MAINTENANCE MANUAL
SYSTEM CONTROL/SYNTHESIZER BOARD
CMC-404A/B
FOR
MLSU140 & MLSU240
TWO-WAY MOBILE RADIO COMBINATIONS

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DESCRIPTION

The System Control/Synthesizer Board (A801) for the MLSU140/240 two-way mobile FM radio, controls the radio by providing all necessary digital processing, tones and control functions. The logic circuitry of this board controls channel acquisition, RF frequency selection, tone generation and detection, timing functions and operator interface functions. Interface functions include control panel displays and switch panel controls, microphone hookswitch and programming functions. The frequency synthesizer generates the transmitter output frequency and the receiver first mixer injection frequency. The Control/Synthesizer Board contains the following:

- Microprocessor
- External memory EPROM for the microprocessor
- The programmable personality EEPROM
- Four octal latches for the I/O microcomputer interface
- Transmit and receive audio processing circuitry

The Control/Synthesizer Boards (CMC-404 & CMC-405) mount in the top section of the frame assembly as shown in Figure 1 - System Control/Synthesizer Board Location.

System Control 1/Synthesizer Board CMC-404 provides the microprocessor and control logic. This board also provides the synthesizer circuit for generating operating frequencies. The Control 2 Board (CMC-405) provides the audio processing for both the transmit circuit and the receive circuit. It also provides power distribution for the other circuits.

CIRCUIT ANALYSIS

Power Distribution

Power connections to the radio from the vehicle battery (+13.8 Volts nominal) is connected to transmit/receive connector J3. This connection is made through power cable ZC805 and connector P2. The battery input is filtered by capacitors C58, C68, C78, C88, C98 and surge protector CD7 and is applied to J101-1. Reverse polarity protection is provided by diode CD8.

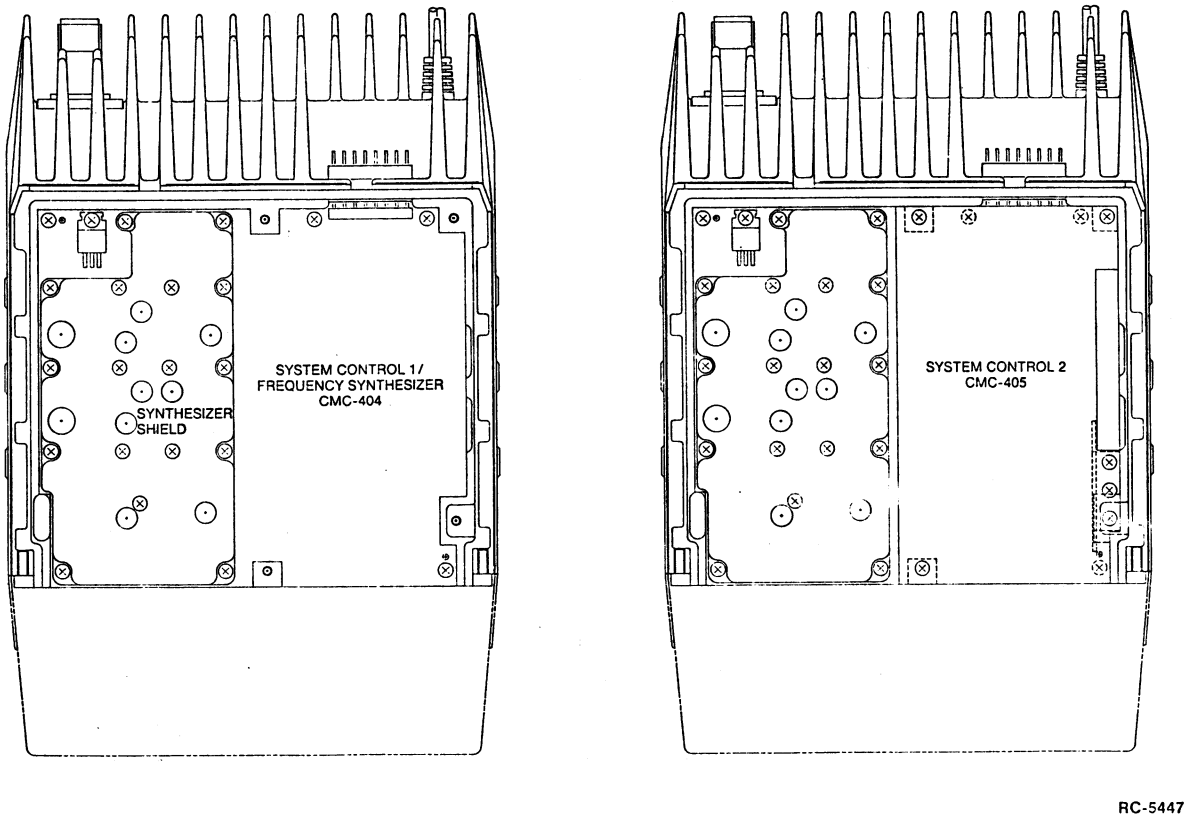

Figure 1 - System Control/Synthesizer Location (Top View)

The 13.8 Volts from J101-1 is applied to J705-1. This input is applied to the power on-off relay K601 through J601. A continuous 13.8 Volts supply is applied to the Power Control circuit (IC607, IC611) and 5-Volt regulator IC606.

Pressing in the power-on switch energizes power relay K601. Energizing this relay applies a switched 13.8 Volts to 5-volt and 9-volt regulators IC101, IC207, IC501, IC607 and IC608. Switched 13.8 Volts is also applied to Audio PA module IC603.

Digital Processing

The digital processing circuitry consists of microprocessor IC701, octal latches IC702, IC706, IC707 and IC709, EPROM IC703 and EEPROM IC704. IC703 is an 8K X 8-Bit EPROM and is used by the microcomputer to control all radio and system functions. Crystal X701 and inverter IC710 provide the time base to sequence the microcomputer through an internal software program, allowing it to execute the program stored in the program memory (refer to Figure 2 - System Control 1 Block Diagram).

EEPROM IC704 contains all data unique to the radio and is referred to as the "Personality" PROM. Information stored in the Personality PROM includes data for RF channels and Channel Guard tones as well as all radio options (e.g. carrier control timer,...etc.).

Operation:

Octal Latches IC702, IC706, IC707 and IC709

Octal latches IC702, IC706, IC707 and IC709 are used to exchange data passing between microprocessor IC701 and the memory and control circuits respectively. Octal latch IC709 provides the interface between the microprocessor and the control panel switches. IC709 is connected so that the latch function is disabled (the "G" input IC709-11 is connected to +5 volts) and the octal latch operates as a buffer for the microprocessor input.

Latch IC706 provides an output interface for the microprocessor. This latch controls the DPTT, watchdog timer, electronic volume control, RX MUTE and squelch switching. The "G" latch control input is connected to decoder IC705-10.

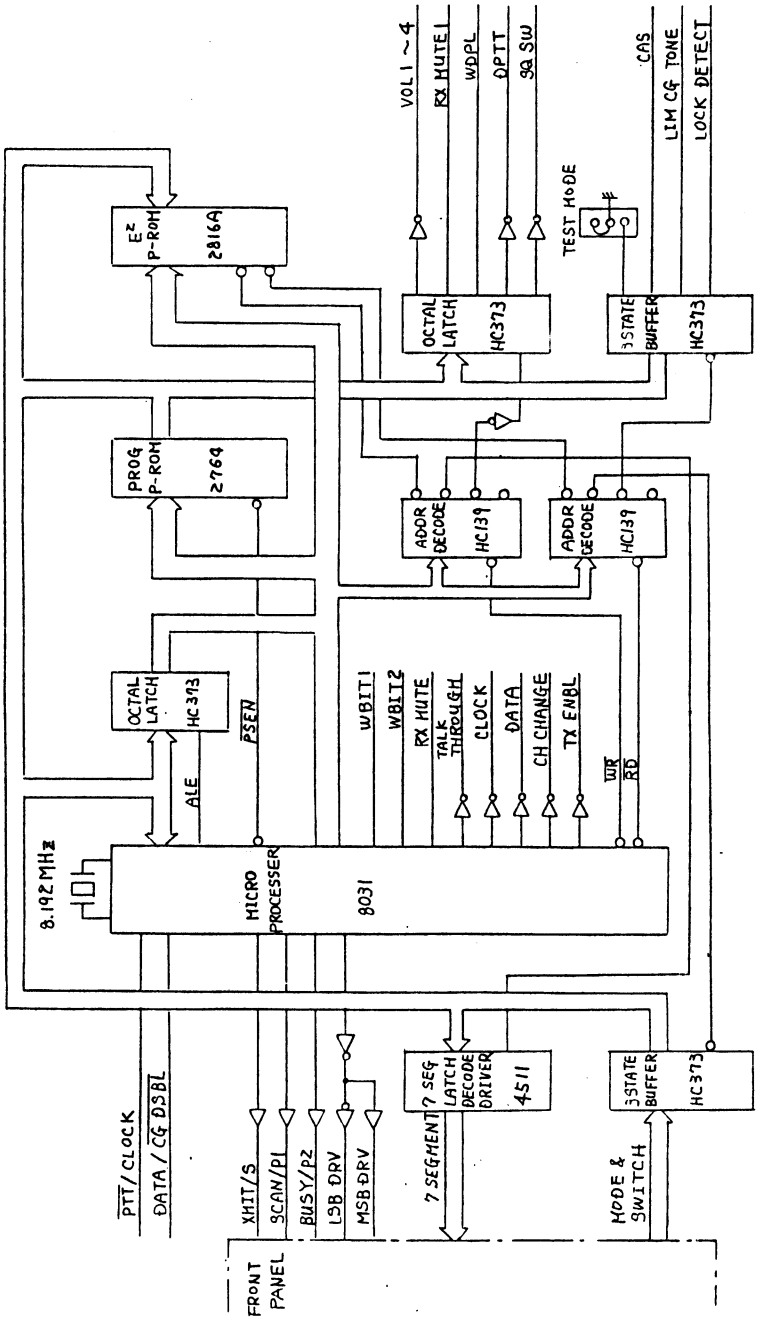

Figure 2 - System Control 1 Block Diagram

Octal latch IC702 has the "G" input connected to the Address Latch Enable (ALE) output of the microprocessor to provide a latched address interface between the microprocessor and program memory IC703.

Reset/Memory Backup

The microprocessor reset circuit consists of 5-volt regulator IC608, zener diode CD604, switching transistors TR603 and TR605 and pass transistor TR604. Microprocessor IC701 is reset by switched A+ (13.8 volts) on/off, watchdog timer reset. The microprocessor resets when +5 volts is applied to IC701-9 (RST) input from regulator IC608 through pass transistor TR604.

When the radio is turned on (A+ SW on) zener diode CD604 conducts, turning on TR603. Transistor TR603 turning on, turns TR605 and TR604 off. When the voltage at IC701-9 becomes "0" volts, the microprocessor starts executing program memory.

Watchdog Timer

The watchdog timer circuit consists of switch transistor TR606 and timer IC609. The timer monitors the operation of microprocessor IC701 and generates a watchdog pulse if the microprocessor fails to function properly. When the microprocessor is operating properly, watchdog pulses from octal latch IC706-15 are applied to the base of switch TR606 through a delay network consisting of resistors R645, R646 and capacitor C624. Turning on TR606 applies +5 volts to IC609-2,6. This holds the clock timer output of IC609-3 low, which holds the microprocessor reset line to the base of pass transistor TR604 high, turning off TR604. Turning off TR604 grounds the microprocessor input at IC701-9, keeping microprocessor IC701 in the operating state.

When the microprocessor is not operating properly, the reset pulses from IC706-5 are not present. Transistor TR606 will turn off and timer IC609 will generate a square wave output at IC609-3 to reset the microprocessor.

Microprocessor

Microprocessor IC701 directly interfaces with and controls the operation of all the digital processing circuitry. It also interfaces with the radio and control panel functions through octal latch IC709 and external buffer stages. Microprocessor IC701 responds to manual initiated functions of Push-To-Talk (PTT), frequency selection (ADD, DELETE), MONITOR, VOLUME and SCAN ADD and DELETE through octal latch IC709. Other functions are performed automatically by the microprocessor.

The microprocessor controls the operation of the radio by performing the following major functions:

- System Timing
- Frequency Selection
- Receiver Scan (16 channels)
- Two-Channel Priority
- Tone Generation and Detection
- Transmit/Receive Control
- Front Panel Controls and Displays
- Audio Routing and Mute Control

Microprocessor IC701 is sequenced through its program by an internal 8.192 MHz oscillator controlled by crystal X701. The microprocessor accesses its program from EPROM IC703. Reading of the stored program at IC703 occurs when the PSEN line of IC701 is low. The upper eight address lines of IC701 (A8 through A15) are stationary during this access time. The lower eight address lines of IC701 (AD0 through AD7) are captured by octal latch IC702 and held stationary. ALE (IC701-30) is used to latch the lower eight address lines. The output of IC703 is then read into the data bus (AD0 through AD7) of IC701.

