MAINTENANCE MANUAL

29-50 MHz BOARD ASSEMBLIES

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DESCRIPTION

The System Control board for RANGR provides all functions necessary for two-way communications. This board is controlled by the control unit.

The System Control board interconnects with the power/control cable from the control unit.

The System Control board contains the audio circuitry, microcomputer, EEPROM and voltage regulators. The micro-computer controls all system functions, supplies frequency data to the frequency synthesizer, and tone/code data to the Channel Guard.

In addition to the normal radio functions, the microcomputer contains self-diagnostic maintenance routines to aid in troubleshooting the radio. Included are an internal test of the microcomputer and input/output tests to assure proper operation of the data port and data bus. Details and procedures are included in the Service Section of this manual.

Centralized metering jacks for servicing are accessible from the top of the radio.

The system control and interface circuits consist of the microcomputer, electrically eraseable PROM, interface circuits for voltage shifting and protection, and a watchdog timer. The EEPROM gives the user the capability to program the radio's personality as desired. The EEPROM contains the receive and transmit frequency data, Channel Guard tone frequencies/digital codes and the CCT delay on a per-channel basis.

NOTE

The EEPROM may be programmed serially through the front connector using the General Electric Universal Radio Programmer Model TQ2310.

CIRCUIT ANALYSIS

SYSTEM CONTROL BOARD

MICROCOMPUTER AND CONTROL

The microcomputer interfaces with the control unit through J701/J702 and responds to all user commands and control functions originating from the control unit. It provides the transmit and receive data to the frequency synthesizer, switching information for tone and digital Channel Guard, and provides the carrier control timer (CCT) function when the radio is in the transmit mode.

When the microphone is keyed, the $\overline{\text{PTT}}$ line from the control unit goes low. This low is applied to the microcomputer through buffer TR702 and inverter TR703. TR702 is controlled by ignition switch A+. The ignition switch must be on and A+ applied to the base of TR702. TR702 must be turned on to permit keying of the transmitter. When Channel Guard is present, the release of the PTT signal is delayed by the microcomputer for approximately 160 milliseconds to eliminate any squelch tail.

The microcomputer immediately closes the antenna relay switch by applying a low level to $\overline{\text{DPTT}}$ at IC702-28. The microcomputer then delays 15 milliseconds before transmit 9V is switched on by applying a low level to $\overline{\text{TX ENB}}$ at IC702-32. This is done to guarantee that the antenna relay contacts are closed before the transmitter is energized. Once $\overline{\text{DPTT}}$ is low, the receive audio is muted. Buffers TR705 and TR704 provide $\overline{\text{DPTT}}$ to the audio control circuits, and antenna relay. IC704-B provides the DPTT signal to the Tx/Rx VCO's and the audio processor.

The $\overline{\text{TX ENB}}$ line is controlled by microcomputer port 1, bit 5 (IC702-32) through inverter TR710 and buffer TR712. A low level on IC702-32 turns TR710 off, allowing the base of TR712 to rise. TR712 turns on, and applies A- to the $\overline{\text{TX ENB}}$ line. Inverter TR711 is also turned on during this time to inhibit the alert tone PTT.

CHANNEL SELECTION

The microcomputer and EEPROM provide the radio with up to 16 independent transmit and receive frequencies. Each time the PTT switch is operated the microcomputer transfers channel data from the EEPROM and converts it to frequency data assigned to the selected channel. The frequency data is then loaded serially into the frequency synthesizer.

The microcomputer continually monitors the status of tri-state buffers IC703A-D. These buffers are periodically turned off by a positive 5 volt, one millisecond pulse from IC702-36. At the same time PROM power switch TR708 is turned on and applies +5 VDC to the EEPROM. When the buffers are turned on, channel select data is loaded into input/output ports of the microcomputer through ports P20-P23. Power is then applied to the EEPROM and the tri-state buffers are turned off. The microcomputer converts the channel select data into address information, accesses the EEPROM, and receives the frequency data stored in the addressed location. This data then passes through the I/O ports of the EEPROM and P20-P23 of the microcomputer. The conversion process is repeated eight times in rapid succession (eight locations are required for each channel) and the data loaded serially into the frequency synthesizer over the clock and data lines. This data also includes Channel Guard information, if present, and carrier control timer information on a per-channel basis. A 4-millisecond channel change pulse from port P16 of the microcomputer is also sent to the frequency synthesizer to speed up channel acquisition.

WATCHDOG TIMER

The watchdog timer, consisting of a digital counter IC701-A and TR701, monitors the operation of the microcomputer. IC701-A generates a reset pulse in the unlikely condition that the microcomputer goes awry and does not execute the software properly.

A 6 MHz crystal X701 steps the microcomputer through the software. As programmed in software a random pulse appears at IC702-35 and is applied to the base of inverter TR701 momentarily turning it on and inhibiting any reset pulse from timer IC701-A. A discharging circuit consisting of R710 and C705 forces the microcomputer to toggle IC701-A. If the timer does not receive any inputs for a specified period of time, TR701 turns off and IC701-A times out and applies a reset pulse to pin 4 of the microcomputer. The watchdog reset will normally restore the microcomputer to normal operation so that only one pulse will occur. In the event the microcomputer is not restored to normal operation, a 6 Hz square wave will appear on the reset line and the indicator CD710 (normally unlit) will turn on. Refer to the self-diagnostic routine to determine the problem.

ADVANCE CHANGE PULSE

The advance change pulse is received from connector J702 and applied to the microcomputer interrupt port IC702-6 through inverter TR707. The advance change pulse is important in radios equipped with PSLM. When a call is received on a priority channel the advance change pulse interrupts the microcomputer, forcing it to service immediately the I/O circuits. The tri-state buffers are turned on and new channel select information read in.

CARRIER CONTROL TIMER

The carrier control timer function is executed by the microcomputer under software control on a per-channel basis. When the programmed time has elapsed an alert tone is generated from P13 (IC702-30) on the microcomputer, applied to the audio PA and heard on the speaker. The CCT may be programmed for 1 or 2 minutes or disabled (programmed for no CCT).

VOLTAGE TRANSLATION

Inverter buffers IC704B-F, TR713, and TR710 translate the 5 VDC levels required by the microcomputer to the +9 VDC level used by the frequency synthesizer. Inverter TR709 restores the proper polarity to the clock.

FREQUENCY SEGMENT CONTROL

To achieve rapid wideband VCO tuning extending over the 29-42 MHz range on the 35-50 MHz range, each Bandsplit is divided into four frequency segments.

By selecting one segment the operating frequency spread of the VCO is limited and frequency lock time reduced. Each segment is identified by two bits on a per-channel basis and programmed into the EEPROM. Capacitors are switched in and out of the VCO tank circuit to set the VCO tuning range to cover the correct frequency segment.

The frequency segment control circuit consists of a dual "D"-type flipflop operating under control of the microcomputer. The four frequency segment identification bits appear on the channel change and data lines and fed to dual "D" FF IC705. At the appropriate time the microcomputer applies the enable signal to clock the new segment data change through the FF. The output of the FF's is a binary expression identifying the frequency segment selected. Table 1 identifies the binary expression and the selected frequency segment.

The output of the frequency segment control circuit is applied to the modulation level control and the frequency segment selector circuits.

	SEGMENT	FREQUENCY SPLIT (MHz)	FF OUTPUT				GROUNDED MODULATION RESISTOR
			IC705-1 (INPUT TR216)	IC705-2 (INPUT TR217)	IC705-13 (INPUT TR218)	IC705-12 (INPUT TR219)	
29-42MHz	1	29-32	0	1	0	1	NONE
	2	32-35	0	1	1	0	R275
	3	35-38.5	1	0	0	1	R276, R296
	4	38.5-42	1	0	1	0	R275, R276 R281, R296
35-50MHz	1	35-38.5	0	1	0	1	NONE
	2	38.5-42	0	1	1	0	R275
	3	42-46	1	0	0	1	R276, R296
	4	46-50	1	0	1	0	R275, R276 R281, R296

TABLE 1 - Frequency Segment Selection

TX AUDIO PROCESSOR

The audio processor provides audio pre-emphasis with amplitude limiting and post limter filtering and a total gain of approximately 24 dB. Approximately 27 dB gain is provided by IC607A, 4 dB by IC607B and -7 dB by R653, R654.

The 9 Volt regulator IC606 powers the audio processor and applies regulated 9 volts to a voltage divider consisting of R651, R655 and symmetry control, RV604. The +4.5 V output from the voltage divider establishes the operating reference point for operational amplifiers IC607A and IC607B. C647 provides an AC ground at the summing input of both operational amplifiers.

When the input signal to IC607A-2 is of a magnitude such that the amplifier output at IC607A-1 does not exceed 5 volts P-P, the amplifier provides a nominal 27 dB gain. When the audio signal level at IC607A-1 exceeds 5 volts P-P, the amplifier gain is reduced to 1. This limits the audio amplitude at IC607A-1 to 6 volts P-P.

Resistors R650, R652 and C646 comprise the audio pre-emphasis network that enhances the signal-to-noise ratio. R652 and C646 control the pre-emphasis curve below limiting. R650 and C646 control the cut-off point for high frequency pre-emphasis. As high frequencies are attenuated, the gain of IC607 is increased.

Audio from the microphone is coupled to the audio processor through R650 and C646.

The amplified output of IC607A is coupled through R653, C650, R656, R657, R658 and bilateral switch IC608C to a second operational amplifier IC607B. The bilateral switch is controlled by the DPTT line so that Tx audio is transmitted only when the PTT switch is pressed. IC607B provides a signal gain of approximately 4 dB.

The Channel Guard tone input is applied to bilateral switch IC608C and IC609 and controlled by the DPTT line. The CG tone then modulates the reference oscillator and VCO on the synthesizer board.

A post-limiter filter consisting of IC607B, R656-R659. C651 and C652 provides 12 dB per octave roll-off. R653 and C649 provide an additional 6 dB per octave roll-off for a total of 18 dB. The output of the post-limiter filter is coupled through the VG (Voice Guard) unit or directly to the synthesizer Tx MOD.

TX enable switch IC608-D shorts out operational amplifier IC607-B when the radio is in the receive mode. The TX ENABLE signal is generated by the microcomputer when the PTT switch is operated and is less than 2.7 VDC in the receive mode.

RX AUDIO

Received audio from the FM detector is applied to the input of audio pre-amplifier IC603-A. The audio output level of the audio preamplifier is adjusted by Volume/Squelch HI level control RV602 for 300 millivolts RMS. The audio of 300 millivolts RMS is applied to the audio preamplifier (IC603-B) through the Tone Reject filter (HC605). When VG is opptionally added, this audio is applied to VG (Voice Guard) circuit (CH602, HC603). Audio output from the VG circuit is applied to Tone Reject filter (HC605) through pins J603-2 & 3. The audio is then applied to the volume and squelch controls in the control unit through connector J701-17.

Audio is returned on the VOL ARM through J701-18 and applied to audio gate (bilateral switch) IC601-B. The audio gate is controlled by DPTT (delayed Push-To-Talk) and PA KEY/CCT PA ENB and is turned on when the control input (pin 5) exceeds 7 VDC. The gate is turned off when the control input is less than 2 volts. Receipt of an on-frequency signal (if present) with

sufficient signal-to-noise level and the correct Channel Guard frequency will cause the audio control circuit to apply +9 volts to IC601-B turning the audio gate on.

Audio from the audio gate is applied to the de-emphasis network consisting of a low-pass filter and a high-pass filter.

The low-pass filter provides a 6 dB per octave roll-off between 300 and 3000 Hz. The high-pass filter attenuates frequencies below 300 Hz.

The audio output from the de-emphasis network is applied to the non-inverting input of the audio power amplifier. The audio power amplifier consists of IC602, and associated circuitry, and provides 10-watts (6.3 VRMS across a 4 ohm load) of audio output power at terminals J702-1 and 5. The gain of IC602 is determined by the value of R615.

SQUELCH CIRCUITS

The squelch circuit(HC601)monitors noise on the SQ ARM output line and allows the receiver to be unmuted when an on-frequency signal reduces the noise level below the squelch threshold setting.

The 300 millivolt output of the audio preamplifier is applied to the squelch circuit through the variable squelch control in the control unit. The squelch control sets the noise threshold level required to operate the squelch circuit. When the noise falls below the threshold level, the receiver is unmuted.

The squelch circuit(HC601) consists of a high-pass filter, an averaging detector, DC amplifier, and a Schmitt trigger shown in Figure 1. The high-pass filter consisting of HC601-A, removes all voice signals from the SQ ARM output and couples noise to HC601-B.

Noise in the 6-8 kHz range is applied to the averaging detector consisting of HC601-B. The noise is rectified and filtered to provide an average DC output level proportional to the noise input. The DC output level is adjusted by RV605.

The average DC level is amplified by HC601-C to a level ranging from 0 to 6.0 VDC, and applied to the non-inverting input of the Schmitt trigger, HC601-D. The inverting input of HC601-D is referenced to 4.5 VDC. IC603-C provides the stable 4.5 VDC reference voltage.

When the DC level exceeds 4.5 VDC, Schmitt trigger HC601-D switches and provides a positive voltage to the CAS (Carrier Activity Sensor) and RUS (Receiver Unsquelched Sensor) control transistors in the audio control circuits. The Schmitt trigger will remain on until the threshold level falls below approximately 4.3 VDC. This difference in voltage between the firing point and turn-off point provides sufficient hysterisis to eliminate "bubbling" -- i.e., noise popping in the speaker. The "bubbling" would normally be caused by transitional changes in the DC level around the reference point which allows the receiver to be unmuted.

When an on-frequency signal is received, there will be little or no noise present at the squelch input. This results in an absence of voltage at the output of the squelch circuit Schmitt trigger, allowing the receiver to be unmuted.

AUDIO CONTROL

The audio control circuits shown by Figure 2 control the operation of the audio gate (IC601-B) and the final audio PA and consist of TR601-605, inverter IC601-A and associated circuitry. The audio control circuit inputs consist of $\overline{\text{DPTT}}$ (Delayed Push-To-Talk), $\overline{\text{RX MUTE}}$ (Receiver Mute), $\overline{\text{PA KEY/CCT}}$ $\overline{\text{PA ENB}}$ (Public Address Key/Carrier Control Timer Public Address Enable), and the output of the squelch circuit.

When an on-frequency signal with the correct Channel Guard Tone is received, CAS control transistor TR601 and RUS control transistor TR602 are turned off by the absence of a positive voltage at their bases. The CAS line from the collector of TR601 rises to +9 VDC and is supplied to J702-21.

The collector of RUS Transistor TR602 also rises to +9 VDC and turns on inverter IC601-A. A- is then applied to the base of inverter TR603, turning it off and allowing its collector to go high. The positive voltage on the collector is applied to audio gate IC601-B, turning it on. TR604 is biased on but has no effect on audio switches TR605. The base of the transistor is connected to the output of audio control switch IC601A-2 which is at A-. Therefore TR605 turns off, allowing input audio to the PA which feed audio power to the speaker.

When the microphone is keyed, the $\overline{\text{DPTT}}$ input is low. This low is applied to audio gate IC601-B through CD604B, turning IC601-B off. It is also applied to audio control switch IC601-A (through CD604A) turning it off. TR603 is also off and TR604, TR605 are on. TR605 shorts out the audio input to the audio PA IC602.

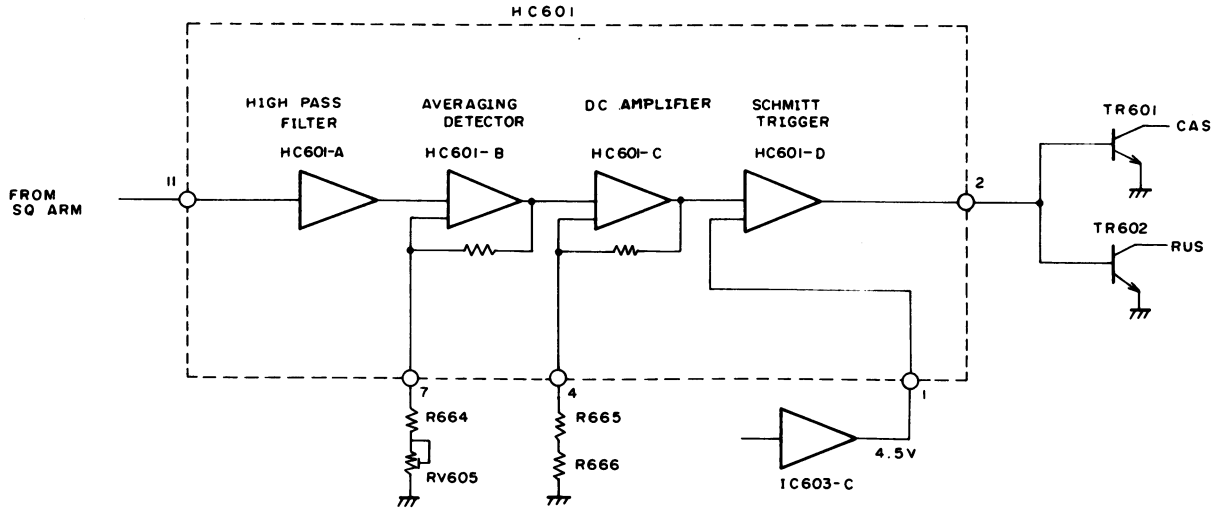


Figure 1 - Squelch circuits (HC601)

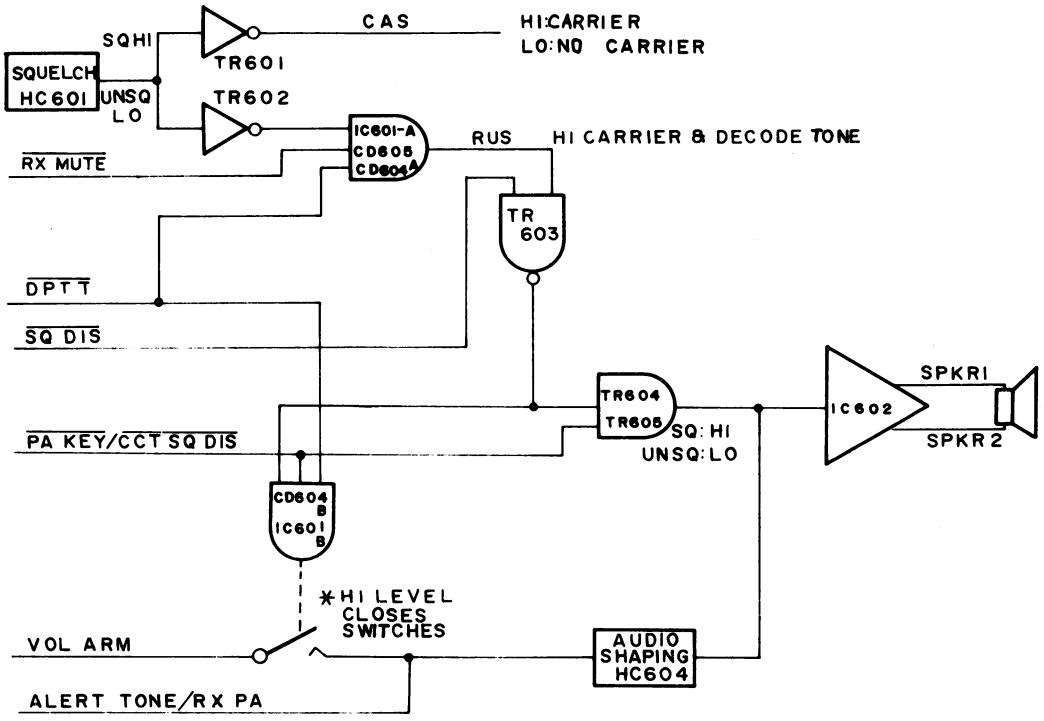


Figure 2 - Audio Control Circuit

POWER DISTRIBUTION

Battery supply A+ enters the radio through the front connector at J750-19. A- enters through J801. Figure 3 is a block diagram of the power distribution system. Two heavy connections are provided for transmit A+ and transmit A- and connect to two busses. The busses are connected to the PA through a special feedthrough arrangement. A second set of wires is routed through the control unit and supplies power to the audio amplifier and all other radio circuitry.

CAUTION

The CMOS Integrated Circuit devices used in this equipment can be destroyed by static discharges. Before handling one of these devices, the serviceman should discharge himself by touching the case of a bench test instrument that has a 3-prong power cord connected to an outlet with a known good earth ground. When soldering or desoldering a CMOS device, the soldering iron should also have a 3-prong power cord connected to an outlet with a known good earth ground. A battery-operated soldering iron may be used in place of the regular soldering iron.

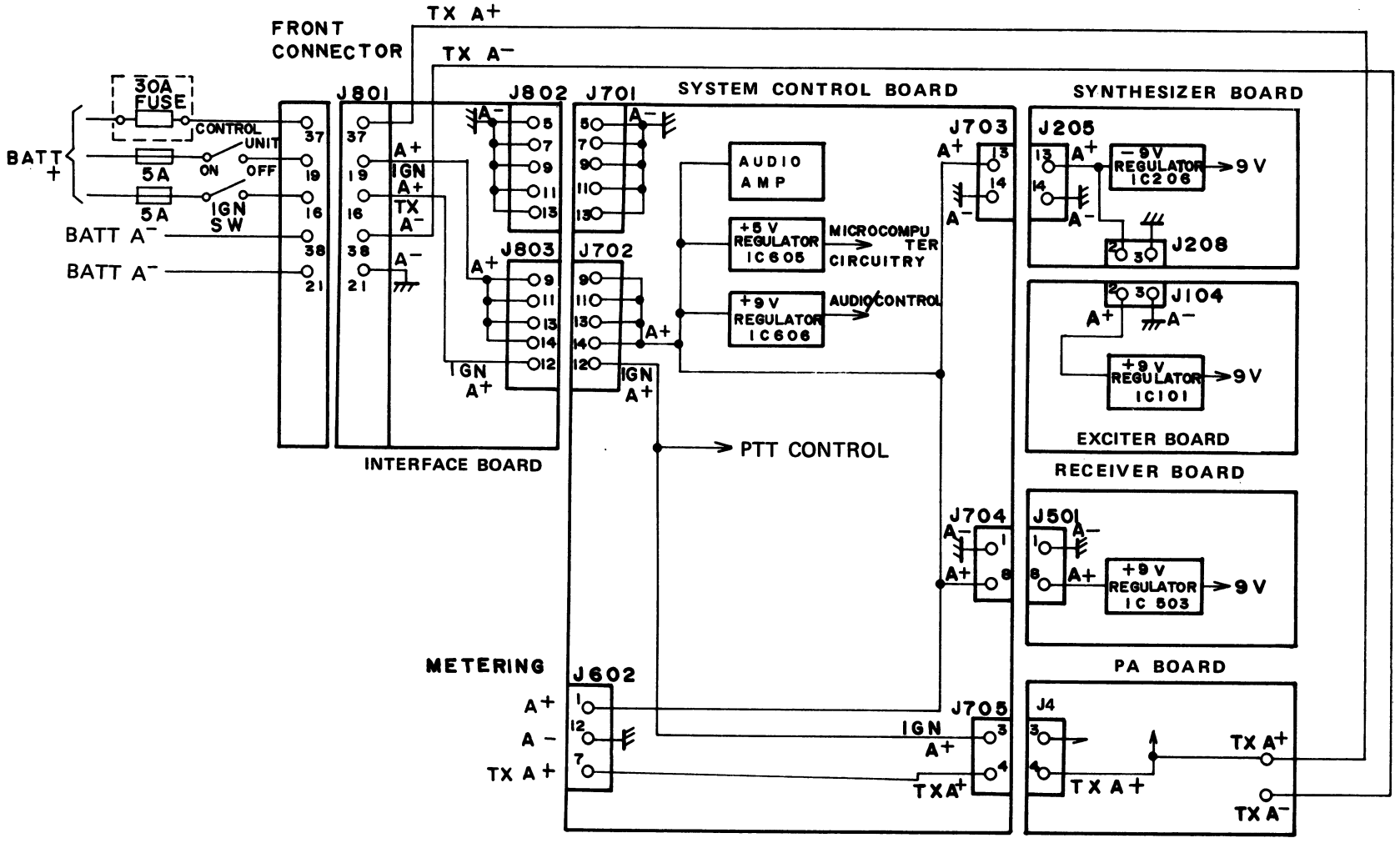


Figure 3 - Power Distribution

CHANNEL GUARD

Channel Guard provides a means of restricting calls to specific radios through the use of a continuous-tone or digitally-coded squelch system (CTCSS or CDCSS). Tone frequencies range from 67 Hz to 210.7 Hz, 33 standard tones and 83 unique digital codes are available. These tones/codes are identified in Tables 2 and 3.

STANDARD TONE FREQUENCIES Hz				
67.0	88.5	107.2	131.8	167.9
71.9	91.5	110.9	136.5	173.8
74.4	94.8	114.8	141.3	179.9
77.0	97.4	118.8	146.2	186.2
79.7	100.0	123.0	151.4	192.8
82.5	103.5	127.3	156.7	203.5
85.4			162.2	210.7

TABLE 2 - Channel Guard Tone Frequencies

PRIMARY CODE	EQUIVALENT CODE	PRIMARY CODE	EQUIVALENT CODE	PRIMARY CODE	EQUIVALENT CODE
023	340, 766	205	135, 610	464	237,642, 772
025		223	350, 475, 750	465	056, 656
026	566	226	104, 557	466	144, 666
031	374, 643	243	267, 342	503	157, 312
032		244	176, 417	506	224, 313, 574
043	355	245	370, 554	516	067, 720
047	375, 707	251	236, 704, 742	532	161, 345
051	520, 771	261	227, 567	546	317, 614, 751
054	405, 675	263	213, 136	565	307, 362
065	301	265	171, 426	606	153, 630
071	603, 717, 746	271	427, 510, 762	612	254, 314, 706
072	470, 701	306	147, 303, 761	624	075, 501
073	640	311	330, 456, 561	627	037, 560
074	360, 721	315	321, 673	631 745	231, 504, 636
114	327, 615	331	372, 507	632	123, 657
115	534, 674	343	324, 570	654	163, 460, 607
116	060, 737	346	616, 635, 724	662 444	363, 436, 443,
125	172	351	353, 435	664	344, 471, 715
131	572, 702	364	130, 641	703	150, 256
132	605, 634, 714	365	107	712	136, 502
134	273	371	217, 453, 530	723	235, 611, 671
143	333	411	117, 756	731	447, 473, 474
152	366, 415	412	127, 411, 711		744
155	233, 660	413	133, 620	732	164, 207
156	517, 741	423 713	234, 563, 621	734	066
162	416, 553	431	262, 316, 730	743	312, 515, 663
165	354	432	276, 326	754	076, 203
172	057	445	222, 457, 575		
174	142, 270				

TABLE 3 - Primary and Equivalent Digital Codes (Octal)

The Channel Guard encode and decode functions are implemented in the microcomputer under software control. The microcomputer provides digital and/or tone Channel Guard with Squelch Tail Elimination (STE).

If the radio is in the receive mode, the Channel Guard tone/code is hard limited and inputted into the microcomputer through IC702-29 (LIM CG Tone Decode). If the correct tone code is present, the receiver is opened by the RX MUTE line. If the radio is in the transmit mode, the microcomputer generates the Channel Guard tone using WALSH BIT 1 and WALSH BIT 2. Those outputs are summed together and filtered on the System Control board to generate a smooth sinewave for tone Channel Guard or a digital waveform for digital Channel Guard.

