

**INSTRUCTION
MANUAL
DIGITAL RECEIVER
FR-101
(DIGITAL COUNTER UNIT)**

YAESU MUSEN CO., LTD.

TOKYO JAPAN

DIGITAL FREQUENCY READOUT FOR FR-101 DIGITAL RECEIVER



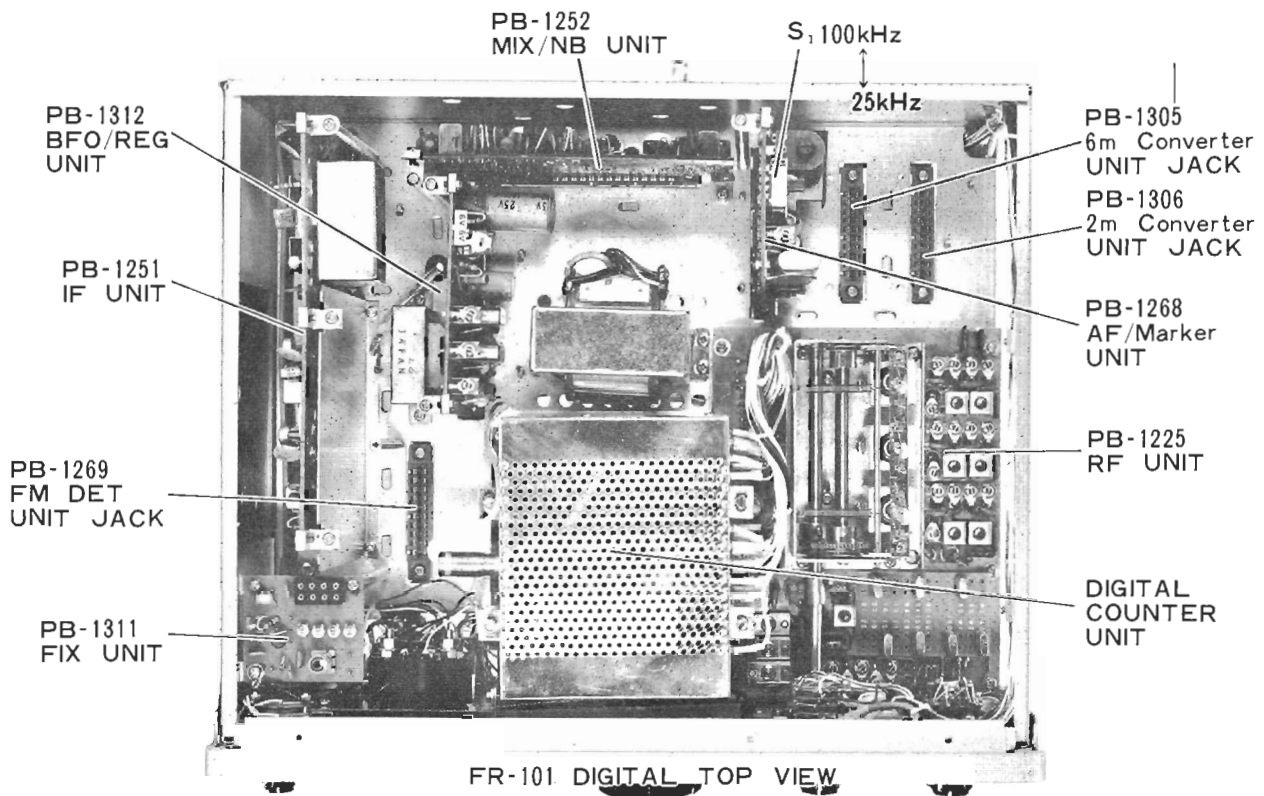
GENERAL DESCRIPTION

In the FR-101 digital receiver, a frequency counter is incorporated for accurate frequency readout by the display tubes. The frequency counter unit contains all elements including display tubes and frequency counter to display received frequencies.

The VFO frequency of 8.7 to 9.2 MHz is converted to 13.0 to 13.5 MHz. The diode matrix circuit, consisting of D1 through D49, converts this frequency into the actual received frequency which corresponds to the setting of the BAND switch.

When the VFO frequency is outside of its range, the display tubes flicker showing out of band operation. When the blue button switch on the front panel of the receiver is depressed, the last digit, 100 Hz display tube, is disappeared to avoid the annoyance of flicker.