The microprocessor interfaces with the microphone through MIC PTT and LOGIC HKSW. It also interfaces with Suitcase Programmer TQ2310 through HKSW, MIC PTT, SER DAT and STORE, and with Personality EEPROM IC704. The microprocessor control signals include the following:

$\overline{EA}$ - When this Enable line is low, allows the microcomputer to retrieve all instructions from external memory.

$\overline{RST}$ - Resets the microcomputer to beginning of the software program when switched A+ is turned off, immediately following power interruptions or with low battery voltage.

SYN DATA - Data transferred to synthesizer representing RF frequencies.

SYN CLOCK - Timing output to synthesizer.

SYN LOCK - A status input signal from the synthesizer to indicate frequency lock status of VCO.

RX MUTE - Receiver Mute turns receiver audio off while operating in the trunked mode during channel acquisition (idle and wait mode) and when transmitting.

$\overline{\text{DPTT}}$ - Delayed PTT energizes the antenna relay. DPTT low switches off the bilateral audio gates on the System Control/Synthesizer Board in the transmit and receive mode.

TX ENBL - TX ENBL low turns transistor TR105 on and applies 9 volts to the exciter.

$\overline{\text{MIC PTT}}$ - The microprocessor monitors the status of the switched PTT lead from the microphone. It also receives clock data on this line while the radio is being programmed.

$\overline{\text{RD, WR}}$ - Read, Write allows the microprocessor to read/write data to/from EEPROM IC704 and read/write from/to digital processor IC705.

PSEN - Program Send Enable allows the processor to read instructions from program memory IC703.

ALE - Address Latch Enable allows the microcomputer to hold the eight least significant lines (AD0 through AD7) stable by using octal latch IC702. This is necessary when reading from program memory IC703 or reading/writing from/to EEPROM IC704.

A8 - A15 - Eight significant address lines. These lines are used to address and access program memory IC703 and EEPROM IC704. Octal latch IC702 holds the outputs stable.

Push-To-Talk

Pressing the PTT switch on the microphone applies a ground through J701-2 on the System Control 1 Board (CMC-404) to microprocessor IC701. The ground on IC701-10 causes the DPTT output at IC701-1 to go low and the RX MUTE output at IC701-2 to go high.

The low DPTT output of IC706-16 is applied to the input of inverter IC710-13 and the input of inverter transistor TR711. The high output at IC710-12 becomes the low outputs $\overline{\text{DPTT1}}$ and $\overline{\text{DPTT}}$ through inverter transistors TR709 and TR710 respectively. The high output of TR711 becomes $\overline{\text{DPTT}}$. $\overline{\text{DPTT1}}$ and $\overline{\text{DPTT}}$ are applied to the synthesizer, exciter/PA board and the audio circuitry. The low output at TR710 is applied to the exciter/PA board from J705-7 and operates antenna relay K1. The $\overline{\text{DPTT}}$ output and the $\overline{\text{DPTT}}$ output are supplied to the synthesizer circuit to turn the RX VCO off and TX VCO on. Also the low $\overline{\text{DPTT1}}$ output at TR709 is added to the bilateral switch IC604 in the audio circuit to change the operating mode from receive to transmit. $\overline{\text{TX ENBL}}$ is low and through J705-8 is connected to the exciter/PA board to apply 9 volts to the exciter and key the transmit circuit.

Channel Select

When a channel is selected and the bit stream is loaded into the synthesizer, a strobe pulse is applied to the Phase-Lock-Loop (PLL) module to allow the synthesizer to generate the correct RF frequency. The microprocessor immediately begins monitoring the LOCK DET LINED to verify that the synthesizer is "on" frequency. If the synthesizer is not locked on the correct frequency, a low on the LOCK DET line will cause the microprocessor to reload the synthesizer in an attempt to lock it on frequency. If the synthesizer is locked on the correct frequency and MIC PTT is low, the microprocessor applies the high to the input of inverter transistor TR713. The low output of TR713 ($\overline{\text{TX ENBL}}$) is connected to the exciter/PA board through J705-8 to key transmit circuit.

Monitor

Pressing the MONITOR pushbutton applies a low to the microprocessor through octal latch IC709-13. This low causes the microprocessor to open the receiver so the channel can be monitored.

Channel Guard

In the encode mode, the microprocessor selects the assigned Channel Guard tone information from the EEPROM memory for each transmit and receive channel and generate the Channel Guard signal. This signal is applied as Walsh Bits "1" and "2" to summing amplifier IC610-D. These two bits are summed together and filtered to provide a smooth sine wave for Tone Channel Guard.

The output of IC610-D is applied to low-pass filter (Voice Reject) HC602. This filter shunts all frequencies above 300 Hz to ground, preventing those frequencies from interfering with the encoded signal.

In the decode mode, the DPTT input to bilateral switches IC604 is high, changing the switches to the receive mode. Audio and tone from RX AUDIO at J601-24 is applied to low-pass filter (Voice Reject) HC602 through buffer amplifier IC610-A. This signal is filtered and only the Channel Guard tone (if present) is applied to hard limiter IC610-B.

The square-wave output of IC610-B is connected to transistor switch TR609 and the Channel Guard tone is applied to the microprocessor for comparison to determine if the Channel Guard tone is correct. If the tone is correct the microprocessor causes the RX MUTE line to go low at J601-12, turning the receiver audio on so that the message can be heard in the speaker.

Carrier Control Timer

The Carrier Control Timer (CTT) is contained in and controlled by the microcomputer. Each time the PTT switch is activated an internal counter begins to count down. If the counter times out, a 500 Hz tone is heard in the speaker for five (5) seconds or until the microphone PTT is released. The timing cycle is programmable from 30 seconds to three (3) minutes in 30-second increments.

EEPROM "WRITE" Control

The EEPROM "WRITE" (WR) control consists of transistors TR715 and TR716. When address bit A9 or A10 from the microprocessor is high, TR716 turns on and TR715 turns off. This applies +5 volts to the WR input which disables the "WRITE" function to protect the channel frequency information. When the address bit A9 or A10 goes low, TR716 turns off and TR715 turns on. This applies a low to the WR input, enabling the "WRITE" function (if EEPROM WR is low from the decoder) which allows data to be written to the EEPROM. To WRITE to the memory, the WR input must be low and the OE input must be high. In the RD (Read) mode, WR is high, OE is low and CS is low. The WR function can also be enabled by a low from Suitcase Programmer TQ2310 through SP STORE.

Audio Circuitry

Transmit and receiver audio signals are routed to and from the Control 2 (CMC-405) Board through three-stage bilateral switches IC604-C (refer to Figure 3 - System Control 2 Block Diagram). The switches are controlled by the RX MUTE 1 output of microprocessor IC701. In the transmit mode, the RX MUTE 1 from IC706 is high, TR610 turns on, bilaterial switch IC604 control lead is low, switching the stages to the transmit mode as shown on the Control 2 Board Schematic Diagram. When the PTT switch is released, the switches revert back to the normal receive mode (DPTT high).

The +9 volts from regulator IC607 is applied to voltage divider resistors R649 and R650. The +4.5-volt output of the voltage dividers establishes the reference voltage for the operational amplifiers. Capacitor C630 provides an AC ground at the summing input of operational amplifier IC610-C.

Transmit Audio

Audio from the microphone at J701-3, 4 (MIC HI, LO) is coupled through capacitor C258 and Audio Processor IC208-B and applied to a high-pass filter. The filter output is coupled through capacitor C230 and Modulation Adjust potentiometer RV201 to the next stage.

The Channel Guard tone (if present) from Voice Reject Filter HC602 is coupled through bilateral switch IC604-A and applied to the CG input of Channel Guard Modulation Adjust potentiometer RV202. The Channel Guard tones and audio are combined and applied to summing amplifier IC208-A.

Receive Audio

In the receive mode, the PTT input to the System Control/Synthesizer Board goes low, switching antenna relay to the receive mode. The RX MUTE lead remains high, keeping the audio amplifier turned off.

If the channel being received has been programmed for Channel Guard, the received CG tone is coupled through bilateral switch IC604-B and buffer amplifier IC610-D to low-pass filter (Voice Reject) HC602. The filtered tone output is coupled through IC610-A, limiter IC610-B and transistor TR609 to the microprocessor.

Received audio from the receiver is applied to the input of buffer amplifier IC601-A. The audio out from IC601-A is applied to the volume control circuit (IC602 and IC601-C) through tone reject filter HC601, audio gate IC604-C and audio pre-amplifier IC601-B. The audio output from the volume control circuit is applied through the de-emphasis network, consisting of resistors R628 and R618 and capacitors C609 and C605, to audio amplifier IC603 which provides up to 4-watts of audio output power to 4-ohm speaker SP801, located in the front panel.

When the radio is squelched, the Carrier Activated Switch (CAS) signal to the microprocessor through J706-5, goes

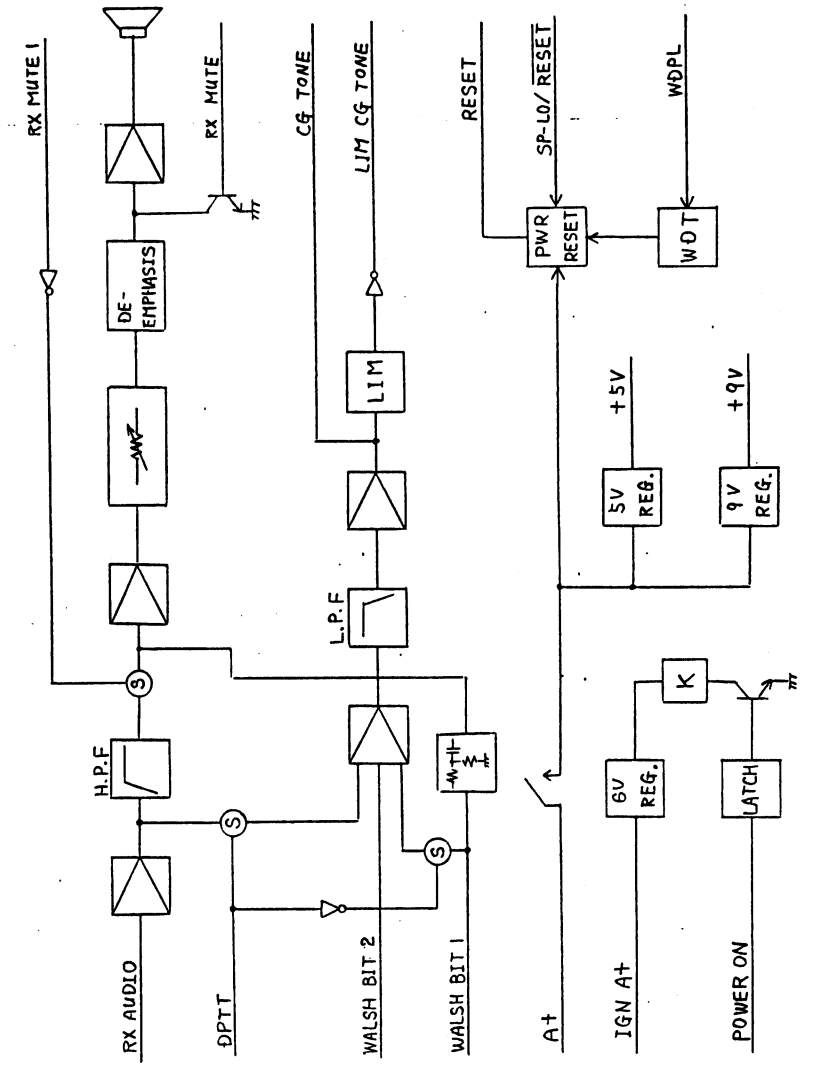

Figure 3 - System Control 2 Block Diagram

low. The microprocessor outputs the RX MUTE and RX MUTE 1 signals. The RX MUTE signal turns bilateral switch IC604-C off and mutes the audio signal. The RX MUTE signal turns transistor TR601 off and mutes the audio signal from IC601-C.

9-Volt Regulator

The 9 volt regulator provides power for the audio circuits on the System Control/Synthesizer Boards. The regulator operates from the 13.8-volt ignition switch voltage. The 9 volts DC output of the regulator is applied to the microphone through J701-3, 4 (MIC HI, LO) on the System Control/Synthesizer Boards.

Frequency Synthesizer

The frequency synthesizer circuit consists of reference oscillator XU201, synthesizer chip IC201, dual modulus pre-scaler IC202, TX and RX Voltage-Controlled Oscillators (VCO's), transistors TR202 and TR209, a loop filter and associated circuitry (refer to Figure 4 - Synthesizer Block Diagram).

