MCS 2000 Mobile Radio Service Instructions

Volume 2b

VHF Frequency Range Specific

68P81080C41-B, Issued 03/99

Safety Information

Every radio, when transmitting, radiates energy into the atmosphere which may, under certain conditions, cause the generation of a spark.

All users of vehicles fitted with radios should be aware of the following warnings:

Do not operate radio near flammable liquids or in the vicinity of explosive devices.

To ensure personal safety, please observe the following simple rules:

Check the laws and regulations on the use of two-way mobile radios in the areas where you drive. Always obey them. Also, when using your radio while driving, please:

- Give full attention to driving,
- Use hands-free operation, if available and
- Pull off the road and park before making or answering a call if driving conditions so require.

Airbag Warning

VEHICLES EQUIPPED WITH AIR BAGS

An air bag inflates with great force. **DO NOT** place objects, including communication equipment, in the area over the air bag or in the air bag deployment area. If the communication equipment is improperly installed and the air bag inflates, this could cause serious injury.

Installation of vehicle communication equipment should be performed by a professional installer/technician qualified in the requirements for such installations.

An air bag's size, shape and deployment area can vary by vehicle make, model and front compartment configuration (e.g., bench seat vs. bucket seats). Contact the vehicle manufacturer's corporate headquarters, if necessary, for specific air bag information for the vehicle make, model and front compartment configuration involved in your communication equipment installation.

LP Gas Warning

It is mandatory that radios installed in vehicles fuelled by liquefied petroleum gas conform to the National Fire Protection Association standard NFPA 58, which applies to vehicles with a liquid propane (LP) gas container in the trunk or other sealed off space within the interior of the vehicle. The NFPA58 requires the following:

- Any space containing radio equipment shall be isolated by a seal from the space in which the LP gas container and its fittings are located.
- Removable (outside) filling connections shall be used.
- The container space shall be vented to the outside.

Anti-Lock Braking System (ABS) and Anti-Skid Braking System Precautions

WARNING

Disruption of the anti-skid/anti-lock braking system by the radio transmitter may result in unexpected vehicle motion.

Motorola recommends the following radio installation precautions and vehicle braking system test procedures to ensure that the radio, when transmitting, does not interfere with operation of the vehicle braking system.

Installation Precautions

1. Always provide as much distance as possible between braking modulator unit and radio, and between braking modulator unit and radio antenna and associated antenna transmission line. Before installing radio, determine location of braking modulator unit in vehicle. Depending on make and model of vehicle, braking modulator unit may be located in trunk, under dashboard, in engine compartment, or in some other cargo area. If you cannot determine location of braking modulator unit, refer to vehicle service manual or contact a dealer for the particular make of vehicle.
2. If braking modulator unit is located on left side of the vehicle, install radio on right side of vehicle, and conversely.
3. Route all radio wiring including antenna transmission line as far away as possible from braking modulator unit and associated braking system wiring.
4. Never activate radio transmitter while vehicle is in motion and vehicle trunk lid is open.

Braking System Tests

The following procedure checks for the most common types of interference that may be caused to vehicle braking system by a radio transmitter.

1. Run vehicle engine at idle speed and set vehicle transmission selector to PARK. Release brake pedal completely and key radio transmitter. Verify that there are no unusual effects (visual or audible) to vehicle lights or other electrical equipment and accessories while microphone is NOT being spoken into.
2. Repeat step 1. except do so while microphone IS being spoken into.
3. Press vehicle brake pedal slightly just enough to light vehicle brake light(s). Then repeat step 1. and step 2.
4. Press the vehicle brake pedal firmly and repeat step 1. and step 2.
5. Ensure that there is a minimum of two vehicle lengths between front of

vehicle and any object in vehicle's forward path. Then, set vehicle transmission selector to DRIVE. Press brake pedal just far enough to stop vehicle motion completely. Key radio transmitter. Verify that vehicle does not start to move while microphone is NOT being spoken into.

6. Repeat step 5. except do so while microphone IS being spoken into.
7. Release brake pedal completely and accelerate vehicle to a speed between 15 and 25 miles/25 and 40 kilometers per hour. Ensure that a minimum of two vehicle lengths is maintained between front of vehicle and any object in vehicle's forward path. Have another person key radio transmitter and verify that vehicle can be braked normally to a moderate stop while microphone is NOT being spoken into.
8. Repeat step 7. except do so while microphone IS being spoken into.
9. Release brake pedal completely and accelerate vehicle to a speed of 20 miles/30 kilometers per hour. Ensure that a minimum of two vehicle lengths is maintained between front of vehicle and any object in vehicle's forward path. Have another person key radio transmitter and verify that vehicle can be braked properly to a sudden (panic) stop while microphone is NOT being spoken into.
10. Repeat step 9. except do so while microphone IS being spoken into.
11. Repeat step 9. and step 10. except use a vehicle speed of 30 miles/50 kilometers per hour.

LIST OF EFFECTIVE PAGES

MCS 2000 Mobile Radio Service Instructions

Volume 2b

VHF Frequency Range Specific Information

Motorola Publication Number 68P81080C41-B

Issue Dates of Original and Revised Pages are:

Original: April 1996
Revision A: December 1996
Revision B: March 1999

The Number of pages in this publication is 121 consisting of the following:

Page Number	Revision Letter	Page Number	Revision Letter
Front cover	B	17 through 38	A
Inside front cover (blank)	O	39 through 49	B
Title	B	50	O
Safety 0 through Safety 2	A	51 through 53	B
A and B	A	54	O
i	B	55 through 57	B
ii	B	58	O
1 through 4	B	59 through 61	B
5	O	62 and 63	O
6 through 16	B	64 through 69	B

LIST OF EFFECTIVE PAGES (Continued)

Page Number	Revision Letter	Page Number	Revision Letter
70 and 71	O	Questionnaire (Back)	O
72 through 108	B	Replacement Parts Ordering (Inside back cover)	O
Questionnaire (Front)	O	Back Cover	B

Note: A letter O in the Revision Letter column of the table above denotes an original page. Original pages ARE NOT identified as such in the page footors except by the ABSENCE of a revision letter and date.

IMPORTANT ELECTROMAGNETIC EMISSION INFORMATION

In August, 1996, The Federal Communications Commission (FCC) adopted an updated safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment. Motorola subscribes to this same updated safety standard for the use of its products.

In keeping with sound installation practice and to maximize radiation efficiency, a one-quarter (1/4) wave length antenna should be installed at the center of the vehicle roof. If it is necessary to mount the antenna on the vehicle's trunk lid, an appropriate 3db gain antenna should be used. This installation procedure will assure that vehicle occupants will be exposed to radio frequency energy levels lower than the limits specified in the standard adopted by the FCC in General Docket 79144.

To assure that radio frequency (RF) energy exposure to bystanders external to a vehicle is lower than that recommended by FCC adopted standard, transmit with any mobile radio only when bystanders are at least two (2) feet away from a properly installed externally mounted antenna for radios with less than 50 watts of output power, or three (3) feet away for radios with 50 watts or greater power.

Control Station Operation

In the event of Control Station operation, to assure operators and bystanders are exposed to radio frequency (RF) energy levels lower than the limits specified in the FCC adopted standard, the antenna should be installed outside of any building, but in no instance shall the antenna be within two feet (less than 50 watts power output) or within three feet (50 watts or higher power output) of station operators or bystanders.

Table of Contents

List of Figures

Note**:** Troubleshooting charts are listed on page 19; Component location, schematic diagram, and parts list illustrations are listed on page 39**.**

Introduction

1

This publication (Service Manual Volume 2b for MCS 2000 Radios, Motorola Publication Number 68P81080C41) provides frequency-range specific information for 110-Watt MCS 2000 Radios that operate in the VHF frequency range. It is a companion volume to Service Manual Volume 1 for MCS 2000 Radios, Motorola Stock Number 68P81083C20, which provides non-frequency-range-specific information for all MCS 2000 Radios.

Service personnel must have both Volume 1 and Volume 2b of the MCS 2000 Service Manual in order to have all service information for 110-Watt MCS 2000 VHF Range 1 and Range 2 Radios. In addition, for radios that are equipped with the Motorola SECURENET option, the SECURENET Option Service Manual, Motorola Stock Number 68P81080C25, is required.

There are several other Volume 2 service manuals (e, g., Volume 2a, 2c, 2d, 2e), which cover other models of the MCS 2000 Radio. Refer to Volume 1 of this service manual for a list of the publications related to operation and maintenance of all models of the MCS 2000 Radio, and the Motorola Stock Numbers for those documents.

Hereafter in this manual, the MCS 2000 Radio is referred to as the radio. The specific hardware portions of the radio covered in this volume of the service manual are as follows:

- Receiver Front End
- Receiver Intermediate Frequency (IF)
- Receiver Back End
- Synthesizer
- Power Amplifier

This volume of the service manual covers the following five topics for the specific hardware portions of the VHF radio listed above:

- Theory of operation
- Troubleshooting
- Component locations
- Parts lists
- Schematic diagrams

The five topics listed above for the controller section and for the control heads are covered in Volume 1 of this service manual, Motorola Publication Number 68P81083C20.

Theory of Operation

2

This chapter provides theory of operation information for the radio. It starts with a block diagram level functional description of the entire radio. This is followed by a detailed functional description for the receiver and transmitter functions of the radio. (Theory of operation for the controller, dc power control and regulation, and operator interface functions for the radio are covered in Volume 1 of this service manual.)

Introduction

The radio is composed of the following five major functions:

- Receiver
- Transmitter
- Controller
- Operator Interface (Control Head)
- Dc Power Control and Regulation

The radio consists of a main radio body and a control head. The main radio body contains two interconnected circuit card assemblies, a main transceiver board and a power amplifier (PA) board. The PA board is connected electrically to the (main) transceiver board with two connectors refered to as the 2-pin and 12-pin PA interconnects.

The operator interface function consists of the control head, which plugs into the main body of the radio. There are two different control head types: the Model II for the Model II Radio and the Model III for the Model III Radio. The two control heads are covered in their entirety in volume 1 of this service manual.

The radio is physically separated into six functional sections as follows:

- Receiver Front End
- Receiver Intermediate Frequency (IF)
- Receiver Back End [Zero Intermediate Frequency (ZIF)]
- Synthesizer
- Transmitter Power Amplifier (PA)
- Controller

The controller section is further divided into two sub-sections: common controller; and dc power control and regulation. The mechanical layout of the transceiver board and the electrical interconnections between its sections are illustrated in Chapter 4.

As previously mentioned, the power amplifier for the transmitter is located on a physically separate circuit board that plugs into the main portion of the transceiver board via 2-pin and 12-pin PA interconnects.

The component location diagrams, parts lists, and schematic diagrams for the controller section of the transceiver board and for the control heads are located in Volume I of this service manual. The component location diagrams, parts lists, and schematic diagrams, for the other five physical sections of the transceiver board and for the PA board are located in this volume (Volume 2b).

Block Diagram Level Theory of Operation

The following discussion refers to the functional block diagram for the radio, Figure 1.

The receiver function of the radio detects, demodulates, amplifies, and outputs via the loudspeaker, radio signals picked up by the vehicle or fixed-station antenna. The radio signal input to the receiver from the antenna reaches the receiver via the antenna switch, which is located in the transmitter function of the radio. The radio signals picked up by the antenna are signals that have been rebroadcast by trunked or conventional repeaters, or that have been broadcast directly by other mobile or fixed station radios.

The receiver function of the radio consists of: the receiver front end section; the receiver intermediate frequency (IF) amplifier section; the receiver back end section; and the audio signal filter (ASFIC) and receiver audio power amplifier circuits in the controller section.

The receiver function of the radio uses the double conversion superheterodyne design to optimize image rejection and selectivity. The receiver front end section converts the receiver input signal to a first IF of 109.65 MHz. The frequency upon which the receiver operates is determined by a first local oscillator signal generated by the synthesizer section. For the purpose of this discussion, the synthesizer section is considered to be part of the transmitter function of the radio.

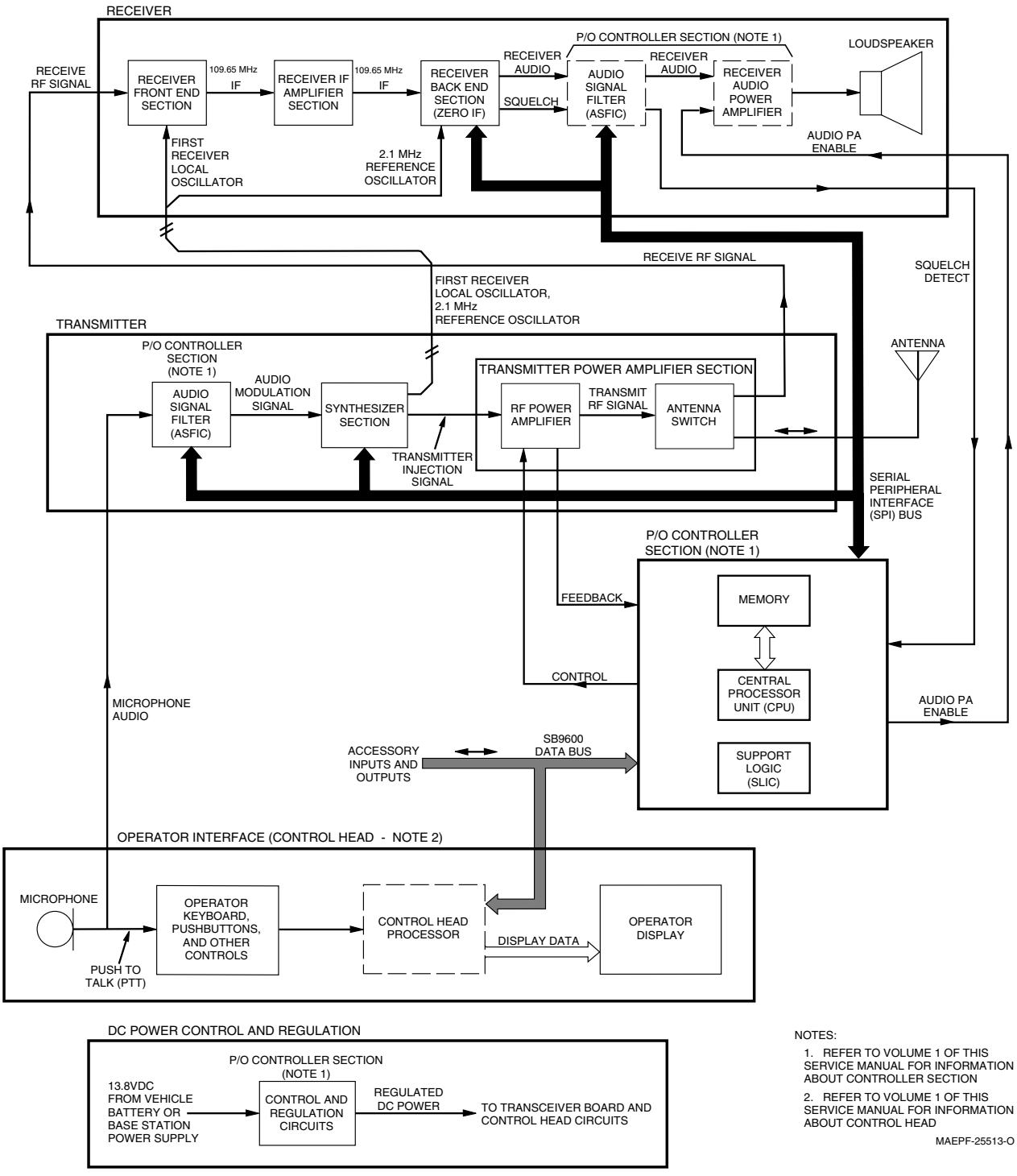


Figure 1 . VHF Radio Functional Block Diagram

The 109.65 MHz IF output signal from the receiver front end section passes through the receiver IF amplifier section where it is filtered and amplified. The 109.65-MHz output of the receiver IF amplifier section goes to the receiver back end section. In the receiver back end section, which contains the zero intermediate frequency (ZIF) integrated circuit (IC), the receiver IF signal is demodulated to produce receiver audio and squelch signals.

The receiver audio and squelch signal outputs from the receiver back end section are processed by the audio signal filter integrated circuit (ASFIC) in the controller section of the radio to generate receiver audio (filtered) and squelch detect signals. The filtering characteristics and other processes of the ASFIC are controlled by the central processor unit in the controller section.

The receiver audio signal (filtered) from the output of the ASFIC goes to the input of the receiver audio power amplifier circuit, which is located in the controller section of the radio. The receiver audio power amplifier circuit does not pass the receiver audio signal to the loudspeaker until it receives an audio PA enable signal from the controller section of the radio. The reason is that the receiver portion of the radio includes a squelch function, which prevents receiver noise from passing to the loudspeaker during periods of no signal reception.

The controller generates the audio PA enable signal based on such variables as the level of the received signal, the frequency channel, and the operating mode of the radio. When the audio PA enable signal is generated, the audio power amplifier (PA) is activated and passes the receiver audio signal to the loudspeaker.

The transmitter function of the radio produces a 110-Watt radio frequency output signal depending on the model of the radio. The radio frequency output signal is frequency modulated by an audio signal from the microphone or from another source such as a telephone keypad or handset.

The transmitter function of the radio consists of: the audio signal filter integrated circuit (ASFIC) in the controller section; the synthesizer section; and the transmitter power amplifier (PA) section. The ASFIC develops a modulation signal by amplifying an audio signal from the microphone, keypad, or handset. The synthesizer section generates a radio frequency carrier signal upon which the transmitter portion of the radio operates.The radio frequency carrier signal generated by the synthesizer section is frequency modulated in the synthesizer section by the modulation signal output from the ASFIC.

The frequency modulated output signal from the synthesizer section is amplified to the required 110-Watt power level by the transmitter PA section. The output of the transmitter PA section passes through the antenna switch and is radiated into space by the vehicle or fixed-station antenna.

The controller section of the radio contains a microprocessor that controls the radio in accordance with its built in programming as well as commands input manually by the radio operator. The radio operator inputs manual commands to the controller section using the pushbuttons and other controls located on the control head. In

addition to its controlling functions, the controller section provides audio amplification of the audio output signal in the receiver function. It also contains squelch detect circuitry based on a buffered discriminator signal from the Zero Intermediate Frequency Integrated Circuit (ZIF IC).

The operator interface function of the radio consists of: a microphone or the microphone portion of a telephone handset; a telephone keypad if used; the pushbuttons and other controls on the control head; and the digital and graphics displays on the control head. The pushbuttons and other controls on the control head provide digital commands to the controller section, and in some instances, hardwired commands to controlled circuits. The digital and graphics displays receive display data from the controller section. The control head contains its own microprocessor, which communicates with the controller section of the radio via an SB9600 serial digital data bus.

The DC power control and regulation function regulates and distributes to the various sections of the radio, DC power from the vehicle battery or fixed station power supply.

Receiver Detailed Functional Description

The portion of the receiver function that is *not* part of the controller section, is composed of three sections: receiver front end; receiver If, and receiver back end.

Front End

The following discussion is based on the schematic diagram for the receiver front end section located on pages 50 and 52 and the transmitter power amplifier (PA) section, page 69.

In the PA section, the radio signal from the antenna switch enters the high pass filter consisting of components C3587, C3588, C3598, L3582, and L3583. The high pass filter attenuates signals below the receiver passband, which is 136 to 174 MHz. The main purpose of the high pass filter is to attenuate undesired signals that could otherwise frequency multiply onto channel through non-linearities in the RF preamplifier. A PIN diode, CR3582, is inserted in the high pass filter. The diode helps to protect the receiver under transmit conditions through a forward bias provided by the keyed 9.1 voltage.

In the receiver section, the next stage is a two pole varactor tuned filter (R3301, C3306, C3307, C3308, C3347, C3304, CR3302, L3304, L3305, L3306, L3307). This filter provides more attenuation for out of band signals, and is tuned for each channel, so that undesired signals within the receiver passband are attenuated. The tuning voltage to the dual varactor (CR3302) is controlled by a digital-to-analog (D/A) converter in the controller section of the radio. The voltage can vary from 0 to 9 volts, depending on receive channel frequency. The varactors do not draw any appreciable amount of current in normal receive operation. The input to the varactor filter between L3304 and L3305 is a 50 ohm point, as is the RF connector on the radio.

A pair of schottky diodes (CR3303) in the varactor filter limit the signal amplitude going to the RF preamplifier. The Schottky diodes, in addition to two PIN diodes (CR3304 and CR 3305), which are located before and after the preamplifier, provide strong signal protection to the receiver. The PIN diodes are biased through a variable DC voltage, which is provided by the ZIF AGC output. Each PIN diode is driven by an operational amplifier (U3400). The PIN diodes are completely off at low signal levels, begin to turn on at -85dBm, and are completely on for signals greater than -10dBm.

The RF preamplifier (composed of components Q3302, R3407, L3405, C3309, C3310, R3361, R3362, R3420, R3359, R3405, C3499, C3354) is a low noise amplifier which sets the noise figure of the receiver. It exists in both standard and preamplifier versions of the radio, but is configured differently in each version. Components L3342, R3353, C3353, C3311, Q3301, C3350, C3301, R3354, R3355, C3352, R3357, L3341, C3312 form an active bias circuit for the RF preamplifier . The preamplifier draws about 30 mA of current in normal operation and operates from a 9.3 volt supply.

A fixed filter, composed of components C3407, C3404, C3412, C3403, C3406, C3405, C3402, C3314, C3313, C3315, C3316, C3317, C3318, C3319, C3320, C3321, C3322, C3323, C3324, C3330, L3327, L3328, L3413, L3408, L3409, L3410, L3411, and L3412, follows the preamplifier. This filter attenuates signals below 136 MHz and above 174 MHz and provides most of the attenuation for signals at 109.65 MHz (radio IF). The filter's main function is to provide rejection of signals at the image frequencies 355.3 MHz to 392.3 MHz. This is so the signals at these frequencies are not converted down to the 109.65 MHz IF by the mixer since the first LO uses frequencies of 245.65 MHz to 283.65 MHz.

The mixer section, composed of components Q3303, T3301, T3302, T3303, R3406, L3406, C3408, C3340, L3340, C3342, C3348, C3346, C3341, R3341, C3345, follows the fixed filter. The gallium arsenide double-balanced active mixer IC (Q3303) converts the incoming signal down to the 109.65 MHz IF using the first LO signal generated by the synthesizer. The frequency of the first LO is always 109.65 MHz higher than the incoming RF signal frequency. The incoming RF signal and the first LO reach the mixer IC through 4:1 baluns (T3301, T3302, T3303), so that the mixer can be biased from 5 volts and draw about 50 mA of current during normal operation. Under these conditions, the first LO power level is +11 to +12 dBm going into the mixer section when disconnected and terminated into 50 ohms.

The mixer IF termination diplexer (C3409, L3402, L3401, C3401, R3401) provides a wideband termination of approximately 50 ohms to the mixer, so that the mixer remains stable, fewer harmonics are produced by the mixer, and the mixer linearity remains high. The signal leaves the receiver front end via C3409 at 109.65 MHz and is applied to the receiver IF section. The output of the front end section at C3409 is a 50 ohm point.

Intermediate Frequency (IF)

The following discussion is based on the schematic diagram for the receiver IF on pages 54 and 56.

The main functions of the IF section are to provide optimum selectivity, high signal gain, and low noise. The IF section consists of an IF amplifier, two crystal filters, a resistive pad (R5376, R5377, R5378) to provide impedance stabilization, a termination for a mixer in the UHF version of the radio (not included in the VHF versions of the radio), and a 12-Volt regulator used for the front end of the UHF version of the radio and also not included in the VHF versions.

The 12 volt regulator consists of R5390, Q5390, C5410, C5411, R5395, VR5371. Only one of the six components of the regulator (R5390) is included in the VHF versions of the radio. It couples tuning voltage, from a D/A converter in the controller section of the radio, to the varactor filter.

The UHF mixer termination (L5374, C5371, R5375, C5370, C5412) supplies the UHF mixer with an approximate 50 ohm match on UHF radios. Thus, R5375 should be the only component placed among these on VHF radios.

The two pole crystal filters (Y5378 and Y5379) provide some adjacent channel selectivity and spurious rejection further away from 109.65 MHz. This essentially rejects all signals except the on-channel 109.65 MHz signal that is to be demodulated.

The IF amplifier (Q5388, L5301, R5379, C5301, R5388, R5301, C5386, R5387, C5382) is actively biased (R5386, C5385, C5418, L5380, C5384, C5417, Q5382, R5385, R5384, R5382, L5399, C5383, C5415) by Q5382 and provides about 12 dB of gain with a noise figure of about 3 dB. It operates from 9.3 volts and draws about 30 mA of current in normal operation.

The other capacitors and inductors (C5377, C5376, L5376, C5378, C5379, L5377, L5378, C5380, C5381, L5379, C5375, C5387, C5303, C5372, L5381, C5388, C5389, L5382, C5390, L5383, C5391, C5302, L5302) provide an impedance match from the 50 ohm IF section input to the first crystal filter, from the first crystal filter to the IF amplifier, from the IF amplifier to the second crystal filter, and from the second crystal filter to the back end section.

A 150 ohm resistor (R5389) is used at the output of the IF section to provide impedance stabilization between the receiver back end section and the second crystal filter in the receiver IF section. The crystal filter input and output impedances are approximately 200 ohms.

Back End

The following discussion is based on the schematic diagram for the receiver back end on pages 58 and 60.

The selectivity of the receiver back end is provided by programmable filters contained in the Zero Intermediate Frequency Integrated Circuit (ZIF IC). The filter bandwidth is adjusted automatically by the controller section of the radio to a bandwidth appropriate for the channel spacing. The ZIF IC (U3201) uses a type of direct conversion process, whereby the second LO frequency is very close to the

frequency of the received IF signal. The voltage controlled oscillator (VCO) for the second LO in the synthesizer section of the radio, is phase-locked to the IF signal and tracks it with a small offset frequency.

In the absence of an IF signal, the second LO VCO searches for a signal. When an IF signal is received, the second LO VCO locks on the signal. The second LO VCO is a Vackar oscillator built around transistor Q3201. A varactor diode (CR3201) adjusts the frequency of the VCO according to feedback voltage from the ZIF IC. This voltage is normally in the range of 1.0 to 3.5 volts.

The feedback voltage is routed through a loop filter consisting of R3215, R3204, C3214, C3215, R3203 and C3233.

The ZIF IC performs several other functions. In addition to providing selectivity, it also provides limiting and FM demodulation functions. The ZIF IC provides a Received Signal-Strength Indicator (RSSI) and a squelch output. The RSSI is a DC voltage monitored by the controller section of the radio. It is used as a peak indicator during the bench tuning of the receiver front end varactor filter. The RSSI voltage is routed from the receiver back end to the controller. The RSSI voltage is available as an auxiliary output at pin 22 of the radio's accessory connector. RSSI is also routed to the option connector located in the controller section of the radio.

The ZIF IC also provides a squelch output on pin 29. The squelch signal is routed to shaping and detection circuits in the Audio Selective Filter Integrated Circuit (ASFIC) located in the controller section of the radio. The ASFIC has squelch detect and channel activity outputs that are routed to the controller section of the radio, which in turn controls audio muting and unmuting.

The ZIF IC has both internal and external automatic gain control (AGC) circuitry. This circuitry is used to prevent strong signal overload of the filter circuits in the ZIF IC. The external AGC circuitry is located in the receiver front end section.

In addition to the audio output signal, the receiver section provides a squelch signal output, which also is processed and used by the controller section of the radio to mute receiver output noise during periods of no signal reception.

Refer to the discussion under the title Receive Audio Circuits located in the theory of operation portion in volume I of this service manual.

Transmitter Detailed Functional Description

The transmitter function of the radio is distributed between the controller, synthesizer, and transmitter power amplifier (PA) sections as shown in figure 1.

The portion of the transmitter function physically located in the controller section is described in the controller section theory of operation located in volume I of this service manual. That portion includes the audio circuits that filter, amplify, and otherwise process the audio signal from the microphone and/or telephone handset.

The portion of the transmitter function located in the synthesizer section of the radio is described in the synthesizer theory section located in the paragraphs that follow. The synthesizer section of the transmitter receives the amplified and processed audio signal from the controller section and produces a frequency modulated radio frequency carrier (injection) signal, which is input to the transmitter power amplifier (PA) section.

The remaining part of the transmitter function is physically located in the PA section. The description for this section follows the synthesizer section of this manual.

Synthesizer Detailed Functional Description

The synthesizer section of the radio generates the first local oscillator for the receiver portion of the radio. It also generates the transmitter RF carrier signal, which is frequency modulated by the amplified and processed audio signal from the output of the audio signal filter IC (ASFIC) in the controller section. The frequency modulated transmitter RF carrier signal is amplified by the transmitter PA section of the radio.

The following discussion is based on the schematic diagrams for the synthesizer section on pages 62 and 65 and VCOs located on pages 63 and 66.

The synthesizer section consists of a Pendulum reference oscillator (U3800) and a phase locked loop (PLL), which is made up of a fractional-n synthesizer integrated circuit (U3801), a loop filter, four voltage controlled oscillators (VCOs), buffer amplifiers, and a feedback amplifier.

The Pendulum reference oscillator contains a temperature compensated crystal, which has an oscillation frequency of 16.8 MHz. The output of the oscillator is applied to pin 14 of U3801 (U3801-14) via C3754 and R3750.The fractional-n synthesizer IC, U3801, consists of a prescaler, a programmable loop divider, control divider logic, a phase detector, a charge pump, an A/D converter for low frequency digital modulation, a balance attenuator to balance the low and high frequency analog modulation, a 13V positive voltage multiplier, a serial interface for control, and a super filter for the regulated 9.3 V.

Q3770 is a current amplifier for the super filter. The output voltage of the super filter drops from 9.3V to 8.5V. This filtered 8.5 Vdc supplies the voltage for the VCOs, their corresponding buffers, and the synthesizer charge pump resistor network (R3754). The synthesizer supply voltage is provided by the 5V regulator. The 2.1 MHz reference signal is generated by dividing down the signal of the reference oscillator after it is applied to U3801-14. In addition to the synthesizer section, the 2.1-MHz reference clock is also used by the controller and receiver back end sections of the radio.

To generate a high voltage that supplies the charge pump output stage at pin VEE2 (U3801-36), 13V is generated at CR3750-1 by the positive voltage multiplier circuitry(CR3750). This voltage multiplier is basically a diode capacitor network driven by two 180 degrees out of phase signals (U3801-8 and U3801-9).

The serial interface (SRL) is connected to the controller section of the radio via the data line (U3801-2), clock line (U3801-3) and chip enable line (U3801-4). Proper enabling of these lines allows the controller section to load the fractional-n synthesizer IC.

All four VCOs are varactor tuned. The VCO frequencies are controlled by the voltage output of the loop filter. This control voltage ranges from about 2.5 to 10.5 Vdc. A small control voltage produces a lower frequency and a large control voltage produces a higher frequency.

There are two receive VCOs. These provide the first LO injection frequency for the receiver, which is 109.65 MHz above the carrier frequency. One VCO operates in the frequency range of 245 MHz to 260 MHz, and the other from 260 to 284 MHz. There are also two transmit VCOs, which generate the RF carrier. One operates in the frequency range of 136 to 155 MHz, and the other from 155 to 174 MHz.

The VCOs are activated by the auxiliary lines on the fractional-n synthesizer IC. Aux2 (U3801-38) and Aux4 (U3801-40) turn on the low and high receive VCOs, respectively. Aux1 (U3801-37) and Aux3 (U3801-39) turn on the low and high frequency transmit VCOs, respectively.

Following the receive VCOs is a buffer stage (Q3781), which provides gain and isolation. The output from the buffer stage passes through an attenuator network (R3773, R3771, C3830) and is then applied to the input of the feedback amplifier (Q3790). To close the synthesizer loop, the output of Q3790 is connected to the PREIN port of the synthesizer, (U3801-21). The buffer output also provides signal for the receiver LO injection.

The loop filter (which consists of R3760, R3761, R3762, C3775, C3776, C3778) transforms this current into a voltage. The output of the loop filter is sent to varactor diodes, which changes the frequency. In transmit mode, the voltage is applied to CR3756-3 for low VCO and CR3754-3 for the high VCO. In receive mode, the voltage is applied to CR3903-3 and CR3904 for the low VCO and CR3901-3 and CR3902 for the high VCO.

The audio signal from the controller is applied to fractional-n synthesizer IC, U3801-5. An A/D converter in the fractional-n synthesizer IC converts the low frequency portion of the analog modulating signal into a digital code, which is applied to a loop divider. This causes the carrier frequency to deviate.

A balanced attenuator is used to adjust the VCO deviation sensitivity to high frequency modulating signals. The output of the balanced attenuator is present at the MOD OUT (U3801-30). This signal then goes through a resistive divider and into a varactor diode (CR3753). This changes the total capacitance within the transmit VCOs and frequency modulates the carrier.

The transmit injection in the synthesizer consists of a buffer stage (Q3789) and two amplifier stages (Q3782, Q3784) whose main purpose is to maintain a constant output to drive the RF power

amplifier and to provide isolation. The output of Q3782 is fed into the attenuator network and the feedback amplifier to close the loop.

The TX injection string is on only during the transmit mode with K9.1V.

Power Amplifier (PA)

Overall PA

The following discussion is based on the schematic diagram for the power amplifier (PA) on page 69.

The transmitter PA consists of a four stage power amplifier followed by an antenna switch, harmonic filter and directional coupler. The four stages of the power amplifier are: controlled stage Q3500; pre-driver Q3520; driver U3540; and final amplifier U3560 and U3561.

In the transmit mode, the PA amplifies the TX injection signal (10 milliwatt amplitude via J3500-5) to a nominal 110 watt level at the antenna connector (J3503) while providing isolation to the receiver front end. In the receive mode, the PA provides a low loss path from the antenna connector to the RX interface connector (J3501). It also distributes A+ voltage from the A+ connector (J3502) to the main board (J3500-1).

The first PA stage (controlled stage) provides a gain that is a function of control voltage (PA_CNTRL, J3500-8). This control voltage comes from the power control section in the controller section of the radio. The control voltage magnitude depends on PA forward output power, temperature, and final amplifier current drain.

For a detailed explanation of the power control function, refer to the paragraph, titled 110-Watt PA Power Control Function, located at the end of this section.

The gain of the controlled stage device (Q3500) is determined by the collector current. The Q3500 BJT device and associated circuitry (Q3501, Q3502, R3509, R3505, R3506, R3507 and R3508) are best described as a voltage-controlled current source. This means that the Q3500 collector current is controlled by the control voltage magnitude. As the controlled voltage is increased, Q3500 collector current increases. By controlling the output power of the Q3500 Class A stage and in turn the input power of the following stages, the power control loop is able to regulate the transmitter output power.

The 200 milliwatt nominal output power of the controlled stage is transferred to the second (predriver) PA stage input by a bandpass match consisting of L3500, C3510, C3511, L3502 and a transmission line.

The predriver device (Q3520) is an enhancement mode N-channel MOSFET which requires a positive gate bias to set its quiescent drain current for proper Class A-B operation. The gate bias voltage is determined by a voltage divider resistor network consisting of K9.1 (J3500-11), R3521, R3522, R3523 and R3524. R3521 and R3523 are laser trimmed at the factory to achieve the desired drain current when the board is manufactured.

Components R3525 and R3528 enhance the stability of device Q3520 at the lower operating frequencies. The network consisting of L3614, C3624, R3610 and L3613 provide A+ to the Q3520 drain. The nominal output power of the predriver stage is 3 watts. The device is heat-sinked to the chassis via H3520.

