Honeywell

MAINTENANCE MANUAL

BENDIX/KING®

KX 165A

NAV/COMM TRANSCEIVER

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SECTION IV

THEORY OF OPERATION

4.1   GENERAL

This manual covers KX 165A configurations.

4.1.1   KX 165A FEATURES

The KX 165A is a single unit, panel mounted communication transceiver/navigation receiver with glideslope receiver and VOR/LOC Converter. The functional capabilities are:

A.   A microprocessor controlled communication transceiver which operates from 118.0000 MHz to 136.9917 MHz in 8.33 kHz increments providing 2280 channels or 118.00 to 136.975 MHz in 25 kHz increments providing 760 channels. 32 program-mable memories.

B.   A microprocessor controlled navigation receiver for VOR/LOC signals from 108.00MHz to 117.95MHz in 50kHz increments providing 200 channels.

C.   A microprocessor controlled glideslope receiver operating from 329.15 MHz to 335.00 MHz in 150kHz increments for 40 glideslope channels.

D.   A microprocessor controlled VOR/LOC converter capable of calculating and display-ing bearing VOR radial digitally.

E.   A microprocessor controlled VOR/LOC converter I/O board for use with indicators that do not contain an internal converter.

F.   DME Channeling

   1.   Provides data to interface with KN 62/A/64 DME or the KDI 572/574 or KPI 553A indicator which will in turn control the KN 63 DME or the KDM 706 DME.

   2.   Provide data to interface with KA 120 Adapter which will in turn channel 2 x 5 or slip code DME's.

G.   Digital Display of:
   1.   Communication "USE" and "STANDBY" frequencies.
   2.   Navigation "USE and "STANDBY" frequencies.
   3.   VOR Radial information displayed in navigation "STANDBY" window.
   4.   Internal course deviation indicator for VOR and localizer.
   5.   Elapsed timer: countdown and elapsed time.

H.   Navigation and Communication frequency information is stored in a non-volatile memory. Information is stored when the radio is turned off and will re-channel to the same frequencies when turned on.

I.   Front panel lighting of bezel and knobs.

4.2   BLOCK DIAGRAM THEORY OF OPERATION

Refer to Figure 4-1 for the following block diagram explanation. The KX 165A Navcom transceiver includes a VHF communication receiver and transmitter, VOR Navigation receiver, glideslope receiver, VOR/LOC converter I/O, front panel with display, power supply, and central processing unit with various interface circuits. The CPU controls the functions of the unit, and includes memory, I/O, and several other functions. Each major function block diagram is described in subsequent sections.
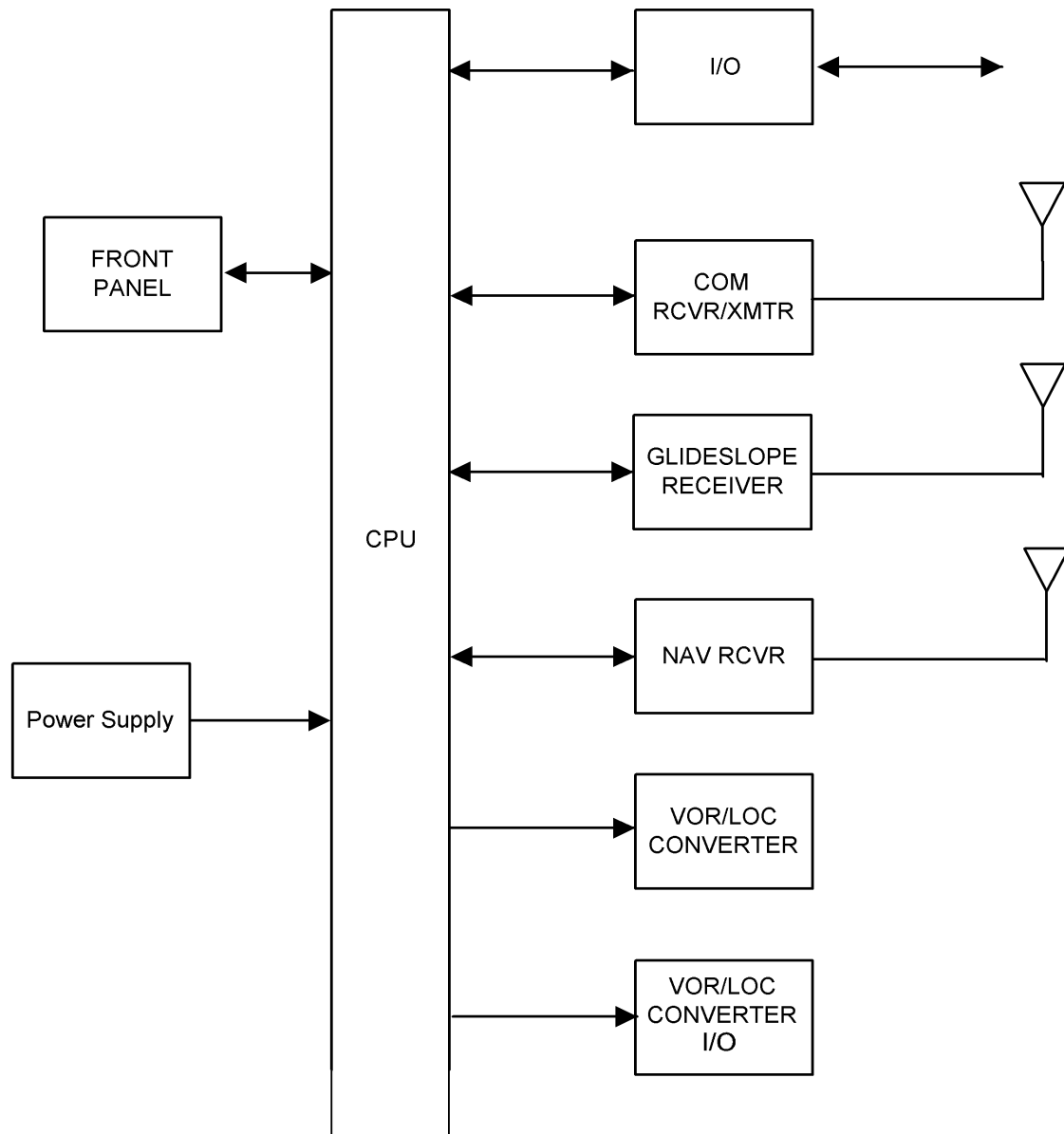
Figure 4-1 KX 165A Block Diagram

4.2.1   COM RECEIVER

Refer to figure 4-2. The front end of the Com receiver employs a dual-gate FET RF amplifier embedded in a 4-pole tracking preselector. This RF amplifier FET also provides RF AGC action. A doubly-balanced mixer converts the RF to a first IF at 21.4 MHz and is followed by a bipolar IF amplifier. In radios which use 25 kHz bandwidths exclusively, the IF amplifier is followed by six poles of crystal filtering.   The IF amplifier is followed by an IF filter board in radios which are both 25 kHz and 8.33 kHz channel capable. This IF filter board switches the IF between a six pole 25 kHz (wide) crystal filter and an 8.33 kHz (narrow) eight pole filter. Selecting wide or narrow channel tuning determines which filter is used. The filtered 21.4 MHz output is amplified by another IF amplifier transistor and passed to the inputs of an AM Receiver IC.

This IC amplifies the first IF signal, mixes it down to 450 kHz, passes the signal through an external ceramic filter before it is further amplified in the receiver IC and detected.   The detected signal is used to develop IF AGC voltage and the detected signal is also output from the IC to drive audio filters and amplifiers. RF AGC voltage is derived from the IF AGC voltage. A high-side-injection first LO signal is derived from a synthesizer circuit which employs a dual-modulus Synthesizer IC, an active integrator, a loop filter and a VCO. Amplification of the VCO output is accomplished with a MMIC. In transmit the synthesizer locks up on the desired transmit frequency and a discrete bipolar amplifier is used to amplify the MMIC output to provide a drive signal to the transmitter. The 20.95MHz synthesizer reference frequency is generated by a crystal oscillator on 25kHz units, and by a TCXO on radios which are 25/8.33kHz capable. This reference frequency also serves as the second LO injection signal. The detected audio signal from the AM IC is lowpass filtered and amplified. A compressor circuit provides a relatively constant audio output level regardless of the percent of modulation of the incoming signal.   Squelch action is controlled by both an audio noise detector squelch and a carrier squelch signal derived off the RF AGC. Squelching is accomplished in the audio path on the RECEIVER BOARD as well as by another squelch gate on the Main Board. On the Main Board, the audio signal passes through the Com volume control to the audio amplifier.

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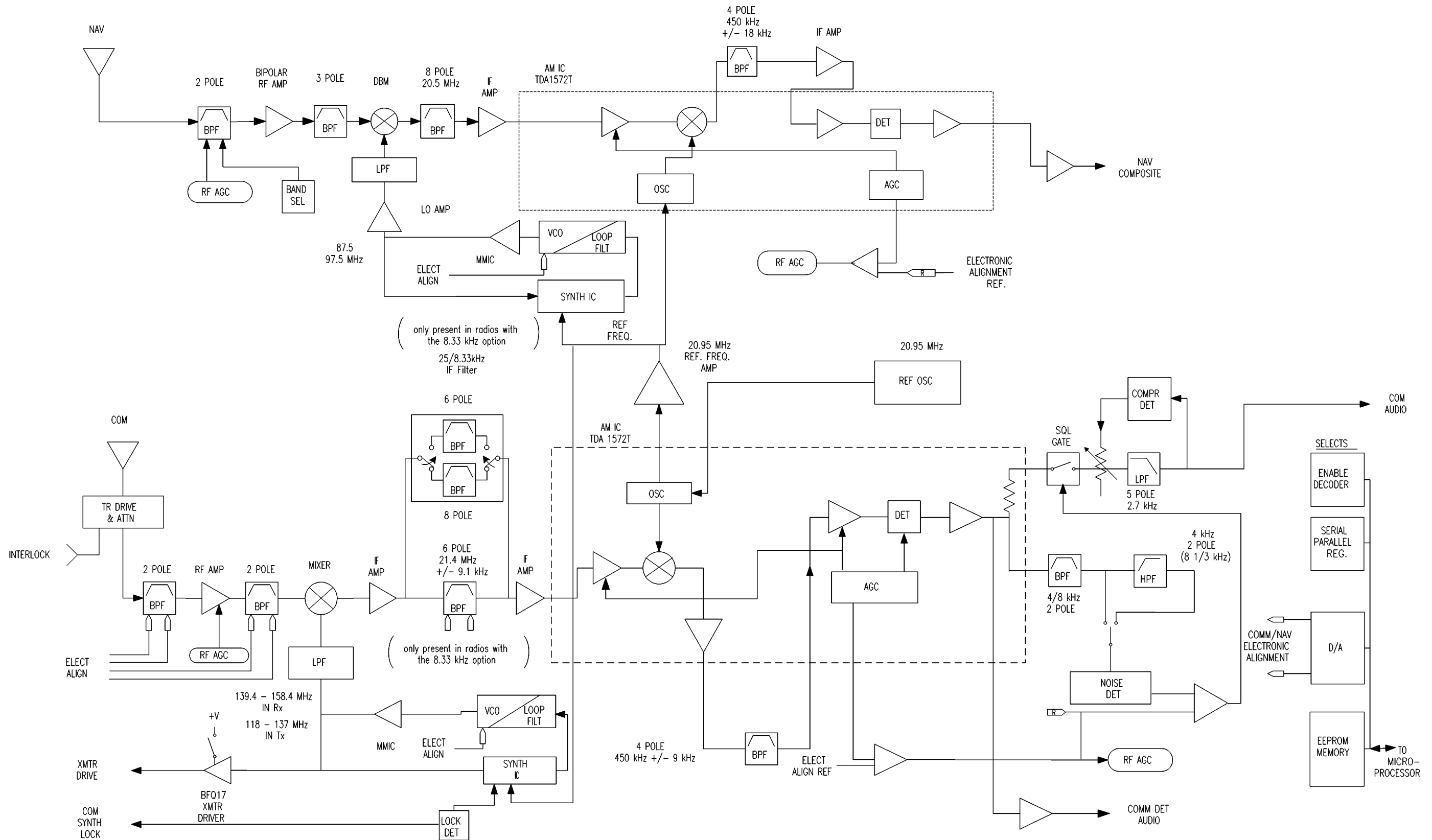
Figure 4-2 KX155A NAV/COM Receiver - Main Board Audio Circuitry

