

MAINTENANCE MANUAL

ORION™

29 - 50 MHz SYNTHESIZER/RECEIVER BOARD
CMN-350A/B

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DESCRIPTION

The Ericsson Inc. **ORION™** Low Band Synthesizer/Receiver Board provides, on one printed circuit board, circuits for both the synthesizer and receiver. The synthesizer circuits generates transmit frequencies for two splits 29-42 MHz designated by **(A)** and 35 - 50 MHz designated by **(B)**. The synthesizer also generates the receiver injection frequencies .

The FM dual-conversion, super-heterodyne receiver is designed for operation in the 29 - 50 MHz frequency range. A regulated 9.0 volts is provided to all receiver stages except the audio PA IC and noise blanker unit, which operates from the switched A+ supply.

The receiver has **Intermediate Frequency (IF)** of 20.8 MHz and 455 kHz. Adjacent channel selectivity is obtained by using a band-pass filter, a 20.8 MHz crystal filter and a 455 kHz ceramic filter.

The receiver circuit consists of:

- Front End Mixer
- 20.8 MHz 1st IF, 455 kHz 2nd IF and FM Detector d lkd d lkd d lkd
- **Audio Signal Processor (ASP)** including Squelch
- Audio PA
- Noise Blanker

The Front End and Mixer circuit is on the Synthesizer/Receiver Board. The 20.8 MHz 1st IF, 455 kHz 2nd IF, FM Detector, ASP, Audio PA and Noise Blanker circuits are on the System Control Logic/IF Board (Maintenance Manual LBI-39145).

CIRCUIT ANALYSIS

FREQUENCY SYNTHESIZER

The frequency synthesizer receives **SYNTH CLOCK**, **SYNTH DATA**, and control information from the microcomputer and generates the Tx/Rx RF frequencies (Refer to Figure 1).It also provides frequency-lock status to the microcomputer. The synthesizer consists of synthesizer chip IC201, low and high current buffers, loop filters, Tx and Rx **Voltage Controlled Oscillators (VCOs)**, feedback amplifiers, the dual modulus prescaler and the reference oscillator. The VCOs 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 of 49.8 to 70 MHz.

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Reference Oscillator

The reference oscillator consists of a 5 PPM **Temperature Compensated (X)Crystal Oscillator (TCXO)**. The standard reference oscillator frequency is 12.8 MHz. The TCXO is enclosed in an RF shielded housing. Access to the oscillator trimmer is made through the hole in the top of the housing. The TCXO is compensated by an internal temperature compensating circuit for both low and high temperatures. With no additional compensation the oscillators will provide 2 PPM stability from -30 degrees C to +60 degrees C.

Synthesizer

Synthesizer chip IC201 contains a programmable reference oscillator divider (R), phase detector, and programmable VCO dividers (+N, A). The reference frequency, 12.8 MHz is divided by a fixed integer number to obtain a 5 kHz channel reference frequency 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 an 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 input compares in frequency and phase.

If a phase error is detected, an error voltage is developed and applied to the VCO DC offset, 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 **SYNTH CLOCK** and **SYNTH DATA** lines from the microcomputer. 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-Lock-Loop (PLL)** to acquire the new frequency.

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

Equalizer

The equalizer circuit consists of operational amplifier IC203-A, resistors R205 and R207 and capacitor C205. This circuit receives transmit audio from Loop Modulation Adjust RV201. The output of the equalizer is summed with the output signal from the Phase Detector or by the adder circuit, operational amplifier IC203-B.

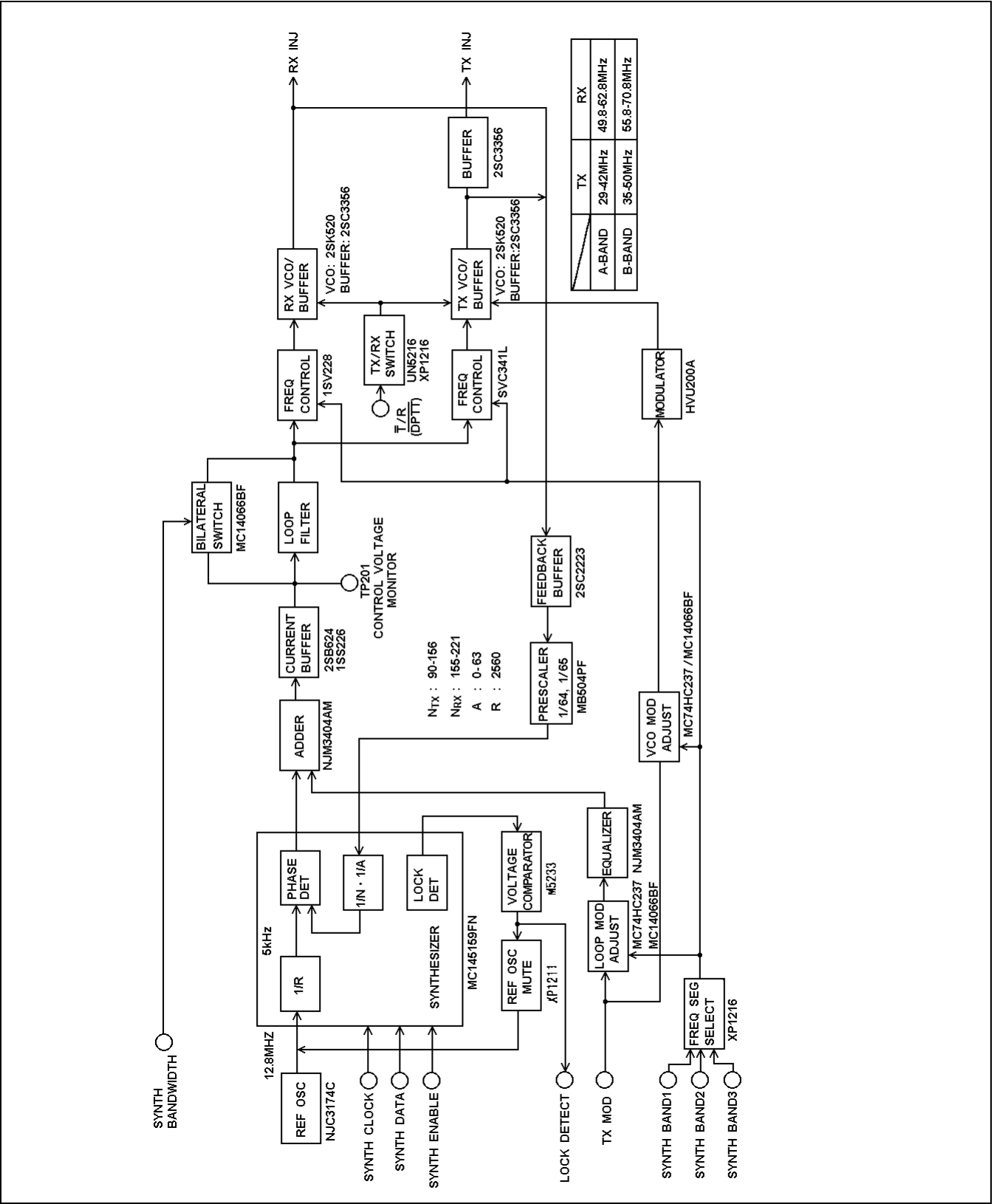


Figure 1 - Synthesizer/Receiver Block Diagram

DC Offset And High Current Buffers

DC offset buffer transistors TR201 and TR202 and diode CD202-A receive error voltage from the synthesizer and increases the level of this error voltage by 1.8 Vdc. This extends 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 TR201 either ON or OFF. This transistor (TR201) controls DC offset butter TR202. Resistor R214, diode CD202 and transistor TR202 complete a high current rapid charge or discharge path for capacitors C210, C211 and C212. As the error voltage decreases, TR201, TR202 and CD202-A turn on, completing a discharge path for C210 through C2112. When the error voltage goes positive, TR201, TR202 and CD212 are turned off, allowing C210 through C212 to charge through R214.

When a channel is changed in receive and when changing from transmit to receive, bilateral switch IC204-E is turned on for 4 milliseconds. and bilateral switches IC240-B & D are turned on for 3 milliseconds. When changing from receive to transmit, bilateral switches IC204--C & E are turned on for 15 milliseconds and IC204- B & D are turned on for 5 milliseconds.

Loop Filter

The loop filter consists of resistors R216 through R218 and capacitors C210 through C212. This filter controls the bandwidth and stability of the synthesizer loop. Bilateral switch IC204 is controlled by a 9 volt **SYNTH BANDWIDTH** and **SYNTH ENABLE** pulse. When the **SYNTH BANDWIDTH** pulse and pulse and **SYNTH ENABLE** pulse are present, the bilateral switch 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 chips.

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

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

Receiver Voltage Controlled Oscillator

The receiver VCO consists of low-noise JFET oscillator TR240 followed by high-gain buffer transistor TR241. Transistor TR241 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 Line. When the line is high, the receiver VCO is turned on, transistor TR242 is on. Oscillator output is typically 0 dBm. The output is applied to the feedback buffer for VCO frequency control and as the Receiver (**Rx**) injection frequency to the Rx 1st mixer through **Local Oscillator (LO)** buffers on the receiver board. The Rx VCO also uses a high-Q coil to achieve superior noise performance. The VCO operates over a frequency range of 49.8-70.8 MHz. The VCO voltage need only be set once at some frequency of the band and split, after which it operates over the entire split with no additional tuning.

