



JOHNSON

SERVICE INFORMATION

VIKING 352/352 D

CITIZENS RADIO TRANSCEIVER
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Covers:

Viking 352 "A" and "Late A" Models

Viking 352D "A" Models

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SPECIFICATIONS

(Measurements are made per EIA Standard RS-382 and are nominal unless otherwise stated.)

GENERAL

Channels	23
Frequency Range	26.965 to 27.255 MHz
Frequency Control	$\pm 0.005\%$ crystal, -30°C to $+60^{\circ}\text{C}$ transmit and receive
Overall Dimensions	6.1 cm H x 19 cm W x 27.2 cm D (2.4 in H x 7.5 in W x 10.7 in D)
Weight - Unit Shipping	2.75 kg (6 lbs) 3.20 kg (7 lbs)
Microphone	Ceramic microphone with neoprene cord
Antenna Impedance	50 ohms
Circuitry	32 transistors, 54 diodes, 2 integrated circuits
Intermediate Frequency	7.8 MHz
Metering	Received signal strength/relative power output
Power Requirements	13.8 VDC positive or negative ground 0.4A squelched receive 1.8A fully modulated transmit
Circuit Protection	4 ampere fuse
Compliance	FCC Type Accepted Rule 95 (D)

RECEIVER

Sensitivity	
AM	10 dB (S+N)/N at 0.5 (1.0) μV input
SSB	10 dB (S+N)/N at 0.35 (0.5) μV input
Selectivity	4.5 kHz minimum bandwidth at -6 dB and 30 kHz maximum bandwidth at -60 dB
Spurious Rejection	50 dB

Audio Output Power 2 watts with less than 10% distortion at 1000 μV , 1000 Hz

Tight Squelch

AM	50 (30) μV minimum and 2000 μV maximum (NB on)
SSB	25 (15) μV minimum and 1000 μV maximum (NB on)

Squelch Sensitivity 3 dB or less signal change for 40 dB quieting at 1 μV

AGC Characteristics

AM	Flat within ± 6 dB from 250,000 to 5 μV with 15 dB ± 4 rolloff from 5 to 0.5 μV
SSB	Flat within $\pm 2/-8$ dB from 250,000 to 5 μV with 15 dB ± 4 rolloff from 5 to 0.5 μV

Speaker Impedance 8 ohms

Receiver Incremental Tune ± 1350 maximum ± 600 Hz minimum

TRANSMITTER

Emission	
AM	6A3
SSB	3A3J

RF Power Output
AM 3 watts minimum/4 watts maximum at 13.8 VDC
SSB 8 watts PEP minimum/12 watts PEP maximum at 13.8 VDC

RF Spurious and Harmonic Attenuation 50 dB

Audio Frequency Response

AM	$\pm 2/-16$ dB from 300 to 3000 Hz
SSB	$\pm 2/-20$ dB from 300 to 3000 Hz

Modulation 80 (70%)* minimum positive and negative

Carrier Suppression
SSB 40 dB

Unwanted Sideband Suppression
SSB 50 dB

* MINIMUM PERFORMANCE SPECIFICATIONS are shown in parenthesis if other than NOMINAL value

INSTALLATION INSTRUCTIONS

The transceiver may be mounted under the dash or on the floor of a vehicle and will operate from either positive or negative ground battery voltage. A suggested installation procedure is as follows, for a more detailed installation procedure refer to E. F. Johnson booklet "Installing Your Citizens Radio" Part No. 004-2000-001.

- a. Select a mounting location that will allow clearance for heater and air conditioning ducts. Install the antenna and route the transmission line to the intended mounting location.
- b. Temporarily assemble the transceiver and the mounting bracket and hold it in the intended mounting location and check for clearance. Remove the bracket from the transceiver and hold the bracket in the mounting location and mark the mounting hole locations.
- c. Center punch and drill the mounting holes where marked and install the mounting bracket.
- d. Connect the antenna transmission line to the antenna connector, connect the red B+ lead to the positive (+) battery terminal, connect the black B+ lead to the negative (-) battery terminal and connect the external speaker, if used.
- e. Install the transceiver in the mounting bracket using the enclosed hardware.

CIRCUIT DESCRIPTION

GENERAL

The Johnson Viking 352 is a 23 channel fully solid state citizens radio transceiver that operates on upper sideband, lower sideband and regular AM channels. All transmit and receive frequencies are generated by a ten crystal frequency synthesizer. The Carrier Insertion Oscillator is a separate oscillator which generates a 7.8025 MHz carrier for sideband detection and transmission.

The receiver is a single conversion receiver with four IF stages and a crystal filter for good selectivity and image rejection. Also included in the receiver is a noise blanker to remove any impulse type noise, an automatic gain control circuit (AGC) to maintain a constant receive signal level and an automatic noise limiter circuit (ANL) to remove any audio noise from the receive signal.

The transmitter consists of a mixer stage and a Class B RF power output stage to provide 4 watts RF output in AM and 12 watts PEP output in SSB.

The transceiver also includes an S/RFO meter which indicates receive signal strength in receive and relative RF output power in transmit in both AM and SSB modes of operation. The transceiver also includes a public address (PA) function so that the audio amplifiers can be used without activating the RF stages of the transmitter.

CARRIER FREQUENCY OSCILLATOR

The Carrier Oscillator consists of Y501, Q19 and associated components. The crystal controlled oscillator uses a crystal operating at series resonance to produce its fundamental frequency of 7.8025 MHz. Oscillator frequency adjustment is provided for by capacitor C510 and temperature compensation is provided by C501 and C502. Since the oscillator is not used in the AM mode, the supply voltage is switched off by the mode switch, S2-2, in the AM position and on in the LSB and USB positions.

In the LSB transmit mode, the 7.8025 MHz is coupled from the emitter of Q19 through C512 to the base of the Buffer stage and then to the Balanced Modulator to be used in audio modulation. In the USB transmit mode, the 7.8025 MHz is used in the Balanced Modulator and it is also coupled by C505 through CR501 to tuned transformers T501 and T502. Transformers T501 and T502 are tuned to pass only 15.6050 MHz (second harmonic of 7.8025 MHz) which is then coupled to the second gate of the USB Mixer transistor through C514 to be used in the Frequency Synthesizer.

In the LSB receive mode, the 7.8025 MHz is coupled through C457 to the emitters of Q16 and Q17, the SSB Detector, to detect the audio signals. To receive USB, the 15.6050 MHz from T502 is coupled to the gate of the USB Mixer and the 7.8025 MHz is also used by the SSB Detector.

FREQUENCY SYNTHESIZER

General

The frequency synthesizer circuitry consists of six high frequency crystals and four low frequency crystals, a high frequency (HF) oscillator, a low frequency (LF) oscillator, a synthesizer mixer, a 19 MHz amplifier, an upper sideband mixer, a 35 MHz amplifier and a diode switching network.

The synthesizer output is 7.8025 MHz below the channel frequency for AM transmit and Lower Sideband (LSB) transmit and receive, 7.800 MHz below the channel frequency for AM receive and 7.8025 MHz above the channel frequency for Upper Sideband (USB) transmit and receive.

Low Frequency (LF) Oscillator

The LF oscillator consists of crystals Y607 through Y610, Q21 and its associated circuitry. The Channel Selector Switch, S1-3, selects one of these crystals and applies the signal to the base of the oscillator transistor, Q21. The oscillator is a modified Colpitts oscillator connected in a common collector configuration to provide high input impedance. In the transmit and receive SSB mode and the transmit AM mode, the crystals operate on their fundamental frequencies along with capacitors C601 and C602 to provide the low frequencies. In the AM receive mode, the LF crystal frequency is increased 2.5 kHz by CR603 so that the output of the synthesizer mixer will be 7.800 MHz below the channel frequency and the signal will pass at the center frequency of the crystal filter, F401.

The low frequency signal is coupled from the emitter of Q21 through C604 to the gate of the Synthesizer Mixer, Q25, where it is mixed with the signal from the high frequency oscillator.

High Frequency (HF) Oscillator

The HF oscillator consists of Q22, its associated circuitry, and crystals Y601 through Y606. The oscillator is a modified Colpitts oscillator connected in a common collector configuration to provide high input impedance. The crystals operate at series resonance to produce their fundamental frequencies and are adjustable ± 800 Hz with the Fine Tune Control. Since the carrier is not transmitted in the SSB mode, the receiver reinserts the carrier and the Fine Tune Control allows the receive crystals to be compensated for any difference between the transmitter carrier frequency and the receiver carrier frequency. The Fine Tune Control, R625, varies the voltage across CR606, this voltage change is felt as a change in capacitance across the high frequency crystals which results in a corresponding change in oscillation and improved audio reproduction.

The desired HF crystal is selected by S1-1 at the same time as S1-3 selects the LF crystal. The crystal frequency is connected to the base of the HF oscillator transistor, Q22, through C638. The HF signal is amplified by the transistor and then coupled from the emitter of Q22 through C608 to the gate of the Synthesizer Mixer, Q25. To eliminate any crystal frequency other than the desired frequency, S1-2 shorts out the unused crystals. To prevent the transceiver from operating on the blank space between channels 22 and 23, S1-4 effectively shorts the synthesizer B+ through R608 to ground.

SYNTHESIZER OUTPUT

Lower Sideband (LSB) and AM

The signal from the LF oscillator is mixed with the signal from the HF oscillator at the synthesizer mixer, Q25. The synthesizer output circuitry T601 and T602 is tuned to pass the sum of the two frequencies, which is in the 19 MHz range and is coupled to the base of the 19 MHz amplifier, Q26, through C617. The output of Q25 is coupled to the switching diode CR602 through T603. The output frequency of Q26 for AM receive is 2.5 kHz higher than the AM transmit and the LSB transmit and receive frequencies. For example channel 1 on AM transmit and LSB would be; $11.700 \text{ MHz} + 7.4625 \text{ MHz} = 19.1625 \text{ MHz}$ and channel 1 on AM receive would be; $11.700 \text{ MHz} + 7.465 \text{ MHz} = 19.165 \text{ MHz}$.

Upper Sideband (USB)

The 19 MHz signal from C616/T602 junction is coupled to the first gate of Q23, the USB Mixer, where it is mixed with 15.6050 MHz from the carrier oscillator. The output of the carrier oscillator is doubled by T501 and T502 to produce 15.6050 MHz which is then coupled through C514 to the second gate of Q23 to be mixed with the 19 MHz. The

output circuitry of T604, C611, T605 and C612 is tuned to pass the sum frequency which is in the 35 MHz range. The 35 MHz signals are then coupled through C612 to the base of the 35 MHz Amplifier, Q24. The amplified 35 MHz signals are then coupled to the diode switch, CR601, through T606. The bias and supply voltage for the USB Mixer and 35 MHz Amplifier and CR601 are switched from the 19 MHz Amplifier by the Mode Switch S2-6.

The output of the USB Mixer for channel 1 USB transmit and receive frequencies would be 19.1625 MHz (from the Synthesizer Mixer) + 15.6050 MHz ($2 \times 7.8025 \text{ MHz}$ from the Carrier Oscillator) = 34.7675 MHz.

VIKING 352D DIGITAL SYNTHESIZER

GENERAL

The frequency synthesizer consists of a voltage controlled oscillator, a reference oscillator, a mixer, a custom integrated circuit (IC), the channel selector switch and the out of lock circuit. The digital synthesizer circuit generates all the mixing frequencies for the transmitter and receiver. Refer to Figure 1, the block diagram of the digital synthesizer circuitry.

The voltage controlled oscillator (VCO) is tuned to operate in the 19 MHz range. Its output is used as a mixing frequency to generate the transmit and receive channel frequencies. The VCO output is controlled by the phase locked loop (PLL) circuit consisting of the reference oscillator (Q9), the doubler (Q7), the mixer (Q6) and the synthesizer IC (IC2).

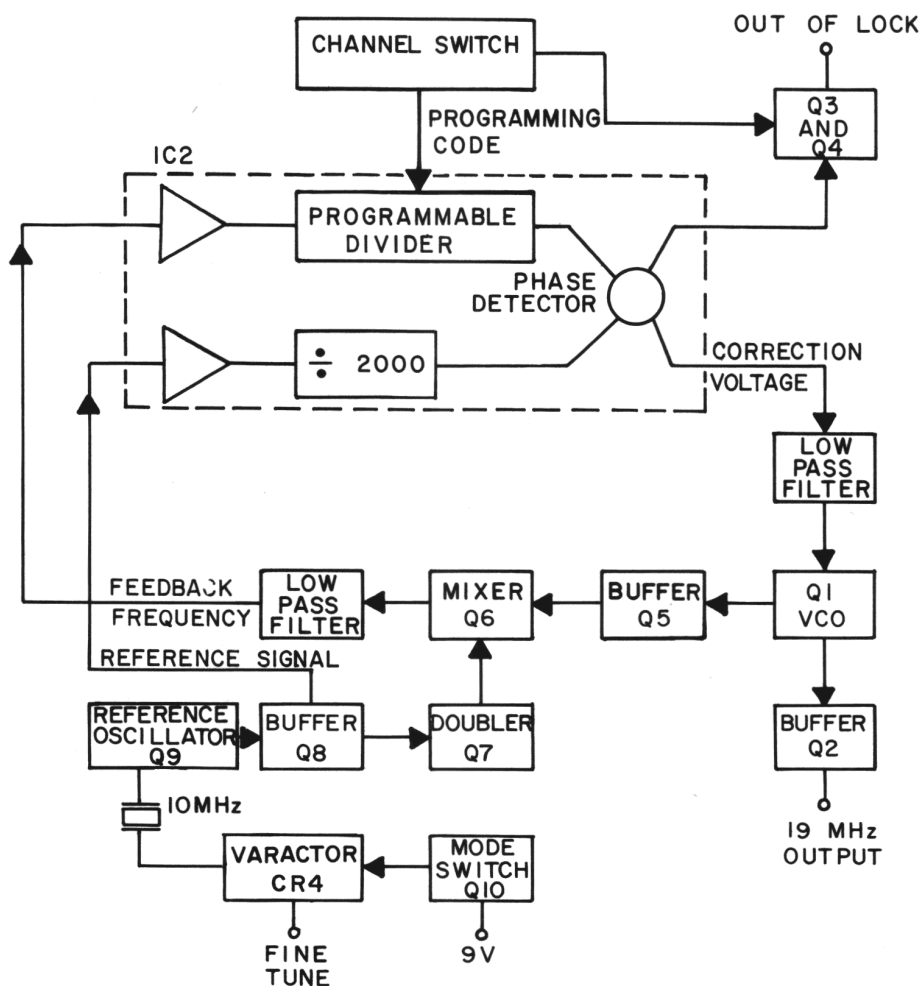
To bring the VCO on to the correct frequency as required by the channel selector switch setting, the VCO frequency is compared in phase and frequency to a crystal controlled reference frequency by IC2. The VCO frequency is applied to gate 1 of the dual gate MOS FET mixer (Q6) through a buffer stage (Q5). On gate 2 of Q6 is 20 MHz from the reference oscillator (Q9) through a buffer stage (Q8) and a frequency doubler stage (Q7). The difference frequency from the mixer is coupled through a low pass filter to the synthesizer IC pin 2 as a feedback frequency. This feedback frequency is then divided by a programmable divider within the IC which has been programmed by the channel selector switch, to divide by 167 (channel 1 example). The output of the programmable divider is applied to the phase comparator section of IC2. The 10 MHz from the reference oscillator is coupled through a buffer stage (Q8) and applied to the IC on pin 3. This reference frequency is divided by 2000 to provide a reference of 5 kHz to the phase detector as a basis of comparison.

If the VCO frequency is not exactly correct, the feedback frequency, when divided by the programmable divider section of IC2, will not be exactly 5 kHz to the phase detector. The phase detector will then detect a difference between the reference and the feedback. This difference, which is called the "error signal", is applied to the VCO from IC2 pin 6 to adjust its frequency until the phase detector no longer detects any difference.

Refer to Table 1 which shows the synthesizer output for each channel and each mode. Table 1 also shows the binary programming code required to program the divider for each channel. The "divide by" number on Table 1 is the decimal equivalent of the binary programming code. The USB "divide by" number is one less than the AM and LSB to provide the required frequency offset for USB operation.

The synthesizer output is 7.8 MHz below the channel

frequency in AM receive, 7.8025 MHz below in LSB receive and 7.7975 MHz below in USB receive. In transmit, the synthesizer output is 7.8025 MHz below the channel frequency in AM and LSB and 7.7975 MHz below in USB. The synthesizer output is mixed with the carrier oscillator frequency to produce the channel frequencies in each mode. To provide the USB synthesizer frequencies, the mode switch causes the varactor in the reference oscillator circuit to shift the reference frequency applied to the phase detector. The "divide by" number is also shifted by the mode switch placing a "0" on pin 15 of IC2 as shown in Table 1.



DIGITAL SYNTHESIZER BLOCK DIAGRAM
FIGURE 1

TABLE 1
DIGITAL SYNTHESIZER PROGRAMMING

Channel Number	Programming Code IC2 Pin No.							Divide By AM/LSB	Number USB	AM Receive Synthesizer Frequency	AM Transmit and LSB Synthesizer Frequency	USB Synthesizer Frequency
	8	9	10	11	12	13	14 15					
1	1	0	1	0	0	1	1 *	167	166	19.165	19.1625	19.1675
2	1	0	1	0	0	1	0 *	165	164	19.175	19.1725	19.1775
3	1	0	1	0	0	0	1 *	163	162	19.185	19.1825	19.1875
4	1	0	0	1	1	1	1 *	159	158	19.205	19.2025	19.2075
5	1	0	0	1	1	1	0 *	157	156	19.215	19.2125	19.2175
6	1	0	0	1	1	0	1 *	155	154	19.225	19.2225	19.2275
7	1	0	0	1	1	0	0 *	153	152	19.235	19.2325	19.2375
8	1	0	0	1	0	1	0 *	149	148	19.255	19.2525	19.2575
9	1	0	0	1	0	0	1 *	147	146	19.265	19.2625	19.2675
10	1	0	0	1	0	0	0 *	145	144	19.275	19.2725	19.2775
11	1	0	0	0	1	1	1 *	143	142	19.285	19.2825	19.2875
12	1	0	0	0	1	0	1 *	139	138	19.305	19.3025	19.3075
13	1	0	0	0	1	0	0 *	137	136	19.315	19.3125	19.3175
14	1	0	0	0	0	1	1 *	135	134	19.325	19.3225	19.3275
15	1	0	0	0	0	1	0 *	133	132	19.335	19.3325	19.3375
16	1	0	0	0	0	0	0 *	129	128	19.355	19.3525	19.3575
17	0	1	1	1	1	1	1 *	127	126	19.365	19.3625	19.3675
18	0	1	1	1	1	1	0 *	125	124	19.375	19.3725	19.3775
19	0	1	1	1	1	0	1 *	123	122	19.385	19.3825	19.3875
20	0	1	1	1	0	1	1 *	119	118	19.405	19.4025	19.4075
21	0	1	1	1	0	1	0 *	117	116	19.415	19.4125	19.4175
22	0	1	1	1	0	0	1 *	115	114	19.425	19.4225	19.4275
23	0	1	1	0	1	1	0 *	109	108	19.455	19.4525	19.4575