NAV
COMPOSITE

9960 Hz BPF → LIMIT/ PLL → LPF → **30 Hz REFERENCE (TO MICROPROCESSOR)**

ANTI- ALIAS FILTERS → **FILTERED NAV COMPOSITE (TO MICROPROCESSOR)**

AUDIO AMP

LPF → BPF → VOLUME CONTROL → AUDIO AMP → **NAV AUDIO OUTPUT**

1020 Hz NOTCH FILTER

COM
AUDIO

AUDIO AMP

VOLUME CONTROL → SQUELCH GATE → AUDIO AMP → **COM AUDIO OUTPUT**

COM VOL

COM SQUELCH

Figure 4-2 KX155A NAV/COM Receiver - Main Board Audio Circuitry

Sheet 2
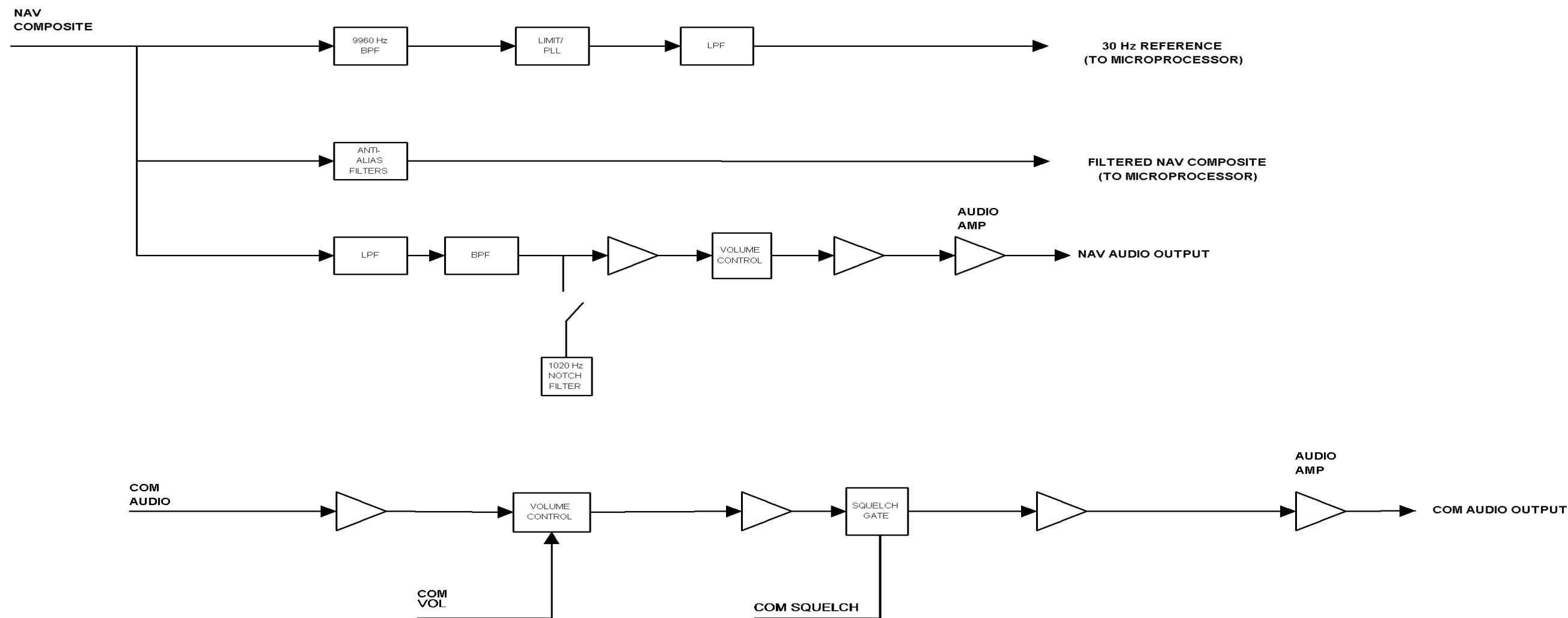
4.2.2   TRANSMITTER

The transmitter produces an amplitude modulated (AM) signal within the COM BAND frequency range of 118 to 137 MHz. The output power of the signal at the COM ANT is 10 watts minimum. Refer to figure 4-3 for the following description of the transmitter.

The audio from the microphone is amplified and passed through a mic gain control which establishes the audio level used to modulate the transmitter. The mic audio signal is limited before it passes through the response amplifier which drives the modulator/power control stage that amplitude modulates the transmitter.

A buffered RF signal derived from the frequency synthesizer drives the transmitter chain. The chain consists of the predriver, driver, final amplifier, LPF and Directional Coupler. The directional coupler is used to sample the RF power. The sampled RF power is detected and buffered, then routed to the modulator/power control stage to maintain the transmitter power output. The output of the modulator/power control stage modulates the gate of the final amplifier and also drives a low level modulator which modulates the predriver.

The T/R switch is embedded within the LPF. In transmit, the receiver is isolated by a PIN diode. In receive, the PIN diode conducts the received signal to the RECEIVER BOARD.

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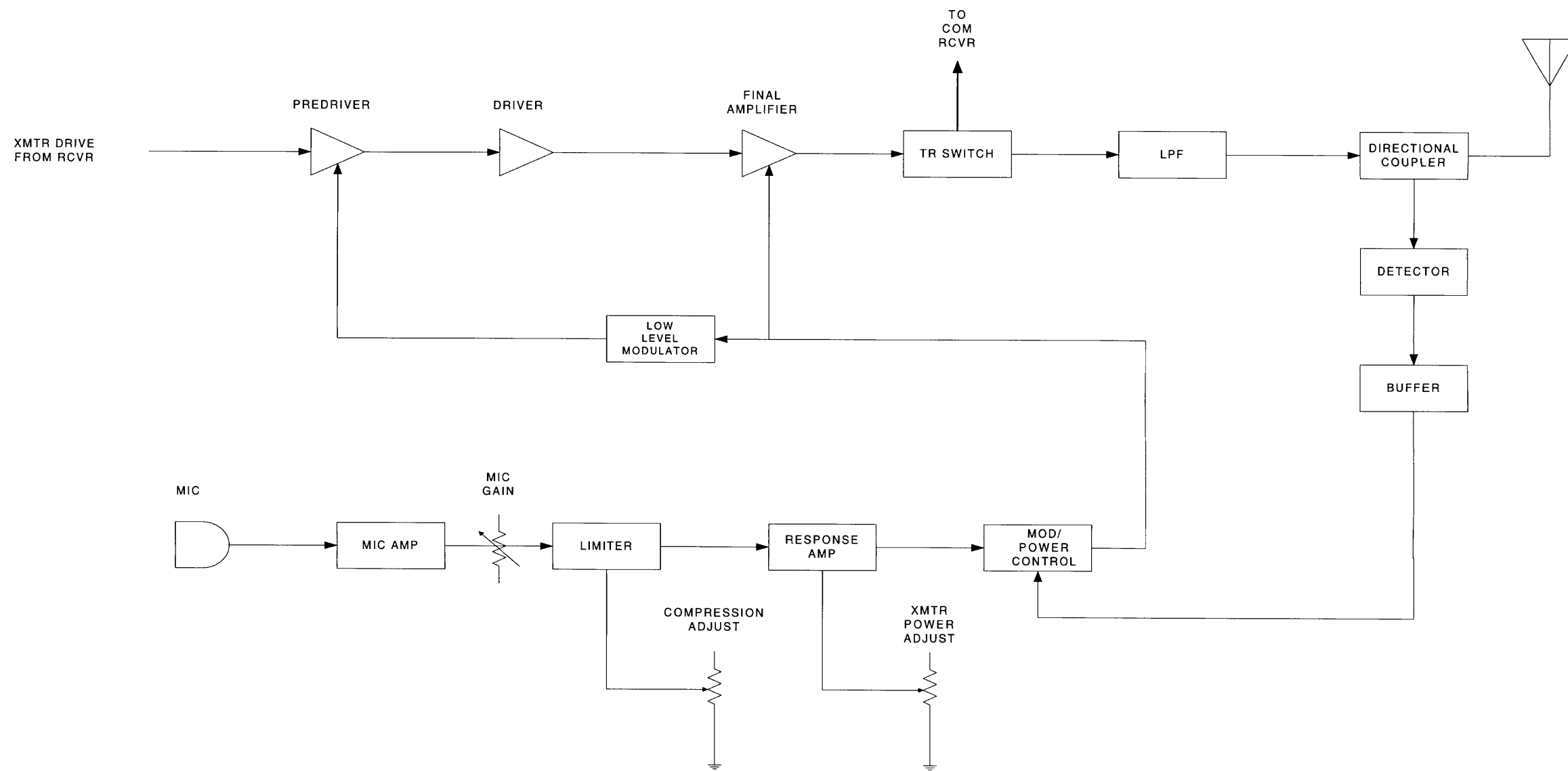
Figure 4-3 Transmitter Block Diagram

4.2.3   VOR/LOC RECEIVER

4.2.3.1   Principles of VOR system

4.2.3.1.1   General

The basic function of VOR is to provide a means to determine an aircraft's position with reference to a VOR ground station and also to follow a certain path toward or away from the station. This is accomplished by indicating whether the aircraft is on a selected VOR station radial or by determining which radial the aircraft is on. A means to differentiate between radials and identify them is therefore necessary. For this purpose, advantage is taken of the fact that the phase difference between two signals can be accurately determined. The phase difference between two signals which are generated by the VOR station is varied as the direction relative to the station changes so that a particular radial is represented by a particular phase difference. Refer to Figure 4-4. One non-directional reference signal is generated with a phase that at any instant is the same in all directions. A second signal is generated with a phase that at any instant is different in different directions. The phase of the variable phase signal is the same as the phase of the reference signal only at the 0° radial (North). As the angle measured from the 0° radial increases, the phase of the variable phase signal lags the phase of the reference signal by the number of degrees of the angle from 0°. The reference and variable phase signals, which are 30Hz voltages, are carried by RF to make radio transmission and reception possible. The VOR receiving equipment must separate the 30Hz reference and variable phase signals from the RF carrier and compare the phase of the two signals. The phase difference is indicated on a course indicator or RMI.