The display does not function when the DC voltage is used for power source.



CIRCUIT DESCRIPTION

The heterodyne oscillator, Q16, oscillates at 22.2 MHz, the second harmonic of the crystal frequency. The heterodyne mixer, Q15, produces a 13.0 to 13.5 MHz signal when the heterodyne oscillator signal is mixed with the VFO signal.

This frequency is shifted approximately ± 3.7 kHz with a varicap diode connected between the crystal and ground in order to calibrate the tolerance of the receiver heterodyne oscillator. The control voltage to the varicap diode is supplied through the potentiometer marked CALIB on the front panel.

The 13.0 to 13.5 MHz signal is fed through a wave shaper Q1-1, time gate Q2-1, inverter Q2-2, and 10 Hz counter Q4, to the counter IC Q5 where 100Hz, 1 kHz, 10 kHz and 100 kHz BCD output signals are produced.

The standard frequency oscillator (clock) is composed of the 1.31072 MHz crystal controlled oscillator. The 1.31072 MHz output signal is divided by a binary counter, Q13, into a 5 Hz signal which is used as gate signal for Q2-1 and as blanking signal for Q3-2. The memory and reset pulses are produced by Q1-2, Q1-3, Q2-3, Q1-4,

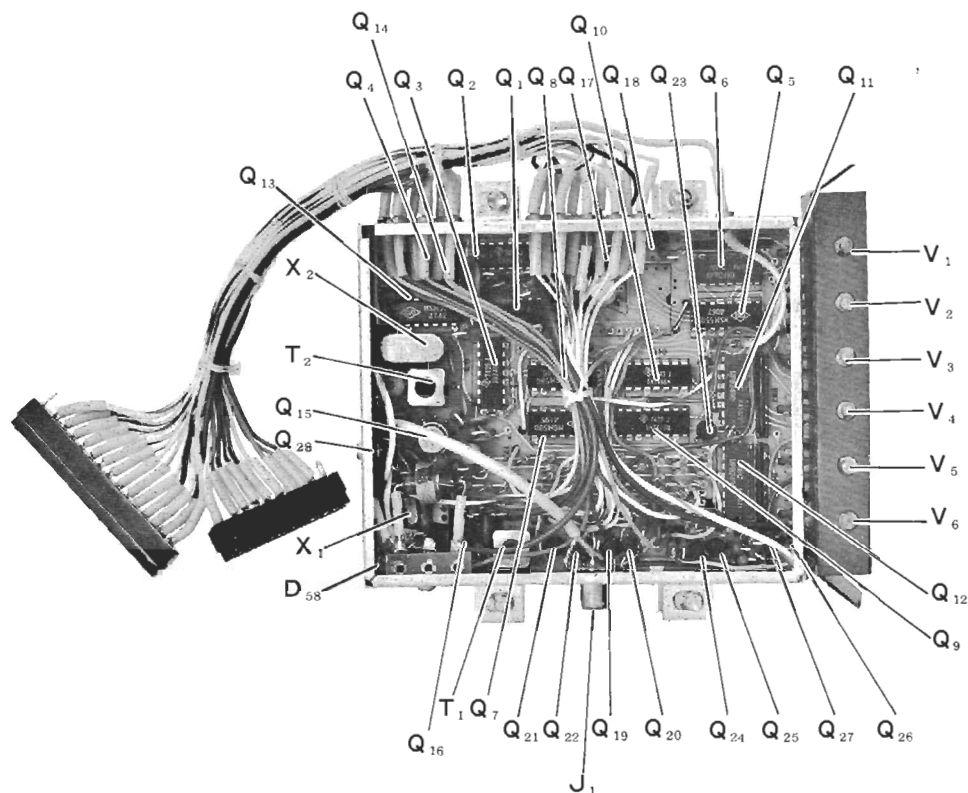
Q1-5 and Q1-6. The BCD output signal supplies an 8 segment output through the driver, Q6, to the display tubes, V1, V2 and V3. Q7, Q8, Q9 and Q10 add 500 kHz to the counter reading when the BAND switch is set to the band that starts from 500 kHz, such as 1.5, 3.5, 28.5, etc. Mega-Hertz indicators V5 and V6 are controlled by Q12 and Q24 through Q27. They select the proper cathode with the BAND switch position.

When the VFO frequency is outside its range, the output from Q14 controls Q10, D52, D53 and Q3-2 to produce the blanking pulses that flicker the display tubes.