The Channel Guard contains a summing amplifier IC604-A 8-pole active voice reject filter HC606 limiter IC604-C and tone/code reject filter HC605. A Channel Guard disable circuit TR606 allows the Channel Guard encode to be disabled. The Channel Guard decoder can be disabled at the microcomputer.

The microcomputer selects the assigned Channel Guard encode code/tone information from the EEPROM memory for each channel, transmit and receive, and generates the Channel Guard signal.

The output of audio preamplifier IC603-A is applied to the summing amplifier through bilateral switches IC601-C and D. In the encode mode DPTT is high applying A- from IC601-D to the control input of IC601-C turning it off and preventing any input from the output of audio preamplifier IC603-A from interfering with the encoding signal.

The output of summing amplifier IC604-A is applied to buffer/amplifier IC604-B through a two-pole active voice reject filter HC606. The active filter shunts all frequencies above 300 Hz to ground, thereby preventing those frequencies from interfering with the encoded signal. The output of IC604-B is the assigned CG tone or digital signal. This signal is applied to the REF MOD line through CG deviation control RV603 and IC609. Channel Guard deviation is set for 0.75 kHz.

In the decode mode DPTT is low, turning bilateral switch IC601-D off, allowing the 9 V filtered supply to turn IC601-C on. The output of audio preamplifier IC603-A is then applied to the summing amplifier IC604-A through bilateral switch IC601-C. This signal is amplified and filtered by IC604A,B and HC606, so that only the CG signal (if present) is applied to hard limiter IC604-C. The CG signal is squared up for comparison by the microcomputer to determine if the CG signal is correct. If the microcomputer determines the CG signal to be correct, RX Mute transistor TR713, is turned off, applying +9 VDC to the RX MUTE line to open the receiver.

The Channel Guard Disable(CG DSBL) line has a double function. It can disable the encode or the decode CG function. The encode function is disabled by applying +19 V or more to J701-15. This will turn on TR606 and shunt the Channel Guard tone/code to ground while the decode function is disabled within the microcomputer software. To disable the decoder, ground the CG DSBL line at J701-15. The microcomputer will detect that the line is low, turn off TR713 and force the RX MUTE line high. The decode filter/limiter circuit is not affected, it continues to operate. The detection software also does not stop working. This allows the off-hook STE to function. When the CG DSBL line is pulled high (9.0 VDC) the microcomputer does not sense any changes. It is buffered by protection diode CD709. Channel Guard disable transistor TR606 will turn on when the CG DSBL line goes above 17 V and shorts the output of the filter to ground. This will prevent any signal from going out on CG HI and will also disable the decoder since no limited CG tone will

go to the microcomputer. The receiver will be muted since no CG is decoded. Disabling the decoder this way will never allow the audio to open up, while taking the radio off hook (pulling CG DSBL low) will always make the radio open up. Turning CG Disable transistor TR606 on causes the DC bias to change. It will take 2 or 3 seconds for the bias to restore itself after the encoder is disabled.

The Squelch Tail Elimination (STE) eliminates squelch tails when the radio is on-hook or off-hook. When Channel Guard is disabled (off-hook), the decoder is still looking at the received signal. The RX MUTE line is high, as would normally be expected. The Channel Guard decoder is looking for the STE burst (phase reversal in tone Channel Guard, STE tone in Digital Channel Guard). If an STE burst is detected, the RX MUTE line will go low for about 200 ms. This will prevent the squelch tail from being heard. After 200 ms, the RX MUTE line will go high again; by now the transmission has ended and the squelch will hold the audio closed. The off-hook STE does not affect the operation of the Channel Guard while on-hook. Another way of looking at it: the radio will go quiet for 200 ms any time STE is detected. If it was on-hook it will stay quiet after the 200 ms, if it was off-hook it will revert to noise squelch operation.

In some instances it is necesssary to invert the polarity of the digital Channel Guard signal to enhance system compatability. Inverted polarity normally results in a wrong code or one that cannot be used. When this occurs, move P604 connected between J604-1,2 to J604-2,3. The encode DCG codes may be inverted by reprogramming the EEPROM.

FREQUENCY SYNTHESIZER BOARD

The frequency synthesizer receives clock, data, and control information from the microcomputer and from this generates the Tx/Rx RF frequencies. It also provides frequency lock status to the microcomputer. It consists of synthesizer chip IC201, low- and high-current buffers, loop filter, Tx & Rx voltage-controlled oscillators (VCO's), feedback amplifiers, the dual- modulus prescaler, and the reference oscillator. The VCO's are locked to the reference oscillator by a single direct-divide synthesis loop consisting of the feedback buffer, prescaler, and synthesizer. The TX VCO operates over a frequency range of 29 MHz to 50 MHz. The RX VCO operates over the range 49.8 to 70.8 MHz.

REFERENCE OSCILLATOR

The reference oscillator consists of a 5 PPM VC-TCXO (Voltage Controlled-Temperature Compensated Crystal Oscillator). The standard reference oscillator frequency is 13.2 MHz.

The 5 PPM VC-TCXO receives transmit CG tone from REF MOD CONTROL RV201. RV201 provides the required tone level and phase to modulate the VC-TCXO. The VC-TCXO is enclosed in an RF shielded can. Access to the oscillator trimmer is made through a hole in the top of the can. The VC-TCXO is compensated by an internal temperature-compensator circuit for both low and high temperatures. With no additional compensation the oscillators will provide 5 PPM stability from -30°C to +60°C.

CAUTION

VC-TCXOs are individually compensated at the factory and cannot be repaired in the field. Any attempt to repair or change the frequency of a VC-TCXO will void the warranty.

SYNTHESIZER

Synthesizer IC201 contains a programmable reference oscillator divider (÷ R), phase detector, and programmable VCO dividers (÷N, A). The reference frequency, 13.2 MHz from the reference oscillator is divided by a fixed integer number to obtain a 5 kHz channel reference for the synthesizer. This divide value can be changed by PROM programming. The internal phase detector compares the output of the reference divider with the output of the internal ÷N, A counter. The ÷N, A counter receives as its input the VCO frequency divided by the dual-modulus prescaler and programmed by the microcomputer. This comparison results in a ± error voltage when the phases differ and a constant output voltage when the phase-detector inputs compare in frequency and phase.

If a phase error is detected an error voltage is developed and applied to the VCO DC offset and high current buffers and loop-filter to reset the VCO frequency. The count of the ÷N, A counters is controlled by the frequency data received on the clock and data lines from the microcomputer. Thus, when a different channel is selected or when changing to the transmit or receive mode an error voltage is generated and appears at the phase-detector output, APD OUT causing the phase-locked loop to acquire the new frequency.

The enable pulse from the microcomputer enables the synthesizer and allows frequency data to be internally stored.

DC OFFSET AND HIGH CURRENT BUFFERS

DC offset buffer TR201 and diode CD201 receive the error voltage from the synthesizer and increase this level by 1.8 VDC to extend the operating range of the high-current buffers. When the PLL is off-frequency due to a channel change or frequency drift, the error voltage from the synthesizer(APD) rises or falls, turning either TR202 or TR203 on. These two transistors control high-current buffers TR204 and TR205. TR204 and TR205 complete a high-current rapid-charge or -discharge path for C207-C209.

If the error voltage decreases, TR203 is turned off and TR205 is turned on, completing a discharge path for C207-C209 through bilateral switches IC204. At the same time TR202 is turned on and TR204 is turned off, blocking the charge path. The opposite conditions exist when the error voltage goes positive. IC204 is turned on for 4 milliseconds when a channel is changed in the receive mode. The time is 20 milliseconds when in transmit mode and when changing from transmit to receive mode.

LOOP FILTER

The loop-filer consists of R209-R211, and C207-207. This filter controls the bandwidth and stability of the synthesizer loop. Bilateral switch IC204 is controlled by the 4 millisecond, 9 volt channel-change pulse. When the channel-change pulse is present, the bilateral switch shorts out the low-pass filter, greatly increasing the loop bandwidth to achieve the 4 millisecond channel acquisition time required for dual priority scan. The low-pass filter removes noise and other extraneous signals internal to the synthesizer chip.

The output of the filter is applied to the varicaps in the transmit and receive VCO's to adjust and maintain the VCO frequency.

The use of two VCO's allows rapid independent selection of transmit and receive frequencies across the frequency split.

RECEIVER VOLTAGE CONTROLLED OSCILLATOR

The receiver VCO consists of a low-noise JFET oscillator, TR210, followed by high-gain buffer TR211. TR211 prevents external loading and provides power gain. The VCO is a Colpitts oscillator with the various varactors, capacitors and coil forming the tank circuit.

The VCO is switched on and off under control of the DPTT line. When the DPTT line is low the Recevier VCO is turned on (TR213 is off, TR212 is on). Oscillator output is typically +10 dBm. The output is applied to the feedback buffers for VCO frequency control and as the Rx injection frequency to the receiver 1st mixer through L.O. buffers TR404, TR405 on the RX board. The Rx VCO also uses a high-Q resonator coil to achieve superior noise performance. The VCO operates over a frequency range of 49.8 to 70.8 MHz. The VCO voltage need only be set once at the highest frequency of the band split, after which it will operate over the entire split with no more tuning.

TRANMITTER VOLTAGE CONTROLLED OSCILLATOR

The transmit VCO is basically the same as the receiver VCO. The wideband VCO allows frequency separation of 13 MHz or 15 MHz as determined by the bandsplit the radio is operating on, 29-42 MHz or 35-50 MHz. The varactors in conjunction with the frequency segment selector circuitry (TR216 - TR219, TR227, TR228, TR230 and pin diodes CD217, CD218 and CD221) provide a voltage-controlled adjustment range that extends across the entire frequency split. Buffer TR221 provides a typical output of +10 dBm to the feedback buffers for VCO frequency control and as the Tx Injection frequency to the exciter.

VCO control switch TR222 turns the Transmit VCO on when DPTT is high.

FEEDBACK BUFFERS

The Rx injection and Tx injection voltage output from the Rx VCO and Tx VCO are supplied to the receiver mixer and the exciter, respectively, and to the feedback buffers. Buffering is provided by TR206 and TR207 and the output applied to dual-modulus prescaler IC202.

DUAL-MODULUS PRESCALER

The dual-modulus prescaler completes the PLL feedback path from the synthesizer to loop filter, to the VCO's and feedback buffers and then back to the synthesizer through the prescaler. The prescaler divides the VCO frequency by 64 or 65 under control of M CONT from the synthesizer. The output of the prescaler is applied to the synthesizer where it is divided down to 5 kHz by an internal ÷ N, A counter and compared in frequency and phase with the divided-down frequency from the reference oscillator. The result of this comparison is the error voltage used to maintain frequency lock. The ÷ N, a counter is controlled by data received from the microcomputer. Depending on the operating frequency, the DC voltage at TP201 should be within the range 3.5 to 7.5 VDC when the PLL is locked.

LOCK DETECT

The lock-detect circuit consists of comparator IC203, diodes CD203 and CD204, and reference oscillator mute switch TR208 and TR209. It is used to quickly synchronize the phase relation of the divided-down VCO frequency and the reference oscillator if the loop loses lock. It also provides a fast lock-detect signal to the microcomputer to turn on the out-of-lock indicator. If a large change in frequency is required, the ramp capacitor output (C_R) of the synthesizer may increase to near 7.5 VDC and cause the comparator output to decrease. This decrease in voltage turns TR209 off and allows TR208 to be turned on by the

positive LD line from the synthesizer. Thus TR208 disables the reference oscillator and allows the PLL loop to be brought back to synchronization rapidly.

If a large frequency error exists, the LD positive lead from the synthesizer will carry negative spikes to the microcomputer through CD204 to activate the lock indicator circuit. Pulse shaper IC701 is a one-shot multivibrator which increases the pulse width to span 1 computer cycle. TR209 is turned on, keeping TR208 off thereby preventing TR208 from muting the reference oscillator.

MODULATION LEVEL CONTROL

The modulation level control circuit automatically sets the Tx audio level applied to the transmit VCO modulator CD212 through VCO deviation adjust control RV202. The modulation level control circuit consists of IC205, R274 - R282, varactor CD212, C245 and bypass capacitors C247 and C248. The modulation level is controlled by turning bilateral switches IC205 on or off (under control of IC705) to include attenuators R275, R276 and R281 in the circuit. R274, R275, R276 and R281 form an adjustable voltage divider to change the modulation level as required. Table 1 also identifies the resistor (if applicable) used for each frequency segment.

FREQUENCY SEGMENT SELECTOR

The frequency-segment selector switches capacitance in and out of the Tx and Rx VCO tank circuits to select the frequency segment containing the selected channel. The frequency segment selector consists of TR216 - TR219, TR227, TR228, TR230, CD209, CD210, CD217, CD218, CD220 and CD221 and operates under control of the microcomputer through FF's IC705A & B. Capacitors (C224, C227, C252, C255, C291 and C294) are selected or deselected for operation in a given segment. Table 4 identifies the circuit conditions existing for selection of each segment and the capacitors used.

Reverse bias to turn the pin diode off is provided by the +8V filtered supply through R232, R234 and R286. Forward bias for the diode and power for the switching transitors are provided by the +8V source through R231, R233 and R285. When segment 3 is selected, transistors TR216, TR219 and TR227 are turned on. This applies ground to the anodes and +8V to the cathodes of pin diodes CD209, CD220 (Rx VCO) and CD217, CD221 (Tx VCO). CD210 and CD218 are forward biased causing them to turn on. This effectively places a short across C227 and AC grounds C228 in the Rx VCO and shorts C255 while AC grounding C256 in the Tx VCO.

With TR216, TR219 and TR227 still on DC ground is applied to the anodes of CD209, CD220, CD217 and CD221 through L206, L224, L218 and L225 while reverse bias is applied to their cathodes (TR217, TR228 and TR230 are off). L206, L224, L218 and L225 present a high impedance to RF frequencies. Therefore the anodes of CD209, CD220, CD217 and CD221 are near DC ground and not at AC ground.

Operation of the radio over the frequency ranges 29-42 MHz or 35-50 MHz is determined by the group number of the synthesizer board. Each frequency split is divided into four operating segments varying from 3 to 4 MHz wide.

EXCITER BOARD

The Exciter consists of three boardband negative feedback amplifier stages operating over a frequency range of 29-50 MHz. An attenuator pad (R101-R103) at the input of the exciter provides a constant load for the exciter VCO and attenuates the signal from the VCO to approximately 0 dBm. The exciter amplifies the 0 dBm signal from the VCO to provide 150 mW drive to the power amplifier.

SEGMENT	TRANSISTOR SWITCH*							PIN DIOES						GROUNDED CAPACITORS
	TR216	TR217	TR218	TR219	TR227	TR228	TR230	CD209	CD210	CD217	CD218	CD220	CD221	
1	0	1	0	1	0	1	1	ON	ON	ON	ON	ON	ON	ALL
2	0	1	1	0	1	0	0	ON	OFF	ON	OFF	OFF	OFF	C223 C251
3	1	0	0	1	1	0	0	OFF	ON	OFF	ON	OFF	OFF	C226 C254
4	1	0	1	0	1	0	0	OFF	OFF	OFF	OFF	OFF	OFF	NONE

*** '1' indicates transistor is turned on.**

TABLE 4 - Capacitor Selection

The injection frequency input from the TX VCO is applied to the base of amplifier TR101 through an attenuator pad and impedance matching components L101 and C101. The impedance matching network matches the VCO output to the base of TR101. R104 and R105 set the bias voltage for the TR101. C105 and C106 provide noise decoupling. T101 consists of broadband transformer (9:4 impedance ratio). R107 and R106 set the gain for TR101. The output of TR101 drives TR102, which is identical to TR101.

The output of TR102 is coupled to the base of amplifier TR103 through T102 and C111.

The 150 mW output of TR103 is coupled to the power amplifier board through impedance matching transformer T103, C120, a low-pass filter consisting of C121, C122, C123, L103, L104, and output connector J104. R114 and R115 set the bias voltage for TR103. R119 set the gain for TR103. T103 is a broadband transformer (4:1 impedance ratio).

Collector voltage for TR101, TR102 and TR103 is supplied by EX 9V through 9V TX switch TR104. EX 9V is regulated from the A+ to 9 VDC by IC101. When $\overline{\text{TX ENB}}$ is low TR104 is turned on, providing voltage to amplifier TR101, TR102 and TR103. When $\overline{\text{TX ENB}}$ goes high (receive mode) TR104 is turned off, isolating the TX VCO.

PA BOARD

The four power amplifiers covering the frequency ranges of 29-42 MHz and 35-50 MHz and power levels of 60 W and 110 W, are very similar in construction and operation. The only differeces are in the transistor types and some component values. The following description applies to all four versions.

The PA assembly uses a driver and three RF power transistors to provide rated output power. The output power is adjustable over a range of 55 to 110 watts and 30 to 60 watts for the two power versions. Five transistors are used in the power control circuit.

Supply voltage for the PA is provided by power leads from the System Interface Baord to J5 (A+) and (A-) on the PA board. C69, C70, C71 and C72 prevent RF from getting on the power leads. Diode CD10 will cause the main fuse in the fuse assembly to blow if the polarity of the power leads is reversed. CD9 is a surge protector to suppress voltage surges on the power leads.

RF AMPLIFIERS

The Exciter output is coupled through coaxial cable ZC610 to the PA input jack J1. The RF is coupled through an attenuator pad (R1-R3), impedance matching transformer T1 and frequency compensator C2 and R4 to the base of pre-driver TR1. L1, R5, CD1, and R7 set the bias voltage for TR1. C5 and R6 provide negative feedback to improve the stability of TR1. Collector voltage on pre-driver TR1 is controlled by the Power Control Circuit and is applied trough a decoupling network which consists of C13, C14, C15, L2, C17 and C19.

The output of TR1 is coupled to the base of amplifier TR2 through impedance-matching transformer T2 and frequency compensator C12, R59 and R10. C10 and C83 provide matching between T2 and the base of TR2. C20 and R11 provided negative feedback and R12 improves the stability of TR2.

Collector voltage to driver TR2 is supplied through a decoupling network consisting of C27, C28, C29, L4, C31, C32 and C33.

The RF output from TR2 passes through impedance-matching transformer T3 and matching element C25. (Note: This is a 50 ohm point and may be used for checking power levels). From C84, RF passes through stabilizing resistors R55 and R56 and matching element C82 to input of 4:1 transformer, T4.

The Power Amplifier, consisting of TR3, TR4, T4 and T5 is a class-C push-pull power amplifier. T4 provides impedance-matching and power splitting to the bases of TR3 and TR4. C35 and C36 provide matching elements to T4. R21 and R22 provide the base loading to TR3 and TR4. C39, R20, C41 and R23 are negative feedback elements to improve the stability of TR3 and TR4, T5 provides impedance-matching and power combining for the collectors of TR3 and TR4. C44 and C45 provide matching elements to T4. C40 and C42 provide matching elements to the collector of TR3 and TR4.

Operating voltage for the power amplifier is supplied from the DC input through T5 and decoupling network consisting of C50, C51, C52, L5, C46, C47, C48 and C49.

The output of the power amplifier passes through T5 to the LPF network consisting of C86, C85, L17 and C87. (Note: This is a 50 ohm point and may be used for checking power levels.) The RF power passes through 50 ohm microstrip Z2 and Z3, directional coupler T6 and associated components and transmit/receive relay K1 to the low-pass filter.

____ The relay is energized by a low on DPTT from the System Control Board.

POWER CONTROL CIRCUIT

The power control circuit provides closed-loop RF power leveling and power turndown when it senses high VSWR load conditions.

When the transmitter is keyed, TR5 turns on and supplies current to zener diode CD11, which provides a constant control reference voltage.

TR6, TR8 and TR9 serve as DC amplifiers to supply voltage to the collector of TR1. The setting of RV1 determines the current supplied to the base of TR6. As the detected RF power increases, the current to the base of TR6 increases causing TR6 to pull current away from the base of TR9. This cuts back the drive to TR9 and in turn TR8, which reduces the voltage at the collector of TR1, decreasing RF output power.

RF power is sensed by directional coupler T6 and its associated elements. Forward power is sensed by CD4 and reflected power by CD3. Forward power is determined by the setting of RV1. CD8, CD13, CD14 and CD15 set the level of reflected RF power at which the control circuit reduces the RF output.

Thermal protection is provided by R51 (posistor) and its associated elements. R51 is thermally connected to the body of TR4. As the temperature of TR4 rises above 90°C, the resistance of R51 increases, and TR7 turns ON. This diverts emitter current from TR6 to R52, which lowers the voltage at the collector of TR1, reducing the power output.

CAUTION

Do not operate the transmitter at levels higher than rated output. Operating at higher than rated output will shorten the life of the RF power transistors.

RECEIVER BOARD

The FM dual-conversion, superheterodyne receiver is designed for operation in the 29-42/35-50 MHz frequency ranges. A regulated 9.0 volts is provided to all receiver stages except the audio PA IC, which operates from the switched A+ supply.

The receiver has intermediate frequencies of 20.8 MHz and 455 kHz. Adjacent channel selectivity is obtained by using two band-pass filters: a 20.8 MHz crystal filter and a 455 kHz ceramic filter.

All of the receiver circuitry except the synthesizer, audio preamp, audio PA, and squelch circuit is mounted on the Rx board. The receiver consists of:

- Front End and Mixer
- 20.8 MHz 1st IF, 455 kHz 2nd IF and FM Detector
- Audio PA
- Squelch

RECEIVER FRONT END

An RF signal from the antenna is coupled through the low-pass filter, antenna relay, and band-pass filter (FL401) to the input of RF amplifier TR401. The output of TR401 is coupled through band-pass filter (FL403) and high-pass filters (FL402, FL404) to the input of 1st mixer HC401. Front-end selectivity is provided by these band-passand high-pass filters.

RECEIVER INJECTION

Receiver RF injection (49.8-62.8 or 55.8-70.8 MHz) from the synthesizer VCO is applied to amplifier TR404 through J402. The input level at J402 will be between 0.5 and 1.0 milliwatts. The output of amplifier TR404 is coupled to the input of amplifier TR405. The output of amplifier TR405 is filtered by a band pass filter (FL405). This filter is tuned to pass frequencies in the 49.8-70.8 MHz passband.

1st MIXER

The first mixer is a double-balanced diode mixer (HC401) that converts a signal in 29-42 or 35-50 MHz range to the 20.8 MHz first IF frequency.

In the mixer stage, RF from the front-end RF filter is applied to one input of the mixer. Injection voltage from the amplifier stages is applied to the other input of the mixer. The 20.8 MHz 1st IF output signal is coupled from the output of HC401 through C427 and R422 to the source input of IF AMPL TR402/403. TR402/403 are a JFET amplifier/buffer stage. The output of the JFET buffer is coupled through C429 to the optional noise blanker (W402 removed) or through impedance matching networks L503, L504 and associated circuitry (bypassing IF blanking FETs TR501 and TR502) to a 4-pole XTAL band-pass filter.

1st IF

The highly-selective Crystal filter consisting of FL501-1 and FL501-2 provides the first portion of the receiver IF selectivity. The output of the filter is coupled through impedance-matching network L506, C507 and C553 to the 1st IF amplifier TR503. The amplifier provides approximately 20 dB of IF gain. The output of TR503 is coupled through an impedance-matching network L507 to a 2-pole XTAL bnad-pass filter. The output of the XTAL band-pass filter is coupled through an impedance matching network L508 to the input of IC501. Diodes CD503 provides limiting for the 20.8 MHz IF signal (1.4Vp-p) to prevent high level overload of IC501.

2nd IF and DETECTOR

IC501 and associated circuitry comprise the 2nd oscillator/mixer, IF amplifier and FM detector. The 20.8 MHz IF input is applied to pin 18 of IC501 and mixed with a 20.8 MHz frequency supplied by crystal oscillator X501. Low-side injection is used. The output of the internal mixer is amplified and applied to a 6-pole ceramic filter, FL503 which provides the 455 kHz selectivity. The output of the 455 kHz filter is reapplied to IC501-5. The 2nd IF signal is amplified and limited. L509 shifts the IF signal by 90° and reapplies it to the internal FM detector. The FM detector compares the shifted IF signal

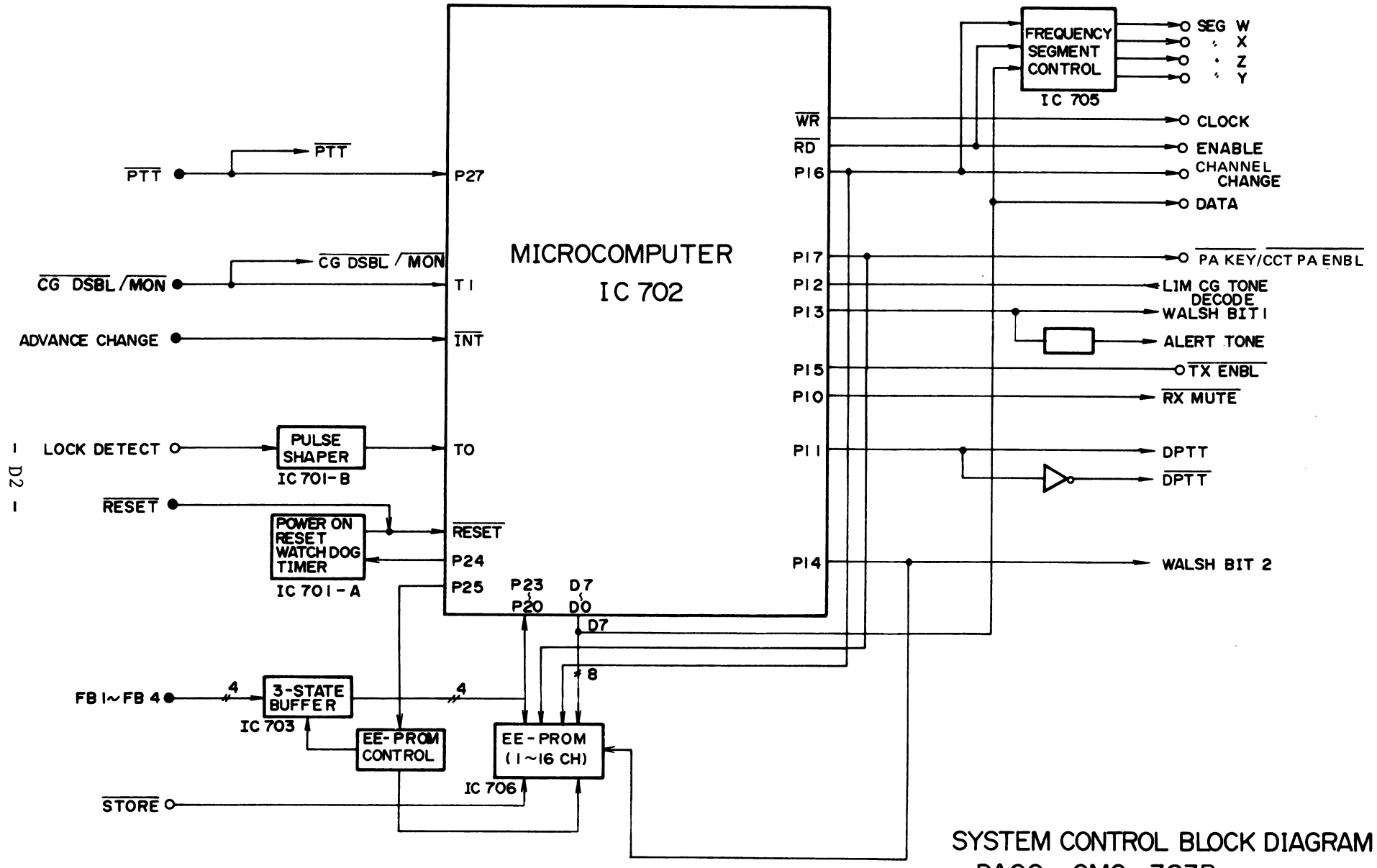
to the internal IF signal to recover the audio modulation. The audio output of IC501 is applied to the System Control board.