4.2.3.1.2   VOR generation

The VOR electromagnetic field is composed of the radiation from two ground based antennas radiating at the same carrier frequency. The first is a non-directional antenna radiating an amplitude modulated carrier. The frequency of the modulating signal varies from 9480Hz to 10440Hz back to 9480Hz 30 times per second. That is, a 9960Hz subcarrier amplitude modulates the RF carrier and is frequency modulated by 30Hz.

The second antenna appears electrically as a horizontal dipole which rotates at the rate of 30 revolutions per second. The dipole produces a figure 8 field pattern. The RF voltages within the two lobes are 180° out of phase. The RF within one of the lobes is exactly in phase with the RF radiated from the non-directional field. The rotating figure 8 pattern reinforces the non-directional pattern on the side. See Figure 4-4. This results in a cardioid field pattern which rotates at the rate of 30 revolutions per second; the rate at which the dipole antenna rotates.

The signal received by aircraft within radio range of the VOR station is an RF carrier with amplitude varying at the rate of 30Hz because of the rotation of the cardioid pattern. The carrier is also amplitude modulated at the station by the 9960Hz signal which is, in turn, frequency modulated on a sub-carrier so that it may be separated from the 30Hz variable phase signal.

4.2.3.2   Principles of localizer system

The localizer facility provides a visual display of the aircraft's position relative to a straight line of the runway. The ground based localizer antenna system generates two patterns. Refer to Figure 4-5. One pattern is directed toward the right side of the runway, the second to the left. The two patterns have the same carrier frequency but different audio modulating signals. The pattern to the left of the runway (in normal approach) is 90Hz, amplitude modulated, while the pattern to the right is 150Hz, amplitude modulated.

The ratio of the levels of the 90Hz to 150Hz audio, after demodulation, is dependent only upon the position of the aircraft within the patterns. The patterns are adjusted so they are of equal strength on a vertical plane extending out from the runway centerline. When the aircraft is on this plane, the 90Hz and 150Hz voltages are equal.

4.2.3.3   NAV (VOR/LOC) Receiver

Refer to figure 4-2 for the Nav receiver description. In order to satisfy the requirements for immu-
nity from interference caused by FM Broadcast stations, the front end of the Nav receiver employs
a high-dynamic-range RF amplifier embedded in a 5-pole-band-switched preselector. The prese-
lector also includes pin diodes to provide RF AGC action. A high-level-doubly-balanced mixer
converts the incoming signal to a 20.5 MHz first IF frequency. Eight poles of crystal filtering follow
the mixer. The filtered 20.5 MHz signal is amplified by a first IF amplifier transistor then is applied
to the input of an AM Receiver IC. This IC amplifies the first IF signal, mixes it down to 450 kHz,
passes the signal through an external ceramic filter and JFET amplifier, then further amplifies the
signal at 450 kHz and finally detects the signal. The detected signal is used to develop IF AGC
voltage and the detected signal is also output from the IC to drive audio filters and amplifiers. RF
AGC voltage is derived from the IF AGC voltage. The low-side-injection first LO signal is derived
from a synthesizer circuit which employs a dual-modulus Synthesizer IC, an active integrator, a
loop filter and a VCO. Amplification of the VCO output is accomplished with both a MMIC and a
discrete bipolar amplifier. The synthesizer reference frequency of 20.95 MHz is taken from the
Com section of the RECEIVER BOARD. This reference frequency also serves as the second LO
injection signal. The detected signal is applied to a buffer-amplifier without any audio filtering to
provide the VOR/LOC composite signal to the Main Board. On the Main Board the Nav composite
signal then splits into three paths: 1) 30 Hz reference, 2) anti-alias filters, and 3) Nav audio.

For the 30 Hz reference, the Nav composite passes through a 9960 Hz bandpass filter and a lim-
iter stage before going to the phase locked loop (PLL) FM demodulator. The PLL extracts the 30
Hz reference modulation from the composite signal so it can be passed to the microprocessor.

The anti-alias filters are low pass filters that filter the composite signal before it is passed to the
microprocessor for signal processing used in the converter function.

The Nav composite signal also passes through a low pass filter to strip off the 9960 Hz sub-carrier
leaving the 30 Hz "variable" signal. The resultant audio signal passes through a bandpass filter
that establishes the frequency response of the signal. The signal passes through a front panel
selectable ident filter before being routed to amplifier stages, volume control, and finally the audio
amplifier.

REFERENCE PHASE
SIGNAL (FM)
ALL RADIALS

+ --- — 10440 Hz

0 --- — 9960 Hz

- --- — 9480 Hz

$\frac{1}{30}$ SECOND

VARIABLE PHASE
SIGNAL (AM)

RESULTANT
ROTATING PATTERN
(30 REVOLUTIONS PER SECOND)

UNMODULATED
ROTATING
DIPOLE PATTERN

10° RADIAL

9960 Hz SUBCARRIER
FREQ. MOD. AT 30 Hz.

270° RADIAL

90° RADIAL

240°

180° RADIAL

REFERENCE PHASE VOLTAGE
(AFTER FM DETECTION)

NORTH   NORTH EAST   EAST   SOUTH EAST   SOUTH   SOUTH WEST   WEST   240°   NORTH WEST   NORTH

240°

VOLTAGES AT AIRCRAFT
ON 240° RADIAL

VARIABLE PHASE VOLTAGE
(AFTER AM DETECTION)

DIRECTION OF POSITIVE LOBE
OF ROTATING ANTENNA.

Figure 4-4 VOR Signal Generation

LOCALIZER ANTENNA PATTERN
(TOP VIEW)
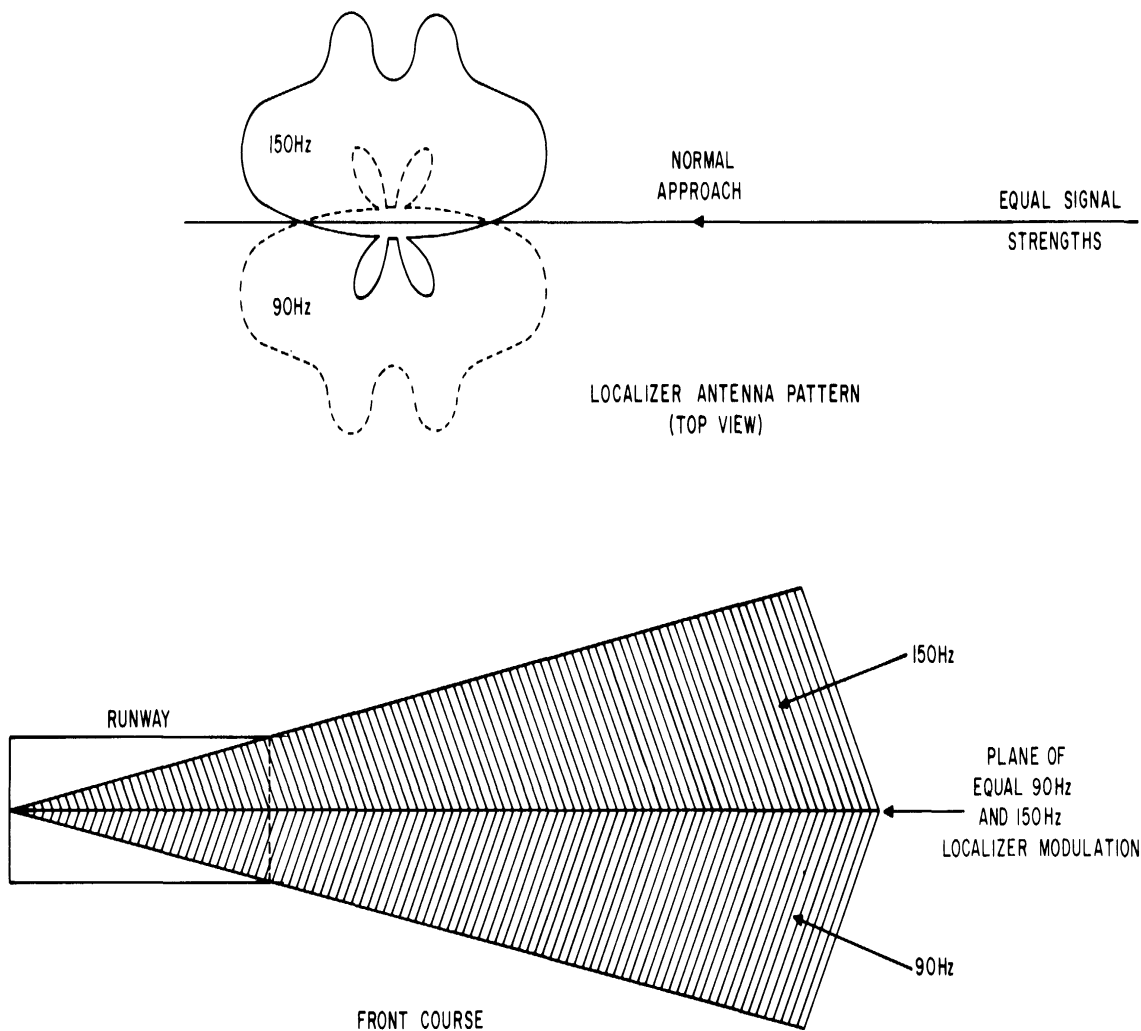
Figure 4-5 Localizer Signal Generation

4.2.4   GLIDESLOPE RECEIVER

4.2.4.1   Principles of glideslope system

The glideslope signal is radiated by a directional antenna array located near the approach end of the runway. The signal consists of two intersecting lobes of RF energy. The upper lobe contains 90Hz modulation and the lower lobe contains 150 Hz modulation. The equal tone amplitude intersection of these two lobes forms the glide path. A typical glide angle is 2.5 degrees. If the aircraft is on the glide path, equal amplitudes of both tones will be received and the deviation bar will be centered. If the aircraft is above the glide path, 90 Hz modulation predominates and the visual display is displaced downward. If below the glide path, 150 Hz predominates and the display is displaced upward.

4.2.4.1.1   GS Receiver

Refer to the Figure 4-7 for a block diagram of Glideslope RECEIVER BOARD 200-09447-0000.

The Glideslope Board contains a receiver that may be tuned throughout the Glideslope frequency band of 329.15 to 335.00 MHz. The Glideslope operation frequency is paired with a selected Localizer frequency. Therefore, Glideslope operating frequency is not viewed/selected directly from the front panel. The radio selects the proper Glideslope frequency based upon the Localizer channel.

Digital and analog I/O comes from the VHF Main Board via a 12 pin ribbon cable. The receiver gets its synthesizer tuning, and DC power from the VHF Main board. The RF Input comes in externally through the antenna connection on the back of the radio. There is a rear edge card connector that is used to output analog converter signals necessary to drive an external indicator.

The RF signal coming from the antenna connector passes through a dual gate FET VGA (variable gain amplifier) and a fixed gain MMIC amplifier. This amplified signal is the RF input to a mixer with a LO 30 kHz below the RF and an IF of 30 kHz. The IF Filter and Amplifiers consist of three fixed gain IF amplifiers, one IF VGA amplifier, and a 50 kHz 9-pole low pass filter. The 30 kHz IF is passed through an AM detector resulting in an AC audio composite and a DC level. The AC composite audio signal contains the 90 and 150 Hz tones needed to produce an up/down indication on an aircraft's indicator. The DC level is used by the IF and RF AGC amplifiers to maintain a constant Detector input power.