Reference oscillator XU201 operates at a frequency of 12.8 MHz and is temperature compensated to provide a frequency stability of ±5 PPM. Voltage for the oscillator is supplied by 9-Volt regulator IC207 and 4-Volt zener diode CD201. The oscillator output is applied to synthesizer chip IC201-2 (refer to Figure 5 - Synthesizer IC201).

Synthesizer IC201 consists of a programmable reference oscillator (divider ÷ R), phase detector and programmable VCO dividers (÷N, A).

When the PTT switch is pressed (transmit) or released (receive) new frequency data is received on the clock, data and enable lines and the synthesizer immediately begins generating the new RF frequency. This serial data determines the VCO frequency by setting the internal dividers. The reference oscillator frequency applied to the programmable reference oscillator divider is divided down to some lower frequency as indicated by the input data and applied to the internal phase detector. The phase detector compares this signal with the output of the internal programmable VCO dividers. The output of the programmable VCO dividers is a function of the RF frequency which is divided down by the dual modulus pre-scaler and the programmable VCO dividers. When operating on the correct frequency, the inputs to the phase detector are identical and the output voltage of the phase detector is constant. Under these conditions, the VCO is stabilized or locked on frequency.

If the compared frequencies (phases) differ, an error voltage is generated and applied to the VCO through the frequency acquisition circuit, causing the Phase-Lock-Loop (PLL) to acquire the new frequency.

The LOCK DETECT (LD) line provides the PLL lock status information to the microcomputer. When the PLL is out of lock, the LOCK DETECT lead is low. When locked on frequency the lead is high.

DC offset buffers TR202, TR204 and TR205 receive the error voltage from the synthesizer and increases 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 TR202 on or off. TR202 controls the DC offset buffers TR205 and TR204 and high current buffers TR203 and TR201. TR203 and TR201 complete a high current rapid charge path for C206-C208. TR204 and TR205 provide the rapid discharge path.

As the error voltage decreases TR202, TR205 and TR204 turn on completing a discharge path for C206-C208 through bilateral switches IC203. When the error voltage goes positive TR202, TR204 and TR205 are turned off, allowing C206-C208 to charge through TR203 and R205-R206. IC203 is turned on for 15 milliseconds each time a channel is changed in receive or when changing from transmit to receive. The time is 15 milliseconds when in transmit.

The loop filter consists of R205-R207, and C206-C208. This filter controls the bandwidth and stability of the synthesizer loop. Bilateral switch IC203 is controlled by the 15 milliseconds, 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 35 milliseconds channel acquisition time required for PSLM. 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 or correct the VCO frequency.

The Receiver VCO consists of a low noise JFET oscillator, TR206, followed by high gain buffer IC205. This buffer prevents external loading and improves power gain. The VCO is a Colpitts oscillator with the varicap capacitors and inductor forming the tank circuit. Capacitor CV201 allows manual adjustment of the VCO across the frequency split. The varicap provides voltage controlled

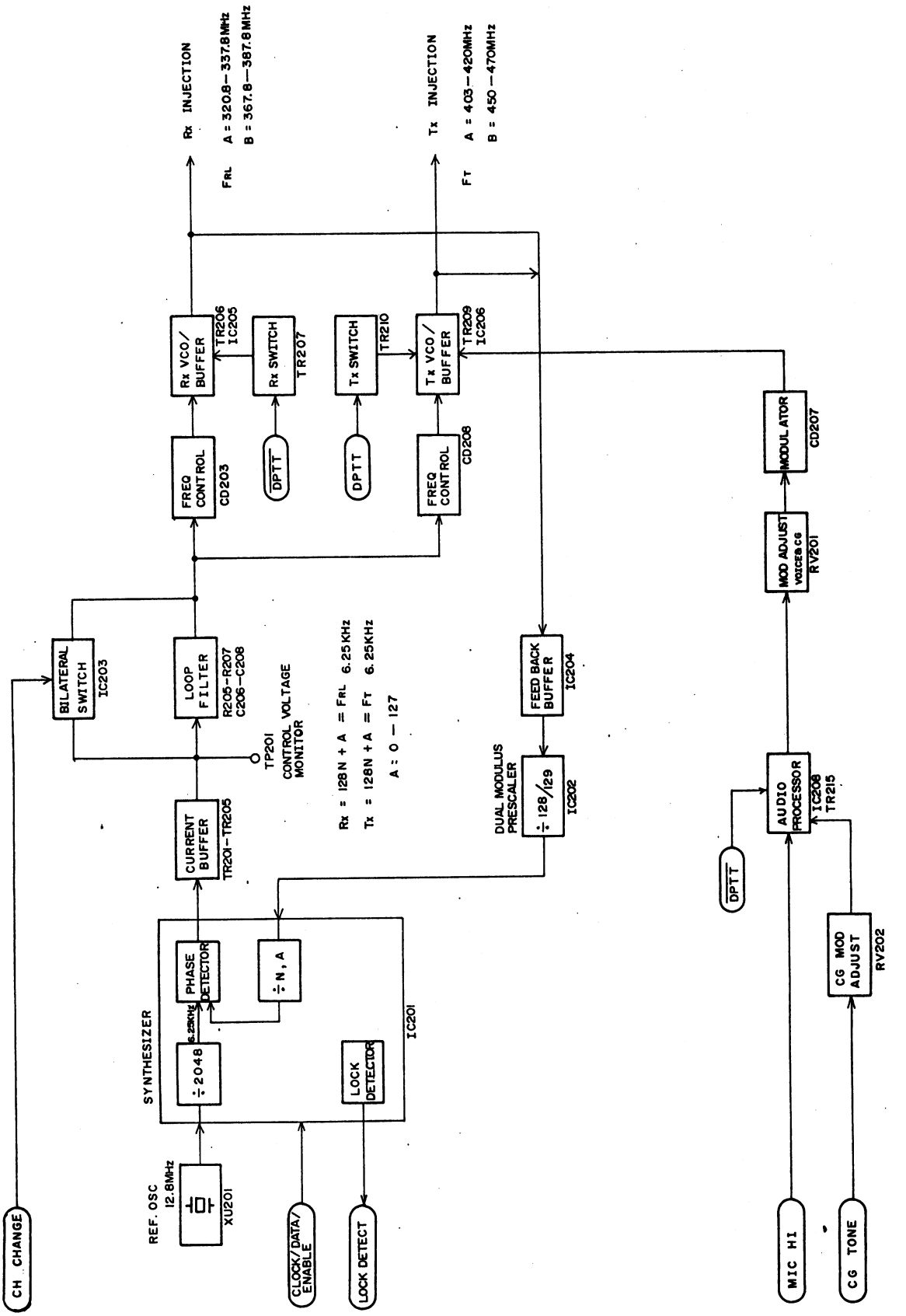

Figure 4 - Synthesizer Block Diagram

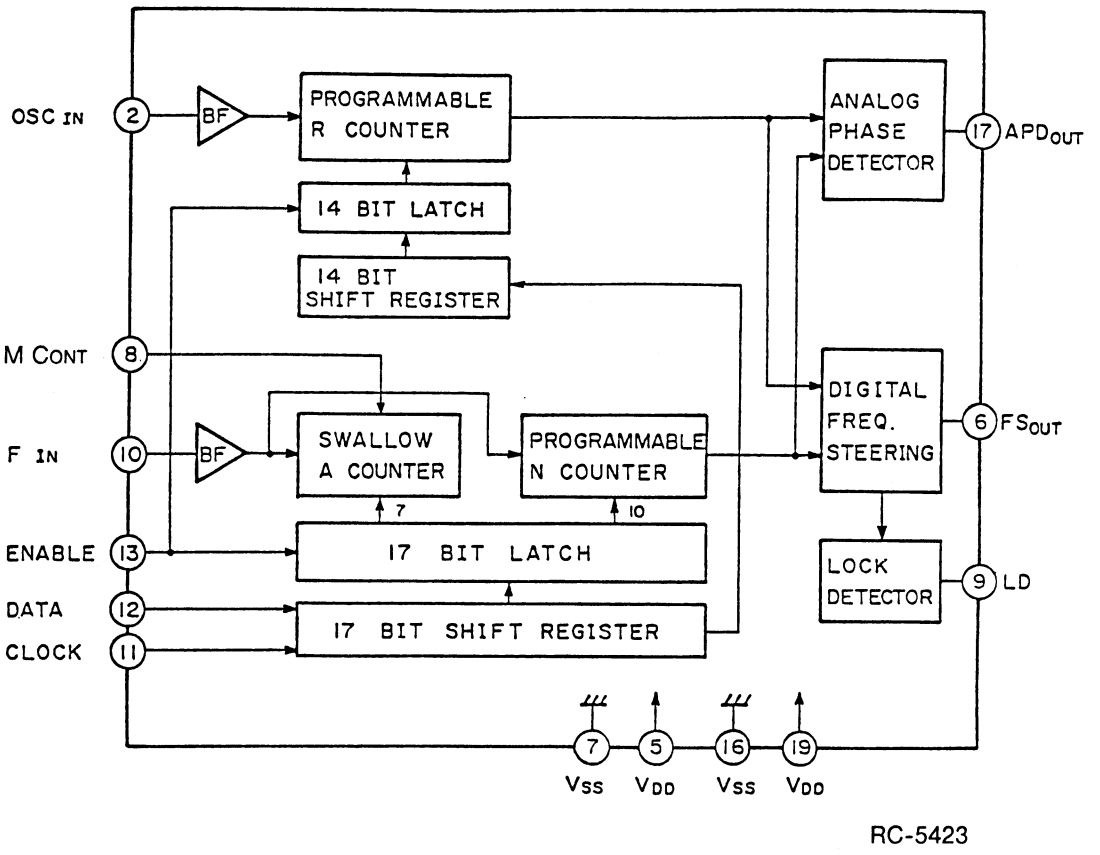

Figure 5 - Synthesizer IC201

frequency adjustment of about 5 MHz. The VCO is switched on and off under control of the DPTT line. When the DPTT line is high the Receiver VCO is turned on (TR207 is on). The RX injection output is typically 0 dBm. RX VCO lock time is 15 milliseconds maximum.

The transmit VCO is basically the same as the Receiver VCO except that capacitor CV202 is turned to provide an operating range of approximately 10 MHz, depending on which frequency split the radio is operating on. The varicap provides a voltage controlled adjustment range of approximately 10 MHz. The TX injection provides a typical output of 0 dBm. Transmit audio is applied to modulation adjustment control RV201. Deviation is set for 4.5 KHz. TX VCO lock time is 15 milliseconds maximum.

TX VCO control switch TR210 turns the Transmit VCO on when DPTT is high. TR210 is on.

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

VCO Characteristics:

The synthesizer has two VCO's, the frequency of which is directly related to a control voltage generated by the synthesizer circuitry and must remain within specified limits for the synthesizer to function properly. The RX VCO typically will increase in frequency about 5 MHz when the control voltage moves from its lower limit to its upper limit. The TX VCO moves about 10 MHz for the same situation. By tuning the variable capacitor in the VCO, the same control voltage frequency spread can be moved up or down through the full range of frequencies that the radio operates on.

In order to maintain the selectivity and hum and noise performance of the radio, the frequency range that the VCO's can be voltage tuned must be kept to a minimum. This requires that all the available voltage range be fully utilized. The alignment procedure, therefore, instructs the user to accurately set the control voltage to the upper limit of the voltage range at the highest frequency channel.

NOTE

Going too high with the voltage setting at the highest frequency channel may cause problems over temperature extremes as the VCO's will drift slightly. Set the voltage too low and you may not remain within the required lower voltage limit as you cover the radio's maximum two frequency spread.

If the required frequency spread is less than the maximum two frequency spread, then there are no restrictions on setting the lowest and highest frequencies within the required voltage limits.

The minimum tuning requirement of the VCO's is to cover the proper frequency range. For instance, to cover 450 to 460 MHz the VCO must be tunable such that at 450 MHz the control voltage is at least greater than or equal to the lower voltage limit, and at 460 MHz the voltage must be less than the upper limit. If the control voltage can be tuned higher than the lower limit at 450 MHz, this simply means that you can program channels below 450 MHz until you finally run into the lower voltage limit. When tuning the VCO's to a channel close to 460 MHz, the control voltage may not reach the upper control voltage limit. This is normal for some radios and is due to the tolerances on the many capacitors in the VCO. Even though it takes very little change in capacitance to shift the VCO frequency range a few megahertz, this variation has been carefully compensated for by increased tuning range for the VCO. Therefore, if you tune to 470 MHz, you may not achieve the maximum control voltage for all radios, but you will always be greater than the lower voltage limit.

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 buffer. Buffering is provided by IC204 and the output applied to dual modulus prescaler IC202.