Transmitter Voltage Controlled Oscillator

The transmitter 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 , transistors TR2301 - TR2303 and band switching diodes CD285 - CD290, provide a Voltage-controlled adjustment range that extends across the entire frequency split. VCO control switch transistor TR282 turns the transmit VCO on when the is low.

Feedback Buffer

The buffered output of the Rx VCO and Tx VCO, from transistors TR241 and TR281 respectively, are supplied to feedback buffer transistor TR2101. This drives the dual-modulus prescaler IC205. The buffered VCO outputs also provide Rx or Tx injection drive.

Dual Modulus Prescaler

The dual-modulus prescaler completes the **Phase-Lock-Loop (PLL)** feedback path from the synthesizer to the loop-filter, to the VCOs and feedback buffers and then back to the synthesizer through the prescaler. The prescaler divides the VCO by 64 or 65 under control of the **M CONT** from the synthesizer. The output of the prescaler is applied to the synthesizer where it is divided down to 5 kHz by and internal **+N, A** counter and compared in frequency and phase with the divided-down frequency for 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 Test Point TP201 should be within 3.5 to 7.5 Vdc when the PLL is locked.

Lock Detect

The lock-detect circuit consists of comparator IC207, diodes CD204 and CD205 and reference oscillator mute

switch transistor TR203. 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 locking -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 (CR) of the synthesizer may increase positive LD line from the synthesizer. Thus, TR203 disables the reference oscillator and allows the PLL 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. Transistor TR203 is turned on, preventing muting of the reference oscillator.

Loop Mod Adjust

The loop mod adjust circuit automatically sets the loop modulation level applied to the equalizer IC202, IC203 through Loop Mod adjuster RV201. The loop mod adjust modulation circuit consists of IC208, IC209, resistors R2001-R2006 and RV201. The loop modulation level is controlled by turning bilateral switches IC209 on or off (under control of IC208) to include resistors R2001-R2006 in the circuit. Resistors R2001-R2006 form an adjustable voltage divider to change the loop modulation level as required. Table 1 also identifies the resistor (if applicable) used for each frequency segment.

VCO Mod Adjust

The VCO Mod adjust circuit automatically sets the VCO modulation level applied to modulator diode CD282. The VCO Mod adjust modulation circuit consists of IC210, IC211 and resistors R2810-R2813. The VCO modulation level is controlled by turning bilateral switches IC211 on or off (under control of IC210) to include resistors R2810-2813 in the circuit. Resistors R2810-R2813 form an adjustable voltage divider to change the VCO 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 (refer to the **Shift Tune Control** section). The frequency segment selector consists of transistors TR2301 - TR2303, diodes CD243 - CD248 and CD285 - CD290 and operates under control of the microcomputer. Capacitors C260-C262, C266-C268, C272-C274, C277-C279, C2104-C2107, C2111-C2114 and C2118-C2121 are selected or deselected for operation in a given segment. Table 2 identifies the circuit conditions existing for selection of each segment and the capacitors used.

Reverse bias to turn off the band switching diodes are

provided by the +8 Volt supply through resistors R2303, R2306 and R2309. Forward bias for the diodes and current for the switching transistors are provided by the + 8 Volt supply through resistors R2301- R2302, R2304, R2307 and R2308. When segment 3 is selcted, transistors TR2302 and TR2303 are turned on. In the Tx VCO diodes CD287, CD288, CD289 and CD290 are reverse biased and diodes CD285 and CD286 are turned on. Capacitors C2111. C2112. C2118 and C2119 are effectively isolated from ground and capacitors C2104 and C2105 are connected to ground through diodes CD285 and CD286.

Similarly in the Rx VCO capacitors C266, C267, C272 and C273 are isolated from ground and capacitors C260 and C261 are grounded through diodes CD243 and CD244.

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 2.5 to 5 MHz wide.

RECEIVER CIRCUIT

Receiver Front End

An RF signal from the antenna is coupled through a low-pass filter, antenna switch and band-pass filter to the input (base) of RF amplifier transistor TR401. The output of TR401 (collector) is coupled through another high-pass filter and another band-pass filter to the input of first mixer circuit HC441. The Front End selectivity is provided by this band-pass filter (see Figure 2).

Shift Tune Control

The frequency of the band-pass filter is controlled by the Shift Tune Control circuit and the microprocessor on the System Control Logic/IF board. Transistor switches TR431-1,2, TR432-1,2 and TR433-1,2 connect the frequency determining components in the filter circuit. Transistor switch TR431-1,2 selects the components to tune the band-pass filter for RX Band 1 (29-32/35-37.5 MHz). TR432-1,2 selects the components to tune the band-pass filter for RX Band 2 (32-35/37.5-41 MHz) and TR433-1,2 selects the components to tune the

band-pass filter for RX Band 3 (35-38.5/41-45 MHz). For the frequency split of 38.5-38.5/45-50 MHz no additional components are connected. For more information refer to the frequency Synthesizer **Frequency Segment Selector** section.

Receiver Injection

Receiver RF injection frequency (49.8-70.8 MHz) from the synthesizer VCO is applied to the base amplifier transistor TR461. The output (collector) of amplifier TR461 is coupled to the base of amplifier transistor TR462. The output (collector) of

Table 1 - Frequency Segment Selection

	Segment	Frequency Split (MHz)	Synth Band 1 (Input TR2302)	Synth Band 2 (Input TR2303)	Synth Band 3 (Input TR2302)	Grounded Modulation Resistor
29-42 MHz	1	29-32	1	1	1	R2813 R333
	2	32-35	0	1	1	R2812
	3	35-38.5	0	1	0	R2811
35-50 MHz	4	38.5-42	0	0	0	R2810
	1	35-37.5	1	1	1	R2813
	2	37.5-41	0	1	1	R2812
	3	41-45	0	1	0	R2811
	4	45-50	0	0	0	R2810

Table 2 - Capacitor Selection

Segment	Transistor Switch*			Band Switching Diodes						Grounded Capacitors
	TR2301	TR2302	TR2303	CD243 CD244	CD245 CD246	CD247 CD248	CD285 CD286	CD287 CD288	CD289 CD290	
1	0	0	0	On	On	On	On	On	On	All
2	0	0	1	On	On	Off	On	On	On	C260, C261, C266, C267, C2104, C2105, C2111, C2112
3	0	1	1	On	Off	Off	On	Off	Off	C260, C261, C2104, C2105
4	1	1	1	Off	Off	Off	Off	Off	Off	None

*"1" Indicates transistor is turned on.

amplifier TR462 is filtered by a low-pass filter consisting of capacitors C4011 through C4014 and inductor L412. This filter is tuned to pass frequency in the 49.8-70.8 MHz pass band.

1st Mixer

The first mixer is a double-balanced diode mixer (HC441) that converts a signal in the 29-50 MHz frequency range to 20.8 MHz first IF. In the Mixer stage, RF from the front-end RF filter is applied to one input of the mixer. Injection voltage from the amplifier stage is applied to the other input of the mixer.

1st IF

The 20.8 MHz 1st IF output signal is coupled from the output of mixer HC441 through capacitor C501 to the source input of IF amplifier/buffer Junction Field Effect Transistors (JFET) TR501 and TR502. These components are located on the System Control logic/IF board (refer to LBI-39145).