The audio composite is digitally processed on the main board to determine the level of Glideslope external indicator deflection and flag level. These values are sent from the Main Board to the Glideslope RECEIVER BOARD via the serial data buss. A quad digital potentiometer receives the serial data. One digital potentiometer controls the flag level. Two other digital potentiometers control the Glideslope indicator deflection. An IF AGC signal is also sent back to the VHF main board for use in automatic test and for automatic detection of the presence of the 200-09447-0000 Glideslope Board. The IF AGC voltage is also available at the rear edge card connector for automatic test use.

Figure 4-6 Glideslope

COMP_AUDIO
(TO MAIN BD)

13 dB
ATTENUATOR

16 dB
ATTENUATOR

30 kHz
IF

ANTENNA RF INPUT → RF PRESELECTOR AND VARIABLE GAIN RF AMPLIFIER → MMIC AMPLIFIER → DUAL GATE FET MIXER → IF AMPLIFIER #1 → 50kHz 9-POLE LOW PASS FILTER → IF AMPLIFIER #2 → VARIABLE GAIN IF AMPLIFIER #3 → IF AMPLIFIER #4 → DETECTOR

RF AGC AMPLIFIER

GS_IF_AGC
(TO MAIN BOARD)

MMIC BUFFER AMPLIFIER

IF AGC AMPLIFIER

AUDIO AMPLIFIER

COMPOSITE AUDIO FILTER AND AMPLIFIER

VCO

LOOP FILTER

SYNTHESIZER

20.95 MHz CRYSTAL OSCILLATOR

LO FREQUENCY DITHER CIRCUIT

SERIAL_DATA

SERIAL_DATA_CLOCK

SYNTH_ENABLE

GS_IF_AGC
(REAR CONN.)

QUAD DIGITAL POT.

DEVIATION

WIDTH

AMPLIFIER

GS UP
(REAR CONN.)

- FLAG
(REAR CONN.)

POT_ENABLE

+ FLAG
(REAR CONN.)

VOLTAGE REFERENCE

GS DOWN
(REAR CONN.)

Figure 4-7 200-09447-000 KX 165A
Glideslope Receiver Block Diagram

4.2.5   CENTRAL PROCESSING UNIT (CPU)

The CPU controls the function of the unit and its connections can be seen in figure 4-8. An external crystal sets the clock frequency for the CPU. The CPU also communicates to a RS-232 IC that converts the CPU levels to those that are RS-232 compatible. An electronically erasable programmable read-only-memory device (EEPROM) is used to store alignment information and other configuration data. The flash memory is used to store the unit software and the static random access memory (SRAM) is used to supplement CPU memory. DME I/O conditions signals from the CPU so they can be used to channel external DME equipment. Discrete I/O pass through filter networks and switch transistors are then routed to the CPU for control purposes. A voltage monitor on the 5V controls the reset line to the microprocessor, when the voltage on the 5V line is below 4.75 VDC the CPU is held in the reset state.
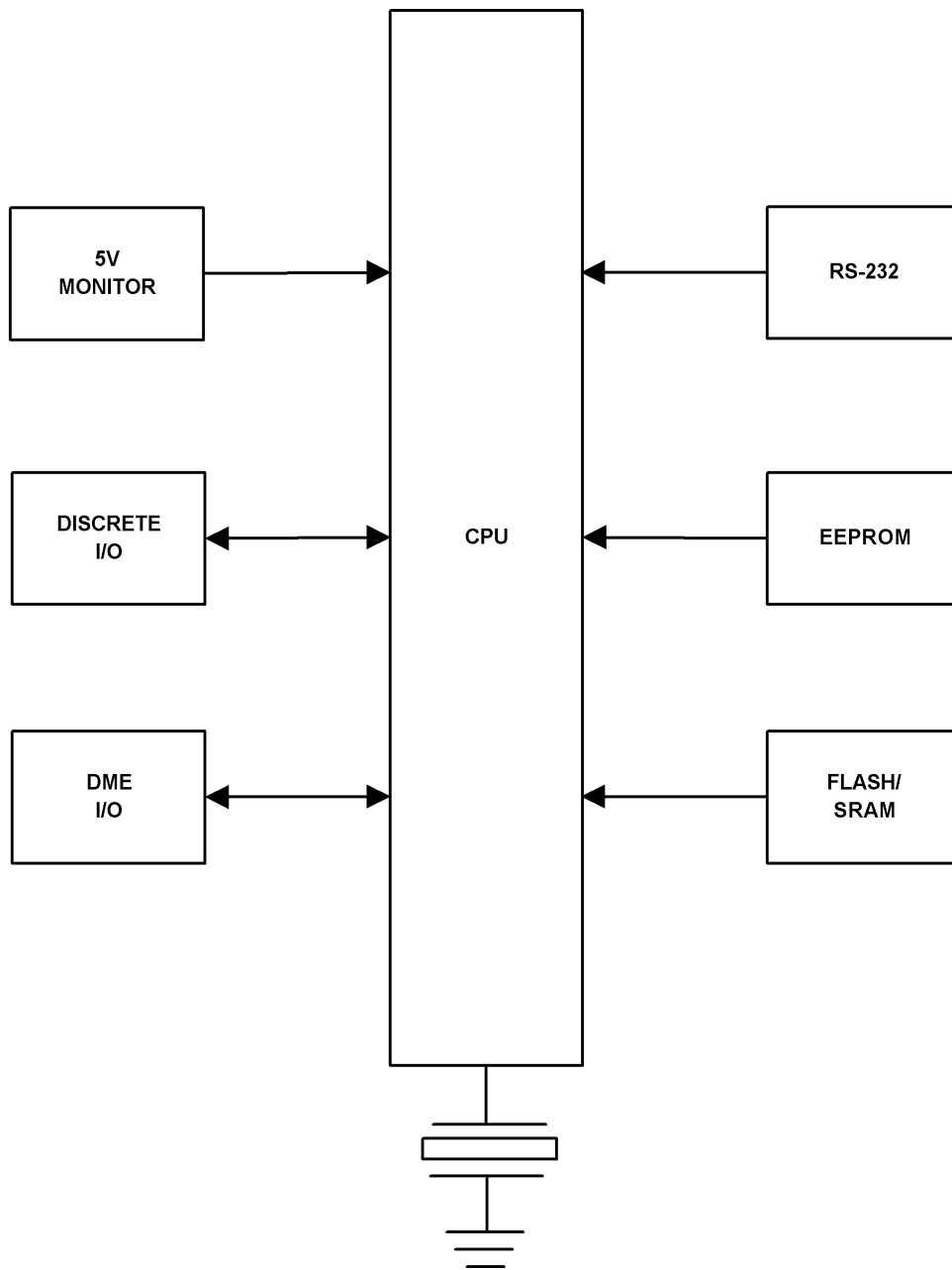
Figure 4-8 CPU Block Diagram

4.2.6   POWER SUPPLY

Refer to figure 4-10 for the power supply block diagram. The unit uses a switching power supply to generate voltages that supply the various electrical functions. The power supply converts 11-33 VDC to 5 VDC, 9VDC, -12VDC, and -200 VDC. Refer to the power supply block diagram located in figure 4-10. The 11-33 VDC aircraft bus is filtered via a hash filter. The output of the hash filter goes to the transmitter and to the transformer. A switch connected to the transformer chops the input voltage so the transformer can convert the input dc voltage to the several different voltages. Each voltage output from the transformer requires a rectifier diode and filter capacitor to complete the conversion to dc voltages. The -200 VDC line also has a post regulator in order to accurately control the voltage that droves the display module. The output of the 9 VDC line is fed back to the regulator IC which keeps the output voltages constant over varying loads. Before the switching regulator stabilizes, a pre-regulator from the aircraft bus is used to supply power to the regulator IC.

4.2.7   FRONT PANEL AND DISPLAY

The front panel display block diagram can be seen in figure 4-9. The Front Panel and Display Module contain the display interface, knobs and buttons for pilot to enter data. The display interface should receive signals from the main board and drive the gas discharge display. The knobs and buttons' data will be sent to the microprocessor on the main board.

The front panel module has two dual concentric INC/DEC optical encoder switches with one pull switch each, four push-button switches, two volume control pots with pull switches and one of the volume controls has a rotary power on/off switch. The front panel buttons and switches are read by periodically latching the state of the switches into the two parallel-to-serial converters/shift registers and shifting the data into the processor on the main board. The optointerrupter INC/DEC switches consist of an IR LED and a phototransistor in a single package. In order for the IR light to be detected by the phototransistor a metallic surface with alternating reflective and non-reflecting surfaces is rotated in front of the photointerrupters.

The unit display is a segmented gas discharge display that is formatted as 24 cathode and 20 anode buses. Each segment can be addressed by one combination of cathode and anode driver line. The display is run by cycling through the cathode bus one at a time and turning on the appropriate anodes. The display is updated by first sending the anode driver data and latching the data into anode driver output latch. Then the cathode data stream is sent to the cathode driver and then the DISPLAY ENABLE line is toggled. The cathode driver outputs are activated and the display lights. This process is repeated for all 24 of the cathode buses on the display to complete one full cycle of updating the display. The frame update rate of the display is approximately 70 Hz.

The front panel contains the potentiometers for the nav and com audio volume controls. The voltage on the wipers of the potentiometers are read by the A to D converters on the main board processor which in turn control the volume by setting the digital pots on the main board.