All frequencies in MHz

"1" = +5 VDC

"0" = open

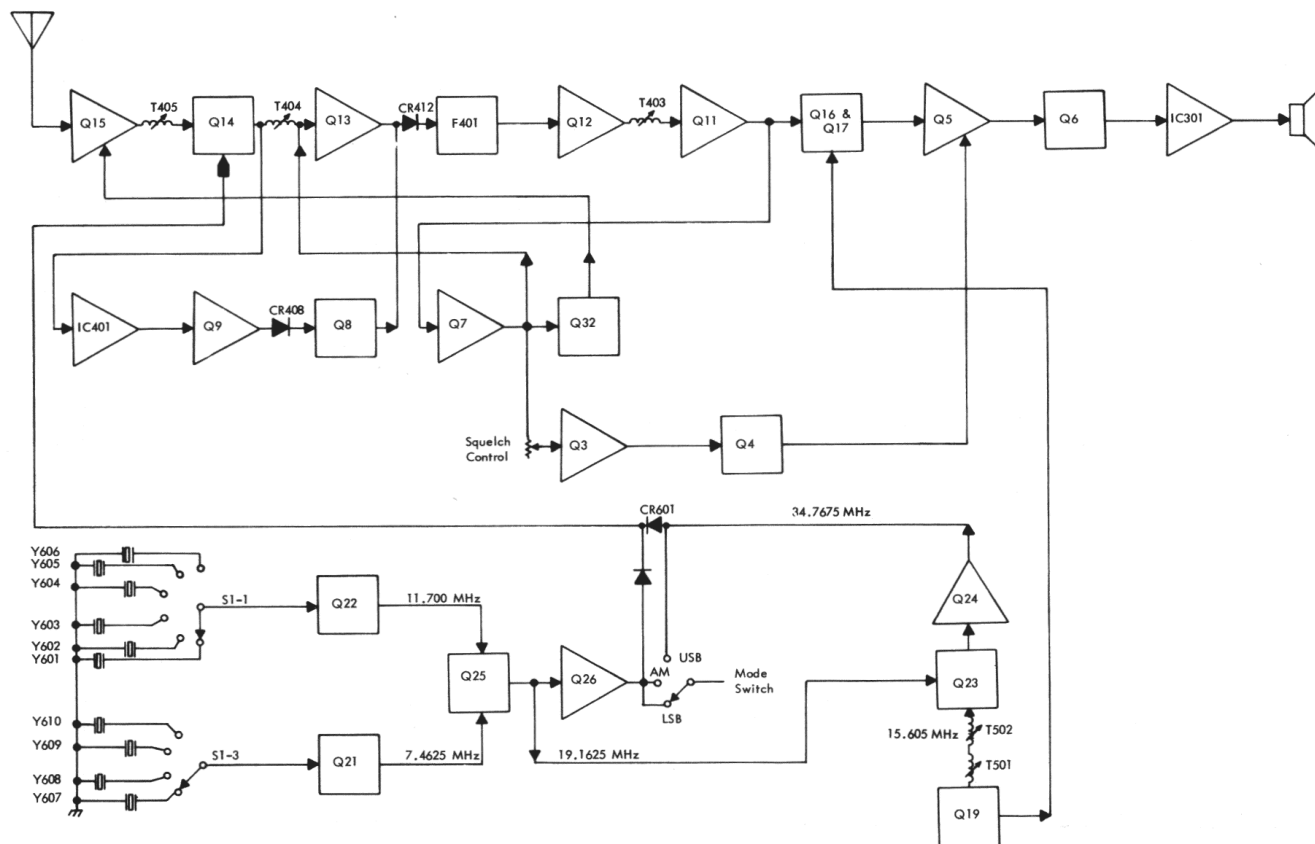
* = "1" for AM and LSB modes

* = "0" for USB modes

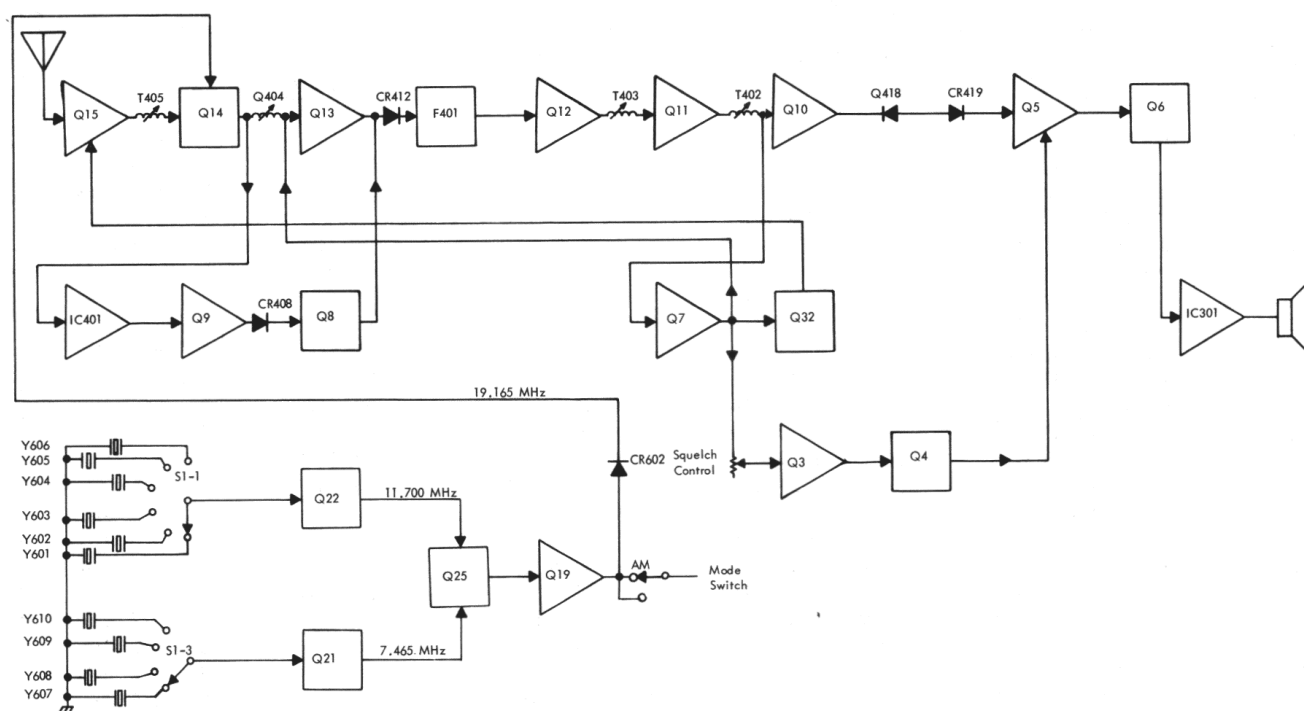
TABLE 2
FREQUENCY SYNTHESIZER TABLE

CHANNEL NUMBER	HIGH FREQUENCY CRYSTAL	LOW FREQUENCY CRYSTAL	LSB SYNTHESIZER OUTPUT	2 (x) CARRIER FREQUENCY	USB SYNTHESIZER OUTPUT
1	Y601-11.700 MHz	Y607-7.4625 MHz	19.1625 MHz	15.605 MHz	34.7675 MHz
2	Y601-11.700 MHz	Y608-7.4725 MHz	19.1725 MHz	15.605 MHz	34.7775 MHz
3	Y601-11.700 MHz	Y609-7.4825 MHz	19.1825 MHz	15.605 MHz	34.7875 MHz
4	Y601-11.700 MHz	Y610-7.5025 MHz	19.2025 MHz	15.605 MHz	34.8075 MHz
5	Y602-11.750 MHz	Y607-7.4625 MHz	19.2125 MHz	15.605 MHz	34.8175 MHz
6	Y602-11.750 MHz	Y608-7.4725 MHz	19.2225 MHz	15.605 MHz	34.8275 MHz
7	Y602-11.750 MHz	Y609-7.4825 MHz	19.2325 MHz	15.605 MHz	34.8375 MHz
8	Y602-11.750 MHz	Y610-7.5025 MHz	19.2525 MHz	15.605 MHz	34.8575 MHz
9	Y603-11.800 MHz	Y607-7.4625 MHz	19.2625 MHz	15.605 MHz	34.8675 MHz
10	Y603-11.800 MHz	Y608-7.4725 MHz	19.2725 MHz	15.605 MHz	34.8775 MHz
11	Y603-11.800 MHz	Y609-7.4825 MHz	19.2825 MHz	15.605 MHz	34.8875 MHz
12	Y603-11.800 MHz	Y610-7.5025 MHz	19.3025 MHz	15.605 MHz	34.9075 MHz
13	Y604-11.850 MHz	Y607-7.4625 MHz	19.3125 MHz	15.605 MHz	34.9175 MHz
14	Y604-11.850 MHz	Y608-7.4725 MHz	19.3225 MHz	15.605 MHz	34.9275 MHz
15	Y604-11.850 MHz	Y609-7.4825 MHz	19.3325 MHz	15.605 MHz	34.9375 MHz
16	Y604-11.850 MHz	Y610-7.5025 MHz	19.3525 MHz	15.605 MHz	34.9575 MHz
17	Y605-11.900 MHz	Y607-7.4625 MHz	19.3625 MHz	15.605 MHz	34.9675 MHz
18	Y605-11.900 MHz	Y608-7.4725 MHz	19.3725 MHz	15.605 MHz	34.9775 MHz
19	Y605-11.900 MHz	Y609-7.4825 MHz	19.3825 MHz	15.605 MHz	34.9875 MHz
20	Y605-11.900 MHz	Y610-7.5025 MHz	19.4025 MHz	15.605 MHz	35.0075 MHz
21	Y606-11.950 MHz	Y607-7.4625 MHz	19.4125 MHz	15.605 MHz	35.0175 MHz
22	Y606-11.950 MHz	Y608-7.4725 MHz	19.4225 MHz	15.605 MHz	35.0275 MHz
23	Y606-11.950 MHz	Y610-7.5025 MHz	19.4525 MHz	15.605 MHz	35.0575 MHz

NOTE: The synthesizer output for AM transmit is the same as the LSB, the AM receive output is 2.5 kHz higher than the LSB output.



SSB RECEIVE BLOCK DIAGRAM



AM RECEIVE BLOCK DIAGRAM

RECEIVER

RF Amplifier

The received signal is coupled through the antenna switching diodes through C444 to the primary of tuned transformer T406. T406 passes the desired 27 MHz signals which are then applied to the gate of the RF Amplifier, Q15. The negative gate bias voltage for Q15 is supplied through CR415. CR425 provides stability of the RF amplifier by rectifying the AGC voltage and applying the resultant negative voltage as degenerative feedback to the gate of Q15. The gate voltage establishes the rate of conduction and the stage gain of Q15. As the received signal is applied to the gate of Q15, it is also applied to the receiver image trap, L404 and C461, which removes the first image frequency. The amplified RF Amplifier output is coupled to the Receive Mixer by T405 and C439.

Receive Mixer

Along with the receive RF signal on gate 1 of the mixer, the mixing frequency from the synthesizer diode switching network is coupled through C701 to gate 2 of the mixer. The output circuitry of the mixer, T404, is tuned to pass the difference between the received RF and the synthesizer mixing frequency. In the AM and LSB mode, the synthesizer frequency is low side injection and in the USB mode the synthesizer uses high side injection. The mix frequency for AM is 7.8 MHz below the receive RF, for LSB reception the mix frequency is 7.8025 MHz below the receive RF and for USB reception the mix frequency is 7.8025 MHz above the receive RF signal. The IF frequencies from T404 are applied directly to the base of the IF Amplifier, Q13.

IF Amplifier and Crystal Filter

The IF Amplifier amplifies the IF frequency enough to be applied to the crystal filter. The output of Q13 is coupled through C433 and through the noise gate diode CR412 and through C432 to the input of the crystal filter. C432, R426 and R425 provide a proper impedance match between the IF Amplifier and the crystal filter to get maximum signal coupling. The crystal filter has a center frequency of 7.8 MHz and a narrow bandwidth to provide good selectivity and image rejection of the received signal.

The output of the filter is coupled through C431 to the base of Q12, the second IF Amplifier. The IF frequency is amplified and coupled through three tuned transformer stages, at the collector of Q10 the IF signal is coupled through C459 to the AM Detector diodes CR417 and CR418.

AM Detector and Noise Limiter

In the AM mode, the amplified IF signal is coupled to the detector diodes through coupling capacitor, C459. When the signal is applied to the detector, current will flow only during the negative portion of the IF signal. This current

causes C445 to charge to the peak value of the rectified voltage on each negative half cycle. Capacitor C446 acts as a filter to remove the IF frequency component of the detector output so that the remaining DC component varies only according to the modulation of the original signal.

The Noise Limiter, CR419, works in conjunction with the Noise Blanker circuit. With the Noise Blanker Switch, S4, in the "ON" position, nine volts bias is applied to CR419 anode through R443 to forward bias the diode. With the Noise Blanker Switch in the "OFF" position, the nine volts is applied to the anode and cathode of CR419 which biases the diode off.

With the Noise Blanker "ON", the amplitude of the audio signal is limited by the conduction of CR419. CR419 is biased so that it will conduct only when aided by a specified level of audio which removes the AM noise from the audio waveform. Capacitor C447 couples the audio to the detector switch diode CR420 which is forward biased in the AM mode by the Mode Switch, S2-2. In the AM mode, the audio is passed through CR420 to the Volume Control.

SSB Detector

The SSB Detector, detects audio from the IF frequency by mixing the received signal with the 7.8025 MHz carrier. Since the carrier is removed from the transmitted signal by the balanced modulator, the receiver must reinsert the carrier as a reference to detect the audio.

The SSB Detector functions as a product detector and consists of T409, Q16, Q17 and associated components. In the SSB mode, supply voltage for the detector transistors and carrier oscillator is provided through the Mode Switch, S2-2. The 7.8025 MHz carrier is taken from the emitter of Q19 and coupled to the emitters of Q16 and Q17 by C457 causing a balanced condition and no output. When a signal is received, a sample of the IF frequency is taken from T402 by coupling capacitor C448 and applied to T409. The IF frequency is then applied to the base of Q16 and Q17 causing Q16 and Q17 to conduct. With 7.8025 MHz on the emitters of Q16 and Q17, the modulation on the IF causes the transistors to conduct. Therefore the audio signal is reproduced on the collectors of Q16 and Q17. The audio from Q17 is then applied to the Volume Control through C325. The signal from Q16 is coupled through C451 to the SSB Meter Amplifier, Q18.

Audio

The audio at the volume control, either from the AM Detector or the SSB Detector, is coupled to the base of the Audio Preamplifier, Q5, through C304. The audio is amplified and filtered by Q6, R311, R312, R313, C309 and C310. The amplified and filtered audio is coupled through R315 and C312 from the emitter of Q6 to the input of the Audio Power Amp, IC301, on pin 5. The Audio Power Amp amplifies the audio to 3 watts which is taken from pin 10 of the integrated circuit to the receive contact of the relay, K1, through C322 through the external speaker jack to the speaker.

Automatic Gain Control (AGC)

The Automatic Gain Control (AGC) circuit causes the receiver audio output to remain constant at the level set by the volume control regardless of the received RF signal level. In the SSB mode the received signal disappears when there is no modulation, therefore the AGC must reduce the receiver gain quickly upon receiving a large signal and increase gain slowly when the signal decreases or disappears. This fast attack and slow release action compensates for short pauses in conversation. The AGC response time can be adjusted by the Q7 source resistor R467. Since the slow release AGC action is not required in the AM mode, CR401 and CR402 are switched out of the circuit in the AM mode by S2-7.

A sample of the received signal is coupled from the collector of Q10 through C416 to the junction of CR404 and the AGC attack rectifier CR405. When the received signal level increases, the signal is rectified by CR405 which applies a negative DC bias voltage on the gate of the AGC Amplifier, Q7. The rate of conduction of Q7 is slowed by a negative voltage on the gate which causes the voltage drop across the source resistor R467 to decrease. This negative going voltage is applied to the base of Q13 through T404 and to the base of Q12 through R424. This negative voltage acts as reverse bias and reduces conduction of both transistors and reduces the IF gain. The negative voltage from Q7 source is also applied to the AGC control, Q32, which causes Q32 conduction to decrease. Since Q32 is in series with the source of the RF Amplifier, the gain of the RF Amplifier decreases. The overall effect is to decrease the RF and IF gain to prevent receiver overloading.

Another IF sample is coupled from T402 through C415 to the AGC release rectifier, CR401. CR401 and CR402 rectify this IF signal which charges C402 which, along with R401, establishes an RC time constant for the AGC release time. When the received signal decreases, the attack rectifier voltage decreases. However the action of Q7, to increase receiver gain, is slowed down by the voltage on C402 discharging through R401 which is felt at the gate of Q7. This negative voltage causes the conduction of Q7 to increase gradually to allow for a conversational pause.

Noise Blanker

The Noise Blanker circuit removes any impulse noise from the received signal. In the "ON" position, the Noise Blanker ON/OFF switch applies B+ to IC401, the Noise Blanker Amplifier, Q9, the Noise Amplifier and, Q8, the Blanker Gate. A sample of the IF frequency is taken from T404 and coupled through L403, C460 and C414 to the 7.8 MHz trap, T407, which effectively removes all 7.8 MHz signal and passes any noise pulses through C412 to the input of IC401 on pin 3. The amplified noise is coupled to the Noise Amplifier, Q9, through T408 and C408. The output from the Drain of Q9 is rectified by CR408 and CR409 and the resultant positive going DC voltage is applied to the gate of Q8, the Blanker Gate. Any negative pulses that may appear at the gate of Q8 are removed by CR424. The positive voltage at the gate of Q8 drives the transistor into saturation

which removes the forward bias from the anode of CR412 and blocks the IF frequency from Q13. Since the conduction of the Blanker Gate is coincident with the noise pulses only the noise pulses are removed and all audio is allowed to pass.

Squelch

The squelch circuitry will quiet the receiver until a signal is received to effectively eliminate any noise on the channel. The amount of signal necessary to open the squelch and enable the receiver is determined by the setting of the squelch control, R319. The farther clockwise the control is rotated, the larger the signal level required to open the squelch.

When a signal is received, a sample is coupled from Q10 collector through C416 causing an AGC action. The AGC voltage from the source of Q7 is felt on the base of the Squelch Amplifier, Q3. This voltage causes Q3 to conduct. With Q3 conducting, the collector voltage decreases and this negative going voltage forward biases the Squelch Gate, Q4. With Q4 conducting, the collector voltage decreases, causing Q5, the Audio Preamplifier, to conduct which enables the receiver audio.

When no signal is received, the Audio Preamplifier is reverse biased which disables the receiver audio. With no received signal, Q3 is cut off causing the collector voltage to increase. This positive voltage is felt at Q4 base causing Q4 to cut off. With Q4 cut off, its collector voltage goes high acting to reverse bias the Audio Preamplifier and disable the receiver audio.

TRANSMITTER

General

When the microphone push to talk button is depressed, the relay K1 is energized to switch the B+ voltage from receive to transmit circuitry. With K1 energized, the forward bias is removed from the switching diode CR201 which turns on the mike amp, Q2, (to isolate the microphone input from the receive circuit).

Microphone Amplifier and AM Modulator

Audio from the microphone is coupled through C204 through the Limiter, Q1, to the base of the Microphone Amplifier, Q2. In the AM mode, the audio is amplified by Q2 and coupled from the collector through C207 and C208 through S3-4, the CB/PA switch, to the Active Filter, Q6. The Active Filter, which consists of R311, C309, R312, C310, R313 and Q6, provides filtering and audio shaping to limit effective bandwidth of the audio before it is amplified by the Audio Power Amplifier, IC301. The audio is coupled from Q6 emitter through R315 and C312 to pin 5 of IC301. The amplified audio is taken from pin 10 through K1 and switch S3-3 through R217 and diode CR204 to the collectors of Q30 and Q31. This acts as modulated B+ for Q30 and Q31 at a level of approximately 7 volts DC for the required 3 to 4 watt power output.

Automatic Microphone Limiter (Audio Compressor)

In the AM transmit mode, a sample of the audio is coupled from IC301 pin 10 through C212. The compressor diode, CR203 applies negative bias voltage through limiter resistor, R202, to the gate of the Limiter, Q1. The negative voltage at the gate of Q1 decreases the gain of Q1 and limits the audio input from the microphone.

Balanced Modulator

In the SSB transmit mode, the audio from the microphone is coupled through C204 through the Limiter and to the base of the Microphone Amp, Q2, through C205. The audio is amplified by Q2 and is coupled to the Balanced Modulator through C207, CR202, C215 and L501. CR202 is forward biased through S2-3, the Mode switch, by placing 9.0 volts on the anode through R209 in either the LSB or USB position.