TABLE OF CONTENTS

DRAWING SHEET No.

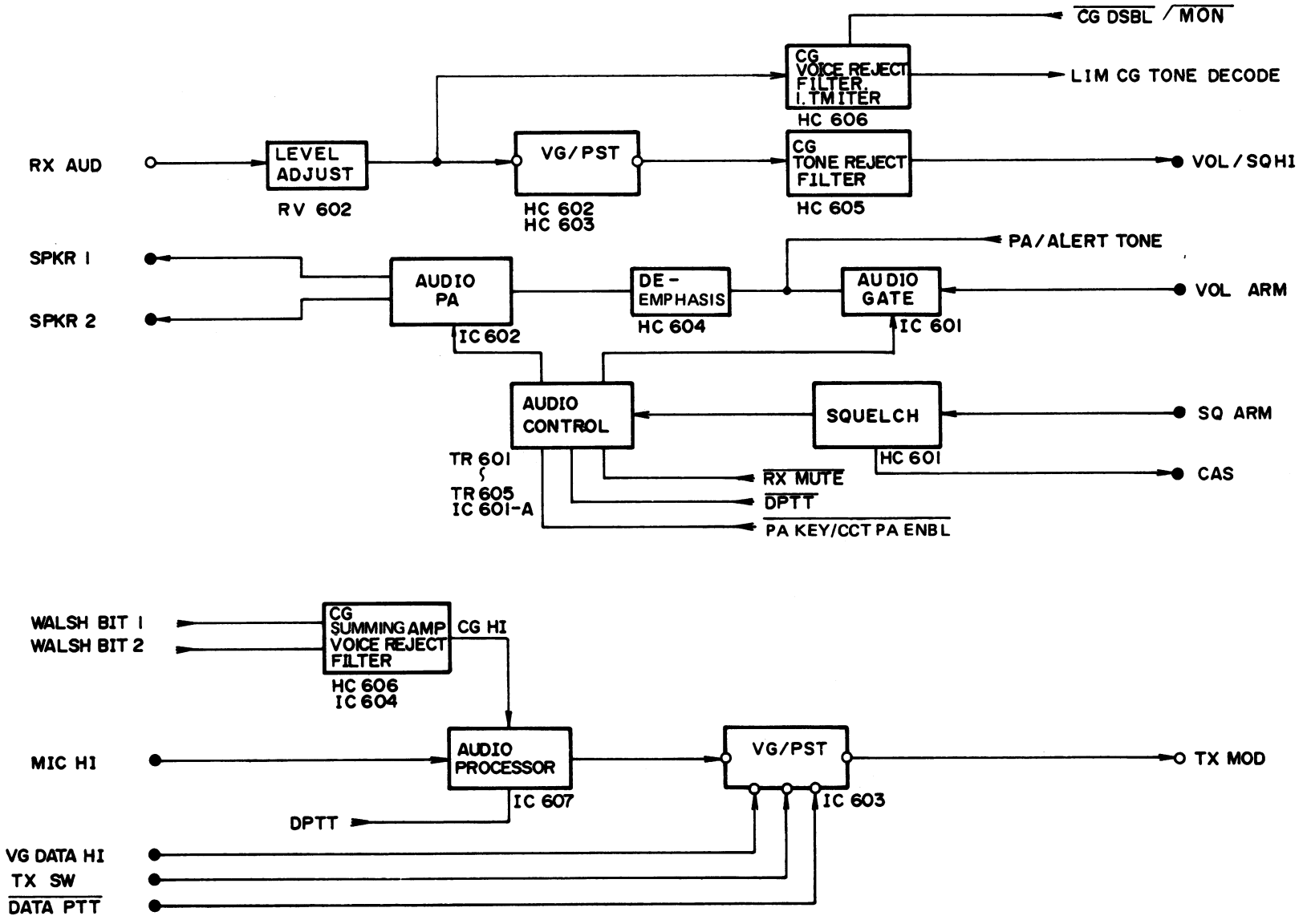
SECTION	BLOCK DIAGRAM
SYSTEM CONTROL	DA00–CMC–383B
SYNTHESIZER	DA00–CMG–130
EXCITER	DA00–CAF–254
POWER AMPLIFIER	DA00–CAH–254
RECEIVER	DA00–CMA–237
INTERFACE	DA00–CFQ–2223A

SECTION	SCHEMATIC DIAGRAM			
	A BAND 29 – 42 MHz		B BAND 35 – 50 MHz	
	60 W	110 W	60 W	110 W
INTERCONNECTION	DD00–JHM–151S60A	DD00–JHM–151S60B	DD00–JHM–151S110A	DD00–JHM–151S110B
SYSTEM CONTROL	DD00–CMC–383B	DD00–CMC–383B	DD00–CMC–383B	DD00–CMC–383B
SYNTHESIZER	DD00–CMG–130A	DD00–CMG–130A	DD00–CMG–130B	DD00–CMG–130B
EXCITER	DD00–CAF–254	DD00–CAF–254	DD00–CAF–254	DD00–CAF–254
POWER AMPLIFIER	DD00–CAH–254	DD00–CAH–254	DD00–CAH–254	DD00–CAH–254
RECEIVER	DD00–CMA–237	DD00–CMA–237	DD00–CMA–237	DD00–CMA–237
INTERFACE	DD00–CFQ–2223	DD00–CFQ–2223	DD00–CFQ–2223	DD00–CFQ–2223

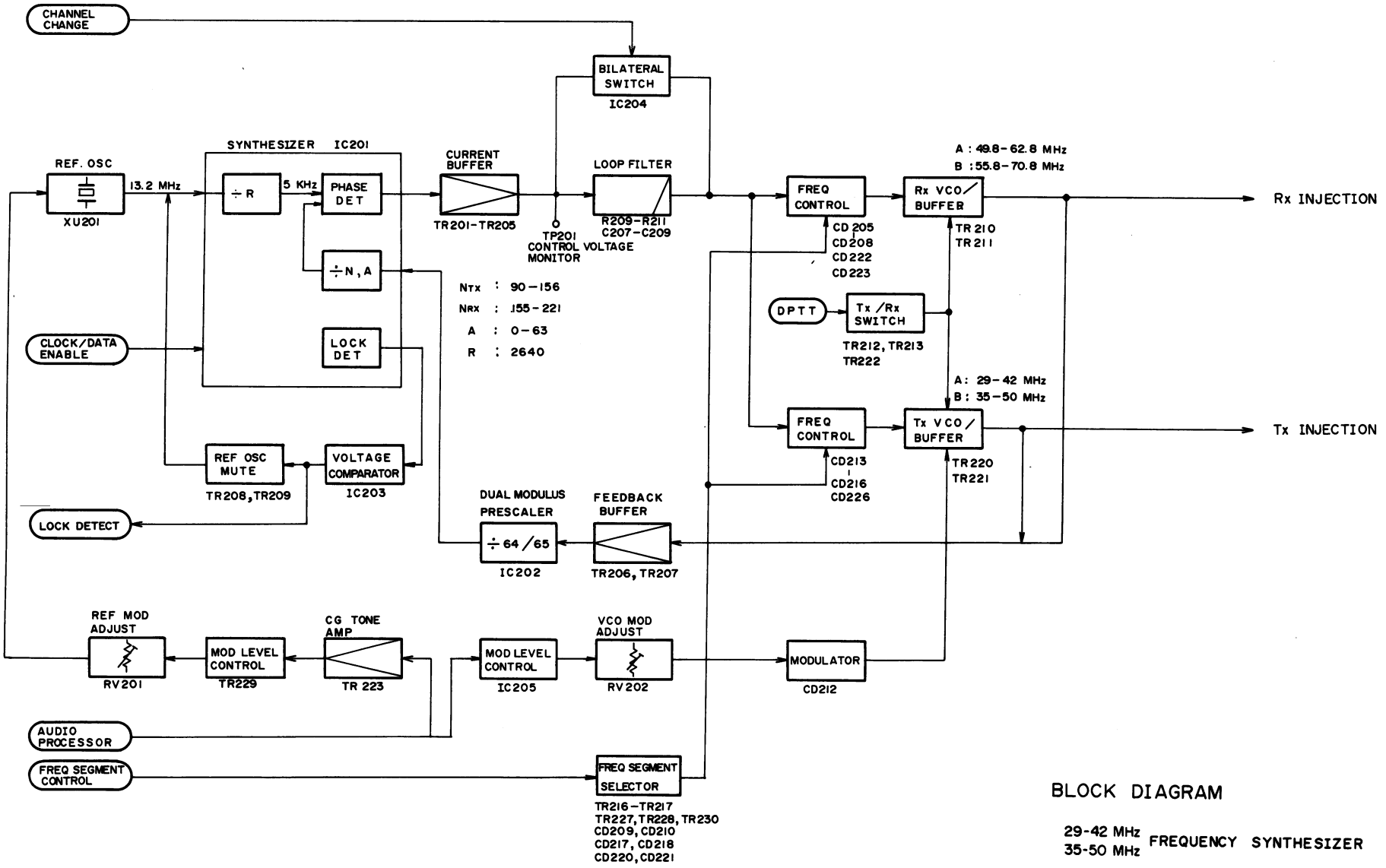


SYSTEM CONTROL BLOCK DIAGRAM
DA00-CMC-383B

1/2



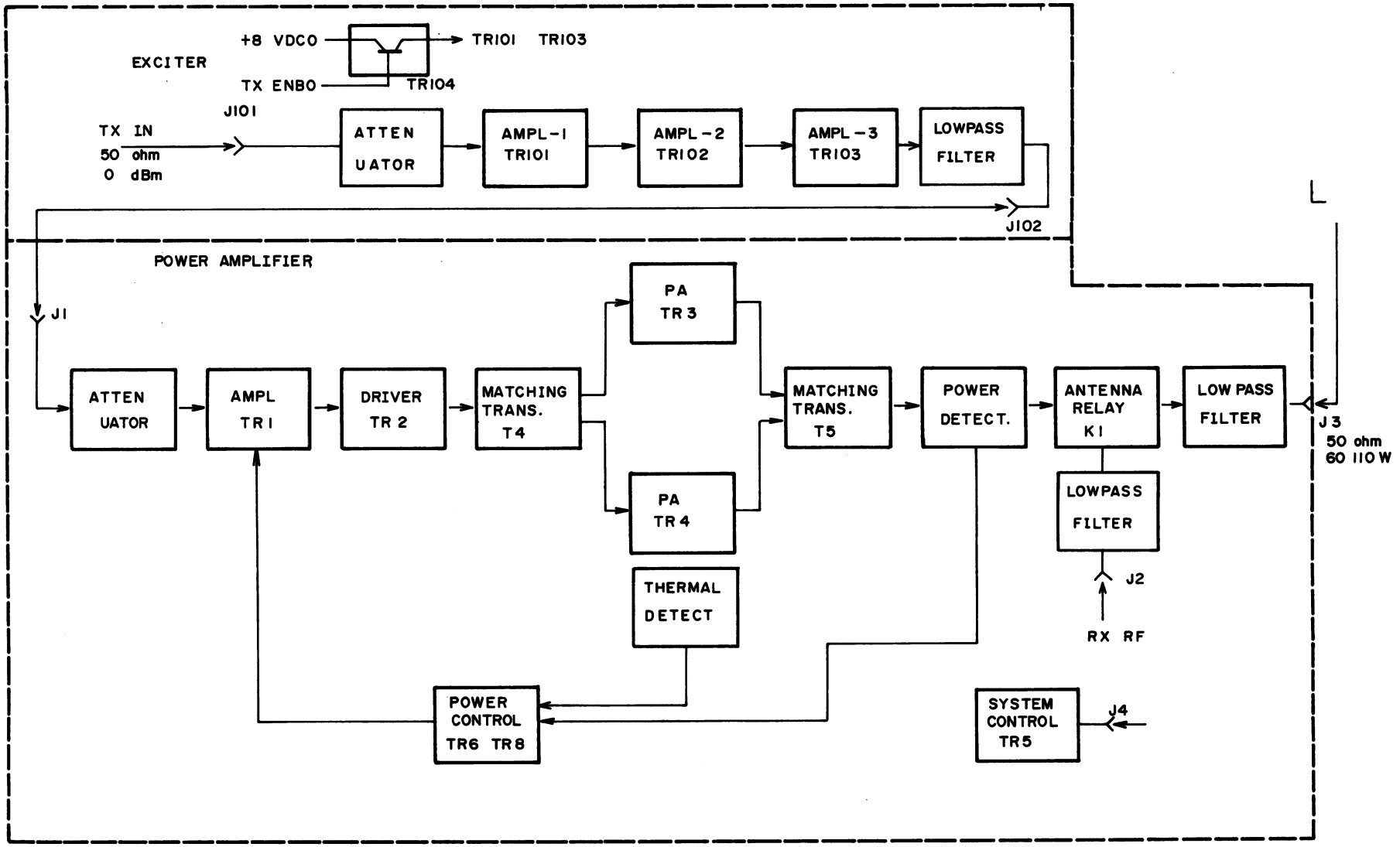
SYSTEM CONTROL BLOCK DIAGRAM
DA00-CMC-383B



BLOCK DIAGRAM

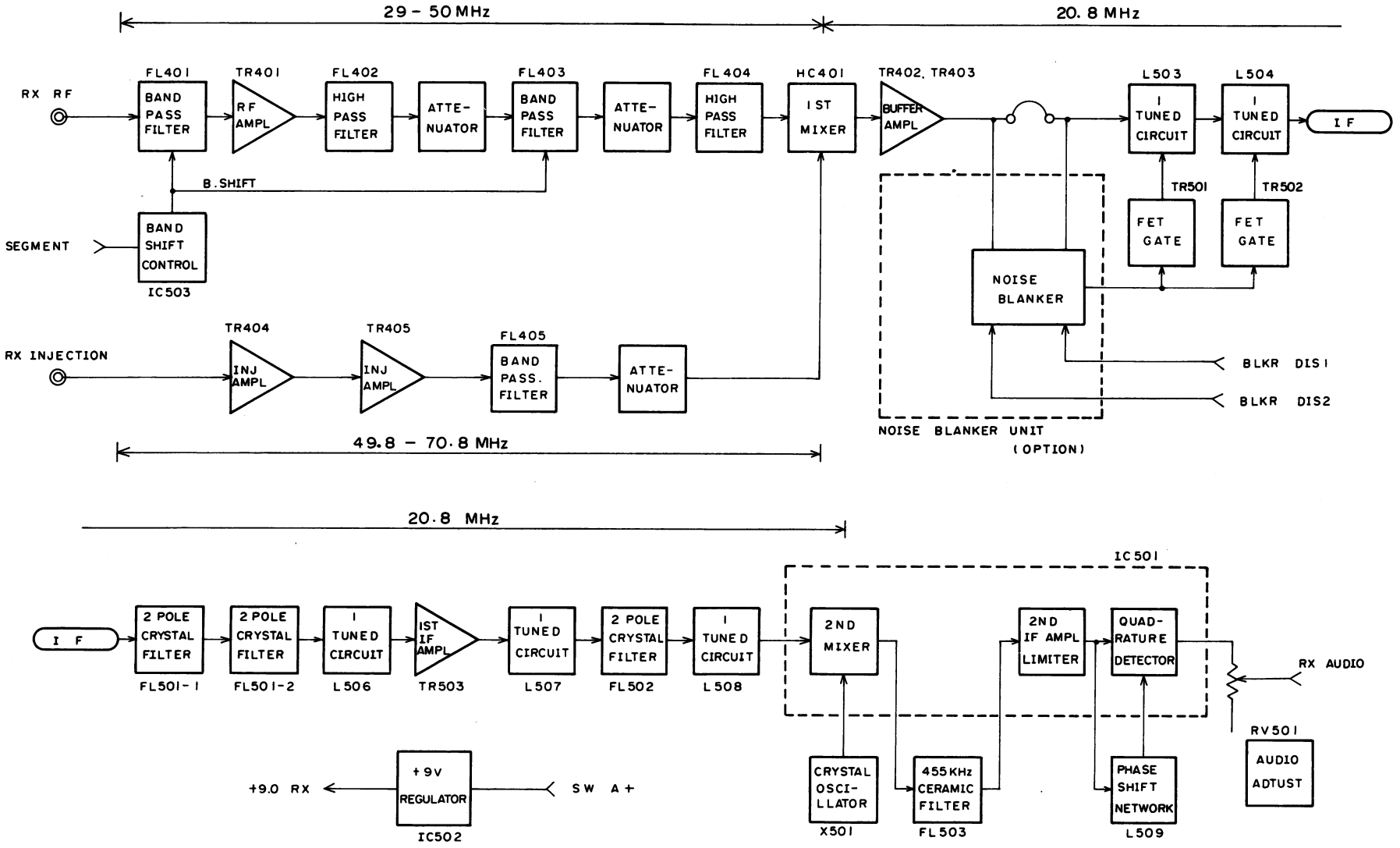
29-42 MHz
35-50 MHz FREQUENCY SYNTHESIZER

DA00-CMG-130



Low Band Exciter and Power Amplifier Block Diagram

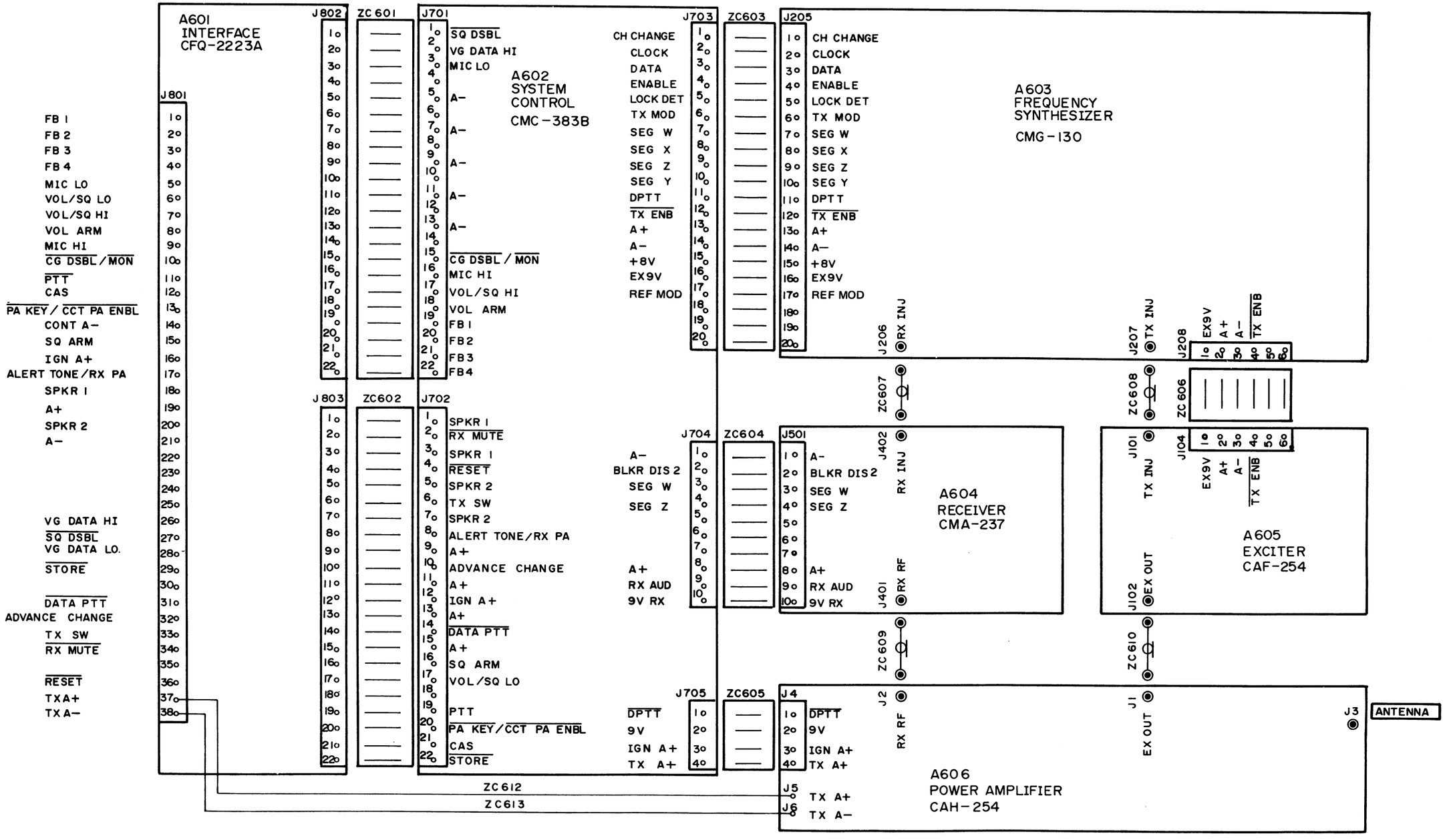
PA (CAH – 254)
EXCITER (CAF – 254)



BLOCK DIAGRAM

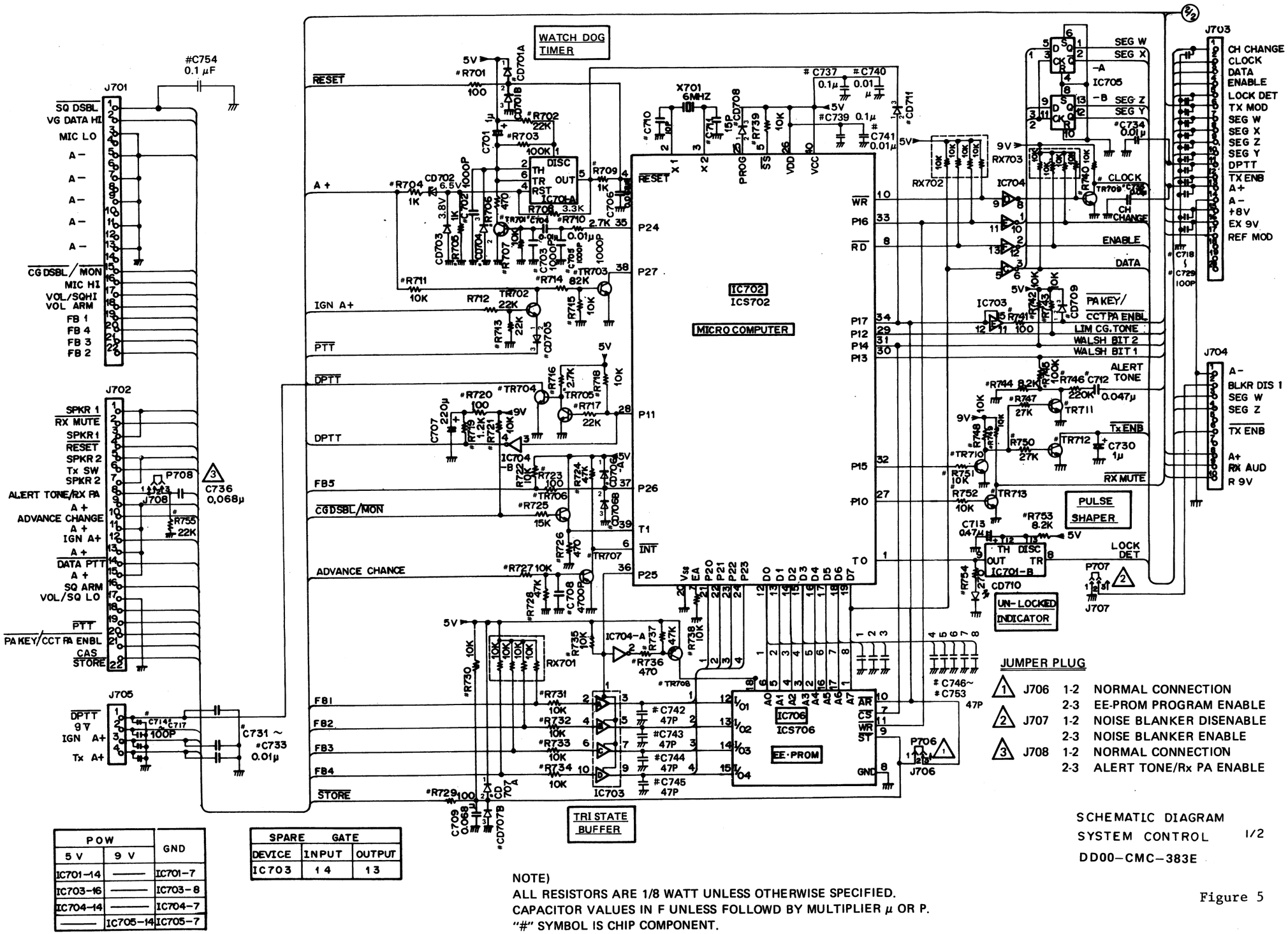
29 - 50 MHz RECEIVER

DA00 - CMA - 237



SECTION IDENTIFICATION CHART				
SECTION	JHM-151S60A (29~42 MHz 60W)	JHM-151S110A (29~42 MHz 110W)	JHM-151S60B (35~50 MHz 60W)	JHM-151S110B (35~50 MHz 110W)
A603	CMG-130A		CMG-130B	
A604	CMA-237A		CMA-237B	
A606	CAH-254AL	CAH-254AH	CAH-254BL	CAH-254BH

SCHEMATIC DIAGRAM
INTERCONNECTION
DDOO-JHM-151S60
DDOO-JHM-151S110



POW		GND
5 V	9 V	
IC701-14	——	IC701-7
IC703-16	——	IC703-8
IC704-14	——	IC704-7
——	IC705-14	IC705-7

SPARE GATE		
DEVICE	INPUT	OUTPUT
IC703	14	13

JUMPER PLUG

1	J706	1-2	NORMAL CONNECTION
		2-3	EE-PROM PROGRAM ENABLE
2	J707	1-2	NOISE BLANKER DISENABLE
		2-3	NOISE BLANKER ENABLE
3	J708	1-2	NORMAL CONNECTION
		2-3	ALERT TONE/Rx PA ENABLE

NOTE)
ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES IN F UNLESS FOLLOWD BY MULTIPLIER μ OR P.
"#" SYMBOL IS CHIP COMPONENT.

