MAINTENANCE MANUAL
SYNTHESIZER BOARD B19/CMG-185

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DESCRIPTION

The frequency synthesizer generates the transmitter output frequency and the receiver first mixer injection frequency. The synthesizer board (CMG-1 85) mounts in the top section of the frame assembly as shown in Figure 1.

CIRCUIT ANALYSIS

The frequency synthesizer circuit (Figure 2 and schematic diagram) consists of reference oscillator XU201, synthesizer chip IC201, dual-modulus prescaler IC204, RX and Tx Voltage Controlled Oscillators (VCOs) TR203 and TR209, a loop filter and associated circuitry.

REFERENCE OSCILLATOR

Reference oscillator XU201 operates at a frequency of 13.2 MHz and is temperature compensated to provide a frequency stability of ±1.5 ppm. Voltage for the oscillator is supplied by 9-volt regulator IC209 and 4-volt Zener diode CD201. The oscillator output is applied to synthesizer chip IC201 -2.

SYNTHESIZER

Synthesizer IC201 (Figure 3) consists of a Programmable R counter, phase detector, and programmable VCO dividers (N and A).

When the microcontroller desires to change transmit or receive frequencies, new frequency data is received on the CLOCK, DATA, and ENABLE lines. The synthesizer immediately begins generating the new frequency.

The serial data (DATA line) sets the internal VCO dividers which determines the VCO frequency. The reference oscillator frequency applied to the programmable reference oscillator divider (R counter) is divided down to a lower frequency determined by the input data. The lower frequency output is 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 prescaler and the programmable VCO dividers.

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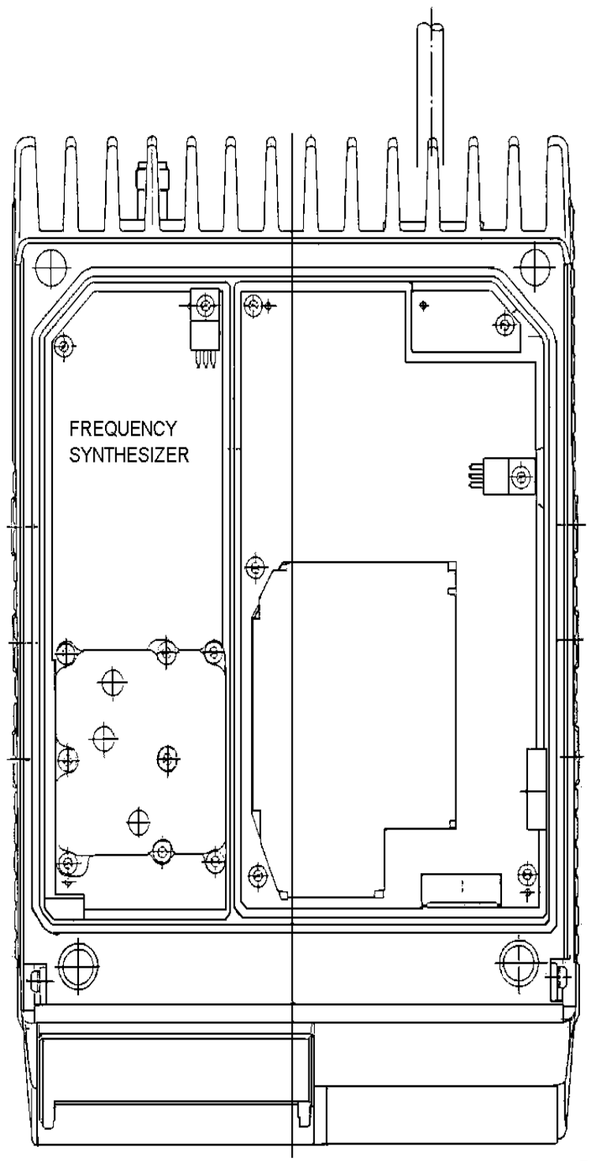


Figure 1 - Synthesizer Location (Top View)