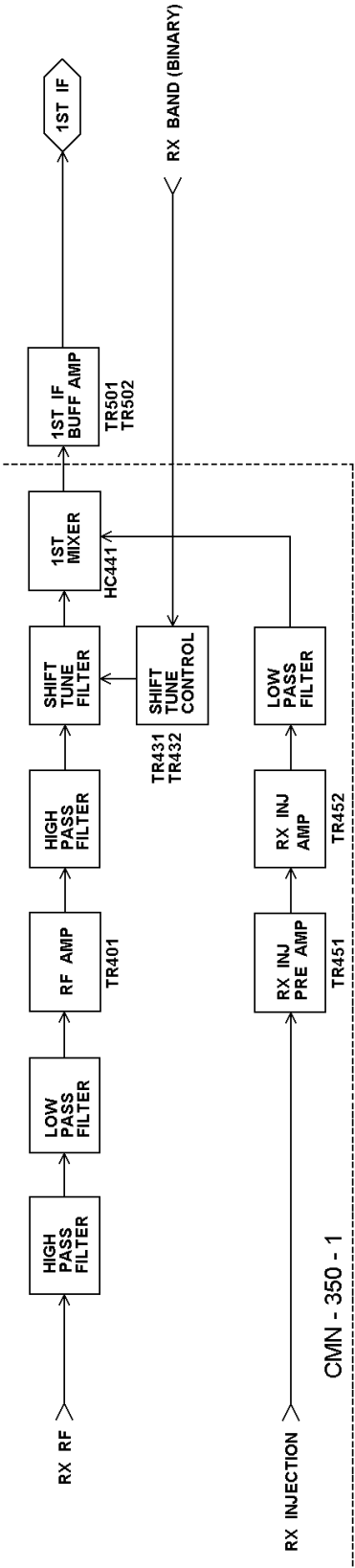


Figure 2 - Receiver Block Diagram

SYNTHESIZER/RECEIVER BOARD
SYNTHESIZER SECTION
CMN-350A2 (Used in P1, P3)
CMN-350B2 (Used in P2, P4)
Issue 1

SYMBOL	PART NO.	DESCRIPTION
C201 C202	NOTE: Parts listed are for reference only. Refer to Service Section for Servicable parts	-----CAPACITORS----- Ceramic: 0.047 μ F \pm 10% 25 VDCW, temp coef \pm 15%. Ceramic: 470 pF \pm 5% 50 VDCW, temp coef +350= - 1000 PPM.
C203		Electrolytic: 220 μ F 20% 10 VDCW.
C204 C205 C206 C207 thru C209 C210		Ceramic: 0.047 μ F \pm 10% 25 VDCW, temp coef \pm 15%. Ceramic: 0.01 μ F \pm 10% 50 VDCW, temp coef \pm 15%. Polyester: 0.47 μ F \pm 5% 50 VDCW. Electrolytic: 47 μ F \pm 20% 16 VDCW.
C211		Metallized Plastic: 1 μ F \pm 10%.
C212		Ceramic: 0.047 μ F \pm 10% 25 VDCW, temp coef \pm 15%. Polypropylene: 0.1 μ F \pm 5% 50 VDCW.
C213		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C214		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C215		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C216		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C217		Ceramic: 0.047 μ F \pm 10% 25 VDCW, temp coef \pm 15%.
C218		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C219		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C220		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C221		Ceramic: 0.047 μ F \pm 10% 25 VDCW, temp coef \pm 15%.
C222		Ceramic: 68 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.
C223		Ceramic: 680 pF \pm 5% 50 VDCW, temp coef +350 \pm - 1000 PPM. Tantalum: 10 μ F \pm 20% 10 VDCW. Tantalum: 4.7 μ F \pm 20% 16 VDCW.
C224		Polyester: 0.1 μ F \pm 5% 50 VDCW.
C225		Electrolytic: 47 μ F \pm 20% 16 VDCW.
C230		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C231		Ceramic: 0.047 μ F \pm 10% 25 VDCW, temp coef \pm 15%.
C232 and C233		Electrolytic: 47 μ F \pm 20% 16 VDCW.
C234		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C236		Ceramic: 180 pF \pm 5% 50 VDCW, temp coef -750 \pm 120 PPM (Used in A).
C237 and C238		Ceramic: 120 pF \pm 5% 50 VDCW, temp coef -750 \pm 120 PPM (Used in B).
C240		Ceramic: 100 pF \pm 5% 50 VDCW temp coef -750 \pm 120 PPM.
C241		Ceramic: 68 pF \pm 5% 50 VDCW, temp coef -750 \pm 120 PPM.
C241		Ceramic: 33 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.
C247		Ceramic: 0.01 μ F \pm 10% 50 VDCW, temp coef \pm 15%.
C248		Ceramic: 33 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.
C250		Ceramic: 5 pF \pm 0.25 pF 50 VDCW, temp coef 0 \pm 30 PPM.
C252 and C253		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C255		Ceramic: 1000 pF \pm 10% 50 VDCW, temp coef \pm 15%.
C256		Ceramic: 18 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.
C257		Ceramic: 33 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM (Used in A).
C257		Ceramic: 27 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM (Used in B).
C258		Ceramic: 18 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.
C260		Ceramic: 18 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM (Used in A).
C260		Ceramic: 22 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.(Used in B).
C261		Ceramic: 33 pF \pm 5% 50 VDCW, temp coef 0 \pm 30 PPM.
C262		Ceramic: 4 pF \pm 0.25 pF 50 VDCW, temp coef 0 \pm 30 PPM.(Used in A).

SYMBOL	PART NO.	DESCRIPTION
C263 and C264 C266		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C266		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C267 C268		Ceramic: 33 pF ±5% 50 VDCW temp coef 0±30 PPM (Used in B).
		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 4 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C269 and C270 C272 C273		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 120 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A.)
C273		Ceramic: 47 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C274		Ceramic: 4 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C275 and C276 C277 thru C279 C280 C281		Ceramic: 5 pF)0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C281		Ceramic: 6 pF ±0.5 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
C282		Ceramic: 4 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM.
C283 C285		Ceramic: 680 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 150 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C285		Ceramic: 82 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C286 C288		Ceramic: 100 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 330 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C288		Ceramic: 82 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C290 C291 C293 C295		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15%.
		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 10 pF ±0.5 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
C295		Ceramic: 5 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C296 thru C298 C2001 C2100		Tantalun: 10μF ±20% 10 VDCW.
		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2100		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2101 C2102		Ceramic: 68 pF ±5% 50 VDCW, temp coef 0±30 PPM.
		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2102		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2104		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2104		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2105		Ceramic: 47 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2105		Ceramic: 39 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2106		Ceramic: 10 pF ±0.5 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
C2106		Ceramic: 2 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
C2107		Ceramic: 12 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2107		Ceramic: 3 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
C2108		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15% (Used in A).
C2108		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15% (Used in B).

SYMBOL	PART NO.	DESCRIPTION
C2109		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15% (Used in A).
C2109		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15% (Used in B).
C2111		Ceramic: 120 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2111		Ceramic: 47 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2112		Ceramic: 150 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2112		Ceramic: 100 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2113		Ceramic: 10 pF ±0.5 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
C2113		Ceramic: 2 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
C2114		Ceramic: 12 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2114		Ceramic: 3 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
C2115		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15% (Used in A).
C2115		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15% (Used in B).
C2116		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15% (Used in A).
C2116		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15% (Used in B).
C2118		Ceramic: 470 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2118		Ceramic: 100 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2119		Ceramic: 560 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2119		Ceramic: 150 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2120		Ceramic: 10 pF ±0.5 pF 50 VDCW, temp coef 0±30 PPM (Used in A).
C2120		Ceramic: 2 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
C2121		Ceramic: 12 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2121		Ceramic: 3 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM (Used in B).
C2122		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15% (Used in A).
C2122		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15% (Used in B).
C2123		Ceramic: 0.01 μF ±10% 50 VDCW, temp coef ±15% (Used in A).
C2123		Ceramic: 1000 pF ±0% 50 VDCW, temp coef ±15% (Used in B).
C2202 C2801 and C2802 C2803		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
		Ceramic: 2 pF ±0.25 pF 50 VDCW, temp coef 0±30 PPM.
C2804 thru C2806 C2807		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
		Ceramic: 82 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in A).
C2807		Ceramic: 56 pF ±5% 50 VDCW, temp coef 0±30 PPM (Used in B).
C2808		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
		--VARIABLE CAPACITORS--
CV240 CV280		Variable: 10 pF max.
		Variable: 10 pF max.
		-----DIODES-----
CD201 CD202		Zener: 4.7 V; sim to HITACHI HZM4.7NB2.
		Silicon: fast recovery (2 diodes in series); sim to TOSHIBA 1SS226.
CD203 CD204		Zener: 3.9 V; sim to HITACHI HZM3.9NB2.
		Silicon: fast recovery (2 diodes in series); sim to TOSHIBA 1SS226.
CD205		Silicon: fast recovery(2 diodes with anode common); sim to TOSHIBA 1SS181
CD242 R206 thru CD248		Silicon: (Schottky Barrier); sim to HITACHI HSU88.
		Silicon: Epitaxial Planer Diode: sim to ROHM 1SS356.