A matching network consisting of C3520, L3520, C3521, C3522 and a transmission line transfer power to the input of the third (driver) PA stage. The driver stage BJT (U3540) is operated Class C with L3540, L3541 and R3540 forming the zero volt DC base bias. A+ voltage is distributed to the U3540 collector by L3617, C3629, R3619 and L3616. The output power of the driver stage is nominally 30 watts. The heat sink for device U3540 is screwed directly to the chassis.

The final amplifier stage is the parallel combination of two RF transistors (U3560 and U3561). The matching network, from the U3540 collector to the bases of U3560 and U3561, utilizes several capacitors and transmission lines as part of a combination matching network and power splitter, providing approximately 15 watts to the base of each final stage device. Each final stage device is operated Class C with L3560, L3561, R3558 and R3560 forming the U3560 BJT base bias (L3564, L3565, R3559 and R3568 for U3561). Both final stage devices are screwed directly to the chassis. Resistors R3565, R3566, R3567 improve the division of drive power between the final stage devices. Both U3560 and U3561 utilize a series RLC feedback network to suppress parasitic oscillations.

The final stage output network serves the dual purpose of impedance matching and power combining for the two final stage devices. This network consists of coils L3566 and L3567, several capacitors, and several transmission lines and transfers approximately 125 watts to a 50 ohm circuit impedance point at junction of C3578 and CR3584.

R3562 and R3563 help balance the load impedances presented to the U3560 and U3561 collectors. A+ voltage is supplied to both final devices via L3611, L3612, R3616, C3620, C3623, VR3610 and the current sense resistor R3617. The transorb diode, VR3610, in conjunction with a spring contact in the chassis provides reverse polarity and over-voltage protection for the radio. Heat sinks H3560 and H3580 are used to channel heat from the PC board to the chassis.

The antenna switch utilizes PIN diodes to form a low loss, high isolation RF relay. During transmit, PIN diodes CR3584, CR3581, and CR3582 are forward biased by the K9.1 supply via L3580, R3582 and R3586. In this state, a low loss path exists from the final amplifier through CR3584 into the harmonic filter and at the same time provides protection to the receiver front end from excessive RF levels. During receive both diodes remain unbiased and provides a low loss path from the harmonic filter to the receiver front end.

Capacitors C3587 through C3589 and C3598, and inductors L3582 and L3583 form a high pass filter in the receive path to attenuate frequencies at half the intended RX frequency. Resistors R3580, R3581, R3584 and R3585 channel heat away from CR3584.

A low-pass harmonic filter, consisting of C3596, L3593, L3590, C3591, L3591, C3593, L3592 and C3594, follows the antenna switch. The

filter's primary function is to attenuate harmonic energy generated by the amplifier stages, but also adds some selectivity for the receiver. R3590 and R3591 channel heat away from coil L3591. The filter is shielded via SH3590 and SH3591 to lessen the amount of harmonic energy bypassing the filter.

The directional coupler is the last circuit block before the antenna connector. The coupler is composed of a pair of parallel microstrip transmission lines, which form a forward power sensing directional coupler and detector. The output of the directional coupler and detector is a DC voltage proportional to the forward RF power output from the PA. Diode CR3600 rectifies the RF energy which appears across it. This voltage is then divided by R3601, RT3604, R3605, R3606 and R3607 and is routed back the power control circuit block (V_FORWARD, J3500-12) on the main board. The directional coupler circuit is shielded by SH3600 and SH3592 to lessen the amount of harmonic energy bypassing the harmonic filter.

PA Power Control

The following discussion is based on the simplified schematic diagram for the PA power control function, Figure 2. The first (controlled) stage of the PA provides a gain that is a function of control voltage (PA_CNTRL, J3500-8). The control voltage is routed from the power control section in the controller section of the radio. The magnitude of the control voltage depends on PA forward power, PA temperature, and final amplifier current drain. The magnitude of the control voltage depends on PA forward power, PA temperature, final amplifier current drain, and radio A+ voltage.

The coupler detect voltage (V_FORWARD, J3500-12), which is proportional to PA forward power, is buffered and summed with PA_PWR_SET provided by the D/A converter (U0551). The resultant voltage level is compared with a reference voltage at U0550-4. Any voltage level difference between U0550-4, pins 9 and 10 causes an increase or decrease in PA_CNTRL, which results in a corresponding change in the V_FORWARD voltage level from the PA. The loop operates in this manner unless it is limited by one or more of the four protection mechanisms described below.

The first protection mechanism limits the maximum magnitude of the PA_CTRL voltage. The maximum allowable PA_CNTRL voltage is determined by PA_CNTRL_LIM (J3500-7). If PA_CNTRL_LIM increases to a level where CR0551 is forward biased, the voltage level at U0550-9 and U0550-4 is clamped and PA_CNTRL cannot increase any further. Control voltage limiting protects the power amplifier against being overdriven and foldback.

The next protection mechanism limits the maximum dc current input to the final devices (U3560 and U3561) in the PA. The dc input to the final devices is measured by the voltage drop across a series resistor (R3617). CURRENT_SENSE+ (J3500-2), the A+ side of R3617, is summed with CUR_LIM_SET from the D/A Converter (U0551). The sum is compared with CURRENT_SENSE- (J3500-10), the device side of R3617, at U0550-2.

A change in the voltage level difference between U0550-2, pins 5 and 6 causes a corresponding increase or decrease at U0550-2, pin 7. If the U0550-2, pin 7 voltage increases to a level where CR0550 (diode 2-3) is forward biased, the voltage level at U0550-4, pin 9 is clamped and PA_CNTRL cannot increase any further. Thus if the voltage drop across R3617 in the PA increases due to increasing final stage current and the voltage at U0550-2, pin 7 increases to the clamping level, the transmitter is current limited. Current limiting protects the final amplifier stage from excessive current drain.

The third protection mechanism is temperature limiting. Thermistor RT3610, which is physically located near the final PA devices, determines the voltage level at U0550-1, pin 2. This level is compared with a set reference level at U0550-1, pin 3. If the voltage level difference at the input of U0550-1 results in an increase in the output voltage sufficient to forward bias CR0551 (diode 1-3), the voltage level at U0550-4, pin 9 is clamped and PA_CNTRL cannot increase any further. Temperature limiting protects the radio from reaching an excessive temperature.

The last protection mechanism is a high-temperature overvoltage protection circuit. This circuit protects the radio from excessive PA temperatures under conditions of high ambient temperature and high A+ voltage. The high-temperature overvoltage protection circuit consists of U3500, VR3611, Q3521 and the associated circuitry.

If the A+ voltage increases to a level where the voltage at pin 3 of U3500-1 exceeds a 5.6 volt reference set by VR3611 (A+ approximately 15.3 volts), the voltage at pin 1 of U3500-1 increases from its normal operating potential (ground) to a set voltage level. The set voltage level is routed to R3600, which applies a DC forward bias to coupler detector diode CR3600. This increases the detected voltage level for a given forward power level.

The power control circuits reduce the forward power to stabilize the loop. However, if the voltage across thermistor RT3610 is above approximately 4.5V, indicating a PA low temperature condition, the voltage at pin 14 of U3500-3 increases. This turns on Q3521 and thereby prevents the voltage at pin 1 of U3500-1 from increasing.

For a more detailed description and a schematic diagram, refer to the controller theory of operation in Volume 1 of this service manual.

Controller Detailed Functional Description

The theory of operation for the controller section of the radio is located in Volume 1 of this service manual.

Dc Power Control and Regulation Detailed Functional Description

The theory of operation for the dc power control and regulation section of the radio is located in Volume 1 of this service manual.

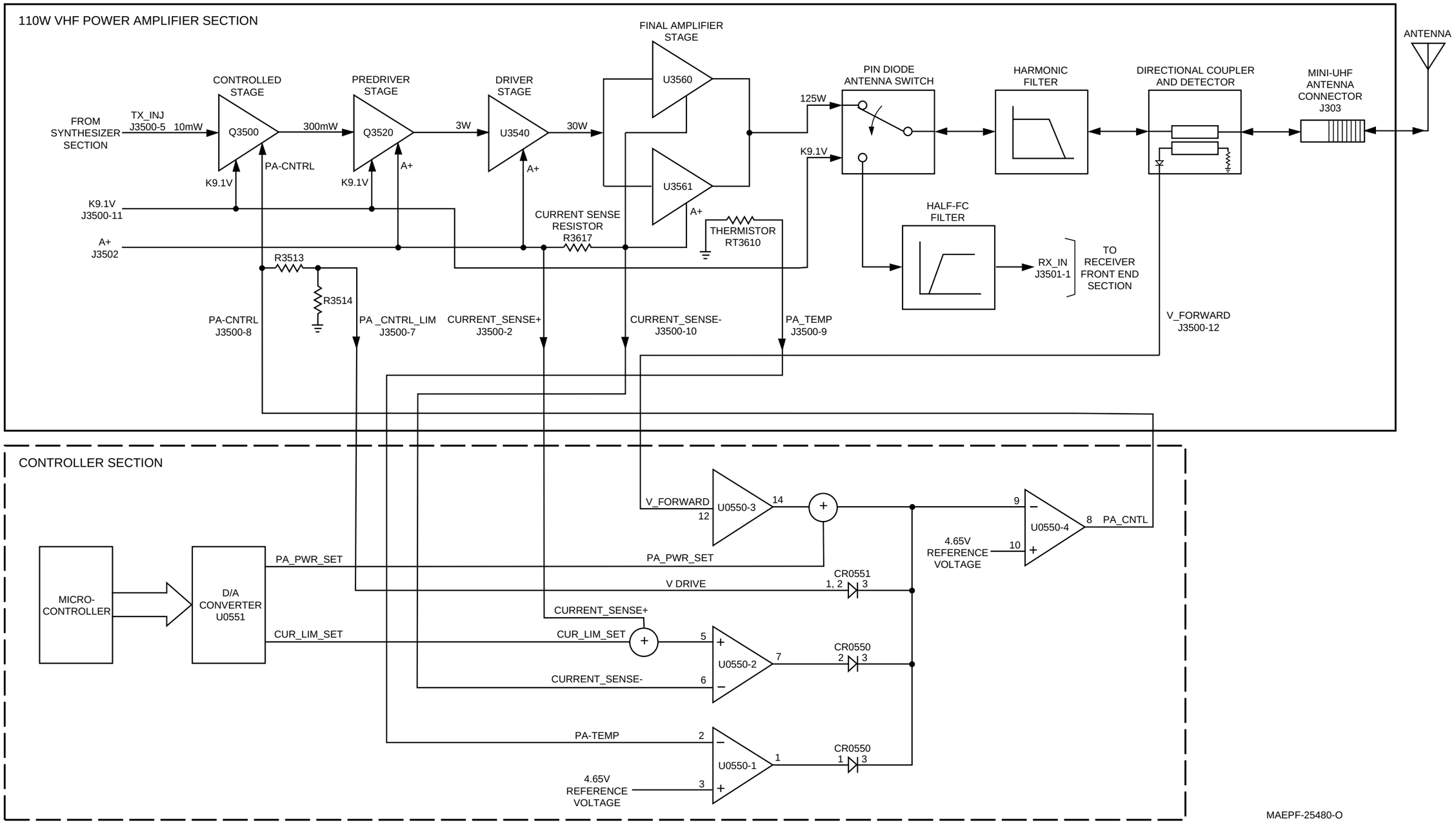


Figure 2. PA Power Control Simplified Schematic Diagram

NOTES

Troubleshooting

3

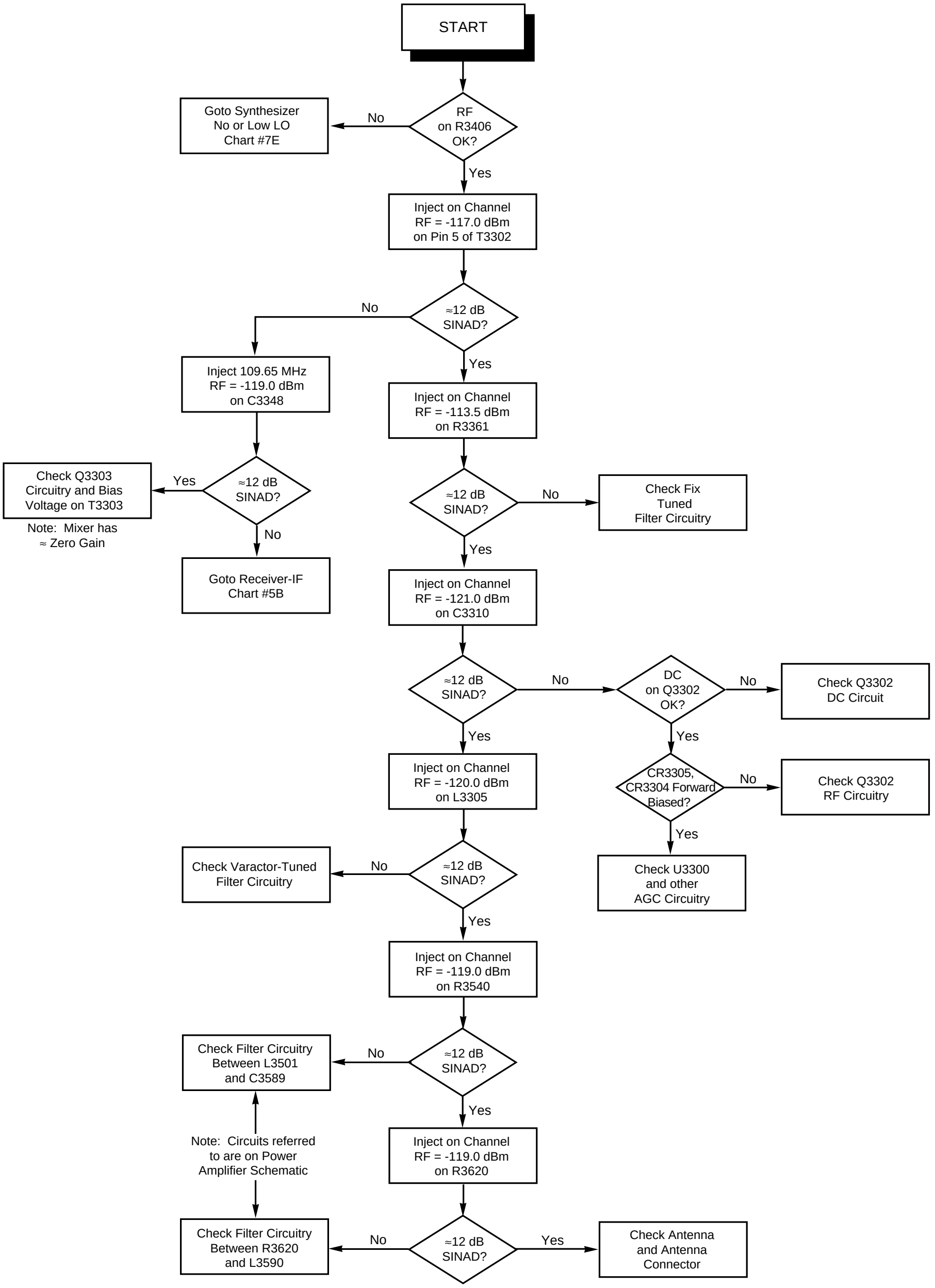
This chapter contains the troubleshooting flowchart diagrams (Charts) listed below for the receiver, power amplifier, and synthesizer sections of the radio:

NOTE: Troubleshooting Charts number 1-1 through 1-13 are located in Volume 1 of this Service Manual, Motorola Publication Number 68P81083C20, because they are common to all models of the radio.

NOTE: Troubleshooting information and troubleshooting Charts for the SECURENET Option for the radio are located in the SECURENET Option Service Manual, Motorola Publication Number 68P81083C25.

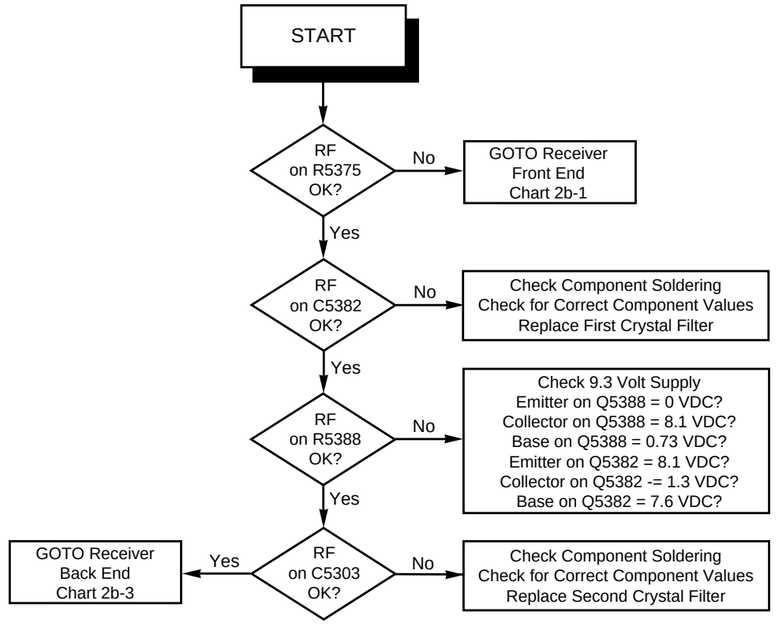
- **Overall Radio:**
  - Refer to Troubleshooting Chart 1-1 in Volume 1 of this service manual.
- **Receiver:**
  - Troubleshooting Chart 2b-1, Receiver Front End - Page 21
  - Troubleshooting Chart 2b-2, Receiver IF - Page 22
  - Troubleshooting Chart 2b-3, Receiver Back End -Page 24
- **Synthesizer:**
  - Troubleshooting Chart 2b-4, Synthesizer Deviation - Page 28
  - Troubleshooting Chart 2b-5, Synthesizer Pendulum Oscillator - Page 29
  - Troubleshooting Chart 2b-6, Synthesizer FAIL 001 - Page 30
  - Troubleshooting Chart 2b-7, Synthesizer No Transmit - Page 31
  - Troubleshooting Chart 2b-8, Synthesizer No or Low Transmitter Injection Signal - Page 32
  - Troubleshooting Chart 2b-9, Synthesizer No or Low Receiver LO Signal - Page 33

- **Power Amplifiers:**
  - Troubleshooting Chart 2b-11, 110-Watt Power Amplifier No Power Output - Page 35



MAEPF-25498-A

Troubleshooting Chart 2b-1, Receiver Front End



MAEPF-25499-A

Notes forTroubleshooting Chart 2b-3

1. If zero IF local oscillator (ZIF LO) is locked, the frequency should be very close to 109.65 MHz. If the ZIF LO is not locked, the frequency can be in the range of 100 to 120 MHz.
2. The ZIF must be programmed properly by the controller section of the radio in order for the ZIF LO to lock on frequency. Verify proper operation of controller section before proceeding.

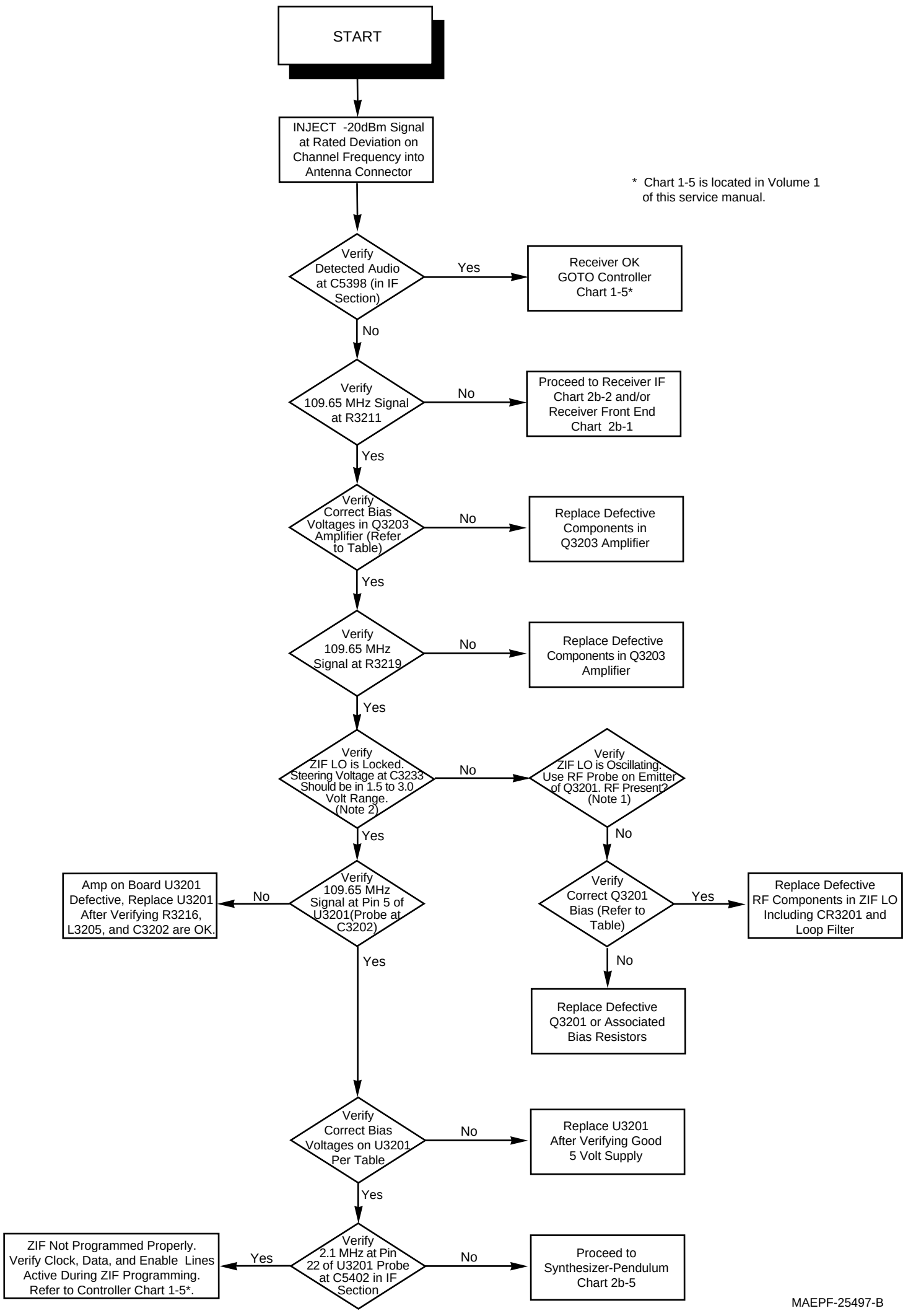
Table 1 Voltage Table (Transistors)

Transistor	Emitter	Base	Collector
Q3201	0.02V	0.7V	2.9V
Q3203	0.0V	0.7V	2.4V

Table 2 Voltage Table (ZIF IC)

U3201 Pin No.	Probe At	Voltage
2	R3220	2.1
27	C3220	2.5
28	C5398	2.5
35	C3207	2.4
6	C3201	1.6

NOTE: Primary supply for the ZIF IC is 5 Volts. The supply originates in the synthesizer section of the radio.



* Chart 1-5 is located in Volume 1 of this service manual.

MAEPF-25497-B

Troubleshooting Chart 2b-3, Receiver Back End

Notes for Troubleshooting Charts 2b-4 and 2b-6 through 2b-9

1. Check that C3759 and C3760 both have a 2.5 V square wave present. If they do not, replace the FRAC-N (U3801). If squarewaves are present, check that 5V is present at pin 4 of CR3750. If 5V is not present at pin 4, replace CR3750.
2. Refer to the table below and determine which auxiliary bit should be on and its corresponding switching transistor, which depend on the programmed receive frequency.

Frequency Range	Auxiliary Bit On	Switching Transistor
136.0 to 150.4 MHz	2	Q3786
150.0 to 174.0 MHz	4	Q3783

NOTE: There should be approximately 4.2V at pin 4 of the corresponding switching transistor if the FRAC-N is functioning correctly.

3. Check that the switching transistor has 8.3V on pin 3 of the relevant switching transistor.
4. Check that 8.3V is on pin two of the switching transistor.
5. Use an RF probe as an antenna to examine the area of the active RX VCO to verify that the VCO is oscillating. The table below shows the active component of VCO which is in operation:

Frequency Range	Active Component
136.0 to 150.4 MHz	Q3904
150.0 to 174.0 MHz	Q3903

6. If VCO is not oscillating, probe drain and source of active component to see if it has the corresponding voltages. Drain should be at approximately 8V and source should be at 1 to 2V. Otherwise, look for shorts and opens among the components in the corresponding VCO. Replace any defective parts.
7. If VCO is oscillating, verify that the two RX buffers (Q3905 and Q3781) are operating properly. If the two RX buffers are not amplifying the signal, check RF path and DC Bias voltages as shown in the table below:

NOTE: The voltages listed in the table below will vary somewhat between radios. Therefore, they should be used only as a guide.

Pin	Q3905	Q3781
Collector	3.9V	4.8V
Base	0.65V	0.9V
Emitter	0.0V	0.25V

8. If there is an oscillation and the radio still exhibits an out of lock condition, it is usually the result of insufficient power getting back to the prescaler. If this is the case, check the prescaler feedback buffer for correct signal amplification and the correct biasing as shown in the table below.

Pin	Q3790
Collector	2.6V
Base	0.8V
Emitter	0.09V

NOTE: Although the amount of power getting back to the prescaler will vary with frequency channel, a level higher than -7 dBm is sufficient to obtain lock.

9. If the radio will not transmit because a synthesizer or TX VCO error exists, the red transmit light will flash when the radio is keyed. Before proceeding make sure that the FAIL 001 error message is not displayed when the radio is in standby mode. If the FAIL 001 message is displayed, go to the FAIL 001 troubleshooting chart.

   When there is a transmit error the radio is much easier to troubleshoot if the Lock Detect line is tied to 5V. This will make the radio think that it is in a locked state when in transmit mode. Otherwise, once the PTT is pressed and the synthesizer does not lock in an allotted time period it goes back into receive mode. The following troubleshooting will assume the Lock Det line is forced high and that the radio is keyed.

10. Look in the table below and determine which auxiliary bit should be on and its corresponding switching transistor depending on the programmed transmit frequency:

Frequency Range	Auxiliary Bit On	Switching Transistor
136 to 155 MHz	1	Q3786
155 to 174 MHz	3	Q3783

11. Check that there is 8.3V on pin 3 of the relevant switching transistor.

12. Check that there is 8.3V on pin two of the relevant switching transistor.

13. Use an RF probe as an antenna to examine the area of the active RX VCO to verify that the VCO is oscillating. The table below shows the active component of the VCO that is in operation:

Frequency Range	Active Component
136 to 155 MHz	Q3761
155 to 174 MHz	Q3760

14. The drain should be at approximately 8V and the source should be at 1 to 1.5V. Look for shorts and opens among the components in the correspondences. Replace any defective components.

15. If the VCO is oscillating, verify that the two TX buffers (Q3789 and Q3782) are operating properly. If the two stages are not amplifying the signal then check the DC Bias voltages in the table below:

NOTE: The voltages listed in the table below will vary somewhat between radios. Therefore, they should be used only as a guide.

Pin	Q3789	Q3782
Collector	6.0V	5.9V
Base	1.0V	1.2V
Emitter	0.3V	0.25V

16. If there is an oscillation but it is at the wrong frequency, this is usually caused by insufficient power going to the prescaler. Check the prescaler feedback buffer for signal amplification and the correct biasing shown below.

Pin	Q3790
Collector	2.6V
Base	0.8V
Emitter	0.09V

NOTE: Although the amount of power getting back to the prescaler will vary with frequency channel, a level above -7 dBm is adequate to obtain lock.

17. If the red transmit light does not stay illuminated when the radio is keyed, there is a synthesizer problem. Go to the synthesizer no transmit troubleshooting chart (chart 7C).

18. Check the injection string buffer for signal amplification and the correct biasing shown below.

Pin	Q3784
Collector	5.4V
Base	0.9V
Emitter	0.35V

19. Check the RF path between the collector of Q3784 and capacitors C3807 and C3808 and the spiral inductor SC3802.

20. Check the path to J3500 pin 5 and replace any defective parts.

21. When in receive or standby mode, verify that FAIL 001 is not displayed. If FAIL 001 is displayed, go to FAIL 001 troubleshooting chart.

22. If no LO is getting to the mixer and there is no out of lock error, check C3795. If it is defective or the wrong value replace it. Otherwise, check the continuity of the LO lines going to the mixer.

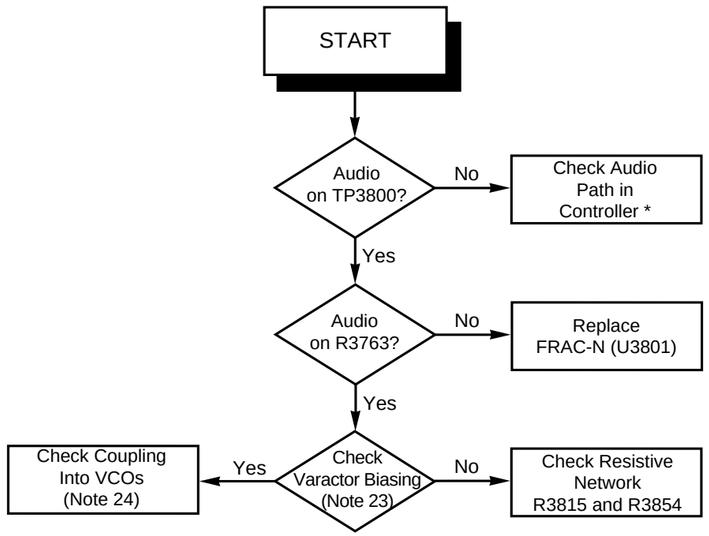
23. Verify that the DC voltage at CR3753 pin 3 is 0.8V.

24. Check the appropriate resistor and capacitor according to the TX frequency as shown in the table below.

Frequency Range	Capacitor	Resistor
136 to 155 MHz	C3822	R3816
155 to 174 MHz	C3772	R3766

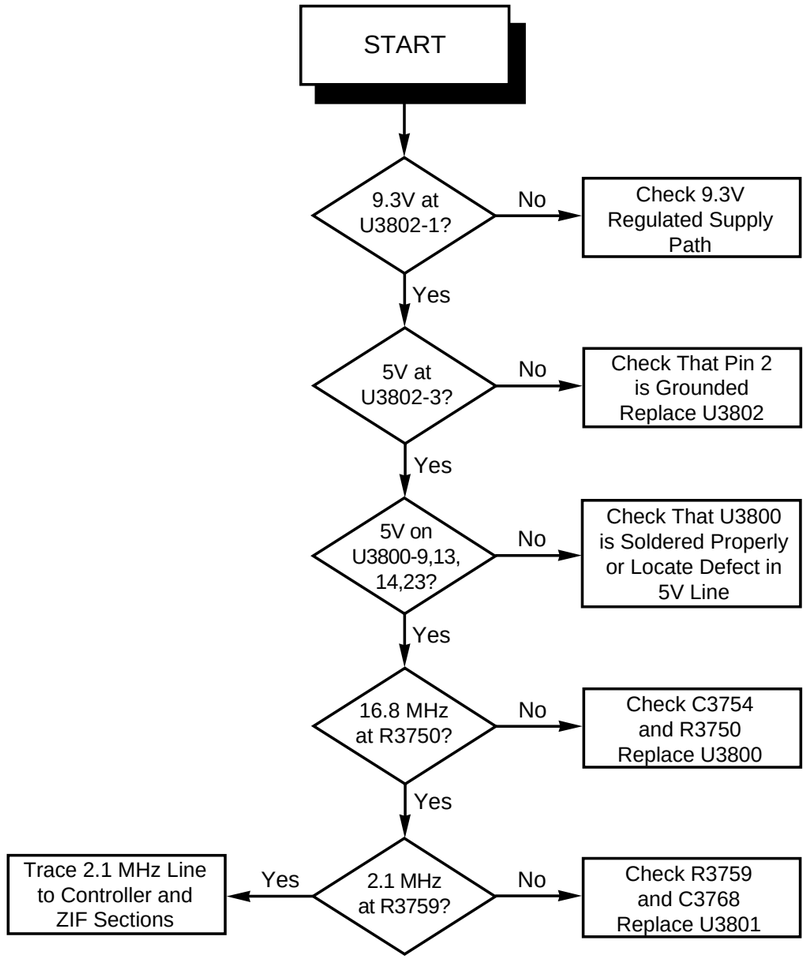
Check the above components for defects and proper part values and replace as required.

NOTES

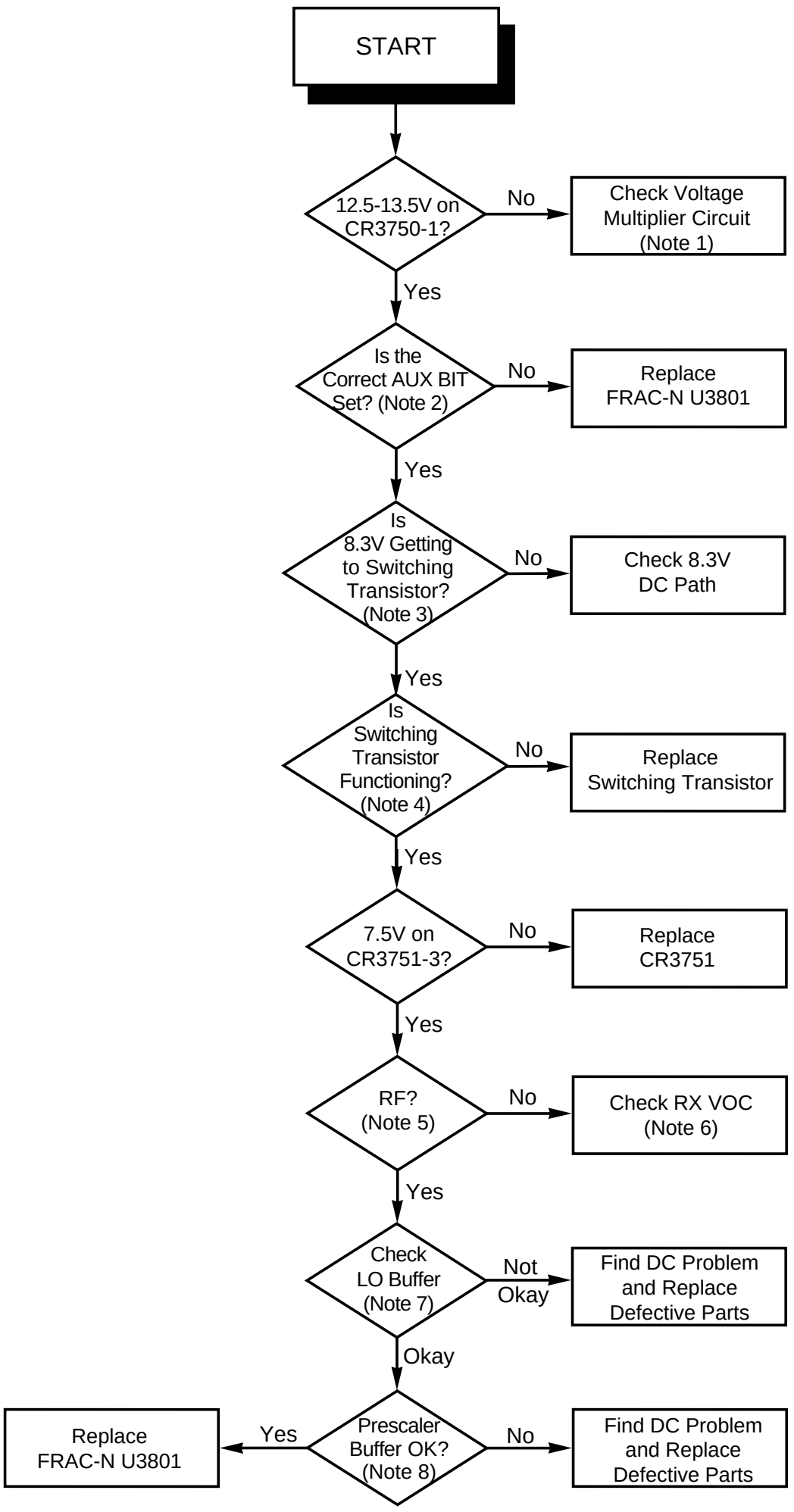


* Refer to Transmit Audio Paths Simplified Schematic Diagram and Controller ASFIC Schematic Diagram in Volume 1 of this service manual.