The Balanced Modulator consists of CR502, CR503, CR504, CR505, T503, R514 and associated components. With no audio input from the Microphone Amplifier, the Balanced Modulator is balanced with R514. The Carrier Oscillator frequency of 7.8025 MHz is coupled from the emitter of Q19 through C512 to the base of the Buffer, Q20. The Buffer stage is an emitter follower configuration to provide high input impedance and prevent any oscillator loading effects from the Balanced Modulator. The carrier frequency from the Buffer is coupled through C513 to R514 which is adjusted for no output from T503.

With audio applied to the junction of CR502/CR503 and CR504/CR505, the diodes will conduct with respect to the audio sinewave voltage polarity. As the modulator diodes conduct, an unbalanced condition arises and the carrier frequency varies at the audio rate. These variations are felt at T503 primary which induces a corresponding voltage at T503 secondary. The modulated carrier frequency is coupled through the switching diode CR413, which has been forward biased through K1 relay contacts and S3-1, to the 7.8 MHz crystal filter. The filtered, modulated 7.8025 MHz is then coupled to the IF Amplifier, Q12, through C431. After the signals are amplified at Q12 they are coupled through the switching diode CR407, which also is forward biased through the relay contacts, S3-1 and R706, to gate 2 of the Transmit Mixer, Q27.

Mixer

The Mixer, Q27, combines the audio modulated 7.8025 MHz from the Balanced Modulator that appears on gate 2 with the frequency synthesizer output present on gate 1 for Upper and Lower Sideband operation. In the AM mode, the mixer mixes the synthesizer frequency with the unmodulated carrier frequency, 7.8025 MHz. For example on Channel 1 frequencies, AM; synthesizer output of 19.1625 MHz + carrier frequency of 7.8025 MHz = 26.965 MHz. The 26.965 MHz then is modulated by the Driver and Power Amplifier Stages.

LSB; synthesizer output of 19.1625 MHz + 1 kHz modulated carrier frequency of 7.8015 = 26.9640 MHz.

USB; synthesizer output of 34.7675 - 1 kHz modulated carrier frequency of 7.8015 MHz = 26.9660 MHz.

RF Stages

The output of the mixer is selected by tuned transformers T701 and T702 and coupled to the Transmit Amplifier, Q28. The Transmit Amplifier and the Pre-Driver, Q29, the Driver, Q30, and the Power Amplifier, Q31, amplify the SSB signals to an RF, PEP (peak envelope power) of 12 watts. In the AM mode, the unmodulated carrier frequency is amplified by Q28 and Q29 then modulated by Q30 and Q31 and amplified for approximately 4 watts RF output.

The power output of the transmitter is determined by the B+ voltage on the collectors of Q30 and Q31. In the AM mode, the collector voltage is approximately 7 volts and is modulated from audio power amp IC301 which results in a 4 watt RF level. In the SSB mode, the collectors are connected directly to the 13.8 VDC source through S2-4, the mode switch, which results in 12 watts PEP RF output.

Automatic Level Control (ALC)

The ALC is used to limit the modulation in SSB operation. A sample of the transmitted RF is coupled by C723 to the ALC Detector diode CR708, which rectifies the RF and the resulting negative voltage is applied to the gate of Q7 through CR406. The negative bias voltage decreases the gain of Q7 causing the source voltage to decrease. This negative going voltage is applied to the base of the IF Amplifier, Q12, and reduces the gain of Q12, which in turn limits the modulated 7.8025 MHz from the Balanced Modulator.

METER CIRCUITRY

The front panel meter serves the dual purpose of indicating received signal strength in "S" units and relative output power in the transmit condition.

In the AM receive condition, a sample of the IF signal is coupled from the secondary of T401 by C419 and is rectified by CR410 and CR411. This allows current to flow through meter giving an indication of the receive signal strength. Meter adjust potentiometer, R469, is adjusted for an S9 meter reading with a 100 μ V signal at the antenna.

In the SSB receive condition, the SSB signal sample is coupled from the collector of Q16 through C451 to the emitter of the SSB Meter Driver, Q18. When Q16 is conducting the collector voltage is a negative going voltage which forward biases Q18. As Q18 conducts, the receive signal from Q18 is rectified by CR422 and CR423. This positive voltage causes current to flow through the meter and R470, the SSB meter adjustment potentiometer.

In the AM and SSB transmit mode, a sample of the output power is coupled through C725 and rectified by CR709. The resultant positive voltage causes current to flow through the meter which is proportional to the modulated RF output.

PUBLIC ADDRESS (PA)

The Public Address (PA) function allows the audio amplifier sections to be used without activating the transmitter so that with a PA speaker connected to the PA speaker jack, the transceiver becomes a public address amplifier. With the PA/CB switch in the PA position and the microphone keyed, audio from the microphone is amplified by Q2 and coupled through C208 through the CB/PA switch to the Volume Control. The Volume Control establishes the gain provided by the Audio Preamplifier, Q5. The amplified audio is coupled from Q5 collector through the Active Filter to the Audio Power Amp, IC301. The amplified audio from the power amp is coupled through the transmit contact of relay K1 through S3-3 and to the external PA speaker.

ALIGNMENT

Carrier Oscillator

- Set the mode switch to LSB and connect the frequency counter to TP2, junction of C457 and R461.
- Adjust C510 for 7.8025 MHz.

FREQUENCY SYNTHESIZER

Frequency Adjustment

- Connect the frequency counter to the emitter of Q22 using an X10 RF probe. Set the Fine Tune control to mid-range and the Mode switch to LSB.
- Rotate the Channel Selector switch and adjust the High Frequency Oscillator frequency as listed in Table 3.

Channel Switch Position	Adjust	Frequency
1	C648	11.700 MHz
5	C647	11.750 MHz
9	C646	11.800 MHz
13	C645	11.850 MHz
17	C644	11.900 MHz
21	C643	11.950 MHz

- Connect the frequency counter to TP1, junction of CR601 and CR602 and adjust the synthesizer output frequencies as listed in Table 4.

TABLE 4
SYNTHESIZER OUTPUT FREQUENCIES

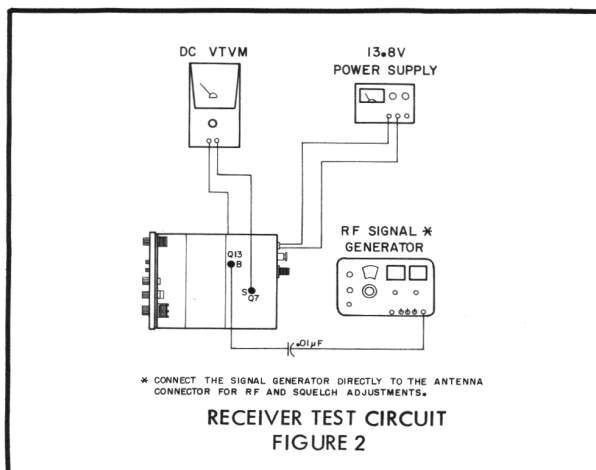
Channel Switch Position	Adjust	Frequency
1	C642	19.1625 MHz
6	C641	19.2225 MHz
11	C640	19.2825 MHz
16	C639	19.3525 MHz

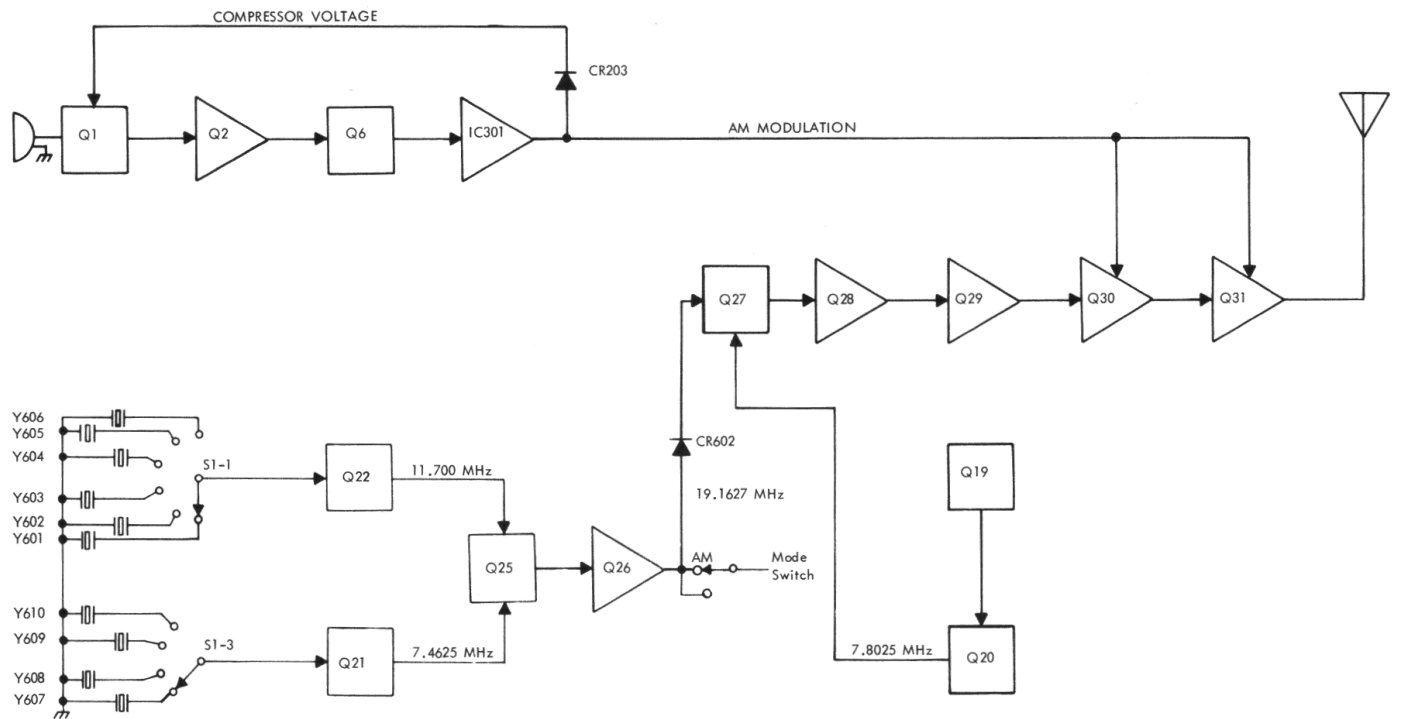
Synthesizer Output

- Set the channel selector switch to channel 13 and set the mode switch to LSB.
- Connect an RF voltmeter to TP1, junction of CR601 and CR602. Adjust T601, T602 and T603 for a maximum meter reading.
- Set the mode switch to USB and adjust T501, T502, T604, T605 and T606 for a maximum meter reading.
- Readjust T606 and T603 for approximately equal voltage levels for USB and LSB respectively.

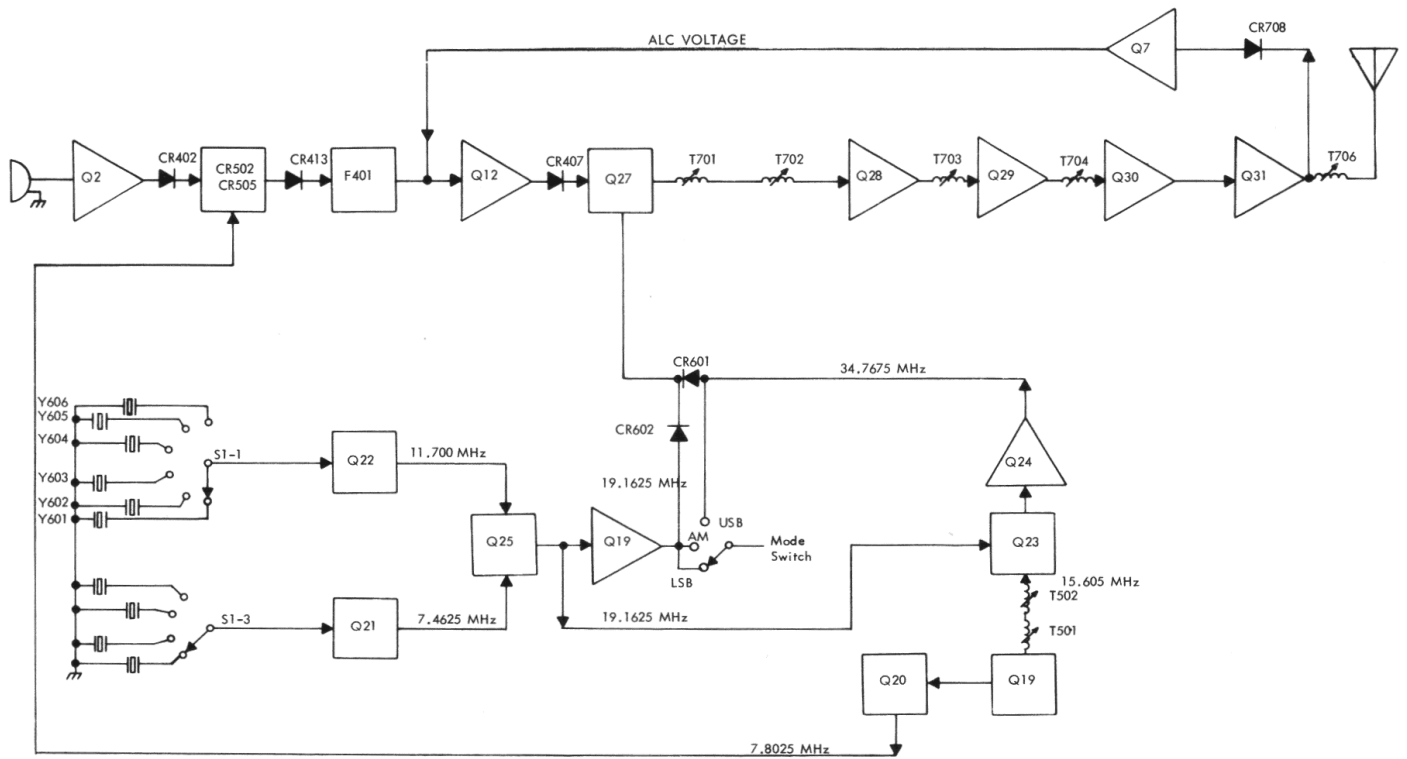
RECEIVER ALIGNMENT

Connect the receiver test circuit as shown in Figure 2 and refer to Figure 5 for alignment points location. Set the squelch control fully counterclockwise, the RF gain control fully clockwise, the fine tune control to its center position and the volume control for a suitable reading.





SSB TRANSMIT
BLOCK DIAGRAM



AM TRANSMIT
BLOCK DIAGRAM

RF AND IF SECTION

IF Adjustment (AM)

- Connect the DC voltmeter to the source of Q7 and adjust R467 for 1.7 VDC.
- Set the mode switch to AM and set the channel selector to channel 13. Set the signal generator to 7.8 MHz modulated 30% with 1 kHz and connect it to the base of Q13 through a ceramic 0.01 μ F capacitor.
- Adjust T401, T402 and T403 for maximum audio output while keeping the generator output to a minimum.

IF Adjustment (SSB)

- Set the mode switch to USB and connect a signal generator to the base of Q13 through a 0.01 μ F ceramic capacitor. Set the signal generator output to 7.8 MHz unmodulated.
- Adjust T409 for maximum audio output. Readjust T401, T402 and T403 if necessary.

RF Adjustment

- Set the mode switch to AM, set the channel selector switch to channel 13 and connect the signal generator to the antenna connector. Set the generator output to 27.115 MHz modulated 30% with 1 kHz.
- Adjust T404, T405 and T406 for maximum audio output while keeping the generator output to a minimum.

Tight Squelch Adjustment

- Set the mode switch to AM, set the channel selector switch to channel 13 and connect the signal generator to the antenna connector. Adjust the signal generator output for 27.115 MHz at a level of 250 μ V.
- Set the squelch control, on the front panel, fully clockwise then adjust R318 until the squelch just opens.

Receive Meter Adjust

- Set the mode switch to AM, set the channel selector switch to channel 13 and connect the signal generator to the antenna connector. Adjust the generator output for 27.115 MHz at a level of 100 μ V.
- Adjust R469 for an S-9 reading on the front panel meter.
- Change the mode switch to LSB and adjust R470 for an S-9 reading on the front panel meter with the same signal input as in step a.

Noise Blanker Adjustment

- Set the mode switch to AM, set the Noise Blanker switch to the NB position, set the channel selector

switch to channel 13 and connect the signal generator to the antenna connector. Set the generator output to 27.115 MHz unmodulated.

- Connect the RF voltmeter to TP4, gate of Q9, and adjust C460 and T408 for a maximum meter reading.
- Adjust T407 for a minimum meter reading with a modulated 27.115 MHz signal at the antenna connector.

Receiver First Image Trap Adjustment

- Set the mode switch to USB, set the channel selector switch to channel 13 and connect the signal generator to the antenna connector. Set the generator output to the first image spurious frequency at USB (channel 13 = 42.7160 MHz).
- Adjust C461 for a minimum audio output while keeping the generator output at a maximum.

TRANSMITTER TUNEUP

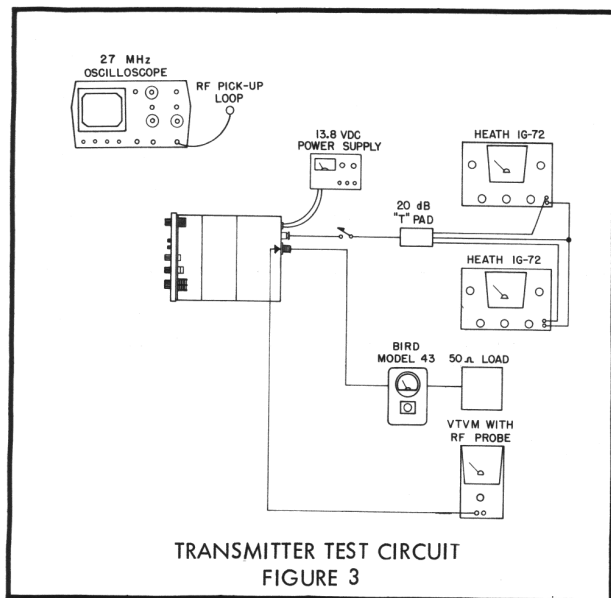
NOTE

The directional insertion wattmeter which is used to read CW signals will not read SSB peak envelope power directly. Therefore a PEP power meter should be used. If a PEP power meter is not available, the directional insertion wattmeter can be used. To convert the reading to PEP, use the following formula:

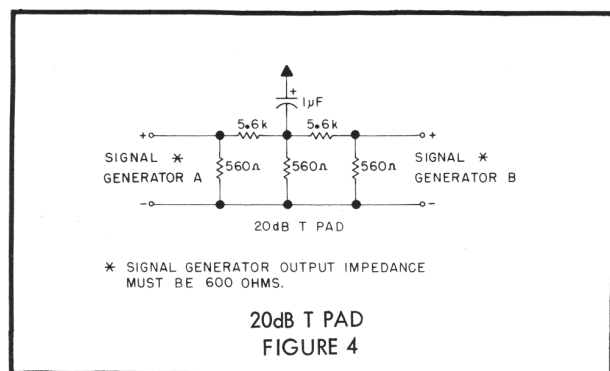
$$\text{Peak Envelope Power (PEP)} = \frac{\text{Wattmeter reading}}{0.405}$$

AM and SSB Power Adjustment

- Set the mode switch to AM and connect the transmitter test setup as shown in Figure 3.



- b. Key the transmitter and adjust T701, T702 and T703 for maximum power output.
- c. Set the mode switch to LSB and connect two audio generators to the microphone input as shown in Figure 4. Adjust the output of one generator to 500 Hz and the other to 2400 Hz at a level that will produce a good crossover waveform.



- d. Key the transmitter and adjust T704, T705 and T706 for maximum RF output while keeping the two tone audio signal input to a minimum.

NOTE

To adjust T703 and T706; melt the wax, make the adjustment and reseal with wax.

SSB Carrier Suppression Adjustment

- a. Set the mode switch to LSB and refer to the transmitter test setup.
- b. Key the transmitter, with no modulation, and adjust C511, R514 and T503 for a minimum RF voltmeter reading at the antenna, approximately 20 mV.