SCHEMATIC DIAGRAM
SYSTEM CONTROL 1/2
DD00-CMC-383E

Figure 5

+9V	GND
IC601-14	IC601-7
IC603-4	IC603-11
IC604-4	IC604-11
———	IC607-4
IC608-14	IC608-7
IC609-14	IC609-7

SPARE GATE			
DEVICE	INPUT	OUTPUT	CONTROL
IC609	3	4	5
	8	9	6
	10	11	12

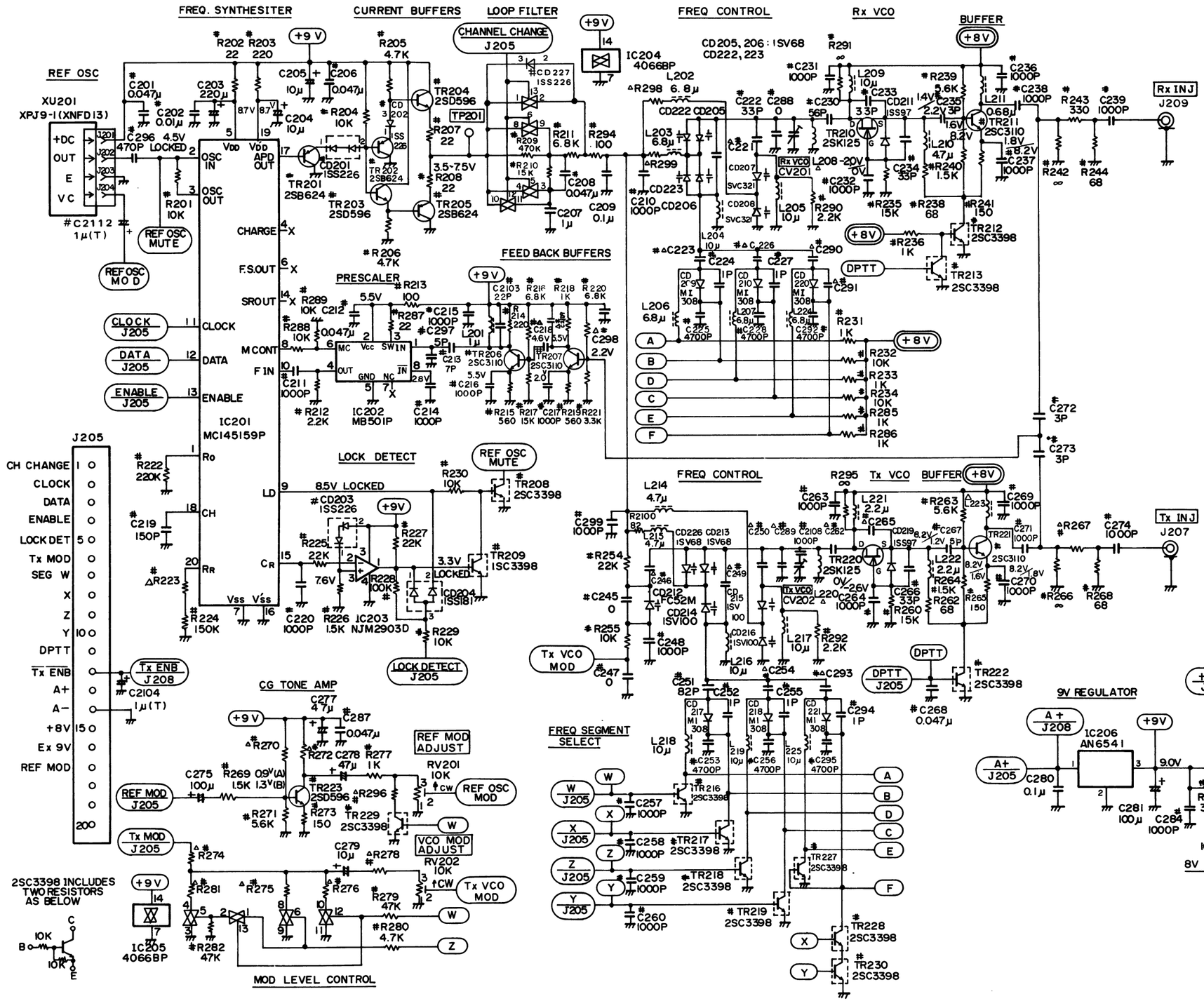
JUMPER PLUG

4	J601	1-2	TRANSMIT VG USE
		2-3	TRANSMIT VG NO USE
5	J602	1-2	CG TONE REJECT FILTER USE
		2-3	CG TONE REJECT FILTER NO USE
6	J603	1-2	RECEIVE VG NO USE
		2-3	RECEIVE VG USE
7	J604	1-2	RECEIVE CG POLARITY NORMAL
		2-3	RECEIVE CG POLARITY INVERT
8	J605	1-2	TRANSMIT CG POLARITY NORMAL
		2-3	TRANSMIT CG POLARITY INVERT

SCHEMATIC DIAGRAM
SYSTEM CONTROL 2/2
DD00-CMC-383E

NOTE) ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER μ
OR P. "#" SYMBOL IS CHIP COMPONENT.

Figure 6

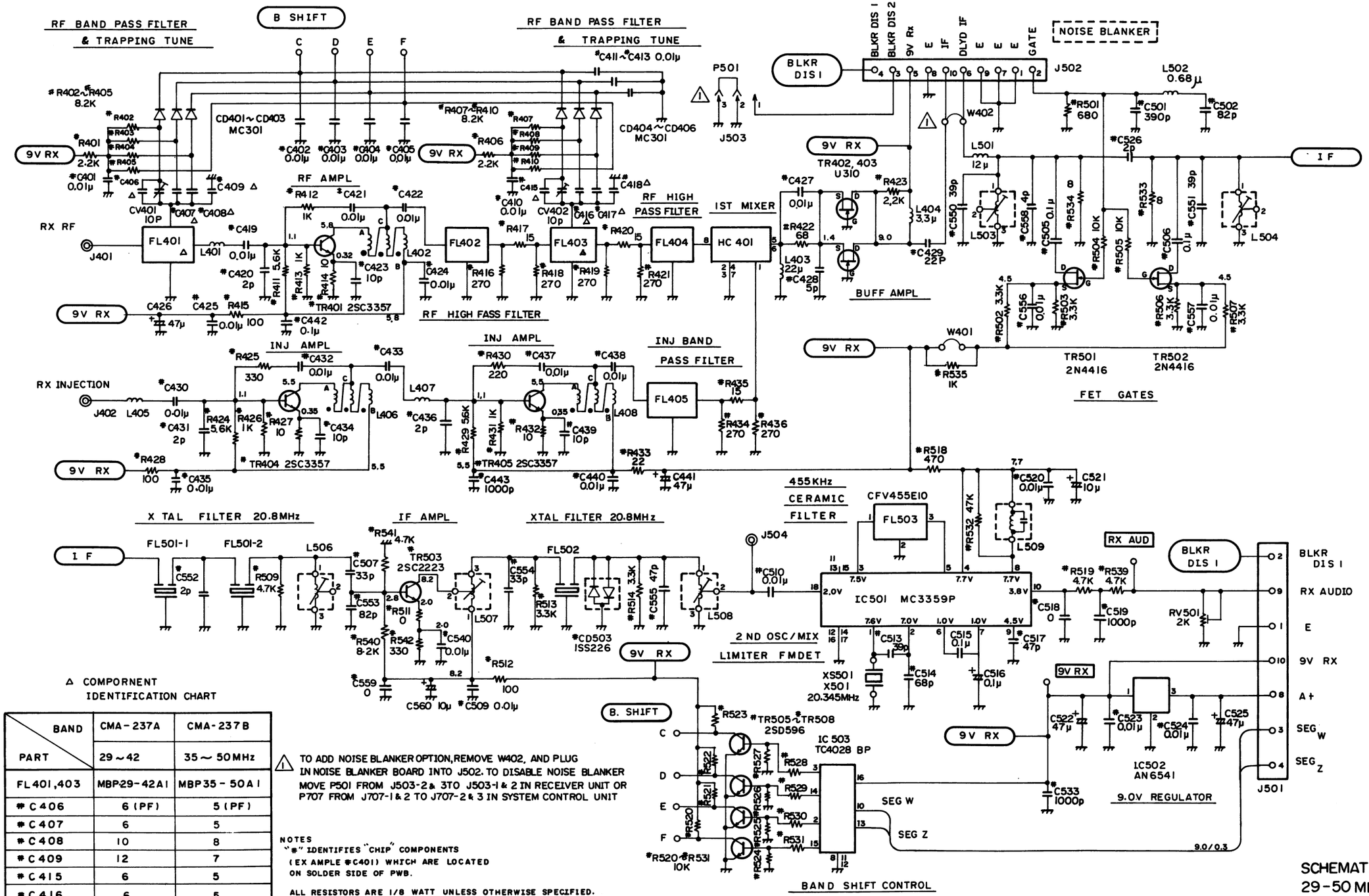


	CMG-130A 29-42MHz	CMG-130B 35-50MHz
C218	47 PF	22 PF
C221	22 PF	33 PF
C223	56 PF	68 PF
C226	18 PF	22 PF
C246	33 PF	15 PF
C249	100 PF	68 PF
C250	120 PF	100 PF
C254	33 PF	22 PF
C262	150 PF	100 PF
C265	56 PF	47 PF
C289	12 PF	0
C290	100 PF	120 PF
C291	1 PF	10 PF
C293	100 PF	120 PF
C298	0.01uF	1000PF
C2109	100PF	0
R223	22 KΩ	1 KΩ
R267	220 Ω	330 Ω
R270	47 KΩ	33 KΩ
R272	2.2 KΩ	1 KΩ
R274	4.7 KΩ	6.8 KΩ
R275	15 KΩ	27 KΩ
R276	8.2 KΩ	10 KΩ
R278	330 KΩ	220 KΩ
R281	27 KΩ	47 KΩ
R296	8.2 KΩ	5.6 KΩ
R298	100 Ω	82 Ω
R299	100 Ω	82 Ω
L208	JR-NB-7561	JR-NB-7560
L220	JR-NB-7563	JR-NB-7562
L223	1.5 μH	1 μH
L224	6.8 μH	2.2 μH

SCHEMATIC DIAGRAM

29-42 MHz
35-50 MHz FREQUENCY SYNTHESIZER

DDOO−CMG−130



△ COMPORNENT IDENTIFICATION CHART

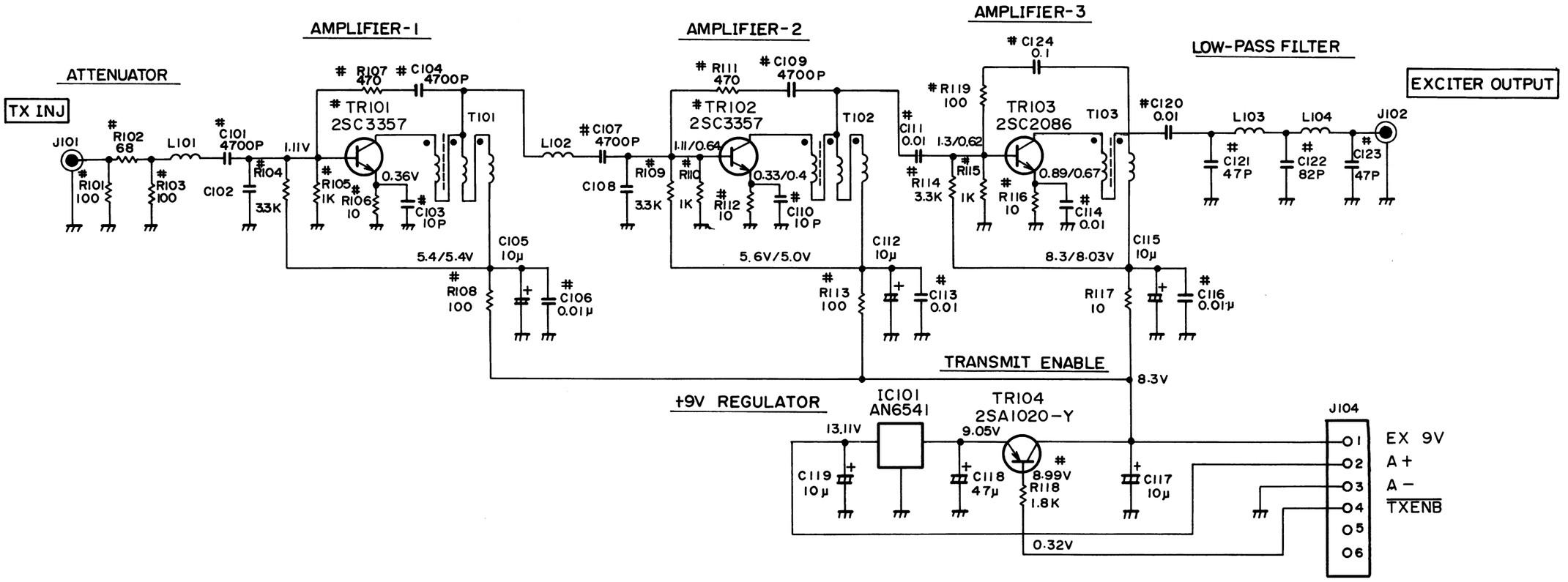
BAND / PART	CMA-237A	CMA-237B
	29~42	35~50MHz
FL401,403	MBP29-42A1	MBP35-50A1
*C406	6 (PF)	5 (PF)
*C407	6	5
*C408	10	8
*C409	12	7
*C415	6	5
*C416	6	5
*C417	10	8
*C418	12	7

⚠ TO ADD NOISE BLANKER OPTION, REMOVE W402, AND PLUG IN NOISE BLANKER BOARD INTO J502. TO DISABLE NOISE BLANKER MOVE P501 FROM J503-2 & 3 TO J503-1 & 2 IN RECEIVER UNIT OR P707 FROM J707-1 & 2 TO J707-2 & 3 IN SYSTEM CONTROL UNIT

NOTES
"*" IDENTIFIES "CHIP" COMPONENTS (EXAMPLE *C401) WHICH ARE LOCATED ON SOLDER SIDE OF PWB.

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER μ, n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR μ.

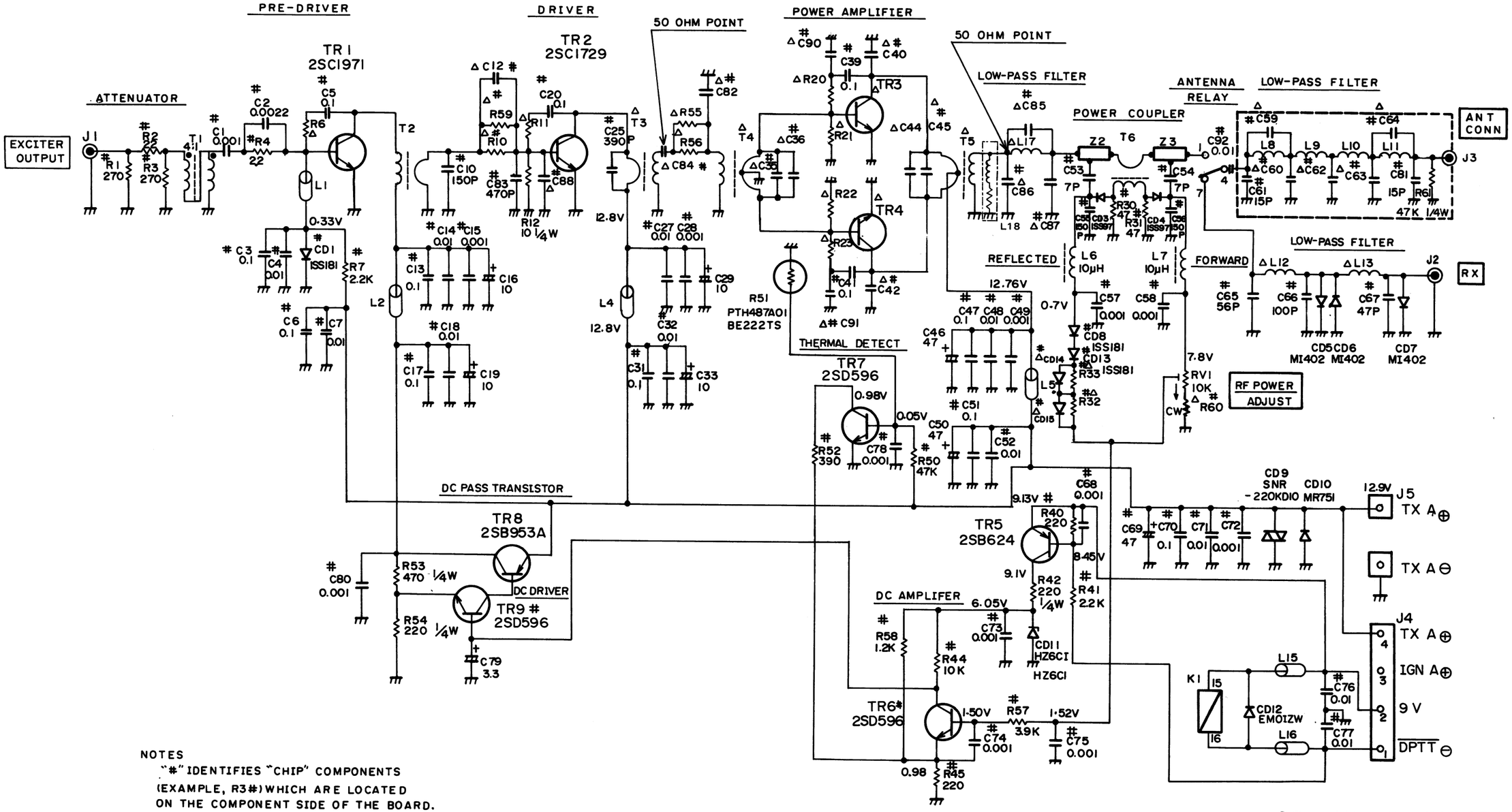
SCHEMATIC DIAGRAM
29-50MHz RECEIVER
DDOO-CMA-237



NOTES
"#" IDENTIFIES "CHIP" COMPONENTS (EXAMPLE . R3#) WHICH ARE LOCATED ON THE SOLDER SIDE OF THE BOARD.

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN µF UNLESS FOLLOWED BY MULTIPLIER n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR µ.

SCHEMATIC DIAGRAM
29.0 - 50MHz EXCITER
DDOO-CAF-254



NOTES

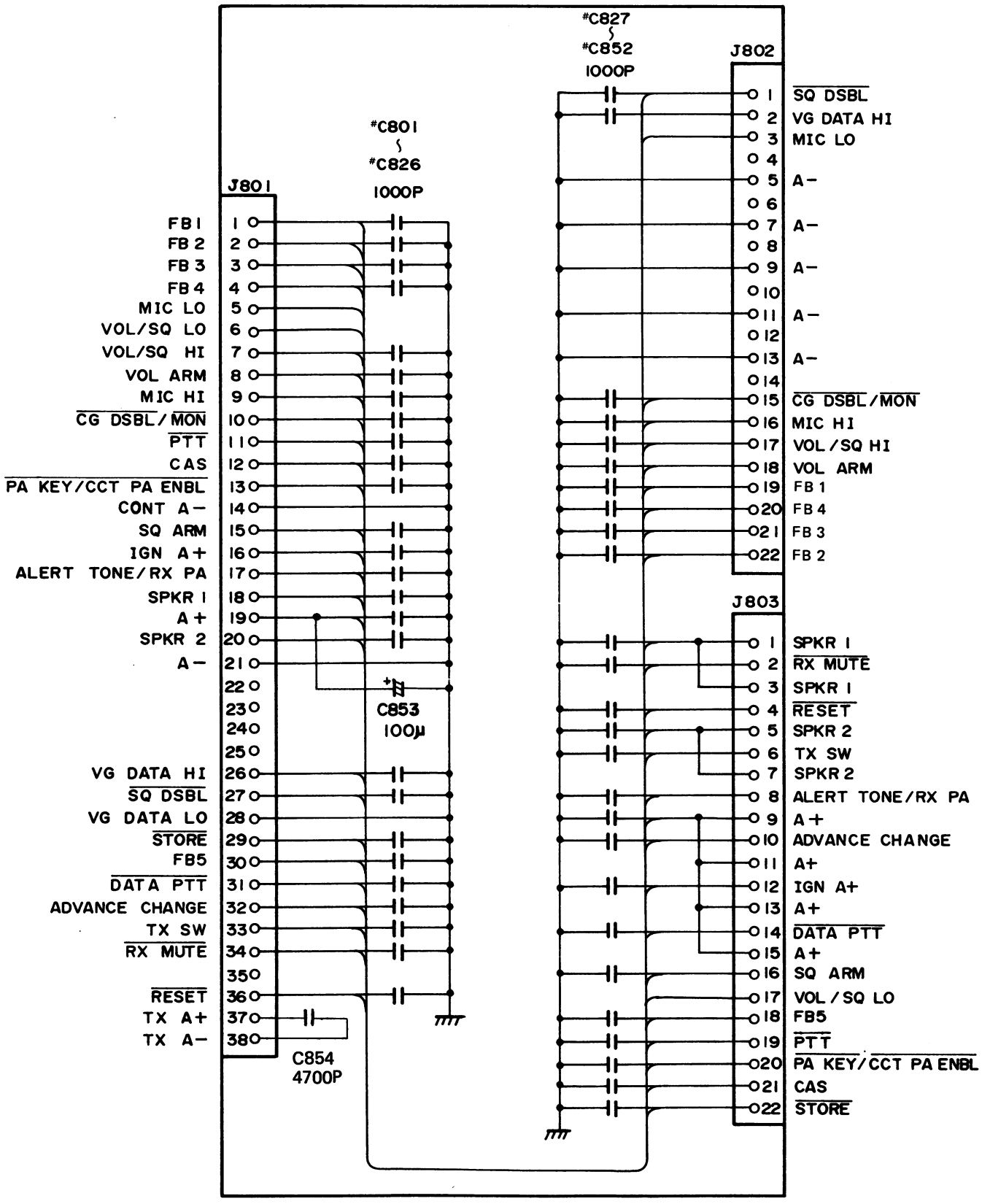
"#" IDENTIFIES "CHIP" COMPONENTS (EXAMPLE, R3#) WHICH ARE LOCATED ON THE COMPONENT SIDE OF THE BOARD.

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED,
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN μF UNLESS FOLLOWED BY MULTIPLIER n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR μ.

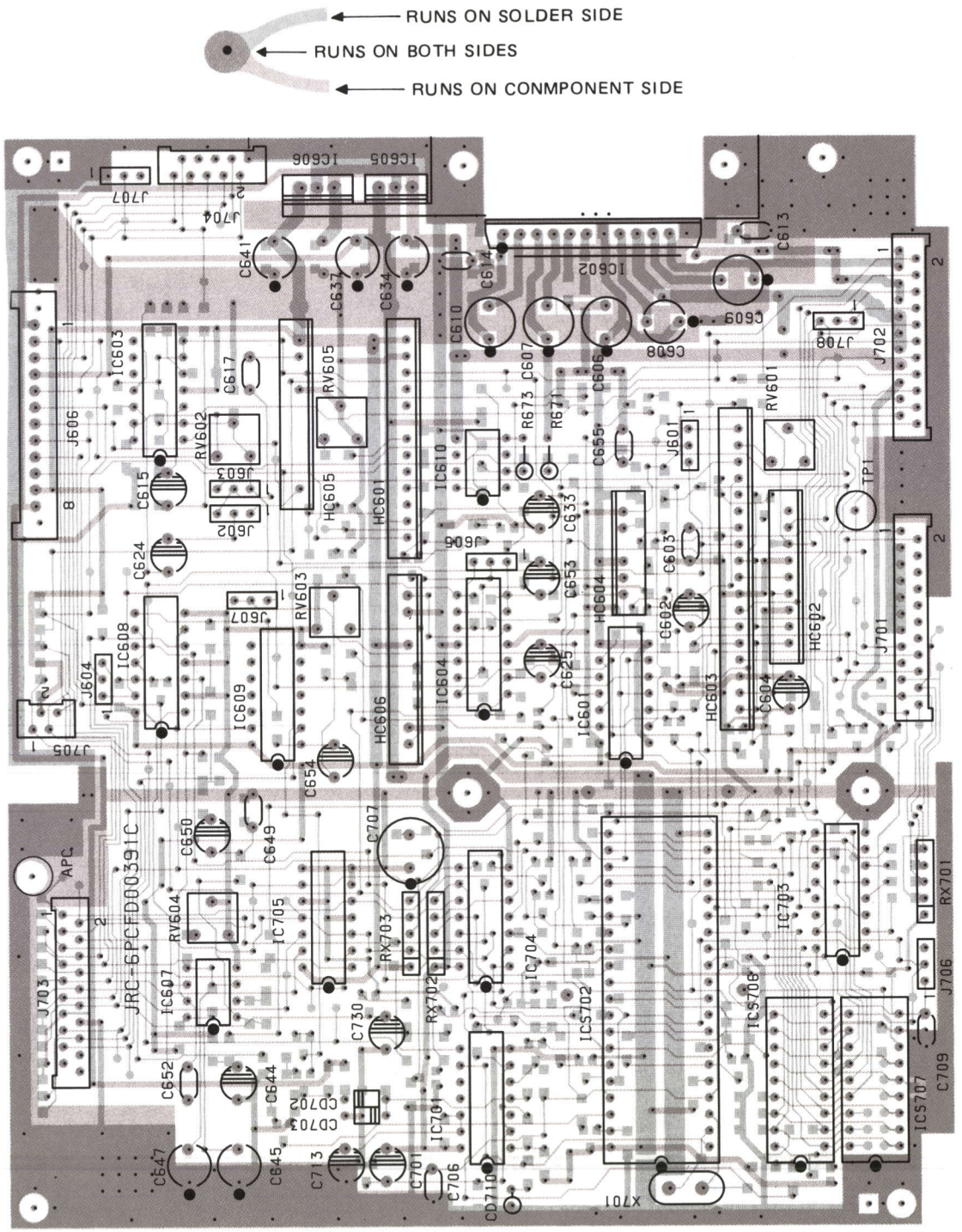
SCHEMATIC DIAGRAM
29.0-50MHz 60/110 WATT
POWER AMPLIFIER
DD00-CAH-254

△ COMPONENT IDENTIFICATION CHART

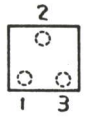
PART	CAH-254AL 29-42MHz 60W	CAH-254AH 29-42MHz 110W	CAH-254BL 35-50MHz 60W	CAH-254BH 35-50MHz 110W
# C12	——	0.0022μ	——	0.0022μ
# C35	——	820P	——	820P
C36	330P	470P	330P	330P
# C40	220P	270P	220P	180P
C42	〃	〃	〃	〃
C44	270P	390P	270P	330P
# C45	390P	470P	390P	820P
# C59	78P	78P	56P	56P
# C60	130P	130P	100P	100P
# C62	185P	185P	130P	130P
# C63	130P	270P	100P	100P
# C64	56P	56P	45P	45P
# C82	——	270P	——	22P
# C84	0.1	0.1	0.1	120P
# C85	70P	70P	56P	56P
# C86	39P	39P	30P	30P
# C87	18P	18P	15P	15P
# C88	270P	——	270P	——
L12	11.5T	11.5T	8.5T	8.5T
L13	〃	〃	9.5T	9.5T
L17	5.5T	5.5T	4.5T	4.5T
R6	1K 1/4W	560Ω 1/4W	1K 1/4W	560Ω 1/4W
# R10	6.8Ω 1/8W	2.2Ω 1/8W	6.8Ω 1/8W	2.2Ω 1/8W
R11	56Ω 2W	47Ω 2W	56Ω 2W	47Ω 2W
R20	47Ω 2W	47Ω 3W	47Ω 2W	47Ω 3W
R21	4.7Ω 1/2W	2.2Ω 1/2W	4.7Ω 1/2W	2.2Ω 1/2W
R22	〃	〃	〃	〃
R23	47Ω 2W	47Ω 3W	47Ω 2W	47Ω 3W
# R33	0Ω 1/8W	——	0Ω 1/8W	——
# R32	0Ω 1/8W	——	0Ω 1/8W	——
T3	1 : 16	1 : 4	1 : 16	1 : 16
T4	16 : 1	4 : 1	16 : 1	9 : 1
TR3	2SC2630	2SC2782	2SC2630	2SC2782
TR4	〃	〃	〃	〃
# CD14	——	1SS181	——	1SS181
# CD15	——	〃	——	〃
# R60	2.7K 1/8W	1.8K 1/8W	3.0K 1/8W	1.8K 1/8W
# C90	——	150P	——	——
# C91	——	150P	——	——
R56	——	10Ω 2W	——	10Ω 2W
R59	5.6Ω 1/8W	——	5.6K 1/8W	——