MAEPF-25500-A

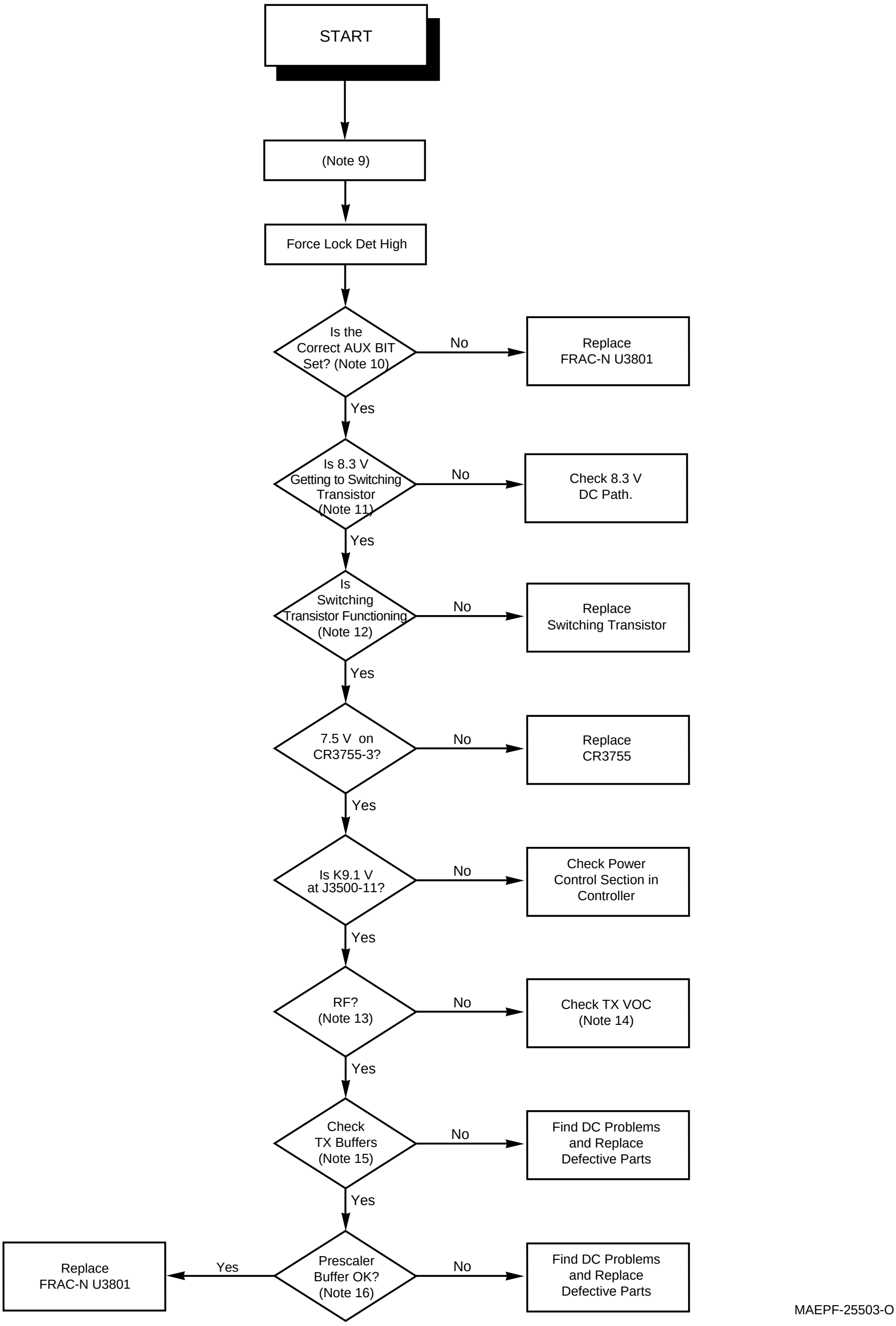


MAEPF-25501-O



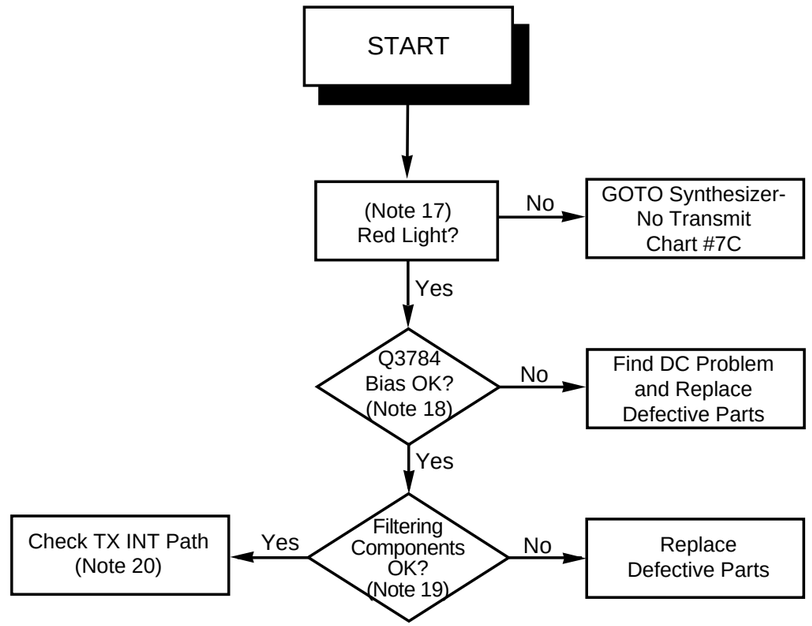
MAEPF-25502-A

Troubleshooting Chart 2b-6, Synthesizer Fail 001

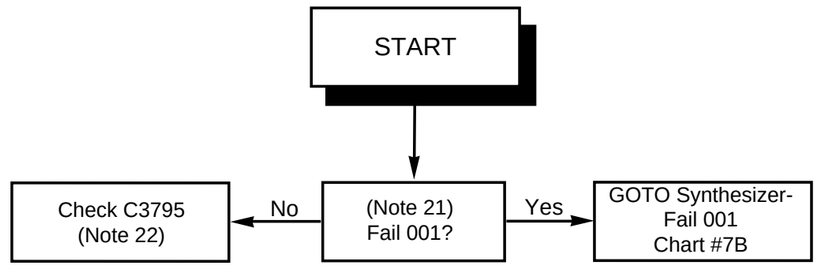


MAEPF-25503-O

Troubleshooting Chart 2b-7, Synthesizer No Transmission



MAEPF-25504-O



MAEPF-25505-O

NOTES

Notes for Troubleshooting Chart 2b-11

General Notes:

- Review the theory of operation before attempting to troubleshoot the power amplifier.
- Most transmitter circuitry is located on the side of the PC board facing down into the chassis. Therefore, a chassis eliminator ("cutaway" chassis), Motorola stock number 2705815W03), is useful while troubleshooting the radio.

WARNING

To avoid personal injury from high RF Voltages and Currents, exercise extreme care while troubleshooting the transmitter power amplifier.

Caution

To avoid permanent damage to the power amplifier, do not key transmitter unless all screws that attach PA board to chassis are in place and are tightened to a torque level between 10- and 12-inch pounds.

Caution

Keying the transmitter for an extended period of time while using the chassis eliminator can cause damage to the radio. While using chassis eliminator, cool the radio by using a fan to force air through chassis cooling fins

- Set A+ supply to 13.4 volts with current limit set to 30 amperes.
- Ensure that any RF power attenuators used in test setups are rate for at least 500 Watts.
- Calibrate power meter regularly following the manufacture's suggested calibration method.
- Keep in mind that VSWR and insertion losses within any test setup affect the accuracy of RF power measurements.
- Table 1 on page 36 provides a list of typical voltage measurements for the 110W power amplifier.
- If a component is removed for troubleshooting, replace the removed part, regardless of its condition, with a new part.
- To reinstall the power amplifier board into the chassis, follow reassembly instructions in volume 1 of this service manual.
- Reapply any thermal paste removed during troubleshooting.
- Use only Motorola specified parts when component replacement is required.

Q3520 Field Bias Trim Procedure:

1. Disconnect A+ supply from radio.
2. Remove R3505 and R3621. Place potentiometer R3527 (Motorola part number 1805170X01) on pads provided (see overlay for location).
3. Solder wires onto R3621 pads and connect milliamp meter in series with Q3520 drain.
4. Reconnect A+ supply, set voltage to 13.4 volts, and set current limit to 0.5 amps.
5. Key up transmitter, monitor milliamp meter and adjust pot until 70 milliamps of drain current is conducted.
6. Dekey transmitter and disconnect A+ supply.
7. Remove wires and replace R3505 and R3621.

Specific (Numbered) Notes

1. Set current limit softpot to zero to disable current limit.
2. Remove R3503 and solder the center conductor of a small coaxial cable onto pin 5 of J3500. Connect ground to pin 4 or pin 6 of J3500. Attach an RF milliwatt meter and key transmitter to measure TX injection power. Then remove coax and replace R3503.
3. Measure PA_CNTRL with a DC voltmeter while transmitter is keyed.
4. Remove R3503 for RF drive off DC voltage measurements. PA_CNTRL should be greater than or equal to 10 volts with RF drive removed.
5. Remove R3503 and L3500, solder wires to remaining pads of L3500, place milliamp meter in series with Q3500 collector and measure DC current. Remove wires and replace R3505 and L3500.
6. Remove R3505, key up radio, measure Q3520 DC gate voltage and replace R3505.
7. If gate bias network parts are replaced, readjust gate bias voltage using the Q3520 Field Bias Trim Procedure that precedes these specific notes.
8. Disconnect A+ supply from radio. Remove R3505 and R3621. Solder wires onto remaining R3621 pads and connect millamp meter in series with Q3520 drain. Reconnect A+ supply, key up transmitter, and monitor milliamp meter. Remove wires and replace R3505 and R3621.
9. If gate bias and A+ supply voltage are present at gate and drain of Q3520, respectively, then Q3520 may be defective. First, check for solder defects. If none are found, replace Q3520 using a hot-air gun to reflow soldered leads, then readjust gate bias voltage using the Q3520 Field Bias Trim Procedure that precedes these specific notes.
10. Perform this measurement only while transmitter is dekeyed.
11. Disconnect A+ supply, remove L3616 and R3619, solder 20 gauge (or larger) wires to remaining R3619 pads, and connect an ammeter in series with the U3540 collector. Reconnect A+ supply, key up transmitter, and monitor ammeter. Remove wires and replace L3616 and R3619.
12. Reflow solder on base and collector leads and gently pry leads away from their pads. Check continuity of leads to ensure they are disconnected from circuit. Measure base-emitter and base-collector junction voltage drops from the base to ground and the base to collector, respectively, using the diode check function of a multimeter. The voltage drops should be approximately 0.6 volts. Reform leads and reflow.

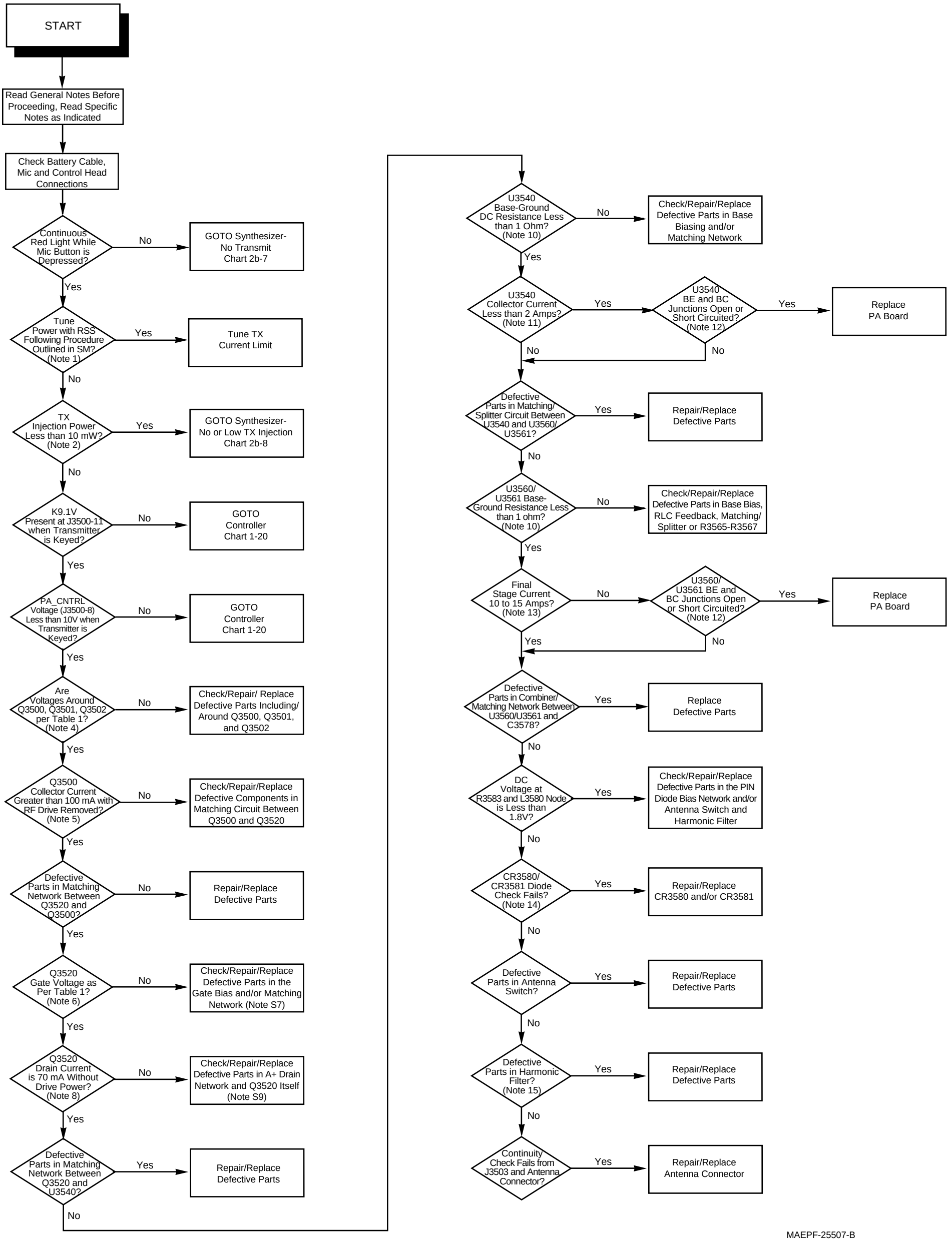
13. Key up the transmitter. Measure the DC voltage at the positive terminal of the battery connector and at the via after R3615. Subtract these two measurements and multiply by 100 to calculate final stage current in amps.

14. Check diodes using the diode check function of a multimeter.

15. Shield SH3590 must be removed with a hot-air gun to enable inspection of the harmonic filter. Be careful to lift the shield straight up. The parts within the shield will reflow before the shield and may be moved off their pads if they contact the shield.

Table 1 Typical Voltage Measurements for 110W Power Amplifier

A+ = 13.4 V	RF Drive On		RF Drive Off	
PA_CNTRL	10V	6V	10V	6V
Q3500 Base	0.75V	0.75V	0.3V	0.3V
Q3500 Collector	7.7V	8.6V	7.7V	8.6V
Q3501 Base	7.1V	8.0V	7.1V	8.0V
Q3501 Emitter	7.7V	8.6V	7.7V	8.6V
Q3501 Collector	1.8V	1.2V	2.0V	0.8V
Q3502 Base	6.7V	4.0V	6.7V	4.0V
Q3502 Emitter	6.0V	3.3V	6.0V	3.5V
Q3502 Collector	7.1V	8.0V	7.1V	8.0V
Q3520 Gate	2.5V	2.5V	N/A	N/A



MAEPF-25507-B

Troubleshooting Chart 2b-11, Power Amplifier for 110-Watt Radio

NOTES

4

Reference Drawings

Introduction

This section contains reference drawings for the receiver (front end, IF, and back end) and transmitter (synthesizer and power amplifier) portions of the radio. Reference drawings for the control head and the controller portions of the radio are located in volume 1 of this service manual.

The hierarchy of the schematic diagrams for the radio is shown in Figure 4. The first and highest tier in the hierarchy for the radio consists of three major blocks, which are: control heads, controller, and radio frequency (RF). On the hierarchy illustration, the details for the control head and controller blocks are not provided beyond the first tier level because all the subordinate drawings for these two blocks are located in volume 1 (Motorola Publication 68P81080C20) of this service manual.

Complete details are provided for the RF block because all the reference drawings for the RF block are located in this volume of the service manual.

Complete details for the control head and controller blocks are provided in a similar hierarchy chart located in volume 1 of this service manual.

Reference Drawings Included in this Section

The following reference drawings are provided in this section of this volume of the service manual:

- **For Overall Radio:**
  - Main Transceiver and Power Amplifier (PA) Board Interconnect - Page 41
  - Main Transceiver Board Section Locations - Page 42
  - Schematic Diagrams Hierarchy - Page 45
  - Main Board Overall Schematic Diagram - Page 46
  - RF Schematic Diagram - Page 47
  - Schematic Diagrams Interconnection Table - Page 73

- **For Receiver**
  - Receiver RF Schematic Diagram - Page 48
  - Receiver Front End Component Locations and Parts List - Pages 49 and 51
  - Receiver Front End Schematic Diagram - Pages 50 and 52
  - Receiver IF Component Locations and Parts List - Pages 53 and 55
  - Receiver IF Schematic Diagram - Pages 54 and 56
  - Receiver Back End Component Locations and Parts List - Pages 57 and 59
  - Receiver Back End Schematic Diagram - Pages 58 and 60
- **For Synthesizer**
  - Synthesizer Component Locations and Parts List - Pages 61 and 64
  - Synthesizer Overall Schematic Diagram - Pages 62 and 65
  - Synthesizer Receiver VCO Schematic Diagam - Pages 63 and 66
  - Synthesizer Receiver Injection String Schematic Diagram - Pages 62 and 65
  - Synthesizer Transmitter Injection String Schematic Diagram - Pages 62 and 65
- **For Power Amplifier**
  - Power Amplifier Board Section Locations - Page 43
  - Range 1, Power Amplifier Component Locations and Parts List - Page 67
  - Range 2, Power Amplifier Component Locations and Parts List - Page 68
  - Power Amplifier Overall Schematic Diagram - Page 69
  - 2-Pin and 12-Pin Power Amplifier Interconnects Component Locations and Parts List - Page 70
  - 2-Pin and 12-Pin Power Amplifier Interconnects Schematic Diagrams - Page 71

Refer to Volume 1 of this service manual (Motorola Publication Number 68P81083C20) for reference drawings for the control head and controller portions of the radio.

Refer to the Secure Option service manual (Motorola Publication Number 68P81083C25) for reference drawings for the secure option for the radio.