The photocell is a variable resistor in which the resistance is dependent on the amount of light incident to the photocell. When biased in a voltage divider configuration with another resistor the A to D converter on the main board can read the changing voltage and change the intensity of the display drive to track the existing light conditions.
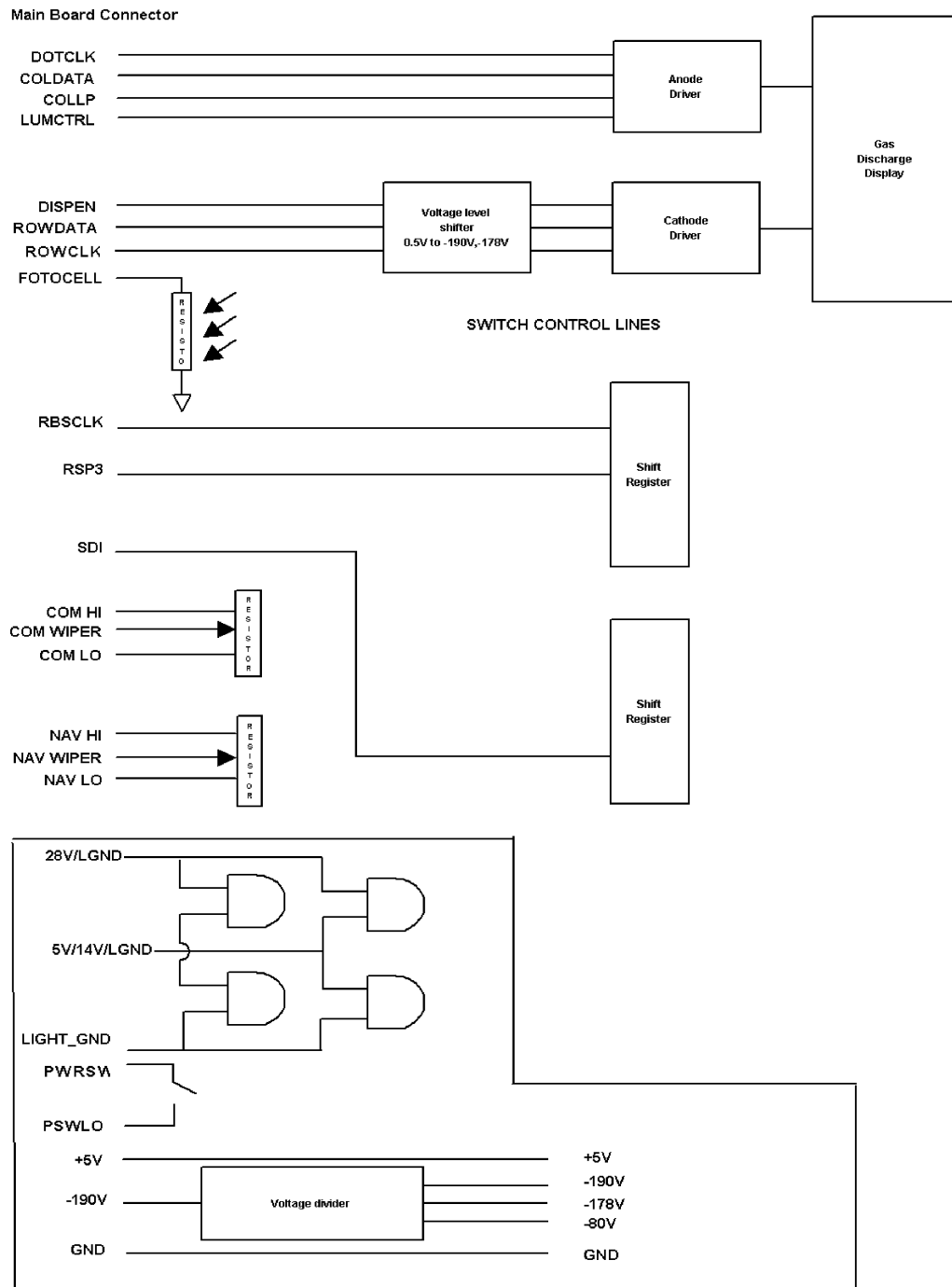
Figure 4-9 Front Panel and Display Diagram
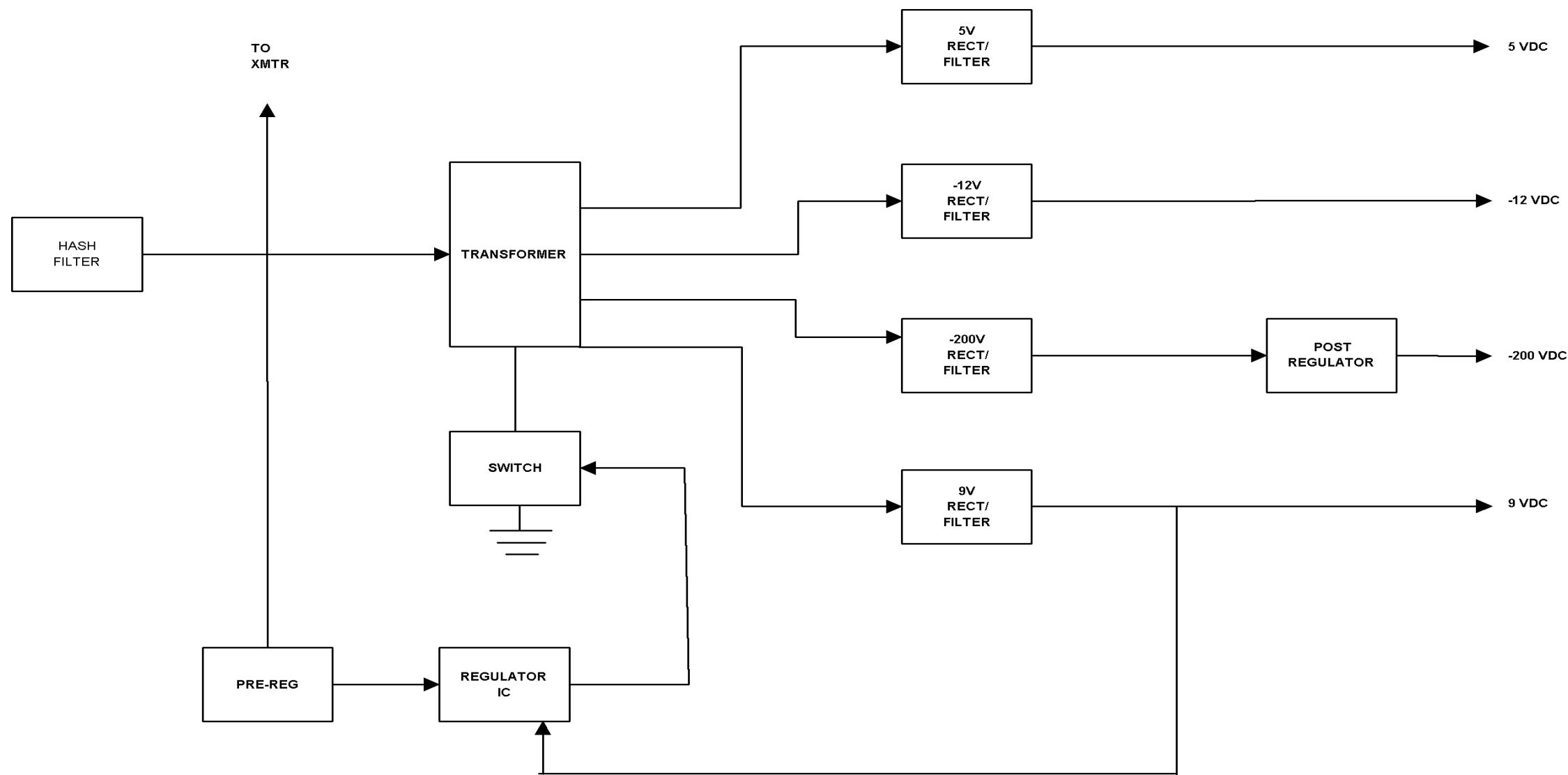
Figure 4-10 Power Supply Block Diagram
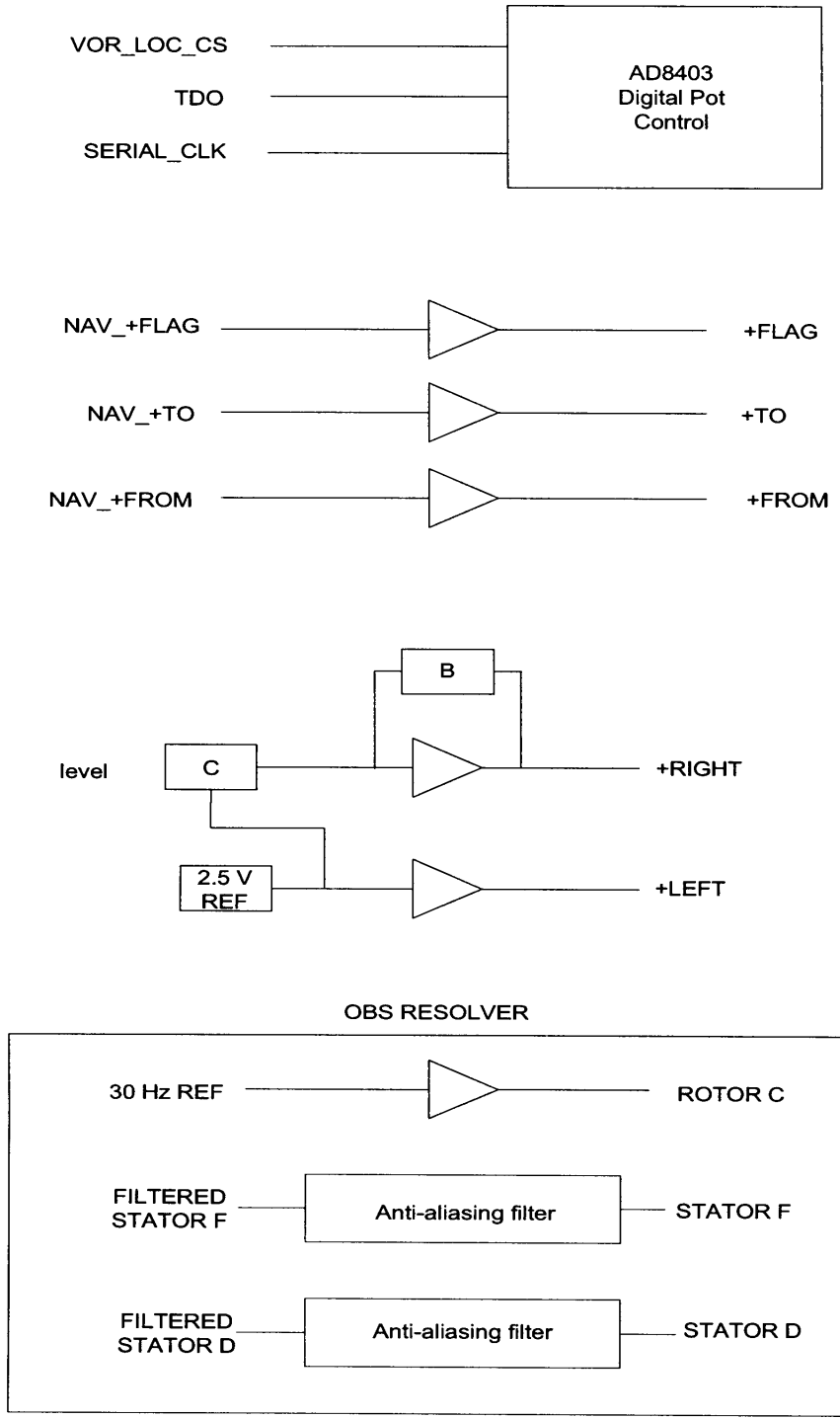
Figure 4-11 VOR/LOC Converter Board Block Diagram

4.2.8   VOR/LOC Converter Board

Refer to Figure 4-11. The VOR/LOC converter I/O board generates the analog signals needed to interface to an indicator with OBS. External system outputs from the board are TO/FROM flag

drive, Warning Flag drive, D-Bar drive, and Reference Stator drive for Indicator OBS resolver. External system inputs to the board are return Stator signals from the OBS resolver.

Discrete logic level signals from the Main board control each of the flag driver circuits. Digitally programmable Potentiometer C controls the D-Bar centering. A 5V reference is resistively divided to produce a input voltage to the +RIGHT drive amplifier. The Input to the +Left drive amplifier is one half the 5V reference. The Gain or slope of the D-Bar output is set by digitally programmable potentiometer B. The serial control of these potentiometers come from the Main Board. A Buffer amplifier isolates the recovered 30 Hz VOR Reference from the Main board signal and outputs it to the external indicator OBS. The returning OBS stator signals are filters on the board and returned to the Main Board. Here they are sampled and used for OBS position calculations.

