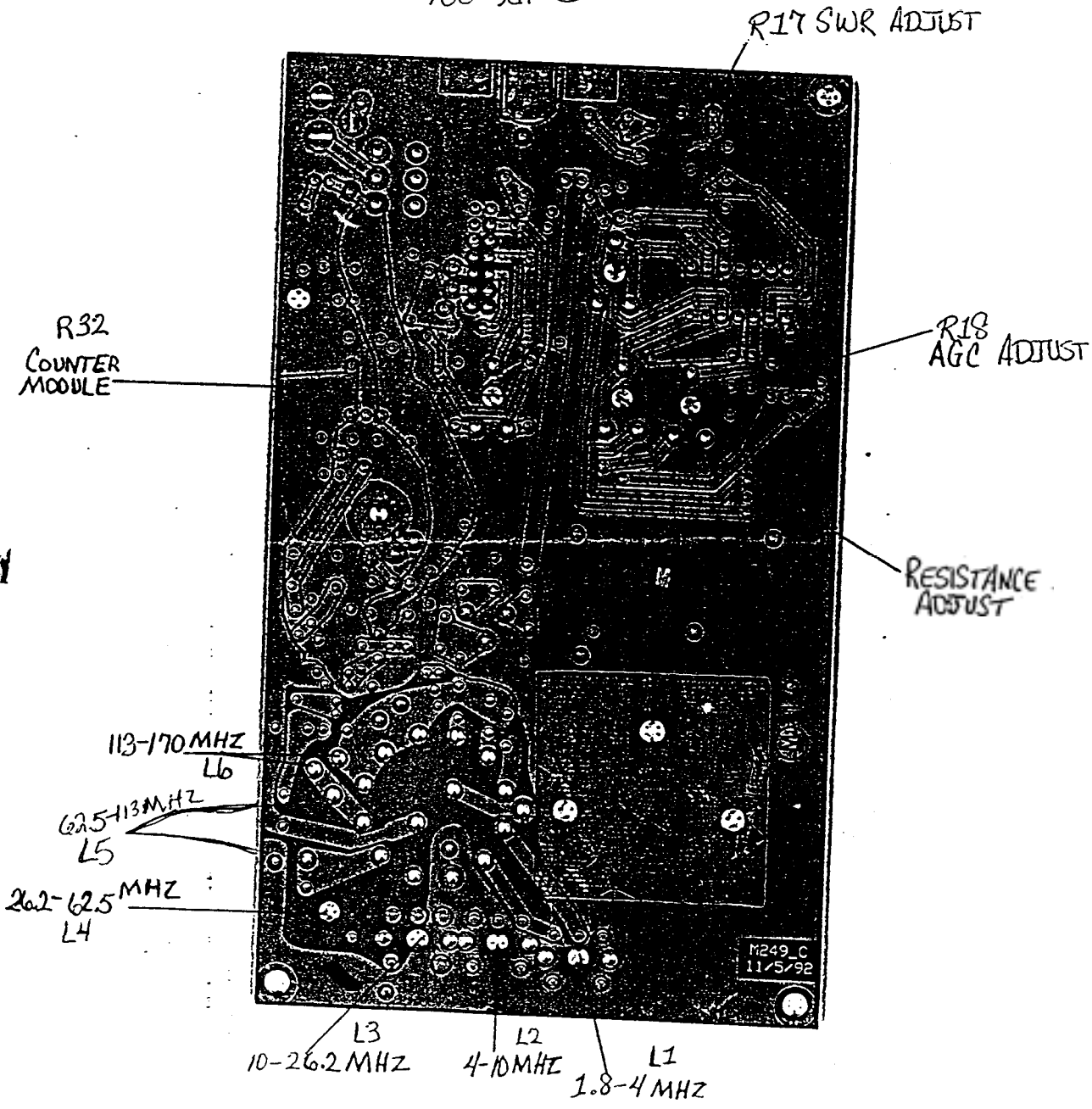
2. Touch your power plug to the other battery connector by placing the tip of your power plug to the large female socket and resting the outside contact of your power plug against the small male connector. Unit should come on.
3. Check other battery connector in the same manner.