Automatic Level Control (ALC) Adjustment

- a. Connect the test setup as shown in Figure 3 and set the mode switch to LSB.
- b. Connect the two tone generators to the microphone input, one generator set to 500 Hz and the other at 2400 Hz.
- c. Key the transmitter and set the audio generator output level to produce 6 watts PEP (2.4 W RMS) from the transmitter.
- d. Increase the generators output level by 23 dB, and adjust R727 for a transmitter power output of 12 watts PEP (4.8 W RMS).

Automatic Modulation Limiter

- a. Connect a signal generator to the microphone connector and set the Mode switch to AM.
- b. Set the audio generator output for 1 kHz at a level sufficient to provide 50% modulation.
- c. Increase the audio generator output level 16 dB and adjust R216 for 90% modulation.

Transmitter Frequency Adjustment

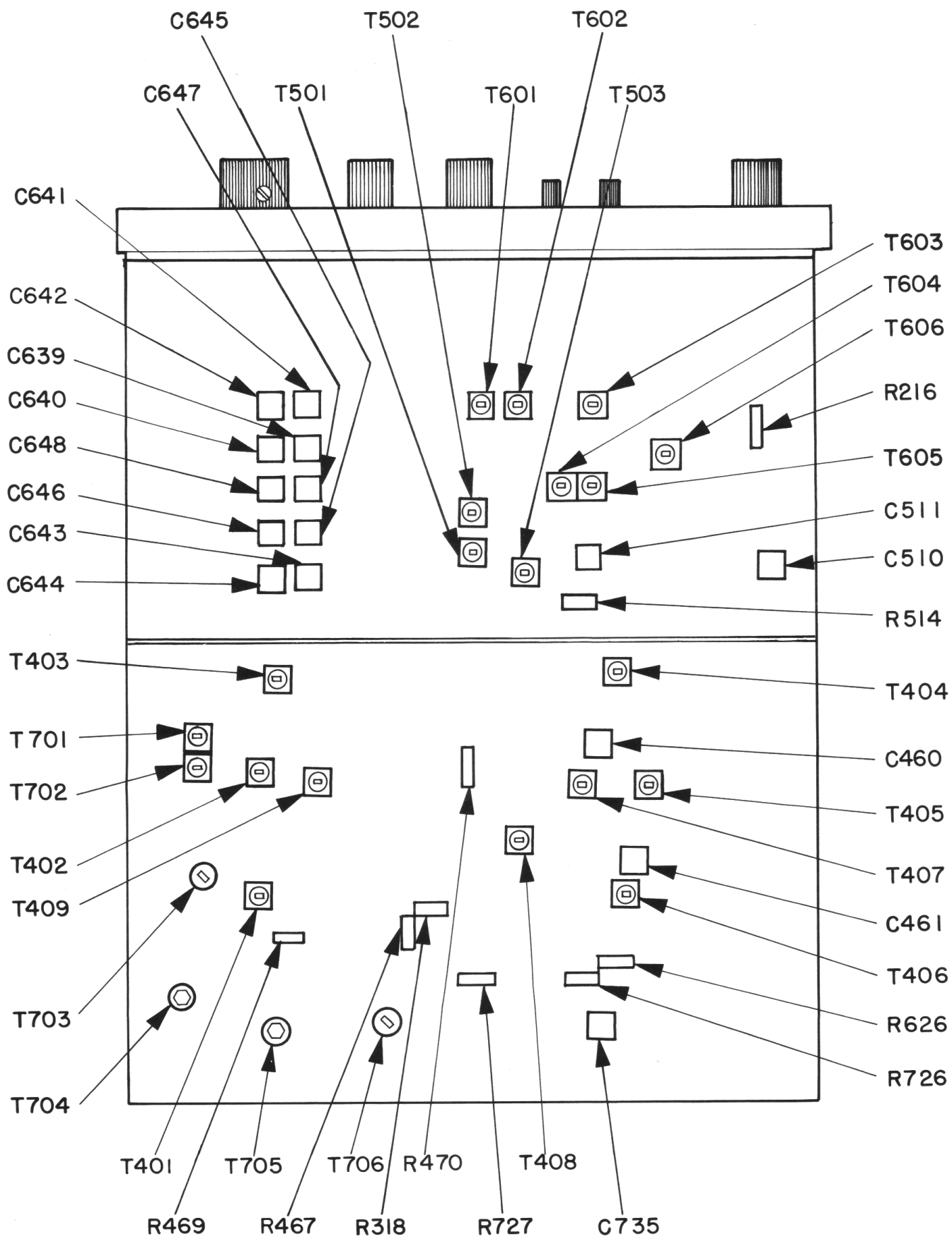
- a. Connect the test setup as shown in Figure 3, set the mode switch to AM and set the channel selector switch to channel 13.
- b. Loop couple the frequency counter to L707 and key the transmitter.
- c. Adjust R626 for 27.115 MHz (unmodulated channel 13) and recheck the frequency on all channels. The transmitted frequency should be within $\pm 0.005\%$ of the channel frequency.

TABLE 3
CHANNEL FREQUENCIES

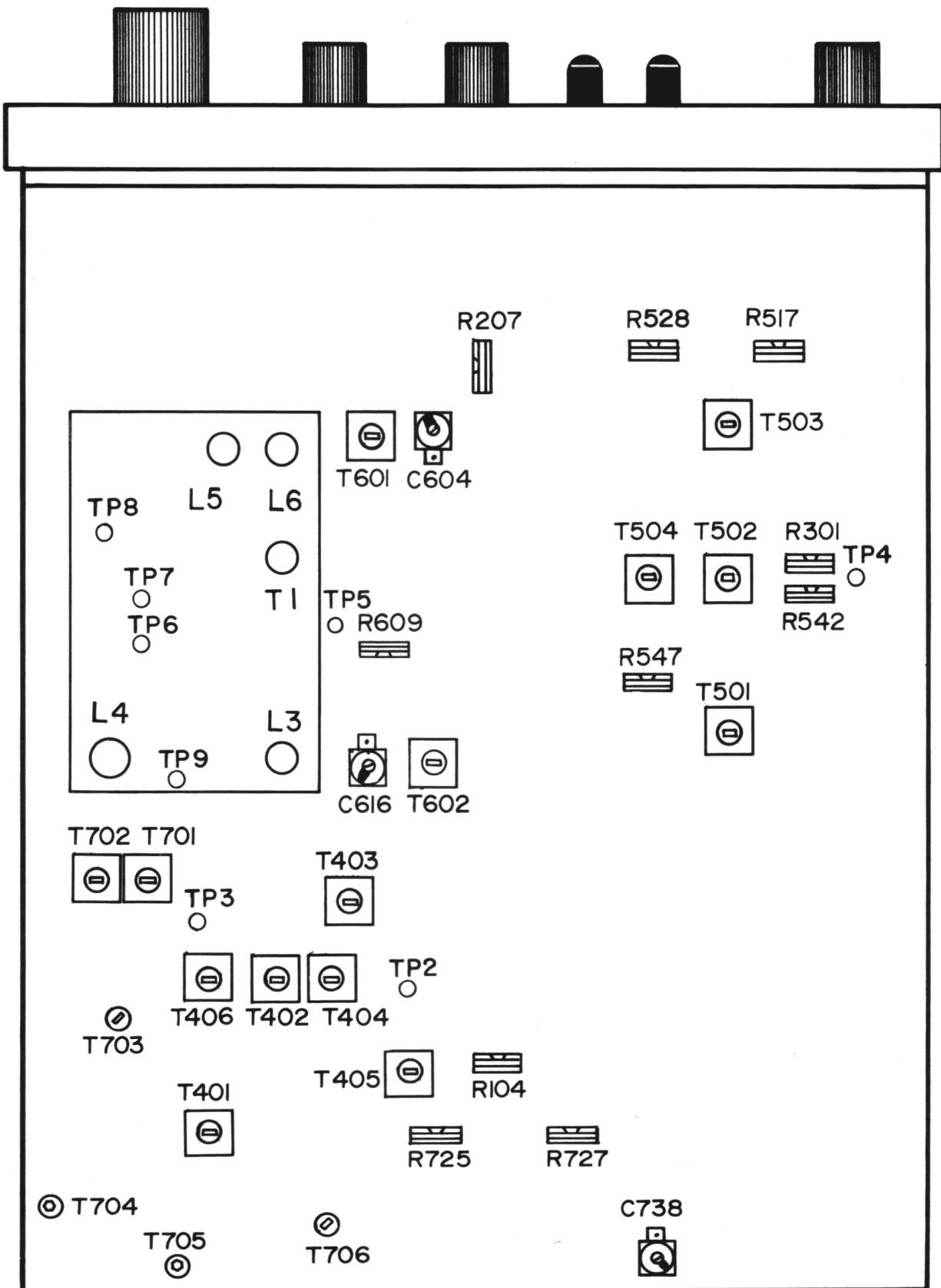
Channel	Minimum Limit (kHz)	Center Frequency (MHz)	Maximum Limit (kHz)	Channel	Minimum Limit (kHz)	Center Frequency (MHz)	Maximum Limit (kHz)
1	26,963.652	26.965	26,966.348	13	27,113.645	27.115	27,116.355
2	26,973.652	26.975	26,976.348	14	27,123.644	27.125	27,126.356
3	26,983.651	26.985	26,986.349	15	27,133.644	27.135	27,136.356
4	27,003.651	27.005	27,006.350	16	27,153.643	27.155	27,156.357
5	27,013.650	27.015	27,016.350	17	27,163.642	27.165	27,166.358
6	27,023.649	27.025	27,026.351	18	27,173.642	27.175	27,176.358
7	27,033.649	27.035	27,036.351	19	27,183.641	27.185	27,186.359
8	27,053.648	27.055	27,056.352	20	27,203.640	27.205	27,206.360
9	27,063.647	27.065	27,066.353	21	27,213.640	27.215	27,216.360
10	27,073.647	27.075	27,076.353	22	27,223.638	27.225	27,226.361
11	27,083.646	27.085	27,086.354	23	27,253.638	27.255	27,256.362
12	27,103.645	27.105	27,106.355				

NOTE:

FCC regulations require all transmitter frequencies to be within $\pm 0.005\%$ of channel center frequency.



ALIGNMENT POINTS
FIGURE 5



V352D ALIGNMENT POINTS

Meter

- a. Connect the test setup as shown in Figure 3 and set the mode switch to AM.
- b. Key the transmitter, unmodulated, and adjust R726 for a reading of 4 on the meter.

Harmonic Trap

This adjustment is made at the factory and it removes the second harmonic frequency from the transmitted signal. Since the second harmonic is in the 54 MHz range, it can interfere with television channel 2. Therefore if there is some question about TV interference, proceed as follows:

- a. Turn on a nearby TV and set it to channel 2.
- b. Set the transceiver channel selector to channel 13, set the Mode Switch to AM, connect a 50 Ω dummy load and key the transmitter.
- c. Adjust C735 for minimum TV interference.

DIGITAL SYNTHESIZER V352D ALIGNMENT

A. Carrier Oscillator

1. Connect the frequency counter to TP5.
2. Set the mode switch to USB and adjust T601 for 7.7975 MHz.
3. Set the mode switch to LSB and adjust C604 for 7.8025 MHz.

B. Reference Oscillator

1. Connect the frequency counter to TP8 and center the Fine Tune control.
2. Set the mode switch to AM and adjust L5 for 10.0000 MHz.
3. Set the mode switch to LSB or USB and adjust L6 for 9.9987 MHz.

C. Mixer

1. Connect the RF voltmeter to TP7.
2. Adjust T1 for a maximum meter indication.

D. Voltage Controlled Oscillator (VCO)

1. Connect a high impedance input DC voltmeter to TP6 and set the channel selector to channel 1.
2. Adjust L3 for 3 VDC.

E. Synthesizer Output

1. Connect the RF voltmeter to TP9 and set the channel selector to channel 13.
2. Adjust L4 for a maximum meter indication.

F. Synthesizer Frequency Adjustment

1. Connect the frequency counter to TP9 and set the mode switch to LSB.
2. Refer to Table 1 for synthesizer output frequencies.
3. Check the channel frequencies on the AM mode and the USB mode.

RECEIVER ALIGNMENT

A. IF Adjustment (AM)

1. Connect the DC voltmeter to the source Q508 and adjust R542 for 1.7 VDC.
2. Set the mode switch to AM and set the channel selector switch to channel 13. Set the signal generator to 7.8 MHz modulated 30% with 1 kHz and connect it to the base of Q13 through a ceramic 0.01 μ F capacitor.
3. Adjust T503, T502 and T501 for maximum audio output while keeping the generator output to a minimum.

B. IF Adjustment (SSB)

1. Set the mode switch to USB and connect a signal generator to the base of Q13 through a 0.01 μ F ceramic capacitor. Set the generator output to 7.8 MHz unmodulated.
2. Adjust T584 for maximum audio output. Readjust T503, T502 and T501 if necessary.

C. RF Adjustment

1. Set the mode switch to AM, set the channel selector switch to channel 13 and connect the signal generator to the antenna connector. Set the generator output to 27.115 MHz modulated 30% with 1 kHz.
2. Adjust T403, T402 and T401 for maximum audio output while keeping the generator output to a minimum.

D. Tight Squelch Adjustment

1. Set the mode switch to AM, set the channel selector switch to channel 13 and connect the signal

generator to the antenna connector. Set the generator output to 27.115 MHz at a level of 250 μ V.

2. Set the front panel squelch control fully clockwise, then adjust R301 until the squelch just opens.

E. Receive Meter Adjust

1. Set the mode switch to AM, set the channel selector switch to channel 13 and connect the signal generator to the antenna connector. Adjust the generator output for 27.115 MHz at a level of 100 μ V.
2. Adjust R517 for an S-9 reading on the front panel meter.
3. Change the mode switch to LSB and adjust R528 for an S-9 reading on the front panel meter with the same signal input as in step 1.

TRANSMITTER TUNEUP

A. AM and SSB Power Adjustment

1. Set the channel selector switch to channel 13 and connect a 50 ohm dummy load and wattmeter to the antenna connector. Set the mode switch to AM and key the transmitter.
2. Adjust T701, T702, T703 and T706 for a maximum power output of 4 watts.
3. Set the mode switch to LSB and USB.
4. Connect the 2 tone audio signal generator (500 Hz and 2400 Hz at the same output level) to the microphone input.
5. Adjust T704, T705 and T706 for maximum power output while keeping the 2 tone audio signal generator output at a minimum.

B. Automatic Level Control (ALC) Adjustment

1. Connect the 50 ohm load and wattmeter to the antenna connector and set the mode switch to LSB or USB.
2. Connect the two tone generators to the microphone input, one generator set to 500 Hz and the other at 2400 Hz.
3. Key the transmitter and set the audio gen-

erator output level to produce 6 watts PEP from the transmitter.

4. Increase the generator output level by 23 dB and adjust R725 for a transmitter power output of 12 watts PEP.

C. SSB Carrier Suppression Adjustment

1. Set the channel selector switch to channel 13, set the mode switch to LSB and connect a 50 ohm dummy load and wattmeter to the antenna connector.
2. Connect an RF voltmeter to the antenna connector.
3. Key the transmitter, with no modulation, and adjust T602, C616 and C609 for a minimum RF voltage reading at the antenna connector, approximately 20 mV.
4. Switch the mode switch to USB and adjust C616 and R609 for a balance between LSB and USB.

D. Automatic Modulation Limiter (AML)

1. Connect a dummy load and oscilloscope to the antenna connector, an audio generator to the microphone input and set the mode switch to AM.
2. Key the transmitter and set the signal generator output for 1 kHz at a level sufficient enough to provide 50% modulation.
3. Increase the audio generator level 16 dB and adjust R207 for 90% modulation.

E. Transmitter Frequency Adjustment

1. Connect a dummy load to the antenna connector, set the mode switch to AM and set the channel selector switch to channel 13.
2. Loop couple the frequency counter to L708, key the transmitter and adjust R104 for 27.115 MHz and check the frequency of all channels.

F. Transmit Meter Adjust

1. Connect a dummy load to the antenna connector and set the mode switch to AM.
2. Key the transmitter and adjust R727 for a front panel meter reading of 4.

VIKING 352

PARTS LIST

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
CAPACITORS			C416	Same as C415	
C101	Feedthru capacitor	022-2810-020	C417	0.01 μ F ceramic 50 WV	510-3002-103
C102	2200 μ F electrolytic 16 WV	022-2810-021	C418	0.04 μ F mylar 50 WV	510-1003-473
C103	220 μ F electrolytic 16 WV	022-2810-017	C419	0.001 μ F ceramic 50 WV	510-3002-102
C104	Same as C103		C420	0.04 μ F mylar 50 WV	510-1003-473
C105	Same as C103		C421	Same as C420	
C106	0.01 μ F ceramic 50 WV	510-3002-103	C422	Same as C420	
C201	Same as C106		C423	Same as C420	
C202	Same as C106		C424	Same as C420	
C203	Same as C106		C425	Same as C420	
C205	1 μ F electrolytic 50 WV	022-2810-009	C426	20 pF mica 50 WV	022-2810-005
C206	47 μ F electrolytic 16 WV	022-2810-015	C428	0.04 μ F mylar 50 WV	510-1003-473
C207	1 μ F electrolytic 50 WV	022-2810-009	C429	Same as C428	
C208	0.02 μ F $\pm 20\%$, 16V	510-3010-223	C430	Same as C428	
C209	10 μ F electrolytic 16 WV	022-2810-013	C431	0.001 μ F ceramic 50 WV	510-3002-102
C210	0.04 mylar 50 WV	510-1003-473	C432	Same as C431	
C211	4.7 μ F electrolytic 25 WV	022-2810-019	C433	20 pF mica 50 WV	022-2810-005
C212	Same as C211		C434	0.01 μ F ceramic 50 WV	510-3002-103
C213	10 μ F electrolytic 16 WV	022-2810-013	C435	0.04 μ F ceramic 50 WV	510-1003-104
C214	0.001 μ F ceramic 50 WV	510-3001-102	C437	0.01 μ F ceramic 50 WV	510-3002-103
C215	1 μ F electrolytic 50 WV	022-2810-009	C438	Same as C437	
C216	0.01 μ F ceramic	510-3002-103	C439	3 pF mica 50 WV	022-2810-011
C301	1 μ F electrolytic 50 WV	022-2810-009	C440	5 pF mica 50 WV	022-2810-004
C302	Same as C301		C441	0.01 μ F ceramic 50 WV	510-3002-103
C303	0.01 μ F ceramic 50 WV	510-3002-103	C442	Same as C441	
C304	1 μ F electrolytic 50 WV	022-2810-009	C443	1 μ F electrolytic 50 WV	022-2810-009
C305	0.01 μ F ceramic 50 WV	510-3002-103	C444	0.01 μ F ceramic 50 WV	510-3002-103
C306	Same as C305		C445	100 pF mica 50 WV	510-3002-101
C307	0.22 μ F electrolytic 16 WV	022-2810-014	C446	0.1 μ F mylar 50 WV	510-1003-104
C308	47 μ F electrolytic 16 WV	022-2810-015	C447	0.04 μ F mylar 50 WV	510-1003-473
C309	0.01 μ F mylar 50 WV	022-2810-022	C448	1 pF mica 50 WV	022-2810-012
C310	Same as C309		C449	0.04 mylar 50 WV	510-1003-473
C311	0.0047 μ F mylar 50 WV	022-2810-016	C450	Same as C449	
C312	0.01 μ F mylar 50 WV	510-1003-103	C451	1 μ F electrolytic 50 WV	022-2810-009
C313	0.01 μ F ceramic 50 WV	510-3002-103	C452	0.01 mylar 50 WV	022-2810-022
C314	47 μ F electrolytic 16 WV	022-2810-015	C453	10 μ F electrolytic 16 WV	022-2810-013
C315	220 μ F electrolytic 16 WV	022-2810-017	C454	0.01 μ F ceramic 50 WV	510-3002-103
C316	120 pF mica 50 WV	510-3002-121	C455	1 pF electrolytic 50 WV	022-2810-009
C317	300 pF mica 50 WV	510-3002-301	C456	Same as C455	
C318	0.1 μ F mylar 50 WV	510-1003-104	C457	15 pF mica 50 WV	510-3002-150
C319	0.033 μ F mylar 50 WV	510-1003-333	C458	0.01 μ F ceramic 50 WV	510-3002-103
C320	47 μ F electrolytic 16 WV	022-2810-015	C459	47 pF mica 50 WV	510-0002-470
C321	470 μ F electrolytic 16 WV	022-2810-018	C460	40 pF trim	022-2812-001
C322	220 μ F electrolytic 16 WV	022-2810-017	C461	10 pF trim	022-2812-004
C323	Same as C322		C462	0.04 mylar 50 WV	510-1003-473
C324	0.1 μ F mylar 50 WV	510-1003-104	C463	56 pF mylar	022-2810-002
C325	1 μ F electrolytic 50 WV	022-2810-009	C464	1 μ F electrolytic 50 WV	022-2810-009
C326	10 μ F electrolytic 16 WV	022-2810-013	C465	0.04 mylar 50 WV	510-1003-473
C401	0.01 μ F ceramic 50 WV	510-3002-103	C466	Same as C465	
C402	1 μ F electrolytic 50 WV	022-2810-009	C467	0.47 μ F electrolytic 50WV	022-2810-025
C403	0.1 μ F mylar 50 WV	510-1003-104	C468	4.7 μ F electrolytic 25WV	022-2810-019
C404	0.01 μ F ceramic 50 WV	510-3002-103	C469	60 pF mica	022-2810-024
C405	1 μ F electrolytic 50 WV	022-2810-009	C470	60 pF mica	022-2810-024
C406	0.001 μ F ceramic 50 WV	510-3002-102	C501	22 pF ceramic NPO 50 WV	510-3013-220
C407	20 pF mica 50 WV	022-2810-005	C502	500 pF mica 50 WV	510-3002-511
C408	Same as C407		C503	150 pF mica 50 WV	510-3002-151
C409	0.01 μ F ceramic 50 WV	510-3002-103	C504	0.01 μ F ceramic 50 WV	510-3002-103
C410	20 pF mica 50 WV	022-2810-005	C505	15 pF mica 50 WV	510-3002-150
C411	0.01 μ F ceramic 50 WV	510-3002-103	C506	2 pF 500 WV	510-9002-209
C412	20 pF mica 50 WV	022-2810-005	C507	0.01 μ F ceramic 50 WV	510-3002-103
C413	0.01 μ F ceramic 50 WV	510-3002-103	C508	0.001 μ F ceramic 50 WV	510-3002-102
C414	15 pF mica 50 WV	510-3002-150	C509	0.01 μ F ceramic 50 WV	510-3002-103
C415	4.7 pF mica 50 WV	022-2810-010	C510	20 pF trim	022-2812-003
			C511	10 pF trim	022-2812-004