4.3 DETAILED CIRCUIT THEORY

The detailed circuit theory description is broken into the following functions:

1. Com receiver/IF board

2. Transmitter

3. Nav (VOR/LOC) receiver

4. Glideslope receiver

5. CPU

6. Power supply

7. Front Panel and Display

8. VOR/LOC Converter I/O Board

These functions may involve more than one assembly; therefore, component designators will point to the assembly on which the parts are found. For example, R1 is on the glideslope reference oscillator, and C1001 is found on the main board.

Table 4-1 Component Designators

1000	Main
2000	Bezel (front panel)
3000	NAV/COM Receiver
4000	Transmitter
5000	Not used
6000	Audio
7000	VOR/LOC Converter I/O Board

4.3.1 COM RECEIVER

Refer to figure 6-21 for the com receiver schematic. Some receiver audio functions appear on the main board schematic in figure 6-8.

4.3.1.1 Digital/Analog Interface Circuitry

Clock, Data and Enable signals generated by the microprocessor on the Main board are used to program the following sections of the receiver:
- Synthesizers for the two receivers (U3011 and U3018)
- Two digital to analog converters (DACs) for alignment functions (U3005 and U3006)
- A serial to parallel register for controlling various modes of the receivers (U3002)
- An EEPROM which stores alignment values for the receiver (U3007)

The enable decoder, U3003, determines which of the devices above read the serial data being sent by the microprocessor. A high on the outputs of U3003 enables that respective device. Select 1, Select 2, Select 3 and Enable lines from the microprocessor control U3003.

4.3.1.2 Digital to Analog Converters

Digital to analog converter (DAC) U3005 drives the varactor tuned Com preselectors as well as provides alignment voltages to the unit's master reference oscillator and sets the threshold of the Com squelch. Another DAC, U3006, provides the alignment voltages for the Com IF filter adjustments, the Com and the Nav RF AGC activation levels as well as the Com and the Nav VCO adjustments. A precision regulator, U3027, provides the DACs with a stable 8.4 VDC supply voltage.

4.3.1.3   Serial to Parallel Register

The outputs of the serial to parallel register, U3002, controls four functions. When the volume control knob is pulled out by the pilot, driving U3005 pin 2 from its normally low state to a high, the squelch can be manually forced open. The Nav RF preselector is controlled by U3005 pin 2, which will be high if the Nav operating frequency is below 113.6 MHz, and will be low at frequencies of 113.6 MHz and above. When U3002 pin 3 is high, the Com receiver audio level compressor is disabled, a feature that may be used during some bench tests.

4.3.1.4   EEPROM

The non-volatile EEPROM, U3007, stores the alignment information for each RECEIVER BOARD. This EEPROM is read by the microprocessor when the unit is first turned on. The values in U3007 are updated when the technician adjusts any of the alignment functions controlled by U3005 and U3006.

4.3.1.5   Voltage Regulator and T/R Inverters

Voltage Regulator and T/R Inverters
Voltage regulator U3009 provides a stable voltage for sensitive synthesizer circuitry.

The microprocessor sends transmit-receive commands to the RECEIVER BOARD via P3001 pin 2. This pin is high when the unit is in transmit. TX switch driver U3001-G, pin 10 is low in transmit and high in receive. The output of inverter U3001-B is high in transmit and low in receive.

4.3.1.6   T/R Switch Drive and Interlock Attenuator

Received signals arrive at RECEIVER BOARD J3006 from the T/R switch located on the Transmitter board. When Q3004 is turned on, a positive voltage appears at the center conductor of J3006 to turn on the T/R diode located on the transmitter board. In transmit, a negative voltage is developed at the center conductor of J3006 by a small amount of rectification in the T/R diode itself, holding the T/R diode off.

CR3004 and CR3005 form a 14 dB attenuator which is activated in transmit or when the unit's interlock feature is enabled externally. Q3001, Q3002 and Q3003 drive the attenuator active when the collectors of Q3002 and Q3003 are at a positive voltage. A negative voltage at the collectors of Q3002 and Q3003 allows the incoming signal to pass through the attenuator with little attenuation.

4.3.1.7   Preselector and RF Amp

L3006 and L3007 are part of the varactor tuned Com preselector, which feeds RF Amp Q3010. The gain of Q3010 is maximum when its gate 2 is above 7 volts. At signals stronger than about -85 dBm at the receivers input, the voltage on gate 2 will drop, reducing the gain of Q3010, providing RF AGC action. Q3010's output is fed to two more varactor tuned preselector poles consisting of L3009 and L3011. The voltage on the varactors CR3006-CR3009 will vary from about 4 VDC at 118.0 MHz to about 7.0 V at 136.9 MHz. In transmit, the preselector poles are detuned to reduce the overloading of the receiver.

4.3.1.8   First Mixer and First IF

A doubly-balanced mixer, U3028, converts the incoming signal to the 21.4 MHz first IF frequency. The first local oscillator signal is applied to pin 6 of the mixer. The First IF amplifier Q3011 amplifies the 21.4 MHz signal and feeds it to either the first IF filter FL3001 or the IF Filter board. On radios which are 25/8.33kHz capable the IF Filter board is installed. It switches between an eight pole narrow bandwidth crystal filter or a six pole wide bandwidth crystal filter depending on the radio being tuned to a wide (25kHz) or narrow (8.33kHz) channel. Radios which use 25kHz bandwidths exclusively use FL3001 and the IF Filter board is not installed. The filtered 21.4MHz IF signal is amplified by IF amp Q3017 before being passed to pin 18 of U3015, an AM receiver IC.

4.3.1.9   AM Receiver IC and Second IF

 U3015, includes an additional gain controlled 21.4 MHz amplifier, a second mixer, amplification at 450 kHz, a detector and AGC circuitry.   The 21.4 MHz signal applied to U3015 pin 18 is amplified then mixed down to 450 kHz, the second IF frequency. The 20.95 MHz reference oscillator is applied to U3015 pin 16 to serve as the second LO.

The 450 kHz second IF signal output at pin 1 of U3015 is impedance matched by L3015 and C3066 to FL3006, a 450 kHz ceramic filter. The filtered signal is then returned to U3015 at pin 3, amplified within the IC, then passed to an internal detector. The gain of both the 21.4 MHz and 450 kHz amplifiers internal to U3015 is controlled by the AGC voltage on pin 7. AGC time constants are established by C3120 and C3134. The amplified 450 kHz signal is available at pin 12 of U3015 (TP3005) to allow easy viewing of the signal with an oscilloscope.

4.3.1.10   Reference Oscillator

In 25kHz radios a 20.95 MHz reference frequency oscillator consisting of Y3002 and Q3022 generates a stable reference frequency to be utilized by the synthesizers. Varactor CR3013 circuitry provides a variable capacitance to fine tune the frequency of Y3002. Units that are both 25kHz and 8.33kHz channel capable have Y3001 installed. This is temperature compensated oscillator used so that the radio remains in specification despite the narrower bandwidths of 8.33kHz channels. This reference frequency is buffered by Q3021 and fed to U3015 to serve as the second local oscillator for U3015. U3015 also outputs the 20.95 MHz signal on pin 14. Q3023 amplifies and buffers this 20.95 MHz reference signal for distribution to other receiver circuits.

4.3.1.11   Com Audio and Receiver Compressor

Detected Com audio from U3015 pin 6 is sent to buffer transistor Q3025 to provide an unsquelched-constant-level output to the unit's rear connector for use by external equipment. U3015 also outputs detected audio on pin 9, which is routed through R3180 then to compressor FET, Q3024. The purpose of the receive audio compressor is to hold the audio level the pilot hears at a nearly constant level regardless of the percent of modulation of the received signal. CR3015 is a clipper that limits the level of noise and transients.

If squelch gate Q3016 is turned on, the signal is fed through to the Audio LPF which amplifies the signals below 2.7 kHz and attenuates higher frequencies. U3008-B and U3008-A stages both have a gain of about 3. Audio out of U3008-A is fed to the Main board via P3002 pin 1 and also the compressor amp, U3008-C. The compressor amp inverts the signal and then feeds it to the compressor detector consisting of CR3017 and C3151. If the incoming signal has a modulation percentage of less than about 20%, the voltage at the gate of Q3024 is high enough to hold Q3024 off, letting the audio signal pass unattenuated to the audio LPF. On signals that are modulated at greater than about 20%, the detected voltage across C3151 will drop enough to turn on Q3024. Q3024 then acts as a variable resistor, attenuating the detected signal out of U3015 as necessary to hold the audio output at a constant level. For testing purposes it may be desirable to disable the compressor; this is accomplished by Q3005. When the input to Q3005 is driven high by the microprocessor via U3002, the compressor is disabled.

Com receiver audio is output from the RECEIVER BOARD via J1002 pin 1. The signal routes to U1023C on the main board which has a gain of about 0.5. The signal goes to U1029A which has a gain of about 2.5, and then is directed to digital pots U1028A&D which control volume. After the volume control, the audio signal is fed to U1029, an amplifier circuit that has a gain of about 0.3, and then to U1027B which has a gain of about 35. T1001 transforms the signal in order to drive a 500 ohm load.

The com receiver audio is squelched when the gates of Q1024 and Q1029 are pulled high.

4.3.1.12   Noise Squelch

Detected Com audio from U3015 pin 6 is applied to the squelch noise bandpass filter U3013-D. Squelch operation differs depending on whether the unit is tuned to a 25kHz or a 8.33kHz channel.

When tuned to a 25kHz channel U3010-C, U3017-C and Q3018 are off, and U3010-D is on. this sets the BPF U3013-D to a center frequency of 8kHz and routes the output directly to the noise detector CR3016. When no desired signal is present the amount of 8kHz noise will be high, charging C3152 up to about 2.5Vdc and exceeding the threshold on pin 9 of squelch comparator U3013C. This allows audio to pass by turning on Q3016 through inverted transistor Q3007. When a desired signal is present the 8kHz noise will drop, and allow Q3016 to turn on and pass audio to the audio LPF U3008-B.

When tuned to an 8.33kHz channel Q3018 is turned on which shifts the center frequency of BPF U3013-D to approximately 4kHz. Because of this the 8.33kHz squelch operates off of 4kHz noise. The output of the BPF is switched to the HPF U3013-A so as to eliminate possible squelch action on desired audio tones. The output of the HPF is routed to the noise detector and the squelch comparator. U3017-C is used to lower the hysteresis of the squelch comparator while on an 8.33kHz channel.

4.3.1.13   RF AGC and Carrier Squelch

The AM receiver IC, U3015, outputs an IF AGC voltage on pin 7. This voltage will be about 1 VDC with no input signal to the unit and rise to about 2 VDC with a strong input signal. U3018-D is used to monitor the IF AGC voltage, and when it reaches about 1.6 VDC, turns Q9 on, pulling the Com RF AGC voltage down below 8VDC. The reduced level of RF AGC voltage reduces the gain of RF amp Q10 to prevent the following stages from being overloaded.

As the IF AGC voltage out of U3015 increases above about 1.5V, the output of the carrier-squelch comparator U3013-B goes positive. This positive voltage is directed to the input of squelch comparator, U3013-C, to force the squelch to open on strong signals.