The 13.5 volt DC voltage is regulated to 5 volts for the IC's and transistors by voltage regulator IC, Q28.

The display tube filament voltage is supplied through a 2.2 ohm resistor from the receiver AC voltage supply.

The display does not function when the DC voltage is used for power source.



DIAL CALIBRATION

For accurate frequency readout, when the receiving band is changed, it may be necessary to recalibrate the dial to compensate for the tolerance of the heterodyne crystals. Please refer to the "DIAL CALIBRATION" on page 8.

SSB MODE

- (1) Set the BAND switch and the PRESELECTOR to the desired band, and the CLARIFIER switch to the OFF position.
- (2) Push the CALIB switch on, and zero beat the main tuning dial against the 100 kHz or 25 kHz marker signal.
- (3) Adjust the CALIB control until the counter shows an exact marker frequency. The CALIB control moves the counter frequency approximately ± 3.7 kHz.

CW MODE

Follow the procedures described in the SSB MODE above, and then adjust the CALIB control until the counter reads 800 Hz higher than the actual zero

beated marker signal frequency. For example, when the dial is zero beated to 21,025 kHz, the counter should be set to 21,025.8 kHz with the CALIB control.

AM-FM MODE

Since the zero beat method can not be used for the AM and FM modes, a maximum S-meter reading is used as described on page 8.