Final Step

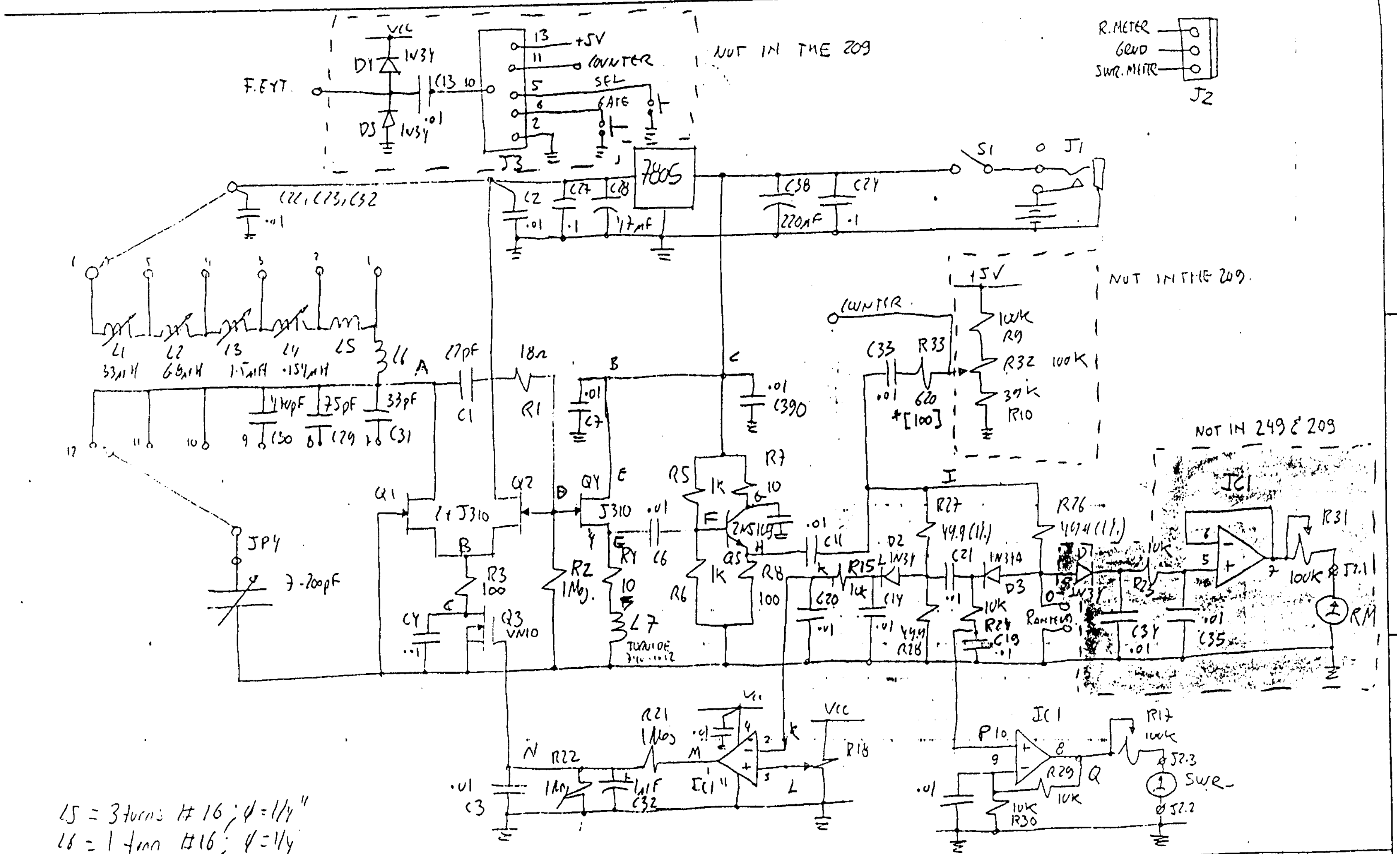
1. Turn unit power switch off before sending to back installation step.