The dual modulus prescaler completes the PLL feedback path from the synthesizer to loop filter, to the VCO's and feedback buffer and then back to the synthesizer through the prescaler. The prescaler divides the VCO frequency by 128 or 129 under control of M Cont from the synthesizer. The output of the prescaler is applied to the synthesizer where it is divided down to 6.25 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 4.5 and 7.5 VDC when the PLL is locked.

The audio processor provides audio pre-emphasis with amplitude limiting and post limiter filtering and a total gain of approximately 27 dB. Approximately 30 dB gain is provided by IC208B and 4 dB by IC208A and -7 dB by R248, R249.

The 9-Volt regulator IC207 powers the audio processor and applies regulated 9 volts to a voltage divider consisting of R245 and R246. The +4.5 V output from the voltage divider establishes the operating reference point for operational amplifiers IC208B and IC208A. C261 provides an AC ground at the summing input of both operational amplifiers.

When the input signal to IC208B-6 is of a magnitude such that the amplifier output at at IC208B-7 does not exceed 5 volts PP, the amplifier provides a nominal 30 dB gain. When the audio signal level at IC208B-7 exceeds 5 volts PP, the amplifier gain is reduced to 1. This limits the audio amplitude at IC208B-7 to 6 volts PP.

Resistors R242, R243 and Capacitor C258 comprise the audio pre-emphasis network that enhances the signal-to-noise ratio. R243 and C258 control the pre-emphasis curve below limiting. R242 and C258 control the cut-off point for high frequency pre-emphasis. As high frequencies are attenuated, the gain of IC208 is increased.

Audio from the microphone is coupled to the audio processor through R242 and C258.

The amplified output of IC208B is coupled through R248, R250, R252 and R253 to a second operational amplifier IC208A. TR215 is controlled by the $\overline{\text{DPTT}}$ line so that TX audio is transmitted only when the PTT switch is pressed.

The Channel Guard tone input is applied to IC208A-2 through CG Mod Adjust RV202, C263 and R254. The CG tone is then combined with the microphone audio at IC208A. IC208A provides a signal gain of approximately 4 dB.

A post limiter filter consisting of IC208A, R250-R253, C264 and C265 provide 12 dB per octave roll-off. R248 and C260 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 Mod Adjust RV201 to the transmitter VCO.

TX enable switch TR215 shorts out operational amplifier IC208-A when the radio is in the receive mode. The DPTT signal is generated by the microcomputer when the PTT switch is released and is 9 VDC in the receive mode.

SCAN Operation:

The scan operation is controlled by the microprocessor, and provides for scanning any or all of up to 16 channels. The scanned channels may be located anywhere within the frequency band of the radio, and can include two priority channels (P1 and P2).

If desired, all 16 channels can be scanned with or without priority level. When SCAN is enabled, scanning of the selected channels starts immediately. Scan time is approximately 50 to 450 milliseconds per channel, depending upon whether Channel Guard has been programmed for a particular scan channel. If a carrier is not detected, the scan time is 50 milliseconds. If a carrier is detected and Channel Guard is programmed for the channel, the time is 200-450 milliseconds, depending upon how close the Channel Guard tone is to the desired tone. Typical value is 250 milliseconds.

Priority 1 (P1) and Priority 2 (P2) channels, if present, are not part of the non-priority channel scan list (S1, S2, S3, ...) and are treated separately. If there is no activity on any of the scanned channels, then the scan sequence is as shown in the following examples.

Example 1: (More than four non-priority channels, i.e., six channels)

P1-P2-S1-S2-S3-S4-P1-P2-S5-S6-S1-S2-P1-P2-S3-S4-S5-S6-P1-P2-...

Example 2: (Four or less non-priority channels, i.e., three channels)

P1-P2-S1-S2-S3-P1-P2-S1-S2-S3-P1-P2-S1-S2-S3-P1-P2-S1-S2-S3-...

Therefore, the scan sequence is: Scan P1 and P2 if programmed. Then scan up to four non-priority channels before scanning P1 and P2 again. If more than 4 non-priority channels exist, then scan will wrap around, continuously scanning four channels of the non-priority list between each P1, P2 scan sequence. If the number of non-priority channels is less than or equal to four, then all non-priority channels will be scanned between each P1, P2 scan.

As an added example, consider channels 1-8 to be the scanned channels, with P1 being Channel 1 and P2 being Channel 8. The scanning order then would be:

S1-S2-S3-S4-P1-P2-S5-S6-S1-S2-P1-P2-S3-S4-...
7 6 5 4 1 8 3 2 7 6 1 8 5 4

Since it takes approximately 50 to 450 milliseconds to scan each channel, then each Priority channel is sampled every 0.3 to 2.7 seconds and the Non-Priority channels are sampled at least once every 0.4 to 3.6 seconds. If Channel Guard is programmed for a channel but no carrier is detected, the scan time for that channel is 50 milliseconds.

SCANNING (Stopped On A Valid SCAN Channel):

Once a carrier is detected, the Receive Channel display will light up, indicating that channel. If the channel is a Non-Priority channel, and there are no Priority channels, then scanning is halted. If only a Priority 2 (P2) channel is present, then it is scanned every 5 seconds if it has Channel Guard programmed and carrier is detected, and every second otherwise. If there is only a Priority channel, then it is sampled every 2.5 seconds if it has Channel Guard 1 (P1) and carrier is detected, and every 500 milliseconds otherwise. If there are P1 and P2 Priority channels, the sample rate will vary.

In order to show the various scan conditions, the following conditions are used:

NOTE

The following conditions are shown while listening to a non-priority channel.

CONDITION 1: P1 And P2 Have Channel Guard Programmed

a. No carriers detected

P1-P1-P2-P1-P1-P2-P1-P1-P2-...

tb (time between samples) = 500 msec
ts (time of sample) = 100 msec

Note: ts is the hole time placed in the signal being heard.

b. Carrier on P1 detected/wrong Channel Guard

P1-P2-P2-P2-P2-P2-P1-P2-P2-P2-P2-P2-P1-P2-...

tb = 1 second
ts = 100 msec for P2
250-500 msec for P1

c. Carrier on P2 detected/wrong Channel Guard

P1-P2-P1-P1-P1-P1-P1-P1-P1-P1-P1-P2-P1-...

tb = 500 milliseconds
ts = 100 milliseconds for P1
250-500 milliseconds for P2

d. Carrier on P1 and P2 detected/both wrong Channel Guard

P1-P1-P2-P1-P1-P2-P1-P1-P2...

tb = 2.5 seconds
ts = 250-500 msec

e. Carrier on P1 and right Channel Guard

Stop scan, display P1

f. Carrier on P2 and right Channel Guard

Display P2, scan P1

P1-P1-P1-P1-P1-P1-...

tb = 500 msec
ts = 100 msec

g. Carrier on P2 with right Channel Guard, carrier/wrong Channel Guard P1

P1-P1-P1-P1-P1-...

tb = 2.5 seconds
ts = 250-500 msec

CONDITION 2: Priority 1 Has Channel Guard Programmed, PRI 2 Does Not

a. No carriers detected

P1-P1-P2-P1-P1-P2-P1-P1-P2-...

tb (time between samples) = 500 msec
ts (time of sample) = 100 msec

b. Carrier on P1 detected/wrong Channel Guard

P1-P2-P2-P2-P2-P2-P1-P2-P2-P2-P2-P2-P1-P2-...

tb = 1 second
ts = 100 msec for P2
250-500 msec for P1

c. Carrier on P1 detected/right Channel Guard

Stop on P1, stop scan

d. Carrier on P2

Stop on P2, scan P1

P1-P1-P1-P1-...

tb = 500 msec
ts = 100 msec

e. Carrier on P2 and P1 with wrong Channel Guard on P1

Stop on P2, scan P1

P1-P1-P1-P1-P1-P1-...

tb = 2.5 seconds
ts = 250-500 msec

CONDITION 3: P2 Has Channel Guard, P1 Does Not

a. No carriers detected

P1-P1-P2-P1-P1-P2-P1-P1-P2-...

tb (time between samples) = 500 msec
ts (time of sample) = 100 msec

b. Carrier on P2 detected/wrong Channel Guard

P1-P2-P1-P1-P1-P1-P1-P1-P1-P1-P1-P2-P1-...

tb = 500 milliseconds
ts = 100 milliseconds for P1
250-500 milliseconds for P2

c. Carrier on P2 detected/right Channel Guard

Stop on P2, scan P1

P1-P1-P1-P1-P1-P1-...

tb = 500 msec
ts = 100 msec

d. Carrier on P1 detected

Stop on P1, stop scan

CONDITION 4: P1 And P2 With No Channel Guard

a. No carriers detected

P1-P1-P2-P1-P1-P2-P1-P1-P2-...

tb (time between samples) = 500 msec
ts (time of sample) = 100 msec

b. Carrier on P2

Display P2, scan P1

P1-P1-P1-P1-P1-P1-...

tb = 500 msec
ts = 100 msec

c. Carrier on P1

Stop on P1, stop scan

Hang Time:

If the carrier on a Non-Priority channel disappears before a carrier is detected on a Priority channel, then a 5-second hang time is applied before Non-Priority scanning is resumed. However, during this time the Priority channels are still being sampled. The hang time is provided to prevent fades from causing big gaps in the audio signals. The transmitter may be keyed at any time during the hang time. The hang time is restarted when the transmitter is unkeyed.

If a carrier (or Channel Guard tone if programmed) is detected on a Priority channel during the sample period, then the channel is immediately switched to the Priority channel, and either the PRI-1 or PRI-2 indicator will turn on. If the carrier is on Priority 1 channel, scanning is stopped until the carrier goes away (plus the five second hang time). If the carrier is on the P2 channel, then P1 is still sampled every 500 milliseconds if no Channel Guard, and every 2.5 seconds if Channel Guard is programmed. If there is no P1 channel, then scanning is stopped until the carrier disappears (+5 seconds). Once a carrier is detected on the P1 channel, the channel is switched to Priority 1 regardless of what is being received on another channel (Non-Priority or P2).

Other Characteristics:

When the microphone is removed from the hookswitch, scanning will stop and revert to the Pre-Scan selected channel if the scan has not stopped on any channel. The scan light will blink. Transmit (if a valid TX frequency is programmed) is possible on the pre-scan channel while off-hook. The channels can be changed during this mode, but when the microphone is returned to the hookswitch, hang time occurs on the pre-scan selected channel.

If a channel has been detected and the radio is hanging on this channel, then scanning stops and the radio will sit on the Received scan channel until the microphone is placed on the hookswitch or scan is disabled by pressing the SCAN button. If the microphone is replaced on the hookswitch scanning will resume five seconds later. Channel changes are allowed until the microphone is replaced in the hookswitch. When scan is disabled, the radio automatically reverts to the Pre-scan selected channel.

When the PTT is pressed, the channel that the scan was hanging on when the microphone was removed from the hookswitch will be the transmit channel. This is the displayed channel. If the PTT is pressed while on-hook and in SCAN, the transmitter is disabled until scan stops on a valid channel or scan is disabled.

Once stopped on a channel and the microphone removed from the hookswitch, the Channel Guard decode function is disabled until the microphone is returned to the hookswitch.

When in the scan mode and the channel display blinks while displaying a channel number, this indicates that one of the scan channels is not locking on frequency (not properly programmed, radio not properly aligned, etc.). Slowly stepping through the channels with scan disabled will reveal the bad channel because the channel display will blink on the bad channel only.