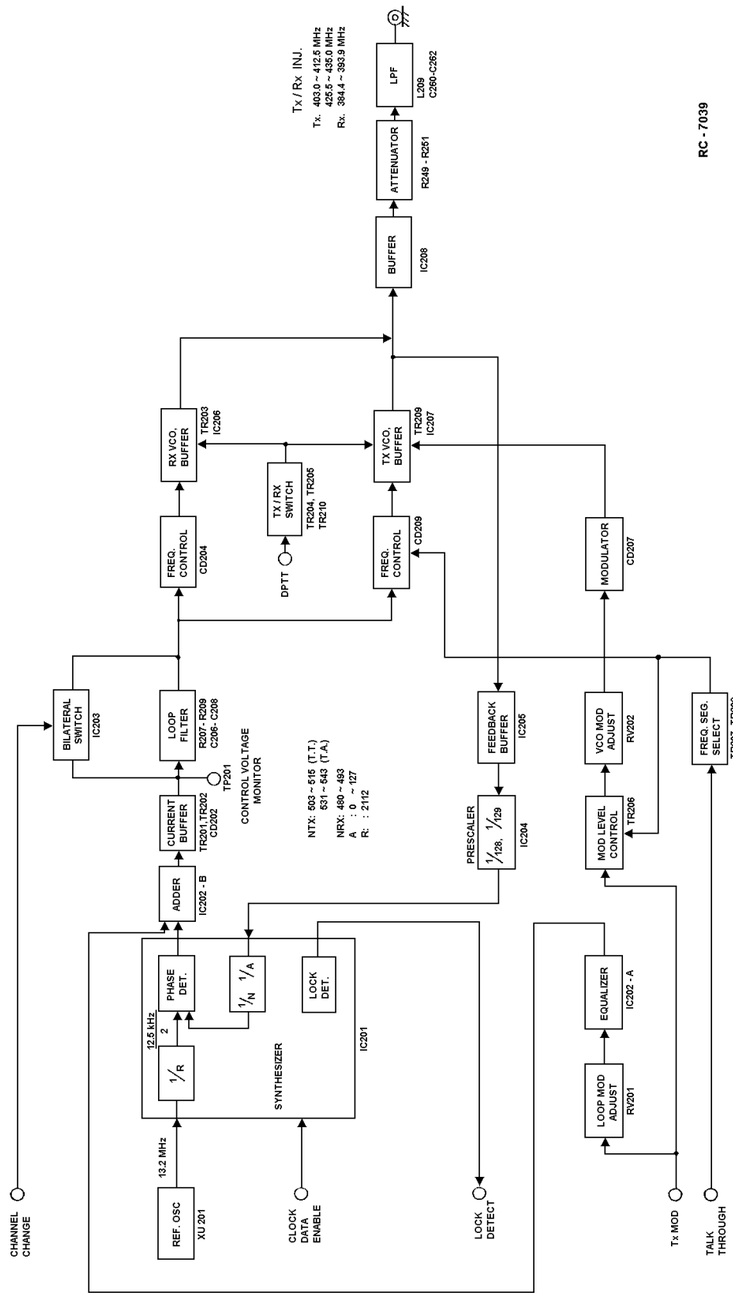


Figure 2 - Synthesizer Block Diagram

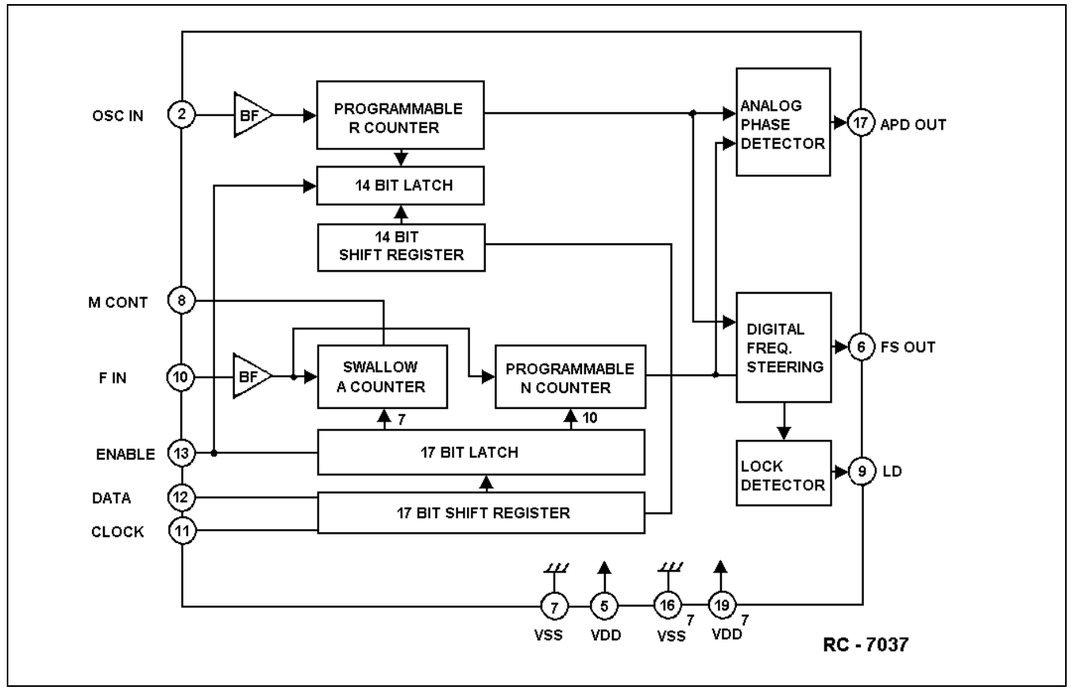


Figure 3 - Synthesizer IC201

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 and 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 status information to the microcontroller. When the PLL is out of lock, the LOCK DETECT line is low. When locked on frequency, the line is high.