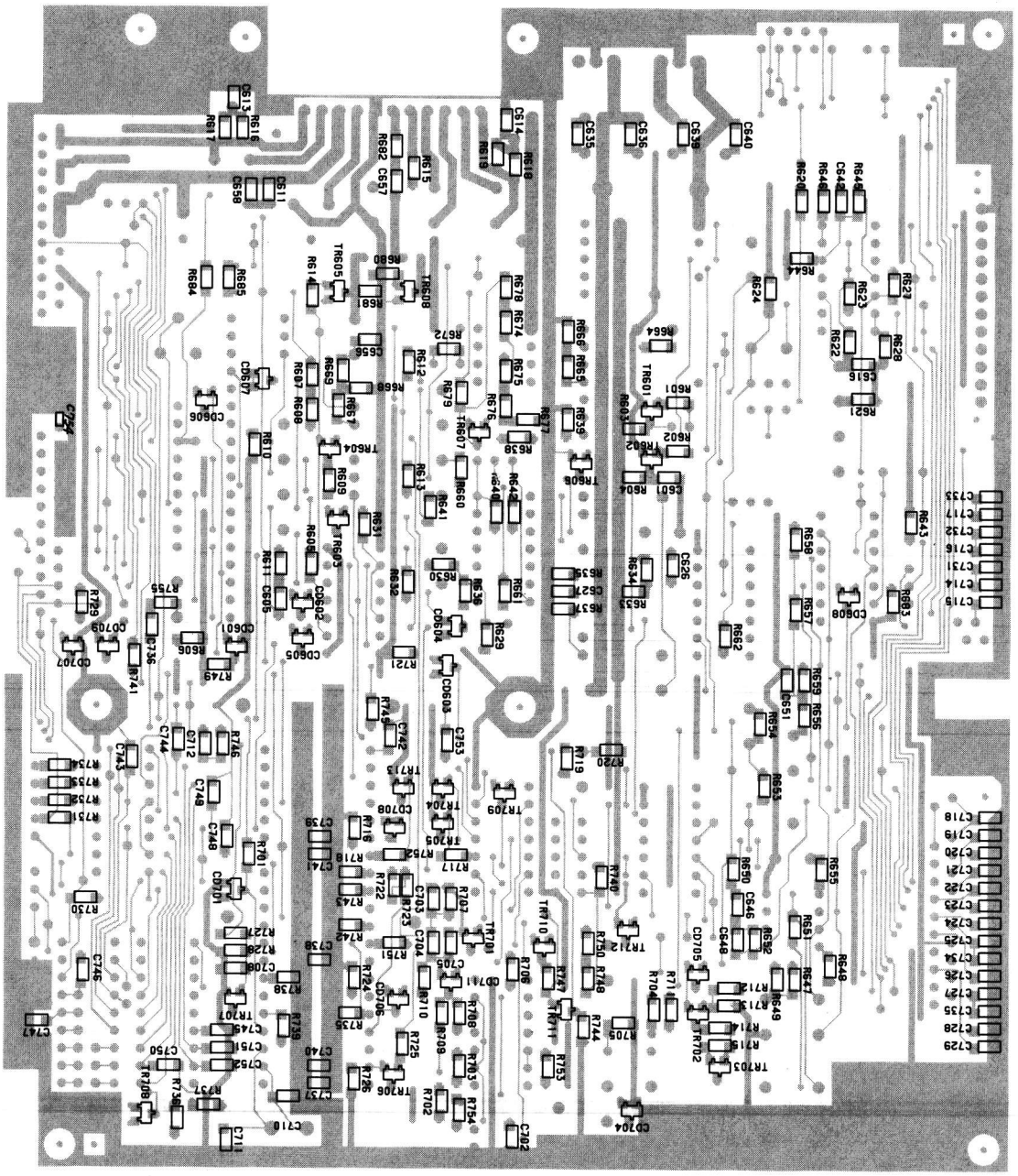
SCHEMATIC DIAGRAM
INTERFACE
DD00-CFQ-2223A
1/1



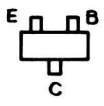
(TOP VIEW)



SYSTEM CONTROL BOARD

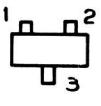


LEAD IDENTIFICATION FOR TRANSISTOR



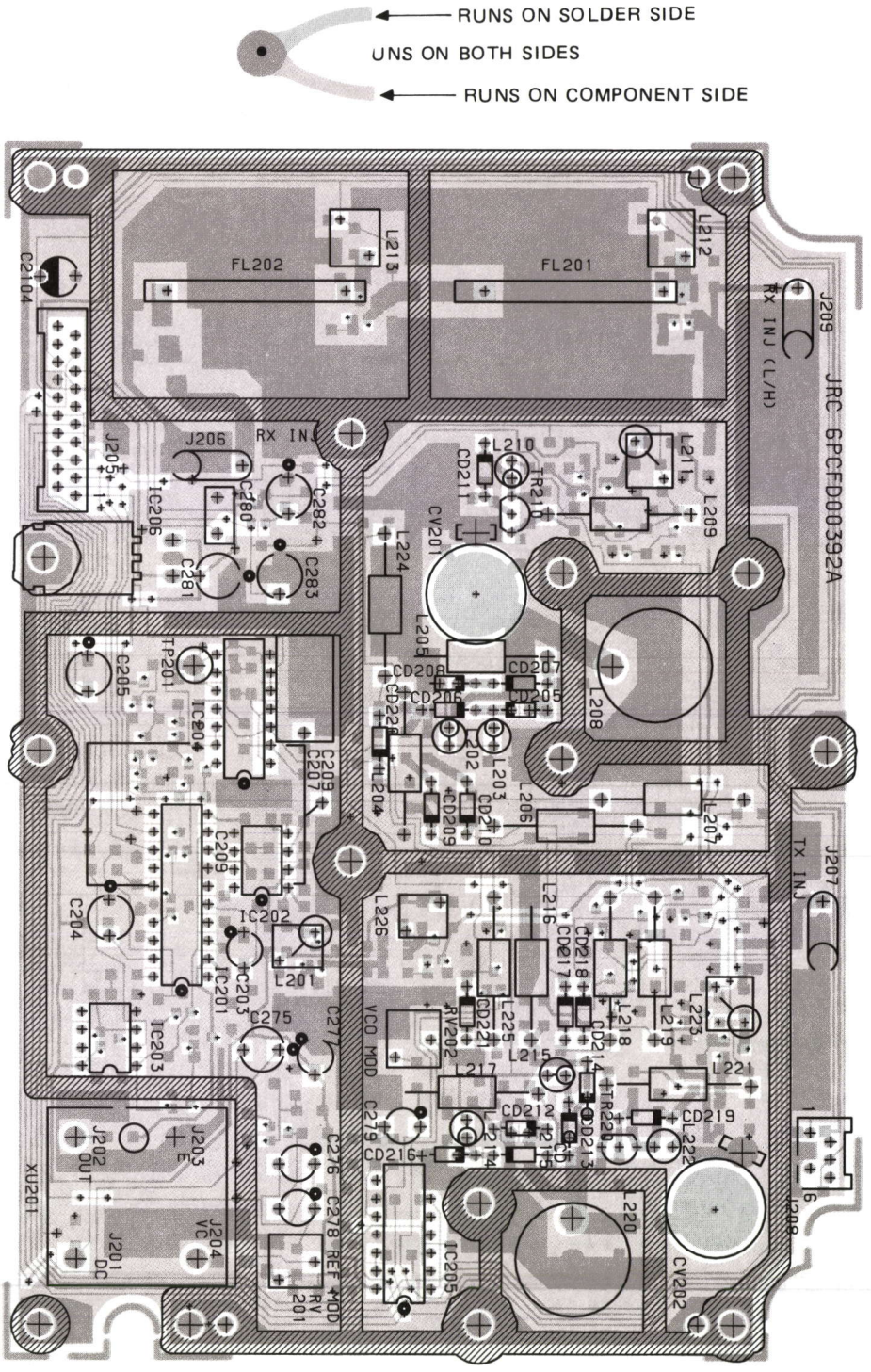
(TOP VIEW)

LEAD IDENTIFICATION FOR DIODES



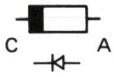
(TOP VIEW)

SYSTEM CONTROL BOARD



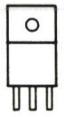
LEAD IDENTIFICATION
FOR TR210, TR220
(TOP VIEW)

LEAD IDENTIFICATION
FOR DIODES
(TOP VIEW)

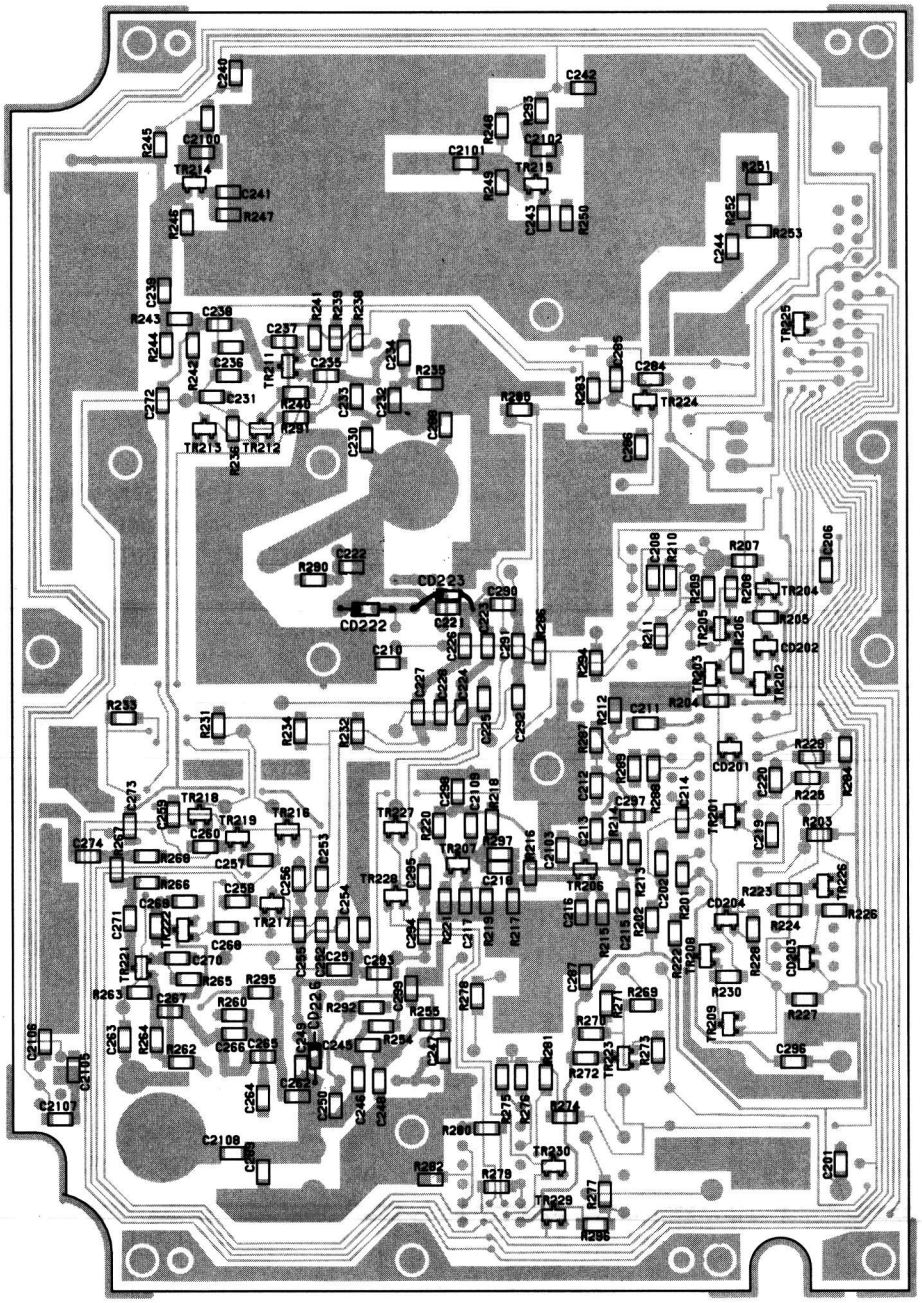


LEAD IDENTIFICATION
FOR RV201, RV202
(TOP VIEW)

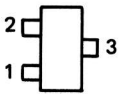
LEAD IDENTIFICATION
FOR IC206
(TOP VIEW)



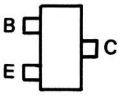
FREQUENCY SYNTHESIZER BOARD



LEAD IDENTIFICATION
FOR DIODES
(TOP VIEW)

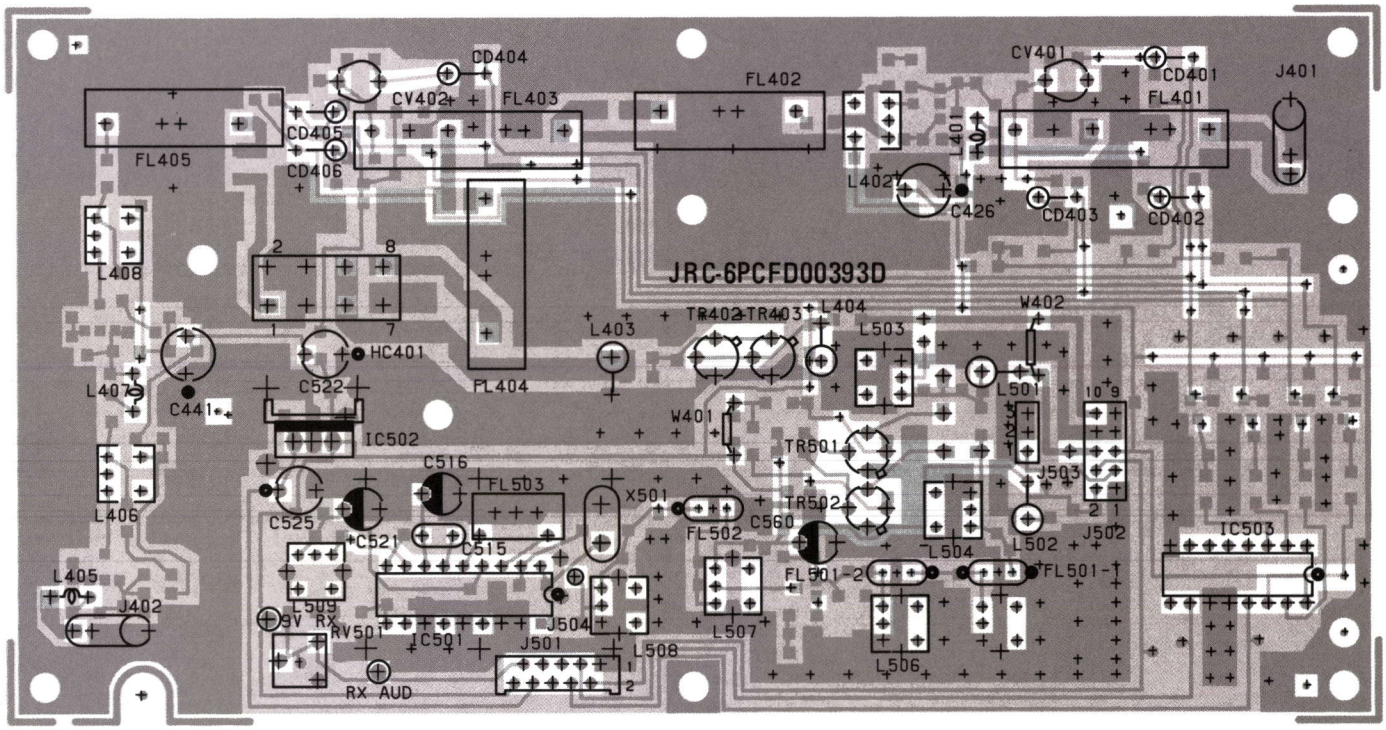


LEAD IDENTIFICATION
FOR TRANSISTORS
(TOP VIEW)



FREQUENCY SYNTHESIZER

(BACK VIEW OF COMPONENT BOARD)

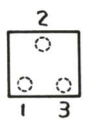


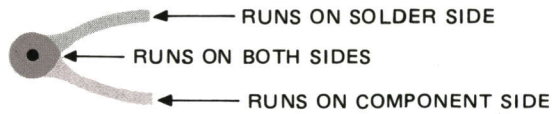
RECEIVER BOARD

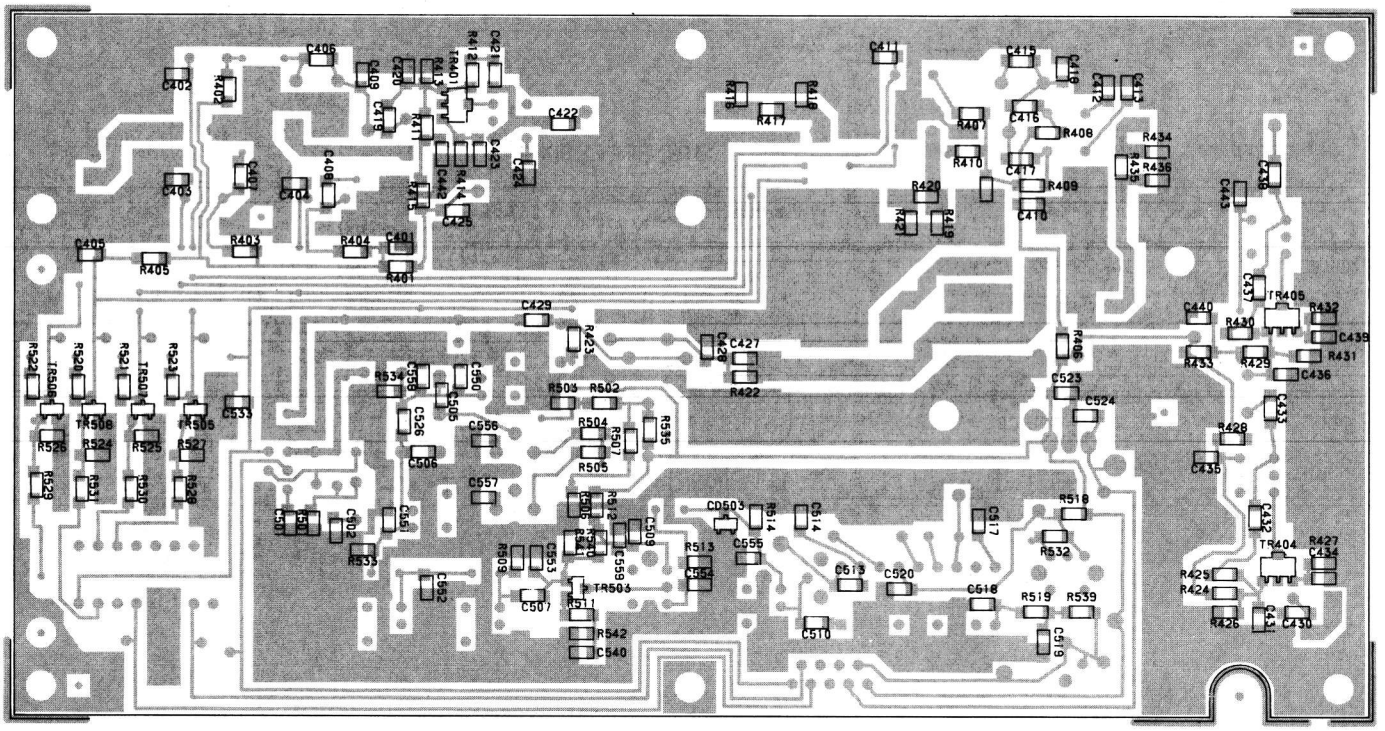
LEAD IDENTIFICATION

FOR RV 501

(TOP VIEW)

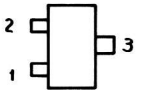




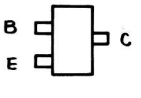


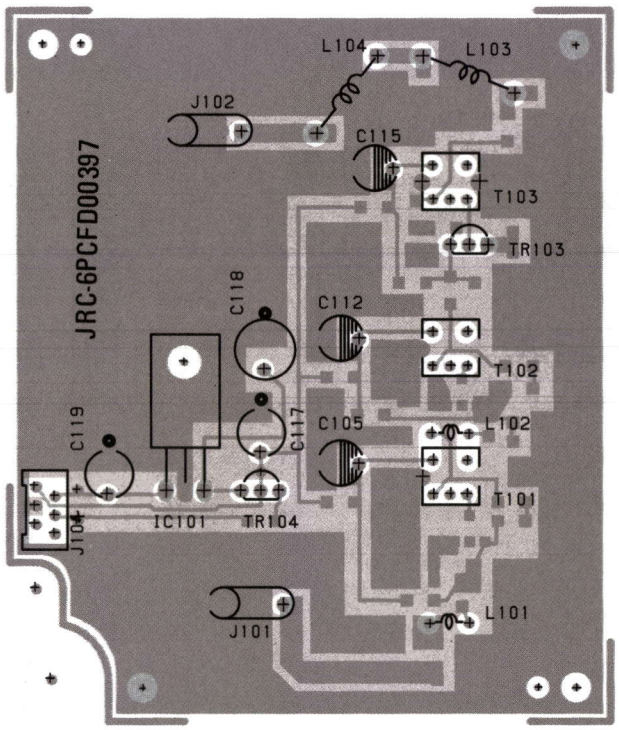
RECEIVER BOARD

LEAD IDENTIFICATION
FOR CD 501
(TOP VIEW)

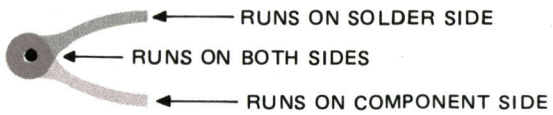


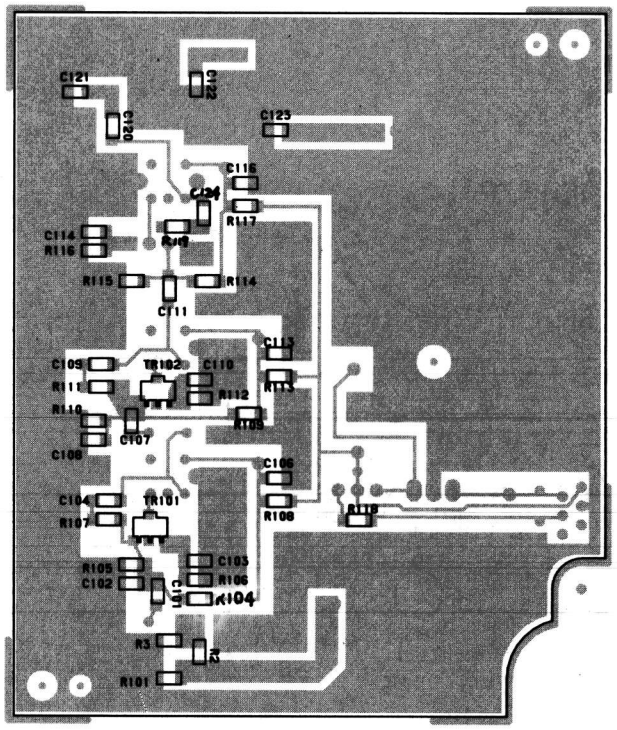
LEAD IDENTIFICATION
FOR TRANSISTORS
(TOP VIEW)





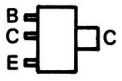
TRANSMIT EXCITER BOARD

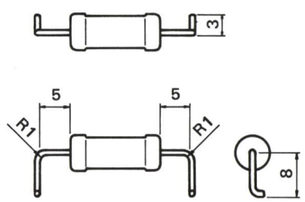




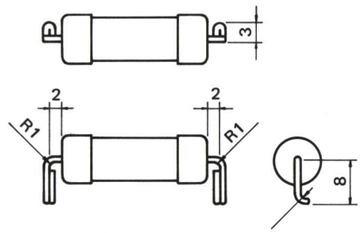
TRANSMIT EXCITER BOARD

LEAD IDENTIFICATION
FOR TRANSISTORS
(TOP VIEW)

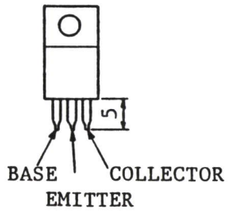




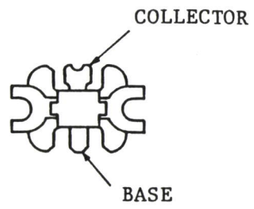
LEAD TRIMMING
FOR R20 AND R23
(Used in A60 and B60)



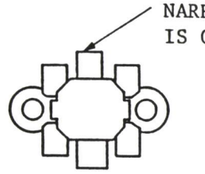
LEAD TRIMMING
FOR R20 AND R23
(Used in A110 and B110)