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WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

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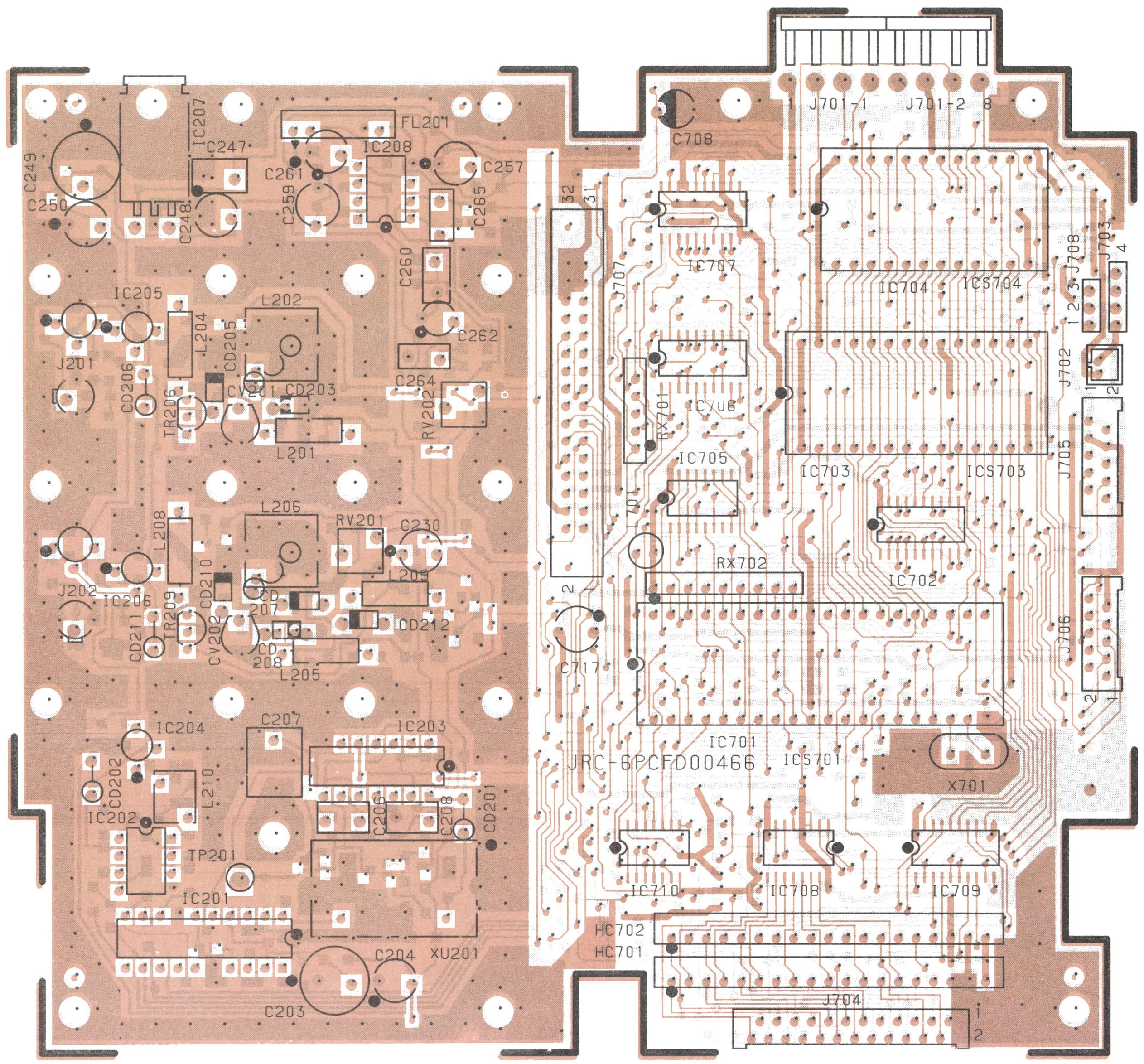
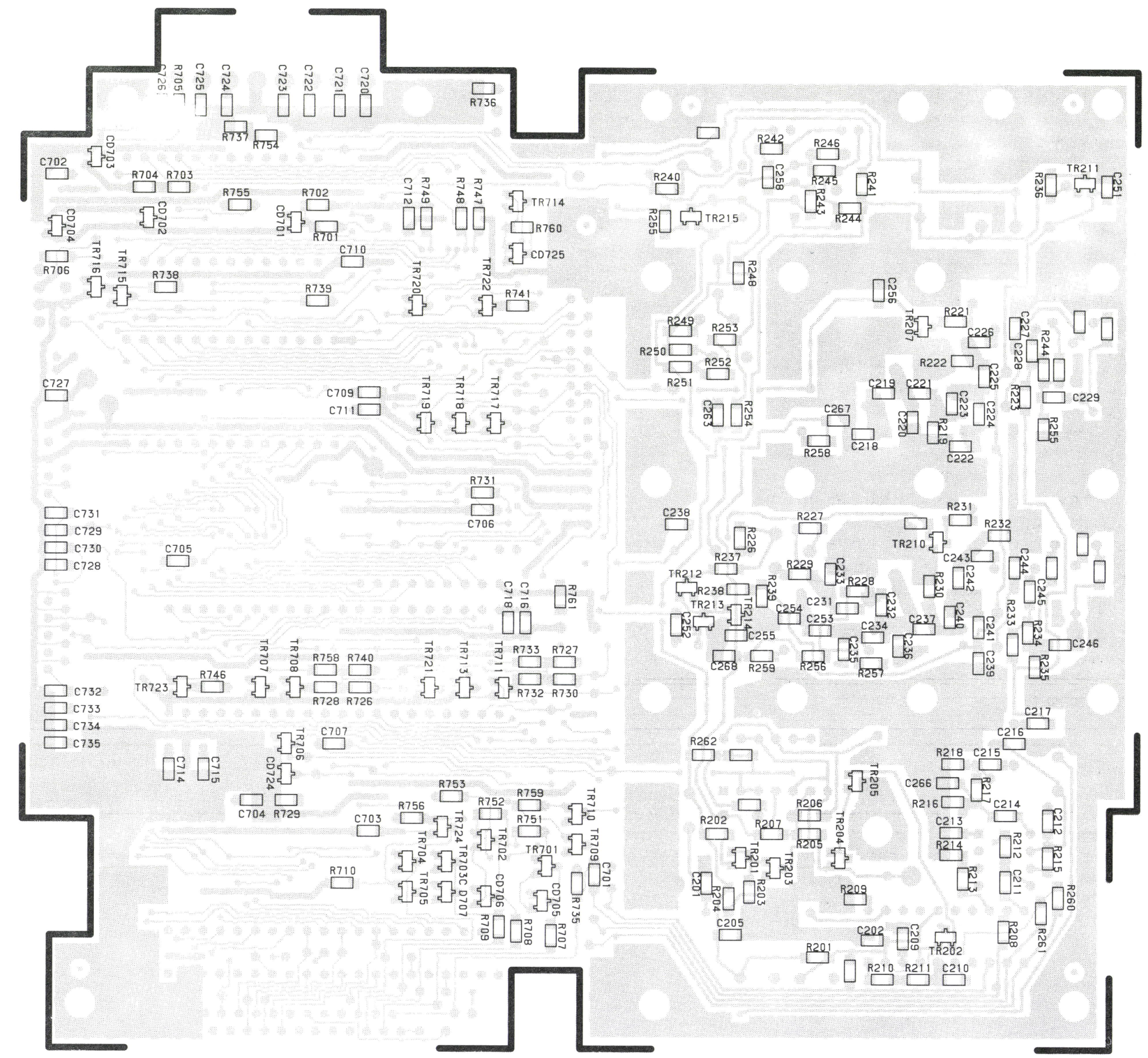
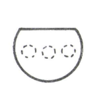
COMPONENT SIDE



SOLDER SIDE

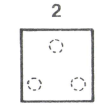


LEAD IDENTIFICATION
FOR TR206, TR209
(TOP VIEW)

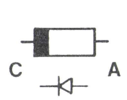


D G S

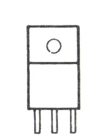
LEAD IDENTIFICATION
FOR RV201, RV202
(TOP VIEW)



LEAD IDENTIFICATION
FOR DIODES
(TOP VIEW)

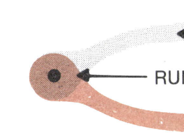


LEAD IDENTIFICATION
FOR IC207
(TOP VIEW)