EQUALIZER

The equalizer (see schematic diagram) consisting of IC202-A, R21 8, R21 9, and C220, receives transmit audio from LOOP MOD adjust RV201 and provides the required audio level. The output of the equalizer (LOOP MOD) is summed with the output signal from the phase detector (BIAS) by adder IC202-B

DC OFFSET AND HIGH-CURRENT BUFFERS

DC offset buffers TR201, TR202, and CD202 (see schematic diagram) receive the error voltage from the equalizer 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 OUT) rises or falls turning TR201 on or off. Transistor TR201 controls the dc offset buffer (TR202 and CD202). Resistors R206, R208, and R209 provide a high-current, rapid-charge path between the + 9 volt supply and C206 and C208. Transistor TR202 and CD202 provide a rapid discharge path for the capacitors.

As the error voltage decreases, transistors TR201 and TR202 turn on completing a discharge path for C206 thru C208 through bilateral switches IC203. When the error voltage goes positive TR201, TR202, and CD202 are turned off, allowing C206 thru C208 to charge through R206. IC203 is turned on for 15 milliseconds when a channel is changed.

LOOP FILTER

The loop filter (see schematic diagram) consists of R207 thru R209 and C206 thru C208. This filter controls the bandwidth and stability of the synthesizer loop.

Bilateral switch IC203 is controlled by the 4 millisecond, 9 volt channel change (CH. CHANGE) pulse. When the channel change pulse is present, the bilateral switch shorts out the low-pass filter, 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 VCOs to adjust or correct the VCO frequency.

RECEIVE VCO

The receiver VCO (see schematic diagram) consists of a low-noise JFET oscillator (TR203) followed by high-gain buffer IC206. This buffer prevents external loading and improves power gain.

The VCO is a Colpitts oscillator with varactor C225 and L203 forming the tank circuit. Variable capacitor CV201 allows manual adjustment of the VCO across the frequency split. The VCO operates over a frequency range of 384.4 to 393.9 MHz.

The VCO switches on and off under control of the DPTT line. When the DPTT line is low, the receiver VCO is turned on (TR204 is off and TR205 is on). Buffer IC206 provides a typical output of +5 dBm.

TRANSMIT VCO

The transmit VCO (TR209) is basically the same as the receiver VCO. The wide band VCO allows frequency separation of 45 MHz as determined by the band-split of the radio (806-825 MHz or 851-870 MHz). The varactor in conjunction with the frequency segment selector circuitry (TR207, TR208, and PIN diode CD208) provides a voltage controlled adjustment range that extends across the entire frequency split.

The VCO operates over frequency ranges of 403-41 2.5 MHz and 425.5-435.0 MHz. Buffer IC207 provides a typical output of + 5 dBm. Transmit audio is applied to modulation adjustment control RV202 (VCO MOD ADJ). Deviation is set for 3.75 kHz (3.0 kHz NPSPAC).

The TX VCO control switch TR210 turns the Transmit VCO on when DPTT is high (TR210 is on). The use of two VCOs allows rapid independent selection of transmit and receive frequencies across the frequency split.

Frequency Segment Selector

The frequency segment selector switches capacitance in and out of the TX VCO tank circuit to select the frequency segment containing the channel. The frequency segment selector consists of TR207, TR208, and CD208 and operates under control of the microcontroller through transistor TR706. Capacitor C243 is selected or deselected for operation in a given segment. Table 1 identifies the circuit conditions and capacitor used for selection of each segment.

Table 1 - Frequency Segment Selection

SEGMENT	FREQUENCY SPLIT (MHZ)	TRANSISTOR TR207 TR208	PIN DIODE CD208	GROUNDED CAPACITOR	GROUNDED RESISTOR
1	Tx: 806-825 RX: 851-870	ON OFF	ON	C243	NONE
2	Tx: 851-870 RX: 851-870	OFF ON	OFF	NONE	R232

Reverse bias to turn PIN diode CD208 off is provided by the + 8 volt filtered supply through resistor R240. Forward bias for the diode and power for the switching transistors is provided by the + 8volt source through resistor R241.

When segment "1" is selected, transistor TR207 is turned on and transistor TR208 is turned off. PIN diode CD208 is forward biased causing it to turn on. This effectively places a short across capacitor C244 and ac grounds C243 in the Tx VCO.

When segment "2" is selected, transistor TR208 is turned on and TR207 is turned off. Diode CD208 is reverse biased causing it to turn off. L206 presents a high impedance to rf frequencies and the anode of CD208 is near dc ground and not at ac ground.