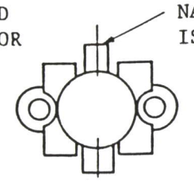
LEAD TRIMMING
FOR TR 1



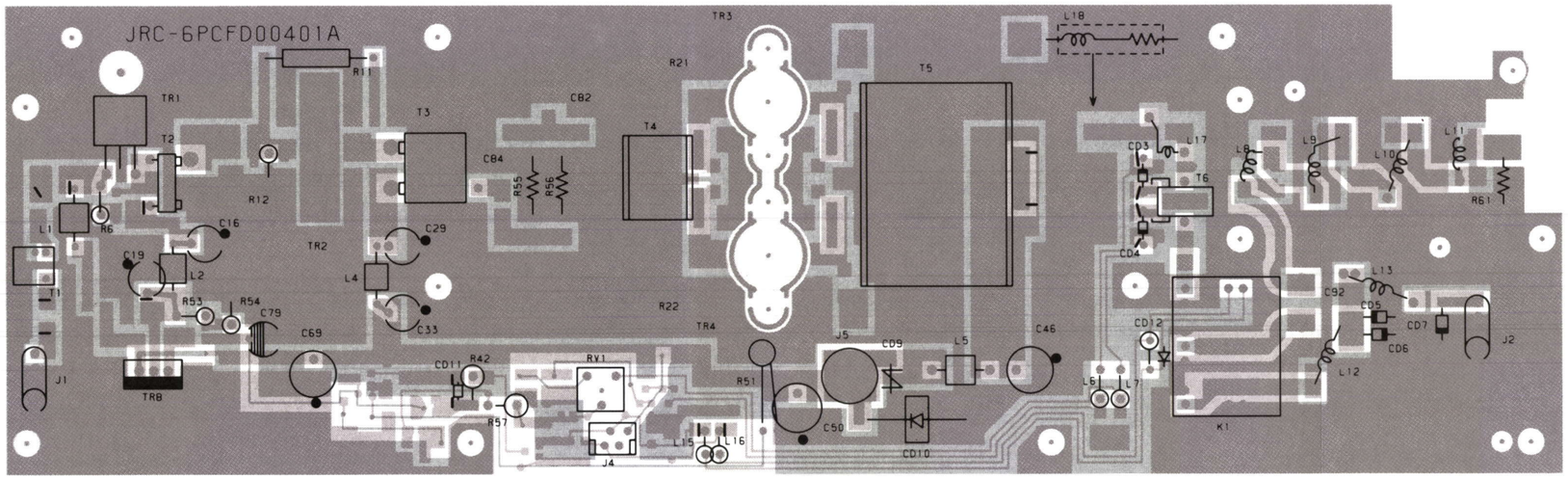
LEAD IDENTIFICATION
FOR TR 2

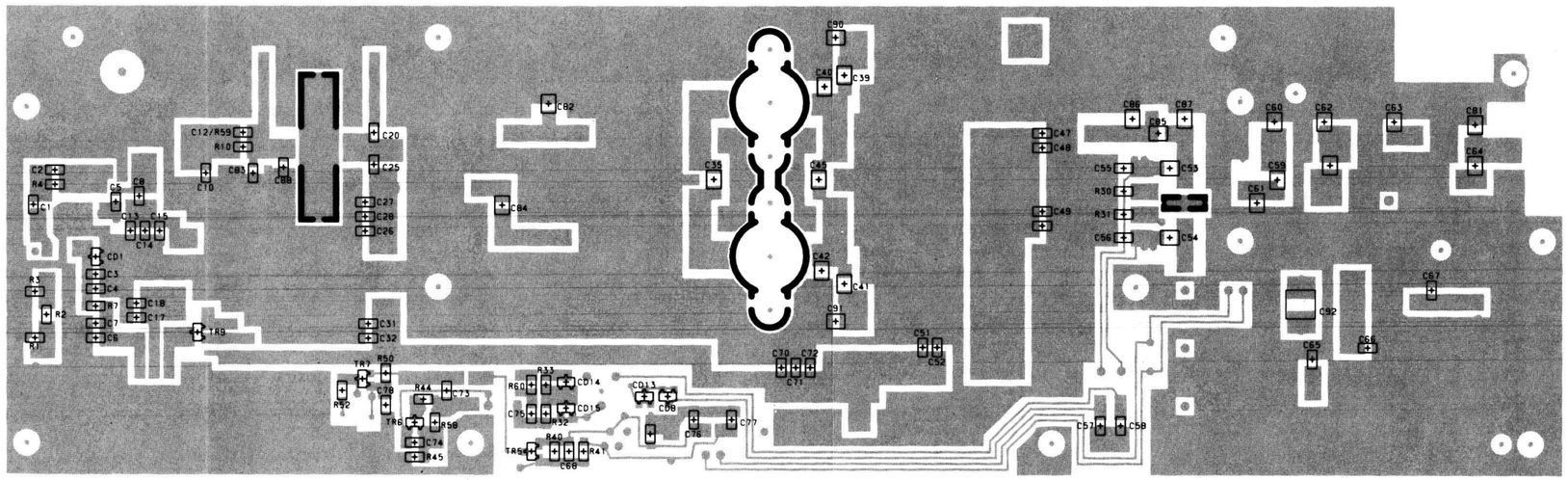


TYP LEAD TRIMMING
FOR TR 3 AND TR 4
(Used in A60 and B60)



TYP LEAD TRIMMING
FOR TR 3 AND TR 4
(Used in A110 and B110)

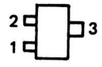




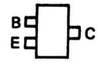
POWER AMPLIFIER BOARD

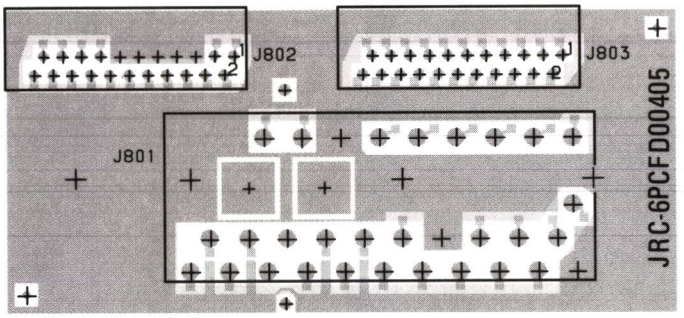
(BACK VIEW OF COMPONENT BOARD)

LEAD IDENTIFICATION FOR CD1, CD8, CD13, CD14 and CD15 (TOP VIEW)

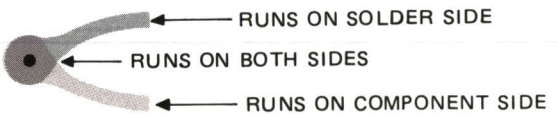


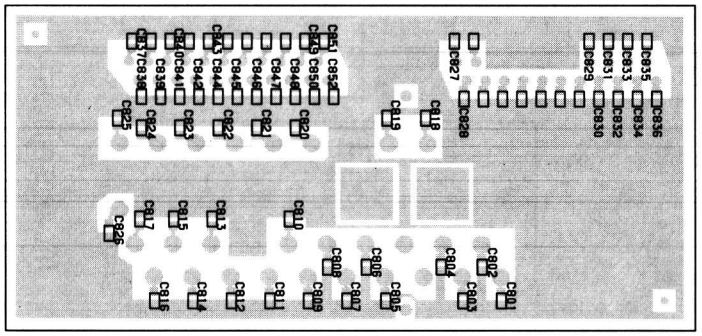
LEAD IDENTIFICATION FOR TRANSISTORS (TOP VIEW)



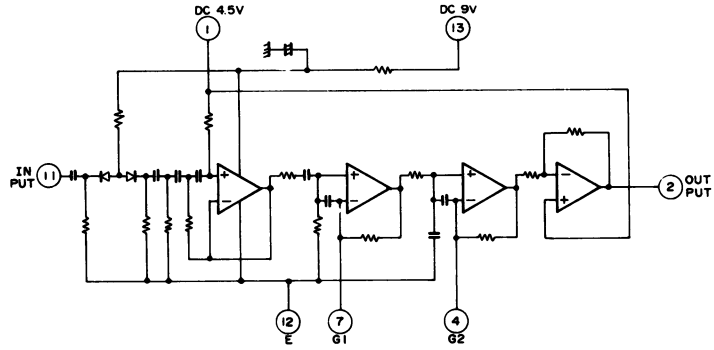
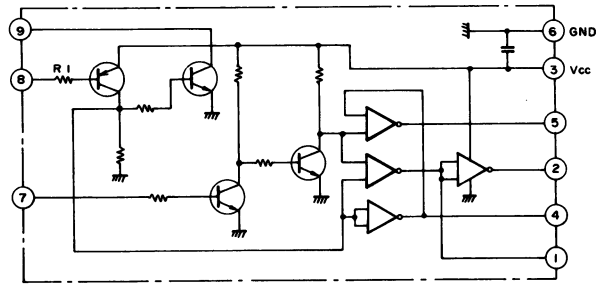
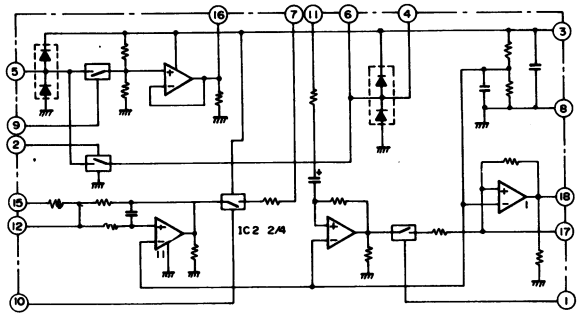
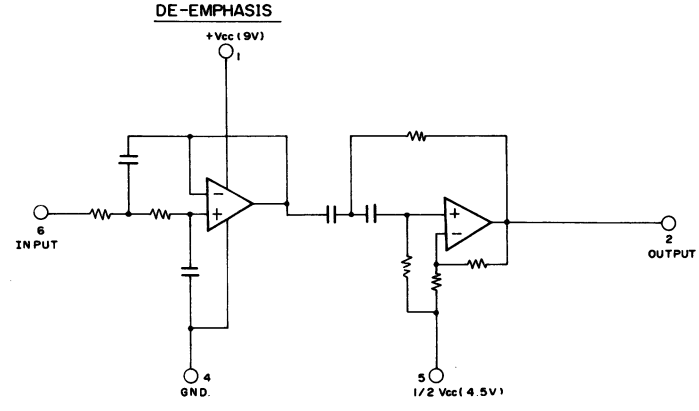


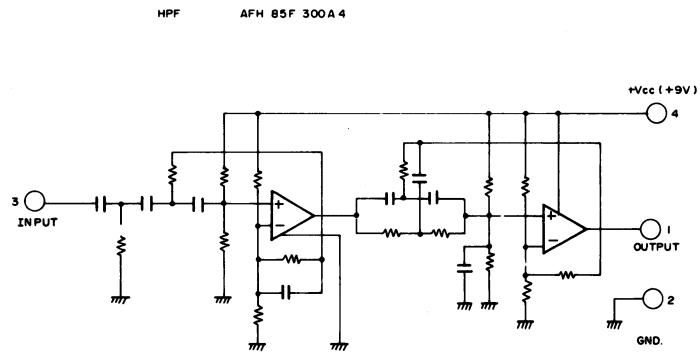
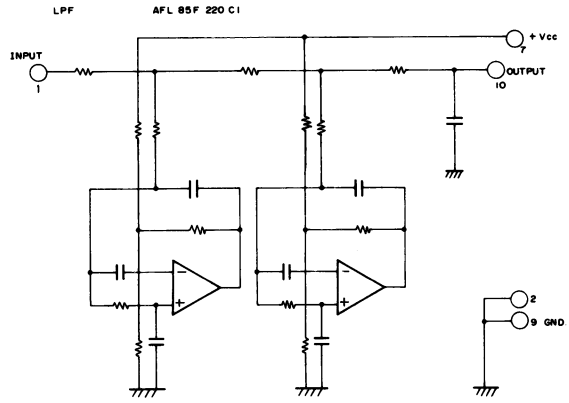
INTERFACE BOARD





INTERFACE BOARD

SYMBOL	JRC PART NO.	EQUIVALENT CIRCUIT
HC601	JRC / 6DHFD00160	
HC602	JRC / 6DHFD00165	
HC603	JRC / 6DHFD00164	
HC604	JRC / 6DHFD00167	

SYMBOL	JRC PART NO.	EQUIVALENT CIRCUIT
HC605	JRC / 6DHFD00168	
HC606	JRC / 6DHFD00169	

PARTS LIST

SYMBOL	GE PART NO.	DESCRIPTION
		A BAND 60W .... A60 B BAND 60W .... B60 A BAND 110W ... A110 B Band 110W ... B110
	B19/CAH-254AL 254AH 254BL 254BH	PA BOARD
		---------- CAPACITOR ----------
C1	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C2	B19/5CAAD00792	Ceramic: 2200pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C3	B19/5CAAD00919	Ceramic: 0.1µF +20%, 25VDCW, temp coef +20 -30%.
C4	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C5	B19/5CAAD01056	Ceramic: 0.1µF +80 -20%, 50VDCW, temp coef +30 -80%.
C6	B19/5CAAD00919	Ceramic: 0.1µF +80 -20%, 25VDCW, temp coef +20 -30%.
C7	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C10	B19/5CAAD00870	Ceramic: 150pF ±5%, 50VDCW, temp coef 0±60 ppm.
C12	B19/5CAAD00792	Ceramic: 2200pF +5%, 50VDCW, temp coef +350 -1000ppm. (Used in B110 and A110.)
C13	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30%.
C14	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C15	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C16	B19/5CEAA02184	Electrolytic: 10µF ±20%, 50VDCW.
C17	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30%.
C18	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C19	B19/5CEAA02184	Electrolytic: 10µF ±20%, 50VDCW.
C20	B19/5CAAD01056	Ceramic: 0.1µF +80 -20%, 50VDCW temp coef +30 -80%.
C25	B19/5CAAD00786	Ceramic: 390pF ±5%, 50VDCW temp coef 0±60ppm.
C27	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW temp coef ±10%.
C28	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW temp coef +350 -1000ppm.
C29	B19/5CEAA02184	Electrolytic: 10µF ±20%, 50VDCW .
C31	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30.
C32	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW temp coef ±10%.
C33	B19/5CEAA02184	Electrolytic: 10µF ±20%, 50VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C35	B19/5CMAB01437	Mica: 820pF ±5%, 100VDCW. (Used in A110.), B110.
C36	B19/5CMAB00139	Mica: 330pF ±5%, 500VDCW. (Used in A60, B110, B60.)
C36	B19/5CMAB00141	Mica: 470pF ±5%, 500VDCW. (Used in A110.)
C39	B19/5CAAA02558	Ceramic: 0.1µF ±20%, 50VDCW.
C40	B19/5CMAB01450	Mica: 220pF ±5%, 500VDCW. (Used in A60 and B60.)
C40	B19/5CMAB01499	Mica: 270pF ±5%, 500VDCW. (Used in A110)
C40	B19/5CMAB01433	Mica: 180pF ±5%, 500VDCW. (Used in B110.)
C41	B19/5CAAA02558	Ceramic: 0.1µF ±20%, 50VDCW.
C42	B19/5CMAB01450	Mica: 220pF +5%, 500VDCW. (Used in A60 and B60.)
C42	B19/5CMAB01499	Mica: 270pF +5%, 500VDCW. (Used in A110.)
C42	B19/5CMAB01433	Mica: 180pF +5%, 500VDCW. (Used in B110.)
C44	B19/5CMAB00139	Mica: 330pF ±5%, 500VDCW. (Used in B110.)
C44	B19/5CMAB00140	Mica: 390pF ±5%, 500VDCW. (Used in A110.)
C44	B19/5CMAB00138	Mica: 270pF +5%, 500VDCW. (Used in A60 and B60.)
C45	B19/5CMAB01478	Mica: 470pF ±5%, 100VDCW. (Used in A110.)
C45	B19/5CMAB01437	Mica: 820pF ±5%, 100VDCW. (Used in B110.)
C45	B19/5CMAB01469	Mica: 390pF ±5%, 100VDCW. (Used in A60 and B60.)
C46	B19/5CEAA01817	Electrolytic: 47µF ±20%, 50VDCW.
C47	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30%.
C48	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C49	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C50	B19/5CEAA01817	Electrolytic: 47µF ±20%, 50VDCW.
C51	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30%.
C52	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C53 and C54	B19/5CMAB01328	Mica: 7pF ±0.5pF, 500VDCW.
C55 and C56	B19/5CAAD00870	Ceramic: 150pF ±5%, 50VDCW, temp coef 0±60ppm.
C57 and C58	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C59	B19/5CMAB01431	Mica: 56pF ±5%, 500VDCW (Used in B110 and B60.)

SYMBOL	GE PART NO.	DESCRIPTION
C59	B19/5CMAB01460	Mica: 78pF ±5%, 500VDCW (Used in A110 and A60.)
C60	B19/5CMAB01425	Mica: 100pF ±5%, 500VDCW. (Used in B110 and B60.)
C61	B19/5CMAB01351	Mica: 15pF ±5%, 500VDCW.
C60	B19/5CMAB01435	Mica: 130pF ±5%, 500VDCW. (Used in A110 and A60.)
C62	B19/5CMAB01461	Mica: 185pF ±5%, 500VDCW. (Used in A60 and A110.)
C62	B19/5CMAB01435	Mica: 130pF ±5%, 500VDCW. (Used in B110 and B60.)
C63	B19/5CMAB01425	Mica: 100pF ±5%, 500VDCW. (Used in B110 and B60.)
C63	B19/5CMAB01435	Mica: 130pF ±5%, 500VDCW. (Used in A60 and A110.)
C64	B19/5CMAB01470	Mica: 45pF ±5%, 500VDCW. (Used in B110 and B60.)
C64	B19/5CMAB01431	Mica: 56pF ±5%, 500VDCW. (Used in A110 and A60.)
C65	B19/5CAAD00863	Ceramic: 56pF ±5%, 50VDCW, temp coef 0±60ppm.
C66	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm.
C67	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW , temp coef 0±60ppm.
C68	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef 0±60ppm.
C69	B19/5CEAA01817	Electrolytic: 47µF ±20%, 50VDCW.
C70	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30%.
C71	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW , temp coef ±10%.
C72 thru C75	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C76 and	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%
C77	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C78	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350-1000ppm.
C79	B19/5CSAC01180	Tantalum: 3.3µF ±20%, 25VDCW.
C80	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C81	B19/5CMAB01351	Mica: 15pF ±5%, 500VDCW.
C82	B19/5CMAB01206	Mica: 22pF ±5%, 500VDCW. (Used in B110.)
C82	B19/5CMAB01499	Mica: 270pF ±5%, 500VDCW. (Used in A110.)
C83	B19/5CAAD00797	Ceramic: 470pF ±5%, 50VDCW, temp coef 0±60ppm.
C84	B19/5CAAA02558	Ceramic: 0.1µF ±20%, 50VDCW. (Used in A60, A110, and B60.)
C84	B19/5CMAB01439	Mica: 120pF ±5%, 500VDCW. (Used in B110.)

SYMBOL	GE PART NO.	DESCRIPTION
C85	B19/5CMAB01281	Mica: 70pF ±5%, 500VDCW. (Used in A60 and A110.)
C85	B19/5CMAB01431	Mica: 56pF ±5%, 500VDCW. (Used in B60 and B110.)
C86	B19/5CMAB01430	Mica: 39pF ±5%, 500VDCW. (Used in A60 and A110.)
C86	B19/5CMAB01466	Mica: 30pF ±5%, 500VDCW. (Used in B60 and B110.)
C87	B19/5CMAB01351	Mica: 15pF ±5%, 500VDCW. (Used in B60 and B110.)
C87	B19/5CMAB01117	Mica: 18pF ±5%, 500VDCW. (Used in A110 and A60.)
C88	B19/5CAAD00883	Ceramic: 270pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in A60 and B60.)
C90	B19/5CMAB01471	Mica: 150pF ±5%, 500VDCW. (Used in A110.)
C91	B19/5CMAB01471	Mica: 150pF ±5%, 500VDCW. (Used in A110.)
C92	B19/5CBAB02003	Ceramic: 0.01 F ±10%, 50VDCW
		---------- DIODES ----------
CD1	B19/5TXAD00356	Silicon. (Schottky Barrier): sim to Toshiba 1SS181 TE85L.
CD3 and CD4	B19/5TXAA00313	Silicon. (Schottky Barrier): sim to NEC 1SS97 (2).
CD5 thru CD7	B19/5TXAR00013	Silicon, fast recovery, (RF Switch): sim to Mitsubishi MI402.
CD8	B19/5TXAR00356	Silicon. (Schottky Barrier): sim to Toshiba ISS181 TE85L.
CD9	B19/5TZAA00104	Ceramic Varistor: Limit voltage 38 to 135V; sim to Sanken SNR-220KD10
CD10	B19/5TXAM00019	Silicon: fwd current 3A, 200P1V; sim to MOTOROLA MR751.
CD11	B19/5TXAE00166	Zener: 500mW, 6V, sim to Hitachi HZ6C1.
CD12	B19/5TXAN00068	Silicon: 200 1A, sim to Sanken EM01ZW
CD13	B19/5TXAD00452	Silicon. (Schottky Barrier): sim to Toshiba 1SS181.
CD14	B19/5TXAD00452	Silicon. (Schottky Barrier): sim to Toshiba 1SS181 TE85R. (Used in A110 and B110.)
CD15	B19/5TXAD00356	Silicon. (Schottky Barrier): sim to Toshiba 1SS181 TE85L. (Used in A110 and B110.)
		---------- CONNECTORS ----------
J1	B19/5JWCL00045	Connector, RF.
J2	B19/5JWCL00045	Connector, RF.
J3	B19/5JAAG00075	Co-axial connector M type. SO-239
J4	B19/5JWBS00176	Connector.
J5	B19/5JTCW00060	Terminal.

SYMBOL	GE PART NO.	DESCRIPTION
		---------- RELAY ----------
K1	B19/5KLAD00657	Relay: DC9V.
		---------- COILS ----------
L1 and L2	B19/6LAFD01129	Coil, RF.
L4 and L5	B19/6LAFD01129	Coil, RF.
L6 and L7	B19/5LCAA00273	RFC, 10uH.
L8	B19/6LAFD01132	Coil, RF.
L9 and L10	B19/6LAFD01133	Coil, RF.
L11	B19/6LAFD01132	Coil, RF.
L12	B19/6LAFD01133	Coil, RF. (Used in A60 and A110)
L12	B19/6LAFD01303	Coil, RF. (Used in B60 and B110)
L13	B19/6LAFD01133	Coil, RF. (Used in A60 and A110)
L13	B19/6LAFD01304	Coil, RF. (Used in B60 and B110)
L15 and L16	B19/5LCAA00124	RFC, 10uH
L17	B19/6LAFD01285	Coil, RF. (Used in B60 and B110.)
L17	B19/6LAFD01132	Coil, RF. (Used in A110, and A60.)
L18	B18/6LALD00036	Choke coil: 2.5 H, closewound on resistor 47 ohms 3W. (Used in A60 and B60)
		---------- RESISTORS ----------
R1	B19/5REAG00622	Metal film: 270 ohms ±5%, 200VDCW, 1/8W.
R2	B19/5REAG00619	Metal film: 22 ohms ±5%, 200VDCW, 1/8W.
R3	B19/5REAG00622	Metal film: 270 ohms ±5%, 200VDCW, 1/8W.
R4	B19/5REAG00613	Metal film: 2.2 ohms ±10%, 200VDCW, 1/8W.
R6	B19/5RDAA01542	Carbon film: 1K ohms ±5%, 500VACW, 1/4W. (Used in A60 and B60.)
R6	B19/5RDAA01339	Carbon film: 560 ohms ±5%, 500VACW, 1/4W. (Used in A110 and B110.)
R7	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R10	B19/5REAG00616	Metal film: 6.8 ohms ±10%, 200VDCW, 1/8W. (Used in A60 and B60.)
R10	B19/5REAG00613	Metal film: 2.2 ohms ±10%, 200VDCW, 1/8W. (Used in A110 and B110.)
R11	B19/5REAG00080	Metal film: 56 ohms ±5%, 350VDCW, 2W. (Used in A60 and B60.)
R11	B19/5REAG00035	Carbon film: 47 ohms ±5%, 350 VDCW, 2W. (Used in A110 and B110.)
R12	B19/5RDAA01576	Carbon film: 10 ohms ±5%,, 500VACW, 1/4W.

SYMBOL	GE PART NO.	DESCRIPTION
R20	B19/5REAG01412	Metal film: 47 ohms ±5%, 1000VACW, 3W. (Used in A60 and B60.)
R20	B19/5REAG01464	Metal film: 47 ohms ±5%, 1000VACW, 3W. (Used in A110 and B110.)
R21	B19/5RDAA00910	Carbon film: 4.7 ohms ±5%, 700VACW. (Used in A60 and B60.)
R21	B19/5RDAA00908	Carbon film: 2.2 ohms ±5%, 700VACW. (Used in A110 and B110.)
R22	B19/5RDAA00908	Carbon film: 2.2 ohms ±5%, 700VACW. (Used in A110 and B110.)
R22	B19/5RDAA00910	Carbon film: 4.7 ohms ±5%, 700VACW. (Used in A60 and B60.)
R23	B19/5REAG01412	Metal film: 47 ohms ±5%, 1000VACW, 3W. (Used in A60 and B60.)
R23	B19/5REAG01464	Metal film: 47 ohms ±5%, 1000VACW, 3W. (Used in A110 and B110.)
R30	B19/5REAG00580	Metal film: 47 ohms ±5%. 200VDCW. 1/8W.
R31	B19/5REAG00580	Metal film: 47 ohms ±5%, 200VDCW, 1/8W.
R32	B19/5REAG01151	Metal film: 0 ohm ±5%, 200VDCW, 1/8W. (Used in A60 and B60)
R33	B19/5REAG01151	Metal film: 0 ohm ±5%, 200VDCW, 1/8W. (Used in A60 and B60)
R40	B19/5REAG00594	Metal film: 220 ohms ±5%, 200VDCW, 1/8W.
R41	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R42	B19/5RDAA01543	Carbon film: 220 ohms ±5%, 500VDCW, 1/4W.
R44	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W
R45	B19/5REAG00594	Metal film: 220 ohms +5%, 200VDCW, 1/8W.
R50	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R51	B19/5RXAE00028	Posistor: 2.2K ohms
R52	B19/5REAG01733	Metal film: 390 ohms ±5%, 200VDCW, 1/8W.
R53	B19/5RDAA01541	Carbon film: 470 ohms ±5%, 500VDCW, 1/4W.
R54	B19/5RDAA01543	Carbon film: 220 ohms ±5%, 500VDCW, 1/4W.
R55	B19/5REAG00048	Metal film: 10 ohms ±5%, 1000VACW, 2W.
R56	B19/5REAG00048	Metal film: 10 ohms ±5%, 1000VACW, 2W. (Used in A110 and B110.)
R57	B19/5RDAA01608	Carbon film: 3.9K ohms ±5%, 500VDCW, 1/4W.
R58	B19/5REAG00585	Metal film: 1.2K ohms ±5%, 200VDCW, 1/8W.
R59	B19/5REAG00595	Metal film: 5.6 ohms ±10%, 200VDCW, 1/8W. (Used in A60 and B60.)
R60	B19/5REAG00927	Metal film: 2K ohms ±10%, 200VDCW, 1/8 W. (Used in B110.)

SYMBOL	GE PART NO.	DESCRIPTION
R60	B19/5RDAA01573	Metal film: 3K ohms ±10%, 200VDCW, 1/8W. (Used in B60.)
R61	B19/5RDAA01153	Carbon film: 47K ohms ±5%, 500VDCW, 1/4W.
R60	B19/5REAG01741	Metal film: 1.8K ohms ±10%, 200VDCW, 1/8W. (Used in A110)
R60	B19/5RDAA02128	Metal film: 2.7k ohms ±5%, 200VDCW, 1/8W. (Used in A60.)
RV1	B19/5RVAB00279	
		---------- TRANSFORMERS ----------
T1	B19/6LHFD00006	RF transformer.
T2	B19/6LHFD00005	RF transformer.
T3	B19/6LHFD00009	RF transformer. (Used in A110.)
T3	B19/6LHFD00004	RF transformer. (Used in A60, B60 and B110.)
T4	B19/6LHFD00011	RF transformer. (Used in A60 and B60.)
T4	B19/6LHFD00012	RF transformer. (Used in A110.)
T4	B19/6LHFD00013	RF transformer. (Used in B110.)
T5	B19/6LHFD00010	RF transformer.
T6	B19/6LHDF00014	RF transformer.
		---------- TRANSISTORS ----------
TR1	B19/5TCAD00040	Silicon, NPN: sim to Mitsubishi 2SC1971
TR2	B19/5TCAD00097	Silicon, NPN: sim to Mitsubishi 2SC1729
TR3	B19/5TCAD00099	Silicon, NPN: sim to Mitsubishi 2SC2630 (Used in A60 and B60.)
TR3	B19/5TCAF00510	Silicon, NPN: sim to Mitsubishi 2SC2782 (Used in A110 and B110.)
TR4	B19/5TCAD00099	Silicon, NPN: sim to Mitsubishi 2SC2630 (Used in A60 and B60.)
TR4	B19/5TCAF00510	Silicon, NPN: sim to Mitsubishi 2SC2782 (Used in A110 and B110.)
TR5	B19/5TBAB00082	Silicon, PNP: sim to NEC 2SB624
TR6	B19/5TDAB00054	Silicon, NPN: sim to NEC 2SD596
TR7	B19/5TDAB00054	Silicon, NPN: sim to NEC 2SD596
TR8	B19/5TBAR00001	Silicon, NPN: sim to Matsushita 25A953A
TR9	B19/5TDAB00054	Silicon, PNP: sim to NEC 2SD596
	B19/CAF-254	EXCITER BOARD
		---------- CAPACITORS ----------
C101	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C103	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C104	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.