1: INPUT
2: COMMON
3: OUTPUT

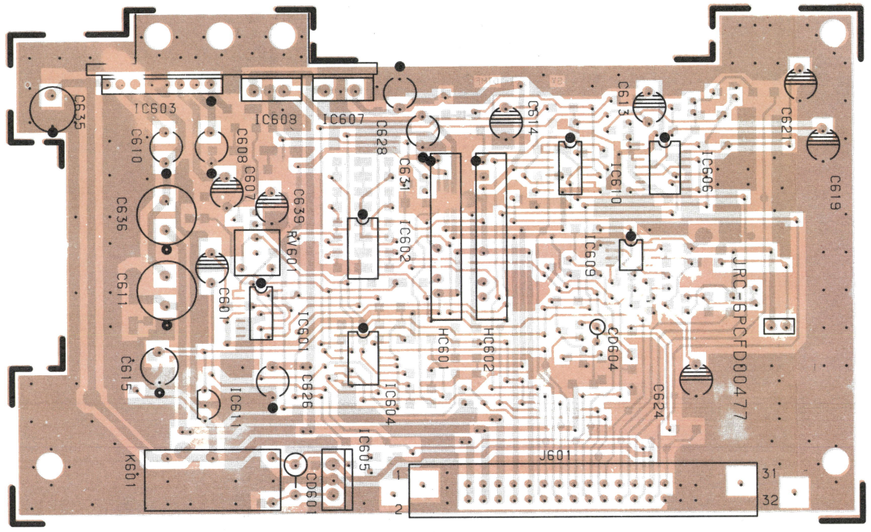
RC-5441



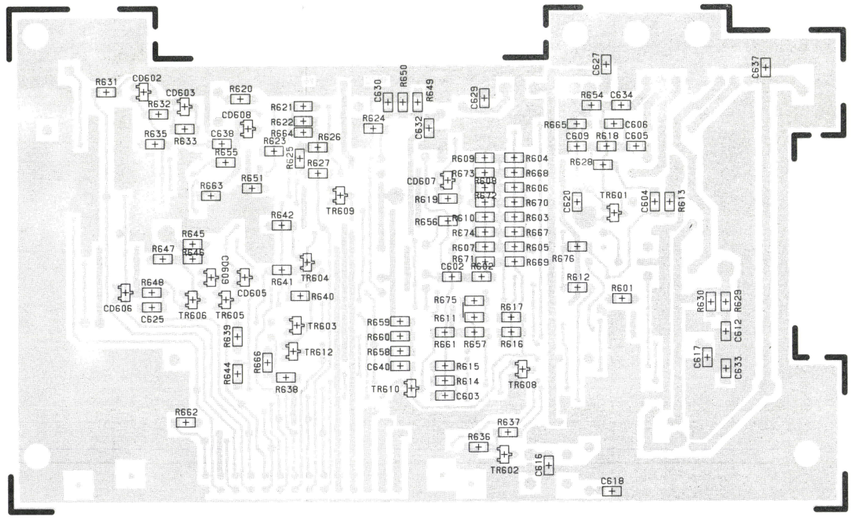
OUTLINE DIAGRAM

System Control 1/
Synthesizer Board
CMC-404

COMPONENT SIDE

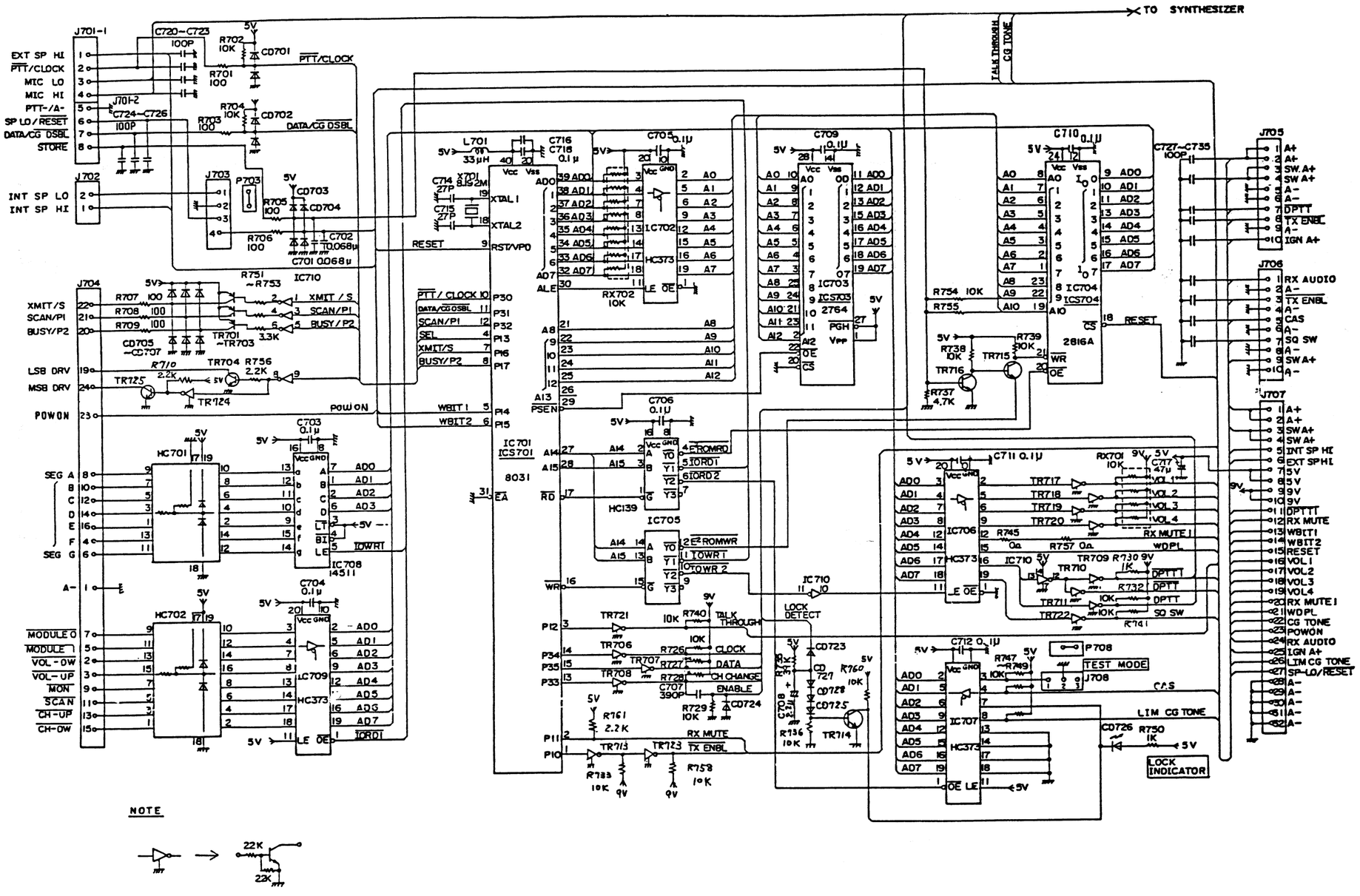


SOLDER SIDE



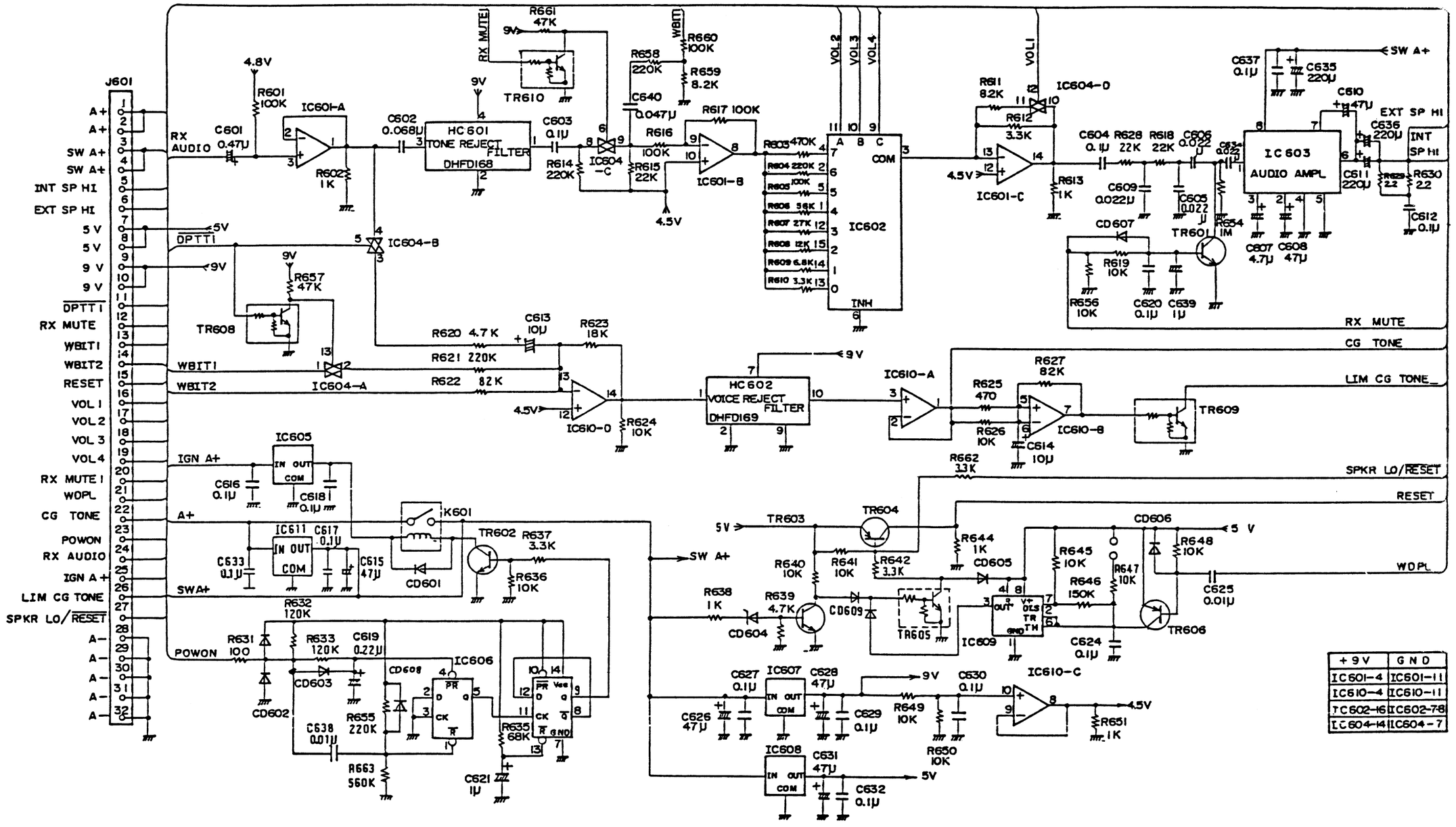
RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE DIAGRAM
Control 2 Board
CMC-405



SCHEMATIC DIAGRAM

System Control 1
CMC-404



+9V	GND
IC601-4	IC601-11
IC610-4	IC610-11
IC602-16	IC602-7,8
IC604-14	IC604-7

SCHEMATIC DIAGRAM

REF OSC
SYNTHESIZER
CURRENT BUFFER
LOOP FILTER
Rx VCO
BUFFER
PRESCALER
FEEDBACK BUFFER
Tx VCO
BUFFER
9V REGULATOR
8V REGULATOR/FILTER
AUDIO PROCESSOR
IC201 MC145159P
IC202 MB501P
IC203 MC14066BCP
IC204 μPC1651G
IC205 μPC1651G
IC206 μPC1651G
IC207 AN6541
IC208-A NJM4558D
IC208-B
TR207 2SC3398
TR210 2SC3398
TR211 2SD596
2SC3398
INCLUDED 2 RESISTORS
Rx INJECTION
Tx INJECTION

SCHEMATIC DIAGRAM

403-420 MHz
Synthesizer

REF OSC
SYNTHESIZER
CURRENT BUFFER
LOOP FILTER
Rx VCO
BUFFER
PRESCALER
FEEDBACK BUFFER
Tx VCO
BUFFER
AUDIO PROCESSOR
9V REGULATOR
8V REGULATOR / FILTER

IC201 MC145159P
IC202 MB501P
IC203 MC14066BCP
IC204 μPC1651G
IC205 μPC1651G
IC206 μPC1651G
IC207 AN6541
IC208-A NJM4558D
IC208-B

Rx INJECTION
Tx INJECTION

2SC3398
INCLUDED 2 RESISTORS

SCHEMATIC DIAGRAM

450-470 MHz
Synthesizer

PARTS LIST

SYSTEM CONTROL 1/SYNTHESIZER BOARD
CMC-404A (403-420 MHz)
CMC-404B (450-470 MHz)
ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C201 and C202	JRC/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C203	JRC/5CEAA01829	Electrolytic: 470 uF ±20%, 10V.
C204	JRC/5CEAA01982	Electrolytic: 47 uF ±20%, 16V.
C205	JRC/5CAAD01131	Ceramic: 0.047 uF ±10%, 25V.
C206	JRC/5CRAA00613	Metallized Plastic: 0.047 uF ±5%, 50V.
C207	JRC/5CRAA00471	Metallized Plastic: 1.0 uF ±5%, 50V.
C208	JRC/5CRAA00576	Metallized Plastic: 0.1 uF ±5%, 50V.
C209	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 50V, temp coef ±60 PPM.
C210	JRC/5CAAD00788	Ceramic: 680 pF ±5%, 50 VDCW, temp coef ±60 PPM.
C211	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C212	JRC/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C213 thru C217	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW.
C219	JRC/5CAAD00822	Ceramic: 8 pF +0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in CMC-404A).
C219	JRC/5CAA00977	Ceramic: 7 pF +0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in CMC-404B).
C221	JRC/5CAAD00785	Ceramic: 10 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C222	JRC/5CAAD00782	Ceramic: 1000 pF ±5% pF, 50 VDCW, temp coef +350 -1000 PPM.
C223 and C224	JRC/5CAAD00800	Ceramic: 5 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C225	JRC/5CAAD00795	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C226	JRC/5CAAD00796	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C227 and C229	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000.
C230	JRC/5CEAA01827	Electrolytic: 100 uF ±20%, 16 V.
C231 and C232	JRC/5CAAD00795	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C233	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000.
C235	JRC/5CAAD00822	Ceramic: 8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in CMC-404A).
C235	JRC/5CAAD00977	Ceramic: 7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in CMC-404B).
C236	JRC/5CAAD00795	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in CMC-404A).
C237	JRC/5CAAD00785	Ceramic: 10 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C238	JRC/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 V.
C239	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C240 and C241	JRC/5CAAD00800	Ceramic: 5 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C242	JRC/5CAAD00795	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C243	JRC/5CAAD00796	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C244 thru C246	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C247	JRC/5CRAA00576	Metallized Plastic: 0.1 uF ±5%, 50 V.
C248	JRC/5CEAA01827	Electrolytic: 100 uF ±20%, 16 V.
C249	JRC/5CEAA01829	Electrolytic: 470 uF ±20%, 16 V.
C250	JRC/5CEAA01827	Electrolytic: 100 uF ±20%, 16 V.
C251	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C256	JRC/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 V.
C257	JRC/5CEAA01982	Electrolytic: 47 uF ±20%, 16 V.
C258	JRC/5CAAD00789	Ceramic: 0.01 uF ±10%, 50 V.
C259	JRC/5CEAA01982	Electrolytic: 47 uF ±20%, 16 V.
C260	JRC/5CRAA00576	Metallized Plastic: 0.1 uF ±5%, 50 V.
C261	JRC/5CEAA01982	Electrolytic: 47 uF ±20%, 16 V.
C262	JRC/5CEAA01864	Electrolytic: 10 uF ±20%, 25 V.
C263	JRC/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 V.
C264	JRC/5CRAA00583	Polyester: 0.01 uF ±10%, 50 V.
C265	JRC/5CRAA00721	Polyester: 0.001 uF ±5%, 50 V.
C266	JRC/5CAAD00796	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C267 and C268	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C701	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C703 thru C706	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C707	JRC/5CAAD00786	Ceramic: 390 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C708	JRC/5CSAC00360	Tantalum: 2.2 uF ±20%, 35 V.
C709	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C714 and C715	JRC/5CAAD00793	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C716	JRC/5CAAD01237	Ceramic: 0.1 uf ±10%, 25 VDCW, temp coef ±15%.
C717	JRC/5CAAD01981	Electrolytic: 47 uF ±20%, 16 V.
C718	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C720 thru C735	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
CV201 and CV202	JRC/5CVAC00112	Variable: 2 pF max.
		- - - - - - - - - - DIODES - - - - - - - - - -
CD201	JRC/5TXAE00587	Zener 4.0 V; sim to Hitachi HZ4B3.
CD202	JRC/5TXAE00566	Zener 3.0 V; sim to Hitachi HZ3B2.
CD203	JRC/5TXAE00453	Silicon epitaxial planar: sim to Hitachi 1SV136.
CD205	JRC/5TXAA00326	Silicon. Schottky Barrier: sim to NEC 1SS97.
CD206	JRC/5TXAE00566	Zener 3.0 V; sim to Hitachi HZ3B2.
CD207 and CD208	JRC/5TXAE00453	Silicon epitaxial planar: sim to Hitachi 1SV136.
CD210	JRC/5TXAA00326	Silicon. Schottky Barrier: sim to NEC 1SS97.
CD211	JRC/5TXAE00566	Zener 3.0 V; sim to Hitachi HZ3B2.
CD701 thru CD703	JRC/5TXAD00320	Silicon, fast recovery (2 diodes in series): sim to Toshiba 1SS226.
CD705 thru CD707	JRC/5TXAD00320	Silicon, fast recovery (2 dioes in series): sim to Toshiba 1SS226.
CD724 thru CD725	JRC/5TXAD00290	Silicon, fast recovery (2 dioes in cathode common): sim to Toshiba 1SS184.
		- - - - - - - - - - HYBRID CIRCUITS - - - - - - - - - -
HC701 and HC702	JRC/6DHFD00177	Noise killer: sim to JRC DHFD177.
		- - - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - - -
IC201	JRC/5DAAJ00328	Synthesizer: C MOS serial input.
IC202	JRC/5DAAT00206	Prescaler: sim to Fujitsu MB501P.
IC203	JRC/5DAAJ00359	Digital, Bilateral switch: sim to Motorola MC14066.
IC204 thru IC206	JRC/5DAAA00171	RF wode band amplifier: sim to NEC UPC 1651G.
IC207	JRC/5DAAR00021	Linear, Positive Voltage Regulator: sim to Matsushita AN6541.
IC208	JRC/5DAAF00027	Linear, Dual, OP AMP: sim to 4558 type.
IC701	JRC/5DDAK00326	Microcomputer (HMOS, 8 Bit), sim to Intel TP8031AH.
IC702	JRC/5DAAJ00455	Digital: Octal Transparent Latch, sim to Motorola MC74HC373F.
IC703	JRC/5DDAK00329	EPROM, sim to Intel TD2764A.
IC704	JRC/5DDBY00035	EEPROM, sim to Xicor X2816BP-C6396.
IC705	JRC/5DAAJ00456	Digital: Dual 1-05-4 Decoder; sim to Motorola MC74HC139F.
IC706 and IC707	JRC/5DAAJ00455	Digital: Octal Transparent Latch, sim to Motorola MC74HC373F.
IC708	JRC/5DAAJ00457	Digital: BCD-to-7 Segment Latch/Decoder/Driver, sim to Motorola MC14511BF.
IC709	JRC/5DAAJ00455	Digital: Octal Transparent Latch, sim to Motorola MC74HC373F.
IC710	JRC/5DAAJ00458	Digital: Hex Inverter, sim to Motorola MC74HC04F.
ICS701	JRC/5ZJAB00029	IC Socket: 40 pin.
ICS703	JRC/5ZJAB00028	IC Socket: 28 pin.
ICS704	JRC/5JZAB00027	IC Socket: 24 pin.
		- - - - - - - - - - JACKS - - - - - - - - - -
J201 and J202	JRC/5JDAX0009	Connector, RF.
J701-1 and J701-2	JRC/5JWCU00093	Connector: 4 pin.
J702	JRC/5JWAD00121	Connector: 2 pin.
J703	JRC/5JTCA00259	Connector: 4 pin.
J704	JRC/5JWBS00182	Connector: 24 pin.
J705 and J706	JRC/5JWBS00178	Connector: 10 pin.
J707	JRC/5JDAA00987	Connector: 32 pin.
J708	JRC/5JTCA00137	Connector: 3 pin.
		- - - - - - - - - - COILS - - - - - - - - - -
L201	JRC/5LCAC00165	Choke Coil, 0.22 uH ±20%.
L202	JRC/6LAFD01244	Coil, RF. (Used in CMC-404A).
L202	JRC/6LAFD01242	Coil, RF. (Used in CMC-404B).
L204 and L205	JRC/5LCAC00165	Choke Coil, 0.22 uH ±20%.
L206	JRC/6LAFD01245	Coil, RF. (Used in CMC-404A).
L206	JRC/6LAFD01243	Coil, RF. (Used in CMC-404B).
L208	JRC/5LCAC00165	Choke Coil, 0.22 uH ±20%.
L210	JRC/6LAFD01241	Coil, RF.
L710	JRC/5LCAB00004	Choke Coil, 33 uH; sim to Sony LF1-330K.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
P703 and P708	JRC/5JDAN00012	Short plug: 2 pin.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R201	JRC/5REAG00619	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 W.
R202	JRC/5REAG00591	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 W.
R203	JRC/5REAG00573	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 W.
R204	JRC/5REAG00619	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 W.
R205	JRC/5REAG00630	Metal film: 150K ohms ±5%, 200 VDCW, 1/8 W.
R206	JRC/5REAG00577	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 W.
R207	JRC/5REAG00589	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 W.
R208	JRC/5REAG00619	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 W.
R209	JRC/5REAG00631	Metal film: 220K ohms ±5%, 200 VDCW, 1/8 W.
R210	JRC/5REAG00592	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 W.
R211	JRC/5REAG00577	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 W. (Used in CMC-404A0.
R211	JRC/5REAG00589	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 W. (Used in CMC-404B).
R212	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
R213 and R214	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R219	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R221	JRC/5REAG00621	Metal film: 68 ohms ±5%, 200 VDCW, 1/8 W.
R222	JRC/5REAG00580	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 W.
R223	JRC/5REAG00597	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 W.
R224	JRC/5REAG00618	Metal film: 15 ohms ±5%, 200 VDCW, 1/8 W.
R225	JRC/5REAG00597	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 W.
R226	JRC/5REAG00573	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 W.
R227	JRC/5REAG00630	Metal film: 150K ohms ±5%, 200 VDCW, 1/8 W.
R228	JRC/5REAG00581	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W.
R229	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R230	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R231	JRC/5REAG00621	Metal film: 68 ohms ±5%, 200 VDCW, 1/8 W.
R232	JRC/5REAG00580	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 W.
R233	JRC/5REAG00597	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 W.
R234	JRC/5REAG00618	Metal film: 15 ohms ±5%, 200 VDCW, 1/8 W.
R235 and R236	JRC/5REAG00597	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 W.
R240 and R241	JRC/5REAG00591	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 W.
R242	JRC/5REAG00574	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 W.
R243	JRC/5REAG01001	Metal film: 560K ohms ±5%, 200 VDCW, 1/8 W.
R244	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R245	JRC/5REAG00573	Metal film: 4.7 ohms ±5%, 200 VDCW, 1/8 W.
R246	JRC/5REAG00625	Metal film: 5.6K ohms ±5%, 200 VDCW, 1/8 W.
R248	JRC/5REAG00585	Metal film: 1.2K ohms ±5%, 200 VDCW, 1/8 W.
R249	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R250	JRC/5REAG00682	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 W.
R251	JRC/5REAG00626	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 W.
R252	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R253	JRC/5REAG00585	Metal film: 1.2K ohms ±5%, 200 VDCW, 1/8 W.
R254	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R255	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R257	JRC/5REAG00619	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 W.
R258 and R259	JRC/5REAG00590	Metal film: < or = 50 Meg ohms.