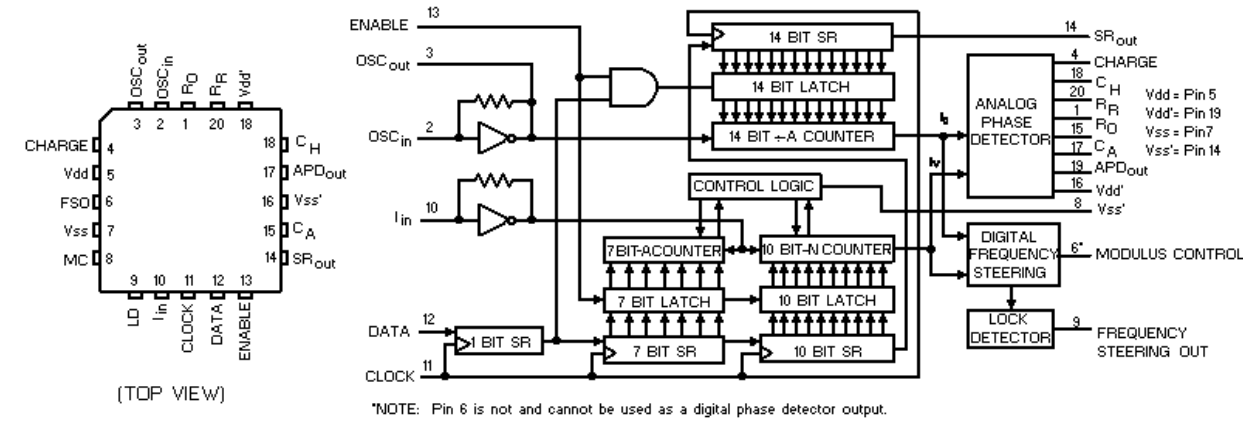
SYMBOL	PART NO.	DESCRIPTION
CD281		Silicon: fast recovery (2 diodes in series); sim to PANASONIC MA153A
CD282		Silicon: Variable capacitance Diode; sim to HITACHI HVU200A.
CD284 CD285 thru CD290 CD2401 thru CD2403 CD2801 and CD2802 CD2804		Silicon: (Schottky Barrier); sim to HITACHI HSU88.
		Silicon: Epitaxial Planer Diode: sim to ROHM 1SS356.
		Silicon: Variable Capacitance Diode; sim to TOSHIBA 1SV228.
		Silicon: Variable Capacitance Diode; sim to SANYO SVC341.
		Silicon: fast recovery(2 diodes with cathode common); sim to TOSHIBA 1SS184
		-----FILTER-----
FL204		EMI Filter: -----INTEGRATED CIRCUITS-----
IC201		Synthesizer: CMOS serial input; sim to MOTOROLA MC145159FN.
IC202 IC203 IC204 IC205 IC207 IC208 IC209 IC210 IC211 IC230		Linear: Dual OP AMP; sim to MITSUBISHI M5223FP.
		Linear: Dual OP AMP; sim to New JRC NJM3404AM.
		Digital: Bilateral switch sim to MOTOROLA MC14066BF.
		Prescaler: sim to MOTOROLA MB504PF.
		Linear: Dual Comparator; sim to MITSUBISHI M5233FP.
		Digital: Decoder; sim to MOTOROLA MC74HC237F.
		Digital: Bilateral switch sim to MOTOROLA MC14066BF.
		Digital: Decoder; sim to MOTOROLA MC74HC237F.
		Digital: Bilateral switch sim to MOTOROLA MC14066BF.
		Linear: Positive Voltage Regulator; sim to PANASONIC AN6541.
		-----COIL-----
L220 L230 L240 and L241 L242 L244 L245 L246 L246 L247 thru L252 L280 and L281 L282 L282 L284 L285 L286 L287 L287 L288 L288 L289 L289 L290 L290 L291 L291 L292 L292 L2801 L2802		Coil RF: 1 μH ±20%.
		Choke Coil: 4.7 μH ±10%.
		Choke Coil: 10 μH ±10%.
		Coil RF (Used in A).
		Coil RF (Used in B).
		Choke Coil: 10 μH ±10%.
		Coil RF: 1 μH ±20%.
		Coil RF: 68 nH ±10% (Used in A).
		Coil RF: 56 nH ±10% (Used in B).
		Choke Coil: 10 μH ±10%.
		Choke Coil: 10 μH ±10%.
		Coil RF (Used in A).
		Coil RF (Used in B).
		Choke Coil: 10 μH ±10%.
		Coil RF: 1 μH ±20%.
		Coil RF: 100 nH ±10%.
		Choke Coil: 15 μH ±10% (Used in A).
		Choke Coil: 10 μH ±10% (Used in B).
		Choke Coil: 15 μH ±10% (Used in A).
		Choke Coil: 10 μH ±10% (Used in B).
		Choke Coil: 15 μH ±10% (Used in A).
		Choke Coil: 10 μH ±10% (Used in B).
		Choke Coil: 15 μH ±10% (Used in A).
		Choke Coil: 10 μH ±10% (Used in B).
		Choke Coil: 15 μH ±10% (Used in A).
		Choke Coil: 10 μH ±10% (Used in B).
		Choke Coil: 10 μH ±10%.
		Choke Coil: 1 μH ±20%.
		-----CONNECTOR-----
P201		Connector, RF
		-----RESISTORS-----
R201 R202 R203 R204 R205 R206 R207 R208 R209		Metal film: 10k ohms ±5% 50 VDCW 1/16W.
		Metal film: 22 ohms ±5% 100 VDCW 1/10W.
		Metal film: 150k ohms ±5% 50 VDCW 1/16W.
		Metal film: 470k ohms ±5% 50 VDCW 1/16W.
		Metal film: 150k ohms ±5% 100 VDCW 1/10W.
		Metal film: 2.2k ohms ±5% 50 VDCW 1/16W.
		Metal film: 1M ohms ±5% 50 VDCW 1/16W.
		Metal film: 2.2k ohms ±5% 50 VDCW 1/16W.
		Metal film: 100 ohms ±5% 50 VDCW 1/16W.

SYMBOL	PART NO.	DESCRIPTION
R210 R211 R213 R214 R215 R216 R217 R218 R219 R220 thru R224 R228 R229 R229 R230 R230 R231 R232 R233 R234 R235 and R236 R237 R238 R239 R241 R242 R243 R244 R245 R246 R247 R248 R249 R280 R281 R282 R284 R286 R287 R288 R289 R290 R291 R292 R292 R293 R294 R295 R296 and R297 R2001 R2002 R2002 R2003 R2003 R2004 R2004 R2005 R2006 R2008 R2011 R2012 R2013 R2101 R2102 R2103 R2104 R2105 R2106 R2301 and R2302 R2303		Metal film: 220k ohms ±5% 50 VDCW 1/16W.
		Metal film: 100k ohms ±5% 50 VDCW 1/16W.
		Metal film: Less than 50m ohms 1/16W.
		Metal film: 330 ohms ±5% 200 VDCW 1/4W.
		Metal film: 10k ohms ±5% 100 VDCW 1/10W.
		Metal film: 560k ohms ±5% 50 VDCW 1/16W.
		Metal film: 15k ohms ±5% 50 VDCW 1/16W.
		Metal film: 6.8k ohms ±5% 50 VDCW 1/16W.
		Metal film: 100 ohms ±5% 50 VDCW 1/16W.
		Metal film: 10k ohms ±5% 50 VDCW 1/16W.
		Metal film: 220k ohms ±5% 50 VDCW 1/16W.
		Metal film: 180k ohms ±5% 50 VDCW 1/16W (Used in A).
		Metal film: 150k ohms ±5% 50 VDCW 1/16W (Used in B).
		Metal film: 82k ohms ±5% 50 VDCW 1/16W (Used in A).
		Metal film: 68k ohms ±5% 50 VDCW 1/16W (Used in B).
		Metal film: 22k ohms ±5% 50 VDCW 1/16W.
		Metal film: 1.5k ohms ±5% 50 VDCW 1/16W.
		Metal film: 22k ohms ±5% 50 VDCW 1/16W.
		Metal film: 100k ohms ±5% 50 VDCW 1/16W.
		Metal film: 10k ohms ±5% 50 VDCW 1/16W.
		Metal film: 4.7k ohms ±5% 50 VDCW 1/16W.
		Metal film: 5.6k ohms ±5% 50 VDCW 1/16W.
		Metal film: 2.2k ohms ±5% 100 VDCW 1/10W.
		Metal film: 47k ohms ±5% 100 VDCW 1/10W.
		Metal film: 270 ohms ±5% 100 VDCW 1/10W.
		Metal film: 5.6k ohms ±5% 100 VDCW 1/10W.
		Metal film: 1.5k ohms ±5% 100 VDCW 1/10W.
		Metal film: 1.5k ohms ±5% 100 VDCW 1/10W.
		Metal film: 120 ohms ±5% 100 VDCW 1/10W.
		Metal film: 100 ohms ±5% 100 VDCW 1/10W.
		Metal film: 220 ohms ±5% 100 VDCW 1/10W.
		Metal film: 100k ohms ±5% 100 VDCW 1/10W.
		Metal film: 33k ohms ±5% 100 VDCW 1/10W.
		Metal film: 22k ohms ±5% 100 VDCW 1/10W.
		Metal film: 47k ohms ±5% 100 VDCW 1/10W.
		Metal film: 47k ohms ±5% 100 VDCW 1/10W.
		Metal film: 270 ohms ±5% 100 VDCW 1/10W.
		Metal film: 5.6k ohms ±5% 100 VDCW 1/10W.
		Metal film: 1.5k ohms ±5% 100 VDCW 1/10W.
		Metal film: 120 ohms ±5% 100 VDCW 1/10W.
		Metal film: 100 ohms ±5% 100 VDCW 1/10W.
		Metal film: 68 ohms ±5% 100 VDCW 1/10W (Used in A).
		Metal film: 56 ohms ±5% 100 VDCW 1/10W (Used in B).
		Metal film: 100 ohms ±5% 100 VDCW 1/10W.
		Metal film: 220 ohms ±5% 100 VDCW 1/10W.
		Metal film: 100 ohms ±5% 100 VDCW 1/10W .
		Metal film: 10k ohms ±5% 100 VDCW 1/10W .
		Metal film: 47k ohms ±5% 50 VDCW 1/16W .
		Metal film: 82k ohms ±5% 50 VDCW 1/16W (Used in A).
		Metal film: 68k ohms ±5% 50 VDCW 1/16W (Used in B).
		Metal film: 150k ohms ±5% 50 VDCW 1/16W (Used in A).
		Metal film: 120k ohms ±5% 50 VDCW 1/16W (Used in B).
		Metal film: 150k ohms ±5% 50 VDCW 1/16W (Used in A).
		Metal film: 82k ohms ±5% 50 VDCW 1/16W (Used in B).
		Metal film: 10k ohms ±5% 50 VDCW 1/16W.
		Metal film: 33k ohms ±5% 50 VDCW 1/16W.
		Metal film: 330 ohms ±5% 50 VDCW 1/16W.
		Metal film: 1M ohms ±5% 50 VDCW 1/16W.
		Metal film: 100k ohms ±5% 100 VDCW 1/10W.
		Metal film: Less than 50m ohms 1/16W.
		Metal film: 5.6k ohms ±5% 100 VDCW 1/10W.
		Metal film: 1.5k ohms ±5% 100 VDCW 1/10W.
		Metal film: 220 ohms ±5% 100 VDCW 1/10W.
		Metal film: 180 ohms ±5% 100 VDCW 1/10W.
		Metal film: 33 ohms ±5% 100 VDCW 1/10W.
		Metal film: 180 ohms ±5% 100 VDCW 1/10W.
		Metal film: 1k ohms ±5% 200 VDCW 1/8W.
		Metal film: 4.7k ohms ±5% 100 VDCW 1/10W.