Note: Whiie not real important, it's good to leave the range switch and tuner in the same position on each unit. I place the range switch in the 113 - 170 position and the tuner fully clockwise, and power switch off.

Pins 10 & 11
1000 µF Inductor



113-170 MHz - Controlled by height of L6
62.5-113 MHz - Controlled by spacing between turns of L5.



L5 = 3 turns #16; ⌀ = 1/4"
L6 = 1 turn #16; ⌀ = 1/4
JP4 = 1" GAGE #16.

MFJ 249/259

OPTOELECTRO\TICS, INC. UTC151
OPERATOR'S MANUAL

Version 1.0
July 21, 1995

INTRODUCTION

This document describes the operation of the Optoelectronics, Inc. Model UTC151 Frequency Counter Module: The UTC151 counts frequencies up to 175 MHz, and provides two inputs and four gate times.

EXTERNAL CONNECTIONS

All connections to the UTC151 Frequency Counter Module are made through a 14-pin male doublerow header, located on the rear panel. The signals available on the connector are summarized in Table 1 below. Following the table is a description of each of the signals.

Table 1. Connector Pinout.

PIN	SIGNAL	TYPE
1	GND	Power
2	GND -	Power
3	OSC-EN*	Ou •gut
4'	-'OE30-PVIRDWN*	Output
5	INPUT*	Input
6	GATE*	Input
7	GATE-SELO*	Input
8	GATE-SELI*	Input
9	N.C.	NIA
10	INPUT-B	Input
11	INPUT-A	Input .
12	GND	Power
13	+5VDC	Power
14	GND	Power

GND

These four connector pins provide the ground reference for the power supply, as well as all input and output signals.

OSC-EN*

This TTL output signal allows the UTC151 to control an external oscillator. When input A is selected, the UTC151 enables the external oscillator by asserting this signal (TTL low). When input B is selected, or when the UTC151 is in SLEEP mode, the UTC151 disables the external oscillator by negating this signal (TTL high). The electrical specifications for this signal are as follows:

TTL low: 0.4 V max., 1.6 mA max. sink current
TTL high: 3.8 V min., 0.4 mA max. source

GATESELO*
GATESELI*

These *TTL* input signals select the power-up default gate setting of the counter. These signals are read once at power-up, and are ignored at all-other times. A weak pull-up is provided internally. Therefore, leaving the signals open is interpreted as a TTL high, and grounding the signals is interpreted as a TTL low. The four power-up-default gate settings supported are summarized in Table 3 below. These signals can also be driven by TTL logic. The electrical specifications for these signals are as follows:

TTL low: O.S V max., 250 itA max. load
current TTL high: 3.9 V min., 2 l.tA max.

Table 3. UTC151 Power-up Default Gate Settings.

GATE SETTING	GATESELO*	GATESEL1*
1	TTL high	TTL high
2	TTL-low	TTL high
3	TTL high	TTL low
4	TTL low	TTL low

INPUT-A

This input is the direct AC coupled input to the frequency counter. Signals up to 175 MHz can be counted through this input. The amplitude of signals presented to this input should not exceed 2.5 volts peak-to-peak.

INPUT-B

This input is the 5052 AC coupled input to the frequency.counter. This input provides a 5052 amplifier stage. When counter input A is selected, the amplifier is disabled. Signals up to 175 MHz can be counted through this input. The amplitude of signals presented to this input should not exceed 2.5 volts peak-to-peak.

+5VDC

DC power is supplied to the UTC151 through this connector pin. The supply voltage range is 4.75-5.25 VDC, 100mA max.

FRONT PANEL DISPLAY

The UTC151 front panel display consists of a ten-digitLiquid Crystal Display (LCD) module. The results of all fi-egm-ncy measurements are displayed here., as well as various annunciators.