SYMBOL	PART NO.	DESCRIPTION
R260 and R261	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R262	JRC/5REAG00575	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W.
RV201 and RV202	JRC/5RVAB00279	Variable: 10K ohms ±30%, 0.1 W.
R701	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R702	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R703	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R704	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R705	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R707 and R708	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R709	JRC/5REAG00621	Metal film: 68 ohms ±5%, 200 VDCW, 1/8 W.
R710	JRC/5REAG00575	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R729	JRC/5REAG00581	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W.
R730	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R731	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
R732	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R733 and R735	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R736	JRC/5REAG00683	Metal film: 39K ohms ±5%, 200 VDCW, 1/8 W.
R737	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
R738 thru R741	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R747 thru R749	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R751 thru R753	JRC/5REAG00589	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 W.
R754 and R755	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R756	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
R758	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R759	JRC/5REAG00624	Metal film: 3.9K ohms ±5%, 200 VDCW, 1/8 W.
R760	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R761	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
RX701	JRC/5RZAB00133	Quad resister array: 10K ohms ±5%, 200 VDCW, 1/8 W.
RX702	JRC/5RZAB00136	Octal resister array: 10K ohms ±5%, 200 VDCW, 1/8 W.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
TR201 thru TR205	JRC/5TBAB00055	Silicon, PNP: sim to NEC 2SB624 (BV3).
TR206	JRC/5TKAH00002	N-channel, field effect. (MOS Single Gate): sim to Sony 2 SK125.
TR207	JRC/5TCAZ00011	Silicon NPN: sim to Sanyo 2SC3398.
TR209	JRC/5TKAH00002	N-channel, field effect. (MOS Single Gate): sim to Sony 2 SK125.
TR210	JRC/5TCAZ00011	Silicon, NPN: sim to Sanyo 2SC3398.
TR211	JRC/5TDAB00054	Silicon, NPN: sim to NEC 2SD596 (DV3).
TR215	JRC/5TDAB00054	Silicon, NPN: sim to NEC 2SD596-T1 (DV3).
TR701 thru TR703	JRC/5TBAB00055	Silicon, PNP: sim to NEC 2SB624 (BV3).
TR704 and TR705	JRC/5TDAB00054	Silicon, NPN: sim to NEC 2SD596-T1 DV3.

SYMBOL	PART NO.	DESCRIPTION
TR706 thru TR708	JRC/5TCAZ00007	Silicon, NPN: sim to Sanyo 2SC3396TB.
TR709	JRC/5TCAZ00011	Silicon, NPN: sim to Sanyo 2SC3398TB.
TR710	JRC/5TDAB00054	Silicon, NPN: sim to NEC 2SD596-T1 DV3.
TR711	JRC/5TDAB00054	Silicon, NPN: sim to Sanyo 2SC3398TB.
TR712 and TR713	JRC/5TCAZ00007	Silicon, NPN: sim to Sanyo 2SC3396TB.
TR714	JRC/5TDAB00055	Silicon, NPN: sim to NEC 2SB624.
TR715 and TR716	JRC-5TDAB00054	Silicon, NPN; sim to NEC 2SC596-T1 DV3.
TR717 thur TR724	JRC/5TCAZ00007	Silicon, NPN: sim to Sanyo 2SC3396TB.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
XU201	JRC/6XNFD00017	Crystal Oscillator (Standard 5 PPM).
XU201	JRC/6XNFD00016	Crystal Oscillator (Option 2.5 PPM).
X701	JRC/5XHAA00817	Quartz crystal: 8.192 MHz.

PARTS LIST

SYSTEM CONTROL 2 BOARD
CMC-405

ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C601	JRC/5CSAC00825	Tantalum: 0.47 uF, 34V.
C602	JRC/5CAAD01201	Ceramic: 0.068 uF ±10%, 25 VDCW, temp coef ±15%.
C603 and C604	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C605 and C606	JRC/5CAAD01273	Ceramic: 0.022 uF ±10%, 25 VDCW, temp coef ±15%.
C607	JRC/5CEAA00323	Tantalum: 10 uF, ±20%, 35V.
C608	JRC/5CEAA01981	Electrolytic: 47 uF, ±20%, 16V.
C609	JRC/5CAAD01273	Ceramic: 0.022 uF ±10%, 25 VDCW, temp coef ±15%.
C610	JRC/5CEAA01981	Electrolytic: 47 uF, ±20%, 16V.
C611	JRC/5CEAA01662	Electrolytic: 220 uF, ±20%, 16V.
C612	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C613 and C614	JRC/5CSAC00323	Tantalum: 10 uF, ±20%, 35V.
C615	JRC/5CEAA01981	Electrolytic: 47 uF, ±20%, 16V.
C616 thru C618	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C619	JRC/5CSAC00796	Tantalum: 1 uF ±20%, 35V.
C620	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C621	JRC/5CSAC00796	Tantalum: 1 uF, ±20%, 35V.
C624	JRC/5CSAC00360	Tantalum: 2.2 uF ±10%, 35V, temp coef ±15%.
C625	JRC/5CAAD01020	Ceramic: 3300 pF ±10%, 50 VDCW, temp coef ±15%.
C626	JRC/5CEAA01897	Electrolytic: 47 uF, ±20%, 25V.
C627	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C628	JRC/5CEAA01981	Electrolytic: 47 uF, ±20%, 16V.
C629 and C630	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C631	JRC/5CEAA01981	Electrolytic: 47 uF, ±20%, 16V.
C632 and C633	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C634	JRC/5CAAD01273	Ceramic: 0.022 uF ±10%, 25 VDCW, temp coef ±15%.
C635	JRC/5CEAA01844	Electrolytic: 220 uF, ±20%, 25V.
C636	JRC/5CEAA01662	Electrolytic: 220 uF, ±20%, 16V.
C637 and C638	JRC/5CAAD01237	Ceramic: 0.1 uF ±10%, 25 VDCW, temp coef ±15%.
C639	JRC/5CSAC00322	Tantalum: 4.7 uF, ±20%, 35V.
C640	JRC/5CAAD01204	Ceramic: 0.04 uF ±10%, 25 VDCW, temp coef ±15%.
		- - - - - - - - - - DIODES - - - - - - - - - -
CD601	JRC/5TXAN00065	Silicon: fwd current 1A, 400 PIV; sim to Sanken EM-1.
CD602	JRC/5TXAD00320	Silicon, fast recovery (2 diodes in series): sim to Toshiba 1SS226.
CD603	JRC/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common): sim to Toshiba 1SS184.
CD604	JRC/5TXAE00172	Zener 8V 1/2 W: sim to Hitachi HZ92A-2.
CD605 thru CD608	JRC/5TXAD00290	Silicon, fast recovery (2 diodes in cathode common): sim to Toshiba 1 SS184.