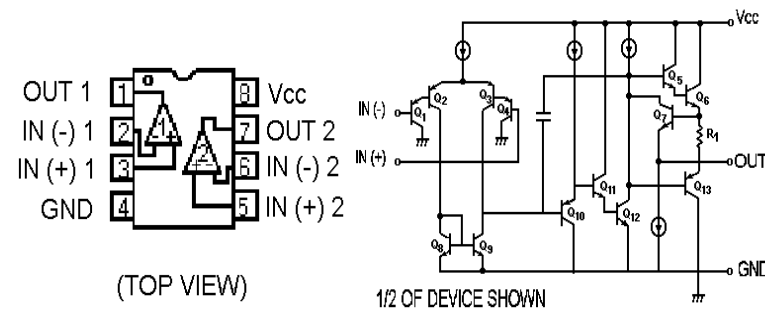
SYMBOL	PART NO.	DESCRIPTION
		-----RESISTORS -----
R401		Metal film: 1.8K ohms 5% 100 VDCW 1/16W.
R402		Metal film: 4.7K ohms 5% 100 VDCW 1/16W.
R403		Metal film: 5.6 ohms 5% 100 VDCW 1/16W.
R404		Metal film: 470 ohms 5% 100 VDCW 1/16W.
R405		Metal film: 100 ohms 5% 100 VDCW 1/10W.
R407		Metal film: 0 ohms.
R420		Metal film: 2.2K ohms 5% 100 VDCW 1/16W.(Used in A)
R420		Metal film: 10K ohms 5% 100 VDCW 1/16W. (Used in B)
R421		Metal film: 2.2K ohms 5% 100 VDCW 1/16W.(Used in A)
R421		Metal film: 10K ohms 5% 100 VDCW 1/16W. (Used in B)
R423		Metal film: 2.2K ohms 5% 100 VDCW 1/16W.
R424		Metal film: 2.2K ohms 5% 100 VDCW 1/16W.
R426		Metal film: 2.2K ohms 5% 100 VDCW 1/16W.(Used in A)
R426		Metal film: 10K ohms 5% 100 VDCW 1/16W. (Used in B)
R427		Metal film: 2.2K ohms 5% 100 VDCW 1/16W.(Used in A)
R427		Metal film: 10K ohms 5% 100 VDCW 1/16W. (Used in B)
R429		Metal film: 180 ohms 5% 100 VDCW 1/16W.(Used in A)
R429		Metal film: 270 ohms 5% 100 VDCW 1/16W.(Used in B)
R430		Metal film: 33 ohms 5% 100 VDCW 1/16W.(Used in A)
R430		Metal film: 18 ohms 5% 100 VDCW 1/16W.(Used in B)
R431		Metal film: 180 ohms 5% 100 VDCW 1/16W.(Used in A)
R431		Metal film: 270 ohms 5% 100 VDCW 1/16W.(Used in B)
R433		Metal film: 0 ohms.
R440		Metal film: 100K ohms 5% 100 VDCW 1/16W.
R441		Metal film: 10K ohms 5% 100 VDCW 1/16W.
R442		Metal film: 100K ohms 5% 100 VDCW 1/16W.
R443		Metal film: 10K ohms 5% 100 VDCW 1/16W.
R444		Metal film: 100K ohms 5% 100 VDCW 1/16W.
R445		Metal film: 100K ohms 5% 100 VDCW 1/16W.
R446		Metal film: 10K ohms 5% 100 VDCW 1/16W.
R447		Metal film: 100K ohms 5% 100 VDCW 1/16W.
R448		Metal film: 10K ohms 5% 100 VDCW 1/16W.
R449		Metal film: 100K ohms 5% 100 VDCW 1/16W.
R460		Metal film: 470 ohms 5% 100 VDCW 1/16W.
R461		Metal film: 10 ohms 5% 100 VDCW 1/16W.
R462		Metal film: 470 ohms 5% 100 VDCW 1/16W.
R463		Metal film: 1.0K ohms 5% 100 VDCW 1/16W.
R464		Metal film: 5.6K ohms 5% 100 VDCW 1/16W.
R465		Metal film: 10 ohms 5% 100 VDCW 1/16W.
R466		Metal film: 470 ohms 5% 100 VDCW 1/16W.
R467		Metal film: 100 ohms 5% 100 VDCW 1/10W.
R468		Metal film: 180 ohms 5% 100 VDCW 1/16W.
R469		Metal film: 680 ohms 5% 100 VDCW 1/16W.
R470		Metal film: 1.0K ohms 5% 100 VDCW 1/16W.
R471		Metal film: 5.6K ohms 5% 100 VDCW 1/16W.
R472		Metal film: 10 ohms 5% 100 VDCW 1/16W.
R473		Metal film: 470 ohms 5% 100 VDCW 1/16W.
R474		Metal film: 100 ohms 5% 100 VDCW 1/10W.
R475		Metal film: 270 ohms 5% 100 VDCW 1/10W.
R476		Metal film: 18 ohms 5% 100 VDCW 1/10W.
R490		Metal film: 0 ohms.(Used in A)
R490		Metal film: 680 ohms 5% 100 VDCW 1/16W.(Used in B)
R501		Metal film: 82 ohms 5% 100 VDCW 1/10W.
		-----TRANSISTORS-----
TR401		Silicon, NPN; sim to NEC 2SC3357.
TR431 and TR432		Silicon, NPN; sim to PANASONIC XN6401.
TR461 and TR462		Silicon, NPN; sim to NEC 2SC3357

SYMBOL	PART NO.	DESCRIPTION
C401	NOTE: Parts listed are for reference only. Refer to Service Section for serviceable parts.	-----CAPACITORS----- Ceramic: 120 pF 5% 50 VDCW temp coef 060 PPM .
C403		Ceramic: 100 pF 5% 50 VDCW temp coef 060 PPM.
C405		Ceramic: 68 pF 5% 50 VDCW temp coef 060 PPM.
C407		Ceramic: 10 pF 0.5 pF 50 VDCW temp coef 060 PPM (Used in A,,B).
C409		Ceramic: 100 pF 5% 50 VDCW temp coef 060 PPM (Used in A).
C409		Ceramic: 150 pF 5% 50 VDCW temp coef 060 PPM (Used in B).
C410		Ceramic: 47 pF 5% 50 VDCW temp coef 060 PPM (Used in A).
C410	Ceramic: 22 pF 5% 50 VDCW temp coef 060 PPM(Used in B).	
C411	Ceramic: 82 pF 5% 50 VDCW temp coef 060 PPM(Used in A).	
C411	Ceramic: 68 pF 5% 50 VDCW temp coef 060 PPM (Used in B).	

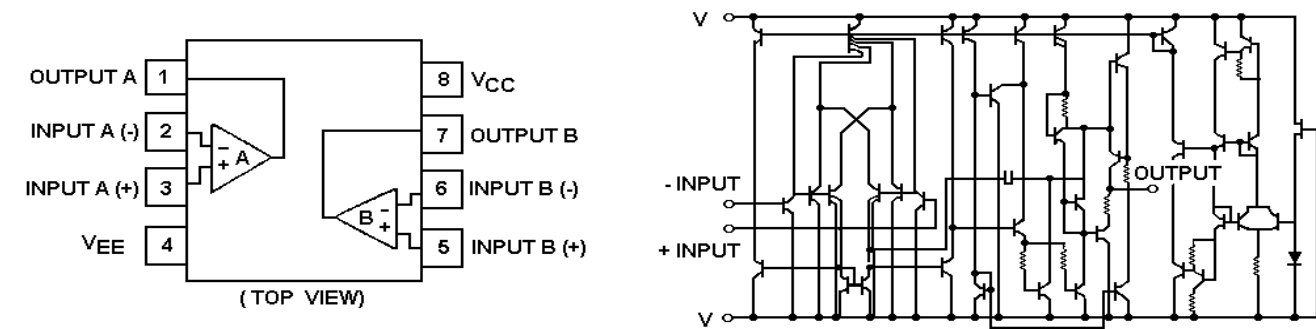
Synthesizer IC201
(MC145159FN)