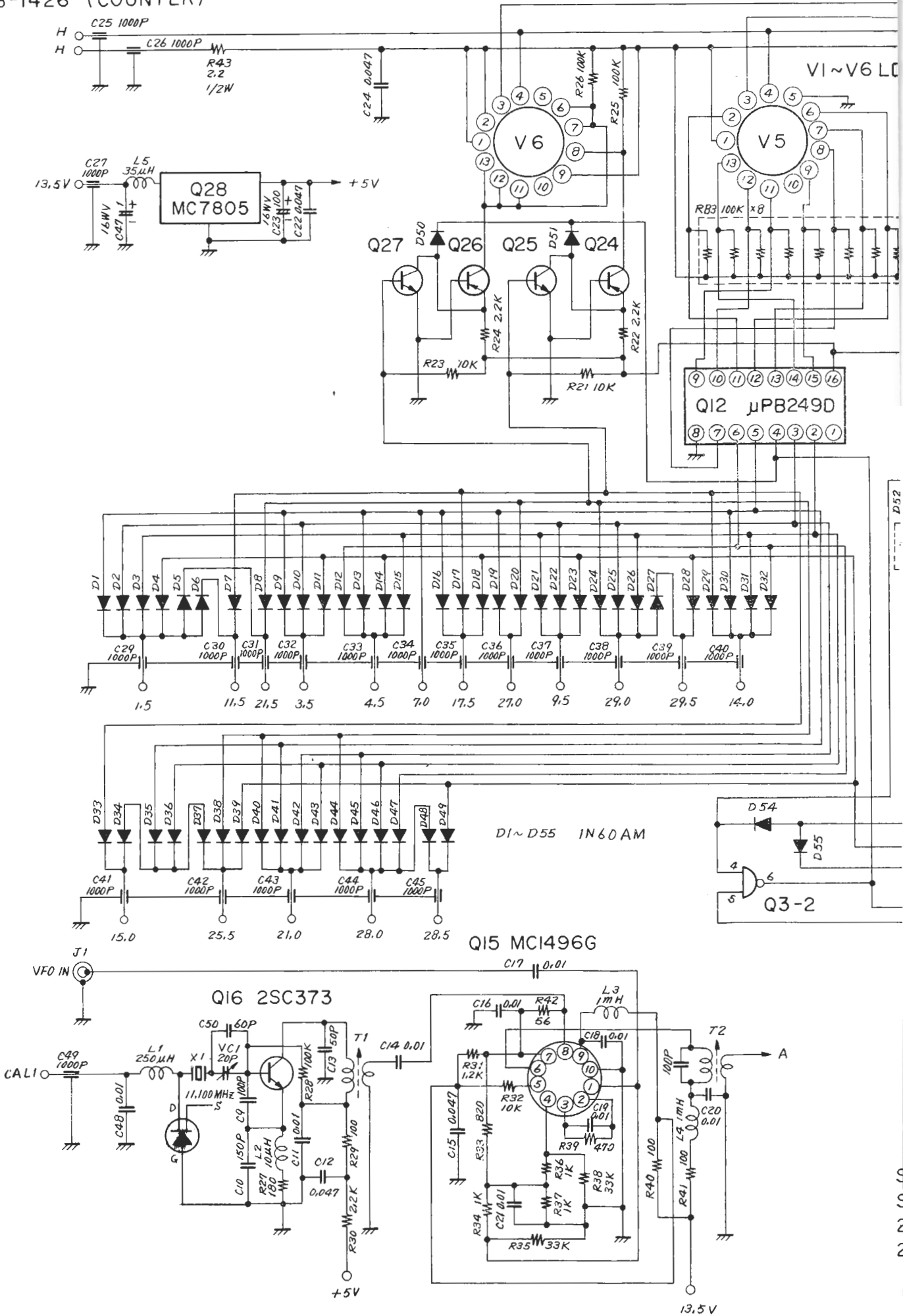
IMPORTANT NOTE

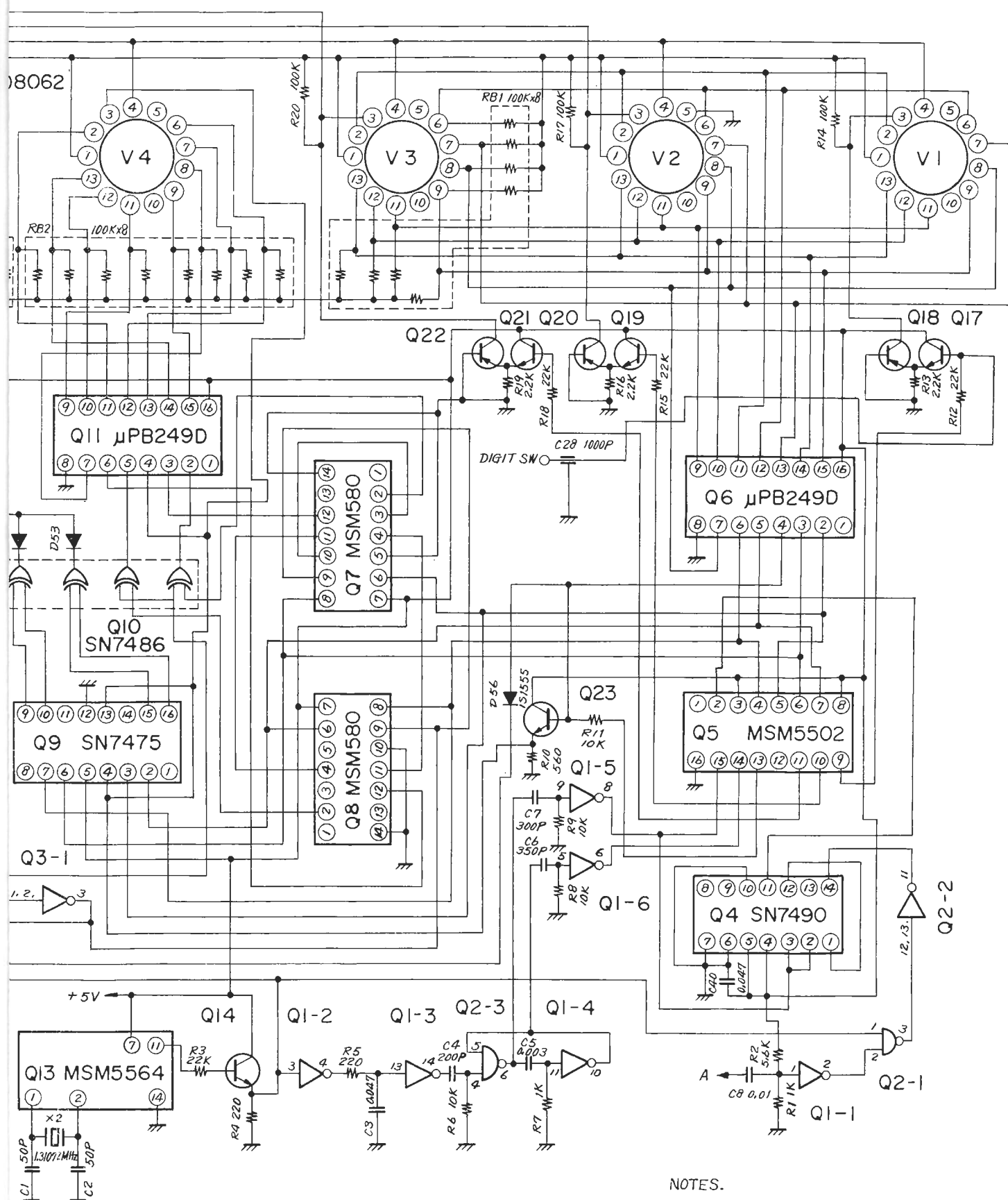
When the FR-101 digital receiver is used in transceive operation in conjunction with our FT-101/277 transceiver or FL-101 transmitter, the frequency counter reads the VFO frequency of either the receiver or transmitter. In other words, the counter shows the received frequency in the receive mode and the transmitted frequency in the transmit mode, regardless of the VFO in use. When the clarifier is used in transceive operation, the counter shows both your transmitting and receiving frequencies.