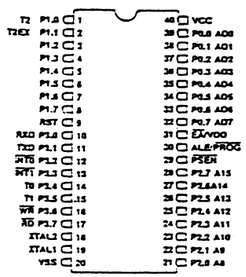
SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - HYBRID CIRCUIT - - - - - - - - - -
HC601	JRC/6DHFD00168	Filter: sim to MURATA DHFD168.
HC602	JRC/6DHFD00169	Filter: sim to MURATA DHFD169.
		- - - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - - -
IC601	JRC/5DAAN00162	Linear, Quad OPAMP: sim to NJRC NJM2902M.
IC602	JRC/5DAAJ00407	Digital, 8-Chanel Analog Multiplexer: sim to Motorola MC14051BF.
IC603	JRC/5DAAJ00246	Linear, Audio Amplifier: sim to NEC UPC1242H.
IC604	JRC/5DAAJ00408	Digital, Bilateral Switch: sim to Motorola MC14C66BF.
IC605	JRC/5DAAN00219	Linear, Positive Voltage Regulator: sim to NJRC NJM7806A.
IC606	JRC/5DAAJ00409	Digital, Dual D-type Flip-Flop: sim to Motorola MC74HC74F.
IC607	JRC/5DAAR00021	Linear, Positive Voltage Regulator: sim to Matushita AN6541.
IC608	JRC/5DAAD00082	Linear, Positive Voltage Regulator: sim to Toshiba TA78005AP.
IC609	JRC/5DAAN00269	Linear, Timer: sim to NJRC NJM555M.
IC610	JRC/5DAAN00162	Linear, Quad OP AMP: sim to NJRC NJM2902M.
IC611	JRC/5DAAN00046	Linear, Positive Voltage Regulator: sim to NJRC NJM78L05A.
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J601	JRC/5JDAA00990	Connector 32 pin.
		- - - - - - - - - - - RELAYS - - - - - - - - - - -
K601	JRC/5KLAC00091	Relay 6 VDC 3A: sim to Takamizawa JY6H-K.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R601	JRC/5REAG00587	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 W.
R602	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R603	JRC/5REAG00633	Metal film: 680K ohms ±5%, 200 VDCW, 1/8 W.
R604	JRC/5REAG00588	Metal film: 270K ohms ±5%, 200 VDCW, 1/8 W.
R605	JRC/5REAG00630	Metal film: 150K ohms ±5%, 200 VDCW, 1/8 W.
R606	JRC/5REAG00627	Metal film: 56K ohms ±5%, 200 VDCW, 1/8 W.
R607	JRC/5REAG00626	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 W.
R608	JRC/5REAG00577	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 W.
R609	JRC/5REAG00623	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 W.
R610	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R611	JRC/5REAG00623	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 W.
R612 and R613	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R614	JRC/5REAG00631	Metal film: 220K ohms ±5%, 200 VDCW, 1/8 W.
R615	JRC/5REAG00581	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W.
R616 and R617	JRC/5REAG00627	Metal film: 56K ohms ±5%, 200 VDCW, 1/8 W.
R618	JRC/5REAG00581	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W.
R619	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R620	JRC/5REAG00682	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 W.
R621	JRC/5REAG00631	Metal film: 220K ohms ±5%, 200 VDCW, 1/8 W.
R622	JRC/5REAG00897	Metal film: 180K ohms ±5%, 200 VDCW, 1/8 W.
R623	JRC/5REAG00682	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 W.
R624	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R625	JRC/5REAG00579	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 W.
R626	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R627	JRC/5REAG00879	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 W.

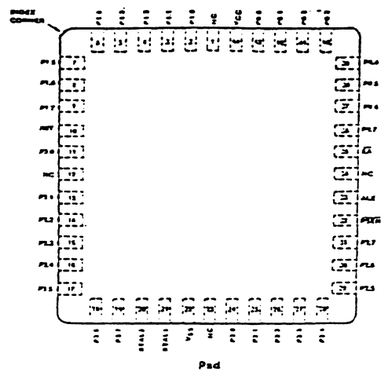
SYMBOL	PART NO.	DESCRIPTION
R628	JRC/5REAG00581	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W.
R629 and R630	JRC/5REAG00613	Metal film: 2.2 ohms ±5%, 200 VDCW, 1/8 W.
R631	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R632 and R633	JRC/5REAG00592	Metal film: 120K ohms ±5%, 200 VDCW, 1/8 W.
R635	JRC/5REAG00628	Metal film: 68K ohms ±5%, 200 VDCW, 1/8 W.
R636	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R637	JRC/5REAG00589	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 W.
R638	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R639	JRC/5REAG00573	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 W.
R640 and R641	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R642	JRC/5REAG00589	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 W.
R644	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R645	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8W.
R646	JRC/5REAG00592	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 W.
R647 thru R650	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R651	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R654	JRC/5REAG00772	Metal film: 1M ohms ±5%, 200 VDCW, 1/8 W.
R655	JRC/5REAG00631	Metal film: 220K ohms ±5%, 200 VDCW, 1/8 W.
R656	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R657	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R658	JRC/5REAG00897	Metal film: 180K ohms ±5%, 200 VDCW, 1/8 W.
R659	JRC/5REAG00587	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 W.
R660	JRC/5REAG00630	Metal film: 150K ohms ±5%, 200 VDCW, 1/8 W.
R661	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R663	JRC/5REAG01001	Metal film: 560K ohms ±5%, 200 VDCW, 1/8 W.
R664	JRC/5REAG00897	Metal film: 180K ohms ±5%, 200 VDCW, 1/8 W.
R665	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
R666	JRC/5REAG00584	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 W.
R669	JRC/5REAG01000	Metal film: 390K ohms ±5%, 200 VDCW, 1/8 W.
R670	JRC/5REAG00897	Metal film: 180K ohms ±5%, 200 VDCW, 1/8 W.
R671	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R675	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
RV601	JRC/5RVAB00278	Variable: 20K ohms ±30%, 0.1 W.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
TR601 thru TR603	JRC/5TDAB00054	Silicon, NPN: sim to NEC 2SD596 (DV3).
TR604	JRC/5TDAB00055	Silicon, NPN: sim to NEC 2SB624 (BV3).
TR605	JRC/5TCAZ00007	Silicon, NPN: sim to Sanyo 2SC0096TB.
TR606	JRC/5TDAB00055	Silicon, NPN: sim to NEC 2SB624 (BV3).
TR608 thru TR610	JRC/5TCAZ00007	Silicon, NPN: sim to Sanyo 2SC3396TB.
TR612	JRC/5TCAZ00007	Silicon, NPN: sim to Sanyo 2SC3396TB.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

MICROPROCESSOR

IC701





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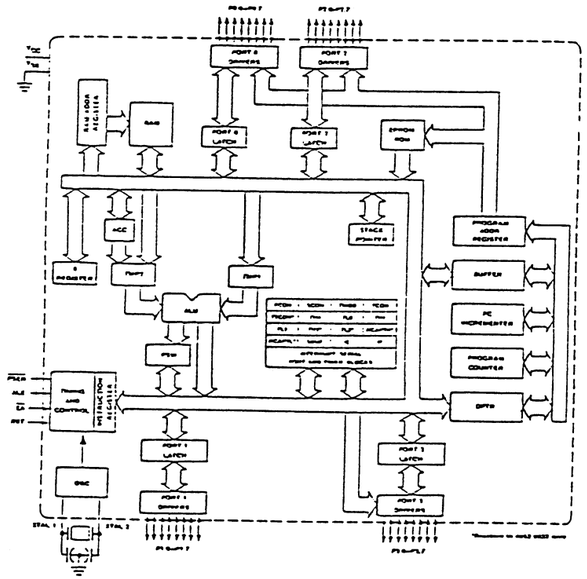

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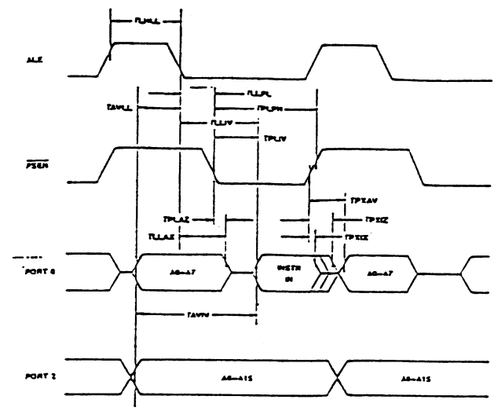

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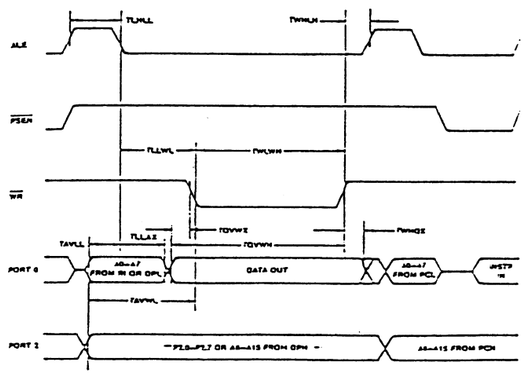

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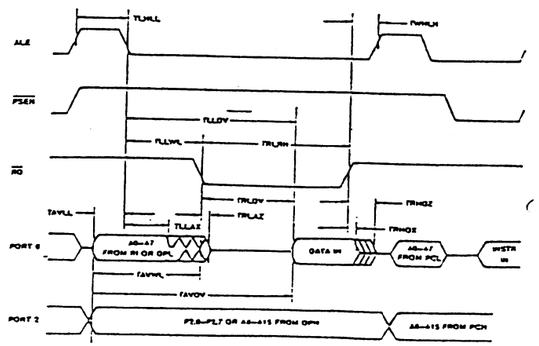
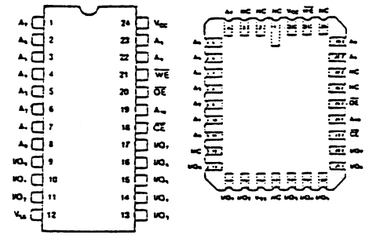


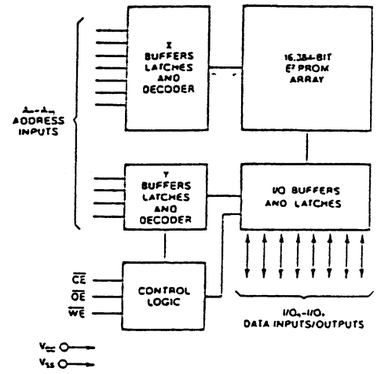
16K Electrically Erasable PROM 2048 x 8 Bit

IC704

PIN CONFIGURATIONS



FUNCTIONAL DIAGRAM



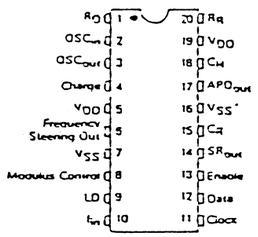
PIN NAMES

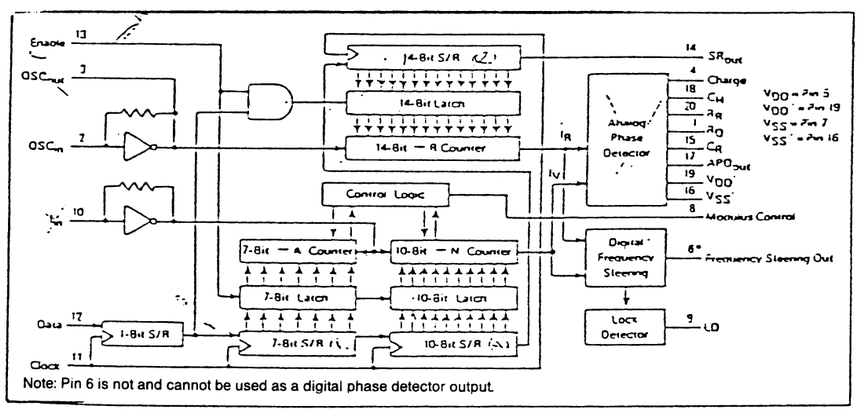
A_0–A_{10}	Address Inouts
I/O_0–I/O_7	Data Input/Output
$\overline{WE}$	Write Enable
$\overline{CE}$	Chip Enable
$\overline{OE}$	Output Enable
V_{CC}	+5V
V_{SS}	Ground
NC	No Connect

RC-5443

PLL MODULE
(IC201)

PIN ASSIGNMENT

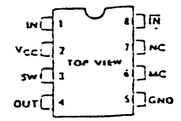




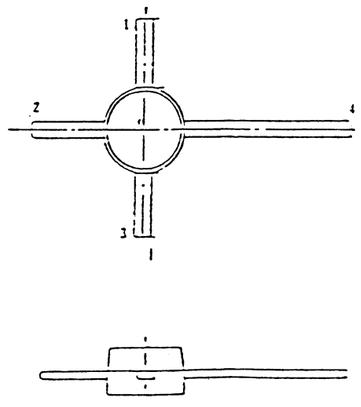
Note: Pin 6 is not and cannot be used as a digital phase detector output.

MODULUS PRESCALER
(IC202)

PIN ASSIGNMENT



OP-AMPS
(IC205 & IC206)



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