VCO CHARACTERISTICS

The synthesizer has two VCOs, 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 9.5 MHz when the control voltage moves from its lower limit to its upper limit. The TX VCO moves about 9.5 MHz on each split respectively for the same situation.

FEEDBACK BUFFERS

The RX injection and TX injection voltage output from the RX VCO and Tx VCO are supplied to the buffer and to the feedback buffer. Buffer IC208 provides typical output of + 2 dBm to Tx/RX INJECTION P201. Feedback buffer is provided by IC204 and the output applied to dual-modulus prescaler IC202.

DUAL-MODULUS PRESCALER

The dual-modulus prescaler (IC204) completes the PLL feedback path from the synthesizer to loop filter, to the VCOs 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 N counter in the synthesizer IC.

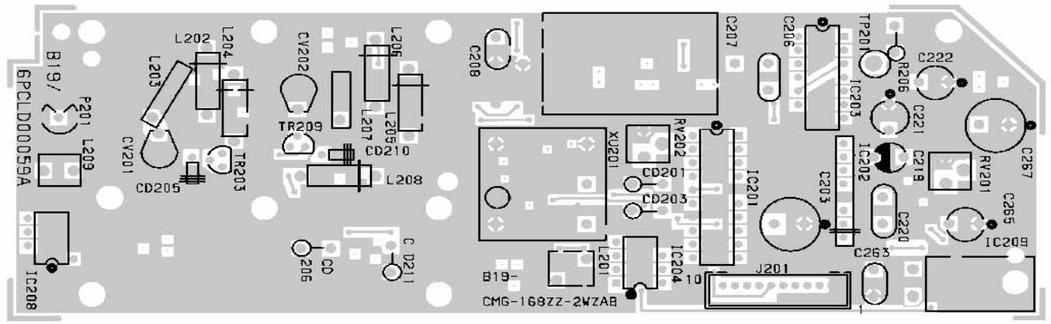
The output of the prescaler is applied to the synthesizer where it is divided down to 6.25 kHz by an internal N and A counter and compared in frequency and phase with the divided frequency from the reference oscillator. The result of this comparison Is the error voltage used to maintain frequency lock. The divide by N and A counters are controlled by data received from the microcontroller. Depending on the operating frequency, the dc voltage at TP201 should be within the range of 3.5 and 7.5 Vdc when the PLL is locked.

MODULATION LEVEL CONTROL

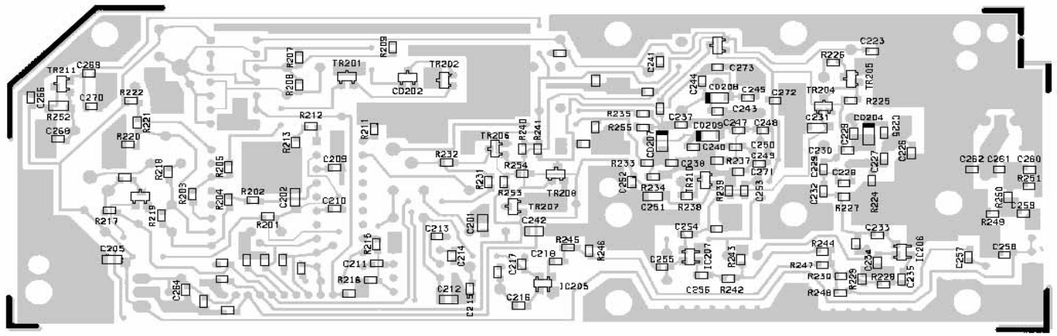
The modulation level control circuit automatically sets the TX Audio level applied to the transmit VCO modulator CD207, depending on the setting of VCO MOD ADJ control RV202. The modulation level control circuit consists of R231, R232, and TR206.

Modulation level is controlled by turning transistor switch TR206 on or off (under control of IC706), which adds (or removes) attenuator R232 to the circuit. Resistors R231 and R232 form an adjustable voltage divider used to change the modulation level as required.