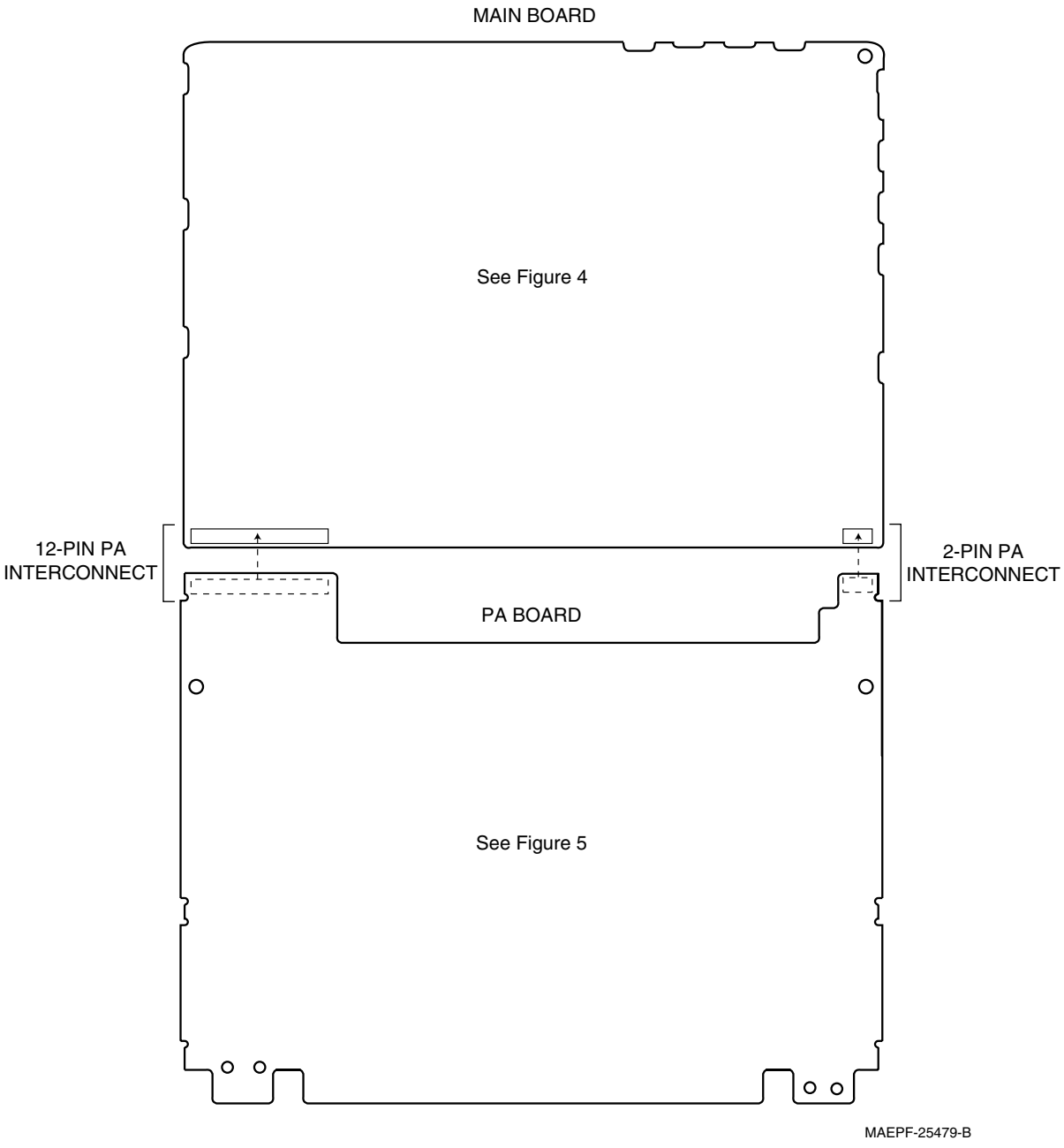


Figure 3. Main Transceiver and Power Amplifier (PA) Board Interconnect

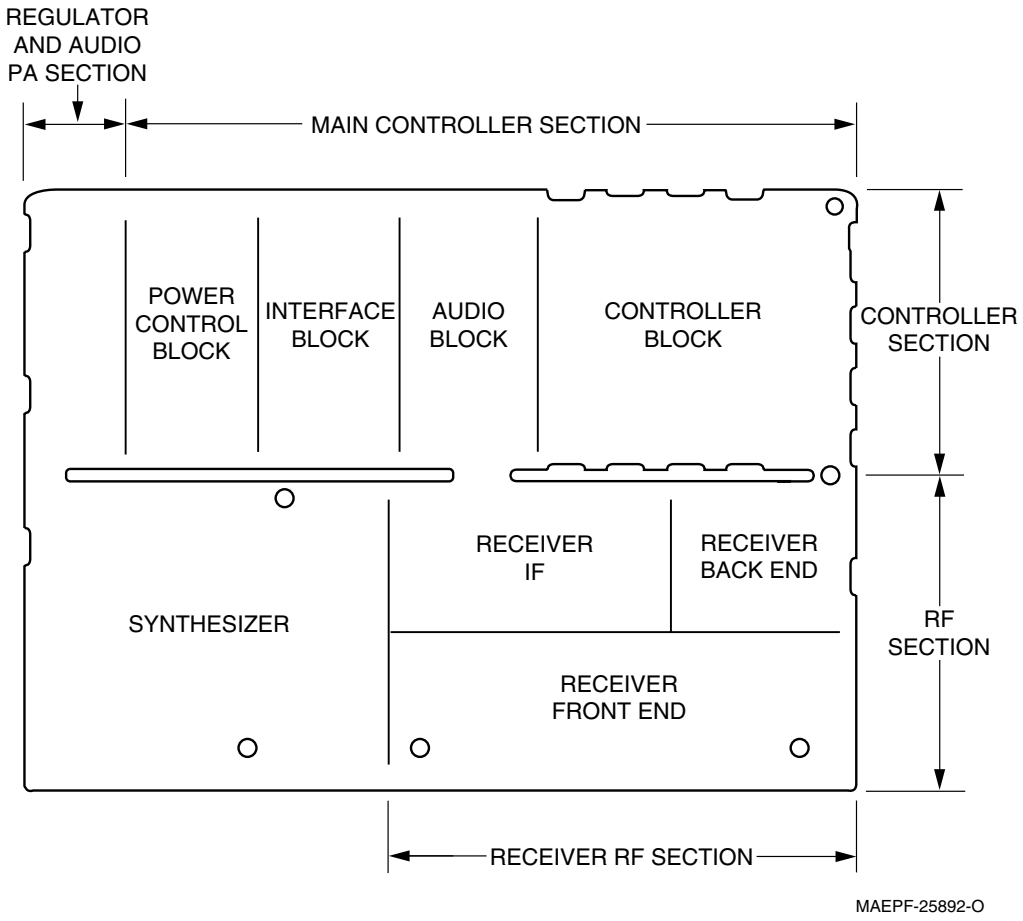


Figure 4. Main Transceiver Board Section Locations

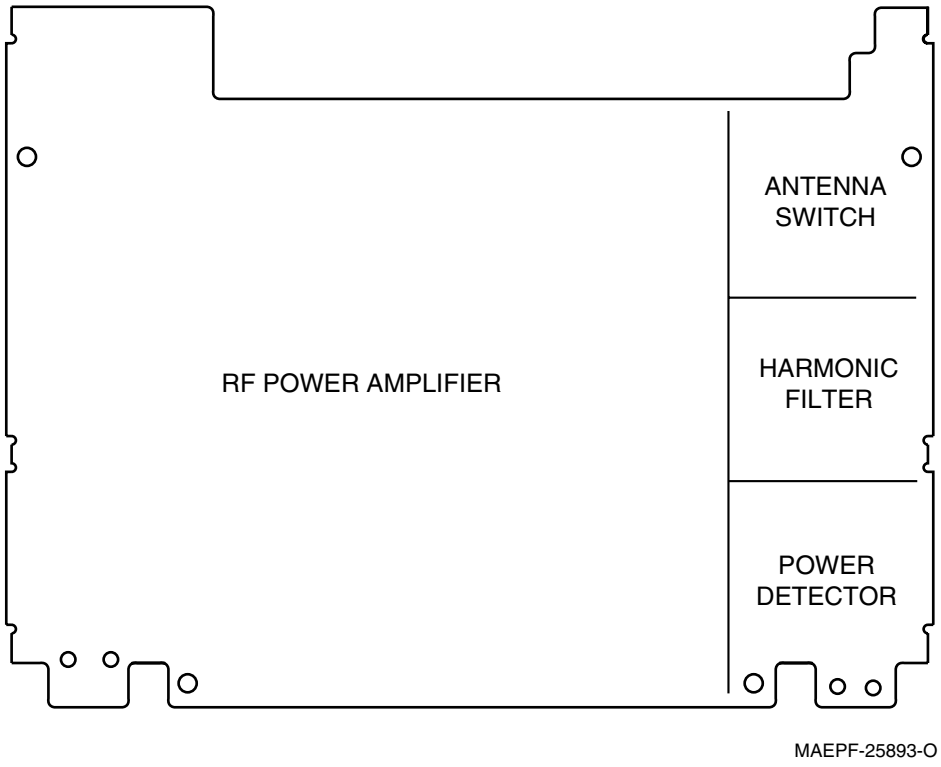


Figure 5. PA Board Section Locations

Notes

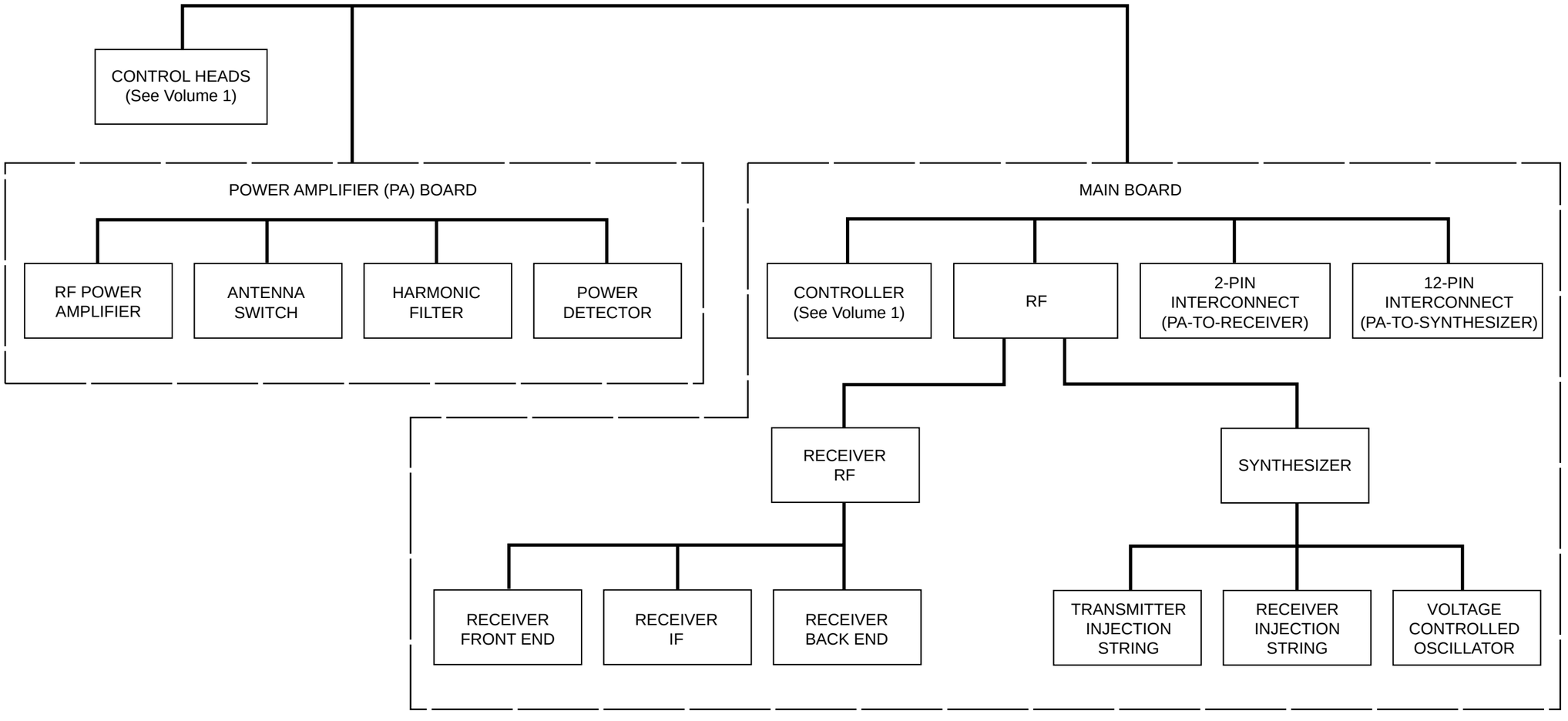
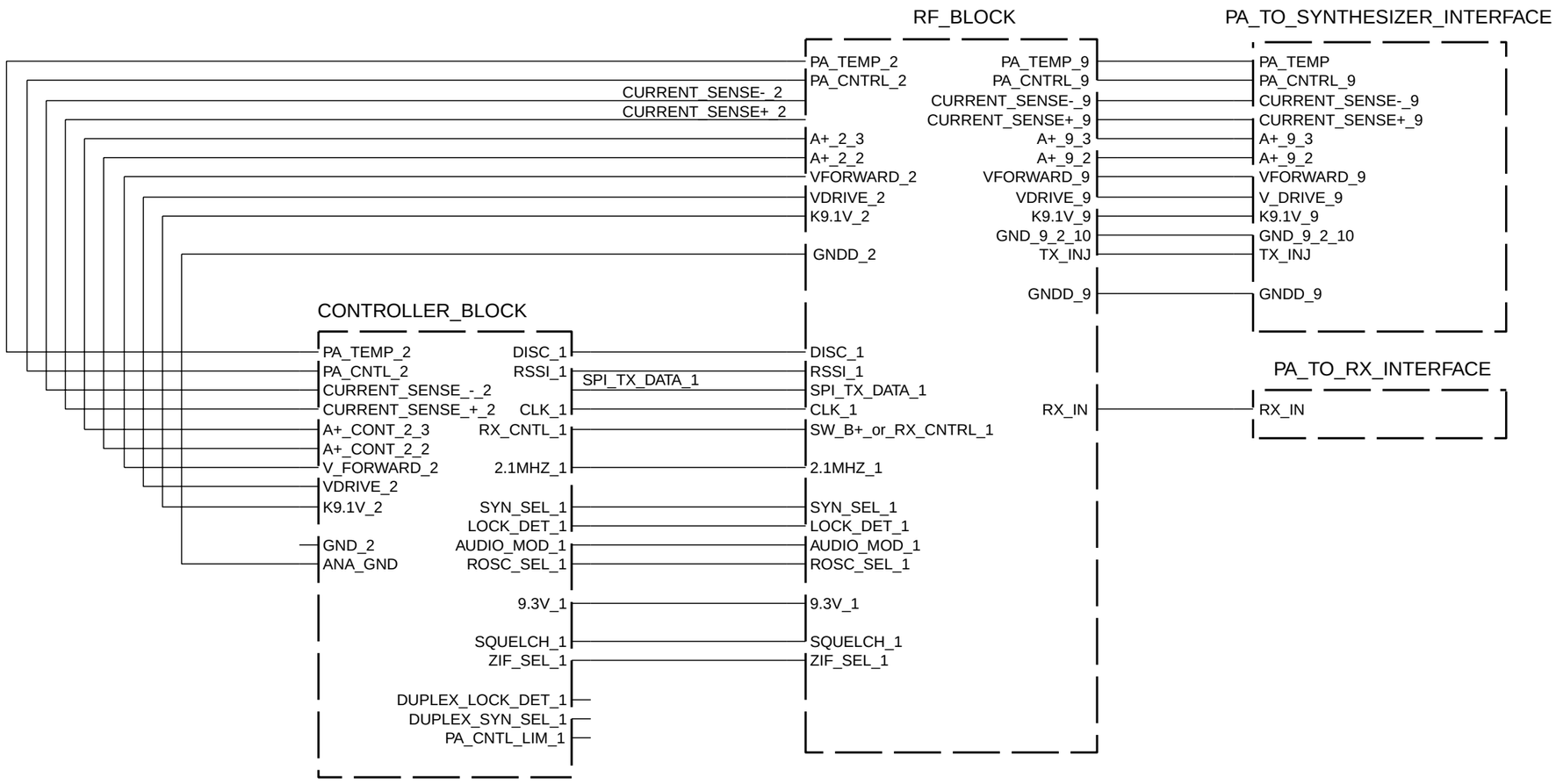
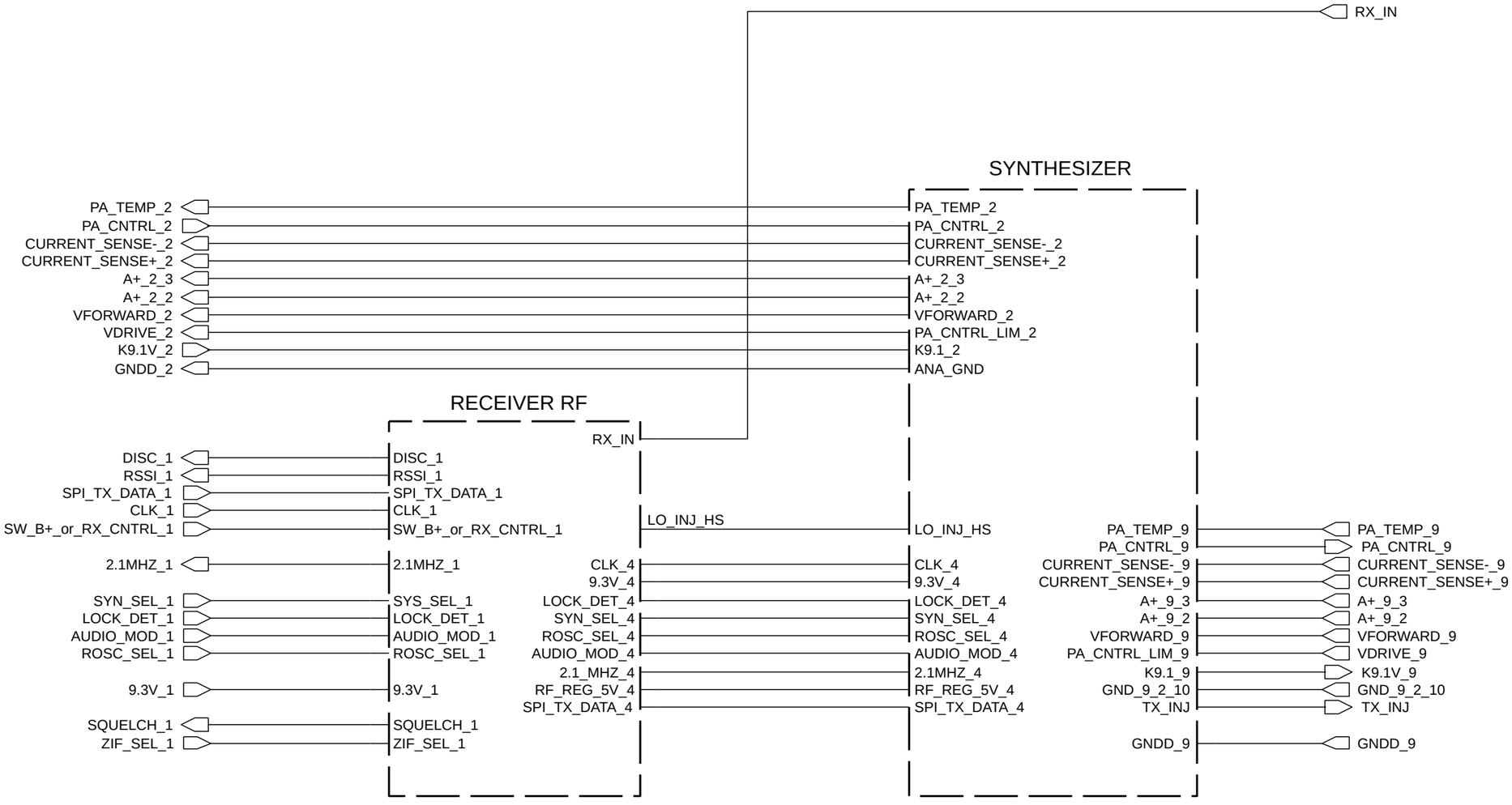
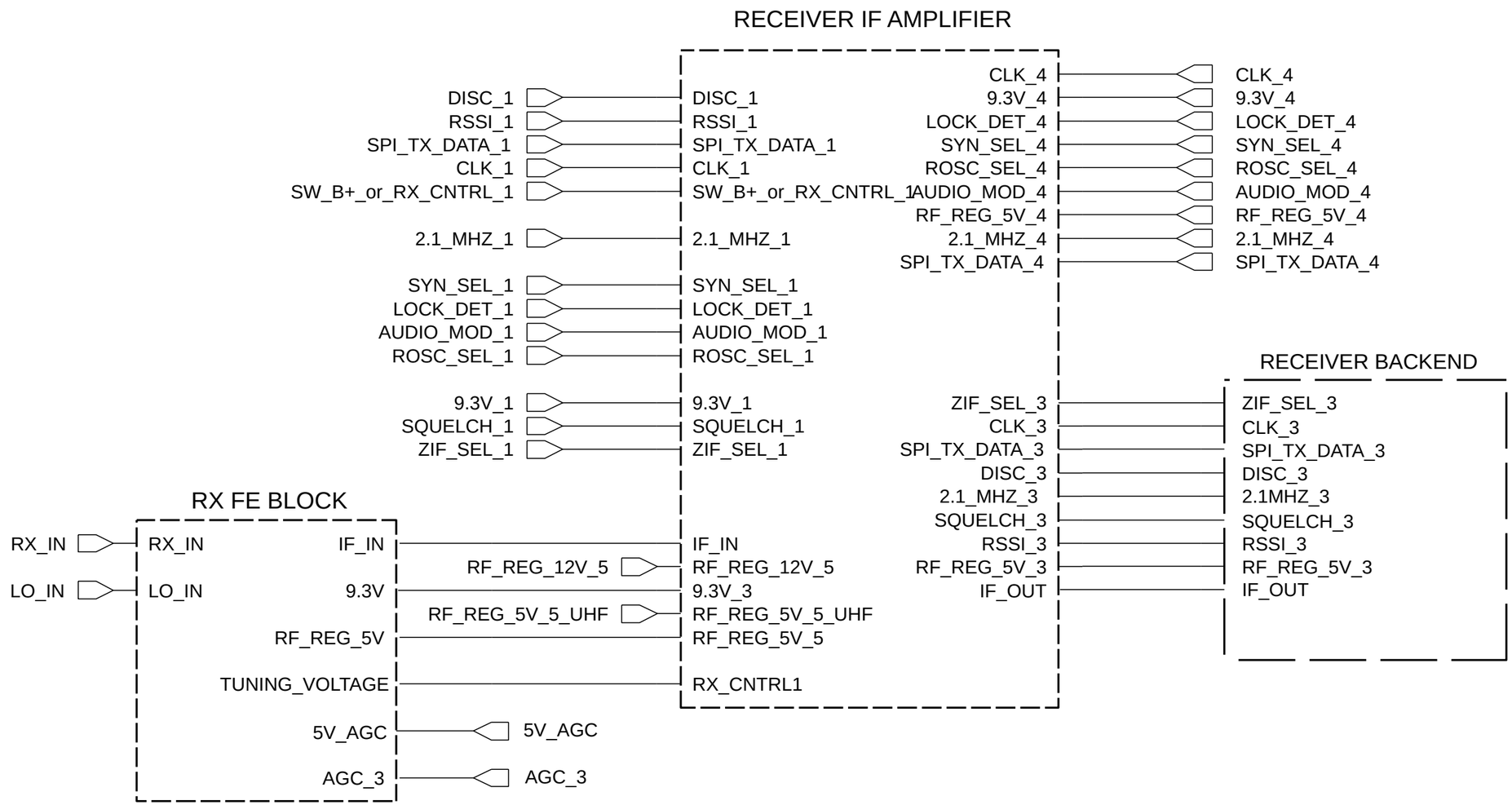


Figure 6 Schematic Diagram Hierarchy (Kits HUD4015A, HUD4015B, HUD4019A, HUD4019B, HUD4016A, HUD4016B, HUD4016C, HUD4021A, HUD4021B, HUD4021C)

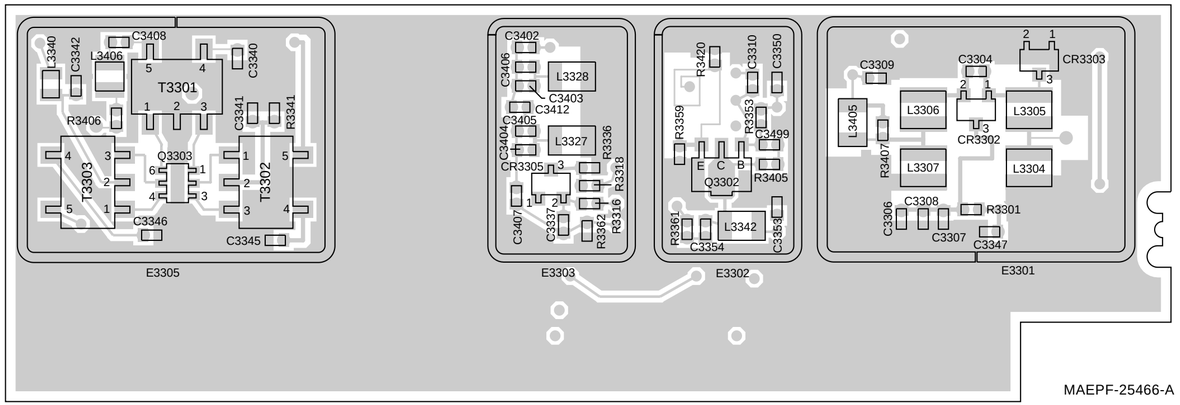

RF_BLOCK
PA_TO_SYNTHESIZER_INTERFACE
PA_TEMP_2
PA_CNTRL_2
CURRENT_SENSE- 2
CURRENT_SENSE+ 2
A+_2_3
A+_2_2
VFORWARD_2
VDRIVE_2
K9.1V_2
GNDD_2
PA_TEMP_9
PA_CNTRL_9
CURRENT_SENSE-_9
CURRENT_SENSE+_9
A+_9_3
A+_9_2
VFORWARD_9
VDRIVE_9
K9.1V_9
GND_9_2_10
TX_INJ
GNDD_9
PA_TEMP
PA_CNTRL_9
CURRENT_SENSE-_9
CURRENT_SENSE+_9
A+_9_3
A+_9_2
VFORWARD_9
V_DRIVE_9
K9.1V_9
GND_9_2_10
TX_INJ
GNDD_9
CONTROLLER_BLOCK
PA_TEMP_2
PA_CNTL_2
CURRENT_SENSE_-_2
CURRENT_SENSE_+_2
A+_CONT_2_3
A+_CONT_2_2
V_FORWARD_2
VDRIVE_2
K9.1V_2
GND_2
ANA_GND
DISC_1
RSSI_1
SPI_TX_DATA_1
CLK_1
RX_CNTL_1
2.1MHZ_1
SYN_SEL_1
LOCK_DET_1
AUDIO_MOD_1
ROSC_SEL_1
9.3V_1
SQUELCH_1
ZIF_SEL_1
DUPLEX_LOCK_DET_1
DUPLEX_SYN_SEL_1
PA_CNTL_LIM_1
DISC_1
RSSI_1
SPI_TX_DATA_1
CLK_1
SW_B+_or_RX_CNTRL_1
2.1MHZ_1
SYN_SEL_1
LOCK_DET_1
AUDIO_MOD_1
ROSC_SEL_1
9.3V_1
SQUELCH_1
ZIF_SEL_1
PA_TO_RX_INTERFACE
RX_IN
RX_IN
63A81092C84-O



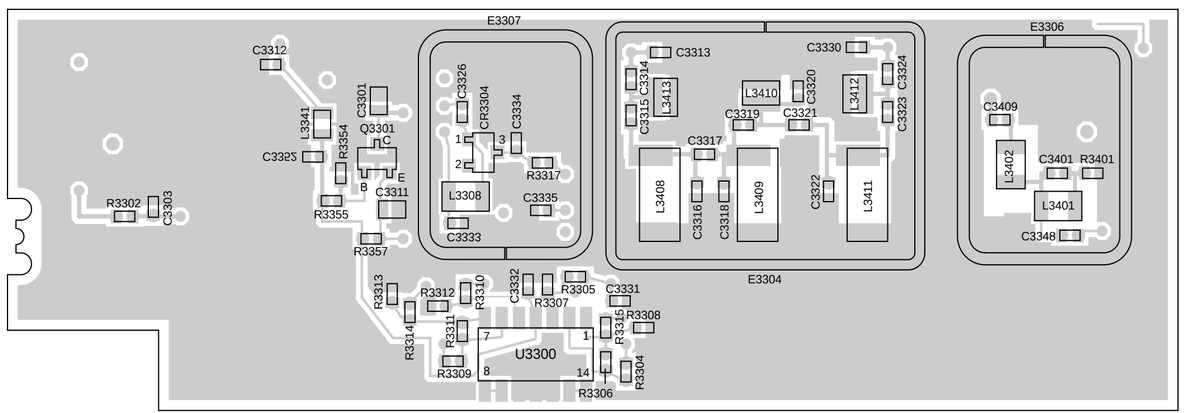
63A81092C85-O


RECEIVER IF AMPLIFIER
DISC_1
RSSI_1
SPI_TX_DATA_1
CLK_1
SW_B+_or_RX_CNTRL_1
2.1_MHZ_1
SYN_SEL_1
LOCK_DET_1
AUDIO_MOD_1
ROSC_SEL_1
9.3V_1
SQUELCH_1
ZIF_SEL_1
CLK_4
9.3V_4
LOCK_DET_4
SYN_SEL_4
ROSC_SEL_4
AUDIO_MOD_4
RF_REG_5V_4
2.1_MHZ_4
SPI_TX_DATA_4
ZIF_SEL_3
CLK_3
SPI_TX_DATA_3
DISC_3
2.1_MHZ_3
SQUELCH_3
RSSI_3
RF_REG_5V_3
IF_OUT
RECEIVER BACKEND
RX FE BLOCK
RX_IN
LO_IN
IF_IN
9.3V
RF_REG_5V
TUNING_VOLTAGE
5V_AGC
AGC_3
RF_REG_12V_5
RF_REG_5V_5_UHF
9.3V_3
RX_CNTRL1
63A81092C86-O

RECEIVER FRONT END COMPONENT LOCATIONS
Printed Circuit Board No. 84D05115Y06 Revision D



HEAVY COMPONENTS SIDE



LIGHT COMPONENTS SIDE

MAEPF-25467-A

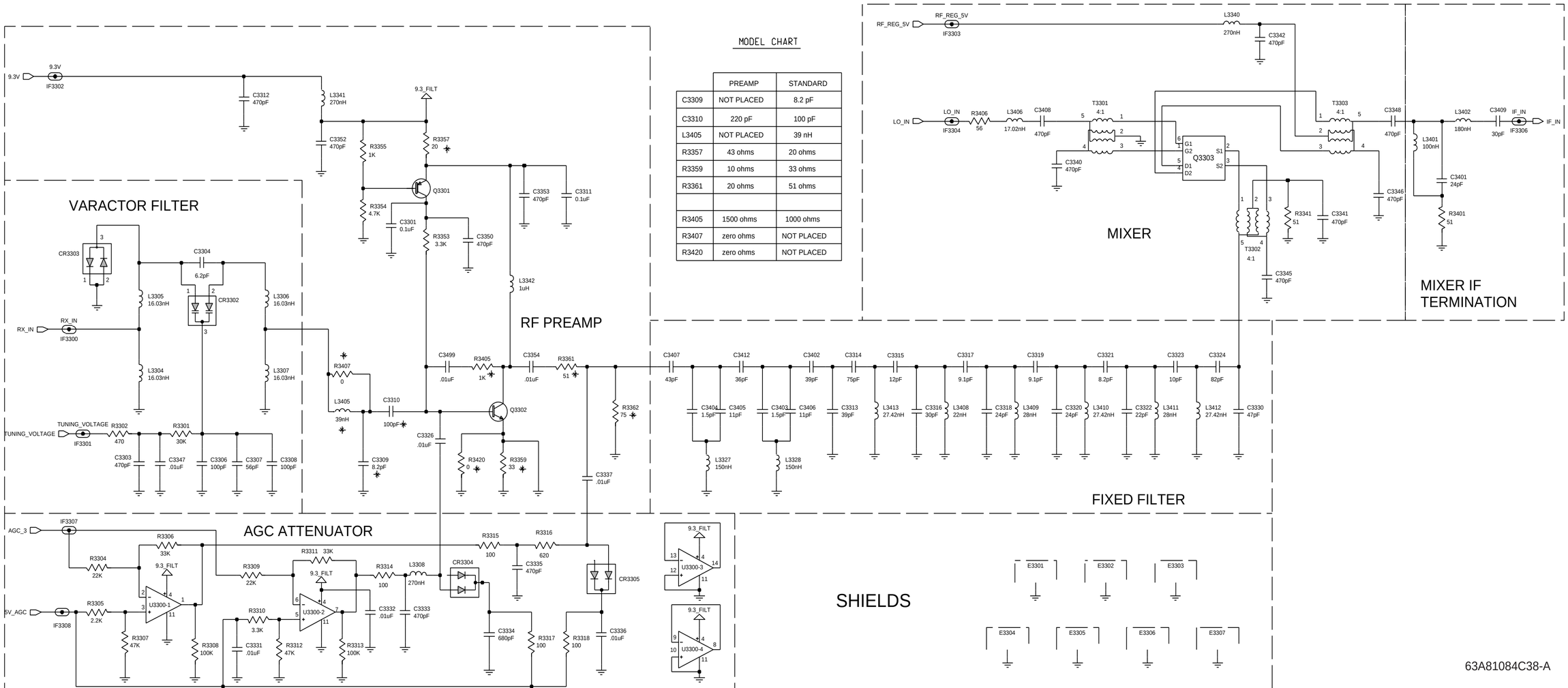
RECEIVER FRONT END PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3301	2113743A19	0.100 uF
C3303	2113931F17	470 pF
C3304	2113930F22	6.2 pF
C3306	2113930F51	100 pF
C3307	2113930F45	56 pF
C3308	2113930F51	100 pF
C3309 #	2113930F25	8.2 pF
C3310 *	2113930F59	220 pF
C3310	2113930F51	100 pF
C3311	2113743A19	0.100 uF
C3312	2113931F17	470 pF
C3313	2113930F41	39 pF
C3314	2113930F48	75 pF
C3315	2113930F29	12 pF
C3316	2113930F38	30 pF
C3317	2113930F26	9.1 pF
C3318	2113930F36	24 pF
C3319	2113930F26	9.1 pF
C3320	2113930F36	24 pF
C3321	2113930F25	8.2 pF
C3322	2113930F35	22 pF
C3323	2113930F27	10 pF
C3324	2113740F49	82 pF
C3326	2113740F59	220 pF
C3330	2113740F43	47 pF
C3331	2113931F49	10000 pF
C3332	2113931F49	10000 pF
C3333	2113931F17	470 pF
C3334	2113931F49	10000 pF
C3335	2113931F17	470 pF
C3336	2113931F49	10000 pF
C3337	2113930F59	220 pF
C3340	2113931F17	470 pF
C3341	2113931F17	470 pF
C3342	2113931F17	470 pF
C3345	2113931F17	470 pF
C3346	2113931F17	470 pF
C3347	2113932K15	0.1 uF
C3348	2113931F17	470 pF
C3350	2113931F17	470 pF
C3352	2113931F17	470 pF
C3353	2113931F17	470 pF
C3354	2113931F49	10,000 pF
C3401	2113930F36	24 pF
C3402	2113930F41	39 pF
C3403	2113930F07	1.5 pF
C3404	2113930F07	1.5 pF
C3405	2113930F28	11 pF
C3406	2113930F28	11 pF
C3407	2113930F42	43 pF
C3408	2113931F17	470 pF
C3409	2113930F38	30 pF
C3412	2113740F40	36 pF
C3499	2113931F49	10,000 pF

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		DIODES:
CR3302	4802081B58	Dual
CR3303	4880154K03	Dual Schottky Mixer
CR3304	4880154K05	PIN, dual
CR3305	4880154K05	PIN, dual
		SHIELDS:
E3301	2605915V01	PCB Mount
E3302	2602660J01	Harmonic Filter
E3303	2602660J01	Harmonic Filter
E3304	2605915V01	PCB Mount
E3305	2605915V01	PCB Mount
E3306	2605261V01	ZIF
E3307	260526IV01	ZIF
		INDUCTORS:
L3304	2460591L29	Air wound coil16.03 nH
L3305	2460591L29	Air wound coil16.03 nH
L3306	2460591L29	Air wound coil16.03 nH
L3307	2460591L29	Air wound coil16.03 nH
L3308	2462587T20	270 nH
L3327	2462587T17	150 nH
L3328	2462587T17	150 nH
L3340	2462587Q40	270 nH
L3341	2462587Q40	270 nH
L3342	2462587T30	1000 nH
L3401	2462587T15	100 nH
L3402	2462587T18	180 nH
L3405 #	2462587T41	39 nH
L3406	2460591C40	Air wound coil17.02 nH
L3408	2484562T16	Air wound coil
L3409	2484562T17	Air wound coil
L3410	2460591M32	Air wound coil 27.42 nH
L3411	2484562T17	Air wound coil
L3412	2460591M32	Air wound coil 27.42 nH
L3413	2460591M32	Air wound coil 27.42 nH
		TRANSISTORS:
Q3301	4805128M16	PNP
Q3302	4882971R01	NPN
		INTEGRATED CIRCUITS:
Q3303	5105625U28	Mixer
		RESISTORS:
R3301	0662057A29	150
R3302	0662057A41	470
R3304	0662057A81	22K
R3305	0662057A61	3300
R3306	0662057A85	33K
R3307	0662057A89	47K
R3309	0662057A81	22K
R3310	0662057A59	2700
R3311	0662057A85	33K
R3312	0662057A89	47K
R3314	0662057A20	62

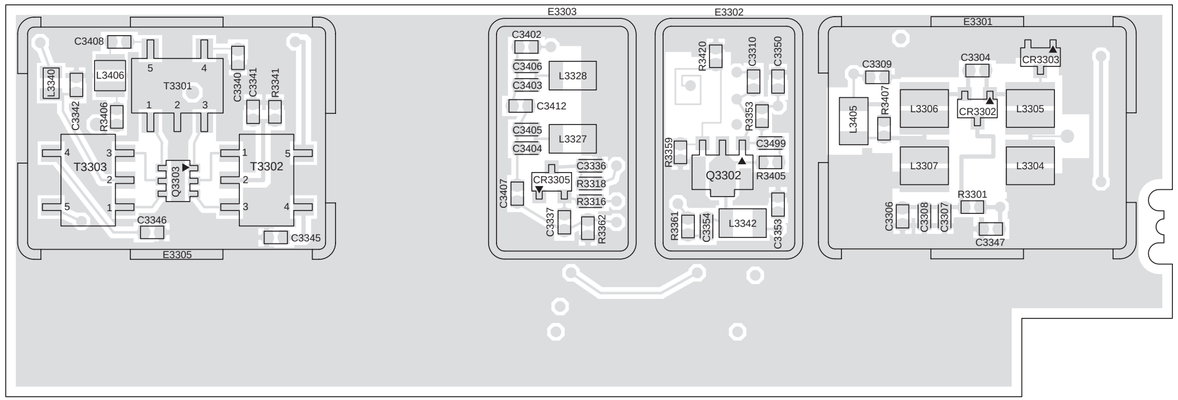
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R3315	0662057A12	30
R3316	0662057A27	120
R3317	0662057A20	62
R3318	0662057A20	62
R3341	0662057A18	51
R3353	0662057A61	3300
R3354	0662057A65	4700
R3355	0662057A49	1000
R3357 *	0662057A16	43
R3357	0662057A08	20
R3359 *	0662057A01	10
R3359	0662057A13	33
R3361 *	0662057A08	20
R3361	0662057A18	51
R3401	0662057A18	51
R3405 *	0662057A53	1500
R3405	0662057A49	1000
R3406	0662057A19	56
R3407 *	0662057B47	0
R3420 *	0662057B47	0
		TRANFORMERS:
T3301	2505515V03	Mixer
T3302	2505515V03	Mixer
T3303	2505515V03	Mixer
		INTERGRATED CIRCUITS:
U3300	5183222M49	Amplifier
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y06	For Kits HUD4015A, HUD4019A

NOTES:
1. All resistance values are in ohms unless indicated otherwise.
2. Items indicated with an asterisk (*) are only placed in preamplifier models of radio.
3. Items indicated with a pound (#) sign are not placed in preamplifier models of radio.
4. Components shown in component location and schematic diagrams but not included in parts list are not placeed.



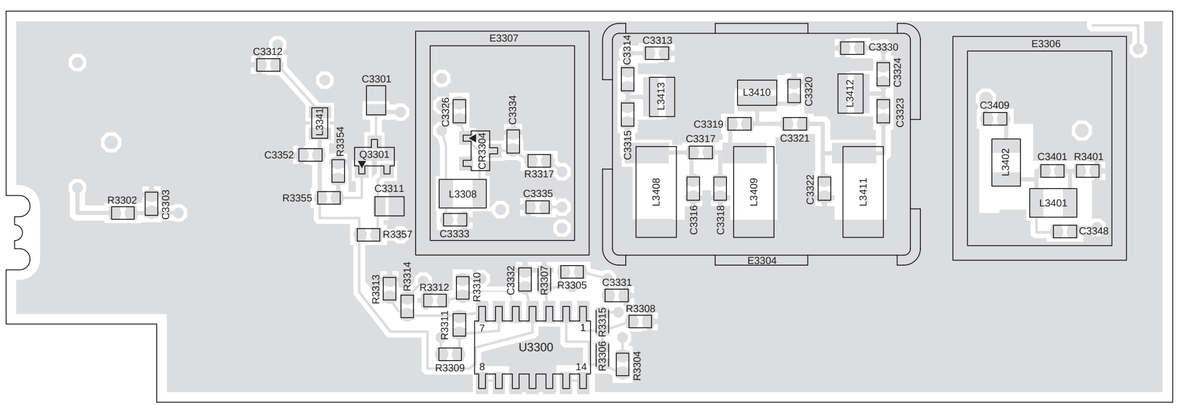
Receiver Front End (Kits HUD4015A, HUD4019A) Schematic Diagram

RECEIVER FRONT END COMPONENT LOCATIONS



HEAVY COMPONENTS SIDE

MAEPF-26643-O



LIGHT COMPONENTS SIDE

MAEPF-26644-O

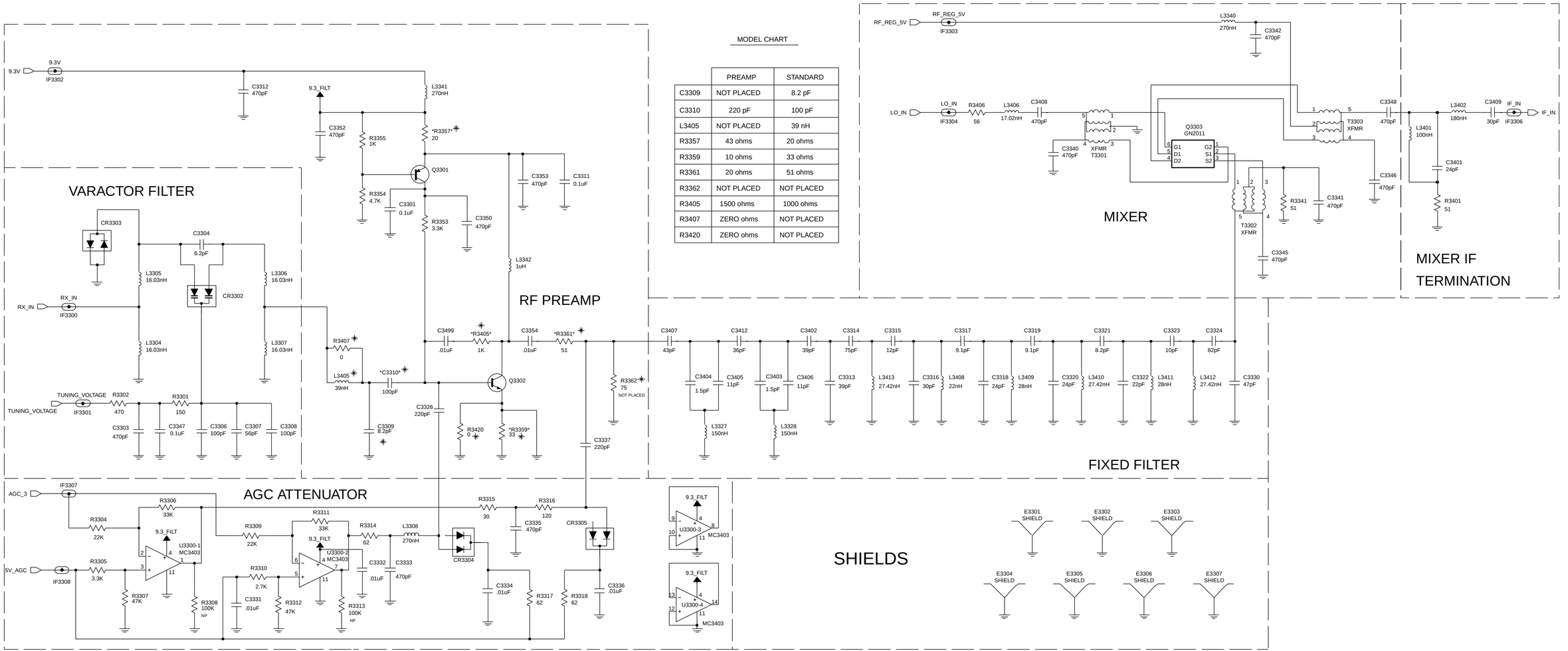
RECEIVER FRONT END PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3301	2113743A19	0.100 uF
C3303	2113931F17	470 pF
C3304	2113930F22	6.2 pF
C3306	2113930F51	100 pF
C3307	2113930F45	56 pF
C3308	2113930F51	100 pF
C3309 #	2113930F25	8.2 pF
C3310 *	2113930F59	220 pF
C3310	2113930F51	100 pF
C3311	2113743A19	0.100 uF
C3312	2113931F17	470 pF
C3313	2113930F41	39 pF
C3314	2113930F48	75 pF
C3315	2113930F29	12 pF
C3316	2113930F38	30 pF
C3317	2113930F26	9.1 pF
C3318	2113930F36	24 pF
C3319	2113930F26	9.1 pF
C3320	2113930F36	24 pF
C3321	2113930F25	8.2 pF
C3322	2113930F35	22 pF
C3323	2113930F27	10 pF
C3324	2113740F49	82 pF
C3326	2113740F59	220 pF
C3330	2113740F43	47 pF
C3331	2113931F49	10000 pF
C3332	2113931F49	10000 pF
C3333	2113931F17	470 pF
C3334	2113931F49	10000 pF
C3335	2113931F17	470 pF
C3336	2113931F49	10000 pF
C3337	2113930F59	220 pF
C3340	2113931F17	470 pF
C3341	2113931F17	470 pF
C3342	2113931F17	470 pF
C3345	2113931F17	470 pF
C3346	2113931F17	470 pF
C3347	2113932K15	0.1 uF
C3348	2113931F17	470 pF
C3350	2113931F17	470 pF
C3352	2113931F17	470 pF
C3353	2113931F17	470 pF
C3354	2113931F49	10,000 pF
C3401	2113930F36	24 pF
C3402	2113930F41	39 pF
C3403	2113930F07	1.5 pF
C3404	2113930F07	1.5 pF
C3405	2113930F28	11 pF
C3406	2113930F28	11 pF
C3407	2113930F42	43 pF
C3408	2113931F17	470 pF
C3409	2113930F38	30 pF
C3412	2113740F40	36 pF
C3499	2113931F49	10,000 pF

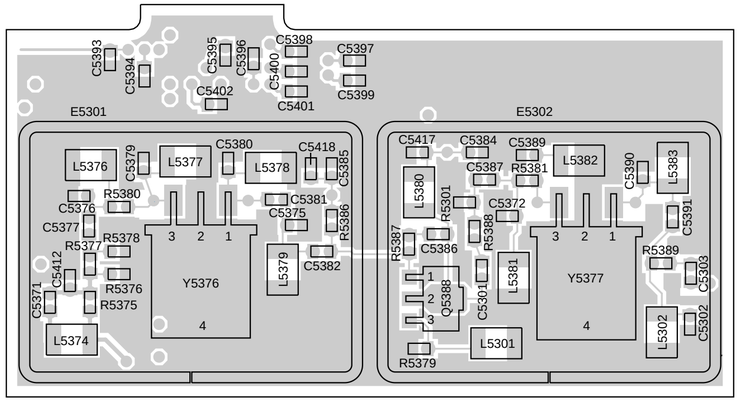
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		DIODES:
CR3302	4802081B58	Dual
CR3303	4880154K03	Dual Schottky Mixer
CR3304	4880154K05	PIN, dual
CR3305	4880154K05	PIN, dual
		SHIELDS:
E3301	2605915V01	PCB Mount
E3302	2602660J01	Harmonic Filter
E3303	2602660J01	Harmonic Filter
E3304	2605915V01	PCB Mount
E3305	2605915V01	PCB Mount
E3306	2605261V01	ZIF
E3307	260526IV01	ZIF
		INDUCTORS:
L3304	2460591L29	Air wound coil16.03 nH
L3305	2460591L29	Air wound coil16.03 nH
L3306	2460591L29	Air wound coil16.03 nH
L3307	2460591L29	Air wound coil16.03 nH
L3308	2462587T20	270 nH
L3327	2462587T17	150 nH
L3328	2462587T17	150 nH
L3340	2462587Q40	270 nH
L3341	2462587Q40	270 nH
L3342	2462587T30	1000 nH
L3401	2462587T15	100 nH
L3402	2462587T18	180 nH
L3405 #	2462587T41	39 nH
L3406	2460591C40	Air wound coil17.02 nH
L3408	2484562T16	Air wound coil
L3409	2484562T17	Air wound coil
L3410	2460591M32	Air wound coil 27.42 nH
L3411	2484562T17	Air wound coil
L3412	2460591M32	Air wound coil 27.42 nH
L3413	2460591M32	Air wound coil 27.42 nH
		TRANSISTORS:
Q3301	4805128M16	PNP
Q3302	4882971R01	NPN
		INTEGRATED CIRCUITS:
Q3303	5105625U28	Mixer
		RESISTORS:
R3301	0662057A29	150
R3302	0662057A41	470
R3304	0662057A81	22K
R3305	0662057A61	3300
R3306	0662057A85	33K
R3307	0662057A89	47K
R3309	0662057A81	22K
R3310	0662057A59	2700
R3311	0662057A85	33K
R3312	0662057A89	47K
R3314	0662057A20	62

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R3315	0662057A12	30
R3316	0662057A27	120
R3317	0662057A20	62
R3318	0662057A20	62
R3341	0662057A18	51
R3353	0662057A61	3300
R3354	0662057A65	4700
R3355	0662057A49	1000
R3357 *	0662057A16	43
R3357	0662057A08	20
R3359 *	0662057A01	10
R3359	0662057A13	33
R3361 *	0662057A08	20
R3361	0662057A18	51
R3401	0662057A18	51
R3405 *	0662057A53	1500
R3405	0662057A49	1000
R3406	0662057A19	56
R3407 *	0662057B47	0
R3420 *	0662057B47	0
		TRANFORMERS:
T3301	2505515V03	Mixer
T3302	2505515V03	Mixer
T3303	2505515V03	Mixer
		INTERGRATED CIRCUITS:
U3300	5183222M49	Amplifier
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y08	For Kits HUD4015B, HUD4019B

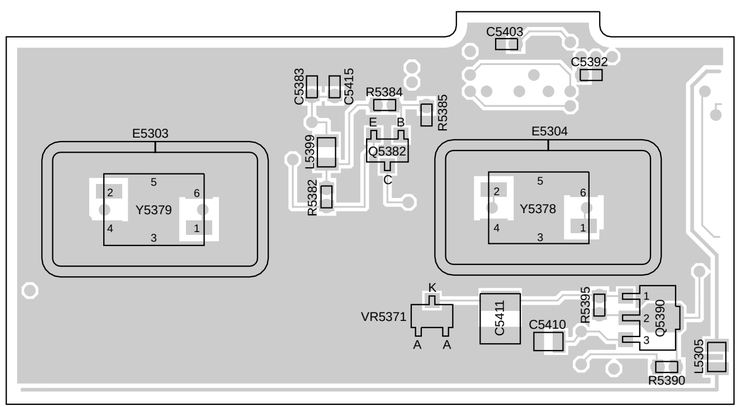
NOTES:
1. All resistance values are in ohms unless indicated otherwise.
2. Items indicated with an asterisk (*) are only placed in preamplifier models of radio.
3. Items indicated with a pound (#) sign are not placed in preamplifier models of radio.
4. Components shown in component location and schematic diagrams but not included in parts list are not placeed.