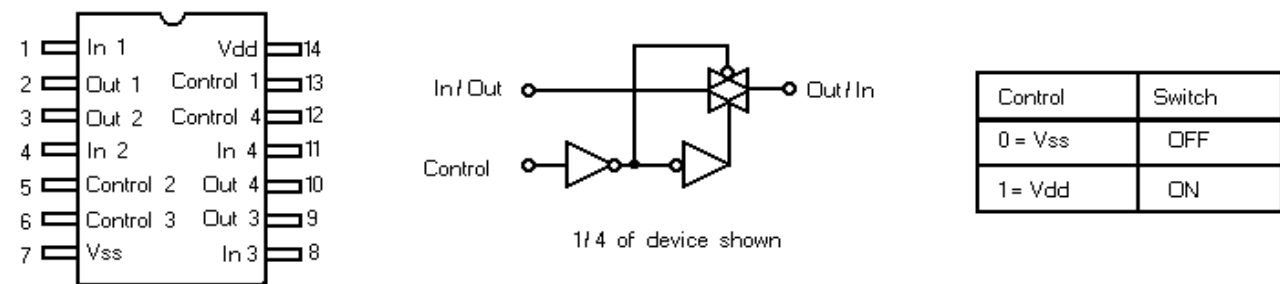
Dual Operational Amplifier IC202
(M5223FP)



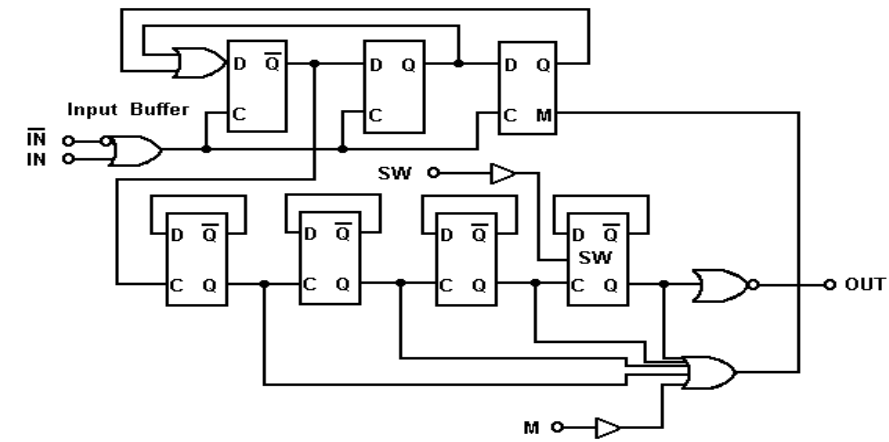
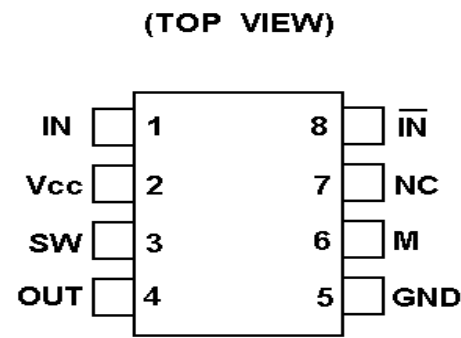
Dual Operational Amplifier IC203
(NJM3404AM)



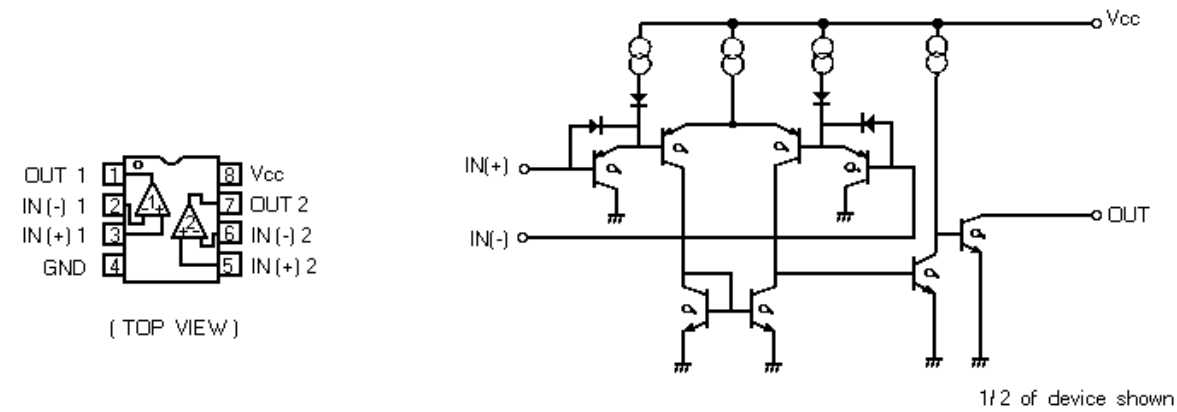
Bilateral Switch IC204, IC209, IC211
(MC14066BF)



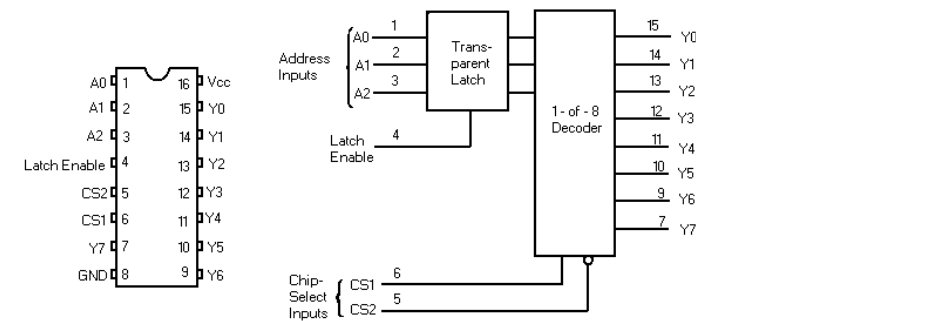
Prescaler IC205
(MB505PF)



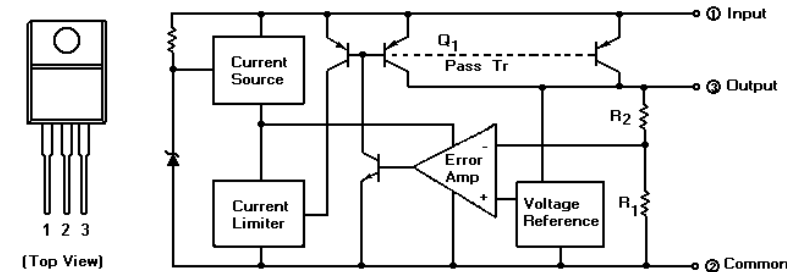
Dual Comparator IC207
(M5233FP)



Digital Decoder IC208, IC210
(MC74HC237F)



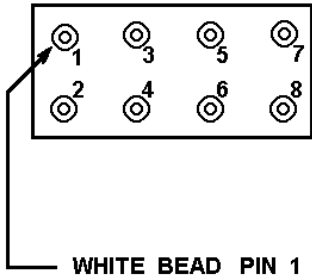
Positive Voltage Regulator IC230, IC481
(AN654I)



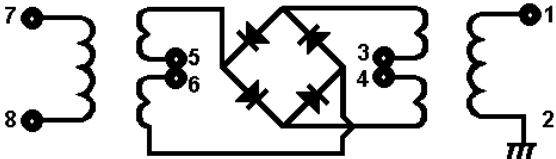
Double Balanced Mixer HC441

RECEIVER

PINOUT



CIRCUIT DIAGRAM



SYMBOL	CMN-350A-1 A (29-42 MHz)	CMN-350-1 B (35-50 MHz)
C409	100 pF	150 pF
C410	47 pF	22 pF
C411	82 pF	68 pF
C412	5 pF	22 pF
C413	27 pF	33 pF
C414	3 pF	0 pF
C415	56 pF	68 pF
C416	2 pF	3 pF
C440	150 pF	82 pF
C441	39 pF	33 pF
C445	82 pF	68 pF
C453	120 pF	100 pF
C456	330 pF	390 pF
C458	0 pF	180 pF
C461	560 pF	470 pF
C462	0 pF	100 pF
C469	120 pF	100 pF
C470	39 pF	33 pF

SYMBOL	CMN-350A-1 A (29-42 MHz)	CMN-350-1 B (35-50 MHz)
C474	82 pF	68 pF
C482	150 pF	82 pF
C496	0.01F	0 pF
C497	0 pF	0.01F
C4011	56 pF	47 pF
C4014	56 pF	47 pF
L402	H-6LALD24256	H-6LALD24206
L403	H-6LALD24258	H-6LALD24308
L408	H-6LALD24306	H-6LALD24305
L409	H-6LALD24306	H-6LALD24305
L412	84 nH	64 nH
R420 ~ R421	2.2 k Ohms	10 k Ohms
R426 ~ R427	2.2 k Ohms	10 k Ohms
R429	180 Ohms	270 Ohms
R430	33 Ohms	18 Ohms
R431	180 Ohms	270 Ohms
R490	0 Ohms	680 Ohms