This carrier squelch (or backup squelch) is required when receiving signals that might contain a strong 8 kHz modulation component which would prevent the noise squelch circuitry from opening the squelch.

4.3.1.14   Com Synthesizer and TX Driver

Serial data from the microprocessor is sent to program the synthesizer IC, U3011. U3011 compares VCO output on pin 8 with the 20.95 MHz reference oscillator signal on pin 1 and generates high or low pulses out of pin 5 to the active integrator, U3016-B. The combined action of U3016-B and the RC loop filter apply a DC tuning voltage to CR3014 in the VCO. The voltage will vary from about 2.5 V at 118 MHz transmit to about 8.4 V at 136.9 MHz receive.

Internal to U3011 are two dividers which divide the 20.95 MHz reference frequency and the VCO frequency down to a lower reference frequency of 25 kHz. The divided reference pulses appear on U3011 pin 13 and the divided VCO frequency pulses appear on pin 14; these pulses are only about 50 ns wide on pin 13 and 300 ns wide on pin 14 and will occur at a 25 kHz rate.

In the transmit mode, the VCO frequency is the same as the unit's operating frequency. In receive, the VCO frequency is 21.4 MHz higher than the operating frequency. U3012 buffers the VCO out-

put directing the signal three places. The output of U3012 goes back to the synthesizer IC, U3011, to keep the loop locked. It also goes to the first mixer to serve as the first LO injection (Gate 2 of Q3011 in a unit without Mod 5 and to U3028 in units with Mod 5). In the transmit mode, U3012 also drives the TX Driver stage Q3015. Approximately +15 dBm of output power is available at J3005 when Q3012 is turned on in transmit providing power to Q3015. This unmodulated signal out of the TX driver stage is fed to the Transmitter board.   In receive, when Q3012 is off, there is less than 0 dBm at J3005.

A pin diode switch consisting of CR3033, is placed between the output of U3012 and the base of Q3015 to remove the drive power to Q3015 in the receive mode.

In a normal synthesizer locked state, the LD output of U3011 (pin 7) will be high. Low going pulses will be seen at the LD output if the synthesizer is unlocked. These pulses are filtered by C3092 and applied to comparator U3016A. The output of U3016 and the Com Synth Lock line at P3001 pin 16 is low in a locked condition and high in an unlocked condition.

4.3.2   TRANSMITTER

Refer to figure 6-13 for the transmitter schematics. Some transmitter functions appear on the main board schematics in figure 6-8.

4.3.2.1   RF PATH

The RECEIVER BOARD lineup of Q3020, U3012 and Q3015 produces an unmodulated RF drive level of 30 mW (+15 dBm) at J3005 on the desired frequency of operation in the COM BAND. The drive signal is conducted by 50 ohm transmission line and fed to the 2N4427 PREDRIVER, Q4004. This stage provides approximately 9 dB of gain, boosting the level of the signal to 250 mW (+24 dBm) for the JT2468 DRIVER, Q4005. Approximately 14 dB of gain is achieved in this stage, to a level of 6 watts for the MRF 173 FINAL, Q4006. The final stage produces 9 dB of gain, to a level of 50 watts peak power. There is a loss of about 1 dB in the HARMONIC FILTER which comprises the Low Pass Filter and Directional Coupler, so the peak output power at the COM ANT is 40 watts for full AM modulation of a 10 watt carrier.

4.3.2.2   AUDIO PATH

Audio input from the MIC input is processed by U1023-A which provides bias for carbon mic elements, and buffering to the digital pot, U1032-A, for mic gain adjustment. The circuitry of U1034-C, U1032-B, U1034-B, and Q1042 comprise the MIC COMPRESSOR to ensure modulation is maintained at the highest average level as possible without overmodulating the carrier on modulation peaks. The shape of the audio response in the BPF is determined in large part by U1035-C to provide a 6 dB bandwidth from 350 to 2500 Hz. The KX165A has an additional audio filter which is needed to meet the 8.33kHz channel spectral requirements. The KX165A TX Audio Adapter Board provides this additonal audio filtering, reference Figure 6-10. U1 and its surrounding components form a switched capacitor filter having an elliptic response.

4.3.2.3   MODULATOR PATH

The audio signal from U1035-C TX Audio Adapter Board provides the reference to modulate the carrier by comparing detected RF, which is buffered by U1035-D, and provides the feedback in U1035-A, with the error amplified and applied to the transmitter final device's gate bias.

4.3.2.4   POWER CONTROL PATH

There are two control loops that monitor the modulator gate bias on TRANSMITTER BOARD Q1006. The main loop for power control detects output power (TRANSMITTER BOARD Directional Coupler & CR4004, U1035-D) and compares in U1035-A this sample against a reference for carrier power set, U1032-C buffered by U1035-C. This carrier power set reference is modulated by the processed audio from the MIC COMPRESSOR / BPF circuitry on the MAIN BOARD.

The modulator gate bias is adjusted instantaneously to effect amplitude modulation of the carrier. RF drive to the gate is controlled by the second control loop. This loop which comprises U1034-D and Q1038 to drive Q4004, predistorts the signal fed to the final by accomplishing low level modulation of the predriver to a level of about 15% AM, allowing a very high degree of final modulation with low distortion.

4.3.2.5   THERMAL CUTBACK

The transmitter estimates ambient temperature by reading the internal thermistor, U1010, and applying offsets for unit specific operation (TOFF) and model specific operation (TAOS). TOFF is typically 0 because thermistor deviation is very small. TAOS is typically -7 for units with glideslope, and -4 for units without glideslope. The Transmitter will hold carrier power of 10 watts to +55C, and fall within the window of 2.5 to 6 watts at +70C.

4.3.2.6   TIMEOUT TIMER

The transmitter will allow continuous transmissions for durations of up to 30 seconds, after which the COMM frequency display will blink indicating timeout of the transmitter. This guarantees minimized interference from a stuck microphone condition which may not be noticed by the pilot.

4.3.3   NAV (VOR/LOC) RECEIVER

Refer to figures 6-21 for the Nav receiver schematic. Some Nav Audio receiver functions appear on the main board schematic in figures 6-8.

4.3.3.1   Preselector and RF Amp

The front end of the Nav receiver employs a high-dynamic-range RF amplifier embedded in a 5-pole-band-switched preselector. Nav Signals at the Nav antenna connector are applied to the first two poles of preselector consisting of L3025, L3035 and associated circuitry. These two poles are band switched in two bands. When the operating frequency is below 113.6 MHz, the base of Q3029 is driven low by U3002 and U3001-F. This turns Q3029 on, turning on pin diodes CR3020, CR3022 and CR3026, lowering the response of the first two poles. At frequencies of 113.6 MHz or higher, these pin diodes are off, allowing the frequency of the preselector to rise. Q3028 is the RF amplifier operating in a lossless-feedback configuration. The gain of the RF amp is controlled by transformer T2 and Directional coupler T1 at about 15 dB. Q3027 is a constant current source for the RF amp, limiting the current through Q3028 to about 30 mA. Three additional poles of preselector filtering consist of L3023, L3027, L3036 and associated circuitry. When CR3021 and CR3027 have a positive voltage on their anodes, they turn on to provide RF AGC action.

4.3.3.2   First Mixer

FET mixer U3022 is a high-level-doubly-balanced mixer that converts the input received frequency on pins 12 and 14 down to a 20.5 MHz first IF Frequency on pins 5 and 10. The first local oscillator signal is applied to pins 1 and 3 at a frequency 20.5 MHz below the desired operating frequency.

4.3.3.3   First IF

The low output impedance of the mixer at the output of T3005 is impedance matched by L3033 and C3317 to the higher input impedance of the 20.5 MHz 8 pole crystal filter, FL11. The output of the filter is likewise matched to the low input impedance of IF amp Q3035 by L3034 and C3312. After being amplified by Q3035, the 20.5 MHz signal is passed to pin 18 of U3023, an AM receiver IC.

4.3.3.4   AM Receiver IC and Second IF

U3023, includes an additional gain controlled 20.5 MHz amplifier, a second mixer, amplification at 450 kHz, a detector and AGC circuitry.   The 20.5 MHz signal applied to U3023 pin 18 is amplified then mixed down to 450 kHz, the second IF frequency. The 20.95 MHz reference oscillator is applied to U3023 pin 16 from the Q3023 buffer-amp to serve as the second LO.

The 450 kHz second IF signal output at pin 1 of U3023 is impedance matched by L3038 and C3314 to FL3008, a 450 kHz ceramic filter. The filtered signal is amplified by Q3034 and then returned to U3023 at pin 3. Within the receiver IC, the 450 kHz is further amplified and passed to an internal detector. C3285 and C3299 filter an internal reference voltage within U3023 and are important to maintaining accurate VOR bearing information. The gain of both the 20.5 MHz and 450 kHz amplifiers internal to U3023 is controlled by the AGC voltage on pin 7. AGC time constants are established by C3230, C3248, C3249, and C3286. The amplified 450 kHz signal is available at pin 12 of U3023 (TP3009) to allow easy viewing of the signal with an oscilloscope.

4.3.3.5   RF AGC

The AM receiver IC, U3023, outputs an IF AGC voltage on pin 7. This voltage will be about 1 VDC with no input signal to the unit and rise to about 2 VDC with a strong input signal. U3020-B is used to monitor the IF AGC voltage, and when it reaches about 1.7 VDC, the U3020 pin 7 voltage increases to a positive voltage, turning on pin attenuator diodes CR3021 and CR3027 in the preselector. As these diodes turn on, they attenuate the incoming signal to prevent the receiver from being overloaded on strong signals.

4.3.3.6   Nav Synthesizer and LO Amplifier

Serial data from the micro processor is sent to program the synthesizer IC, U3018. U3018 compares VCO output on pin 8 with the 20.95 MHz reference oscillator signal on pin 1 and generates high or low pulses out of pin 5 to the active integrator, 3019-A. The combined action of U3006-B and the RC loop filter apply a DC tuning voltage to CR3025 in the VCO. The voltage will vary from about 3.5 V at 108 MHz to about 7 V at 117.95 MHz .

Internal to U3018 are two dividers which divide the 20.95 MHz reference frequency and the VCO frequency down to a lower reference frequency of 50 kHz . The divided reference pulses appear on U3018 pin 13 and the divided VCO frequency pulses appear on pin 14; these pulses are only about 50 ns wide on pin 13 and 300 ns wide on pin 14 and will occur at 50 kHz rate. The VCO frequency is 20.5 MHz lower than the receiver's operating frequency. U21 buffers the VCO output and sends it back to the synthesizer IC, U3018, to keep the loop locked. The output of U3021 is also routed to Q3030, the Nav local oscillator amplifier. A lowpass filter on the output of Q3030 reduces the LO harmonics before T3003 transforms the low source impedance of Q3030 to a high impedance on the balanced input of the mixer at pins 1 and 3 of U3022.

4.3.3.7   Nav Audio

Nav audio is output from the RECEIVER BOARD on the nav composite line. The audio then is input to the main board's nav audio filter which is a 4 pole 350Hz-2500Hz bandpass filter composed of U1017-A&B and associated circuitry. The output of the audio filter is then amplified by a gain of 1.6 by U1029-D before passing through the digital potentiometers U1016-B&D. After the potentiometers, the signal routes to unity gain amplifier U1029-C and then to audio power amplifier U1031-B which has a gain of about 35. T1002 transforms the signal in order to drive a 500 ohm load.