SYMBOL	GE PART NO.	DESCRIPTION
C105	B19/5CSAC00932	Tantalum: 10µF ±20%, 16VDCW.
C106	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C107	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C109	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C110	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C111	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C112	B19/5CSAC00932	Tantalum: 10µF ±20%, 16VDCW.
C113	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C114	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C115	B19/5CSAC00932	Tantalum: 10µF ±20%, 16VDCW.
C116	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C117	B19/5CEAA01864	Electrolytic: 10µF ±20%, 25VDCW.
C118	B19/5CEAA01816	Electrolytic: 47µF ±20%, 25VDCW.
C119	B19/5CEAA01864	Electrolytic: 10µF ±20%, 25VDCW.
C120	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C121	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW, temp coef 0±60ppm.
C122	B19/5CAAD00930	Ceramic: 82pF ±5%, 50VDCW, temp coef 0±60ppm.
C123	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW, temp coef 0±60ppm.
C124	B19/5CAAD00919	Ceramic: 0.1µF ±20%, 25VDCW, temp coef +20 -30%.
		--------- INTEGRATED CIRCUIT ---------
IC101	B19/5DAAR00021	Linear, Positive Voltage Regulator: sim to Matsushita AN6541.
		---------- CONNECTORS ----------
J101	B19/5JWCL00045	Co-axial connector.
J102	B19/5JWCL00045	Co-axial connector.
J104	B19/5JWBS00174	Connector.
		---------- COILS ----------
L101	B19/6LAFD01150	Coil, RF.
L102	B19/6LAFD01150	Coil, RF.
L103	B19/6LAFD01133	Coil, RF.
L104	B19/6LAFD01133	Coil, RF.
		---------- RESISTORS ----------
R101	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R102	B19/5REAG00621	Metal film: 68 ohms ±5%, 200VDCW, 1/8W.
R103	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R104	B19/5REAG00589	Metal film: 3.3K ohms ±5%, 200VDCW, 1/8W.
R105	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R106	B19/5REAG00617	Metal film: 10 ohms ±5%, 200VDCW, 1/8W.
R107	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.
R108	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R109	B19/5REAG00589	Metal film: 3.3K ohms ±5%, 200VDCW, 1/8W.
R110	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R111	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.
R112	B19/5REAG00617	Metal film: 10 ohms ±5%, 200VDCW, 1/8W.
R114	B19/5REAG00589	Metal film: 3.3K ohms ±5%, 200VDCW, 1/8W.
R115	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R116	B19/5REAG00617	Metal film: 10 ohms ±5%, 200VDCW, 1/8W.
R117	B19/5REAG00617	Metal film: 10 ohms ±5%, 200VDCW, 1/8W.
R118	B19/5REAG00582	Metal film: 1.8K ohms ±5%, 200VDCW, 1/8W.
R119	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
		---------- TRANSFORMERS ----------
T101	B19/6LAFD01136	Transformer RF,: 9:4
T102	B19/6LAFD01136	Transformer RF,: 9:4
T103	B19/6LHFD00006	Transformer RF,: 4:1
		---------- TRANSISTORS ----------
TR101	B19/5TCAB00287	Silicon, NPN: 2SC3357
TR102	B19/5TCAB00287	Silicon, NPN: 2SC3357
TR103	B19/5TCAD00098	Silicon, NPN: 2SC2086
TR104	B19/5TCAG00093	Silicon, PNP: 2SA1020-Y
	B19/CMG-130A B19/CMG-130B	SYNTHESIZER
		---------- CAPACITORS ----------
C201	B19/5CAAD01131	Ceramic: 0.047µF ±10%, 25VDCW, temp coef ±10%.

SYMBOL	GE PART NO.	DESCRIPTION
C202	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 5VDCW, temp coef ±10%.
C203	B19/5CEAA02119	Electrolytic: 220µF ±20%, 10VDCW.
C204 and C205	B19/5CEAA01826	Electrolytic: 10µF ±20%, 16VDCW.
C206	B19/5CAAD01131	Ceramic: 0.047µF ±10%, 25VDCW, temp coef ±10%.
C207	B19/5CRAC00424	Polypropylene: 1µF ±5%, 200VDCW.
C208	B19/5CAAD01131	Ceramic: 0.047µF ±10%, 25VDCW, temp coef ±10%.
C209	B19/5CRAA00680	Polypropylene: 0.1µF ±5%, 50VDCW.
C210 and C211	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350-1000ppm
C212	B19/5CAAD01131	Ceramic: 0.047µF ±10%, 25VDCW, temp coef ±10%.
C213	B19/5CAAD00977	Ceramic: 7pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C214 thru C217	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C218	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CGM-130A.)
C218	B19/5CAAD00869	Ceramic: 22pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CGM-130A.)
C219	B19/5CAAD00870	Ceramic: 150pF ±5%, 50VDCW, temp coef 0±60ppm.
C220	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C221	B19/5CAAD00869	Ceramic: 22pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C221	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B..)
C222	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm.
C223	B19/5CAAD00863	Ceramic: 56pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C223	B19/5CAAD00929	Ceramic: 68pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C224	B19/5CAAD00795	Ceramic: 1pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C225	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C226	B19/5CAAD00868	Ceramic: 18pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C226	B19/5CAAD00869	Ceramic: 22pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C227	B19/5CAAD00795	Ceramic: 1pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C228	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C230	B19/5CAAD00863	Ceramic: 56pF ±5%, 50VDCW, temp coef 0±60ppm.

SYMBOL	GE PART NO.	DESCRIPTION
C231 and C232	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C233 and C234	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm.
C235	B19/5CAAD00796	Ceramic: 3pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C236 thru C239	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C246	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C246	B19/5CAAD00787	Ceramic: 15pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C248	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C249	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C249	B19/5CAAD00929	Ceramic: 68pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C250	B19/5CAAD00931	Ceramic: 120pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C250	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C251	B19/5CAAD00930	Ceramic: 82pF ±5%, 50VDCW, temp coef 0±60ppm.
C252	B19/5CAAD00795	Ceramic: 1pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C253	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C254	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C254	B19/5CAAD00869	Ceramic: 22pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C255	B19/5CAAD00795	Ceramic: 1pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C256	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C257 thru C260	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C262	B19/5CAAD00870	Ceramic: 150pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C262	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C263 and C264	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C265	B19/5CAAD00863	Ceramic: 56pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C265	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C266	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm.
C267	B19/5CAAD00800	Ceramic: 5pF ±0.25pF, 50VDCW, temp coef 0±60ppm.

SYMBOL	GE PART NO.	DESCRIPTION
C268	B19/5CAAD01131	Ceramic: 0.047µF ±10%, 25VDCW, temp coef ±10%.
C269 thru C271	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C272 and C273	B19/5CAAD00796	Ceramic: 3pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C274	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C275	B19/5CEAA01827	Electrolytic: 100µF ±20%, 16VDCW.
C277 and C278	B19/5CEAA01982	Electrolytic: 47µF ±20%, 16VDCW.
C279	B19/5CEAA01826	Electrolytic: 10µF ±20%, 16VDCW.
C280	B19/5CRAA00576	Metalized plastic: 0.1uF ±5%, 50VDCW.
C281 thru C283	B19/5CEAA01827	Electrolytic: 100µF ±20%, 16VDCW.
C284 thru C286	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C287	B19/5CAAD01131	Ceramic: 0.047µF ±10%, 25VDCW, temp coef ±10%.
C289	B19/5CAAD00784	Ceramic: 12pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C290	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C290	B19/5CAAD00931	Ceramic: 120pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C291	B19/5CAAD00795	Ceramic: 1pF ±0.25pF, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C291	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C292	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C293	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C293	B19/5CAAD00931	Ceramic: 120pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130B.)
C294	B19/5CAAD00795	Ceramic: 1pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C295	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C296	B19/5CAAD00797	Ceramic: 470pF ±5%, 50VDCW, temp coef 0+60ppm.
C297	B19/5CAAD00800	Ceramic: 5pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C298	B19/5CAAD00789	Ceramic: 0.01uF ±10%, 5VDCW, temp coef ±10%(Used in CMG-130A)
C298	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.(Used in CMG130B)
C299	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C2103	B19/5CAAD00869	Ceramic: 22pF ±5%, 50VDCW, temp coef 0±60ppm.
C2104	B19/5CSAC00982	Tantalum: 1µF ±20%, 35VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C2105 thru C2108	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C2109	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMG-130A.)
C2112	B19/5CEAA02249	Tantalum: 1 F ±20%, 16VDCW.
		---------- DIODES ----------
CD201 thru CD203	B19/5TXAD00320	Silicon, fast recovery (2 diodes in series): sim to Toshiba 1SS226.
CD204	B19/5TXAD00356	Silicon, fast recovery (2 diodes with anode common): sim to Toshiba 1SS181.
CD205 and CD206	B19/5TXAE00170	Silicon, Variable Capacitance Diodes: sim to Hitachi 1SV68.
CD207 and CD208	B19/5TXAT00004	Silicon, Variable Capacitance Diodes: sim to Sanyo SVC321B
CD209 and CD210	B19/5TXAR00041	Silicon, fast recovery, (RF Switch): sim to Mitsubishi MI308.
CD211	B19/5TXAA00326	Silicon. (Schottky Barrier): sim to NEC 1SS97.
CD212	B19/5TXAB00021	Silicon, Variable Capacitance Diodes: sim to Fujitu FC52M.
CD213	B19/5TXAE00170	Silicon, Variable Capacitance Diodes: sim to Hitachi 1SV68.
CD214 thru CD216	B19/5TXAD00487	Silicon, Variable Capacitance Diodes: sim to Toshiba 1SV100.
CD217 and CD218	B19/5TXAR00041	Silicon, fast recovery, (RF Switch): sim to Mitsubishi MI308.
CD219	B19/5TXAA00326	Silicon. (Schottky Barrier): sim to NEC 1SS97.
CD220 and CD221	B19/5TXAR00041	Silicon, fast recovery, (RF Switch): sim to Mitsubishi MI308.
CD222, CD223 and CD226	B19/5TXAE00170	Silicon, Variable Capacitance Diode: sim to Hitachi 1SV68.
CD227	B19/5TXAD00330	Silicon, fast recovery (2 diodes in series): sim to Toshiba 1SS226.
		---------- CAPACITORS ----------
CV201 and CV202	B19/5CVAD00165	Variable: max 10pF.
		--------- INTEGRATED CIRCUITS --------
IC201	B19/5DAAJ00328	Synthesizer: C MOS serial input.
IC202	B19/5DDAT00206	Prescaler: sim to Fujitsu MB501P.
IC203	B19/5DAAN00016	Linear, Dual Comparator: sim to NJRC NJM2903D.
IC204 and IC205	B19/5DAAJ00359	Digital, Bilateral switch: sim to Motorola MC14066.
IC206	B19/5DAAR00021	Linear, Positive Voltage Regulator: sim to Matsushita AN6541.
		---------- JACKS ----------

SYMBOL	GE PART NO.	DESCRIPTION
J201 thru J204	B19/5ZJTL00001	Crystal Socket.
J205	B19/5JWBS00173	Connector, 20 pins.
J207	B19/5JWCL00045	Connector, RF.
J208	B19/5JWBS00174	Connector, 6 pins.
J209	B19/5JWCL00045	Connector, RF.
		---------- COILS ----------
L201	B19/5LCAC00173	Coil, RF: 1uH ±10%.
L202 and L203	B19/5LCAC00151	Coil, RF: 6.8uH ±10%.
L204 and L205	B19/5LCAC00018	Coil, RF: 10uH ±10%.
L206 and L207	B19/5LCAC00151	Coil, RF: 6.8uH ±10%.
L208	B19/5LAAC00055	Coil, RF. (Used in CMG-130A.)
L208	B19/5LAAC00057	Coil, RF. (Used in CMG-130B.)
L209	B19/5LCAC00018	Coil, RF: 10uH ±10%.
L210	B19/5LCAB00016	Coil, RF: 4.7uH ±10%.
L211	B19/5LCAC00174	Coil, RF: 0.68uH ±10%.
L214	B19/5LCAB00016	Coil, RF: 4.7uH ±10%.
L215	B19/5LCAC00158	Coil, RF: 4.7uH ±10%.
L216 and L219	B19/5LCAC00018	Coil, RF: 10uH ±10%.
L220	B19/5LAAC00056	Coil, RF. (Used in CMG-130A.)
L220	B19/5LAAC00058	Coil, RF. (Used in CMG-130B.)
L221	B19/5LCAC00154	Coil, RF: 2.2uH ±10%.
L222	B19/5LCAB00014	Coil, RF: 2.2uH ±10%.
L223	B19/5LCAC00156	Coil, RF. 1.5uH ±10%. (Used in CMG-130A.)
L223	B19/5LCAC00173	Coil, RF. 1.0uH ±10%. (Used in CMG-130B.)
L224	B19/5LCAC00151	Coil, RF: 6.8uH ±10%.
L225	B19/5LCAC00018	Coil, RF: 10uH ±10%.
		---------- RESISTORS ----------
R201	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R202	B19/5REAG00619	Metal film: 22 ohms ±5%, 200VDCW, 1/8W.
R203	B19/5REAG00594	Metal film: 220 ohms ±5%, 200VDCW, 1/8W.
R204	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R205 and R206	B19/5REAG00573	Metal film: 4.7K ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R207 and R208	B19/5REAG00619	Metal film: 22 ohms ±5%, 200VDCW, 1/8W.
R209	B19/5REAG00593	Metal film: 470K ohms ±5%, 200VDCW, 1/8W.
R210	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W.
R211	B19/5REAG00577	Metal film: 6.8K ohms ±5%, 200VDCW, 1/8W.
R212	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R213	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R214	B19/5REAG00594	Metal film: 220 ohms ±5%, 200VDCW, 1/8W.
R215	B19/5REAG00571	Metal film: 560 ohms ±5%, 200VDCW, 1/8W.
R216	B19/5REAG00577	Metal film: 6.8K ohms ±5%, 200VDCW, 1/8W.
R217	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W.
R218	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R219	B19/5REAG00571	Metal film: 560 ohms ±5%, 200VDCW, 1/8W.
R220	B19/5REAG00577	Metal film: 6.8K ohms ±5%, 200VDCW, 1/8W.
R221	B19/5REAG00589	Metal film: 3.3K ohms ±5%, 200VDCW, 1/8W.
R222	B19/5REAG00631	Metal film: 220K ohms ±5%, 200VDCW, 1/8W.
R223	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R223	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R224	B19/5REAG00630	Metal film: 150K ohms ±5%, 200VDCW, 1/8W.
R225	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R226	B19/5REAG00574	Metal film: 1.5K ohms ±5%, 200VDCW, 1/8W.
R227	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R228	B19/5REAG00587	Metal film: 100K ohms ±5%, 200VDCW, 1/8W.
R229 and R230	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R231	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R232	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R233	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R234	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R235	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W.
R236	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R238	B19/5REAG00621	Metal film: 68 ohms ±5%, 200VDCW, 1/8W.
R239	B19/5REAG00625	Metal film: 5.6K ohms ±5%, 200VDCW, 1/8W.
R240	B19/5REAG00574	Metal film: 1.5K ohms ±5%, 200VDCW, 1/8W.
R241	B19/5REAG00583	Metal film: 150 ohms ±5%, 200VDCW, 1/8W.
R243	B19/5REAG00597	Metal film: 330 ohms ±5%, 200VDCW, 1/8W.
R244	B19/5REAG00621	Metal film: 68 ohms ±5%, 200VDCW, 1/8W.
R254	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R255	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R260	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W.
R262	B19/5REAG00621	Metal film: 68 ohms ±5%, 200VDCW, 1/8W.
R263	B19/5REAG00625	Metal film: 5.6K ohms ±5%, 200VDCW, 1/8W.
R264	B19/5REAG00574	Metal film: 1.5K ohms ±5%, 200VDCW, 1/8W.
R265	B19/5REAG00583	Metal film: 150 ohms ±5%, 200VDCW, 1/8W.
R267	B19/5REAG00594	Metal film: 220 ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R267	B19/5REAG00597	Metal film: 330 ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R268	B19/5REAG00621	Metal film: 68 ohms ±5%, 200VDCW, 1/8W.
R269	B19/5REAG00574	Metal film: 1.5K ohms ±5%, 200VDCW, 1/8W.
R270	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R270	B19/5REAG00592	Metal film: 33K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R271	B19/5REAG00625	Metal film: 5.6K ohms ±5%, 200VDCW, 1/8W.
R272	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R272	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R273	B19/5REAG00583	Metal film: 150 ohms ±5%, 200VDCW, 1/8W.
R274	B19/5REAG00573	Metal film: 4.7K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R274	B19/5REAG00577	Metal film: 6.8K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R275	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)

SYMBOL	GE PART NO.	DESCRIPTION
R275	B19/5REAG00626	Metal film: 27K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R276	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R276	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R277	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R278	B19/5REAG00632	Metal film: 330K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R278	B19/5REAG00631	Metal film: 220K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R279	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R280	B19/5REAG00573	Metal film: 4.7K ohms ±5%, 200VDCW, 1/8W.
R281	B19/5REAG00626	Metal film: 27K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R281	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R282	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R283	B19/5REAG00597	Metal film: 330 ohms ±5%, 200VDCW, 1/8W.
R285 and R286	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R287	B19/5REAG00619	Metal film: 22 ohms ±5%, 200VDCW, 1/8W.
R288 and R289	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R290	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R292	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R294	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R296	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130A.)
R296	B19/5REAG00625	Metal film: 5.6K ohms ±5%, 200VDCW, 1/8W. (Used in CMG-130B.)
R298	B19/5RDAA01175	Carbon film: 100 ohms ±5%, 300VDCW, 1/4W (Used in CMG-130A.)
R298	B19/5RDAA01228	Carbon film: 82 ohms ±5%, 300VDCW, 1/4W (Used in CMG-130B.)
R299	B19/5RDAA01175	Carbon film: 100 ohms ±5%, 300VDCW, 1/4W (Used in CMG-130A.)
R299	B19/5RDAA01228	Carbon film: 82 ohms ±5%, 300VDCW, 1/4W (Used in CMG-130B.)
R2100	B19/5RDAA01228	Carbon film: 82 ohms ±5%, 300VDCW, 1/4W.
RV201 and RV202	B19/5RVAB00279	Variable: 10K ohms ±30%, 0.1W.

SYMBOL	GE PART NO.	DESCRIPTION
		---------- TRANSISTORS ----------
TR201 and TR202	B19/5TBAB00055	Silicon, PNP; sim to NEC 2SB624 (BV3).
TR203 and TR204	B19/5TDAB00054	Silicon, NPN; sim to NEC 2SD596 (DV3).
TR205	B19/5TBAB00055	Silicon, PNP; sim to NEC 2SB624 (BV3).
TR206 and TR207	B19/5TCAG00047	Silicon, NPN; sim to Matsushita 2SC3110.
TR208 and TR209	B19/5TCAZ00011	Silicon, NPN; sim to Sanyo 2SC3398.
TR210	B19/5TKAH00002	N-channel, field effect. (Junction Single Gate); sim to Sony 2SK125.
TR211	B19/5TCAG00047	Silicon, NPN; sim to Matsushita 2SC3110.
TR212 and TR213	B19/5TCAZ00011	Silicon, NPN, sim to Sanyo 2SC3398.
TR216 thru TR219	B19/5TCAZ00011	Silicon, NPN; sim to Sanyo 2SC3398.
TR220	B19/5TKAH00002	N-channel, field effect. (Junction Single Gate); sim to Sony 2SK125.
TR221	B19/5TCAG00047	Silicon, NPN; sim to Matsushita 2SC3110.
TR222	B19/5TCAZ00011	Silicon, NPN; sim to Sanyo 2SC3398.
TR223 and TR224	B19/5TDAB00054	Silicon, NPN; sim to NEC 2SD596 (DV3).
TR227 thru TR230	B19/5TCAZ00011	Silicon, NPN; sim to Sanyo 2SC3398.
		---------- CRISTALS ----------
XU201	B19/6XNFD00013	Reference Oscillator unit.
	B19/CMA-237A B19/CMA-237B	RECEIVER
		---------- CAPACITORS ----------
C401 thru C405	B19/5CAAD00789	Ceramic: 0.01μF ±10%, 50VDCW, temp coef ±10%.
C406	B19/5CAAD00799	Ceramic: 6pF ±0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C406	B19/5CAAD00800	Ceramic: 5pF ±0.25pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C407	B19/5CAAD00799	Ceramic: 6pF ±0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C407	B19/5CAAD00800	Ceramic: 5pF ±0.25pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C408	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C408	B19/5CAAD00822	Ceramic: 8pF ±0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)

SYMBOL	GE PART NO.	DESCRIPTION
C409	B19/5CAAD00784	Ceramic: 12pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C409	B19/5CAAD00977	Ceramic: 7pF +0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C410 thru C413	B19/5CAAD00789	Ceramic: 0.01µF ±10%. 50VDCW, temp coef ±10%.
C415	B19/5CAAD00799	Ceramic: 6pF +0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C415	B19/5CAAD00800	Ceramic: 5pF +0.25pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C416	B19/5CAAD00799	Ceramic: 6pF +0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C416	B19/5CAAD00800	Ceramic: 5pF +0.25pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C417	B19/5CAAD00785	Ceramic: 10pF +0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C417	B19/5CAAD00822	Ceramic: 8pF +0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C418	B19/5CAAD00784	Ceramic: 12pF ±5%, 50VDCW, temp coef 0±60ppm. (Used in CMA-237A.)
C418	B19/5CAAD00977	Ceramic: 7pF +0.5pF, 50VDCW, temp coef 0±60ppm. (Used in CMA-237B.)
C419	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C420	B19/5CAAD00798	Ceramic: 2pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C421 and C422	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C423	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C424 and C425	B19/5CAAD00789	Ceramic: 0.01µF +10%, 50VDCW, temp coef ±10%.
C426	B19/5CEAA01816	Electrolytic: 47µF ±20%, 25VDCW.
C427	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C428	B19/5CAAD00800	Ceramic: 5pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C429	B19/5CAAD00869	Ceramic: 22pF ±5%, 50VDCW, temp coef 0±60ppm.
C430	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C431	B19/5CAAD00798	Ceramic: 2pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C432 and C433	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C434	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C435	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C436	B19/5CAAD00798	Ceramic: 2pF ±0.25pF, 50VDCW, temp coef 0±60ppm.

SYMBOL	GE PART NO.	DESCRIPTION
C437 and C438	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C439	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C440	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C441	B19/5CEAA01816	Electrolytic: 47µF ±20%, 25VDCW.
C442	B19/5CAAD01056	Ceramic: 0.1µF ±20%, 50VDCW.
C443	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW
C501	B19/5CAAD00786	Ceramic: 390pF ±5%, 50VDCW, temp coef 0±60ppm.
C502	B19/5CAAD00930	Ceramic: 82pF ±5%, 50VDCW, temp coef 0±60ppm.
C505 and C506	B19/5CAAD01056	Ceramic: 0.1µF ±20%, 50VDCW.
C507	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0 ± 60ppm.
C509 and C510	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%
C513	B19/5CAAD00875	Ceramic: 39pF ±5%, 50VDCW, temp coef 0±60ppm.
C514	B19/5CAAD00929	Ceramic: 68pF ±5%, 50VDCW, temp coef 0±60ppm.
C515	B19/5CBAB00462	Ceramic: 0.1µF ±20%, 50VDCW.
C516	B19/5CSAC01068	Tantalum: 0.1µF ±20%, 35VDCW.
C517	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW, temp coef 0±60ppm.
C519	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C520	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C521	B19/5CSAC00950	Tantalum: 10µF ±20%, 25VDCW.
C522	B19/5CEAA01816	Electrolytic: 47µF ±20%, 25VDCW.
C523 and C524	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C525	B19/5CEAA01816	Electrolytic: 47µF ±20%, 25VDCW.
C526	B19/5CAAD00798	Ceramic: 2pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C533	B19/5CAAD00782	Ceramic: 1000pF ±5%, 50VDCW, temp coef +350 -1000ppm.
C540	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C550	B19/5CAAD00875	Ceramic: 39pF ±5%, 50VDCW, temp coef 0±60ppm.
C551	B19/5CAAD00875	Ceramic: 39pF ±5%, 50VDCW, temp coef 0±60ppm.
C552	B19/5CAAD00798	Ceramic: 2pF ±5%, 50VDCW, temp coef 0±60ppm.

SYMBOL	GE PART NO.	DESCRIPTION
C553	B19/5CAAD00930	Ceramic: 82pF ±5%, 50VDCW, temp coef 0±60ppm.
C554	B19/5CAAD00794	Ceramic: 33pF ±5%, 50VDCW, temp coef 0±60ppm.
C555	B19/5CAAD00864	Ceramic: 47pF ±5%, 50VDCW, temp coef 0±60ppm.
C556 and C557	B19/5CAAD00789	Ceramic: 0.01µF ±10%, 50VDCW, temp coef ±10%.
C558	B19/5CAAD00801	Ceramic: 4pF ±0.25pF, 50VDCW, temp coef 0±60ppm.
C560	B19/5CSAC00950	Tantalum: 10µF ±20%, 25VDCW
		---------- DIODES ----------
CD401 thru CD406	B19/5TXAR00023	Silicon, fast recovery, (RF Switch): sim to Mitsubishi MC301.
CD503	B19/5TXAD00320	Silicon, (Schottky Barrier): sim to Toshiba 1SS226.
		---------- CAPACITORS ----------
CV401 and CV402	B19/5CVAC00079	Variable: max 10pF.
		---------- FILTERS ----------
FL401	B19/5NLAT00030	RF filter: BPF 29-42MHz. (Used in CMA-237A.)
FL401	B19/5NLAT00027	RF filter: BPF 35-50MHz. (Used in CMA-237B.)
FL402	B19/5NLAT00028	RF filter: HPF 29MHz.
FL403	B19/5NLAT00030	RF filter: BPF 29-42MHz. (Used in CMA-237A.)
FL403	B19/5NLAT00027	RF filter: BPF 35-50MHz. (Used in CMA-237B.)
FL404	B19/5NLAT00028	RF filter: HPF 29MHz.
FL405	B19/5NLAT00029	RF filter: BPF 60MHz.
FL501	B19/5XHAA00784	Crystal filter 20.8MHz 4 poles.
FL502	B19/5XHAA00785	Crystal filter 20.8MHz 2 poles.
FL503	B19/5NRAA00144	Ceramic filter: 455KHz; sim to Mulata CFV455E10.
		---------- HYBRID CIRCUIT ----------
HC401	B19/5DHAT00022	Double Balanced Mixer.
		--------- INTEGRATED CIRCUITS --------
IC501	B19/5DDAS00074	Linear, IF Amplifier & Detector: sim to Motorola MC3359P.
IC502	B19/5DAAR00021	Linear, Positive Voltage Regulator: sim to Matsushita AN6541.
IC503	B19/5DDAE00069	Degital, CMOS: sim to Toshiba TC4028BP.
		---------- CONNECTORS ----------
J401 and J402	B19/5JWCL00045	Connector, RF.