MODEL CHART
PREAMP
STANDARD
C3309 NOT PLACED 8.2 pF
C3310 220 pF 100 pF
L3405 NOT PLACED 39 nH
R3357 43 ohms 20 ohms
R3359 10 ohms 33 ohms
R3361 20 ohms 51 ohms
R3362 NOT PLACED NOT PLACED
R3405 1500 ohms 1000 ohms
R3407 ZERO ohms NOT PLACED
R3420 ZERO ohms NOT PLACED
VARACTOR FILTER
RF PREAMP
AGC ATTENUATOR
MIXER
MIXER IF TERMINATION
FIXED FILTER
SHIELDS
9.3V
IF3302
9.3_FILT
C3312 470pF
L3341 270nH
C3352 470pF
R3355 1K
R3357 20
Q3301
R3354 4.7K
C3301 0.1uF
R3353 3.3K
C3350 470pF
C3353 470pF
C3311 0.1uF
L3342 1uH
CR3303
C3304 6.2pF
L3305 16.03nH
L3306 16.03nH
CR3302
RX_IN
IF3300
L3304 16.03nH
L3307 16.03nH
TUNING_VOLTAGE
IF3301
R3302 470
R3301 150
C3303 470pF
C3347 0.1uF
C3306 100pF
C3307 56pF
C3308 100pF
R3407 0
L3405 39nH
C3310 100pF
C3309 8.2pF
C3499 .01uF
R3405 1K
C3354 .01uF
R3361 51
C3326 220pF
R3420 0
R3359 33
Q3302
R3362 75 NOT PLACED
C3337 220pF
C3407 43pF
C3404 1.5pF
L3327 150nH
C3412 36pF
C3405 11pF
C3403 1.5pF
L3328 150nH
C3406 11pF
C3402 39pF
C3313 39pF
C3314 75pF
L3413 27.42nH
C3315 12pF
C3316 30pF
C3317 9.1pF
L3408 22nH
C3318 24pF
C3319 9.1pF
L3409 28nH
C3320 24pF
C3321 8.2pF
L3410 27.42nH
C3322 22pF
C3323 10pF
L3411 28nH
C3324 82pF
L3412 27.42nH
C3330 47pF
RF_REG_5V
IF3303
L3340 270nH
C3342 470pF
LO_IN
IF3304
R3406 56
L3406 17.02nH
C3408 470pF
C3340 470pF
XFMR T3301
Q3303 GN2011
G1 D1 D2 G2 S1 S2
T3303 XFMR
C3348 470pF
C3346 470pF
T3302 XFMR
R3341 51
C3341 470pF
C3345 470pF
L3402 180nH
C3409 30pF
IF_IN
IF3306
L3401 100nH
C3401 24pF
R3401 51
AGC_3
IF3307
R3306 33K
R3304 22K
9.3_FILT
U3300-1 MC3403
R3305 3.3K
5V_AGC
IF3308
R3307 47K
R3308 100K NP
R3309 22K
R3311 33K
R3314 62
L3308 270nH
U3300-2 MC3403
R3310 2.7K
C3331 .01uF
R3312 47K
R3313 100K NP
C3332 .01uF
C3333 470pF
R3315 30
R3316 120
C3335 470pF
CR3305
CR3304
C3334 .01uF
R3317 62
R3318 62
C3336 .01uF
U3300-3 MC3403
U3300-4 MC3403
E3301 SHIELD
E3302 SHIELD
E3303 SHIELD
E3304 SHIELD
E3305 SHIELD
E3306 SHIELD
E3307 SHIELD
63A81091C65-O

RECEIVER IF COMPONENT LOCATIONS



HEAVY COMPONENTS SIDE MAEPF-25468-A



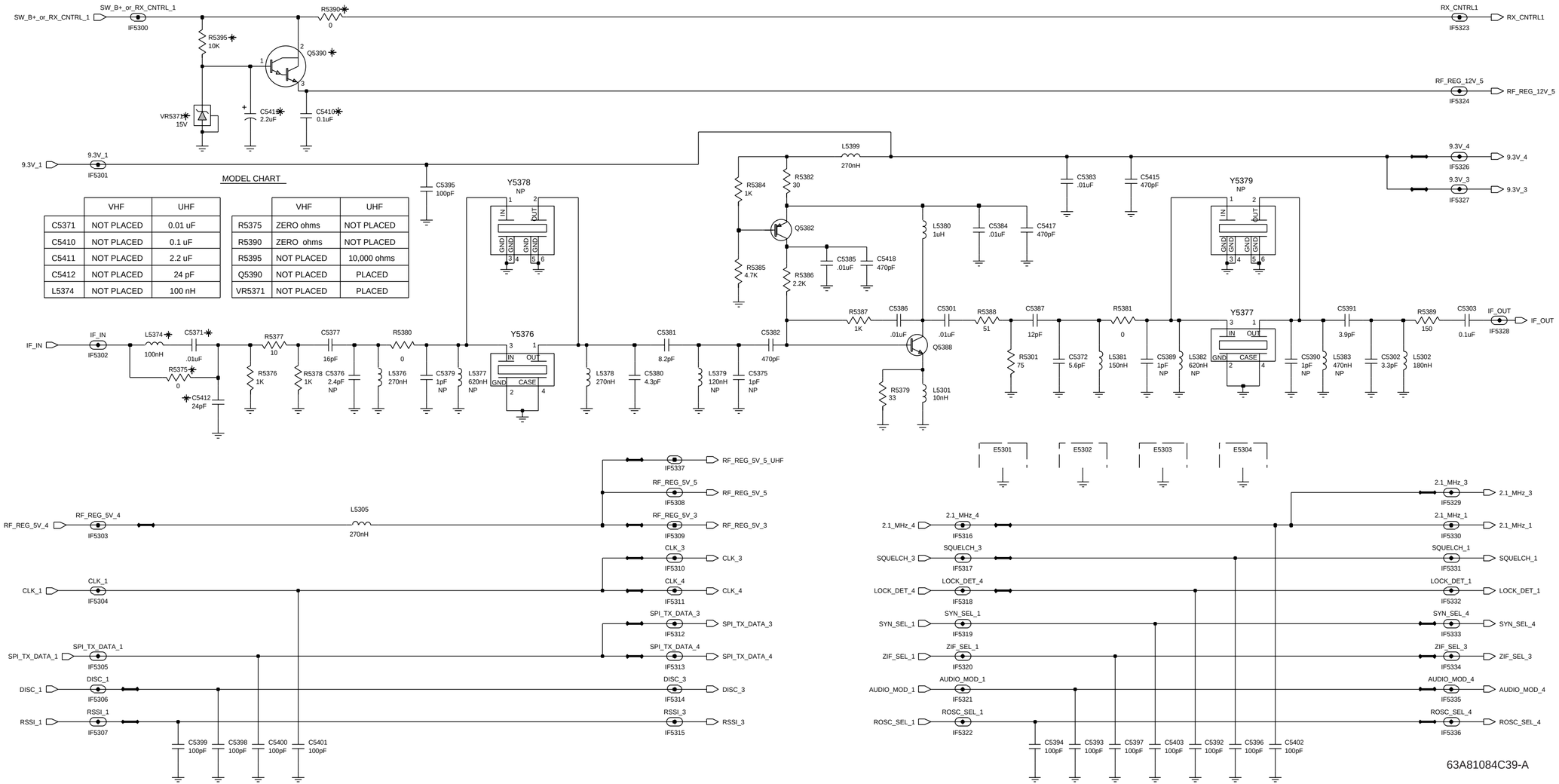
LIGHT COMPONENTS SIDE MAEPF-25469-A

RECEIVER IF PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C5301	2113931F49	10,000 pF
C5302	2113930F15	3.3pF
C5303	2113932K15	0.1 uF
C5377	2113930F32	16 pF
C5380	2113930F18	4.3 pF
C5381	2113930F25	8.2 pF
C5382	2113930F17	470 pF
C5383	2113931F49	10,000 pF
C5384	2113931F49	10,000 pF
C5385	2113931F49	10,000 pF
C5386	2113931F49	10,000 pF
C5387	2113930F34	20 pF
C5391	2113930F49	10,000 pF
C5392	2113930F51	100 pF
C5393	2113930F51	100 pF
C5394	2113930F51	100 pF
C5395	2113930F51	100 pF
C5396	2113930F51	100 pF
C5397	2113930F51	100 pF
C5398	2113930F51	100 pF
C5399	2113930F51	100 pF
C5400	2113930F51	100 pF
C5401	2113930F51	100 pF
C5402	2113930F51	100 pF
C5403	2113930F51	100 pF
C5415	2113931F17	470 pF
C5417	2113931F17	470 pF
C5418	2113931F17	470 pF
		SHIELDS:
E5301	2605915V01	PCB Mount
E5302	2605915V01	PCB Mount
E5303	2605134Y01	2nd Injection
E5304	2605134Y01	2nd Injection
		INDUCTORS:
L5301	2462587T03	10 nH
L5302	2462587T20	270 nH
L5305	2462587Q40	270 nH
L5376	2462587T20	270 nH
L5378	2462587T20	270 nH
L5380	2462587T30	1000 nH
L5381	2462587T17	150 nH
L5399	2462587Q40	270 nH
		TRANSISTORS:
Q5382	4805128M16	PNP
Q5388	4882971R01	NPN
		RESISTORS:
R5301	0662057A18	51
R5375	0662057B47	0
R5376	0662057A49	1000
R5377	0662057A01	10
R5378	0662057A49	1000
R5379	0662057A18	51
R5380	0662057B47	0
R5381	0662057A47	0
R5382	0662057A22	75
R5384	0662057A49	1000
R5385	0662057A65	4700
R5386	0662057A57	2200
R5387	0662057A57	2200
R5388	0662057A22	75
R5389	0662057B47	0
R5390	0662057B47	0
		FILTERS:
Y5378	4805736Y03	Xtal, 2 Poles, 109.65 MHz
Y5379	4805736Y04	Xtal, 2 Poles, 109.65 MHz
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y06	For Kits HUD4015A, HUD4019A

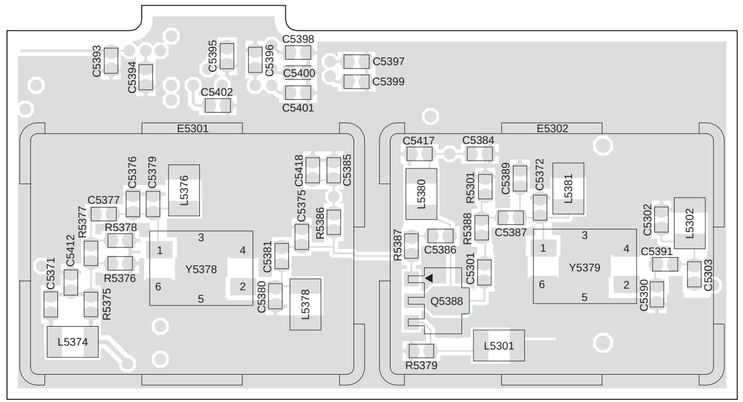
NOTES:
1. All resistance values are in ohms unless indicated otherwise.

2. Components shown in component location and schematic diagrams but not included in parts list are not placed.



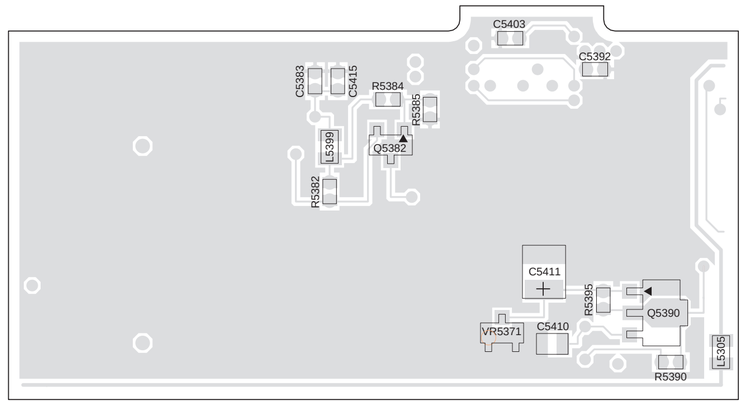
Receiver IF (Kits HUD4015A, HUD4019A)
Schematic Diagram

RECEIVER IF COMPONENT LOCATIONS



HEAVY COMPONENTS SIDE

MAEPF-26645-O



LIGHT COMPONENTS SIDE

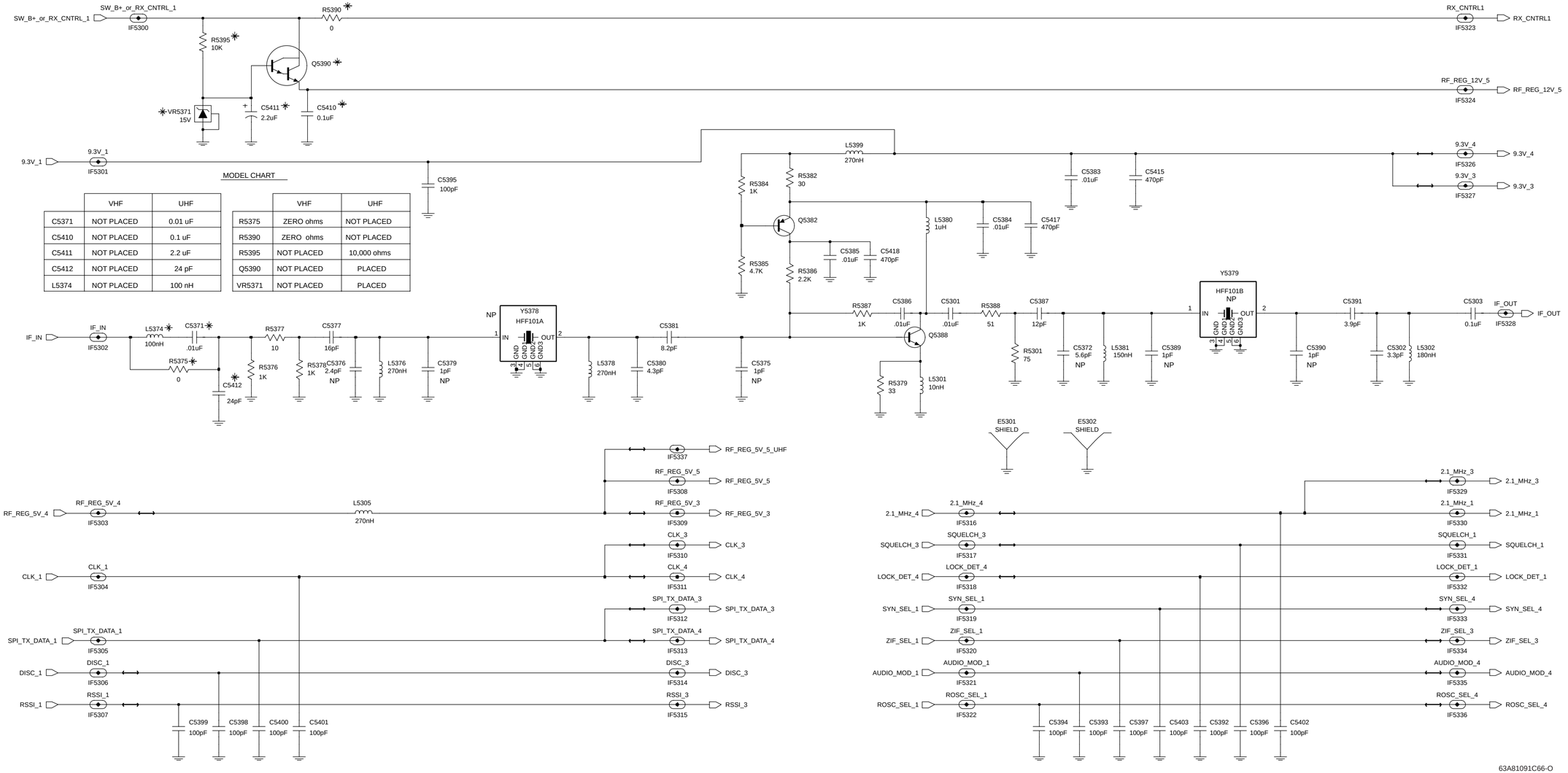
MAEPF-26646-O

RECEIVER IF PARTS LIST

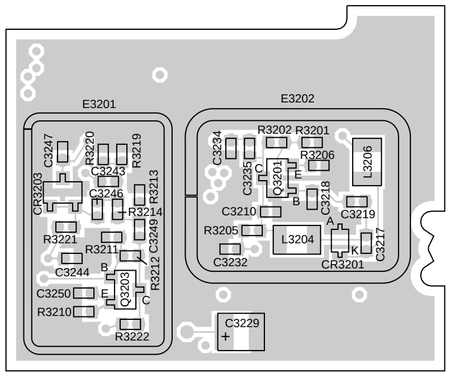
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C5301	2113931F49	10,000 pF
C5302	2113930F15	3.3pF
C5303	2113932K15	0.1 uF
C5377	2113930F32	16 pF
C5380	2113930F18	4.3 pF
C5381	2113930F25	8.2 pF
C5383	2113931F49	10,000 pF
C5384	2113931F49	10,000 pF
C5385	2113931F49	10,000 pF
C5386	2113931F49	10,000 pF
C5387	2113930F29	12 pF
C5391	2113930F17	3.9 pF
C5392	2113930F51	100 pF
C5393	2113930F51	100 pF
C5394	2113930F51	100 pF
C5395	2113930F51	100 pF
C5396	2113930F51	100 pF
C5397	2113930F51	100 pF
C5398	2113930F51	100 pF
C5399	2113930F51	100 pF
C5400	2113930F51	100 pF
C5401	2113930F51	100 pF
C5402	2113930F51	100 pF
C5403	2113930F51	100 pF
C5415	2113931F17	470 pF
C5417	2113931F17	470 pF
C5418	2113931F17	470 pF
		SHIELDS:
E5301	2605915V01	PCB Mount
E5302	2605915V01	PCB Mount
		INDUCTORS:
L5301	2462587T03	10 nH
L5302	2462587T18	180 nH
L5305	2462587Q40	270 nH
L5376	2462587T20	270 nH
L5378	2462587T20	270 nH
L5380	2462587T30	1000 nH
L5381	2462587T17	150 nH
L5399	2462587Q40	270 nH
		TRANSISTORS:
Q5382	4805128M16	PNP
Q5388	4882971R01	NPN
		RESISTORS:
R5301	0662057A22	75
R5375	0662057B47	0
R5376	0662057A49	1000
R5377	0662057A01	10
R5378	0662057A49	1000
R5379	0662057A13	33
R5382	0662057A12	30
R5384	0662057A49	1000
R5385	0662057A65	4700
R5386	0662057A57	2200
R5387	0662057A49	1000
R5388	0662057A18	51
R5390	0662057B47	0
		FILTERS:
Y5378	4805736Y03	Xtal, 2 Poles, 109.65 MHz
Y5379	4805736Y04	Xtal, 2 Poles, 109.65 MHz
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y08	For Kits HUD4015B HUD4019B

NOTES:
1. All resistance values are in ohms unless indicated otherwise.

2. Components shown in component location and schematic diagrams but not included in parts list are not placed.

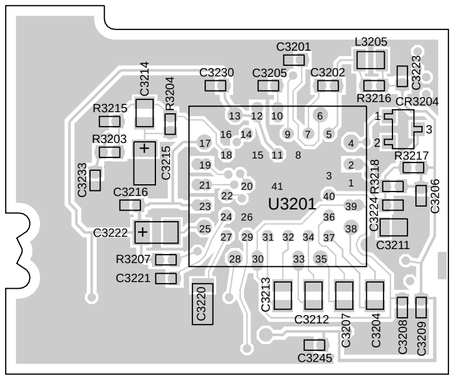

SW_B+_or_RX_CNTRL_1
IF5300
R5390
0
R5395
10K
Q5390
VR5371
15V
C5411
2.2uF
C5410
0.1uF
RX_CNTRL1
IF5323
RF_REG_12V_5
IF5324
9.3V_1
IF5301
C5395
100pF
L5399
270nH
R5384
1K
R5382
30
C5383
.01uF
C5415
470pF
9.3V_4
IF5326
9.3V_3
IF5327
Q5382
L5380
1uH
C5384
.01uF
C5417
470pF
C5385
.01uF
C5418
470pF
R5385
4.7K
R5386
2.2K
Y5379
HFF101B
NP
IN
OUT
GND
GND
GND
GND
R5387
1K
C5386
.01uF
C5301
.01uF
R5388
51
C5387
12pF
C5391
3.9pF
C5303
0.1uF
IF_OUT
IF5328
Q5388
R5301
75
C5372
5.6pF
NP
L5381
150nH
C5389
1pF
NP
C5390
1pF
NP
C5302
3.3pF
L5302
180nH
R5379
33
L5301
10nH
IF_IN
IF5302
L5374
100nH
C5371
.01uF
R5375
0
C5412
24pF
R5376
1K
R5377
10
C5377
16pF
R5378
1K
C5376
2.4pF
NP
L5376
270nH
C5379
1pF
NP
Y5378
HFF101A
NP
C5381
8.2pF
L5378
270nH
C5380
4.3pF
C5375
1pF
NP
E5301
SHIELD
E5302
SHIELD
MODEL CHART
VHF
UHF
C5371
NOT PLACED
0.01 uF
C5410
NOT PLACED
0.1 uF
C5411
NOT PLACED
2.2 uF
C5412
NOT PLACED
24 pF
L5374
NOT PLACED
100 nH
R5375
ZERO ohms
NOT PLACED
R5390
ZERO ohms
NOT PLACED
R5395
NOT PLACED
10,000 ohms
Q5390
NOT PLACED
PLACED
VR5371
NOT PLACED
PLACED
RF_REG_5V_5_UHF
IF5337
RF_REG_5V_5
IF5308
RF_REG_5V_3
IF5309
RF_REG_5V_4
IF5303
L5305
270nH
CLK_3
IF5310
CLK_4
IF5311
CLK_1
IF5304
SPI_TX_DATA_3
IF5312
SPI_TX_DATA_4
IF5313
SPI_TX_DATA_1
IF5305
DISC_3
IF5314
DISC_1
IF5306
RSSI_3
IF5315
RSSI_1
IF5307
C5399
100pF
C5398
100pF
C5400
100pF
C5401
100pF
2.1_MHz_3
IF5329
2.1_MHz_1
IF5330
2.1_MHz_4
IF5316
SQUELCH_1
IF5331
SQUELCH_3
IF5317
LOCK_DET_1
IF5332
LOCK_DET_4
IF5318
SYN_SEL_4
IF5333
SYN_SEL_1
IF5319
ZIF_SEL_3
IF5334
ZIF_SEL_1
IF5320
AUDIO_MOD_4
IF5335
AUDIO_MOD_1
IF5321
ROSC_SEL_4
IF5336
ROSC_SEL_1
IF5322
C5394
100pF
C5393
100pF
C5397
100pF
C5403
100pF
C5392
100pF
C5396
100pF
C5402
100pF
63A81091C66-O

RECEIVER BACK END COMPONENT LOCATIONS



MAEPF-25472-A

HEAVY COMPONENTS SIDE



MAEPF-25473-A

LIGHT COMPONENTS SIDE

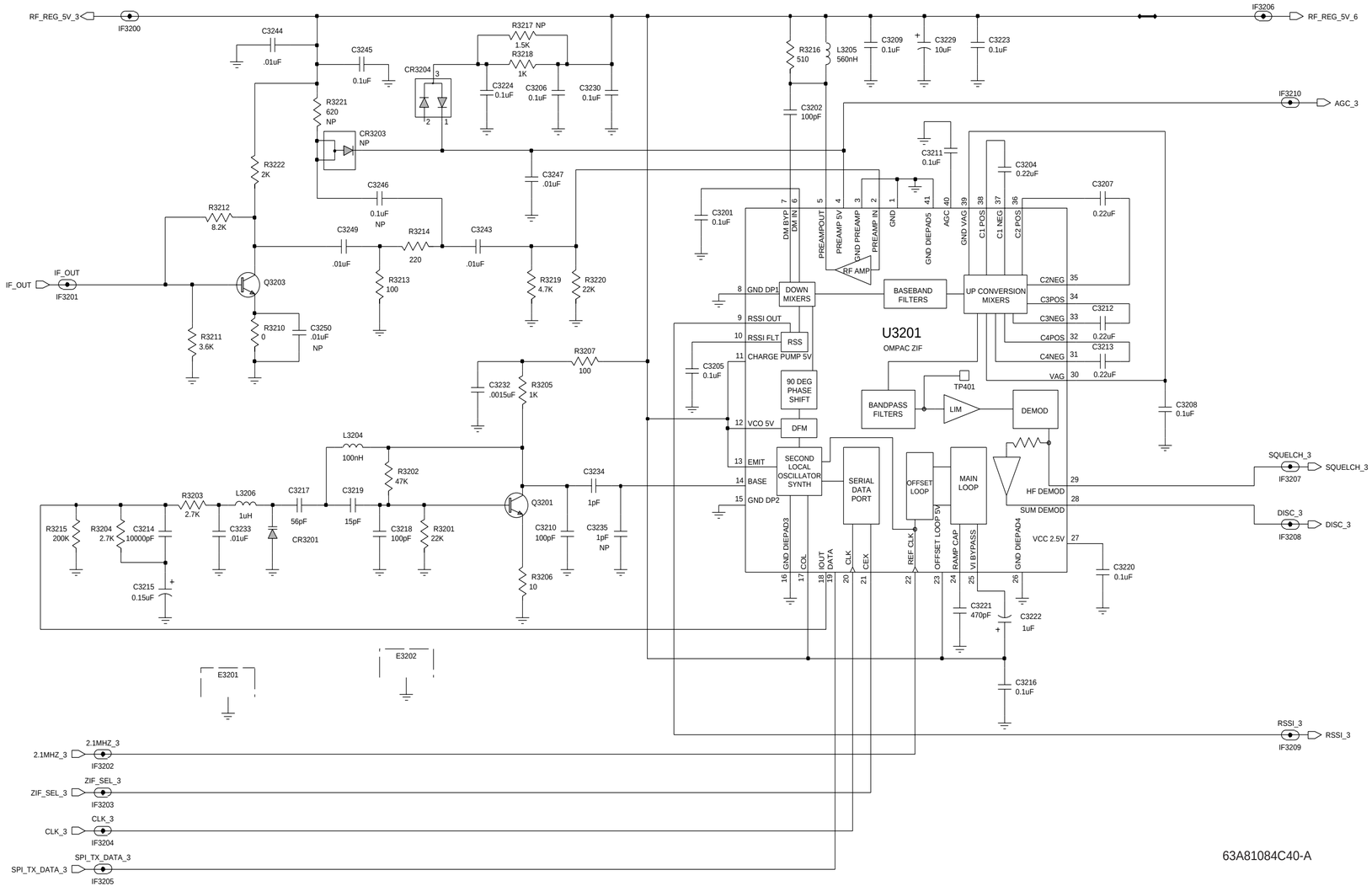
RECEIVER BACK END PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3201	2113932K15	0.1 uF
C3202	2113930F51	100 pF
C3204	2113743A23	0.22 uF
C3205	2113932K15	0.1 uF
C3206	2113932K15	0.1 uF
C3207	2113743A23	0.22 uF
C3208	2113932K15	0.1 uF
C3209	2113932K15	0.1 uF
C3210	2113930F51	100 pF
C3211	2113743A19	0.100 uF
C3212	2113743A23	0.220 uF
C3213	2113743A23	0.220 uF
C3214	2113741A45	10000
C3215	2311049A02	0.15 uF
C3216	2113932K15	0.1 uF
C3217	2113930F45	56 pF
C3218	2113930F51	100 pF
C3219	2113930F31	15 pF
C3220	2109720D14	0.1 uF
C3221	2113931F17	470 pF
C3222	2311049A07	1 uF
C3223	2113932K15	0.1 uF
C3224	2113932K15	0.1 uF
C3229	2311049J23	10 uF
C3230	2113932K15	0.1 uF
C3232	2113931F29	1500 pF
C3233	2113931F49	10000 pF
C3234	2113930F03	1 pF
C3243	2113931F49	10,000 pF
C3244	2113931F49	10000 pF
C3245	2113932K15	0.1 uF
C3247	2113931F49	10,000 pF
C3249	2113931F49	10,000 pF
		DIODES:
CR3201	4862824C01	Varactor
CR3204	4880154K03	Dual Schottky mixer

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		SHIELDS:
E3202	2605261V01	ZIF
		INDUCTORS:
L3204	2462587T15	100 nH
L3205	2462587Q44	560 nH
L3206	2462587T30	1000 nH
		TRANSISTORS:
Q3201	4882022N70	NPN
Q3203	4882022N70	NPN
		RESISTORS:
R3201	0662057A81	22K
R3202	0662057A89	47K
R3203	0662057A59	2700
R3204	0662057A59	2700
R3205	0662057A49	1000
R3206	0662057A01	10
R3207	0662057A25	100
R3210	0662057B47	0
R3211	0662057A53	1500
R3212	0662057A65	4700
R3215	0662057B05	200K
R3216	0662057A42	510
R3218	0662057A51	1200
R3219	0662057A65	4700
R3220	0662057A81	22K
R3222	0662057A49	1000
R3213	0662057A49	1000
R3214	0662057A33	220
		INTERGRATED CIRCUITS
U3201	5105457W94	Zero IF (ZIF)
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y06	For Kits HUD4015A, HUD4019A

NOTES:
1. All resistance values are in ohms unless indicated otherwise.

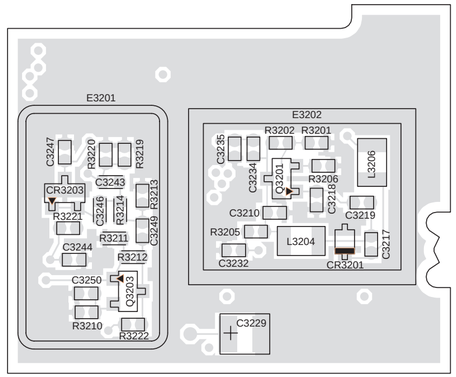
2. Components shown in component location and schematic diagrams but not included in parts list are not placed.



63A81084C40-A

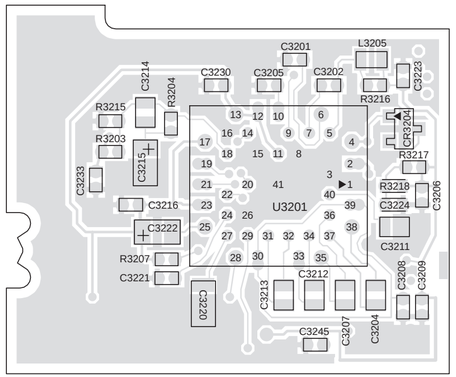
Receiver Back End (Kits HUD4015A, HUD4019A)
Schematic Diagram

RECEIVER BACK END COMPONENT LOCATIONS



MAEPF-26647-O

HEAVY COMPONENTS SIDE



MAEPF-26648-O

LIGHT COMPONENTS SIDE

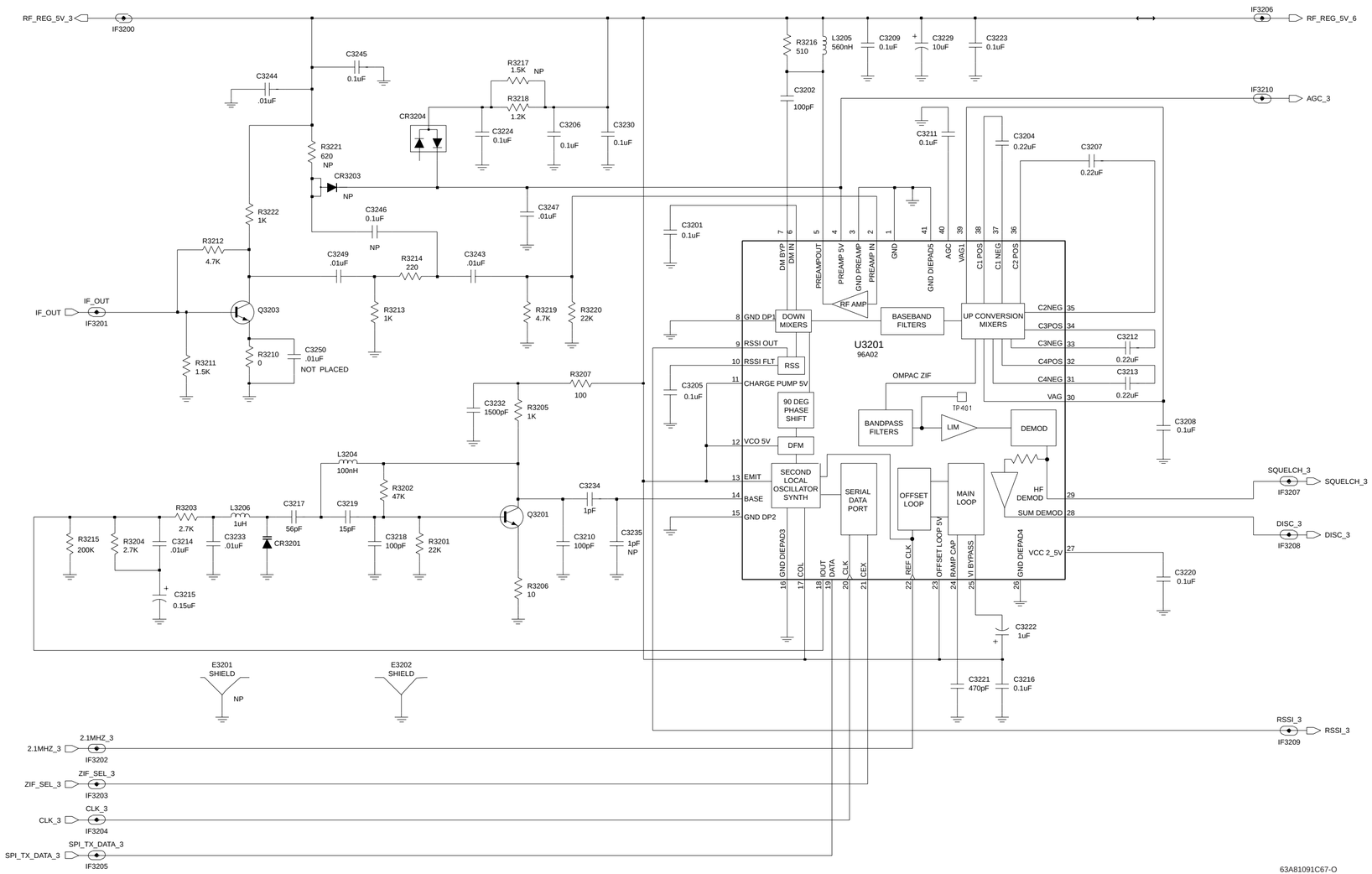
RECEIVER BACK END PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3201	2113932K15	0.1 uF
C3202	2113930F51	100 pF
C3204	2113743A23	0.22 uF
C3205	2113932K15	0.1 uF
C3206	2113932K15	0.1 uF
C3207	2113743A23	0.22 uF
C3208	2113932K15	0.1 uF
C3209	2113932K15	0.1 uF
C3210	2113930F51	100 pF
C3211	2113743A19	0.100 uF
C3212	2113743A23	0.220 uF
C3213	2113743A23	0.220 uF
C3214	2113741A45	10000
C3215	2311049A02	0.15 uF
C3216	2113932K15	0.1 uF
C3217	2113930F45	56 pF
C3218	2113930F51	100 pF
C3219	2113930F31	15 pF
C3220	2109720D14	0.1 uF
C3221	2113931F17	470 pF
C3222	2311049A07	1 uF
C3223	2113932K15	0.1 uF
C3224	2113932K15	0.1 uF
C3229	2311049J23	10 uF
C3230	2113932K15	0.1 uF
C3232	2113931F29	1500 pF
C3233	2113931F49	10000 pF
C3234	2113930F03	1 pF
C3243	2113931F49	10,000 pF
C3244	2113931F49	10000 pF
C3245	2113932K15	0.1 uF
C3247	2113931F49	10,000 pF
C3249	2113931F49	10,000 pF
		DIODES:
CR3201	4862824C01	Varactor
CR3204	4880154K03	Dual Schottky mixer

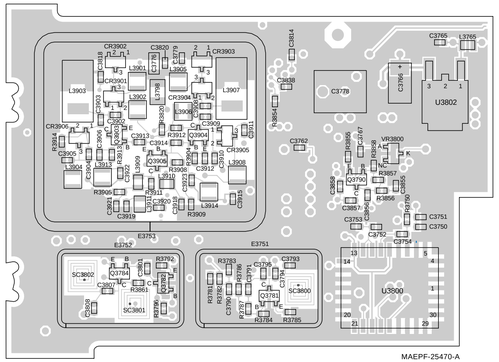
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		SHIELDS:
E3202	2605261V01	ZIF
		INDUCTORS:
L3204	2462587T15	100 nH
L3205	2462587Q44	560 nH
L3206	2462587T30	1000 nH
		TRANSISTORS:
Q3201	4882022N70	NPN
Q3203	4882022N70	NPN
		RESISTORS:
R3201	0662057A81	22K
R3202	0662057A89	47K
R3203	0662057A59	2700
R3204	0662057A59	2700
R3205	0662057A49	1000
R3206	0662057A01	10
R3207	0662057A25	100
R3210	0662057B47	0
R3211	0662057A53	1500
R3212	0662057A65	4700
R3215	0662057B05	200K
R3216	0662057A42	510
R3218	0662057A51	1200
R3219	0662057A65	4700
R3220	0662057A81	22K
R3222	0662057A49	1000
R3213	0662057A49	1000
R3214	0662057A33	220
		INTERGRATED CIRCUITS
U3201	5186296A02	Zero IF (ZIF)
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y08	For Kits HUD4015B, HUD4019B

NOTES:
1. All resistance values are in ohms unless indicated otherwise.