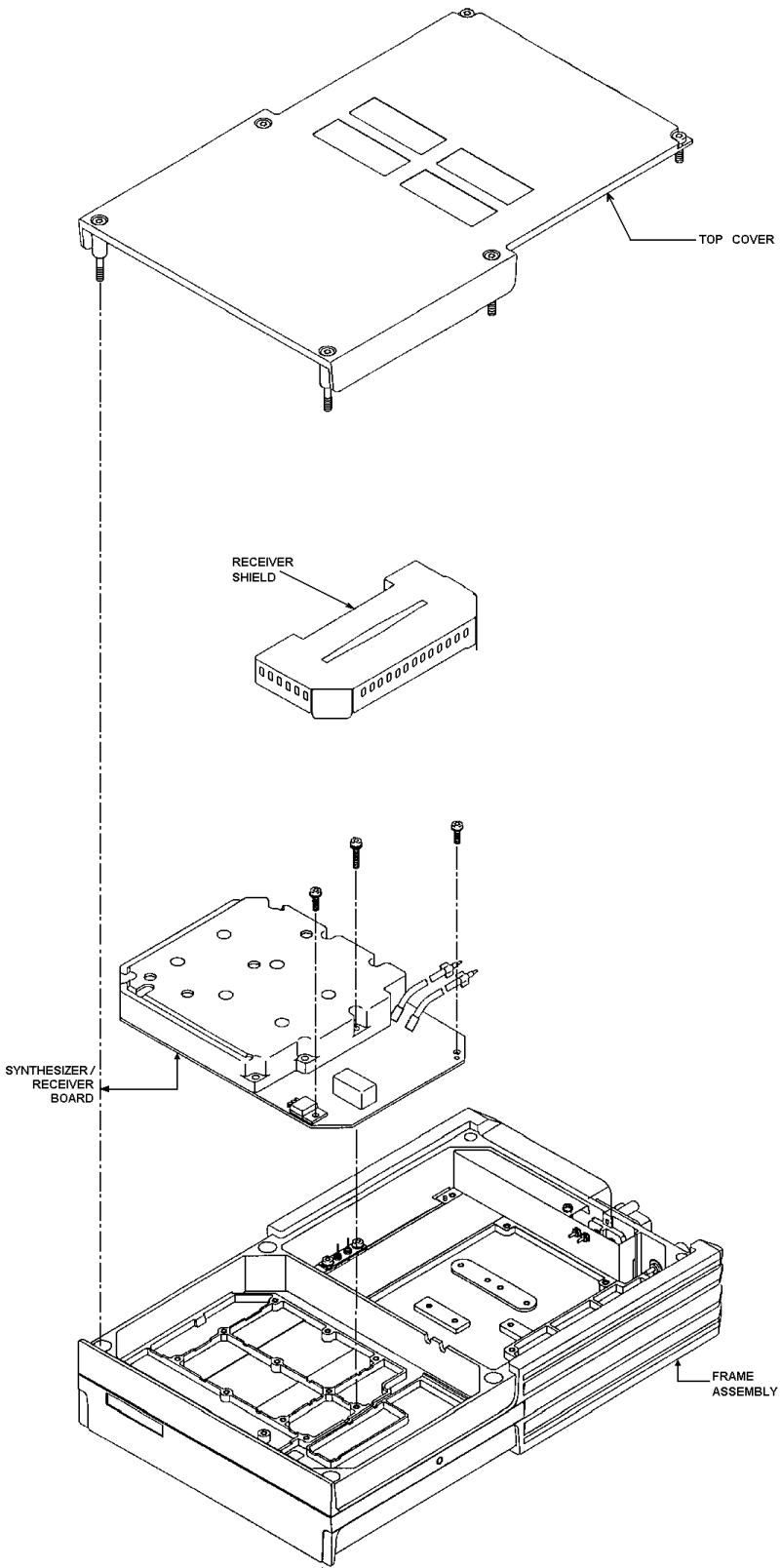
(DD00-CMN-350-1 2/2)

SYNTHESIZER

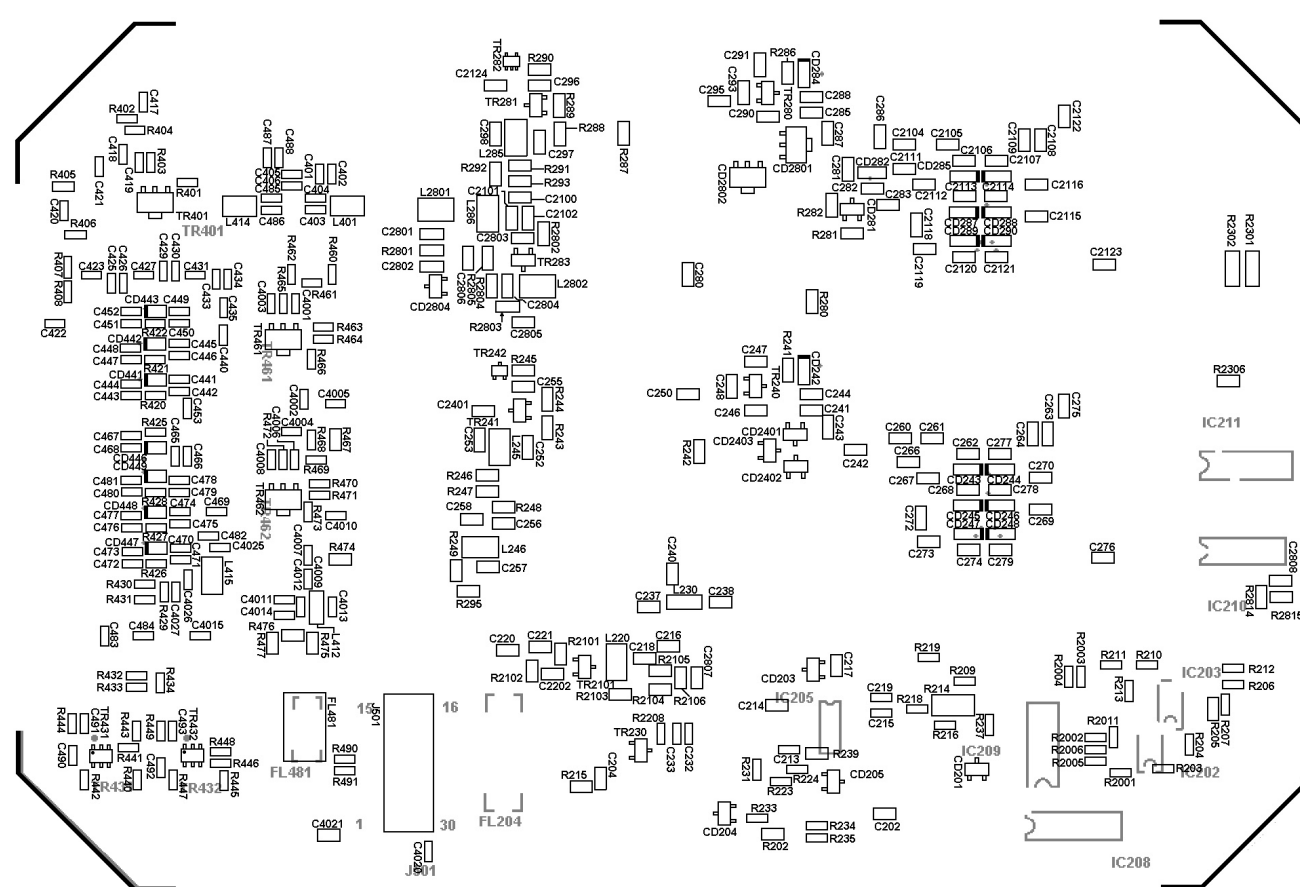
SYMBOL	A (29-42 MHz)	B (35-50 MHz)
C241	180 pF (UJ)	120 pF
C256	18 pF	18 pF
C257	33 pF	27 pF
C258	18 pF	18 pF
C260	18 pF	22 pF
C261	33 pF	33 pF
C262	4 pF	-
C266	39 pF	33 pF
C267	39 pF	39 pF
C268	4 pF	-
C272	39 pF	39 pF
C273	120 pF	47 pF
C274	4 pF	-
C277	5 pF	-
C278	5 pF	-
C279	5 pF	-
C281	6 pF	4 pF
C285	150 pF	82 pF
C288	330 pF	82 pF
C295	10 pF	5 pF
C2100	39 pF	33 pF
C2101	68 pF	47 pF
C2102	39 pF	33 pF
C2104	39 pF	33 pF
C2105	47 pF	39 pF
C2106	10 pF	2 pF
C2107	12 pF	3 pF
C2108	0.01 f	1000 pF
C2109	0.01 f	1000 pF
C2111	120 pF	47 pF
C2112	150 pF	100 pF
C2113	10 pF	2 pF
C2114	12 pF	3 pF