FRIOI COUNTER UNIT PARTS LIST

PB PRINTED CIRCUIT BOARD			CERAMIC FEED THRU		
1426 (A~Z)	COUNTER CIRCUIT		25~45,49	500WV	1000PF
			MYLAR		
V	DISPLAY TUBE		5	50WV	0.003 μ F
1~6	DIGITRON	LD-8062	ELECTROLYTIC		
Q	IC & TRANSISTOR		47	16WV	1 μ F
2,3	TTL	SN7400N	23	16WV	100 μ F
1.	"	SN7404N	TC	TRIMMER CAPACITOR	
9	"	SN7475N	1	ECV-1ZW	20P50
10	"	SN7486N			
4	"	SN7490N	L	INDUTOR	
6,11,12	"	μ PB249D	1	TV-245	250 μ H
7,8	C-MOS	MSM580	2		10 μ H
5	"	MSM5502	3,4		1mH
13	"	MSM5564	5	10K80T	35 μ H
15	LINEAR	MC1496G			
28	REGULATOR	MC7805P	T	TRANSFORMER	
14,16,17,19,21	TR	2SC373	1	OSC	
23,25,27,29	"		2	OUT PUT	
18,20,22,24,26	"	2SA564A(R)			
			P	PLUG	
			1	128-15-10-281S	
			2	128-10-10-281S	
D	DIODE		3	US PIN PLUG	SQ-4052
1~50	Ge	1N60AM			
56,57	Si	1S1555			
58	Varactor (FET)	2SK30A	J	JACK	
			1	US PIN JACK	SQ-3052
X	CRYSTAL				
1	HC-18/U	11.100MHz			
2	HC-6/U	1.31072MHz			
R	RESISTOR				
			CARBON FILM		
42	$\frac{1}{4}$ W	56 Ω			
29,40,41	"	100 Ω			
27	"	180 Ω			
4,5	"	220 Ω			
39	"	470 Ω			
10	"	560 Ω			
33	"	820 Ω			
1,7,34,36,37	"	1K Ω			
31	"	1.2K Ω			
13,16,19,22,24,30	"	2.2K Ω			
2	"	5.6K Ω			
6,8,9,11,21,23,32	"	10K Ω			
3,12,15,18	"	22K Ω			
35,38	"	33K Ω			
14,17,2,,25,26,28 20	"	100K Ω			
			CARBON COMPOSITION		
43	$\frac{1}{2}$ W	2.2 Ω			
RB	BLOCK RESISTOR				
1,2,3	CENTER COMMON	8 \times 100K Ω			
C	CAPACITOR				
			DIPPED MICA		
1,2,13	50WV	50PF			
50	"	60PF			
9	"	100PF			
10	"	150PF			
4	"	200PF			
7	"	300PF			
6	"	350PF			
			CERAMIC DISC		
8,11,14,16,17	50WV	0.01 μ F			
18,19,20,21,48					
3,12,15,22,24,46	50WV	0.047 μ F			

PB-1426 (COUNTER)





- SN7404 ---- Q1
- SN7400 ---- Q2, Q3
- SC373 ---- Q14, Q17, Q19, Q21, Q23, Q25, Q27
- SA564 ---- Q18, Q20, Q22, Q24, Q26

- NOTES.
1. ALL RESISTORS IN OHM 1/4W ±10% UNLESS OTHERWISE NOTED.
 2. ALL CAPACITORS IN μF UNLESS OTHERWISE NOTED.

FR-101
COUNTER UNIT DIAGRAM