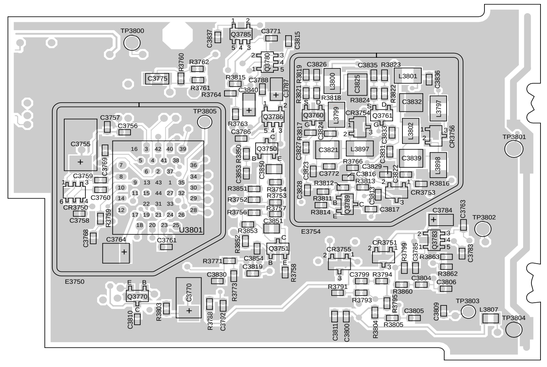
2. Components shown in component location and schematic diagrams but not included in parts list are not placed.


RF_REG_5V_3
IF3200
IF3206
RF_REG_5V_6
R3216 510
L3205 560nH
C3209 0.1uF
C3229 10uF
C3223 0.1uF
C3202 100pF
IF3210
AGC_3
C3211 0.1uF
C3204 0.22uF
C3207 0.22uF
C3245 0.1uF
C3244 .01uF
R3217 1.5K NP
R3218 1.2K
CR3204
C3224 0.1uF
C3206 0.1uF
C3230 0.1uF
R3221 620 NP
CR3203 NP
C3246 0.1uF NP
C3247 .01uF
R3222 1K
R3212 4.7K
C3249 .01uF
R3214 220
C3243 .01uF
C3201 0.1uF
IF_OUT
IF3201
Q3203
R3213 1K
R3219 4.7K
R3220 22K
R3211 1.5K
R3210 0
C3250 .01uF NOT PLACED
R3207 100
C3232 1500pF
R3205 1K
C3205 0.1uF
L3204 100nH
R3202 47K
C3234 1pF
R3203 2.7K
L3206 1uH
C3217 56pF
C3219 15pF
R3215 200K
R3204 2.7K
C3214 .01uF
C3233 .01uF
CR3201
C3218 100pF
R3201 22K
Q3201
C3210 100pF
C3235 1pF NP
R3206 10
C3215 0.15uF
E3201 SHIELD NP
E3202 SHIELD
U3201
96A02
DM BYP
DM IN
PREAMPOUT
PREAMP 5V
GND PREAMP
PREAMP IN
GND
GND DIEPAD5
AGC
VAG1
C1 POS
C1 NEG
C2 POS
RF AMP
BASEBAND FILTERS
UP CONVERSION MIXERS
C2NEG
C3POS
C3NEG
C4POS
C4NEG
VAG
C3212 0.22uF
C3213 0.22uF
C3208 0.1uF
GND DP1
DOWN MIXERS
RSSI OUT
RSSI FLT
RSS
CHARGE PUMP 5V
90 DEG PHASE SHIFT
OMPAC ZIF
TP401
BANDPASS FILTERS
LIM
DEMOD
VCO 5V
DFM
EMIT
BASE
GND DP2
SECOND LOCAL OSCILLATOR SYNTH
SERIAL DATA PORT
OFFSET LOOP
MAIN LOOP
HF DEMOD
SUM DEMOD
VCC 2_5V
SQUELCH_3
IF3207
DISC_3
IF3208
GND DIEPAD3
COL
OUT DATA
CLK
CEX
REF CLK
OFFSET LOOP 5V
RAMP CAP
VI BYPASS
GND DIEPAD4
C3220 0.1uF
C3222 1uF
C3221 470pF
C3216 0.1uF
RSSI_3
IF3209
2.1MHZ_3
IF3202
ZIF_SEL_3
IF3203
CLK_3
IF3204
SPI_TX_DATA_3
IF3205
63A81091C67-O

SYNTHESIZER COMPONENT LOCATIONS



HEAVY COMPONENTS SIDE



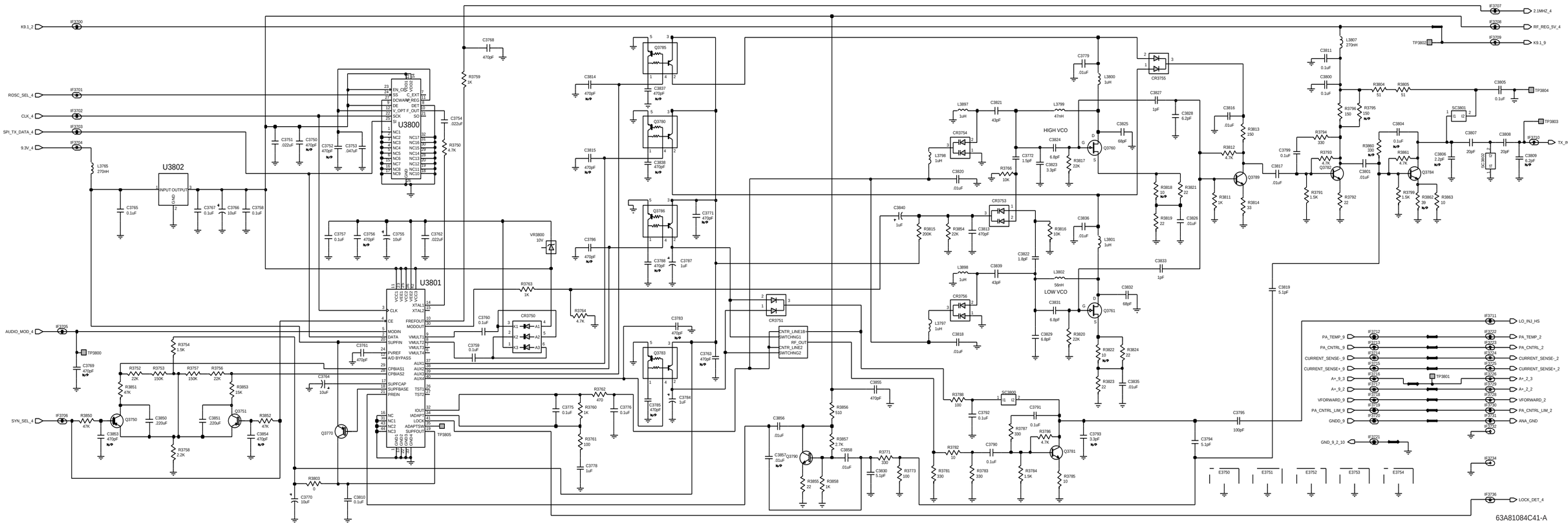
LIGHT COMPONENTS SIDE

SYNTHESIZER PARTS LIST

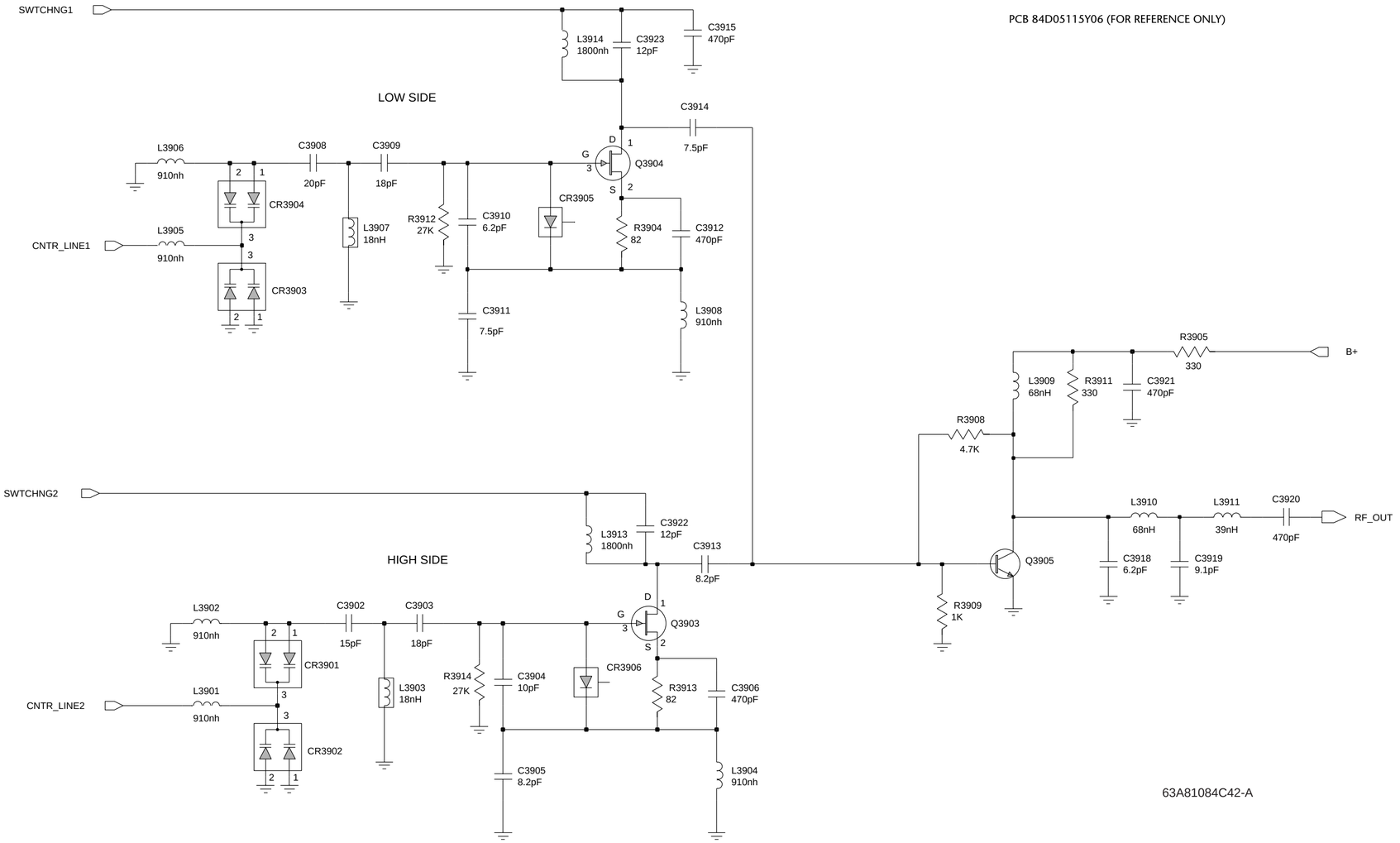
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3751	2113932E07	0.022 uF
C3753	2113932K07	0.047 uF
C3754	2113932E07	0.022 uF
C3755	2311049A19	10 uF
C3757	2113932K15	0.1 uF
C3758	2113932K15	0.1 uF
C3759	2113932K15	0.1 uF
C3760	2113932K15	0.1 uF
C3761	2113740F67	470
C3762	2113932E07	0.022 uF
C3764	2311049J23	10 uF
C3765	2113932K15	0.1 uF
C3766	2311049J26	10 uF
C3767	2113932K15	0.1 uF
C3768	2113740F67	470
C3770	2311049J26	10 uF
C3772	2113930F07	1.5 pF
C3775	2109720D14	0.1 uF
C3776	2109720D14	0.1 uF
C3778	0811051A19	1 uF
C3779	2113931F49	10,000 pF
C3784	2311049A07	1 uF
C3787	2311049A07	1 uF
C3790	2113932K15	0.1 uF
C3791	2113932K15	0.1 uF
C3792	2113932K15	0.1 uF
C3794	2113930F20	5.1 pF
C3795	2113930F51	100 pF
C3799	2113932K15	0.1 uF
C3800	2113932K15	0.1 uF
C3801	2113931F49	10,000 pF
C3805	2113932K15	0.1 uF
C3807	2113930F34	20 pF
C3808	2113930F34	20 pF
C3810	2113932K15	0.1 uF
C3811	2113932K15	0.1 uF
C3813	2113740F67	470
C3816	2113931F49	10,000 pF
C3817	2113931F49	10,000 pF
C3818	2113931F49	10,000 pF
C3819	2113930F20	5.1 pF
C3820	2113931F49	10,000 pF
C3821	2111078B33	43 pF
C3822	2113930F09	1.8 pF
C3823	2113930F15	3.3 pF
C3824	2113930F23	6.8 pF
C3825	2111078B38	68 pF
C3826	2113931F49	10,000 pF
C3827	2113930F03	1 pF
C3828	2113930F22	6.2 pF
C3829	2113930F23	6.8 pF
C3830	2113930F20	5.1 pF
C3831	2113930F23	6.8 pF
C3832	2111078B38	68 pF
C3833	2113930F03	1 pF
C3835	2113931F49	10,000 pF
C3836	2113931F49	10,000 pF
C3839	2111078B33	43 pF
C3840	2311049A07	1 uF
C3850	2113743A23	0.22 uF
C3851	2113743A23	0.22 uF
C3855	2113740F67	470
C3856	2113931F49	10,000 pF
C3858	2113931F49	10,000 pF
C3902	2113930F31	15 pF
C3903	2113930F33	18 pF
C3904	2113930F27	10 pF
C3905	2113930F25	8.2 pF
C3906	2113740F67	470
C3908	2113930F34	20 pF
C3909	2113930F33	18 pF
C3910	2113930F22	6.2 pF
C3911	2113930F24	7.5 pF
C3912	2113740F67	470
C3913	2113930F25	8.2 pF
C3914	2113930F24	7.5 pF
C3915	2113740F67	470
C3918	2113930F22	6.2 pF
C3919	2113930F26	9.1 pF
C3920	2113740F67	470
C3921	2113740F67	470
C3922	2113930F29	12 pF
C3923	2113930F29	12 pF
		DIODES:
CR3750	4802233J09	Triple
CR3751	4813833C02	Dual
CR3753	4805649Q13	Varactor
CR3754	4805649Q13	Varactor
CR3755	4813833C02	Dual
CR3756	4805649Q13	Varactor
CR3901	4805649Q13	Varactor
CR3902	4805649Q13	Varactor
CR3903	4805649Q13	Varactor
CR3904	4805649Q13	Varactor
CR3905	4805129M05	Hot carrier
CR3906	4805129M05	Hot carrier
VR3800	4813830A23	10V Zener
		SHIELDS:
E3750	2602658J02	FRAC N
E3751	2602660J02	L.O. buffer
E3752	2602660J02	TX injection string
E3753	2605782V04	RX VCO
E3754	2602658J02	TX VFO
		INDUCTORS:
L3765	2462587Q40	270 nH
L3797	2462587T30	1000 nH
L3798	2462587T30	1000 nH
L3799	2462587T42	47 nH
L3800	2462587T30	1000 nH
L3801	2462587T30	1000 nH
L3802	2462587T12	56 nH
L3807	2462587Q40	270 nH
L3897	2462587T30	1000 nH
L3898	2462587T30	1000 nH
L3901	2405452C59	Coil
L3902	2405452C59	Coil
L3903	0105953T96	Helical 4.5 turns
L3904	2405452C59	Coil
L3905	2405452C59	Coil
L3906	2405452C59	Coil
L3907	0105953T96	Helical 4.5 turns
L3908	2405452C59	Coil
L3909	2462587V32	68 nH
L3910	2462587V32	68 nH
L3911	2462587V29	39 nH
L3913	2405452C66	Coil
L3914	2405452C66	Coil
		TRANSISTORS:
Q3750	4805128M16	PNP
Q3751	4805128M16	PNP
Q3760	4880141L06	FET
Q3761	4880141L06	FET
Q3770	4805128M16	PNP
Q3780	4805921T04	Dual, switching
Q3781	4882022N70	NPN
Q3782	4882022N70	NPN
Q3783	4805921T04	Dual, switching
Q3784	4882022N70	NPN
Q3785	4805921T04	Dual, switching
Q3786	4805921T04	Dual, switching
Q3789	4882022N70	NPN
Q3790	4882022N70	NPN
Q3903	4880141L06	FET
Q3904	4880141L06	FET
Q3905	4882022N70	NPN
		RESISTORS:
R3750	0662057A65	4700
R3752	0662057A81	22K
R3753	0662057B02	150K
R3754	0662057A53	1500
R3756	0662057A81	22K
R3757	0662057B02	150K
R3758	0662057A57	2200
R3759	0662057A49	1000
R3760	0662057A49	1000
R3761	0662057A25	100
R3762	0662057A41	470
R3763	0662057A49	1000
R3764	0662057A65	4700
R3766	0662057A73	10K
R3767	0662057B47	0
R3768	0662057B47	0
R3771	0662057A37	330
R3773	0662057A25	100
R3781	0662057A37	330
R3782	0662057A01	10
R3783	0662057A37	330
R3784	0662057A53	1500
R3785	0662057A01	10
R3786	0662057A65	4700
R3787	0662057A37	330
R3788	0662057A25	100
R3791	0662057A53	1500
R3792	0662057A09	22
R3793	0662057A65	4700
R3794	0662057A37	330
R3796	0662057A29	150
R3799	0662057A53	1500
R3804	0662057A18	51
R3805	0662057A18	51
R3811	0662057A49	1000
R3812	0662057A65	4700
R3813	0662057A29	150
R3814	0662057A13	33
R3815	0662057B05	200K
R3816	0662057A73	10K
R3817	0662057A81	22K
R3819	0662057A09	22
R3820	0662057A81	22K
R3821	0662057A09	22
R3823	0662057A09	22
R3824	0662057A09	22
R3850	0662057A89	47K
R3851	0662057A89	47K
R3852	0662057A89	47K
R3853	0662057A77	15K
R3854	0662057A81	22K
R3855	0662057A09	22
R3856	0662057A42	510
R3857	0662057A59	2700
R3858	0662057A49	1000
R3861	0662057A65	4700
R3862	0662057A09	22
R3904	0662057A23	82
R3905	0662057A37	330
R3908	0662057A65	4700
R3909	0662057A49	1000
R3911	0662057A37	330
R3912	0662057A83	27K
R3913	0662057A23	82
R3914	0662057A83	27K
		INTEGRATED CIRCUITS:
U3800	5105385Y26	16.8 MHz refernece oscillator
U3801	5105457W73	Hybrid
U3802	5113816A07	5V regulator
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y06	For Kits HUD4015A, HUD4019A

NOTES:

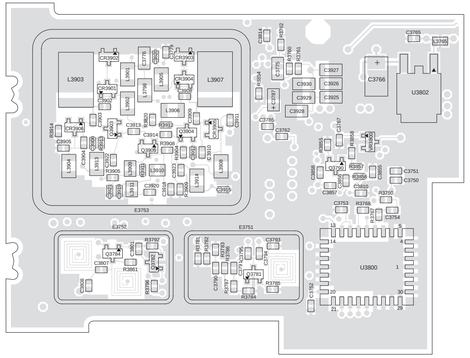
1. All resistance values are in ohms unless indicated otherwise.
2. Components shown in component location and schematic diagrams but not included in parts list are not placed.



Synthesizer (Kits HUD4015A, HUD4019A)
Schematic Diagram

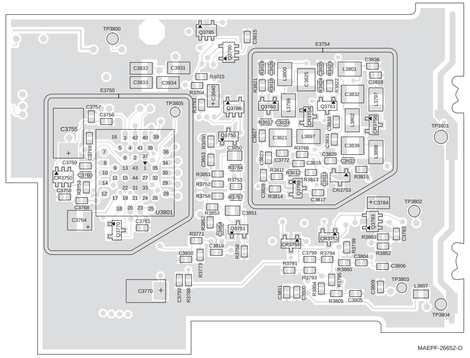

PCB 84D05115Y06 (FOR REFERENCE ONLY)
SWTCHNG1
L3914
1800nh
C3923
12pF
C3915
470pF
LOW SIDE
C3914
7.5pF
L3906
910nh
C3908
20pF
C3909
18pF
D
G
S
Q3904
CR3904
CR3905
L3905
910nh
CNTR_LINE1
L3907
18nH
R3912
27K
C3910
6.2pF
R3904
82
C3912
470pF
CR3903
C3911
7.5pF
L3908
910nh
R3905
330
B+
L3909
68nH
R3911
330
C3921
470pF
R3908
4.7K
SWTCHNG2
L3913
1800nh
C3922
12pF
C3913
8.2pF
HIGH SIDE
L3910
68nH
L3911
39nH
C3920
470pF
RF_OUT
Q3905
C3918
6.2pF
C3919
9.1pF
R3909
1K
L3902
910nh
C3902
15pF
C3903
18pF
Q3903
CR3901
L3901
910nh
CNTR_LINE2
L3903
18nH
R3914
27K
C3904
10pF
CR3906
R3913
82
C3906
470pF
CR3902
C3905
8.2pF
L3904
910nh
63A81084C42-A

SYNTHESIZER COMPONENT LOCATIONS



MAEPF-26651-O

HEAVY COMPONENTS SIDE



MAEPF-26652-O

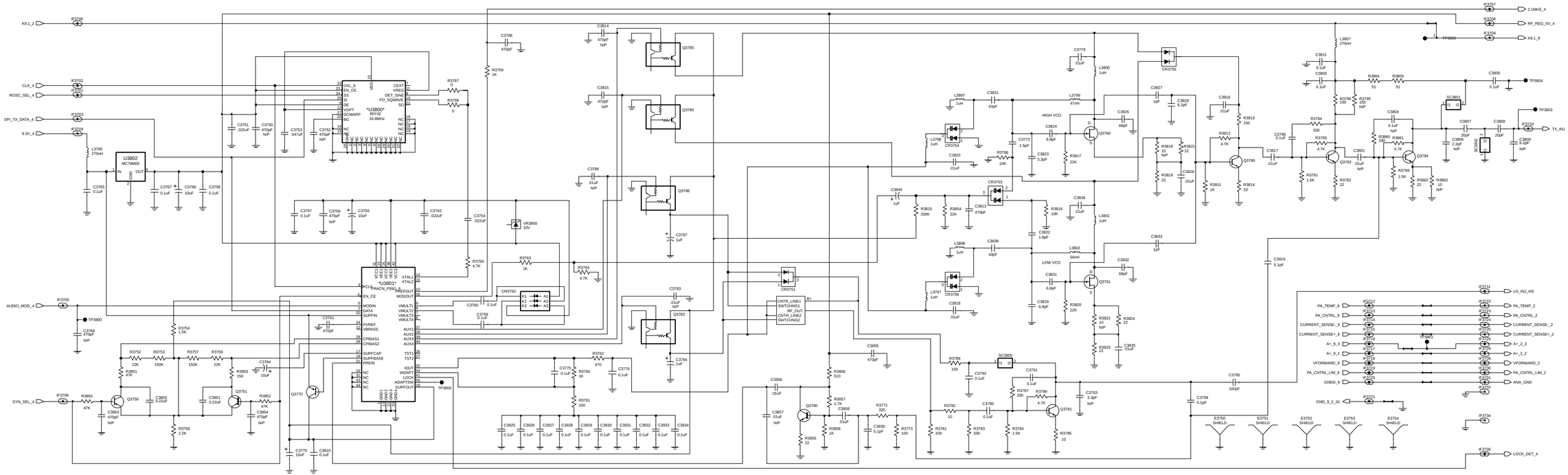
LIGHT COMPONENTS SIDE

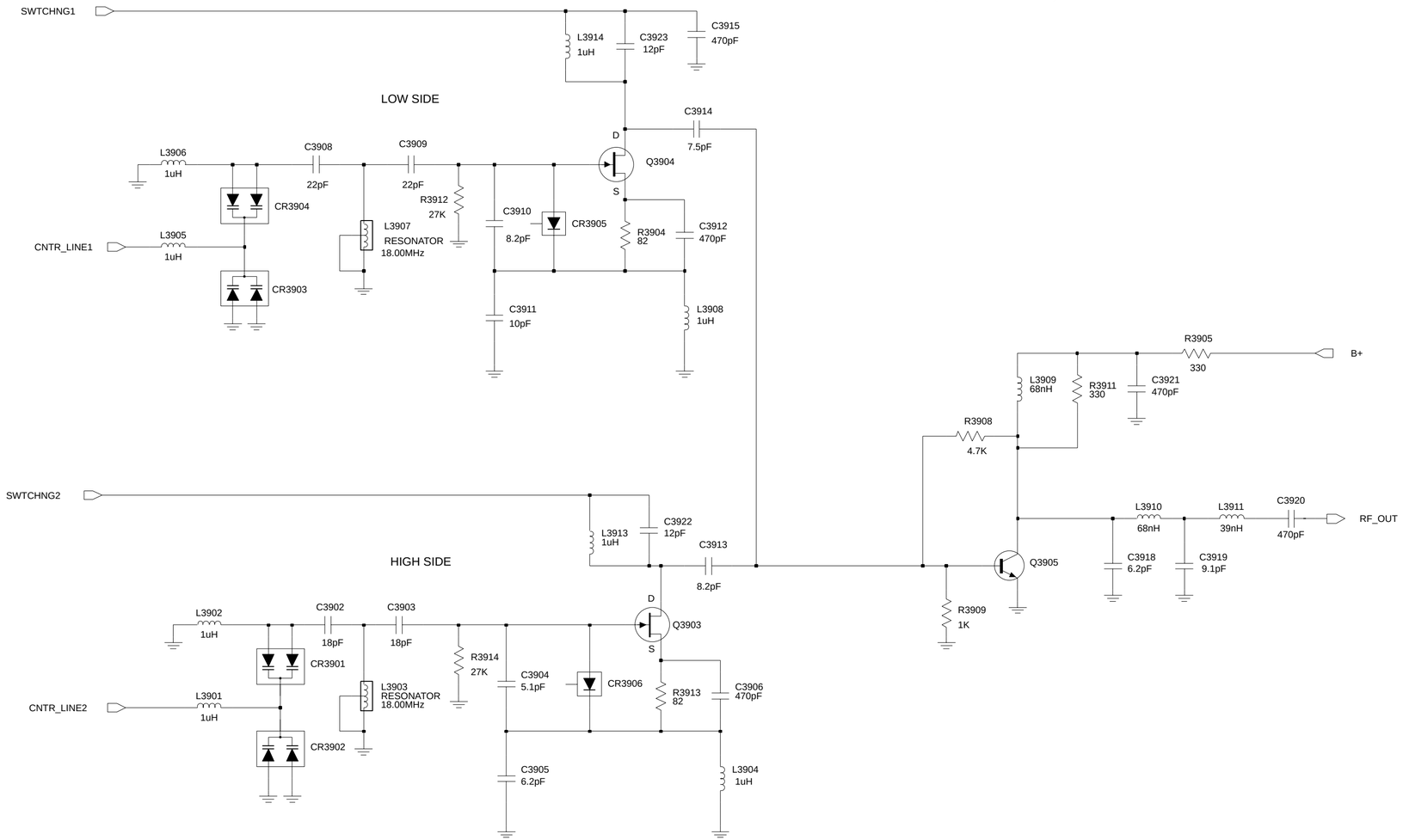
SYNTHESIZER PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3751	2113932E07	0.022 uF
C3753	2113932K07	0.047 uF
C3754	2113932E07	0.022 uF
C3755	2311049A19	10 uF
C3757	2113932K15	0.1 uF
C3758	2113932K15	0.1 uF
C3759	2113932K15	0.1 uF
C3760	2113932K15	0.1 uF
C3761	2113740F67	470
C3762	2113932E07	0.022 uF
C3764	2311049J23	10 uF
C3765	2113932K15	0.1 uF
C3766	2311049J26	10 uF
C3767	2113932K15	0.1 uF
C3768	2113740F67	470
C3770	2311049J26	10 uF
C3772	2113930F07	1.5 pF
C3775	2109720D14	0.1 uF
C3776	2109720D14	0.1 uF
C3779	2113931F49	10,000 pF
C3784	2311049A07	1 uF
C3787	2311049A07	1 uF
C3790	2113932K15	0.1 uF
C3791	2113932K15	0.1 uF
C3792	2113932K15	0.1 uF
C3794	2113930F20	5.1 pF
C3795	2113930F51	100 pF
C3799	2113932K15	0.1 uF
C3800	2113932K15	0.1 uF
C3801	2113931F49	10,000 pF
C3805	2113932K15	0.1 uF
C3807	2113930F34	20 pF
C3808	2113930F34	20 pF
C3810	2113932K15	0.1 uF
C3811	2113932K15	0.1 uF
C3813	2113740F67	470
C3816	2113931F49	10,000 pF
C3817	2113931F49	10,000 pF
C3818	2113931F49	10,000 pF
C3819	2113930F20	5.1 pF
C3820	2113931F49	10,000 pF
C3821	2111078B33	43 pF
C3822	2113930F09	1.8 pF
C3823	2113930F15	3.3 pF
C3824	2113930F23	6.8 pF
C3825	2111078B38	68 pF
C3826	2113931F49	10,000 pF
C3827	2113930F03	1 pF
C3828	2113930F22	6.2 pF
C3829	2113930F23	6.8 pF
C3830	2113930F20	5.1 pF
C3831	2113930F23	6.8 pF
C3832	2111078B38	68 pF
C3833	2113930F03	1 pF
C3835	2113931F49	10,000 pF
C3836	2113931F49	10,000 pF
C3839	2111078B33	43 pF
C3840	2311049A07	1 uF
C3850	2113743A23	0.22 uF
C3851	2113743A23	0.22 uF
C3855	2113740F67	470
C3856	2113931F49	10,000 pF
C3858	2113931F49	10,000 pF
C3902	2113930F33	18 pF
C3903	2113930F33	18 pF
C3904	2113930F20	5.1 pF
C3905	2113930F22	6.2 pF
C3906	2113740F67	470
C3908	2113930F35	22 pF
C3909	2113930F35	22 pF
C3910	2113930F25	8.2 pF
C3911	2113930F27	10 pF
C3912	2113740F67	470
C3913	2113930F25	8.2 pF
C3914	2113930F24	7.5 pF
C3915	2113740F67	470
C3918	2113930F22	6.2 pF
C3919	2113930F26	9.1 pF
C3920	2113740F67	470
C3921	2113740F67	470
C3922	2113930F29	12 pF
C3923	2113930F29	12 pF
C3925	2109720D14	0.1 uF
C3926	2109720D14	0.1 uF
C3927	2109720D14	0.1 uF
C3928	2109720D14	0.1 uF
C3929	2109720D14	0.1 uF
C3930	2109720D14	0.1 uF
C3931	2109720D14	0.1 uF
C3932	2109720D14	0.1 uF
C3933	2109720D14	0.1 uF
C3934	2109720D14	0.1 uF
		DIODES:
CR3750	4802233J09	Triple
CR3751	4813833C02	Dual
CR3753	4805649Q13	Varactor
CR3754	4805649Q13	Varactor
CR3755	4813833C02	Dual
CR3756	4805649Q13	Varactor
CR3901	4805649Q13	Varactor
CR3902	4805649Q13	Varactor
CR3903	4805649Q13	Varactor
CR3904	4805649Q13	Varactor
CR3905	4805129M41	Hot carrier
CR3906	4805129M41	Hot carrier
VR3800	4813830A23	10V Zener
		SHIELDS:
E3750	2602658J02	FRAC N
E3751	2602660J02	L.O. buffer
E3752	2602660J02	TX injection string
E3753	2605782V04	RX VCO
E3754	2602658J02	TX VFO
		INDUCTORS:
L3765	2462587Q40	270 nH
L3797	2462587T30	1000 nH
L3798	2462587T30	1000 nH
L3799	2462587T42	47 nH
L3800	2462587T30	1000 nH
L3801	2462587T30	1000 nH
L3802	2462587T12	56 nH
L3807	2462587Q40	270 nH
L3897	2462587T30	1000 nH
L3898	2462587T30	1000 nH
L3901	2462587T30	Coil
L3902	2462587T30	Coil
L3903	2460593801	Helical 4.5 turns
L3904	2462587T30	Coil
L3905	2462587T30	Coil
L3906	2462587T30	Coil
L3907	2460593801	Helical 4.5 turns
L3908	2462587T30	Coil
L3909	2462587V32	68 nH
L3910	2462587V32	68 nH
L3911	2462587V29	39 nH
L3913	2462587T30	Coil
L3914	2462587T30	Coil
		TRANSISTORS:
Q3750	4805128M16	PNP
Q3751	4805128M16	PNP
Q3760	4880141L06	FET
Q3761	4880141L06	FET
Q3770	4805128M16	PNP
Q3780	4805921T04	Dual, switching
Q3781	4882022N70	NPN
Q3782	4882022N70	NPN
Q3783	4805921T04	Dual, switching
Q3784	4882022N70	NPN
Q3785	4805921T04	Dual, switching
Q3786	4805921T04	Dual, switching
Q3789	4882022N70	NPN
Q3790	4882022N70	NPN
Q3903	4880141L06	FET
Q3904	4880141L06	FET
Q3905	4882022N70	NPN
		RESISTORS:
R3750	0662057A65	4700
R3752	0662057A81	22K
R3753	0662057B02	150K
R3754	0662057A53	1500
R3756	0662057A81	22K
R3757	0662057B02	150K
R3758	0662057A57	2200
R3759	0662057A49	1000
R3760	0662057A49	1000
R3761	0662057A25	100
R3762	0662057A41	470
R3763	0662057A49	1000
R3764	0662057A65	4700
R3766	0662057A73	10K
R3767	0662057B47	0
R3768	0662057B47	0
R3771	0662057A37	330
R3773	0662057A25	100
R3781	0662057A37	330
R3782	0662057A01	10
R3783	0662057A37	330
R3784	0662057A53	1500
R3785	0662057A01	10
R3786	0662057A65	4700
R3787	0662057A37	330
R3788	0662057A25	100
R3791	0662057A53	1500
R3792	0662057A09	22
R3793	0662057A65	4700
R3794	0662057A37	330
R3796	0662057A29	150
R3799	0662057A53	1500
R3804	0662057A18	51
R3805	0662057A18	51
R3811	0662057A49	1000
R3812	0662057A65	4700
R3813	0662057A29	150
R3814	0662057A13	33
R3815	0662057B05	200K
R3816	0662057A73	10K
R3817	0662057A81	22K
R3819	0662057A09	22
R3820	0662057A81	22K
R3821	0662057A09	22
R3823	0662057A09	22
R3824	0662057A09	22
R3850	0662057A89	47K
R3851	0662057A89	47K
R3852	0662057A89	47K
R3853	0662057A77	15K
R3854	0662057A81	22K
R3855	0662057A09	22
R3856	0662057A42	510
R3857	0662057A59	2700
R3858	0662057A49	1000
R3861	0662057A65	4700
R3862	0662057A09	22
R3904	0662057A23	82
R3905	0662057A37	330
R3908	0662057A65	4700
R3909	0662057A49	1000
R3911	0662057A37	330
R3912	0662057A83	27K
R3913	0662057A23	82
R3914	0662057A83	27K
		INTEGRATED CIRCUITS:
U3800	5105385Y26	16.8 MHz refernece oscillator
U3801	5105457W98	Hybrid
U3802	5113816A07	5V regulator
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05115Y08	For Kits HUD4015B HUD4019B

NOTES:
1. All resistance values are in ohms unless indicated otherwise.