COMPONENT SIDE



SOLDER SIDE



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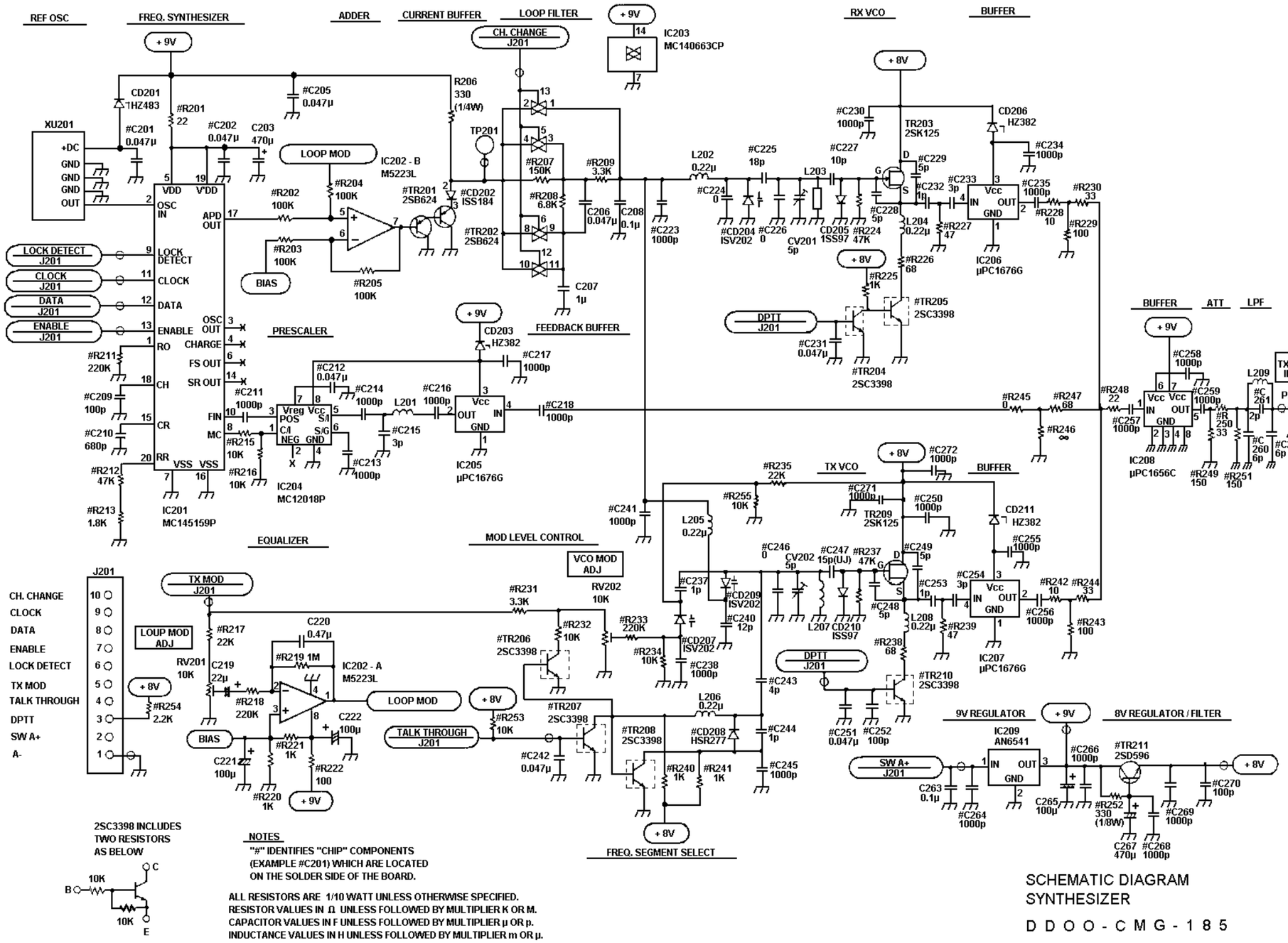
SYNTHESIZER BOARD