FRONT PANEL INDICATOR

The UTC151 has one Light-Emitting Diode (LED) front panel indicator. This indicator LED flashes each time a measurement is successfully completed. The amount of time between flashes of the indicator LED is equal to the currently selected measurement time (see Table 2). At the shortest measurement time, the indicator LED %-ill flash so fast that, to the human eye, it will appear to be on continuously.

OE30-PNVRDNN'N* .

This TTL output signal; when asserted (TTL low), indicates that the OESO counter chip is in power down mode. This occurs when the UTC151 is in SLEEP mode. When the UTC151 is in normal operation, this signal is negated (TTL high). The electrical specifications for this signal are as follows:

TTL low: 0.4 V max., 1.6 mA max. sink current
TTL high: 3.S V min., 0.4 mA max. source current

INPUT*

This TTL input signal selects between counter inputs A anc B. This signal is fully debounced, and a weak pull-up is provided internally. Therefore, a normally-open, momentary push-button switch can be connected between this signal and ground. Each time the push-button switch is pressed and released, the. opposite input is selected. The currently selected input is indicated by 'the corresponding annunciator on the display. This signal can also be driven by TTL logic. - However, due to the debounce logic, the minimum duration: of any input state is 60 milliseconds. The electrical specifications for this signal are as follows:

TTL low: 0.8 V max., 250 FA max. load current
TTL high: 3.9 V min., 2 VA max. load current

GATE*

This TTL input signal selects the gate time, and hence the measurement resolution, of the counter. This signal is fully debounced, and a weak pull-up is provided internally_. _Therefore, a normally= open, momentary push-button switch can be connected between this signal and ground. The UTC151 has four gate settings. Each time the push-button switch is pressed and released, the next gate setting is selected.

The currently selected_ gate setting is indicated by the position of the 'decimal point on. the frequency display. The four gate settings supported are summarized in Table 2 below. This signal also has an alternate function. When the UTC151 is turned on while pressing and holding the GATE push-button switch, the five-minute SLEEP mode timeout function is disabled. This signal can also be driven by TTL logic. However, due to the debounce logic, the minimum duration of any input state is 60 milliseconds. The electrical specifications for this signal are as follows:

TTL low: 0.8 V max., 250 l.tA max. load current
TTL high: 3.9 V min., 2 pa max. load current

Table 2. UTC151 Gate Settings.

GATE SETTING	GATE TLTVIE	MEASUREMENT TL1IE	MEASUREMENT **RESOLUTION -**	**EX-4MPLE (11IHz)**
1	10 ms	25 mS	100 Hz	162.5500
2	100 ms	130 ms	10 Hz	162.55000
3	1 S	1 S	1 Hz	162.550000
4	10S	10S	0.1 Hz	162.5500000

POWER UP

When the UTC151 is turned on by applying DC power to the +5VDC pin, a display self-test is performed by illuminating all front panel display segments for appro\imately two seconds. "AFJ" is then displayed for an nddition nl tun sec-onds. The IJTC151 then hi-.gins, normal operation with the currently selected power-up default gate setting, and the five-minute SLEEP mode timeout function enabled. To disable the fire-minute SLEEP mode time-out function, press and hold the GATE push-button svdtch before turning on the UTC151. Once the display self-test begins, release the GATE switch.

SLEEP MODE

The UTC151 has an internal five-minute SLEEP mode timer. Each time the INPUT or GATE push-button switch is pressed, the timer is reset to five minutes. If five minutes have elapsed since the last time either push-button switch was pressed, the UTC151 automatically. enters.SLEEP mode, and 'SLEEP-----'(is displayed on the front panel display. In 'SLEEP' modc,,.thc.OE30 . counter chip;. the 5052 amplifier, and the external oscillator are disabled to conserve battery power. Once in SLEEP rnbde, pressing either the-INPUT or GATE push-button switch causes the UTC151 to resume normal -operation. -The SLEEP mode timeout function can be disabled as described. above.