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
C512	100 pF mica 50 WV	510-3002-101	C712	Same as C711	
C513	Same as C512		C713	Same as C711	
C514	5 pF mica 50 WV	022-2810-004	C714	30 pF mica 50 WV	022-2810-003
C515	0.01 μ F ceramic 50 WV	510-3002-103	C715	100 pF mica 50 WV	510-3002-101
C601	100 pF mica 50 WV	510-3002-101	C716	0.01 μ F ceramic 50 WV	510-3002-103
C602	300 pF mica 50 WV	510-3002-301	C717	Same as C716	
C603	0.01 μ F ceramic 50 WV	510-3002-103	C718	85 pF mica 50V	022-2810-026
C604	2 pF mica 50 WV	022-2810-001	C719	150 pF mica 50 WV	510-3002-151
C605	100 pF mica 50 WV	510-3002-101	C720	0.01 μ F ceramic 50 WV	510-3002-103
C606	300 pF mica 50 WV	510-3002-301	C721	Same as C720	
C607	0.01 μ F ceramic 50 WV	510-3002-103	C722	150 pF mica 50 WV	510-3002-151
C608	10 pF mica 50 WV	510-3002-100	C723	20 pF mica 50 WV	022-2810-005
C609	0.01 μ F ceramic 50 WV	510-3002-103	C724	400 pF mica 50 WV	022-2810-006
C610	Same as C609		C725	2 pF mica 50 WV	022-2810-007
C611	1P 500V	510-9002-109	C726	0.01 μ F ceramic 50 WV	510-3002-103
C612	56 pF 500V	022-2810-002	C727	65 pF mica 50 WV	022-2810-008
C613	0.01 μ F ceramic 50 WV	510-3002-103	C728	200 pF mica 50 WV	510-3002-201
C614	Same as C613		C729	0.01 μ F ceramic 50 WV	510-3002-103
C615	Same as C613		C730	0.1 μ F mylar 50 WV	510-1003-104
C616	2 pF 500V	510-9002-209	C731	0.01 μ F ceramic 50 WV	510-3002-103
C617	100 pF mica 500V	510-3002-101	C732	100 pF mica 50 WV	510-3002-101
C618	0.01 μ F ceramic 50 WV	510-3002-103	C733	1 μ F electrolytic 50 WV	022-2810-009
C619	220 pF mica 50 WV	510-3002-221	C734	0.01 μ F ceramic 50 WV	510-3002-103
C620	0.01 μ F ceramic 50 WV	510-3002-103	C737	22 μ F	022-2810-023
C621	22 pF ceramic 50 WV	510-3013-220	C738	10 μ F electrolytic 16 WV	022-2810-013
C622	Same as C621		C801	0.01 μ F ceramic 50 WV	510-3002-103
C623	Same as C621		C802	Same as C801	
C624	Same as C621		C803	Same as C801	
C625	30 pF ceramic 50 WV	022-2810-003	C804	Same as C801	
C626	Same as C625		C805	Same as C801	
C627	Same as C625		C806	0.04 μ F mylar 50 WV	510-1003-473
C628	Same as C625		C807	Same as C806	
C629	Same as C625			DIODES	
C630	Same as C625				
C631	15 pF mica 50 WV	510-3002-150	CR101	Silicon, U05B	022-2823-001
C632	0.01 μ F ceramic 50 WV	510-3002-103	CR102	Zener 9V 1W BX090	022-2823-002
C633	0.04 μ F mylar 50 WV	510-1003-473	CR103	Same as CR102	
C634	0.01 μ F ceramic 50 WV	510-3002-103	CR104	Same as CR102	
C635	Same as C634		CR201	Germanium 1N60	022-2823-003
C636	Same as C634		CR202	Silicon WG713	022-2823-004
C637	56 pF mica 50 WV	510-3002-560	CR203	Germanium 1N60	022-2823-003
C638	0.001 μ F ceramic 50 WV	510-3002-102	CR204	Silicon U05B	022-2823-001
C639	40 pF trim	022-2812-001	CR301	Germanium 1N60	022-2823-003
C640	Same as C639		CR401	Same as CR301	
C641	Same as C639		CR402	Silicon WG713	022-2823-004
C642	Same as C639		CR403	Same as CR402	
C643	30 pF trim	022-2812-002	CR404	Same as CR402	
C644	Same as C643		CR405	Germanium 1N60	022-2823-003
C645	Same as C643		CR406	Silicon WG713	022-2823-004
C646	Same as C643		CR407	Same as CR406	
C647	Same as C643		CR408	Germanium 1N60	022-2823-003
C648	Same as C643		CR409	Same as CR408	
C649	0.01 μ F ceramic 50 WV	510-3002-103	CR410	Same as CR408	
C650	Same as C649		CR411	Same as CR408	
C651	Same as C649		CR412	Same as CR408	
C652	Same as C649		CR413	Same as CR408	
C701	100 pF mica 50 WV	510-3002-101	CR414	Silicon WG713	022-2823-004
C702	5 pF mica 50 WV	022-2810-004	CR415	Silicon 1S2472	022-2823-005
C703	0.01 μ F ceramic 50 WV	510-3002-103	CR416	Same as CR415	
C704	Same as C703		CR417	Germanium 1N60	022-2823-003
C705	100 pF mica 50 WV	510-3002-101	CR418	Same as CR417	
C706	1 pF 500V	510-9002-109	CR419	Silicon WG713	022-2823-004
C707	220 pF 500V	510-3002-221	CR420	Same as CR419	
C708	0.01 μ F ceramic 50 WV	510-3002-103	CR421	Same as CR419	
C709	Same as C708		CR422	Germanium 1N60	022-2823-003
C710	130 pF mica 50 WV	510-3002-131	CR423	Same as CR422	
C711	0.01 μ F ceramic 50 WV	510-3002-103			

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
CR424	Germanium 1N34A	022-2823-006	L402	Same as L401	
CR425	Silicon WG713	022-2823-004	L403	22 μ H choke	542-3002-002
CR501	Same as CR425		L404	1 μ H choke	542-3002-001
CR502	Germanium 1N60P	022-2823-007	L501	22 μ H choke	542-3002-002
CR503	Same as CR502		L502	150 μ H choke	022-2842-003
CR504	Same as CR502		L601	5.5 μ H choke	022-2842-004
CR505	Same as CR502		L602	470 μ H choke	022-2842-002
CR601	Silicon WG713	022-2823-004	L603	Same as L602	
CR602	Same as CR601		L604	0.22 μ H choke	022-2842-005
CR603	Germanium 1S1007	022-2823-008	L608	22 μ H choke	542-3002-002
CR604	Silicon WG713	022-2823-004	L701	0.65 μ H choke	022-2842-006
CR605	Same as CR604		L702	Same as L701	
CR606	Silicon 1S2888	022-2823-009	L703	0.22 μ H choke	022-2842-005
CR701	Zener 0.7V 250 mW	022-2823-010	L704	22 μ H choke	542-3002-002
CR702	Same as CR701		L705	Same as L704	
CR703	Same as CR701		L706	0.65 μ H choke	022-2842-006
CR704	Silicon 10D4	022-2823-011	L707	0.22 μ H choke	022-2842-005
CR705	Same as CR704		L708	C997ND 27 MHz ant	022-2842-007
CR706	Germanium 1N60	022-2823-003	L714	1.2 μ H choke	022-2842-008
CR707	Same as CR706				
CR708	Same as CR706			METER	
CR709	Same as CR706		M1	Meter	022-2854-001
	LAMPS			TRANSISTORS	
DS101	14V 75 mA	022-2849-001	Q1	FET limiter	022-2876-001
DS102	16V 40 mA	022-2849-002	Q2	NPN mic amp	022-2876-002
DS103	Same as DS102		Q3	NPN squelch amp.	022-2876-003
DS104	Same as DS102		Q4	PNP squelch gate	022-2876-004
DS105	Same as DS102		Q5	NPN audio preamp	022-2876-003
DS106	Red 16V 40 mA	022-2849-003	Q6	NPN active filter	022-2876-003
	FUSES		Q7	FET AGC amp	022-2876-005
F101	Fuse, 3A 250V	534-0003-026	Q8	FET blanker gate	022-2876-001
F301	Fuse (pigtail) 1.5A	022-2834-001	Q9	FET noise amp	022-2876-006
TB302	Terminal strip	586-1001-019	Q10	NPN IF amp	022-2876-007
	FILTER		Q11	Same as Q10	
F401	Crystal filter 7.8 MHz	022-2832-501	Q12	Same as Q10	
	IC		Q13	Same as Q10	
IC301	HA1339 audio amp	022-2844-001	Q14	FET receive mixer	022-2876-013
IC401	Noise amp μ A703	022-2844-002	Q15	FET RF amp	022-2876-009
	CONNECTORS		Q16	NPN SSB detector	022-2876-007
J101	Mic connector	515-1003-001	Q17	Same as Q16	
J301	3.5 connector (P. A. Spkr. Jack)	022-2815-001	Q18	NPN SSB meter amp	022-2876-003
J302	Same as J301 (Ext. Spkr. Jack)		Q19	NPN 7.8025 MHz osc	022-2876-007
J701	Antenna connector	515-3003-001	Q20	NPN 7.8025 MHz buffer	022-2876-007
	RELAY		Q21	NPN low frequency osc	022-2876-007
K1	Relay	022-2867-001	Q22	NPN high frequency osc	022-2876-007
	SPEAKER		Q23	FET USB mixer	022-2876-013
LS1	Speaker	022-2889-001	Q24	NPN 35 MHz amp	022-2876-007
	INDUCTORS		Q25	FET synthesizer mixer	022-2876-005
L101	1 mH choke	022-2842-001	Q26	NPN 19 MHz amp	022-2876-007
L201	22 μ H choke	542-3002-002	Q27	FET transmit mixer	022-2876-008
L401	470 μ H choke	022-2842-002	Q28	NPN transmit amp	022-2876-007
			Q29	NPN predriver	022-2876-010
			Q30	Driver	022-2876-011
			Q31	NPN power amplifier	022-2876-012
			Q32	AGC control	022-2876-007
				RESISTORS	
			R101	56 Ω 1 W metal oxide	569-1006-560
			R102	Same as R101	
			R103	33 Ω 1 W metal oxide	569-1006-330
			R202	270K Ω 1/4 W carbon	569-1002-271
			R203	10K Ω 1/4 W carbon	569-1002-103
			R204	3.3K Ω 1/4 W carbon	569-1002-332

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
R205	15K Ω 1/4 W carbon	569-1002-153	R436	10K Ω 1/4 W carbon	569-1002-103
R206	470 Ω 1/4 W carbon	569-1002-471	R437	470 Ω 1/4 W carbon	569-1002-471
R207	Same as R206		R439	15K Ω 1/4 W carbon	569-1002-153
R208	2.2K Ω 1/4 W carbon	569-1002-222	R440	220 Ω 1/4 W carbon	569-1002-221
R209	10K Ω 1/4 W carbon	569-1002-103	R441	10K Ω $\pm 10\%$ 1/4 W	569-1002-103
R210	1K Ω 1/4 W carbon	569-1002-102	R442	Same as R441	
R212	22K Ω 1/4 W carbon	569-1002-223	R443	33K Ω 1/4 W carbon	569-1002-333
R213	2.2K Ω 1/4 W carbon	569-1002-222	R445	Same as R443	
R214	10K Ω 1/4 W carbon	569-1002-103	R446	Same as R443	
R215	330 Ω $\pm 10\%$ 1/4 W	569-1002-331	R447	Same as R443	
R216	1K Ω	022-2862-006	R448	10K Ω 1/4 W carbon	569-1002-103
R217	0.22 Ω 1/4 W carbon	022-2869-003	R449	Same as R448	
R301	100 Ω 1/4 W carbon	569-1002-101	R450	Same as R448	
R302	56K Ω 1/4 W carbon	569-1002-563	R451	15K Ω 1/4 W carbon	569-1002-153
R303	33K Ω 1/4 W carbon	569-1002-333	R452	3.3K Ω 1/4 W carbon	569-1002-332
R304	4.7K Ω 1/4 W carbon	569-1002-472	R453	10K Ω 1/4 W carbon	569-1002-103
R305	15K Ω 1/4 W carbon	569-1002-153	R454	Same as R453	
R306	1K Ω 1/4 W carbon	569-1002-102	R456	15K Ω 1/4 W carbon	569-1002-153
R307	3.3K Ω 1/4 W carbon	569-1002-332	R457	4.7K Ω 1/4 W carbon	569-1002-472
R308	1K Ω 1/4 W carbon	569-1002-102	R458	470 Ω 1/4 W carbon	569-1002-471
R309	10K Ω 1/4 W carbon	569-1002-103	R459	2.2K Ω 1/4 W carbon	569-1002-222
R310	Same as R309		R460	3.3K Ω 1/4 W carbon	569-1002-332
R311	1.8K Ω 1/4 W carbon	569-1002-182	R461	1K Ω 1/4 W carbon	569-1002-102
R312	4.7K Ω 1/4 W carbon	569-1002-472	R464	100 Ω 1/4 W carbon	569-1002-101
R313	Same as R312		R465	2.2K Ω 1/4 W carbon	569-1002-222
R314	Same as R312		R466	10K Ω 1/4 W carbon	569-1002-103
R315	22K Ω 1/4 W carbon	569-1002-223	R467	5K Ω	022-2862-013
R316	330 Ω 1/4 W carbon	569-1002-331	R468	Potentiometer, RF gain	022-2862-003
R317	1K Ω 1/4 W carbon	569-1002-102	R469	20K Ω	022-2862-008
R318	10K Ω	022-2862-007	R470	100K Ω	022-2862-009
R319	Potentiometer, squelch	022-2862-002	R471	22K Ω $\pm 10\%$ 1/4 W	569-1002-223
R320	Potentiometer volume	022-2862-001	R501	4.7K Ω 1/4 W carbon	569-1002-472
R401	470K Ω 1/4 W carbon	569-1002-471	R502	Same as R501	
R402	1K Ω 1/4 W carbon	569-1002-102	R503	470 Ω 1/4 W carbon	569-1002-471
R403	100K Ω 1/4 W carbon	569-1002-104	R504	220 Ω 1/4 W carbon	569-1002-221
R404	27 Ω 1/4 W carbon	569-1002-271	R505	2.7K Ω 1/4 W carbon	569-1002-272
R405	3.3K Ω 1/4 W carbon	569-1002-332	R506	33K Ω 1/4 W carbon	569-1002-333
R406	2.7K Ω 1/4 W carbon	569-1002-272	R507	15K Ω 1/4 W carbon	569-1002-153
R407	1K Ω 1/4 W carbon	569-1002-102	R508	1K Ω 1/4 W carbon	569-1002-102
R408	1M Ω 1/4 W carbon	569-1002-105	R509	Same as R508	
R409	Same as R408		R510	47K Ω 1/4 W carbon	569-1002-473
R410	220K Ω 1/4 W carbon	569-1002-224	R511	330 Ω 1/4 W carbon	569-1002-331
R411	20K Ω 1/4 W carbon	569-1002-203	R512	100 Ω 1/4 W carbon	569-1002-102
R412	1K Ω 1/4 W carbon	569-1002-102	R513	330 Ω 1/4 W carbon	569-1002-331
R413	220 Ω 1/4 W carbon	569-1002-221	R514	500 Ω	022-2862-010
R414	15K Ω 1/4 W carbon	569-1002-153	R601	1K Ω 1/4 W carbon	569-1002-102
R415	3.3K Ω 1/4 W carbon	569-1002-332	R602	33K Ω 1/4 W carbon	569-1002-333
R416	470 Ω 1/4 W carbon	569-1002-471	R603	22K Ω 1/4 W carbon	569-1002-223
R417	1K Ω 1/4 W carbon	569-1002-102	R604	330 Ω 1/4 W carbon	569-1002-331
R418	3.3K Ω 1/4 W carbon	569-1002-332	R605	22K Ω 1/4 W carbon	569-1002-223
R419	470 Ω 1/4 W carbon	569-1002-471	R606	33K Ω 1/4 W carbon	569-1002-333
R420	1K Ω 1/4 W carbon	569-1002-102	R607	330 Ω 1/4 W carbon	569-1002-331
R421	47 Ω 1/4 W carbon	569-1002-470	R608	100 Ω 1 W	569-1006-101
R422	100 Ω 1/4 W carbon	569-1002-101	R609	470 Ω 1/4 W carbon	569-1002-471
R423	1K Ω 1/4 W carbon	569-1002-102	R610	Same as R609	
R424	200 Ω 1/4 W carbon	022-2869-004	R612	47K Ω 1/4 W carbon	569-1002-473
R425	47K Ω 1/4 W carbon	569-1002-473	R613	47 Ω 1/4 W carbon	569-1002-470
R426	470 Ω $\pm 10\%$ 1/4 W	569-1002-471	R614	330 Ω $\pm 10\%$ 1/4 W	569-1002-331
R427	1K Ω 1/4 W carbon	569-1002-102	R615	470K Ω 1/4 W solid	569-1002-474
R428	Same as R427		R616	1K Ω 1/4 W carbon	569-1002-102
R429	3.3K Ω 1/4 W carbon	569-1002-332	R618	220 Ω 1/4 W carbon	569-1002-221
R430	470 Ω 1/4 W carbon	569-1002-471	R619	47K Ω 1/4 W carbon	569-1002-473
R431	47 Ω 1/4 W carbon	569-1002-470	R620	47 Ω 1/4 W carbon	569-1002-470
R432	100K Ω 1/4 W carbon	569-1002-104	R621	680 Ω 1/4 W carbon	569-1002-681
R433	1M Ω 1/4 W carbon	569-1002-105	R622	1K Ω 1/4 W carbon	569-1002-102
R434	Same as R433		R623	100K Ω 1/4 W carbon	569-1002-104
R435	100K Ω 1/4 W carbon	569-1002-104	R624	3.3K Ω 1/4 W carbon	569-1002-332