SYNTHESIZER

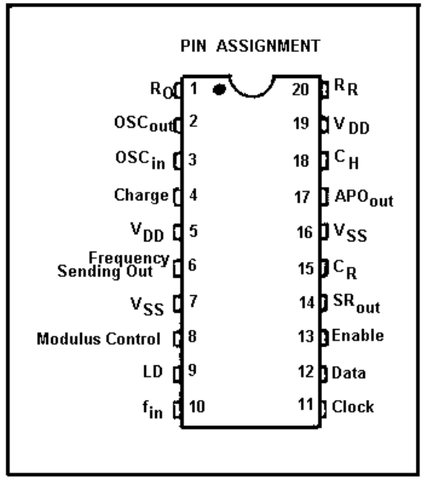
PARTS LIST

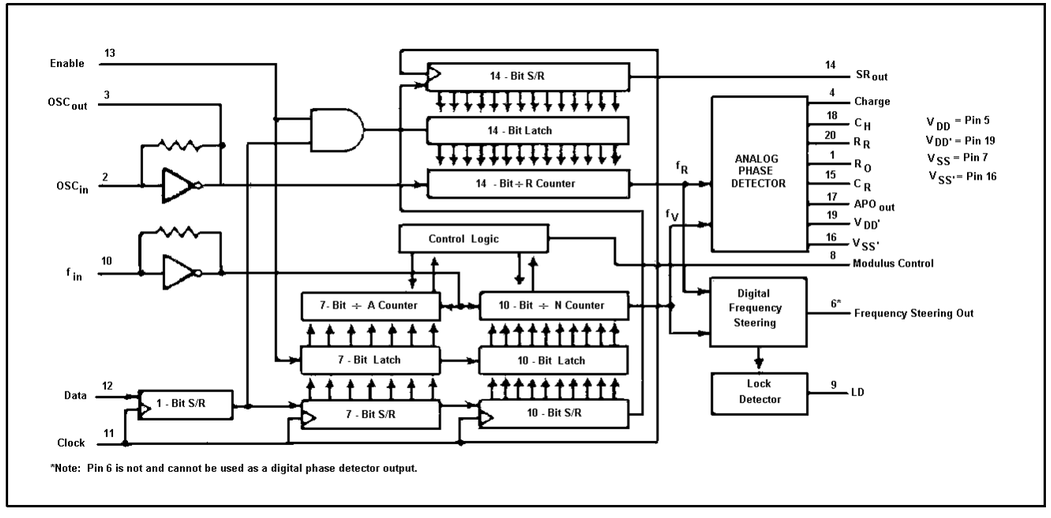
SYNTHESIZER BOARD
B19/CMG-185
ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C201 and C202	B19/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C203	B19/5CEAA01828	Electrolytic: 470 uF ±20%, 16 VDCW.
C205	B19/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C206	B19/5CRAA00628	Metallized plastic: 0.047 uF ±5%, 50 VDCW.
C207	B19/5CRAH00086	Metallized plastic: 1 uF ±10%, 200 VDCW.
C708	B19/5CRAA00617	Metallized plastic: 0.1 uF ±5%, 50 VDCW.
C209	B19/5CAAD00839	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C210	B19/5CAAD01063	Ceramic: 680 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C211	B19/5CAAD01154	Ceramic: 1000 pF ±10, 50 VDCW, temp coef +350 -1000 PPM.
C212	B19/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C213 and C214	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C215	B19/5CAAD00853	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C216 thru C218	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C219	B19/5CSAC01129	Tantalum: 2.2 uF ±10%, 25 VDCW.
C220	B19/5CRAA00838	Metallized plastic: 0.47 uF ±5%, 50 VDCW.
C221 and C222	B19/5CEAA01827	Electrolytic: 100 uF ±20%, 16 VDCW.
C223	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C225	B19/5CAAD00963	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C227	B19/5CAAD00953	Ceramic: 10 pF ±0.5 pF, 50 VDCW, temp coef 0 ±30 PPM.
C228 and C229	B19/5CAAD00956	Ceramic: 5 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C230	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C231	B19/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C232	B19/5CAAD00852	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C233	B19/5CAAD00853	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C234 and C235	B19/5CAAD02154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C237	B19/5CAAD00852	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C238	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C240	B19/5CAAD00968	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 +30 PPM
C241	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -2000 PPM.
C242	B19/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C243	B19/5CAAD00961	Ceramic: 4 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C244	B19/5CAAD00852	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C245	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C247	B19/5CAAD01423	Ceramic: 15 pF ±5%, 50 VDCW, temp coef -750 ±120 PPM.
C248 and C249	B19/5CAAD00956	Ceramic: 5 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C250	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C251	B19/5CAAD01131	Ceramic: 0.047 uF ±10%, 25 VDCW.
C252	B19/5CAAD00839	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C253	B19/5CAAD00852	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C254	B19/5CAAD00853	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C255 thru C259	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C260	B19/5CAAD00962	Ceramic: 6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±30 PPM.
C261	B19/5CAAD00949	Ceramic: 2 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C262	B19/5CAAD00962	Ceramic: 6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±30 PPM.
C263	B19/5CRAA00617	Metallized plastic: 0.1 uF ±5%, 50 VDCW.
C264	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C265	B19/5CEAA01827	Electrolytic: 100 uF ±20, 16 VDCW.
C266	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C267	B19/5CEAA01829	Electrolytic: 470 uF ±20%, 16 VDCW.
C268 and C269	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C270	B19/5CAAD00839	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C271 thru C273	B19/5CAAD01154	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
		---------- DIODES ----------
CD201	B19/5TXAE00587	Zener: 4V, sim to HITACHI HZ4B3.
CD202	B19/5TXAD00290	Silicon, fast recovery (2 diodes in Cathode common), sim to TOSHIBA 1SS184.
CD203	B19/5TXAE00566	Zener: 3V, sim to HITACHI HZ3B2.
CD204	B19/5TXAE00690	Silicon, Variable Capacitance Diode; sim to HITACHI 1SV202.
CD205	B19/5TXAA00326	Silicon, Schottky Barrier: sim to NEC 1SS97.
CD206	B19/5TXAE00566	Zener: 3V, sim to HITACHI HZ3B2.
CD207	B19/5TXAE00690	Silicon, Variable Capacitance Diode; sim to HITACHI 1SV202.
CD208	B19/5TXAE00686	Silicon, Epitaxial planar: sim to HITACHI 1SR277.
CD209	B19/5TXAE00690	Silicon, Variable Capacitance Diode; sim to HITACHI 1SV202.
CD210	B19/5TXAA00326	Silicon, Schottky Barrier; sim to NEC 1SS97.