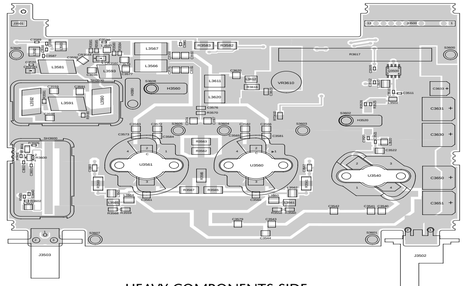
2. Components shown in component location and schematic diagrams but not included in parts list are not placed.


K9.1_2
CLK_4
ROSC_SEL_4
SPI_TX_DATA_4
9.3V_4
AUDIO_MOD_4
SYN_SEL_4
U3802
MC78M05
U3801
FRACN_F555_2
U3800
16.8MHz
Q3785
Q3780
Q3786
Q3783
Q3784
Q3760
Q3761
Q3781
Q3789
Q3790
Q3770
Q3750
Q3751
CR3755
CR3754
CR3753
CR3752
CR3751
VR3800
10V
SC3805
SC3806
SC3807
SC3802
SC3803
CNTR_LINE1
SWTCHNO1
CNTR_LINE2
SWTCHNO2
RF_OUT
B+
HIGH VCO
LOW VCO
2.1MHZ_4
RF_REG_5V_4
K9.1_9
TX_IN2
LO_IN2_HS
PA_TEMP_9
PA_CNTRL_9
CURRENT_SENSE-_9
CURRENT_SENSE+_9
A+_9_3
A+_9_2
VFORWARD_9
PA_CNTRL_LIM_9
GNDD_9
GND_9_2_10
PA_TEMP_2
PA_CNTRL_2
CURRENT_SENSE-_2
CURRENT_SENSE+_2
A+_2_3
A+_2_2
VFORWARD_2
PA_CNTRL_LIM_2
ANA_GND
LOCK_DET_4
E3750 SHIELD
E3751 SHIELD
E3752 SHIELD
E3753 SHIELD
E3754 SHIELD
63A81091C69-O

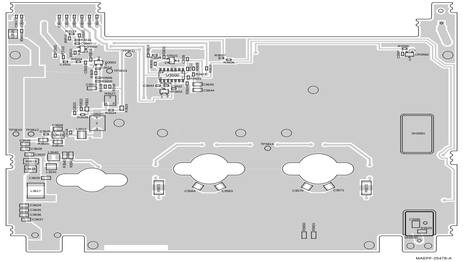


63A81091C70-O

POWER AMPLIFIER COMPONENT LOCATIONS



HEAVY COMPONENTS SIDE



LIGHT COMPONENTS SIDE

POWER AMPLIFIER PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3502	2113931F49	10,000 pF
C3503	2113931F49	10,000 pF
C3505	2113931F49	10,000 pF
C3507	2113931F49	10,000 pF
C3510	2113930F50	91 pF
C3511	2113930F39	33 pF
C3512	2113931F49	10,000 pF
C3513	2113741N69	100000 pF
C3514	2113931F49	10,000 pF
C3520	2113930F55	150 pF
C3521	2113930F45	56 pF
C3522	2111078B43	110 pF
C3540	2111078B44	120 pF
C3541	2111078B44	120 pF
C3542	2111078B38	68 pF
C3543	2113741N69	100000 pF
C3544	2111078B52	240 pF
C3550	2111078B33	43 pF
C3551	2111078B33	43 pF
C3560	2111078B49	180 pF
C3561	2111078B49	180 pF
C3562	2113741N69	100000 pF
C3563	2111078B51	220 pF
C3564	2111078B51	220 pF
C3565	2111078B42	100 pF
C3566	2111078B42	100 pF
C3567	2111078B36	56 pF
C3568	2111078B33	43 pF
C3569	2113741N69	100,000 pF
C3570	2111078B51	220 pF
C3571	2111078B51	220 pF
C3572	2111078B42	100 pF
C3573	2111078B42	100 pF
C3574	2111078B36	56 pF
C3575	2111078B33	43 pF
C3576	2113740B65	470 pF
C3577	2111078B25	27 pF
C3578	2111078B59	470 pF
C3579	2111078B38	68 pF
C3580	2113931F17	470 pF
C3581	2111078B42	100 pF
C3582	2111078B42	100 pF
C3583	2111078B42	100 pF
C3584	2111078B42	100 pF
C3586	2113930F30	13 pF
C3587	2113930F35	22 pF
C3588	2113930F35	22 pF
C3589	2113930F35	22 pF
C3591	2111078B34	47 pF
C3592	2111078B23	24 pF
C3593	2111078B34	47 pF
C3594	2111078B20	18 pF

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C3595	2111078B59	470 pF
C3596	2111078B13	10 pF
C3597	2113931F17	470 pF
C3598	2113930F39	33 pF
C3601	2113930F37	27 pF
C3602	2113931F17	470 pF
C3610	2113931F49	10,000 pF
C3611	2113931F49	10,000 pF
C3612	2113931F49	10,000 pF
C3613	2113931F49	10,000 pF
C3614	2113931F49	10,000 pF
C3615	2113931F49	10,000 pF
C3616	2113931F49	10,000 pF
C3617	2113931F49	10,000 pF
C3620	2111078B59	470 pF
C3623	2113741N69	0.1 uF
C3624	2113931F17	470 pF
C3629	2113741B21	1000 pF
C3634	2113741N69	100,000 pF
C3635	2113741N69	100,000 pF
C3636	2113741N69	100,000 pF
C3639	2113931F49	10,000 pF
C3640	2113931F49	10,000 pF
C3641	2113931F17	470 pF
C3642	2113931F49	10,000 pF
C3643	2113933IF49	10,000 pF
C3650	2380090M32	220 uF
C3651	2380090M32	220 uF
		DIODES:
CR3581	4802482J02	Pin
CR3582	4880154K05	Dual, common cathode
CR3584	4880121R01	Pin
CR3600	4813825A05	Hot Carrier
VR3610	4880222R01	Zener
VR3611	4813830A15	Zener
		HEATSINKS:
H3520	2605132Y02	
H3560	2605132Y02	
H3580	2605132Y02	
		CONNECTORS:
J3500	2880001R12	12 Pins
J3501	2880001R02	2 Pins
J3502	0905902V04	Power
J3503	0905901V09	Antenna
		INDUCTORS:
L3500	2460591N67	Air wound coil 43.49 nH
L3502	2460591M32	Air wound coil 27.42 nH
L3520	2460591C23	Air wound coil 13.85 nH
L3540	2484657R01	Bead
L3541	2460591N67	Air wound coil 43.49 nH
L3560	2460591N67	Air wound coil 43.49 nH
L3561	2484657R01	Bead
L3562	2460591N67	Air wound coil 43.49 nH

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L3563	2460591N67	Air wound coil 43.49 nH
L3564	2460591N67	Air wound coil 43.49 nH
L3565	2484657R01	Bead
L3567	2460591X05	Air wound coil square
L3566	2460591X05	Air wound coil square
L3580	2480140E01	1.2 nH
L3581	2460592B01	51 nH
L3582	2460591N53	Air wound coil 41.23 nH
L3583	2460591N53	Air wound coil 41.23 nH
L3590	2460592B01	51 nH
L3591	2460592B01	51 nH
L3592	2460592B01	51 nH
L3593	2460592A01	Air wound coil 17 nH
L3600	2460591C23	Air wound coil 13.85 nH
L3612	2484657R01	Bead
L3613	2484657R01	Bead
L3614	2460591N67	Air wound coil 43.49 nH
L3616	2484657R01	Bead
L3617	2460591X02	Air wound coil square
L3618	2484657R01	Bead
L3620	2460591X02	Air wound coil square
		TRANSISTORS:
Q3500	4880182D50	MRF8372
Q3501	4805128M16	PNP, MMBT3906
Q3502	4880141L02	NPN
Q3520	4813827A36	N-CH FET, MRF5003
Q3521	4880141L02	NPN
		RESISTORS:
R3501	0662057A25	100
R3503	0662057A18	51
R3504	0662057A56	2000
R3505	0662057A18	51
R3506	0662057A18	51
R3507	0662057A18	51
R3508	0662057A18	51
R3509	0662057A37	330
R3510	0662057A49	1000
R3511	0662057A56	2000
R3512	0662057A49	1000
R3513	0662057A69	6800
R3514	0662057A73	10K
R3515	0662057A49	1000
R3521	0660081A73	10K
R3522	0662057A93	68K
R3523	0660081A73	10K
R3524	0662057A79	18K
R3525	0662057A25	100
R3528	0662057A25	100
R3540	0611077A26	10
R3558	0611077A26	10
R3559	0611077A26	10
R3560	0611077A26	10
R3561	0680194M25	100
R3562	0680194M13	33

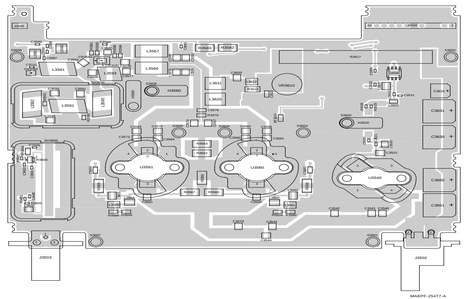
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R3563	0680194M13	33
R3565	0680194M01	10
R3566	0680194M18	51
R3567	0680194M01	10
R3568	0611077A26	10
R3569	0680194M25	100
R3570	0611077A26	10
R3571	0680194M25	100
R3572	0680194M25	100
R3580	0660076B25	1 Meg
R3581	0660076B25	1 Meg
R3582	0680194M13	33
R3583	0680194M13	33
R3584	0660076B25	1 Meg
R3585	0660076B25	1 Meg
R3586	0662057A49	1000
R3590	0660076B25	1 Meg
R3591	0660076B25	1 Meg
R3601	0662057A53	1500
R3602	0662057A27	120
R3603	0662057A41	470
R3605	0662057A81	22K
R3606	0662057A62	3600
R3607	0662057A66	5100
R3610	0611077A26	10
R3611	0662057A25	100
R3615	0662057A25	100
R3616	0680195M01	10
R3617	1705876X01	Shunt
R3619	0680195M01	10
R3620	0611077B15	47K
R3621	0611077A01	Jumper
R3622	0662057A88	43K
R3623	0662057A81	22K
R3624	0662057A81	22K
R3625	0662057A85	33K
R3626	0662057A81	22K
R3627	0662057A45	680
R3628	0662057A81	22K
R3629	0662057A81	22K
R3630	0662057A81	22K
R3631	0662057A81	22K
R3651	0611077A01	0
RT3604	0680149M02	Thermistor
RT3610	0680149M02	Thermistor
		SHIELDS:
SH3590	2605836Z01	Harmonic filter
SH3591	2602660J02	Transmission line
SH3592	2605259V01	Transmission line
SH3600	2605836Z01	Coupler
		INTEGRATED CIRCUITS:
U3500	5183222M49	Operational amplifier

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		POWER AMPLIFIER DEVICES: (For Kits HUD4021A, HUD4021B,)
U3540	2605224Y05	M25C22
U3560	2605750X09	MRF257
U3561	2605750X09	MRF257
		POWER AMPLIFIER DEVICES: (For Kit HUD4021C)
U3540	2685698A02	M25C22 With Heat Sink
U3560	2685700A04	MRF247 With Heat Sink
U3561	2685700A04	MRF247 With Heat Sink
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05113Y02	For Kits HUD4021A, HUD4021B,
	84D05113Y03	For Kit HUD4021C

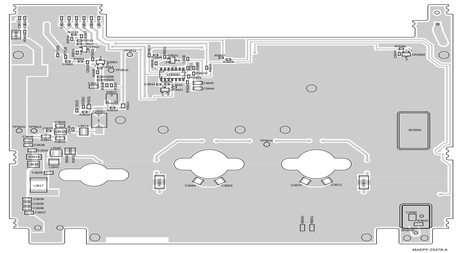
NOTES:
1. All resistance values are in ohms unless indicated otherwise.

2. Components shown in component location and schematic diagrams but not included in parts list are not placed.

POWER AMPLIFIER COMPONENT LOCATIONS



HEAVY COMPONENTS SIDE



LIGHT COMPONENTS SIDE

110W POWER AMPLIFIER PARTS LIST

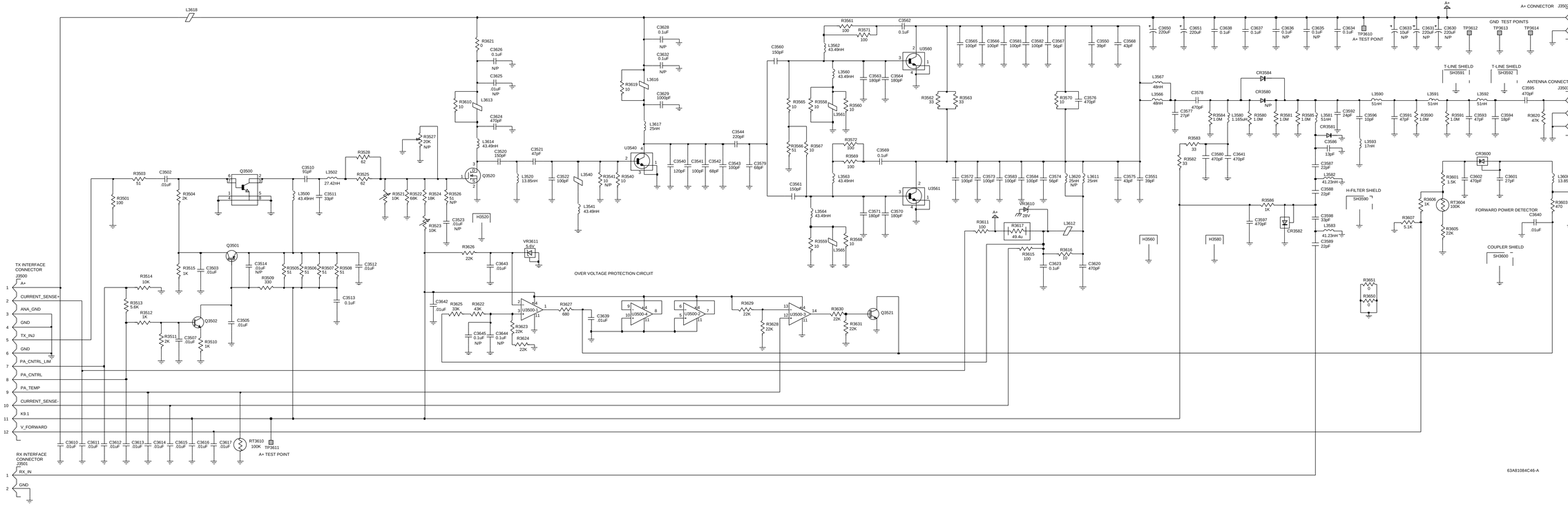
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C3502	2113931F49	10,000 pF
C3503	2113931F49	10,000 pF
C3505	2113931F49	10,000 pF
C3507	2113931F49	10,000 pF
C3510	2113930F50	91 pF
C3511	2113930F39	33 pF
C3512	2113931F49	10,000 pF
C3513	2113741N69	100,000 pF
C3514	2113931F49	10,000 pF
C3520	2113930F55	150 pF
C3521	2113930F43	47 pF
C3522	2111078B42	100 pF
C3540	2111078B44	120 pF
C3541	2111078B42	100 pF
C3542	2111078B38	68 pF
C3543	2111078B42	100 pF
C3544	2111078B51	220 pF
C3550	2111078B32	39 pF
C3551	2111078B32	39 pF
C3560	2111078B47	150 pF
C3561	2111078B47	150 pF
C3562	2113741N69	100,000 pF
C3563	2111078B49	180 pF
C3564	2111078B49	180 pF
C3565	2111078B42	100 pF
C3566	2111078B42	100 pF
C3567	2111078B36	56 pF
C3568	2111078B33	43 pF
C3569	2113741N69	100,000 pF
C3570	2111078B49	180 pF
C3571	2111078B49	180 pF
C3572	2111078B42	100 pF
C3573	2111078B42	100 pF
C3574	2111078B36	56 pF
C3575	2111078B33	43 pF
C3576	2113740B65	470 pF
C3577	2111078B25	27 pF
C3578	2111078B59	470 pF
C3579	2111078B38	68 pF
C3580	2113931F17	470 pF
C3581	2111078B42	100 pF
C3582	2111078B42	100 pF
C3583	2111078B42	100 pF
C3584	2111078B42	100 pF
C3586	2113930F30	13 pF
C3587	2113930F35	22 pF
C3588	2113930F35	22 pF
C3589	2113930F35	22 pF
C3591	2111078B34	47 pF
C3592	2111078B23	24 pF
C3593	2111078B34	47 pF
C3594	2111078B20	18 pF
C3595	2111078B59	470 pF
C3596	2111078B13	10 pF
C3597	2113931F17	470 pF
C3598	2113930F39	33 pF
C3601	2113930F37	27 pF

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C3602	2113931F17	470 pF
C3610	2113931F49	10,000 pF
C3611	2113931F49	10,000 pF
C3612	2113931F49	10,000 pF
C3613	2113931F49	10,000 pF
C3614	2113931F49	10,000 pF
C3615	2113931F49	10,000 pF
C3616	2113931F49	10,000 pF
C3617	2113931F49	10,000 pF
C3620	2111078B59	470 pF
C3623	2113741N69	100,000 pF
C3624	2113931F17	470 pF
C3629	2113741B21	1000 pF
C3634	2113741N69	100,000 pf
C3635	2113741N69	100,000 pF
C3636	2113741N69	100,000 pF
C3639	2113931F49	10,000 pF
C3640	2113931F49	10,000 pF
C3641	2113931F17	470 pF
C3642	2113931F49	10,000 pF
C3643	2113931F49	10,000 pF
C3650	2380090M32	220 uF
C3651	2380090M32	220 uF
		DIODES:
CR3581	4802482J02	Pin
CR3582	4880154K05	Dual, common cathode
CR3584	4880121R01	Pin
CR3600	4813825A05	Hot Carrier
VR3610	4880222R01	Zener
VR3611	4813830A15	Zener
		HEATSINKS:
H3520	2605132Y02	
H3560	2605132Y02	
H3580	2605132Y02	
		CONNECTORS:
J3500	2880001R12	12 Pins
J3501	2880001R02	2 Pins
J3502	0905902V04	Power
J3503	0905901V09	Antenna
		INDUCTORS:
L3500	2460591N67	Air wound coil 43.49 nH
L3502	2460591M32	Air wound coil 27.42 nH
L3520	2460591C23	Air wound coil 13.85 nH
L3540	2484657R01	Bead
L3541	2460591N67	Air wound coil 43.49 nH
L3560	2460591N67	Air wound coil 43.49 nH
L3561	2484657R01	Bead
L3562	2460591N67	Air wound coil 43.49 nH
L3563	2460591N67	Air wound coil 43.49 nH
L3564	2460591N67	Air wound coil 43.49 nH
L3565	2484657R01	Bead
L3567	2460591X05	Air wound coil square
L3566	2460591X05	Air wound coil square
L3580	2480140E01	1.2 nH
L3581	2460592B01	51 nH
L3582	2460591N53	Air wound coil 41.23 nH
L3583	2460591N53	Air wound coil 41.23 nH

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L3590	2460592B01	51 nH
L3591	2460592B01	51 nH
L3592	2460592B01	51 nH
L3593	2460592A01	Air wound coil 17 nH
L3600	2460591C23	Air wound coil 13.85 nH
L3611	2460591X02	Air wound coil square
L3612	2484657R01	Bead
L3613	2484657R01	Bead
L3614	2460591N67	Air wound coil 43.49 nH
L3616	2484657R01	Bead
L3617	2460591X02	Air wound coil square
L3618	2484657R01	Bead
		TRANSISTORS:
Q3500	4880182D50	MRF8372
Q3501	4805128M16	PNP, MMBT3906
Q3502	4880141L02	NPN
Q3520	4813827A36	N-CH FET, MRF5003
Q3521	4880141L02	NPN
		RESISTORS:
R3501	0662057A25	100
R3503	0662057A18	51
R3504	0662057A56	2000
R3505	0662057A18	51
R3506	0662057A18	51
R3507	0662057A18	51
R3508	0662057A18	51
R3509	0662057A37	330
R3510	0662057A49	1000
R3511	0662057A56	2000
R3512	0662057A49	1000
R3513	0662057A69	6800
R3514	0662057A73	10K
R3515	0662057A49	1000
R3521	0660081A73	10K
R3522	0662057A93	68K
R3523	0660081A73	10K
R3524	0662057A79	18K
R3525	0662057A20	62
R3528	0662057A20	62
R3540	0611077A26	10
R3558	0611077A26	10
R3559	0611077A26	10
R3560	0611077A26	10
R3561	0680194M25	100
R3562	0680194M13	33
R3563	0680194M13	33
R3565	0680194M01	10
R3566	0680194M18	51
R3567	0680194M01	10
R3568	0611077A26	10
R3569	0680194M25	100
R3570	0611077A26	10
R3571	0680194M25	100
R3572	0680194M25	100
R3580	0660076B25	1 Meg
R3581	0660076B25	1 Meg
R3582	0680194M13	33
R3583	0680194M13	33

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R3584	0660076B25	1 Meg
R3585	0660076B25	1 Meg
R3586	0662057A49	1000
R3590	0660076B25	1 Meg
R3591	0660076B25	1 Meg
R3601	0662057A53	1500
R3602	0662057A27	120
R3603	0662057A41	470
R3605	0662057A81	22K
R3606	0662057A62	3600
R3607	0662057A66	5100
R3610	0611077A26	10
R3611	0662057A25	100
R3615	0662057A25	100
R3616	0680195M01	10
R3617	1705876X01	Shunt
R3619	0680195M01	10
R3620	0611077B15	47K
R3621	0611077A01	Jumper
R3622	0662057A88	43K
R3623	0662057A81	22K
R3624	0662057A81	22K
R3625	0662057A85	33K
R3626	0662057A81	22K
R3627	0662057A45	680
R3628	0662057A81	22K
R3629	0662057A81	22K
R3630	0662057A81	22K
R3631	0662057A81	22K
R3650	0611077A01	0
RT3604	0680149M02	Thermistor
RT3610	0680149M02	Thermistor
		SHIELDS:
SH3590	2605836Z01	Harmonic filter
SH3591	2602660J02	Transmission line
SH3592	2605259V01	Transmission line
SH3600	2605836Z01	Coupler
		INTEGRATED CIRCUITS
U3500	5183222M49	Operational amplifier
		POWER AMPLIFIER (PA) BOARD: (For Kits HUD4016A , HUD4021B)
U3540	2605224Y05	M25C22 With Heatsink
U3560	2605750X09	MRF257 With Heatsink
U3561	2605750X09	MRF257 With Heatsink
		POWER AMPLIFIER DEVICES: (For Kit HUD4016C)
U3540	2685698A02	M25C22 With Heat Sink
U3560	2685700A04	MRF247 With Heat Sink
U3561	2685700A04	MRF247 With Heat Sink
		PRINTED CIRCUIT BOARD (For Reference Only)
	84D05113Y02	For Kits HUD4016A,, HUD4021B,
	84D05113Y03	For Kit HUD4016C

NOTES:
1. All resistance values are in ohms unless indicated otherwise.
2. Components shown in component location and schematic diagrams but not included in parts list are not placed.


TX INTERFACE CONNECTOR J3500
A+
CURRENT_SENSE+
ANA_GND
GND
TX_INJ
GND
PA_CNTRL_LIM
PA_CNTRL
PA_TEMP
CURRENT_SENSE-
K9:1
V_FORWARD
RX INTERFACE CONNECTOR J3501
RX_IN
GND
A+ CONNECTOR J3502
GND TEST POINTS
A+ TEST POINT
T-LINE SHIELD SH3591
T-LINE SHIELD SH3592
ANTENNA CONNECTOR J3503
H-FILTER SHIELD SH3590
FORWARD POWER DETECTOR
COUPLER SHIELD SH3600
OVER VOLTAGE PROTECTION CIRCUIT
63A81084C46-A

2-PIN PA INTERCONNECT COMPONENT LOCATIONS

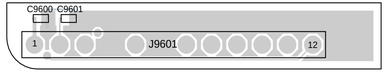
MAEPF-25474-A

2-PIN AND 12-PIN PA INTERCONNECTS PARTS LIST
Kit No. HUD4015A for Non-Preamplifier Models
Kit No. HUD4019A for Preamplifier Models

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS:
C9600	2113931F49	10,000 pF
C9601	2113931F49	10,000 pF
C9606	2113931F49	10,000 pF
C9607	2113931F49	10,000 pF
C9608	2113931F49	10,000 pF
C9609	2113931F49	10,000 pF
C9610	2113931F49	10,000 pF
		CONNECTORS:
J9500	0980008R02	2 Pins
J9601	0980008R12	12 Pins

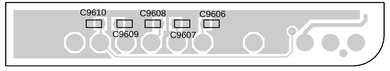
NOTE:
Open parentheses ( ) at end of kit number stand for revision letter of kit number (i.e., A, B, etc.), which changes from time to time.