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
R625	Potentiometer, fine tune	022-2862-004	T702	C182ZT 10MM 27 MHz	022-2892-015
R626	10K	022-2862-012	T703	C042QD 10MM 27 MHz	022-2892-016
R627	100Ω 1/4 W carbon	569-1002-101	T704	C979NT 10MM 27 MHz	022-2892-017
R701	100KΩ 1/4 W carbon	569-1002-104	T705	C996NT 10MM 27 MHz	022-2892-018
R702	1KΩ 1/4 W carbon	569-1002-102	T706	C043ND 10MM 27 MHz	022-2892-019
R703	3.3KΩ 1/4 W carbon	569-1002-332			
R704	470Ω 1/4 W carbon	569-1002-471			
R705	Same as R704			CRYSTALS	
R706	10KΩ 1/4 W carbon	569-1002-103	Y501	7.8025 MHz HC-25/U	022-2820-011
R707	2.7KΩ 1/4 W carbon	569-1002-272	Y601	11.700 MHz HC-25/U	022-2820-001
R708	470Ω 1/4 W carbon	569-1002-471	Y602	11.750 MHz HC-25/U	022-2820-002
R709	47Ω 1/4 W carbon	569-1002-470	Y603	11.800 MHz HC-25/U	022-2820-003
R710	10Ω 1/4 W carbon	569-1002-100	Y604	11.850 MHz HC-25/U	022-2820-004
R711	1KΩ 1/4 W carbon	569-1002-102	Y605	11.900 MHz HC-25/U	022-2820-005
R712	5.6Ω 1/4 W carbon	569-1002-569	Y606	11.950 MHz HC-25/U	022-2820-006
R713	2.2Ω 1/2 W solid	569-1004-222	Y607	7.4625 MHz HC-25/U	022-2820-007
R714	1KΩ 1/4 W carbon	569-1002-102	Y608	7.4725 MHz HC-25/U	022-2820-008
R715	47Ω 1/2 W solid	569-1004-470	Y609	7.4825 MHz HC-25/U	022-2820-009
R716	470Ω 1/2 W solid	569-1004-471	Y610	7.5025 MHz HC-25/U	022-2820-010
R717	22Ω 1/2 W solid	569-1004-220			
R718	100Ω 2 W metal oxide	022-2869-001		KNOBS	
R719	10Ω 1/2 W solid	569-1004-100			
R720	150Ω 1 W metal oxide	022-2869-002		Knob, squelch	547-0014-002
R721	3.3KΩ 1/4 W carbon	569-1002-332		Knob, volume	547-0014-002
R722	1KΩ 1/4 W carbon	569-1002-102		Knob, mode switch	547-0014-002
R723	4.7MΩ 1/4 W solid	569-1004-475		Knob, RF gain	547-0014-002
R724	1KΩ 1/4 W carbon	569-1002-102		Knob, fine tune	547-0014-002
R725	15KΩ 1/4 W carbon	569-1002-153		Knob, channel selector	547-0014-001
R726	100KΩ	022-2862-009			
R727	10KΩ	022-2862-012		HARDWARE	
	SWITCHES				
S1	Channel selector switch	022-2883-001		352 panel	022-2832-001
S2	Mode switch	022-2883-002		Dial	022-2832-002
S3	CB-PA slide switch	022-2883-003		352 overlay (Viking 352)	022-2859-001
S4	Noise blanker slide switch	022-2883-004		352 overlay (Johnson)	022-2859-002
	TRANSFORMERS			Pilot lamp bracket, red	022-2817-001
T401	S190AT 10MM 7.8 MHz IF	022-2892-001		Pilot lamp bracket, amber	022-2817-002
T402	S183AT 10MM 7.8 MHz IF	022-2892-002		Pilot lamp bracket, blue	022-2817-003
T403	Same as T402			Pilot lamp bushing	022-2813-001
T404	Same as T402			Johnson plastic trade mark	559-2018-002
T405	10MM 27 MHz	022-2892-003		Front overlay	022-2859-003
T406	10MM 27mHz	022-2892-004		Rear panel	022-2817-004
T407	S183AT 10MM 7.8 MHz IF	022-2892-002		Battery cable stopper	586-1001-019
T408	Same as T407			3.5 connector mounting plate	022-2817-005
T409	S185ZT 10MM 7.8 MHz detector	022-2892-005		Main chassis	022-2817-006
T501	Z176IT 10MM 15.6 MHz multi	022-2892-006		Meter mounting panel	022-2817-007
T502	Same as T501			Heat sink for Q29,Q30,Q31	022-2814-001
T503	S111DT 10MM balance modulator	022-2892-007		Heat sink for IC301	022-2814-002
T601	Z282IT 10MM 19 MHz	022-2892-008		Feedthru capacitor mounting plate	022-2817-008
T602	Z188AT 10MM 19 MHz	022-2892-009		Cabinet	022-2817-009
T603	Z284AT 10MM 19 MHz	022-2892-010		Mounting bracket	537-9352-001
T604	Z285IT 10MM 35 MHz	022-2892-011		Crystal holder	126-0110-005
T605	Z286KT 10MM 35 MHz	022-2892-012		Insulator f/HA1339	022-2818-001
T606	Z287AT 10MM 35 MHz	022-2892-013		Insulator f/mic connector	022-2818-002
T701	C181ZT 10MM 27 MHz	022-2892-014		Rubber plate f/speaker	022-2818-003
				Mount plate f/speaker	022-2817-011
				Phone plug	515-0020-001

VIKING 352 D

PARTS LIST

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
CAPACITORS			C301	1μF electrolytic 50 WV	022-2810-009
C1	0.04μF mylar 50 WV	510-1003-473	C302	Same as C301	
C2	220μF electrolytic 16 WV	022-2810-017	C303	10μF electrolytic 16 WV	022-2810-013
C3	0.01μF ceramic 50 WV	510-3002-103	C304	0.01μF ceramic 50 WV	510-3002-103
C4	Same as C3		C305	4.7 μF electrolytic	022-2810-019
C5	10μF electrolytic	022-2810-013	C306	0.22μF electrolytic 50 WV	022-2810-502
C6	56 pF ceramic 50 WV	510-3013-560	C307	0.01μF mylar 50 WV	022-2810-022
C7	100 pF ceramic 50 WV	510-3013-101	C308	Same as C307	
C8	47 pF ceramic 50 WV	510-3013-470	C309	0.0047μF mylar 50 WV	022-2810-016
C9	2 pF ceramic 50 WV	022-2810-501	C310	0.04μF mylar 50 WV	510-1003-473
C10	0.01μF ceramic 50 WV	510-3002-103	C311	0.01μF mylar 50 WV	022-2810-022
C11	15 pF ceramic 50 WV	510-3013-150	C312	120 pF ceramic 50 WV	510-3020-121
C12	56 pF ceramic 50 WV	510-3013-560	C313	300 pF mica 50 WV	510-0001-301
C13	0.01μF ceramic 50 WV	510-3002-103	C314	47μF electrolytic 16 WV	022-2810-015
C14	30 pF ceramic 50 WV	510-0002-300	C315	0.01μF ceramic 50 WV	510-3002-103
C15	0.04μF mylar 50 WV	510-1003-473	C316	220μF electrolytic 16 WV	022-2810-017
C16	0.22μF electrolytic 50 WV	022-2810-502	C317	0.033μF mylar 50 WV	510-1003-333
C17	5 pF ceramic 50 WV	510-3013-509	C318	47μF electrolytic 16 WV	022-2810-015
C18	0.22 μF electrolytic	022-2810-502	C319	0.01μF ceramic 50 WV	510-3002-103
C19	1μF tantal 25 WV	510-2045-109	C320	0.1μF mylar 50 WV	510-1003-104
C20	5 pF ceramic 50 WV	510-3013-509	C321	Same as C320	
C21	1.5 pF ceramic 50 WV	022-2810-503	C322	470μF electrolytic 16 WV	022-2810-018
C22	0.04μF mylar 50 WV	510-1003-473	C323	220μF electrolytic 16 WV	022-2810-017
C23	100 pF ceramic 50 WV	510-3013-101	C324	Same as C323	
C24	Same as C23		C325	0.04 μF mylar 50 wV	510-1003-473
C25	0.001μF ceramic 50 WV	510-3002-102	C401	20 pF ceramic 50 WV	022-2810-504
C26	0.01μF ceramic 50 WV	510-3002-103	C402	0.01μF ceramic 50 WV	510-3002-103
C27	Same as C26		C403	0.47μF electrolytic 50 WV	022-2810-025
C28	0.001μF ceramic 50 WV	510-3002-102	C404	0.01μF ceramic 50 WV	510-3002-103
C29	Same as C28		C405	3 pF ceramic 50 WV	022-2810-505
C30	0.01μF ceramic 50 WV	510-3002-103	C406	Same as C405	
C31	330 pF mica 50 WV	510-0004-331	C407	0.01μF ceramic 50 WV	510-3002-103
C32	150 pF ceramic 50 WV	510-0002-151	C408	Same as C407	
C33	0.001μF ceramic 50 WV	510-3002-102	C409	5 pF ceramic 50 WV	510-3013-509
C34	22 pF ceramic 50 WV	510-3013-220	C410	0.01μF ceramic 50 WV	510-3002-103
C35	0.01μF ceramic 50 WV	510-3002-103	C411	15 pF ceramic 50 WV	510-3013-150
C36	Same as C35		C412	0.01μF ceramic 50 WV	510-3002-103
C101	1000 pF feedthru capacitor	022-2810-020	C413	Same as C412	
C102	0.01μF ceramic 50 WV	510-3002-103	C414	33 pF ceramic 50 WV	510-3013-330
C103	2200μF electrolytic 16 WV	022-2810-021	C415	62 pF ceramic 50 WV	510-3013-620
C104	220μF electrolytic 16 WV	022-2810-017	C416	0.04μF mylar 50 WV	510-1003-473
C105	Same as C104		C417	20 pF ceramic 50 WV	022-2810-504
C106	Same as C104		C418	0.04μF mylar 50 WV	510-1003-473
C107	0.01μF ceramic 50 WV	510-3002-103	C419	0.001μF ceramic 50 WV	510-3002-102
C201	Same as C107		C420	0.01μF ceramic 50 WV	510-3002-103
C202	Same as C107		C421	20 pF ceramic 50 WV	022-2810-504
C203	Same as C107		C422	0.01μF ceramic 50 WV	510-3002-103
C204	1μF electrolytic 50 WV	022-2810-009	C423	20 pF ceramic 50 WV	022-2810-504
C205	0.01μF ceramic 50 WV	510-3002-103	C424	0.01μF ceramic 50 WV	510-3002-103
C206	0.001μF ceramic 50 WV	510-3002-102	C425	20 pF ceramic 50 WV	022-2810-504
C207	10μF electrolytic 16 WV	022-2810-013	C427	15 pF ceramic 50 WV	510-3013-150
C208	0.01μF ceramic 50 WV	510-3002-103	C428	56 pF ceramic 50 WV	510-3013-560
C209	4.7μF electrolytic 25 WV	022-2810-019	C429	0.001μF ceramic 50 WV	510-3002-102
C210	Same as C209		C430	1μF electrolytic 50 WV	022-2810-009
C211	1μF electrolytic 50 WV	022-2810-009	C501	0.001μF ceramic 50 WV	510-3002-102
C212	47μF electrolytic 16 WV	022-2810-015	C502	0.04μF mylar 50 WV	510-1003-473
C213	10μF electrolytic 16 WV	022-2810-013	C504	0.04μF mylar 50 WV	510-1003-473
C214	1μF electrolytic 50 WV	022-2810-009	C505	0.01μF ceramic 50 WV	510-3002-103
C215	0.04μF mylar 50 WV	510-1003-473	C506	20 pF ceramic 50 WV	022-2810-504
C216	0.47 μF electrolytic	022-2810-025	C507	0.05μF ceramic 50 WV	510-3002-103
C217	0.04 μF mylar		C508	0.04μF mylar 50 WV	510-1003-473
C218	100 μF electrolytic	510-1003-473	C509	Same as C508	
C219	0.04μF mylar 50 WV	510-1003-473	C510	Same as C508	
			C511	Same as C508	

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
C512	Same as C508		C718	0.01μF ceramic 50 WV	510-3002-103
C513	Same as C508		C719	Same as C718	
C514	Same as C508		C720	0.1μF mylar 50 WV	510-1003-104
C515	Same as C508		C721	82 pF ceramic 50 WV	510-3013-820
C516	Same as C508		C722	150 pF ceramic 50 WV	510-0002-151
C517	0.001μF ceramic 50 WV	510-3002-102	C723	10μF electrolytic 16 WV	022-2810-013
C518	0.04μF mylar 50 WV	510-1003-473	C724	0.01μF ceramic 50 WV	510-3002-103
C519	1 pF ceramic 50 WV	022-2810-506	C725	56 pF ceramic 50 WV	510-3013-560
C520	0.01μF ceramic 50 WV	510-3002-102	C726	0.047 μF ±20% 50V Disc	510-3002-473
C521	Same as C520		C727	Same as C726	
C522	0.04μF mylar 50 WV	510-1003-473	C728	300 pF mica 50 WV	510-0001-301
C523	0.01μF ceramic 50 WV	510-3002-102	C729	400 pF mica 50 WV	022-2810-006
C524	1μF electrolytic 50 WV	022-2810-009	C730	20 pF ceramic 50 WV	022-2810-504
C525	10μF electrolytic 16 WV	022-2810-013	C731	0.01μF ceramic 50 WV	510-3002-103
C526	0.01μF ceramic 50 WV	510-3002-103	C732	2 pF ceramic 50 WV	022-2810-501
C527	1μF electrolytic 50 WV	022-2810-009	C733	130 pF ceramic 50 WV	510-3013-131
C528	Same as C527		C734	0.01μF ceramic 50 WV	510-3002-103
C529	Same as C527		C735	Same as C734	
C530	47 pF ceramic 50 WV	510-3013-470	C736	Same as C734	
C531	100 pF ceramic 50 WV	510-3013-101	C737	62 pF ceramic 50 WV	510-3013-620
C532	0.1μF mylar 50 WV	510-1003-104	C738	10 pF trim	022-2812-004
C533	0.04μF mylar 50 WV	510-1003-473	C739	100 pF ceramic 50 WV	510-3013-101
C534	1μF electrolytic 50 WV	022-2810-009	C741	0.1μF mylar 50 WV	510-1003-104
C535	Same as C534		C742	0.01μF ceramic 50 WV	510-3002-103
C536	3 pF ceramic 50 WV	022-2810-505	C743	10μF electrolytic 16 WV	022-2810-013
C537	1μF electrolytic 50 WV	022-2810-009	C744	0.01μF ceramic 50 WV	510-3002-103
C538	0.01μF ceramic 50 WV	510-3002-103	C745	10μF electrolytic 16 WV	022-2810-013
C539	0.1μF mylar 50 WV	510-1003-104	C801	0.04μF mylar 50 WV	510-1003-473
C540	0.01μF ceramic 50 WV	510-3002-103	C802	Same as C801	
C541	3 pF ceramic 50 WV	022-2810-505	C803	Same as C801	
C542	0.01μF ceramic 50 WV	510-3002-103	C804	Same as C801	
C543	0.04μF mylar 50 WV	510-1003-473	C805	Same as C801	
C544	0.01μF ceramic 50 WV	510-3002-103	C806	0.01μF ceramic 50 WV	510-3002-103
C601	Same as C544		C807	Same as C806	
C602	Same as C544		C808	0.01μF ceramic 50 WV	510-3002-103
C603	5 pF ceramic 50 WV	510-3013-509	C809	Same as C808	
C604	10 pF trim	022-2812-004	C810	Same as C808	
C605	0.01μF ceramic 50 WV	510-3002-103		DIODES	
C606	500 pF mica 50 WV	510-0001-511	CR1	Silicon BB142	022-2823-501
C607	180 pF ceramic 50 WV	510-3013-181	CR2	Silicon 1N4448	523-1000-883
C608	0.01μF ceramic 50 WV	510-3002-103	CR3	Same as CR2	
C609	10 pF ceramic 50 WV	510-3013-100	CR4	Silicon 1S2688	022-2823-503
C610	Same as C609		CR101	Silicon U05B	022-2823-001
C611	15 pF ceramic 50 WV	510-3013-150	CR102	Zener 9V1W BZ090	022-2823-002
C612	0.04μF mylar 50 WV	510-1003-473	CR103	Same as CR102	
C613	100 pF ceramic 50 WV	510-3013-101	CR104	Same as CR102	
C614	0.01μF ceramic 50 WV	510-3002-103	CR201	Silicon 1N4448	523-1000-883
C615	15 pF ceramic 50 WV	510-3013-150	CR202	Germanium 1N60	022-2823-003
C616	10 pF trim	022-2812-004	CR203	Silicon 1N4448	523-1000-883
C617	0.01μF ceramic 50 WV	510-3002-103	CR204	Same as CR203	
C618	0.001μF ceramic 50 WV	510-3002-102	CR205	Silicon 1N4448	523-1000-883
C701	100 pF ceramic 50 WV	510-3013-101	CR301	Germanium 1N60	022-2823-003
C702	5 pF ceramic 50 WV	510-3013-509	CR402	Silicon 1S2472	022-2823-005
C703	0.01μF ceramic 50 WV	510-3002-103	CR403	Same as CR402	
C704	Same as C703		CR404	Silicon 1N4448	523-1000-883
C706	0.01μF ceramic 50 WV	510-3002-103	CR405	Germanium 1N60	022-2823-003
C707	10μF electrolytic 16 WV	022-2810-013	CR406	Same as CR405	
C708	0.01μF ceramic 50 WV	510-3002-103	CR407	Same as CR405	
C709	220 pF ceramic 50 WV	022-2810-507	CR408	Germanium 1N34A	022-2823-006
C710	0.01μF ceramic 50 WV	510-3002-103	CR501	Germanium 1N60	022-2823-003
C711	Same as C710		CR502	Same as CR501	
C712	130 pF ceramic 50 WV	510-3013-131	CR503	Same as CR501	
C713	0.01μF ceramic 50 WV	510-3002-103	CR504	Same as CR501	
C714	Same as C713		CR505	Same as CR501	
C715	Same as C713		CR506	Same as CR501	
C716	30 pF ceramic 50 WV	510-3013-300			
C717	100 pF ceramic 50 WV	510-3013-101			