CD211	B19/5TXAE00566	Zener: 3V, sim to HITACHI HZ3B2.
CV201	B19/5CVBB00093	Variable: 5P max.
CV202	B19/5CVBB00093	Variable: 5P max.
		---------- INTEGRATED CIRCUITS ----------
IC201	B19/5DAAJ00328	Synthesizer, cmos serial input; sim to MOTOROLA MC145159P.
IC202	B19/5DDAB00164	Linear Dual OP Amp: sim to MITSUBISHI M5223L.
IC203	B19/5DAAJ00359	Digital Bilateral Switch; sim to MOTOROLA MC14066BCP.
IC204	B19/5DAAJ00574	Prescaler, sim to MOTOROLA MC12018P.
IC205 thru IC207	B19/5DAAA00284	RF Wide band amplifier; sim to NEC uPC1676G.
IC208	B19/5DAAA00183	RF Wide band amplifier; sim to uPC1655C.
IC209	B19/5UAAK00021	Linear, Positive voltage regulator; sim to MATSUSHITA AN6541.
		---------- CONNECTORS ----------
J201	B19/5JWAV00121	Connector: 10 pins.
		---------- COILS ----------
L201	B19/6LAFD01241	Coil, RF.
L202	B19/5LCAC00882	Coil, RF: 0.22 uH.
L203	B19/6LALD00087	Coil, RF.
L204 thru L206	B19/5LCAC00882	Coil, RF: 0.22 uH.
L207	X19/6LALD00080	Coil, RF.
L208	B19/5LCAC00882	Coil, RF: 0.22 uH.
L209	B19/6LALD00038	Coil, RF.
		---------- PLUGS ----------
P201	619/6JJLD00020	Connector, RF.
		---------- RESISTORS ----------
R201	B19/5RDAC02465	Metal Film: 22 ohms ±5%, 100 VDCW, 1/10W.
R202 thru R205	B19/5RDAC02449	Metal Film: 100K ohms ±5%, 100 VDCW, 1/10W.
R206	B19/5RDAA01480	Carbon film: 330 ohms ±5%, 300 VDCW, 1/4W.
R207	B19/5RDAC02455	Metal Film: 150K ohms ±5%, 100 VDCW, 1/10W.
R208	B19/5RDAC02458	Metal Film: 6.8K ohms ±5%, 100 VDCW, 1/10W.
R209	B19/5RDAC02462	Metal Film: 3.3K ohms ±5%, 100 VDCW, 1/10W.
R211	B19/5RDAC02453	Metal Film: 220K ohms ±5%, 100 VDCW, 1/10W.
R212	B19/5RDAC02439	Metal Film: 47K ohms ±5%, 100 VDCW, 1/10W.
R213	B19/5RDAC02475	Metal Film: 1.8K ohms ±5%, 100 VDCW, 1/10W.
R215 and R216	B19/5RDAC02445	Metal Film: 10K ohms ±5%, 100 VDCW, 1/10W.
R217	B19/5RDAC02454	Metal Film: 22K ohms ±5%, 100 VDCW, 1/10W.
R218	B19/5RDAC02453	Metal Film: 220K ohms ±5%, 100 VDCW, 1/10W.
R219	B19/5RDAC02461	Metal Film: 1K ohms ±5%, 100 VDCW, 1/10W.
R220 and R221	B19/5RDAC02446	Metal Film: 1K ohms ±5%, 100 VDCW, 1/10W.
R222	B19/5RDAC02447	Metal Film: 100 ohms ±5%, 100 VDCW, 1/10W.
R224	B19/5RDAC02439	Metal Film: 47K ohms ±5%, 100 VDCW, 1/10W.
R225	B19/5RDAC02446	Metal Film: 1K ohms ±5%, 100 VDCW, 1/10W.
R226	B19/5RDAC02467	Metal Film: 68 ohms ±5%, 100 VDCW, 1/10W.
R227	B19/5RDAC02460	Metal Film: 47 ohms ±5%, 100 VDCW, 1/10W.
R228	B19/5RDAC02450	Metal Film: 10 ohms ±5%, 100 VDCW, 1/10W.
R229	B19/5RDAC02447	Metal Film: 100 ohms ±5%, 100 VDCW, 1/10W.
R230	B19/5RDAC02466	Metal Film: 33 ohms ±5%, 100 VDCW, 1/10W.
R231	B19/5RDAC02462	Metal Film: 3.3K ohms ±5%, 100 VDCW, 1/10W.
R232	B19/5RDAC02445	Metal Film: 10K ohms ±5%, 100 VDCW, 1/10W.
R233	B19/5RDAC02453	Metal Film: 220K ohms ±5%, 100 VDCW, 1/10W.
R234	B19/5RDAC02445	Metal Film: 10K ohms ±5%, 100 VDCW, 1/10W.
R235	B19/5RDAC02454	Metal Film: 22K ohms ±5%, 100 VDCW, 1/10W.
R237	B19/5RDAC02439	Metal Film: 47K ohms ±5%, 100 VDCW, 1/10W.
R238	B19/5RDAC02467	Metal Film: 68 ohms ±5%, 100 VDCW, 1/10W.
R239	B19/5RDAC02460	Metal Film: 47 ohms ±5%, 100 VDCW, 1/10W.
R240 and R241	B19/5RDAC07446	Metal Film: 1K ohms ±5%, 100 VDCW, 1/10W.
R242	B19/5RDAC02450	Metal Film: 10 ohms ±5%, 100 VDCW, 1/10W.
R243	B19/5RDAC02447	Metal Film: 100 ohms ±5%, 100 VDCW, 1/10W.
R244	B19/5RDAC02466	Metal Film: 33 ohms ±5%, 100 VDCW, 1/10W.
R247	B19/5RDAC02467	Metal Film: 68 ohms ±5%, 100 VDCW, 1/10W.
R248	B19/5RDAC02465	Metal Film: 22 ohms ±5%, 100 VDCW, 1/10W.
R249	B19/5RDAC02468	Metal Film: 150 ohms ±5%, 100 VDCW, 1/10W.
R250	B19/5RDAC02466	Metal Film: 33 ohms ±5%, 100 VDCW, 1/10W.
R251	B19/5RDAC02468	Metal Film: 150 ohms ±5%, 100 VDCW, 1/10W.
R252	B19/5RDAC02140	Metal Film: 330 ohms ±5%, 100 VDCW, 1/8W.
R253	B19/5RDAA02445	Metal Film: 10K ohms ±5%, 100 VDCW, 1/10W.
R254	B19/5RDAA02451	Metal Film: 2.2K ohms ±5%, 100 VDCW, 1/10W.
R255	B19/5RDAA02445	Metal Film: 10K ohms ±5%, 100 VDCW, 1/10W.
RV201 and RV202	B19/5RVAB00399	Variable: 10K ohms, 0.1W.
		---------- TRANSISTORS ----------
TR201 and TR202	B19/5TBAB00055	Silicon, PNP: sim to NEC2SB624 (BV3).
TR203	B19/5TKAH00006	N-channel field effect (Junction Single Gate); sim to SONY 2SK125.
TR204 thru TR208	B19/5TCAZ00011	Silicon, NPN: sim to SANYO 2SC3398
TR209	B19/5TKAH00006	N-channel field effect (Junction Single Gate); sim to SONY 2SK125.
TR210	B19/5TCAZ00011	Silicon, NPN: sim to SANYO 2SC3398.
TR211	B19/5TDAB00054	Silicon, NPN: sim to NEC 2SD596 (BV3).
		---------- OSCILLATOR ----------
XU201	B19/6XNLD00010	Reference Oscillator Unit.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