12-PIN PA INTERCONNECT COMPONENT LOCATIONS



MAEPF-25475-A

HEAVY COMPONENTS SIDE



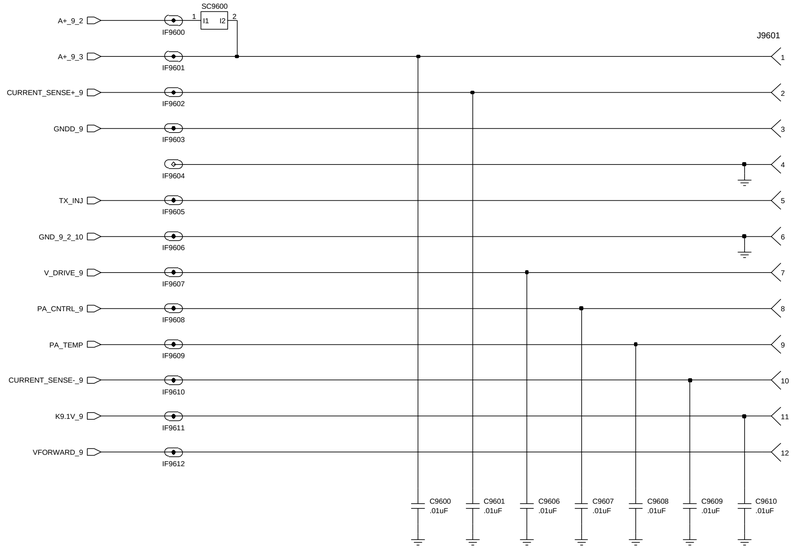
MAEPF-25476-A

LIGHT COMPONENTS SIDE

2-PIN PA INTERCONNECT

63A81084C43-A

12-PIN PA INTERCONNECT



63A81084C44-A

NOTES

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
RECEIVER FRONT END					
9.3V	Receiver Front End	68P81080C41-B	9.3V-1 9.3V-3 9.3V-4	Receiver IF	68P81080C41-B
RF_REG_5V	Receiver Front End	68P81080C41-B	RF_REG_5V_4	Receiver IF	68P81080C41-B
			RF_REG_5V_5_UHF	Receiver IF	68P81080C41-B
			RF_REG_5V_5	Receiver IF	68P81080C41-B
			RF_REG_5V_3	Receiver IF	68P81080C41-B
TUNING_VOLTAGE	Receiver Front End	68P81080C41-B	RX_CNTRL1	Receiver IF	68P81080C41-B
RX_IN	Receiver Front End	68P81080C41-B	RX_IN	Power Amplifier	68P81080C41-B
LO_INJ	Receiver Front End	68P81080C41-B	LO_INJ_HS	Synthesizer	68P81080C41-B
IF_IN	Receiver Front End	68P81080C41-B	IF_IN	Receiver IF	68P81080C41-B
5V_AGC	Receiver Front End	68P81080C41-B	RF_REG_5V_6	Receiver Back End	
AGC_3	Receiver Front End		AGC_3	Receiver Back End	
RECEIVER INTERMEDIATE FREQUENCY (IF)					
RF_REG_5V_4	Receiver IF	68P81080C41-B	RF_REG_5V_5	Receiver IF	68P81080C41-B
			RF_REG_5V_3	Receiver IF	68P81080C41-B
			RF_REG_5V_5_UHF	Receiver IF	68P81080C41-B
			RF_REG_5V	Receiver Front End	68P81080C41-B
			RF_REG_5V_4	Synthesizer	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			RF_REG_5V_6	Receiver Back End	68P81080C41-B
9.3V_1	Receiver IF	68P81080C41-B	9.3V_4	Receiver IF	68P81080C41-B
			9.3V_3	Receiver IF	68P81080C41-B
			9.3V_7_2_26	LPAUD	68P81080C41-B
			9.3V_7_2_30	LPAUD	68P81080C41-B
			9.3V_4	Synthesizer	68P81080C41-B
RSSI_1	Receiver IF	68P81080C41-B	RSSI_3	Receiver IF	68P81080C41-B
RSSI_1	Receiver IF	68P81080C41-B	RSSI_3	Receiver Back End	68P81080C41-B
RX_CNTRL1	Receiver IF	68P81080C41-B	RX_CNTRL1	Controller	C20-B
RX_CNTRL1	Receiver IF	68P81080C41-B	TUNING_VOLTAGE	Receiver Front End	C41-B
2.1MHZ_4		68P81080C41-B	2.1MHZ_3	Receiver IF	68P81080C41-B
			2.1MHZ_1	Receiver IF	68P81080C41-B
			2.1MHZ_3	Receiver Back End	68P81080C41-B
LOCK_DET_1	Receiver IF	68P81080C41-B	LOCK_DET_4	Receiver IF	68P81080C41-B
RF_REG_12V_5	Receiver IF	68P81080C41-B			
ZIF SELECT	Receiver IF	68P81080C41-B	ZIF_SEL_3	Receiver IF	68P81080C41-B
			ZIF_SEL_3	Receiver Back End	68P81080C41-B
CLK_1	Receiver IF	68P81080C41-B	CLK_3	Receiver IF	68P81080C41-B
			CLK_4	Receiver IF	68P81080C41-B
			CLK_3	Receiver Back End	68P81080C41-B
			CLK_4	Synthesizer	68P81080C41-B
IF_OUT	Receiver Back End	68P81080C41-B	IF_OUT	Receiver Back End	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
SPI_TX_DATA_1	Receiver IF	68P81080C41-B	SPI_TX_DATA_3	Receiver IF	68P81080C41-B
			SPI_TX_DATA_4	Receiver IF	68P81080C41-B
			SPI_TX_DATA_4	Synthesizer	68P81080C41-B
			SPI_TX_DATA_3	Receiver Back End	68P81080C41-B
SYN_SEL_1	Receiver IF	68P81080C41-B	SYN_SEL_4	Receiver IF	68P81080C41-B
			SYN_SEL_4	Synthesizer	68P81080C41-B
AUDIO_MOD_1	Receiver IF	68P81080C41-B	AUD_MODE_4	Receiver IF	68P81080C41-B
			AUD_MODE_4	Synthesizer	68P81080C41-B
SQUELCH_3	Receiver IF	68P81080C41-B	SQUELCH_1	Receiver IF	68P81080C41-B
			SQUELCH_3	Receiver Back End	68P81080C41-B
ROSC_SEL_1	Receiver IF	68P81080C41-B	ROSC_SEL_4	Receiver IF	68P81080C41-B
			ROSC_SEL_4	Synthesizer	68P81080C41-B
DISC_1	Receiver IF	68P81080C41-B	DISC_3	Receiver IF	68P81080C41-B
			DISC_3	Receiver Back End	68P81080C41-B
IF_IN	Receiver IF	68P81080C41-B	IF_IN	Receiver Front End	68P81080C41-B
SW_B+or_RX_CNTRL_1	Receiver IF	68P81080C41-B	RX_CNTRL1	Receiver Front End	68P81080C41-B
RECEIVER BACK END/ZERO INTERMEDIATE FREQUENCY (ZIF)					
RF_REG_5V_3	Receiver Back End	68P81080C41-B	RF_REG_5V_4	Receiver IF	68P81080C41-B
			RF_REG_5V_5	Receiver IF	68P81080C41-B
			RF_REG_5V_3	Receiver IF	68P81080C41-B
			RF_REG_5V_5_VHF	Receiver IF	68P81080C41-B
			RF_REG_5V_3	Receiver Back End	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
RF_REG_5V_6	Receiver Back End	68P81080C41-B	5V_AGC	Receiver Front End	68P81080C41-B
IF_OUT	Receiver Back End	68P81080C41-B	IF_OUT	Receiver IF	68P81080C41-B
2.1MHZ_3	Receiver Back End	68P81080C41-B	2.1MHZ_4	Receiver IF	68P81080C41-B
			2.1MHZ_3	Receiver IF	68P81080C41-B
			2.1MHZ_1	Receiver IF	68P81080C41-B
			2.1MHZ_4	Synthesizer	68P81080C41-B
ZIF_SEL_3	Receiver Back End	68P81080C41-B	ZIF_SEL_1	Receiver IF	68P81080C41-B
CLK_3	Receiver Back End	68P81080C41-B	CLK_1	Receiver IF	68P81080C41-B
			CLK_3	Receiver IF	68P81080C41-B
			CLK_4	Receiver IF	68P81080C41-B
			CLK_4	Synthesizer	68P81080C41-B
SPI_TX_DATA_3	Receiver Back End	68P81080C41-B	SPI_TX_DATA_1	Receiver IF	68P81080C41-B
			SPI_TX_DATA_3	Receiver IF	68P81080C41-B
			SPI_TX_DATA_4	Receiver IF	68P81080C41-B
			SPI_TX_DATA_4	Synthesizer	68P81080C41-B
AGC_3	Receiver Back End	68P81080C41-B	AGC3	Receiver Front End	68P81080C41-B
SQUELCH_3	Receiver Back End	68P81080C41-B	SQUELCH_3	Receiver IF	68P81080C41-B
			SQUELCH_1	Receiver IF	68P81080C41-B
DISC_3	Receiver Back End	68P81080C41-B	DISC_1	Receiver IF	68P81080C41-B
			DISC_3	Receiver IF	68P81080C41-B
RSSI_3	Receiver Back End	68P81080C41-B	RSSI_3	Receiver IF	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			RSSI_1	Receiver IF	68P81080C41-B
SYNTHESIZER					
ROSC_SEL_4	Synthesizer	68P81080C41-B	ROSC_SEL_4	Receiver IF	68P81080C41-B
SPI_TX_DATA_4	Synthesizer	68P81080C41-B	SPI_TX_DATA_3	Receiver Back End	68P81080C41-B
9.3V_4	Synthesizer	68P81080C41-B	9.3V_1	Receiver IF	68P81080C41-B
CLK_4	Synthesizer	68P81080C41-B	CLK_3	Receiver Back End	68P81080C41-B
AUDIO_MOD_4	Synthesizer	68P81080C41-B	AUDIO_MOD_4	Receiver IF	68P81080C41-B
SYN_SEL_4	Synthesizer	68P81080C41-B	SYN_SEL_4	Receiver IF	68P81080C41-B
RF_REG_5V_4	Synthesizer	68P81080C41-B	RF_REG_5V_4	Receiver IF	68P81080C41-B
			RF_REG_5V_3	Receiver IF	68P81080C41-B
2.1MHZ_4	Synthesizer	68P81080C41-B	2.1MHZ_3	Receiver Back End	68P81080C41-B
K9.1_9	Synthesizer	68P81080C41-B	K9.1_9 (J9601-11)	J9601 PA Interconnect	68P81080C41-B
TX_INJ	Synthesizer	68P81080C41-B	TX_INJ (J9601-5)	12-PIN PA Interconnect	68P81080C41-B
PA_TEMP_2	Synthesizer	68P81080C41-B	PA_TEMP_9	Synthesizer	68P81080C41-B
			PA_TEMP (J9601-9)	12-PIN PA Interconnect	68P81080C41-B
PA_ CNTRL_2	Synthesizer	68P81080C41-B	PA_ CNTRL_9	Synthesizer	68P81080C41-B
			PA_ CNTRL_9 (J9601-8)	12-PIN PA Interconnect	68P81080C41-B
CURRENT_SENSE-_2	Synthesizer	68P81080C41-B	CURRENT_SENSE-_9	Synthesizer	68P81080C41-B
			CURRENT_SENSE-_9 (J9601-10)	12-PIN PA Interconnect	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
CURRENT_SENSE+_2	Synthesizer	68P81080C41-B	CURRENT_SENSE+_9	Synthesizer	68P81080C41-B
			CURRENT_SENSE+_9 (J9601-2)	12-PIN PA Interconnect	68P81080C41-B
A+_2_3	Synthesizer	68P81080C41-B	A+_9_3	Synthesizer	68P81080C41-B
			A+_9_3 (J9601-1)	12-PIN PA Interconnect	68P81080C41-B
A+_2_2			A+_9_2	Synthesizer	68P81080C41-B
			A+_9_3		68P81080C41-B
VFORWARD_2	Synthesizer	68P81080C41-B	VFORWARD_9	Synthesizer	68P81080C41-B
			VFORWARD_9 (J9601-12)	12-PIN PA Interconnect	68P81080C41-B
VDRIVE_2	Synthesizer	68P81080C41-B	VDRIVE_9	Synthesizer	68P81080C41-B
			VDRIVE_9 (J9601-7)	2-PIN PA Interconnect	68P81080C41-B
GNDD_2	Synthesizer	68P81080C41-B	GNDD_9	Synthesizer	68P81080C41-B
			GNDD_9 (J9601-3)	12-Pin PA Interconnect	68P81080C41-B
			GND_9_2_10 (J9601-6)	12-Pin PA Interconnect	68P81080C41-B
LO_INJ_HS	Synthesizer	68P81080C41-B	LO_INJ_HS	Receiver Front End	68P81080C41-B
LOCK_DET_4	Synthesizer	68P81080C41-B	LOCK_DET_4	Receiver IF	68P81080C41-B
POWER AMPLIFIER (PA)					
K9.1V_9	Synthesizer	68P81080C41-B	K9.1V_9 (J3500-4)	Power Amplifier	68P81080C41-B
TX_INJ (J9601-5)	Synthesizer	68P81080C41-B	TX_INJ (J3500-5)	12-PIN PA Interconnect	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
PA_TEMP_2	Synthesizer	68P81080C41-B	PA_TEMP_9 (J9601-9)	Synthesizer	68P81080C41-B
			PA_TEMP (J3500-9)	12-PIN PA Interconnect	68P81080C41-B
PA_ CNTRL_2	Synthesizer	68P81080C41-B	PA_ CNTRL_9 (J9601-8)	Synthesizer	68P81080C41-B
			PA_ CNTRL_9 (J3500-8)	12-PIN PA Interconnect	68P81080C41-B
CURRENT_SENSE-_2	Synthesizer	68P81080C41-B	CURRENT_SENSE-_9 (J9601-10)	Synthesizer	68P81080C41-B
			CURRENT_SENSE-_9 (J3500-10)	12-PIN PA Interconnect	68P81080C41-B
CURRENT_SENSE+_2	Synthesizer	68P81080C41-B	CURRENT_SENSE+_9 (J9601-2)	Synthesizer	68P81080C41-B
			CURRENT_SENSE+_9 (J3500-2)	12-PIN PA Interconnect	68P81080C41-B
A+_2_3	Synthesizer	68P81080C41-B	A+-9_3 (J9601-1)	Synthesizer	68P81080C41-B
			A+_9_3 (J3500-1)	12-PIN PA Interconnect	68P81080C41-B
A+_2_2			A+_9_2 (J9601-1)	Synthesizer	68P81080C41-B
			A+_9_3 (J9601-1)		68P81080C41-B
VFORWARD_2	Synthesizer	68P81080C41-B	VFORWARD_9 (J9601-12)	Synthesizer	68P81080C41-B
			VFORWARD_9 (J3500-12)	12-PIN PA Interconnect	68P81080C41-B
VDRIVE_2	Synthesizer	68P81080C41-B	VDRIVE_9 (J9601-7)	Synthesizer	68P81080C41-B
			PA_CNTRL_LIM (J3500-7)	12-PIN PA Interconnect	68P81080C41-B
GNDD_2	Synthesizer	68P81080C41-B	GNDD_9 (J9601-3)	Synthesizer	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			GND_9_2_10 (J3500-6)	Power Amplifier	
			GND_9_2_10 (J9601-6)	Synthesizer	
A+ (J3500-1)	Power Amplifier	68P81080C41-B	A+_9_3 (J9601-1)	Synthesizer	68P81080C41-B
			A+_2_3	Synthesizer	68P81080C41-B
			A+_9_2 (J9601-1)	Synthesizer	68P81080C41-B
			A+_2_2	Synthesizer	68P81080C41-B
CURRENT SENSE+ (J3500-2)	Power Amplifier	68P81080C41-B	CURRENT SENSE+_9 (J9601-2)	Synthesizer	68P81080C41-B
			CURRENT SENSE+_2	Synthesizer	68P81080C41-B
			CURRENT SENSE+_2	Controller: Regulator and Audio Power Amplifier	68P81083C20-B
GNDD_9 ANA_GND (J3500-3)	Power Amplifier	68P81080C41-B	GNDD_9 (J9601-3)	Synthesizer	68P81080C41-B
GND (J3500-6)	Power Amplifier	68P81080C41-B	GNDD_9_2_10 (J9601-6)	Synthesizer	68P81080C41-B
TX_INJ (J3500-5)	Power Amplifier	68P81080C41-B	TX_INJ (J9601-5)	Synthesizer	68P81080C41-B
PA_CNTRL_LIM (J3500-7)	Power Amplifier	68P81080C41-B	VDRIVE_9 (J9601-7)	Synthesizer	
			PA_CNTRL_LIM	Synthesizer	
PA_CNTRL (J3500-8)	Power Amplifier	68P81080C41-B	PA_CNTRL_9 (J9601-8)	Synthesizer	68P81080C41-B
PA_TEMP (J3500-9)	Power Amplifier	68P81080C41-B	PA_TEMP_9 (J9601-9)	Synthesizer	68P81080C41-B
CURRENT SENSE (J3500-10)	Power Amplifier	68P81080C41-B	CURRENT SENSE-_9 (J9601-10)	Synthesizer	68P81080C41-B
K9.1V (J3500-11)	Power Amplifier	68P81080C41-B	K9.1V_2	Synthesizer	68P81080C41-B
			K9.1V_9 (J9601-11)	Synthesizer	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			K9.1V_9	Controller: Regulator and Audio Power Amplifier	68P81083C20-B
V_FORWARD (J3500-12)	Power Amplifier	68P81080C41-B	VFORWARD_9 (J9601-12)	Synthesizer	68P81080C41-B
			VFORWARD_2	Controller: Regulator and Audio Power Amplifier	68P81083C20-B
RX_IN (J3501-1)	Power Amplifier	68P81080C41-B	RX_IN	Receiver Front End	68P81080C41-B
CONTROLLER					
VDRIVE	Controller, Power Control/ MainController	68P81083C20-B	VDRIVE	Power Amplifier	68P81080C41-B
PWR_RANGE	Controller, Power Control/ MainController	68P81083C20-B	PWR_RANGE	Controller/Main Controller	8P81083C20-B
V_FORWARD	Controller, Power Control/ MainController	68P81083C20-B	VFORWARD	Power Amplifier	68P81080C41-B
VFWD_BUF	Controller, Power Control/ MainController	68P81083C20-B	VFWD_BUF	Audio PA & Voltage Regulators	68P81083C20-B
VSUM	Controller, Power Control/ Main Controller	68P81083C20-B	VSUM	Audio PA & Voltage Regulators	68P81083C20-B
CLK	Controller, Power Control/ MainController	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
DA_SEL	Controller, Power Control/ MainController	68P81083C20-B	DA_SEL	Controller/Main Controller	68P81083C20-B
SPI_TX_DATA	Controller, Power Control/ MainController	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
TEMP_GND	Controller, Power Control/ MainController	68P81083C20-B			
CURRENT_SENSE+	Controller, Power Control/ Main Controller	68P81083C20-B	CURRENT_ SENSE+	Power Amplifier	68P81080C41-B
CURRENT_SENSE-	Controller, Power Control/ MainController	68P81083C20-B	CURRENT_ SENSE-	Power Amplifier	68P81080C41-B
PA_TEMP	Controller, Power Control/ MainController	68P81083C20-B	PA_TEMP	Power Amplifier	68P81080C41-B
PA_DIS	Controller, Power Control/ MainController	68P81083C20-B	PA_DIS	Controller/Main Controller	68P81083C20-B
K9.1_ENB	Controller, Power Control/ MainController	68P81083C20-B	K9.1_ENB	Controller/Main Controller	68P81083C20-B
9.3V	Controller, Power Control/ MainController	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
SW_B+	Controller, Power Control/ MainController	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
+5V	Controller, Power Control/ MainController	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
PA_CNTL_LIM	Controller, Power Control/ MainController	68P81083C20-B			
PA_CNTL	Controller, Power Control/ MainController	68P81083C20-B	PA_CNTL	Power Amplifier	68P81080C41-B
TEMP	Controller, Power Control/ MainController	68P81083C20-B	TEMP	Controller/Main Controller	68P81083C20-B
RX_CNTL1	Controller, Power Control/Main Controller	68P81083C20-B	RX_CNTL1	Receiver IF	68P81080C41-B
			RX_CNTL1	Receiver IF	68P81080C41-B
K9.1V	Controller, Power Control/ MainController	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
A+_CONT	Audio PA & Voltage Regulators/ Controller Interface	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
UNSW_5V	Audio PA & Voltage Regulators	68P81083C20-B	UNSW_+5V	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
CL_UNSW_5V	Audio PA & Voltage Regulators	68P81083C20-B			
+5V	Audio PA & Voltage Regulators	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
SW_B+	Audio PA & Voltage Regulators	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
AUPA_EN	Audio PA & Voltage Regulators	68P81083C20-B	AUPA_EN	Controller/Main Controller	68P81083C20-B
RX_AUDIO	Audio PA & Voltage Regulators	68P81083C20-B	RX_AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
SPKR+	Audio PA & Voltage Regulators/ Controller Interface	68P81083C20-B	SPKR+	Controller Interface	68P81083C20-B
SPKR-	Audio PA & Voltage Regulators/ Controller Interface	68P81083C20-B	SPKR-	Controller Interface	68P81083C20-B
				Controller Interface	68P81083C20-B
A+	Audio PA &Voltage Regulators	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
B+_ON_OFF	Audio PA &Voltage Regulators/ Controller Interface	68P81083C20-B	B+_ON_OFF	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
IGNITION_ CLEAR	Audio PA &Voltage Regulators	68P81083C20-B	IGNITION_ CLEAR	Controller/Main Controller	68P81083C20-B
B+_IGNITION	Audio PA &Voltage Regulators/ Controller Interface	68P81083C20-B	B+_IGNITION	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
9.3	Audio PA &Voltage Regulators	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
Vdd	Audio PA &Voltage Regulators	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
Vaud	Audio PA &Voltage Regulators	68P81083C20-B	Vaud	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
PWR_RST	Audio PA &Voltage Regulators	68P81083C20-B	PWR_RST	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
			PWR_RST	Controller/Main Controller	68P81083C20-B
VFWD_BUF	Audio PA &Voltage Regulators	68P81083C20-B	VFWD_BUF	Controller, Power Control/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
VSUM	Audio PA &Voltage Regulators	68P81083C20-B	VSUM	Controller, Power Control/Main Controller	68P81083C20-B
EXP_FILTERED_AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	EXP_FILTERED_AUDIO	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
AUX_RX_IN1	Controller, ASFIC/ Audio Block Diagram/Main Controller/Controller Interface	68P81083C20-B	AUX_RX_IN1	Controller Interface	68P81083C20-B
AUX_RX_IN2	Controller, ASFIC/ Audio Block Diagram/Main Controller/Controller Interface	68P81083C20-B	AUX_RX_IN2	Controller Interface	68P81083C20-B
AUX_RX_IN3	Controller, ASFIC/ Audio Block Diagram/Main Controller/Controller Interface	68P81083C20-B	AUX_RX_IN3	Controller Interface	68P81083C20-B
AUX_TX_IN1	Controller, ASFIC/ Audio Block Diagram/Main Controller/Controller Interface	68P81083C20-B	AUX_TX_IN1	Controller Interface	68P81083C20-B
AUX_TX_IN2	Controller, ASFIC/ Audio Block Diagram/Main Controller/Controller Interface	68P81083C20-B	AUX_TX_IN2	Controller Interface	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
AUX_TX_IN3	Controller, ASFIC/ Audio Block Diagram/Main Controller/Controller Interface	68P81083C20-B	AUX_TX_IN3	Controller Interface	68P81083C20-B
9.3V	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
VAG	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	VAG	Controller, IO RSSI Buffers Controller Interface/ Main Controller	68P81083C20-B
Vaud	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	Vaud	Audio PA & Voltage Regulators	68P81083C20-B
CLK	Controller, ASFIC/ AUdio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
PL_TX	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	PL_TX	Controller/Main Controller	68P81083C20-B
2.1MHZ	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
TX_DATA	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	TX_DATA	Controller/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
LG_DTMF	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	LG_DTMF	Controller/Main Controller	68P81083C20-B
ASFIC_SEL	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	ASFIC_SEL	Controller/Main Controller	68P81083C20-B
SPI_TX_DATA	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
EXP_AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	EXP_AUDIO	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
RX_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	RX_IN	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
TRL_HD2:KEY_FAIL	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	TRL_HD2:KEY_FAIL	Controller Interface	68P81083C20-B
SQUELCH_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	SQUELCH	Receiver IF	68P81080C41-B
			SQUELCH	Receiver IF	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
MIC_VOLTAGE	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	MIC_VOLTAGE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
MIC_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	MIC_IN	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
DISC	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	DISC	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
			DISC	Receiver IF	68P81080C41-B
			DISC	Receiver IF	68P81080C41-B
			DISC	Receiver Back End	68P81080C41-B
EXT_MIC_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	EXT_MIC_IN	Controller Interface	68P81083C20-B
TX_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	TX_IN	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
RSSI	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
PWR_RST	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	PWR_RST	Audio PA & Voltage Regulators	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			PWR_RST	Controller/Main Controller	68P81083C20-B
RX_HI&FIL_ AUDIO_OUT	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	RX_HI&FIL_ AUDIO_OUT	Controller Interface	68P81083C20-B
RX_HI	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	RX_HI	Controller Interface	68P81083C20-B
1200	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	1200	Controller/Main Controller	68P81083C20-B
UP_CLK	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	UP_CLK	Controller/Main Controller	68P81083C20-B
PL_RX	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	PL_RX	Controller/Main Controller	68P81083C20-B
RX_DATA	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	RX_DATA	Controller/Main Controller	68P81083C20-B
RX_AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	RX_AUDIO	Audio PA & Voltage Regulators	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
FILTERED_ AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	FILTERED_ AUDIO	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
ASFIC_MIC_ AUD_OUT	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	ASFIC_MIC_ AUD_OUT	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B
VOX	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	VOX	Controller/Main Controller	68P81083C20-B
ASFIC_PRE-EMP_OUT	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	ASFIC_PRE-EMP_OUT		68P81083C20-B
AUDIO_MOD	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	AUDIO_MOD	Receiver IF	68P81080C41-B
			AUDIO_MOD	Receiver IF	68P81080C41-B
			AUDIO_MOD	Synthesizer	68P81080C41-B
FF_EN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	FF_EN	Controller, Hear Clear/audio Block Diagram/Main Controller	68P81083C20-B
HCI_DIS	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	HCI_DIS	Controller, Hear Clear/audio Block Diagram/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
LC_DIS	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	LC_DIS	Controller, Hear Clear/audio Block Diagram/Main Controller	68P81083C20-B
COMP_EN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	COMP_EN	Controller, Hear Clear/audio Block Diagram/Main Controller	68P81083C20-B
HI_CLMP_EN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	HI_CLMP_EN	Controller, Hear Clear/audio Block Diagram/Main Controller	68P81083C20-B
CH_ACT	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	CH_ACT	Controller/Main Controller	68P81083C20-B
SQ_DET	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	SQ_DET	Controller/Main Controller	68P81083C20-B
UNIV_IO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B	UNIV_IO	Controller Interface	68P81083C20-B
			UNIV_IO	Controller, IO RSSI Buffers/Controller Interface/Main Controller	68P81083C20-B
COMP_EN	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	COMP_EN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
FF_EN	Controller, Hear Clear/audio Block Diagram/Main Controller	68P81083C20-B	FF_EN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
HI_CLMP_EN	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	HI_CLMP_EN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
RSSI	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
DISC	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	DISC	Receiver IF	68P81080C41-B
			DISC	Receiver IF	68P81080C41-B
			DISC	Receiver Back End	68P81080C41-B
			DISC	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
HCI_DIS	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	HCI_DIS	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
LC_DIS	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	LC_DIS	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
FILTERED_ AUDIO	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	FILTERED_ AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
ASFIC_MIC_ AUD_OUT	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	ASFIC_MIC_ AUD_OUT	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
9.3V	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
EXP_FILTERED_AUDIO	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	EXP_FILTERED _AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
EXP_AUDIO	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	EXP_AUDIO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
RX_IN	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	RX_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
TX_IN	Controller, Hear Clear/Audio Block Diagram/Main Controller	68P81083C20-B	TX_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
UNIV_IO	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B	UNIV_IO	Controller Interface	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			UNIV_IO	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
RSSI	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
UNIV_IO_OUT	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B	BUFFERED DISCRIMINATOR		68P81083C20-B
RSSI_OUT	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B	RSSI_OUT	Controller/Main Controller	68P81083C20-B
			RSSI_OUT	Controller Interface	68P81083C20-B
9.3V	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
Vdd	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
VAG	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B	VAG	Controller, ASFIC/ AUdio Block Diagram/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
MIC_VOLTAGE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	MIC_VOLTAGE	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
MIC_IN	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	MIC_IN	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
EMERGENCY	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	EMERGENCY	Controller Interface	68P81083C20-B
B+_CTRL	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	B+_CTRL	Controller/Main Controller	68P81083C20-B
IGNITION	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	IGNITION	Controller Interface	68P81083C20-B
SW_B+_SENSE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	SW_B+_SENSE	Controller/Main Controller	68P81083C20-B
B+_ON_OFF	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	B+_ON_OFF	Audio PA & Voltage Regulators/ Controller Interface	68P81083C20-B
EMER_OUT	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	EMER_IN	Controller/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
A+_SENSE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	A+_SENSE	Controller/Main Controller	68P81083C20-B
IGNITION_ SENSE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	IGNITION_SENSE	Controller/Main Controller	68P81083C20-B
B+_IGNITION	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	B+_IGNITION	Audio PA & Voltage Regulators/ Controller Interface	68P81083C20-B
+5V	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
SW_B+	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
UNSW_+5V	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B	UNSW_5V	Audio PA & Voltage Regulators	68P81083C20-B
Vdd	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
BUS-	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	BUS-	Controller Interface	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
BUS+	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	BUS+	Controller Interface	68P81083C20-B
SCI_TX	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	SCI_TX	Controller/Main Controller	68P81083C20-B
BUSY_OUT	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	BUSY_OUT	Controller/Main Controller	68P81083C20-B
BUSY	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	BUSY	Controller Interface	68P81083C20-B
RESET_OUT	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	RESET_OUT	Controller/Main Controller	68P81083C20-B
LH_RESET	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	RESET	Controller Interface	68P81083C20-B
			RESET	Controller Interface	68P81083C20-B
SCI_RX	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	SCI_RX	Controller/Main Controller	68P81083C20-B
SCI_ECHO	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	SCI_ECHO	Controller	68P81083C20-B
BUS_SCI	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B			
BUSY_IN	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	BUSY_IN	Controller/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
RESET_IN	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B	RESET_IN	Controller/Main Controller	68P81083C20-B
CLOSED_ RESET (On Closed Architecture Only)	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B			
+5V	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
Vdd	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
IO2	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IO2	Controller Interface	68P81083C20-B
OUT2	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	OUT_2	Controller/Main Controller	68P81083C20-B
IO3	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IO3	Controller Interface	68P81083C20-B
			VPP_PROGRAM	Controller/Main Controller	68P81083C20-B
OUT3	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	OUT_3	Controller/Main Controller	68P81083C20-B
IO4	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IO4	Controller Interface	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
OUT4	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	OUT_4	Controller/Main Controller	68P81083C20-B
IO5	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IO5	Controller Interface	68P81083C20-B
OUT5	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	OUT_5	Controller/Main Controller	68P81083C20-B
IO6	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IO6	Controller Interface	68P81083C20-B
OUT6	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	OUT_6	Controller/Main Controller	68P81083C20-B
IN2	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IN_2	Controller/Main Controller	68P81083C20-B
IN3	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IN_3	Controller/Main Controller	68P81083C20-B
IN4	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IN_4	Controller/Main Controller	68P81083C20-B
IN5	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IN_5	Controller/Main Controller	68P81083C20-B
IN6_:_RTSBIN	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B	IN_6	Controller/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
Vdd	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
SW_B+	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
+5V	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
RX_DATA_IN	Controller/Main Controller	68P81083C20-B	SW_5V:RX_ DATA_IN	Controller Interface	68P81083C20-B
RTSB_OUT	Controller/Main Controller	68P81083C20-B	BUF_CH_EN: RTSB_OUT	Controller Interface	68P81083C20-B
RESET*	Controller/Main Controller	68P81083C20-B	RESET*	Controller Interface	68P81083C20-B
PWR_RST	Controller/Main Controller	68P81083C20-B	PWR_RST	Audio PA & Voltage Regulators	68P81083C20-B
			PWR_RST	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
RESET_OUT	Controller/Main Controller	68P81083C20-B	RESET_OUT	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B
RESET_IN	Controller/Main Controller	68P81083C20-B	RESET_IN	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
RX_DATA	Controller/Main Controller	68P81083C20-B	RX_DATA	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
ASN_SEL	Controller/Main Controller	68P81083C20-B			
K9.1_ENB	Controller/Main Controller	68P81083C20-B	K9.1_ENB	Controller, Power Control/Main Controller	68P81083C20-B
OUT_3	Controller/Main Controller	68P81083C20-B	OUT3	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
OUT_2	Controller/Main Controller	68P81083C20-B	OUT2	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
AUPA_EN	Controller/Main Controller	68P81083C20-B	AUPA_EN	Audio PA & Voltage Regulators	68P81083C20-B
JABBA_SEL	Controller/Main Controller	68P81083C20-B	O:JABBA_SEL_C:DTMF_ SEL	Controller Interface	68P81083C20-B
PWR_RANGE	Controller/Main Controller	68P81083C20-B	PWR_RANGE	Controller, Power Control/Main Controller	68P81083C20-B
DA_SEL	Controller/Main Controller	68P81083C20-B	DA_SEL	Controller, Power Control/Main Controller	68P81083C20-B
PL_RX	Controller/Main Controller	68P81083C20-B	PL_RX	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
DUPLEX_SYN_SEL	Controller/Main Controller	68P81083C20-B	DUPLEX_SYN_SELECT	Receiver IF	68P81080C41-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
BUF_SPI_DATA:SECURE_SEL	Controller/Main Controller	68P81083C20-B	BUF_SPI_DATA:SECURE_SELECT	Controller Interface	68P81083C20-B
IGNITION_CLEAR	Controller/Main Controller	68P81083C20-B	IGNITION_CLEAR	Audio PA & Voltage Regulators	68P81083C20-B
ZIF_SEL	Controller/Main Controller	68P81083C20-B	ZIF_SEL	Receiver IF	68P81080C41-B
			ZIF_SEL	Receiver IF	68P81080C41-B
			ZIF_SEL	Receiver BACK-END	68P81080C41-B
OUT_6	Controller/Main Controller	68P81083C20-B	OUT6	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
BUSY_OUT	Controller/Main Controller	68P81083C20-B	BUSY_OUT	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B
B+_CTRL	Controller/Main Controller	68P81083C20-B	B+_CTRL	Controller, Emergency Ignition/Controller Interface/Main Controller	68P81083C20-B
LOCK_DET	Controller/Main Controller	68P81083C20-B	LOCK_DET	Receiver IF	68P81080C41-B
			LOCK_DET	Receiver IF	68P81080C41-B
			LOCK_DET	Synthesizer	68P81080C41-B
IN_3	Controller/Main Controller	68P81083C20-B	IN3	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
IN_4	Controller/Main Controller	68P81083C20-B	IN4	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
ASN_INT	Controller/Main Controller	68P81083C20-B	ASN_INT_OPT_TX	Controller Interface	68P81083C20-B
OUT_5	Controller/Main Controller	68P81083C20-B	OUT5	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
OUT_4	Controller/Main Controller	68P81083C20-B	OUT4	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
EMER_IN	Controller/Main Controller	68P81083C20-B	EMER_OUT	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
SW_B+_SENSE	Controller/Main Controller	68P81083C20-B	SW_B+_SENSE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
DUPLEX_LOCK_DET (Not Connected For Half Duplex)	Controller/Main Controller	68P81083C20-B			
IGNITION_SENSE	Controller/Main Controller	68P81083C20-B	IGNITION_ SENSE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
IN_6	Controller/Main Controller	68P81083C20-B	IN6_:_RTSBIN	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
JABBA_INT	Controller/Main Controller	68P81083C20-B	O:JABBA_INT_C:DTMF_SEL	Controller Interface	68P81083C20-B
SQ_DET	Controller/Main Controller	68P81083C20-B	SQ_DET	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
IN_5	Controller/Main Controller	68P81083C20-B	IN5	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
CH_ACT	Controller/Main Controller	68P81083C20-B	CH_ACT	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
IN_2	Controller/Main Controller	68P81083C20-B	IN2	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B
PL_TX	Controller/Main Controller	68P81083C20-B	PL_TX	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
TX_DATA	Controller/Main Controller	68P81083C20-B	TX_DATA	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
LG_DTMF	Controller/Main Controller	68P81083C20-B	LG_DTMF	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
1200	Controller/Main Controller	68P81083C20-B	1200	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
BUSY_IN	Controller/Main Controller	68P81083C20-B	BUSY_IN	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
A+_SENSE	Controller/Main Controller	68P81083C20-B	A+_SENSE	Controller, Emergency Ignition/ Controller Interface/ Main Controller	68P81083C20-B
UP_CLK	Controller/Main Controller	68P81083C20-B	UP_CLK	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
MOD_A_B	Controller/Main Controller	68P81083C20-B	MOD_A_B	Controller Interface	68P81083C20-B
SCI_RX	Controller/Main Controller	68P81083C20-B	SCI_RX	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B
SCI_TX	Controller/Main Controller	68P81083C20-B	SCI_TX	Controller, SCI Drivers/Controller Interface/Main Controller	68P81083C20-B
SPI_RX_DATA	Controller/Main Controller	68P81083C20-B	SPI_RX_DATA	Controller Interface	68P81083C20-B
SPI_TX_DATA	Controller/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
CLK	Controller/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
PA_DIS	Controller/Main Controller	68P81083C20-B	PA_DIS	Controller, Power Control/Main Controller	68P81083C20-B
RSSI	Controller/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
RSSI_OUT	Controller/Main Controller	68P81083C20-B	RSSI_OUT	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B
			RSSI_OUT	Controller Interface	68P81083C20-B
LBAT	Controller/Main Controller	68P81083C20-B	LBAT	Controller Interface	68P81083C20-B
TEMP	Controller/Main Controller	68P81083C20-B	TEMP	Controller, Power Control/Main Controller	68P81083C20-B
VOX	Controller/Main Controller	68P81083C20-B	VOX	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
SYN_SEL	Controller/Main Controller	68P81083C20-B	SYN_SEL	Receiver IF	68P81080C41-B
			SYN_SEL	Receiver IF	68P81080C41-B
			SYNT_SEL	Synthesizer	68P81080C41-B
ROSC_SEL	Controller/Main Controller	68P81083C20-B	ROSC_SEL	Receiver IF	68P81080C41-B
			ROSC_SEL	Receiver IF	68P81080C41-B
			ROSC_SEL	Synthesizer	68P81080C41-B
ASFIC_SEL	Controller/Main Controller	68P81083C20-B	ASFIC_SEL	Controller, ASFIC/ Audio Block Diagram/Main Controller	68P81083C20-B
VPP_ PROGRAM	Controller/Main Controller	68P81083C20-B	IO3	Controller, IO Buffers/Controller Interface/Main Controller	68P81083C20-B

Table 1: Schematic Diagram Interconnection List

From/To			From/To		
Signal Name	**Schematic Diagram Title**	**Publication No.**	**Signal Name**	**Schematic Diagram Title**	**Publication No.**
			IO3	Controller Interface	68P81083C20-B
Vdd	Controller/Main Controller	68P81083C20-B		All Nodes with this Signal Name are Common within the Entire Radio	
SW_5V:RX_ DATA_IN	Controller Interface	68P81083C20-B	RX_DATA_IN	Controller/Main Controller	68P81083C20-B
BUF_CH_EN: RTSB_OUT	Controller Interface	68P81083C20-B	RTSB_OUT	Controller/Main Controller	68P81083C20-B
O:JABBA_SEL_C:DTMF_ SEL	Controller Interface	68P81083C20-B	JABBA_SEL	Controller/Main Controller	68P81083C20-B
BUF_SPI_DATA:SECURE _ SELECT	Controller Interface	68P81083C20-B	BUF_SPI_DATA:SECURE _SEL	Controller/Main Controller	68P81083C20-B
O:JABBA_INT_C:DTMF_S EL	Controller Interface	68P81083C20-B	JABBA_INT	Controller/Main Controller	68P81083C20-B
MOD_A_B	Controller Interface	68P81083C20-B	MOD_A_B	Controller/Main Controller	68P81083C20-B
SPI_RX_DATA	Controller Interface	68P81083C20-B	SPI_RX_DATA	Controller/Main Controller	68P81083C20-B
RSSI_OUT	Controller Interface	68P81083C20-B	RSSI_OUT	Controller, IO RSSI Buffers/ Controller Interface/ Main Controller	68P81083C20-B
			RSSI_OUT	Controller/Main Controller	68P81083C20-B
LBAT	Controller Interface	68P81083C20-B	LBAT	Controller/Main Controller	68P81083C20-B

Cut along dotted line

SERVICE MANUAL QUESTIONNAIRE

We believe that reports from users provide valuable information for producing quality manuals. By taking a few moments to answer the following questions as they relate to this specific manual, you can take an active role in the continuing effort to ensure that our manuals contain the most accurate and complete information of benefit to you. Thank you for your cooperation.

In reference to Manual Number: 68P81080C41-B

MCS 2000™ Mobile Radio

1. Please check all the appropriate boxes:

	Complete	Incomplete	Correct	Incorrect	Clear	Confusing	Size Adequate	Size Too Small	Not Covered in This Manual
Disassembly Procedures									
Alignment Procedures									
Exploded Views									
Schematic Diagrams									
Circuit Board Details									
Electrical Parts Lists									
Exploded View Parts List									

2. How would you rate the overall organization of this manual?

☐excellent ☐very good ☐good ☐fair ☐poor

3. Did this Service manual provide you with the information necessary to service and maintain the specific equipment?

☐very much so ☐generally yes ☐to some extent ☐no

4. How do you rate this particular Service Manual?

☐excellent ☐very good ☐good ☐fair ☐poor

5. We would appreciate any corrections or recommendations for improving this manual. Please include the specific page number(s) of the diagram or procedure in question.

   a. Disassembly Procedures:(Page No. _____)

   b. Alignment Procedures:(Page No. _____)

   c. Exploded Views:(Page No. _____)

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO 9040 FT. LAUDERDALE, FL

POSTAGE WILL BE PAID BY ADDRESSEE

MOTOROLA

Attention: Media and Communication
8000 W. Sunrise Boulevard
Ft. Lauderdale, FL 33322

FOLD FOLD

(Continued)

Please specify the page number along with any corrections or recommendations for improvement.

d. Schematic Diagrams: (Page No. _____)
e. Component Location Details: (Page No. _____)
f. Electrical Parts List: (Page No. _____)
g. Exploded View Parts List: (Page No. _____)

6. General comments/suggestions:

Name:.....
Company:.....

☐Customer ☐COSC ☐MSS ☐FTR ☐Other

Address:.....
City/State/Zip:.....
Phone Number (Please include Area Code):.....

PLEASE USE TAPE TO SEAL

POSTAL REGULATIONS PROHIBIT USE OF STAPLES

MOTOROLA

MCS 2000 Mobile Radio Service Instructions
VHF Frequency Range Specific
Publication Number 68P81080C41-B

6881080C41-B