SYMBOL	A (29-42 MHz)	B (35-50 MHz)
C2115	0.01F	1000 pF
C2116	0.01F	1000 pF
C2118	470 pF	100 pF
C2119	560 pF	150 pF
C2120	10 pF	2 pF
C2121	12 pF	3 pF
C2122	0.01F	1000 pF
C2123	0.01F	1000 pF
C2807	82 pF	56 pF
L242	JR-NB-14063	JR-NB-14064
L246	68 nH	56 nH
L282	JR-NB-14061	JR-NB-14062
L286	100 nH	100 nH
L287	15 H	10 H
L288	15 H	10 H
L289	15 H	10 H
L290	15 H	10 H
L291	15 H	10 H
L292	15 H	10 H
R229	180 k Ohms	150 k Ohms
R230	82 k Ohms	68 k Ohms
R291	100 Ohms	100 Ohms
R292	68 Ohms	56 Ohms
R293	100 k Ohms	100 Ohms
R2002	82 k Ohms	68 k Ohms
R2003	150 k Ohms	120 k Ohms
R2004	150 k Ohms	82 k Ohms
R2005	10 k Ohms	10 k Ohms
R2006	33 k Ohms	33 k Ohms
R2810	10 k Ohms	15 k Ohms
R2811	15 k Ohms	22 k Ohms
R2812	22 k Ohms	33 k Ohms
R2813	33 k Ohms	39 k Ohms

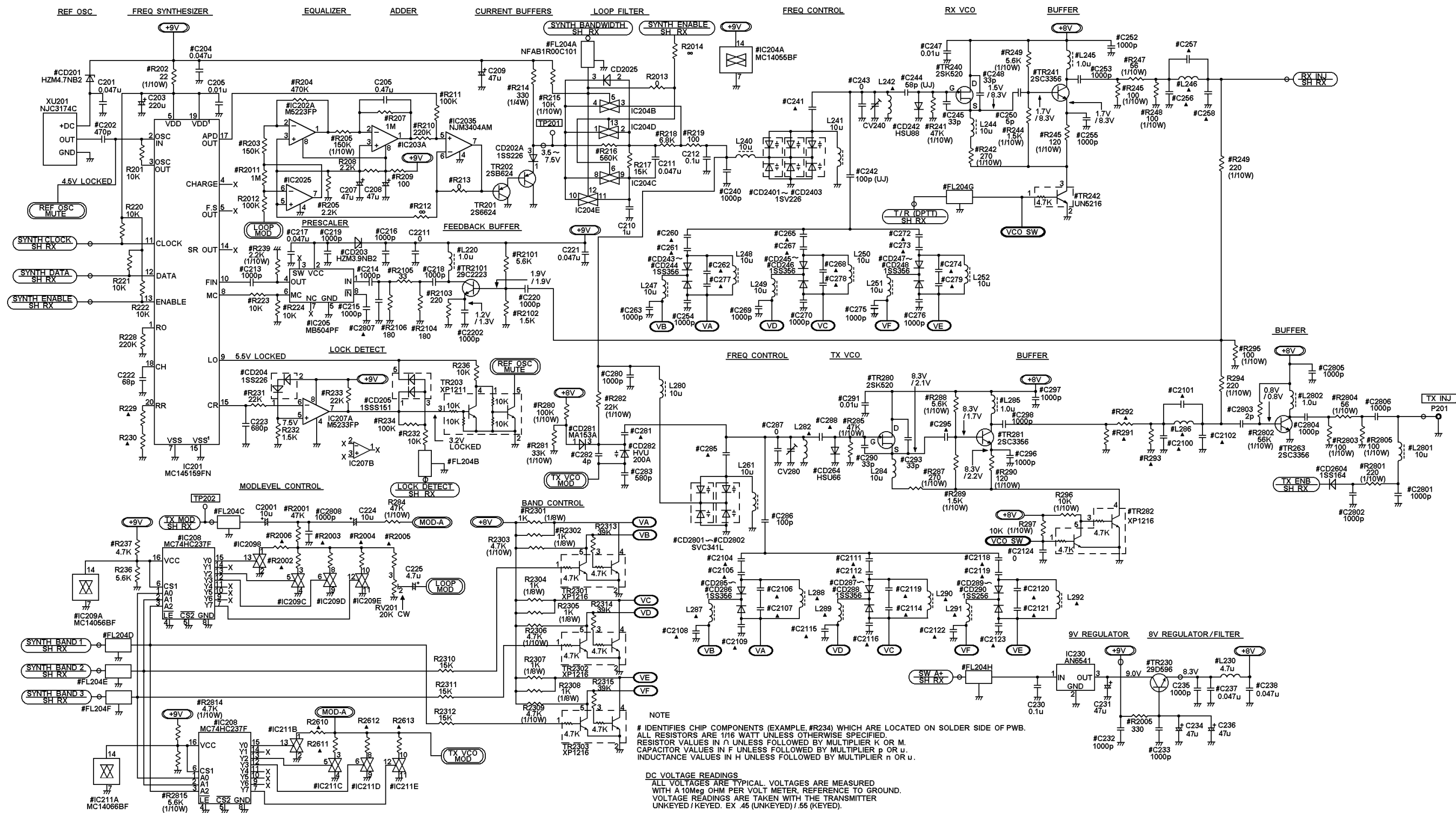
(DD00-CMN-350-1 2/2)



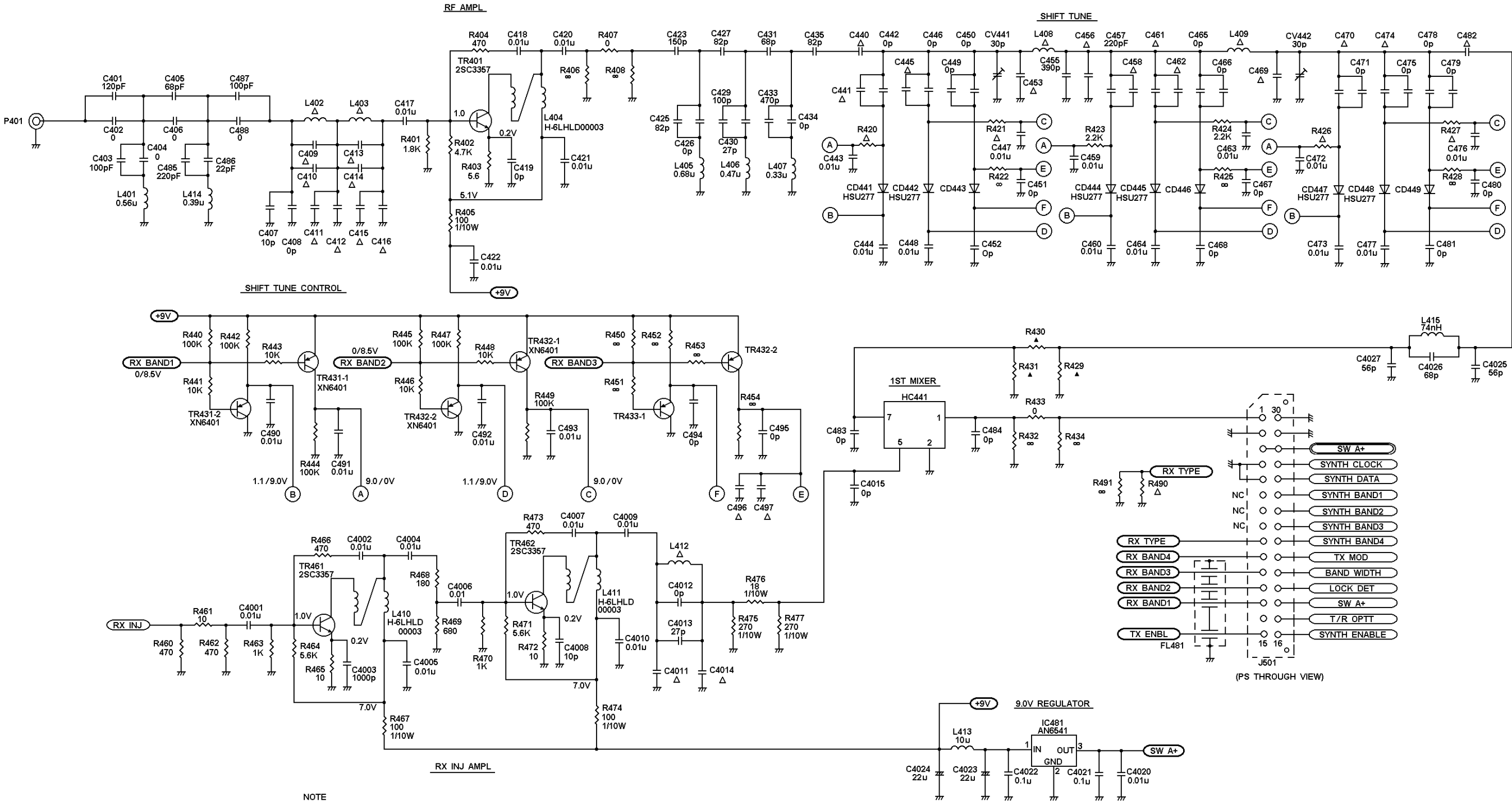
ORION LOW BAND
Synthesizer/Receiver

SOLDER SIDE

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ORION LOW BAND
Synthesizer
(DD00-CMN-350-2 1/2)



NOTE
ALL RESISTORS ARE 1/16 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER μ OR p
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER μ OR n.

ORION LOW BAND
Receiver
(DD00-CMN-350-1 1/2)