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
CR507	Germanium 1N34A	022-2823-006		Knob, RF gain	547-0014-002
CR508	Silicon 1N4448	523-1000-883		Knob, finetune	547-0014-002
CR509	Same as CR508				
CR510	Germanium 1N60	022-2823-003		RELAY	
CR511	Silicon 1N4448	523-1000-883			
CR512	Same as CR511		K1	Relay	022-2867-001
CR513	Germanium 1N60	022-2823-003		INDUCTORS	
CR514	Silicon 1N4448	523-1000-883			
CR515	Same as CR514		L1	100μH choke	022-2842-501
CR516	Same as CR514		L2	150μH choke	022-2842-003
CR601	Same as CR514		L3	Z368N 10 mm 19 MHz OSC	022-2842-503
CR602	Same as CR514		L4	C354N 10 mm 19 MHz	022-2842-504
CR603	Same as CR514		L5	Y369N 10 mm 10 MHz OSC	022-2842-505
CR604	Germanium 1N60P	022-2823-502	L6	Y370N 10 mm 10 MHz OSC	022-2842-506
CR605	Same as CR604		L101	K18 AF choke	022-2842-001
CR606	Same as CR604		L201	22μH choke	022-2842-502
CR607	Same as CR604		L401	470μH choke	022-2842-002
CR608	Germanium 1N60	022-2823-003	L402	Same as L401	
CR701	Silicon 1N4448	523-1000-883	L403	130 mH	022-2842-507
CR702	Silicon 1S990S	022-2823-010	L601	22μH choke	022-2842-502
CR703	Same as CR702		L602	Same as L601	
CR704	Same as CR702		L603	150μH choke	022-2842-003
CR705	Silicon 10D4	022-2823-011	L701	0.65μH RFC	022-2842-006
CR706	Same as CR705		L702	Same as L701	
CR707	Germanium 1N60	022-2823-003	L703	1.2μH choke	022-2842-008
CR708	Same as CR707		L704	0.22μH RFC	022-2842-005
CR709	Silicon 1N4448	523-1000-883	L705	C997N 27 MHz ANT coil	022-2842-007
CR710	Germanium 1N60	022-2823-003	L706	22μH RFC	542-3002-002
	LAMPS		L707	Same as L706	
DS101	Pilot lamp 14V 75 mA (channel)	022-2849-001	L708	0.22μH RFC	022-2842-005
DS102	Pilot lamp 14V 75 mA (meter)	022-2849-001	L709	0.65μH RFC	022-2842-006
DS103	Pilot lamp 16V 75 mA (USB)	022-2849-002		SPEAKER	
DS104	Pilot lamp 16V 75 mA (AM)	022-2849-002	LS1	Speaker	022-2889-001
DS105	Pilot lamp 16V 75 mA (LSB)	022-2849-002		METER	
DS106	Pilot lamp 16V 75 mA (RX)	022-2849-002			
DS107	Pilot lamp red 16V 40 mA (TX)	022-2849-003			
	FUSES		M1	Meter	022-2854-001
F101	Fuse	534-0003-026		TRANSISTORS	
	FILTER		Q1	2SC710C NPN 19 MHz V. C. O.	022-2876-007
F501	Crystal filter 7.8 MHz	022-2832-501	Q2	2SC710C NPN buffer amp	022-2876-007
	IC's		Q3	2SC710C NPN out of lock amp	022-2876-007
IC1	78L06C	022-2844-501	Q4	2SA844C PNP out of lock amp	022-2876-501
IC2	NDC40 013	022-2844-502	Q5	2SC710C NPN buffer amp	022-2876-007
IC301	HA1339	022-2844-001	Q6	3SK41L FET mixer	022-2876-013
IC401	UA703	022-2844-002	Q7	2SC710C NPN multiplier	022-2876-007
	CONNECTORS		Q8	2SC710C NPN buffer amp	022-2876-007
J201	MIC connector	515-1003-001	Q9	2SC710C NPN 10 MHz standard oscillator	022-2876-007
J301	3.5 connector	022-2815-001	Q10	2SC710C NPN	022-2876-007
J302	Same as J301		Q201	2SK40C FET limiter	022-2876-502
J701	Antenna connector	515-3003-001	Q202	2SD187Y NPN mic amp	022-2876-002
	KNOBS		Q301	2SC710C NPN squelch amp	022-2876-007
	Knob, mode switch	547-0014-002	Q302	2SA844C PNP	022-2876-501
	Knob, channel selector	547-0014-001	Q303	2SC372Y NPN AF preamp	022-2876-003
	Knob, squelch	547-0014-002	Q304	2SC372Y NPN active filter	022-2876-003
	Knob, volume	547-0014-002	Q305	2SC1061 NPN AM mod.	022-2876-014
			Q401	2SK41E FET RF amp	022-2876-503
			Q402	2SC710C NPN RF AGC amp	022-2876-007
			Q403	3SK41L FET RX mixer	022-2876-013
			Q404	2SC710C NPN IF amp	022-2876-007
			Q405	2SK54B FET noise emp	022-2876-504

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
Q406	2SK55D FET blanker gate	022-2876-006	R202	10K ohm 1/4 W carbon	569-1002-103
Q501	2SC710C NPN IF Amp	022-2876-007	R204	Same as R202	
Q502	2SC710C NPN out of lock killer	022-2876-007	R205	2.2K ohm 1/4 W carbon	569-1002-222
Q503	2SC710C NPN IF amp	022-2876-007	R206	330 ohm 1/4 W carbon	569-1002-331
Q504	Same as Q503		R207	1K ohm variable	022-2862-006
Q505	2SC710C NPN SSB det.	022-2876-007	R208	3.3K ohm 1/4 W carbon	569-1002-332
Q506	Same as Q505		R209	15K ohm 1/4 W carbon	569-1002-153
Q507	2SC372Y NPN SSB S-meter amp	022-2876-003	R210	2.2K ohm 1/4 W carbon	569-1002-222
Q508	2SK34E FET AGC amp	022-2876-505	R211	470 ohm 1/4 W carbon	569-1002-471
Q509	2SC710C NPN	022-2876-007	R212	4.7K ohm 1/4 W carbon	569-1002-472
Q601	Same as Q509		R213	3.3K ohm 1/4 W carbon	569-1002-332
Q602	Same as Q509		R214	4.7K ohm 1/4 W carbon	569-1002-102
Q603	2SC710C NPN carrier OSC	022-2876-007	R215	Same as R214	569-1002-472
Q604	2SC710C NPN buffer amp	022-2876-007	R216	Same as R215	
Q701	3SK41L FET TX mixer	022-2876-013	R217	3.3K ohm 1/4 W carbon	569-1002-332
Q702	2SC710C NPN TX amp	022-2876-007	R301	10K ohm variable	022-2862-007
Q703	2SC1449 NPN predriver	022-2876-010	R302	Squelch control 10K ohm	022-2862-002
Q704	2SC1306 NPN driver	022-2876-011	R303	100 ohm 1/4 W carbon	569-1002-101
Q705	2SC1969 NPN power amp	022-2876-506	R304	56K ohm 1/4 W carbon	569-1002-563
RESISTORS			R305	33K ohm 1/4 W carbon	569-1002-333
R1	47 ohm 1/4 W carbon	569-1002-470	R306	1K ohm 1/4 W carbon	569-1002-102
R2	3.3K ohm 1/4 W carbon	569-1002-332	R307	Volume control 10K ohm	022-2862-001
R3	10K ohm 1/4 W carbon	569-1002-103	R308	15K ohm 1/4 W carbon	569-1002-153
R4	47K ohm 1/4 W carbon	569-1002-473	R309	4.7K ohm 1/4 W carbon	569-1002-472
R5	4.7K ohm 1/4 W carbon	569-1002-472	R310	1K ohm 1/4 W carbon	569-1002-102
R6	220 ohm 1/4 W carbon	569-1002-221	R311	3.3K ohm 1/4 W carbon	569-1002-332
R7	10K ohm 1/4 W carbon	569-1002-103	R312	1K ohm 1/4 W carbon	569-1002-102
R8	1K ohm 1/4 W carbon	569-1002-102	R313	10K ohm 1/4 W carbon	569-1002-103
R9	330 ohm 1/4 W carbon	569-1002-331	R314	Same as R313	
R10	3.3K ohm 1/4 W carbon	569-1002-332	R315	1.8K ohm 1/4 W carbon	569-1002-182
R11	1.5K ohm 1/4 W carbon	569-1002-152	R316	4.7K ohm 1/4 W carbon	569-1002-472
R12	4.7K ohm 1/4 W carbon	569-1002-472	R317	Same as R316	
R13	470 ohm 1/4 W carbon	569-1002-471	R318	Same as R316	
R14	47K ohm 1/4 W carbon	569-1002-473	R319	330 ohm 1/4 W carbon	569-1002-331
R15	1K ohm 1/4 W carbon	569-1002-102	R401	150K ohm 1/4 W carbon	569-1002-154
R16	Same as R15		R402	10K ohm 1/4 W carbon	569-1002-103
R17	100 ohm	569-1002-101	R403	100K ohm 1/4 W carbon	569-1002-104
R18	10K ohm	569-1002-103	R404	470 ohm 1/4 W carbon	569-1002-471
R19	Same as R18		R405	1M ohm 1/4 W carbon	569-1002-105
R20	56K ohm	569-1002-563	R406	100K ohm 1/4 W carbon	569-1002-104
R21	100K ohm	569-1002-104	R407	47 ohm 1/4 W carbon	569-1002-470
R22	Same as R21		R408	470 ohm 1/4 W carbon	569-1002-471
R23	100 ohm	569-1002-101	R409	3.3K ohm 1/4 W carbon	569-1002-332
R24	100K ohm	569-1002-104	R410	100 ohm 1/4 W carbon	569-1002-101
R25	4.7K ohm	569-1002-472	R411	1K ohm 1/4 W carbon	569-1002-102
R26	22K ohm	569-1002-223	R412	470 ohm 1/4 W carbon	569-1002-471
R27	330 ohm	569-1002-331	R413	47K ohm 1/4 W carbon	569-1002-473
R28	100 ohm	569-1002-101	R414	1K ohm 1/4 W carbon	569-1002-102
R29	1K ohm	569-1002-102	R415	22K ohm 1/4 W carbon	569-1002-223
R30	6.8K ohm	569-1002-682	R416	220K ohm 1/4 W carbon	569-1002-224
R31	47K ohm	569-1002-473	R417	1M ohm 1/4 W carbon	569-1002-105
R32	1K ohm	569-1002-102	R418	Same as R417	
R33	22K ohm	569-1002-223	R419	1K ohm 1/4 W carbon	569-1002-102
R34	1K ohm 1/4 W carbon	569-1002-102	R420	2.7K ohm 1/4 W carbon	569-1002-272
R35	6.8K ohm 1/4 W carbon	569-1002-682	R501	1K ohm 1/4 W carbon	569-1002-102
R36	3.3K ohm 1/4 W carbon	569-1002-332	R502	200 ohm 1/4 W carbon	569-1002-201
R37	1K ohm 1/4 W carbon	569-1002-102	R503	22 ohm 1/4 W carbon	569-1002-220
R101	56 ohm 1 W metal oxide	569-1006-560	R504	1K ohm 1/4 W carbon	569-1002-102
R102	Same as R101		R505	10K ohm 1/4 W carbon	569-1002-103
R103	33 ohm 1 W metal oxide	569-1006-330	R506	3.3K ohm 1/4 W carbon	569-1002-332
R104	10K ohm variable	022-2862-012	R507	470 ohm 1/4 W carbon	569-1002-471
R105	Finetune control 10K ohm	022-2862-004	R508	3.3K ohm 1/4 W carbon	569-1002-332
R106	2.2K ohm 1/4 W carbon	569-1002-222	R509	15K ohm 1/4 W carbon	569-1002-153
R107	6.8K ohm 1/4 W carbon	569-1002-682	R510	100 ohm 1/4 W carbon	569-1002-101
R201	270K ohm 1/4 W carbon	569-1002-274	R511	1K ohm 1/4 W carbon	569-1002-102
			R512	470 ohm 1/4 W carbon	569-1002-471
			R513	15K ohm 1/4 W carbon	569-1002-153

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
R514	3.3K ohm 1/4 W carbon	569-1002-332	R719	22 ohm 1/2 W solid	569-1004-220
R515	220 ohm 1/4 W carbon	569-1002-221	R720	150 ohm 1 W metal oxide	022-2869-002
R516	100 ohm 1/4 W carbon	569-1002-101	R721	10K ohm 1/4 W carbon	569-1002-103
R517	20K ohm variable	022-2862-008	R722	3.3K ohm 1/4 W carbon	569-1002-332
R518	15K ohm 1/4 W carbon	569-1002-153	R723	4.7K ohm 1/4 W solid	569-1002-472
R519	3.3K ohm 1/4 W carbon	569-1002-332	R724	1K ohm 1/4 W carbon	569-1002-102
R520	Same as R519		R725	10K ohm variable	022-2862-012
R521	10K ohm 1/4 W carbon	569-1002-103	R726	1K ohm 1/4 W carbon	569-1002-102
R522	Same as R521		R727	100K ohm variable	022-2862-009
R523	1K ohm 1/4 W carbon	569-1002-102			
R524	15K ohm 1/4 W carbon	569-1002-153		THERMISTORS	
R525	4.7K ohm 1/4 W carbon	569-1002-472	RT201	TD5C310 10K ohm	022-2869-005
R526	2.2K ohm 1/4 W carbon	569-1002-222	RT501	TDSC310 10K ohm	022-2869-005
R527	470 ohm 1/4 W carbon	569-1002-471			
R528	50K ohm 1/4W carbon	022-2862-009		SWITCHES	
R529	33K ohm 1/4 W carbon	569-1002-333	S1	ON/OFF switch/volume control	022-2862-001
R530	22K ohm 1/4 W carbon	569-1002-223	S2	Mode switch	022-2883-002
R531	33K ohm 1/4 W carbon	569-1002-333	S3	CB-PA slide switch	022-2883-003
R532	Same as R531		S4	NB ON-OFF slide switch	022-2883-004
R533	1M ohm 1/4 W carbon	569-1002-105	S5	Channel selector switch	022-2883-501
R534	33K ohm 1/4 W carbon	569-1002-333			
R535	1K ohm 1/4 W carbon	569-1002-102		TRANSFORMERS	
R536	10K ohm 1/4 W carbon	569-1002-103	T1	Z177Z 10 mm 20 MHz	022-2892-501
R537	Same as R536		T401	C365Z 10 mm 27 MHz ANT	022-2892-502
R538	470K ohm 1/4 W carbon	569-1002-474	T402	C187A 10 mm 27 MHz RF	022-2892-003
R539	47K ohm 1/4 W carbon	569-1002-473	T403	S183A 10 mm 7.8 MHz IF	022-2892-002
R540	1K ohm 1/4 W carbon	569-1002-102	T404	S183A 10 mm 7.8 MHz trap	022-2892-002
R541	100K ohm 1/4 W carbon	569-1002-104	T405	S183A 10 mm 6 MHz noise IF	022-2892-002
R542	5K ohm variable	022-2862-013	T406	Z177Z 10 mm 19 MHz	022-2892-501
R543	47K ohm 1/4 W carbon	569-1002-473	T501	S183A 10 mm 7.8 MHz IF	022-2892-002
R544	3.3K ohm 1/4 W carbon	569-1002-332	T502	Same as T501	
R545	270 ohm 1/4 W carbon	569-1002-271	T503	S190A 10 mm 7.8 MHz IF	022-2892-001
R546	RF gain 5K ohm	022-2862-003	T504	S185Z 10 mm 7.8 MHz IF	022-2892-005
R547	20K ohm variable	022-2862-501	T601	Y372N 10 mm 7.8 MHz OSC	022-2892-503
R548	15K ohm 1/4 W carbon	569-1002-153	T602	S111D 10 mm balanced modulator	022-2892-007
R549	100K ohm 1/4 W carbon	569-1002-104	T701	C181Z 10 mm 27 MHz	022-2892-014
R550	2.2K ohm 1/4W carbon	569-1002-222	T702	C182Z 10 mm 27 MHz	022-2892-015
R601	3.3K ohm 1/4 W carbon	569-1002-332	T703	C042Z 10 mm 27 MHz	022-2892-016
R602	Same as R601		T704	C979N 10 mm 27 MHz	022-2892-017
R603	22K ohm 1/4 W carbon	569-1002-223	T705	C996N 10 mm 27 MHz	022-2892-018
R604	20K ohm 1/4 W carbon	569-1002-103	T706	C043N 10 mm 27 MHz	022-2892-019
R605	1K ohm 1/4 W carbon	569-1002-102			
R606	33K ohm 1/4 W carbon	569-1002-333		PC BOARDS	
R607	15K ohm 1/4 W carbon	569-1002-153	U1	PC board, main	022-2835-501
R608	470 ohm 1/4 W carbon	569-1002-471	U2	PC board, PLL	022-2835-502
R609	500 ohm variable	022-2862-010			
R610	100 ohm 1/4 W carbon	569-1002-101		CRYSTALS	
R611	330 ohm 1/4 W carbon	569-1002-331	Y1	10.000 MHz HC-25/U	022-2820-501
R612	Same as R611		Y601	7.8015 MHz HC-25/U	022-2820-502
R613	47K ohm 1/4 W carbon	569-1002-473			
R701	10K ohm 1/4 W carbon	569-1002-103		HARDWARE	
R702	100K ohm 1/4 W carbon	569-1002-104			
R703	Same as R702				
R705	56 ohm 1/4 W carbon	569-1002-560			
R706	470 ohm 1/4 W carbon	569-1002-471			
R707	2.7K ohm 1/4 W carbon	569-1002-272			
R708	470 ohm 1/4 W carbon	569-1002-471			
R709	47 ohm 1/4 W carbon	569-1002-470			
R710	10 ohm 1/4 W carbon	569-1002-100		Front panel	022-2832-001
R711	1K ohm 1/4 W carbon	569-1002-102		Front overlay	022-2859-003
R712	5.6 ohm 1/4 W carbon	569-1002-569		Overlay of Viking 352D	022-2859-501
R713	2.2 ohm 1/2 W solid	569-1004-229		Overlay of Johnson	022-2859-002
R714	1K ohm 1/4 W carbon	569-1002-102		Johnson plastic trademark part	559-2018-002
R715	47 ohm 1/2 W solid	569-1004-470		Mylar paper for DS106/DS107	022-2818-501
R716	470 ohm 1/2 W solid	569-1004-471		Pilot lamp bushing	022-2813-001
R717	100 ohm 2 W metal oxide	022-2869-001		Pilot lamp bracket red	022-2817-001
R718	6.8 ohm 1/4 W carbon	569-1002-689		Pilot lamp bracket amber	022-2817-002
				Pilot lamp bracket blue	022-2817-003

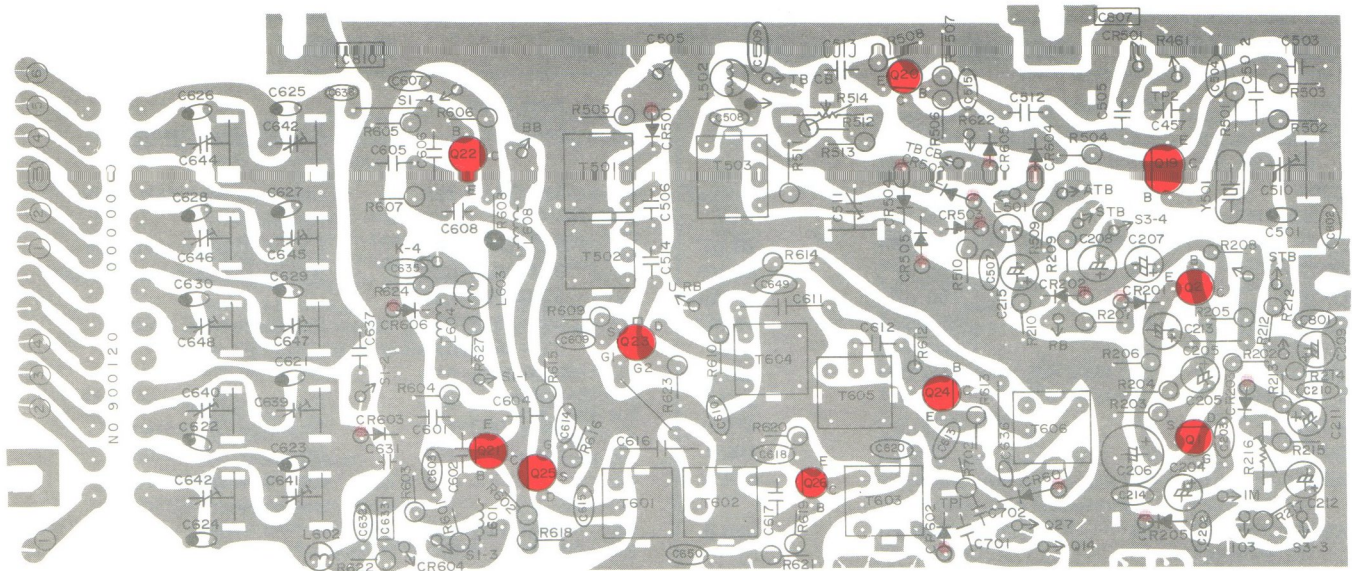
PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION	PART NO.	SYMBOL NO.	DESCRIPTION	PART NO.
	Mount plate for meter	022-2817-007		Heat sink for IC301	022-2814-502
	Buffer of meter mounting plate	022-2818-502		Insulator for IC301	022-2818-001
	Knob for potentiometers and mode switch	547-0014-002		Mount plate for main PC board	022-2817-503
	Knob for channel selector	547-0014-001		Mount plate for meter illumination lamp	022-2817-504
	Potentiometer for finetune R105	022-2862-004		Shield case for PLL synthesizer unit	022-2817-505
	Potentiometer for squelch R302	022-2862-002		Lid of shield case	022-2817-506
	Potentiometer with switch for volume R307/S1	022-2862-001		Ferrite bead	517-2001-001
	Potentiometer for RF gain R546	022-2862-003		Earth plate	022-2817-010
	Spring-plate for potentiometers and mode switch	022-2817-501		Rear panel	022-2817-507
	Dial	022-2832-002		Mount plate for J301, J302	022-2817-005
	Main chassis	022-2817-502		Insulator for MIC connector	022-2818-002
	Cabinet	022-2817-009		3.5 phone plug	515-0020-001
	Mounting bracket	537-9352-001		Battery cable red	022-2823-104
	Mount plate for speaker	022-2817-011		Battery cable black	022-2823-103
	Rubber plate for speaker	022-2818-003		Red cable with connectors	022-2823-102
	Mount plate for C101	022-2817-008		Black cable with connectors	022-2823-101
	Heat sink for Q703, Q704, Q705	022-2814-001		DC cord strain relief	586-1001-019
	Heat sink for Q305	022-2814-501		Fuseholder	534-1004-005
				Plate "FCC"	022-2859-502