SYMBOL	GE PART NO.	DESCRIPTION
J501	B19/5JWBS00178	Connector, 10 pins.
J502	B19/5JFAL00007	Connector, 10 pins.
J503	B19/5JTCA00137	Connector.
J504	B19/5JWCL00047	Connector
		---------- COILS ----------
L401	B19/6LAFD01156	Coil, RF.
L402	B19/6LAFD01136	Coil, RF.
L403	B19/5LCAC00202	Choke coil: 22µH ±10%.
L404	B19/5LCAC00160	Choke coil: 3.3µH ±10%.
L405	B19/6LAFD01156	Coil, RF.
L406	B19/6LAFD01136	Coil, RF.
L407	B19/6LAFD01156	Coil, RF.
L408	B19/6LAFD01136	Coil, RF.
L501	B19/5LCAC00779	Choke coil: 12µH ±10%.
L502	B19/5LCAC00229	Choke coil: 0.68µH ±10%.
L503	B19/6LAFD00032	Coil, RF.
L504	B19/6LAFD00032	Coil, RF.
L506	B19/6LAFD01207	Coil, RF.
L507	B19/6LAFD00032	Coil, RF.
L508	B19/6LAFD00005	Coil, RF.
L509	B19/6LAFD00877	Coil, RF.
		---------- PLUG ----------
P501	B19/5JDAN00012	Connector, RF.
		---------- RESISTORS ----------
R401	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R402 thru R405	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W.
R406	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R407 thru R410	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W.
R411	B19/5REAG00625	Metal film, 5.6K ohms ±5%, 200VDCW, 1/8W.
R412 and R413	B19/5REAG00572	Metal film, 1K ohms ±5%, 200VDCW, 1/8W.
R414	B19/5REAG00617	Metal film, 10 ohms ±5%, 200VDCW, 1/8W.
R415	B19/5REAG00586	Metal film, 100 ohms ±5%, 200VDCW, 1/8W.
R416	B19/5REAG00622	Metal film, 270 ohms ±5%, 200VDCW, 1/8W.
R417	B19/5REAG00618	Metal film, 15 ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R418 and R419	B19/5REAG00622	Metal film, 270 ohms ±5%, 200VDCW, 1/8W.
R420	B19/5REAG00618	Metal film, 15 ohms ±5%, 200VDCW, 1/8W.
R421	B19/5REAG00622	Metal film, 270 ohms ±5%, 200VDCW, 1/8W.
R422	B19/5REAG00621	Metal film, 68 ohms ±5%, 200VDCW, 1/8W.
R423	B19/5REAG00575	Metal film, 2.2K ohms ±5%, 200VDCW, 1/8W.
R424	B19/5REAG00625	Metal film, 5.6K ohms ±5%, 200VDCW, 1/8W.
R425	B19/5REAG00597	Metal film, 330 ohms ±5%, 200VDCW, 1/8W.
R426	B19/5REAG00572	Metal film, 1K ohms ±5%, 200VDCW, 1/8W.
R427	B19/5REAG00617	Metal film, 10 ohms ±5%, 200VDCW, 1/8W.
R428	B19/5REAG00586	Metal film, 100 ohms ±5%, 200VDCW, 1/8W.
R429	B19/5REAG00625	Metal film, 5.6K ohms ±5%, 200VDCW, 1/8W.
R430	B19/5REAG00594	Metal film, 220 ohms ±5%, 200VDCW, 1/8W.
R431	B19/5REAG00572	Metal film, 1K ohms ±5%, 200VDCW, 1/8W.
R432	B19/5REAG00617	Metal film, 10 ohms ±5%, 200VDCW, 1/8W.
R433	B19/5REAG00619	Metal film, 22 ohms ±5%, 200VDCW, 1/8W.
R434	B19/5REAG00622	Metal film, 270 ohms ±5%, 200VDCW, 1/8W.
R435	B19/5REAG00618	Metal film, 15 ohms ±5%, 200VDCW, 1/8W.
R436	B19/5REAG00622	Metal film, 270 ohms ±5%, 200VDCW, 1/8W.
R501	B19/5REAG00591	Metal film, 680 ohms ±5%, 200VDCW, 1/8W.
R502 and R503	B19/5REAG00589	Metal film, 3.3K ohms ±5%, 200VDCW, 1/8W.
R504 and R505	B19/5REAG00576	Metal film, 10K ohms ±5%, 200VDCW, 1/8W.
R506 and R507	B19/5REAG00589	Metal film, 3.3K ohms ±5%, 200VDCW, 1/8W.
R509	B19/5REAG00573	Metal film, 4.7K ohms ±5%, 200VDCW, 1/8W.
R511	B19/5REAG00590	Metal film, 0 ohms
R512	B19/5REAG00586	Metal film, 100 ohms ±5%, 200VDCW, 1/8W.
R513 and R514	B19/5REAG00589	Metal film, 3.3K ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R518	B19/5REAG00579	Metal film, 470 ohms ±5%, 200VDCW, 1/8W.
R519	B19/5REAG00573	Metal film, 4.7K ohms ±5%, 200VDCW, 1/8W.
R520 thru R531	B19/5REAG00576	Metal film, 10K ohms ±5%, 200VDCW, 1/8W.
R532	B19/5REAG00578	Metal film, 47K Ohms ±5%, 200VDCW, 1/8W.
R535	B19/5REAG00572	Metal film, 1K ohms ±5%, 200VDCW, 1/8W.
R539	B19/5REAG00573	Metal film, 4.7K ohms ±5%, 200VDCW, 1/8W.
R540	B19/5REAG00584	Metal film, 8.2K ohms ±5%, 200VDCW, 1/8W.
R541	B19/5REAG00573	Metal film, 4.7K ohms ±5%, 200VDCW, 1/8W.
R542	B19/5REAG00597	Metal film, 330 ohms ±5%, 200VDCW, 1/8W.
RV501	B19/5RVAB00275	Variable: max 2K ohms.
		---------- TRANSISTORS ----------
TR401	B19/5TCAB00287	Silicon, NPN: sim to NEC 2SC3357.
TR402 and TR403	B19/5TKAG00007	N-channel, field effect: sim to Silicon U310.
TR404 and TR405	B19/5TCAB00287	Silicon, NPN: sim to NEC 2SC3357.
TR501 and TR502	B19/5TZAR00015	N-channel field effect: sim to Motorola 2N4416.
TR503	B19/5TCAB01107	Silicon, NPN: sim to NEC 2SC2223.
TR505 thru TR508	B19/5TDAB00054	Silicon, NPN: sim to NEC 2SD596.
		---------- CRYSTAL ----------
X501	B19/5XHAA00786	Quartz crystal, 20.343MHz.
		---------- CRYSTAL SOCKETS ----------
XS501-A	B19/5ZJDF00001	Crystal Socket.
XS501-B	B19/5ZJDF00001	Crystal Socket.
	B19/CMC383B	SYSTEM CONTROL BOARD
		---------- CAPACITORS ----------
C601	B19/5CAAD01237	Ceramic: 0.1µF ±10%, 25VDCW, temp coef ±15%.
C602	B19/5CSAC00939	Tantalum: 22µF ±20%, 16VDCW.
C603	B19/5CRAA00585	Polyester: 1000pF ±5%, 50VDCW.
C604	B19/5CSAC01069	Tantalum: 2.2µF ±20%, 35VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C605	B19/5CAAD01237	Ceramic: 0.1 F ±10%, 25VDCW, temp coef ±15%.
C606 and C607	B19/5CEAA01827	Electrolytic: 100 F ±20%, 16VDCW.
C608	B19/5CEAA01982	Electrolytic: 47 F ±20%, 16VDCW.
C609 and C610	B19/5CEAA01827	Electrolytic: 100 F ±20%, 16VDCW.
C611	B19/5CAAD01237	Ceramic: 0.1 F ±10%, 25VDCW, temp coef ±15%.
C613 and C614	B19/5CRAA00576	Polyester: 0.1uF ±5%, 50VDCW.
C615	B19/5CSAC01065	Tantalum: 0.47 F ±20%, 35VDCW.
C616	B19/5CAAD00797	Ceramic: 470pF ±5%, 50VDCW, temp coef 0±60ppm.
C617	B19/5CRAA00597	Polyester: 0.068 F ±5%, 50VDCW.
C624	B19/5CSAC00982	Tantalum: 1 F ±20%, 35VDCW.
C625	B19/5CSAC00939	Tantalum: 22 F ±20%, 16VDCW.
C626 and C627	B19/5CAAD01237	Ceramic: 0.1 F ±10%, 25VDCW, temp coef ±15%.
C633	B19/5CSAC00912	Tantalum: 10 F ±20%, 35VDCW.
C634	B19/5CEAA01816	Electrolytic: 47 F ±20%, 25VDCW.
C635 and C636	B19/5CAAD01237	Ceramic: 0.1 F ±10%, 25VDCW, temp coef ±15%.
C637	B19/5CEAA01816	Electolytic: 47 F ±20%, 25VDCW.
C640	B19/5CAAD01237	Ceramic: 0.1 F ±10%, 25VDCW, temp coef ±15%.
C641	B19/5CEAA01816	Electrolytic: 47 F ±20%, 25VDCW.
C642	B19/5CAAD01237	Ceramic: 0.1 F ±10%, 25VDCW, temp coef ±15%.
C644	B19/5CSAC00939	Tantalum: 22 F ±20%, 16VDCW.
C645	B19/5CEAA01982	Electrolytic: 47 F ±20%, 16VDCW.
C646	B19/5CAAD00789	Ceramic: 0.01 F ±10%, 50VDCW, temp coef ±10%.
C647	B19/5CEAA01982	Electrolytic: 47 F ±20%, 16VDCW.
C649	B19/5CRAA00617	Polyester: 0.1 F ±5%, 50VDCW.
C650	B19/5CSAC00912	Tantalum: 10 F ±20%, 35VDCW.
C651	B19/5CAAD00789	Ceramic: 0.01 F ±10%, 50VDCW, temp coef ±10%.
C652	B19/5CRAA00585	Polyester: 1000pF ±5%, 50VDCW.
C653 and C654	B19/5CSAC00939	Tantalum: 22 F ±20%, 16VDCW.
C655	B19/5CRAA00576	Polyester: 0.1 F ±5%, 50VDCW.
C656	B19/5CAAD00789	Ceramic: 0.01 F ±10%, 50VDCW, temp coef ±10%.

SYMBOL	GE PART NO.	DESCRIPTION
C657	B19/5CAAD01237	Ceramic: 0.1uF ±10%, 25VDCW temp coef ±15%.
C658	B19/5CAAD01237	Polyester: 0.1uF ±5%, 50VDCW.
C701	B19/5CSAC00982	Tantalum: 1 F ±20%, 35VDCW.
C702 and C703	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C704	B19/5CAAD00789	Ceramic: 0.01 F ±10%, 50VDCW, temp coef ±10%.
C705	B19/5CAAD00878	Ceramic: 1000pF ±10%, 50VDCW, temp coef +350 -1000ppm.
C706	B19/5CRAA00597	Polyester: 0.068 F ±5%, 50VDCW.
C707	B19/5CEAA01320	Electrolytic: 220 F ±20%, 25VDCW.
C708	B19/5CAAD00783	Ceramic: 4700pF ±10%, 50VDCW, temp coef ±10%.
C709	B19/5CRAA00597	Polyester: 0.068 F ±5%, 50VDCW.
C710	B19/5CAAD00785	Ceramic: 10pF ±0.5pF, 50VDCW, temp coef 0±60ppm.
C711	B19/5CAAD00787	Ceramic: 15pF ±5%, 50VDCW, temp coef 0±60ppm.
C712	B19/5CAAD01204	Ceramic: 0.047 F ±10%, 25VDCW, temp coef ±15%.
C713	B19/5CSAC01065	Tantalum: 0.47 F ±20%, 35VDCW.
C714 thru C729	B19/5CAAD00780	Ceramic: 100pF ±5%, 50VDCW, temp coef 0±60ppm.
C730	B19/5CSAC00982	Tantalum: 1 F ±20%, 35VDCW.
C731 and C735	B19/5CAAD00789	Ceramic: 0.01 F ±10%, 50VDCW, temp coef ±10%.
C736	B19/5CAAD01201	Ceramic: 0.068 F ±10%, 25VDCW, temp coef ±15%.
C737 and C739	B19/5CAAD01237	Ceramic: 0.1uF ±10%, 25VDCW, temp coef ±15%.
C740 and C741	B19/5CAAD00789	Ceramic: 0.01uF ±10%, 50VDCW, temp coef 0±30ppm.
C742 thru C753	B19/5CAAD00854	Ceramic: 47pF ±5%, 50VDCW, temp coef ±0.5%.
C754	B19/5CAAD01237	Ceramic: 0.1uF ±10%, 25VDCW.
		---------- DIODES ----------
CD601 thru CD603	B19/5TXAD00320	Silicon, fast recovery (2 diodes in series); sim to Toshiba 1SS226.
CD604 and CD605	B19/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common); sim to Toshiba 1SS184.
CD606	B19/5TXAD00320	Silicon, fast recovery (2 diodes in series); sim to Toshiba 1SS226.
CD607	B19/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common); sim to Toshiba 1SS184.
CD608	B19/5TXAD00290	Silicon, fast recovery (2 diode in cathode common); sim to Toshiba 1SS184.

SYMBOL	GE PART NO.	DESCRIPTION
CD701	B19/5TXAD00320	Silicon, fast recovery (2 diodes in series); sim to Toshiba 1SS226.
CD702	B19/5TXAE00257	Zener: 500mW, 6.5V, sim to Hitachi HZ7A2.
CD703	B19/5TXAE00199	Zener: 500mW, 3.8V, sim to Hitachi HZ4B1.
CD704 and CD705	B19/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common); sim to Toshiba 1SS184.
CD706 and CD707	B19/5TXAD00320	Silicon, fast recovery (2 diodes in series); sim to Toshiba 1SS226.
CD708 and CD709	B19/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common); sim to Toshiba 1SS184.
CD710	B19/5TZAD00020	Diode, optoelectoronic: red; sim to Toshiba TLR 102A.
CD711	B19/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common); sim to Toshiba 1SS184.
		---------- HYBRID CIRCUITS ----------
HC601	B19/6DHFD00160	Squelch; sim to JRC DHFD160.
HC602	B19/6DHFD00165	Switch; sim to JRC DHFD165.
HC603	B19/6DHFD00164	Filter; sim to JRC DHFD164.
HC604	B19/6DHFD00167	Filter; sim to MURATA DHFD167.
HC605	B19/6DHFD00168	Filter; sim to MURATA DHFD168.
HC606	B19/6DHFD00169	Filter; sim to MURATA DHFD169.
		--------- INTEGRATED CIRCUITS --------
IC601	B19/5DAAJ00359	Digital, Bilateral switch; sim to Motorola MC14066.
IC602	B19/5DAAA00233	Linear, Audio Amplifier; sim to NEC PC1230H2.
IC603 and IC604	B19/5DAAN00004	Linear, Quad OP AMP; sim to NJRC NJM2902N.
IC605	B19/5DAAD00082	Linear, Positive Voltage Regulator; sim to Toshiba TA78005AP.
IC606	B19/5DAAR00021	Linear, Positive Voltage Regulator; sim to Matsushita AN6541.
IC607	B19/5DAAF00027	Linear, Dual OP AMP; sim to 4558 type.
IC608 and IC609	B19/5DAAJ00359	Digital, Bilateral switch; sim to Motorola MC14066.
IC610	B19/5DAAL00753	Linear, Voltage Detector, Sim to TI TL7700.
IC701	B19/5DAAB00140	Linear, Timer; sim to Mitsubishi M51847P.
IC703	B19/5DAAJ00358	Digital, Hex Non-inverting 3-state Buffer; sim to Motorola MC14503.
IC704	B19/5DDAF00216	Digital, Hex Inverter Buffer/Driver; sim to Hitachi HD7416.
IC705	B19/5DDAB00209	Digital, Dual D-type Flip Flop; sim to Mitsubishi M4013.

SYMBOL	GE PART NO.	DESCRIPTION
IC706	B19/5DDBY00026	Digital, EEPROM; sim to Xicor X2212AP.
		---------- SOCKETS ----------
ICS702	B19/5ZJAB00029	IC Sockets. 40 pin.
ICS706	B19/5ZJAB00030	IC Sockets. 18 pin.
		---------- JACKS ----------
J601 thru J605	B19/5JTCA00137	Contact, electrical.
J606	B19/5JDAG00152	Connector, Metering, 12 pins.
J607	B19/5JTGA00137	Contact, electrical.
J701	B19/5JWBS00179	Connector, 22 pins.
J702	B19/5JWBS00179	Connector, 22 pins.
J703	B19/5JWBS00173	Connector, 20 pins.
J704	B19/5JWBS00178	Connector, 10 pins.
J705	B19/5JWBS00176	Connector, 4 pins.
J706 thru J708	B19/5JTCA00137	Contact, electrical.
		---------- PLUGS ----------
P601 thru P605	B19/5JDAN00012	Receptacle: 2 position, shorting, rated at 1 amp; sim to Honda DIC-S252.
P607	B19/5JDAN00012	Receptacle: 2 position, shorting.
P706 thru P708	B19/5JDAN00012	Receptacle: 2 position, shorting, rated at lamp; sim to Honda DSC-S252.
		---------- RESISTORS ----------
R601 thru R606	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R607	B19/5REAG00573	Metal film: 4.7K ohms ±5%, 200VDCW, 1/8W.
R608	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R609	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R610	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R611	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R612	B19/5REAG00631	Metal film: 220K ohms ±5%, 200VDCW, 1/8W.
R613	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R614	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R615	B19/5REAG00583	Metal film: 150 ohms ±5%, 200VDCW, 1/8W.
R616 thru R619	B19/5RDAC02223	Metal film: 2.2 ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R620	B19/5REAG00590	Metal film: 0 ohms
R622	B19/5REAG00897	Metal film: 180K ohms ±5%, 200VDCW, 1/8W.
R623	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W.
R624	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R627	B19/5REAG00897	Metal film: 180K ohms ±5%, 200VDCW, 1/8W.
R628	B19/5REAG00575	Metal film: 2.2K ohms ±5%, 200VDCW, 1/8W.
R629	B19/5REAG00879	Metal film: 82K ohms ±5%, 200VDCW, 1/8W.
R630	B19/5REAG00631	Metal film: 220K ohms ±5%, 200VDCW, 1/8W.
R631	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R632	B19/5REAG00573	Metal film: 4.7K ohms ±5%, 200VDCW, 1/8W.
R633	B19/5REAG00580	Metal film: 47 ohms ±5%, 200VDCW, 1/8W.
R634	B19/5REAG00623	Metal film: 2.7K ohms ±5%, 200VDCW, 1/8W.
R635	B19/5REAG00582	Metal film: 1.8K ohms ±5%, 200VDCW, 1/8W.
R636	B19/5REAG00682	Metal film: 18K ohms ±5%, 200VDCW, 1/8W.
R637	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R638	B19/5REAG00626	Metal film: 27K ohms ±5%, 200VDCW, 1/8W.
R639	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R640	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.
R641	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R642	B19/5REAG00879	Metal film: 82K ohms ±5%, 200VDCW, 1/8W.
R643 thru R645	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R646	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R647	B19/5REAG00591	Metal film: 680 ohms ±5%, 200VDCW, 1/8W.
R648	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R649	B19/5REAG00591	Metal film: 680 ohms ±5%, 200VDCW, 1/8W.
R650	B19/5REAG00574	Metal film: 1.5K ohms ±5%, 200VDCW, 1/8W.
R651	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W.
R652	B19/5REAG00632	Metal film: 330K ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R653	B19/5REAG00585	Metal film: 1.2K ohms ±5%, 200VDCW, 1/8W.
R654	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R655	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R656	B19/5REAG00682	Metal film: 18K ohms ±5%, 200VDCW, 1/8W.
R657	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R658	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.
R659	B19/5REAG00626	Metal film: 27K ohms ±5%, 200VDCW, 1/8W.
R660 and R661	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R662	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R664	B19/5REAG00577	Metal film: 6.8K ohms ±5%, 200VDCW, 1/8W.
R665	B19/5REAG00625	Metal film: 5.6K ohms ±5%, 200VDCW, 1/8W.
R666	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R667	B19/5REAG00589	Metal film: 3.3K ohms ±5%, 200VDCW, 1/8W.
R668	B19/5REAG00574	Metal film: 1.5K ohms ±5%, 200VDCW, 1/8W.
R669	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W.
R671	B19/5REAG02757	Metal film: 39.2K ohms ±1%, 250VDCW, 1/4W.
R672	B19/5REAG00623	Metal film: 2.7K ohms ±5%, 200VDCW, 1/8W.
R673	B19/5REAA02533	Metal film: 2.21K ohms ±1%, 250VDCW, 1/4W.
R674	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R675	B19/5REAG00879	Metal film: 82K ohms ±5%, 200VDCW, 1/8W.
R676	B19/5REAG00573	Metal film: 4.7K ohms ±5%, 200VDCW, 1/8W.
R677 thru R680	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R681	B19/5REAG00772	Metal film: 1M ohms ±5%, 200VDCW, 1/8W.
R682	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R683	B19/5REAG00587	Metal film: 100K ohms ±5%, 200VDCW, 1/8W.
R684 and R685	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R701	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R702	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R703	B19/5REAG00587	Metal film: 100K ohms ±5%, 200VDCW, 1/8W.
R704 and R705	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R706	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.
R707	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R708	B19/5REAG00589	Metal film: 3.3K ohms ±5%, 200VDCW, 1/8W.
R709	B19/5REAG00572	Metal film: 1K ohms ±5%, 200VDCW, 1/8W.
R710	B19/5REAG00623	Metal film: 2.7K ohms ±5%, 200VDCW, 1/8W.
R711	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R712 and R713	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R714	B19/5REAG00879	Metal film: 82K ohms ±5%, 200VDCW, 1/8W.
R715	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R716	B19/5REAG00623	Metal film: 2.7K ohms ±5%, 200VDCW, 1/8W.
R717	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
R718	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R719	B19/5REAG00585	Metal film: 1.2K ohms ±5%, 200VDCW, 1/8W.
R720	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R721 and R722	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R723	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R724	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R725	B19/5REAG00596	Metal film: 15K ohms ±5%, 200VDCW, 1/8W.
R726	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.
R727	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R728	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R729	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R730 thru R735	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R736	B19/5REAG00579	Metal film: 470 ohms ±5%, 200VDCW, 1/8W.

SYMBOL	GE PART NO.	DESCRIPTION
R737	B19/5REAG00578	Metal film: 47K ohms ±5%, 200VDCW, 1/8W.
R738 thru R740	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R741	B19/5REAG00586	Metal film: 100 ohms ±5%, 200VDCW, 1/8W.
R742 and R743	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R744	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W.
R745	B19/5REAG00587	Metal film: 100K ohms ±5%, 200VDCW, 1/8W.
R746	B19/5REAG00631	Metal film: 220K ohms ±5%, 200VDCW, 1/8W.
R747	B19/5REAG00626	Metal film: 27K ohms ±5%, 200VDCW, 1/8W.
R748 and R749	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R750	B19/5REAG00626	Metal film: 27K ohms ±5%, 200VDCW, 1/8W.
R751 and R752	B19/5REAG00576	Metal film: 10K ohms ±5%, 200VDCW, 1/8W.
R753	B19/5REAG00584	Metal film: 8.2K ohms ±5%, 200VDCW, 1/8W.
R754	B19/5REAG00622	Metal film: 270 ohms ±5%, 200VDCW, 1/8W.
R755	B19/5REAG00581	Metal film: 22K ohms ±5%, 200VDCW, 1/8W.
RV601	B19/5RVAB00279	Variable: 10K ohms ±30%, 0.1W.
RV602	B19/5RVAB00276	Variable: 100K ohms ±30%, 0.1W.
RV603 and RV604	B19/5RVAB00279	Variable: 10K ohms ±30%, 0.1W.
RV605	B19/5RVAB00277	Variable: 5K ohms ±30%, 0.1W.
RX701 thru RX703	B19/5RZAB00133	Quad Resistor array; 10K ohms ±5%, 1/8W.
		---------- TRANSISTORS ----------
TR601 thru TR608	B19/5TDAB00054	Silicon, NPN; sim to NEC 2SD596 (DV3).
TR701 thru TR707	B19/5TDAB00054	Silicon, NPN; sim to NEC 2SD596 (DV3).
TR708	B19/5TBAB00055	Silicon, PNP; sim to NEC 2SB624 (BV3).
TR709 thru TR713	B19/5TDAB00054	Silicon, NPN; sim to NEC 2SD596 (DV3).
		---------- CRYSTALS ----------
X701	B19/5XHAA00778	Quartz crystal: 6MHz.

SYMBOL	GE PART NO.	DESCRIPTION
		---------- SOCKETS ----------
X701-A and X701-B	B19/5ZJDF00001	Crystal Socket.
	B19/CFQ2223A	INTERFACE BOARD
		---------- CAPACITORS ----------
C801 thru C852	B19/5CAAD00838	Ceramic: 1000pF ±10%, 50VDCW, temp coef ±15%.
C853	B19/5CEAA01813	Electrolytic: 100 F ±20%, 25VDCW.
C854	B19/5CBAB00399	Ceramic: 4700pF +100%, 50VDCW, temp coef +25%, -55%
		---------- JACKS ----------
J801	B19/5JCAP00006	Connector; sim to SMK CSC5033-0301R.
J802 and J803	B19/5JWBS00175	Connector, 22 pins.
	B19/CMC-410	CPU BOARD
		---------- CAPACITORS ----------
C1	B19/5CAAD01237	Ceramic: 0.1uF ±10%, 25VDCW temp coef ±15%
C2 and C3	B19/5CAAD00789	Ceramic: 0.01uF ±10%
C4	B19/5CAAD01237	Ceramic: 0.1uF ±10%m 25VDCW temp coef ±15%
IC702	B19/6DLFD00002	Microcompoter; H-6DLFD00002
	B19/JHM151S	-------- INTERCONNECTION CABLE -------
X601	JRX/5XHAA00777	Crystal kit
ZC601 and ZC602	B19/5ZCCL00025	Flexible cable:
ZC603	B19/5ZCCL00026	Flexible cable:
ZC604	B19/5ZCCL00027	Flexible cable:
ZC605	B19/5ZCCL00028	Flexible cable:
ZC606	B19/5ZCCL00029	Flexible cable:
ZC607	B19/6JJFD00049	Co-axial cable:
ZC608	B19/6JJFD00050	Co-axial cable:
ZC609	B19/6JJFD00051	Co-axial cable:
ZC610	B19/6JJFD00052	Co-axial cable:
ZC612	B19/6ZCFD00145	Power cable:
ZC613	B19/6ZCFD00146	Power cable:
		---------- MISCELLANEOUS ----------
	B19/MPDM01167	Radio key
	B19/MPBX14964	Radio Mounting Plate

SYMBOL	GE PART NO.	DESCRIPTION
	B19/MPXP01744	Hardware Kit (Radio Mounting)
	B19/MPBC07112	Bottom Cover (Complete Assembly)
	B19/MPBC07108	Top Cover (Complete Aseembly)
	19A704978P1	Keylock Assembly
	B19/CFR-72-1	Noise Blanker Kit
	19B216021G3	Tx Fuse, 20A-low power
	19B216021G6	Tx Fuse, 30A-high power