MC145159P

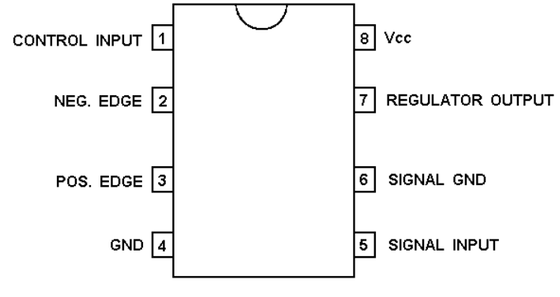




PHASE LOCK LOOP (PLL)
(IC201)

MC12018

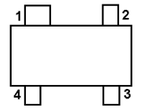
PIN ASSIGNMENT



RC - 7042

WIDE BAND AMPLIFIER
(IC205 THROUGH IC207)

NEC uPC1676G



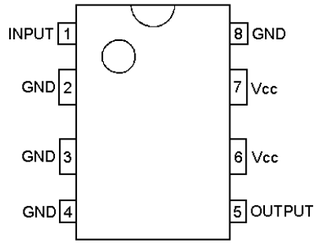
1. GND
2. OUTPUT
3. Vcc
4. INPUT

DUAL-MODULUS PRESCALER
(IC204)

WIDE BAND AMPLIFIER
(IC208)

NEC uPC1656C

PIN ASSIGNMENT

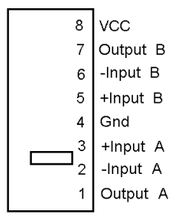


DUAL OPERATIONAL AMPLIFIER

(IC202)

MITSUBISHI M5223L

PIN ASSIGNMENT



WIDE-BAND AMPLIFIER
(IC208)