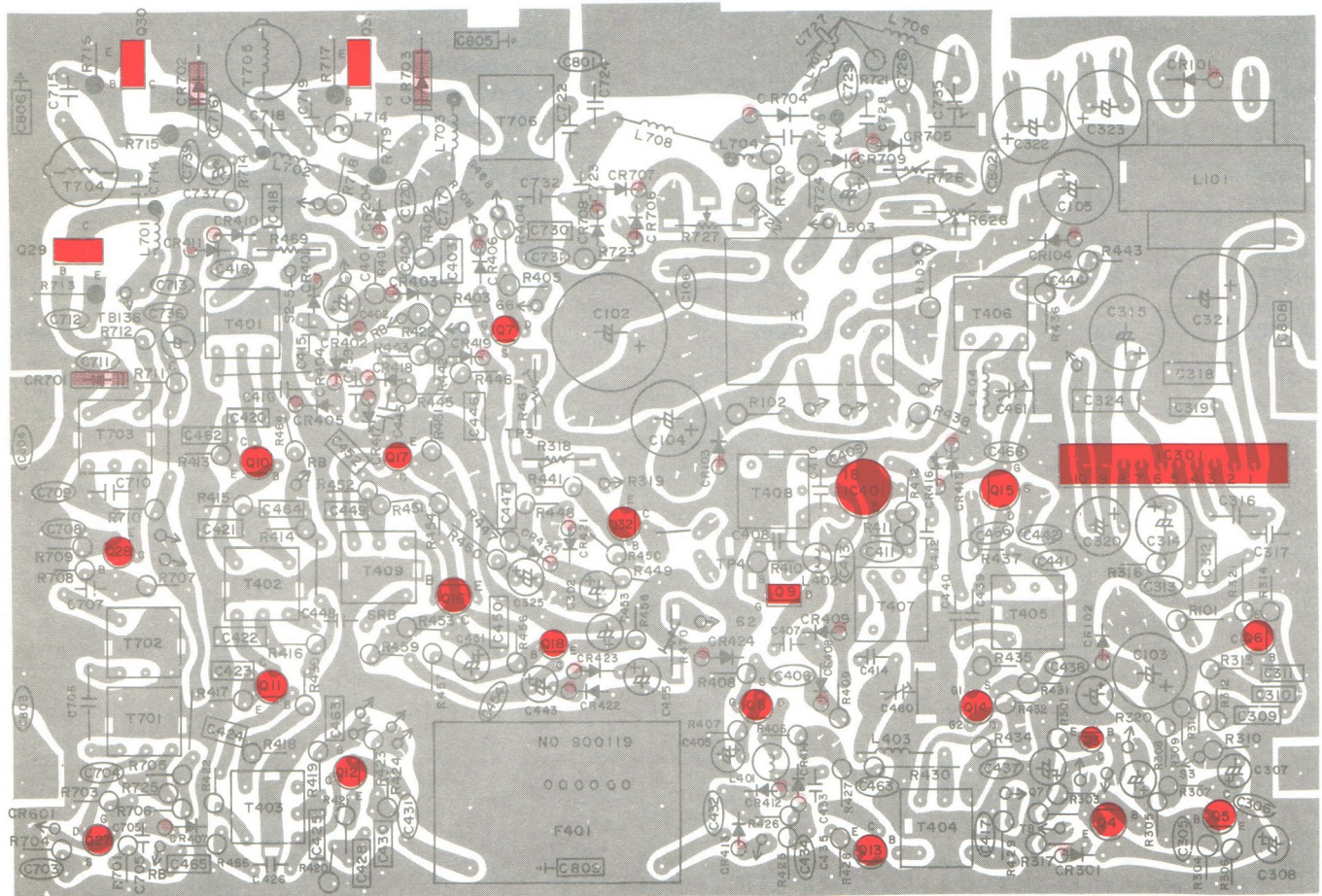
ENGINEERING CHANGES

LATE A REVISION

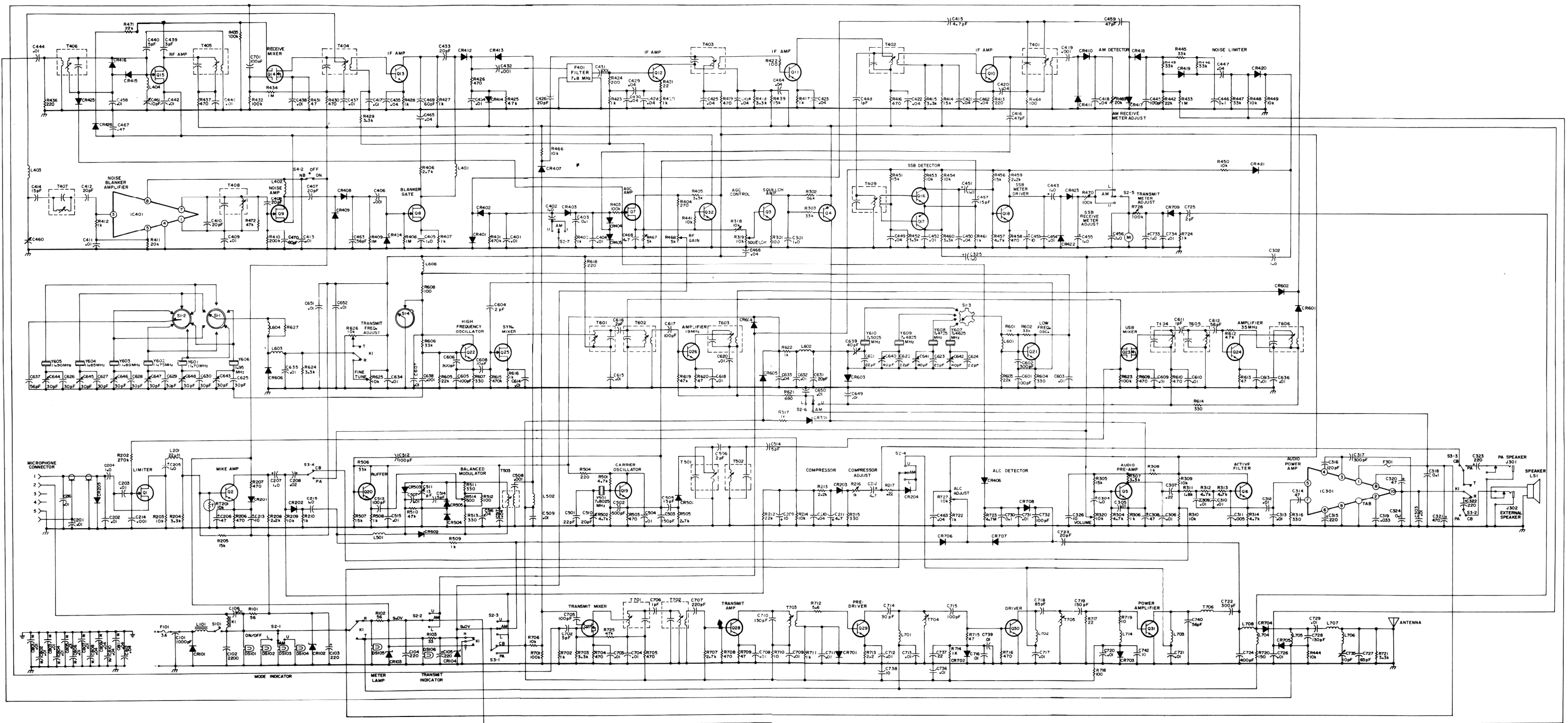
<u>Components Changed</u>	<u>Schematic Location</u>	<u>From</u>	<u>To</u>	<u>New Part Number</u>	<u>Reason for Change</u>
C208	D8	1μF	0.01μF	510-3010-223	Improve transmit audio response
C631	C6	15 pF	20 pF	022-2810-005	LF oscillator stability
C718	E8	56 pF	85 pF	022-2810-026	Improve AM power output
C739	E7	56 pF	0.01μF	510-0001-103	
CR419	A9	WG713	1N34A	022-2823-006	Improve AGC rolloff
Q14	A2	6008	6013	022-2876-013	
Q23	C8	6008	6013	022-2876-013	
R215	D6	470 Ω	330 Ω	569-1002-331	Increase range of R216
R426	A4	220 Ω	470 Ω	569-1002-471	Improve IF response
R441	B5	22KΩ	10KΩ	569-1002-103	Improve AGC rolloff
R604	C8	330 Ω	510 Ω	569-1001-511	Increase synthesizer stability at +60°C
R614	C9	560 Ω	330 Ω	569-1002-331	" " "
<u>Components Added</u>	<u>Schematic Location</u>	<u>Part Description</u>	<u>Part Number</u>	<u>Reason for Change</u>	
C467	B2	0.47μF electrolytic, 50V	022-2810-025	Improve AGC flatness	
C468	B5	4.7μF electrolytic, 25V	022-2810-019	" " "	
C469	A4	60 pF mica	022-2810-024	" " "	
C470	B3	60 pF mica	022-2810-024	" " "	
C516		0.04μF mylar, 50V	510-1003-473	Reduce intermodulation	
C517		0.04μF mylar, 50V	510-1003-473	" "	
C742	E8	10μF electrolytic, 16V	022-2810-013	Improve SSB modulation	
CR426	A1	1N34A	022-2823-006	Improve AGC flatness	
L201	D2	22μH choke	542-3002-002	Improve transmit audio response	
R471	A2	22KΩ ±10%, 1/4 W	569-1002-223	Improve AGC flatness	
R472	B3	47KΩ ±10%, 1/4 W	569-1002-473	Eliminate noise blanker oscillation	
RT201	D2	10KΩ thermister	022-2869-005	Improve SSB power at +60°C	



FREQUENCY SYNTHESIZER PC BOARD
(SOLDER SIDE VIEW)



TRANSCEIVER PC BOARD
(SOLDER SIDE VIEW)



Q1,8



Q2



Q3-6



Q7,15,25



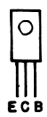
Q9



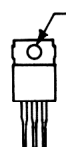
Q10-13,16-22,
24,26,28,32



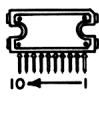
Q14,23,27



Q29



Q30,31



IC301



IC401

NOTE: COLLECTOR IS CONNECTED TO FIN.

NOTE: PIN 4 CONNECTED TO CASE.

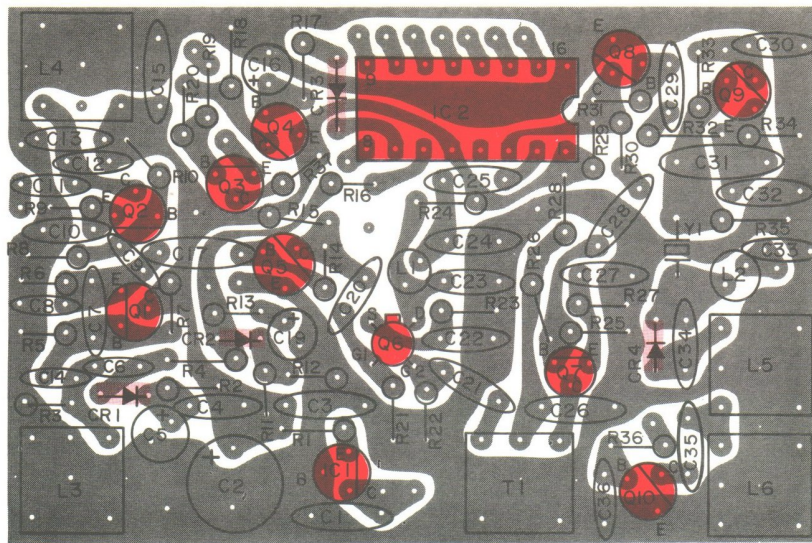
(BOTTOM VIEW)

Q1 A 0.45 D 0.1 S 0	Q2 B 1.6 E 1.14 C 2.8	Q3 B 0.6 E 0.05 C 1.15	Q4 B 8.6 (unquenched) E 9.2 C 1.15
Q5 B 1.8 (unquenched) E 1.15 C 4.0	Q6 B 4.8 E 3.9 C 9.2	Q7 D 3.7 (RF Gain Max.) G -0.1 S 1.5	Q8 D 7.5 G 0.01 S 0.49
Q9 D 9.3 (NB ON) G 0 S 0.3	Q10 B 1.5 E 0.9 C 8.9	Q11 B 1.6 E 0.9 C 8.9	Q12 B 1.2 E 0.7 C 8.8
Q13 B 1.5 E 0.8 C 8.5	Q14 D 8.0 G 0.2 C 2.4	Q15 D 8.9 G 0.01 C 0.3	Q16 B 1.5 E 1.2 C 3.2
Q17 B 1.6 E 1.2 C 2.8	Q18 B 2.0 E 1.4 C 2.6	Q19 B 3.1 E 3.3 C 6.8	Q20 B 2.3 E 2.5 C 8.5
Q21 B 2.6 E 2.4 C 9.2	Q22 B 2.4 E 2.5 C 8.4	Q23 D 13.2 G 0.01 C 0.62	Q24 B 1.0 E 0.4 C 6.5
Q25 D 8.8 G 0.06 S 1.8	Q26 B 1.2 E 0.5 C 5.4	Q27 A 8.8 D 10.8 G 1.9 S 1.0	Q28 B 0.6 E 1.3 C 9.0
Q29 B 0.7 E 0.1 C 12.9	Q30 A 8.8 B 0.5 C 5.3	Q31 A 8.8 B 0.5 C 5.0	Q32 B 0.5 E 0 C 0.3
IC301 1 13.8 2 1.3 3 8.2 4 1.4 5 3.4	IC401 1 8.9 2 1.5 3 7.8 4 0 5 1.5	IC501 1 8.9 2 1.5 3 7.8 4 0 5 1.5	IC601 1 8.9 2 1.5 3 7.8 4 0 5 1.5

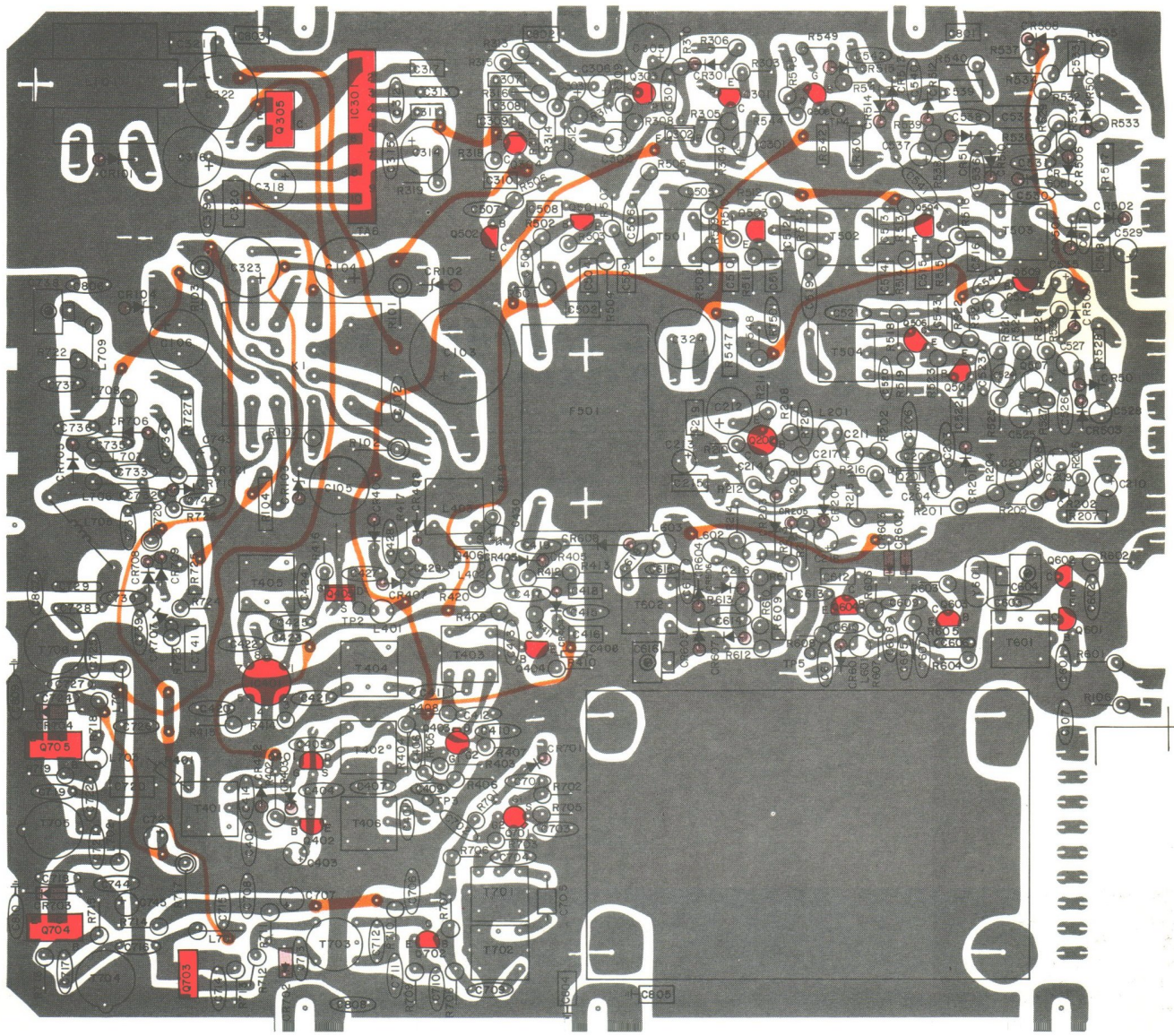
NOTES:

1. CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
3. * = ISOLATION CAPACITORS

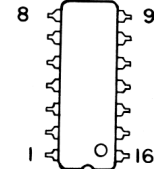
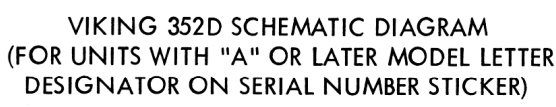
VIKING 352 SCHEMATIC DIAGRAM
(FOR UNITS WITH "A" OR LATER MODEL DESIGNATOR
ON SERIAL NUMBER STICKER)



DIGITAL SYNTHESIZER PC BOARD
(SOLDER SIDE VIEW)



VIKING 352D TRANSCEIVER BOARD
(SOLDER SIDE VIEW)



IC 2

VIKING 352D SCHEMATIC DIAGRAM
(FOR UNITS WITH "A" OR LATER MODEL LETTER
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