The ident filter, U1017-C&D and related components, form a 1020 Hz notch filter. When the notch is enabled (front panel ident knob in), the 1020 Hz identification signal is attenuated by more than 15dB. The ident filter is disabled when the front panel ident knob is pulled out enabling the 1020 Hz signal to pass to the audio amplifiers.

4.3.3.8   VOR Converter

The KX165A has an internal VOR converter that can convert the VOR receiver composite to bearing/radial information. The nav composite signal routes to a 9960Hz bandpass filter, U1015C. The signal is "squared up" and fed to a phase-lock loop, U1003. The PLL demodulates the 9960 Hz composite in order to extract the 30 Hz reference which is then directed to the microprocessor for signal processing.

The composite signal also routes to anti-aliasing filters (lowpass filters), U1004-C&D before it is fed to the microprocessor to be converted to bearing/radial information. The lowpass filters have a 3dB bandwidth of about 1kHz.

The composite signal also is fed to U1015-A where its level is adjusted so that it can be set to drive external converters.

Table 4-2 GS/LOC FREQUENCY PAIRS VS. GS VCO FREQUENCY

LOCALIZER FREQUENCY (MHz)	GLIDESLOPE FREQUENCY (MHz)
108.1	334.7
108.15	334.55
108.30	334.10
108.35	333.95
108.50	329.90
108.55	329.75
108.70	330.50
108.75	330.35
108.90	329.30
108.95	329.15
109.10	331.40
109.15	331.25
109.30	332.00
109.35	331.85
109.50	332.60
109.55	332.45
109.70	332.20
109.75	333.05
109.90	333.80
109.95	333.65
110.10	334.40
110.15	334.25
110.30	335.00
110.35	334.85
110.50	329.60
110.55	329.45
110.70	330.20
110.75	330.05
110.90	330.80
110.95	330.65
111.10	331.70
LOCALIZER FREQUENCY (MHz)	GLIDESLOPE FREQUENCY (MHz)

111.15	331.55
111.30	332.30
111.35	332.15
111.50	332.90
111.55	332.75
111.70	333.50
111.75	333.35
111.90	331.10
111.95	330.95

4.3.4   GLIDESLOPE RECEIVER Fig 6-29

4.3.4.1   General

The Glideslope Board contains a receiver that may be tuned throughout the Glideslope frequency band of 329.15 to 335.00 MHz. The Glideslope operating frequency is paired with a selected Localizer frequency (Reference Table 4-2.). The radio selects the proper Glideslope frequency based upon the Localizer channel. Digital and analog I/O comes from the VHF Main board via a 12 pin ribbon cable. The RF input comes in externally through the antenna connection on the back of the radio. There is a rear edge card connector that is used to output analog converter signals necessary to drive an external indicator. The receiver gets its synthesizer tuning, and DC power from the VHF Main board.

4.3.4.2   Variable Gain RF Amplifier

Q6 is an N-channel depletion type dual gate MOS-FET that is the active component in the Variable Gain RF Amplifier. The RF AGC voltage is applied to one of its gates, and controls the amount of RF gain through the amplifier. The RF AGC voltage can vary from 0 to 8.5 V, resulting in a gain variation of +20 dB to -30 dB of gain. The full range of gain adjustment occurs as the input RF power varies from -90 dBm to -50dBm. A moderate amount of preselection filtering is accomplished in the tuned matching circuits of L1/C48/L5 and C49/L6/C7. C50 forms a 166MHz series resonant circuit with C48/L5. This series resonant circuit filters out the 1/2 channel frequency so that the out of band response is minimized.

4.3.4.3   13 dB Attenuator

The 13 dB RF Attenuator reduces the amount of RF power input to later stages. Reducing the signal level improves the crossmod performance of the MMIC RF Amplifier and the Mixer. Excess RF power exists because of the Mixer LO to Antenna Port reverse isolation requirement necessitating the use of the RF MMIC Amplifier.

4.3.4.4   RF MMIC Amplifier

This is a high reverse isolation silicon MMIC amplifier with a gain of 20 dB in the GS frequency band.

4.3.4.1.5   16 dB Attenuator

The 16 dB RF Attenuator reduces the amount of RF power input to the Mixer. Reducing the signal level improves the crossmod performance of the Mixer. Excess RF power exists because of the Mixer LO to Antenna Port reverse isolation requirement necessitating the use of the RF MMIC Amplifier.

4.3.4.6   Mixer

Q7 is an N-channel depletion type dual gate MOS-FET that is the active component in the Mixer. The output from the synthesizer's VCO buffer amplifier is incident upon one of the gates and serves as the LO (Local Oscillator) for the Mixer. The GS signal is incident upon the other gate, and is the RF input to the Mixer. The LO is 30 kHz below the GS signal so that a 30 kHz IF (intermediate Frequency) is generated. Conversion loss from the input RF lever to the IF power level absorbed by the IF Amplifier #1 is 13 dB. This loss is due mainly to an impedance mismatch between the Mixer and the IF Amplifier #1 causing most of the Mixer's output power to be dissipated in R2.

4.3.4.7   IF Amplifier #1

Q5 is the active device in the IF Amplifier #2. Gain at the 30 kHz IF is 30 dB.

4.3.4.8   50 kHz Low Pass Filter

This 9 pole filter has a Chebyshev response and a -6dB pass band of 50 kHz minimum. Out of band rejection is typically 60 dB at 90 kHz. Ultimate refection is greater than 70 dB.

4.3.4.9   IF Amplifier #2

Q1 is the active device in the IF Amplifier #2. Gain at the 30 kHz IF is 30 dB. This is the power gain from the power absorbed by the Amplifier #2 input to the power delivered to R10.

4.3.4.10   IF Amplifier #3

U4 is an IF VGA (Variable Gain Amplifier). Its gain is adjusted by the IF AGC amplifier. The RF VGA has more effect on receiver gain over the power range of -90 dBm to -50 dBm than the IF VGA. From -105 to -90 dBm and -50 to -33 dBm the IF VGA has more effect on overall receiver gain than the RF VGA.

4.3.4.11   IF Amplifier #4

Q2 is the active device in the IF Amplifier #4. Gain at the 30 kHz IF is 25 dB. This is the power gain from the power absorbed by the Amplifier #4 input to the power delivered to the Detector.

4.3.4.12   Detector

Q4 is the active device in the 30 kHz IF detector. Q3 supplies a temperature compensated bias for Q4. C34 and R86 form an RC filter that filters off residual 30 kHz IF but does not filter any of the 90/150 Hz composite audio.

4.3.4.13   Composite Audio Buffer Amplifier

Op-Amp U3-A is used to amplify and DC level shift the 90/150 Hz audio before it goes to the main board. C106 and R36 introduce a low pass response to filter out some of the higher frequency noise.

4.3.4.14   IF AGC Amplifier

Op-Amp U3-B is configured as an integrator and is the IF AGC Amplifier. The DC level from the Detector is used by the AGC loop to maintain a constant carrier input power into the Detector. The output of this Amplifier is connected to the IF VGA, to adjust the IF gain, and is the input to the RF AGC Amplifier. The IF AGC voltage varies from 3.6 V with no RF input, to 6 V with -33 dBm RF input.

4.3.4.15   RF AGC Amplifier

Op-Amp U3-D is the RF AGC Amplifier with a gain of 16 and an adjustable DC offset. While the RF AGC is in its linear region, it varies 16 times faster than the IF AGC. That is why the RF AGC predominates while it is active. R25 is used to set the point at which the RF AGC becomes active. This point is factory set at -87 dBm. The RF AGC voltage varies from 7.5 V with no RF input, to 0.1 V with -33 dBm RF input.

4.3.4.16   20.95 MHz Crystal Oscillator

Q8 is the active device in this common collector Synthesizer Reference Crystal Oscillator. Y1 is an AT cut crystal that is the Oscillator's frequency determining device. C66 is a variable NPO capacitor that adjusts the operating frequency of the Crystal Oscillator. Q9 is used in a buffer amplifier that increases the level of the crystal oscillator to the level needed by the Synthesizer IC U6. The buffer amplifier also provides isolation to the Crystal Oscillator.

4.3.4.17   Synthesizer

Serial Data from the Main Board is sent to program the Synthesizer IC, U6. The synthesizer compares a divided down 20.95 MHz reference with a divided down sample of the VCO output. U6 divides the reference and VCO down to 10 kHz for phase/frequency comparison. U6 is a dual modulus synthesizer, so that the VCO can be tuned in 10 kHz steps throughout the GS band. Operation is limited to the GS channels less the 30 kHz IF offset (low side injection). The range of operation is therefore 329.12 MHz to 339.97 MHz. U6 pin 5 is the synthesizer charge pump output and is used as the input to the loop filter/integrator U5-A.

4.3.4.18   LO Frequency Dither

A sample of the 10 kHz comparison frequency is taken from U6-14 and divided by 16 in U8. the resulting 625 Hz square wave is used to dither (frequency modulate) the VCO. The 625 Hz square wave is present on U8 pin 11 and is changed into a ramp waveform by the RC combination of R89 and C83. It is this ramp that varies the VCO/LO frequency at a rate of 625 Hz and a deviation of 1 kHz. Dithering eliminates the possibility of zero beat problems in the IF. This would be the case of a receiver or ground station failure causing a receive or transmit frequency error that allows the LO and RF to be only 90 Hz or 150 Hz offset.

4.3.4.19   332 MHz VCO

Q10 is the active device in this common base VCO (Voltage Controlled Oscillator). C75 is a mechanical variable capacitor that is adjusted so that the electronic tuning range is centered in the

GS frequency band. Electronic tuning is provided by varactor CR2. The tuning voltage typically ranges from 3.1 V to 4.8 V to cover the range of 329.12 MHz to 334.97 MHz. U7 is an MMIC buffer amp that increases the power level of the VCO enough to drive the synthesizer and Mixer LO.

4.3.4.20   Voltage Reference

U12 generates a stable +5 V reference voltage that is used by the converter circuitry. The Flag Driver and Indicator Driver use the +5 V reference directly. the GS Down voltage is derived from dividing the +5 V in half to +2.5 V, and is then buffered through U10. The +2.5 V is the 0 ddm reference voltage (GS Down). GS Up varies above and below this voltage to move the indicator up and down.

4.3.4.21   Flag Driver

The Main Board sends serial data to U11 to operate the flag. U11-B is in one of two states. The first state is with the flag in view, wiper connected to ground through pin 2. The second state is with flag pulled out of view, wiper connected to +5 V through pin 3.

4.3.4.22   Indicator Driver

U9, U11-D, and U11-C form the active portion of the Indicator Driver. Digital potentiometer U11-C adjusts the converter deviation. It allows the GS Up to be adjusted above or below GS Down's 2.5 V reference. the range of GS Up is 2.2 to 2.8 V (+/- 300 mV from GS Down). The 0 ddm centering voltage may be adjusted during Installation so that the Indicator's needle is centered for a received 0 ddm GS signal. Digital potentiometer U11-D adjusts the half scale deflection. The half scale deflection may be adjusted during Installation so that the indicator's needle reads half scale for a received .091 ddm GS signal.

4.3.5   CPU FUNCTION

The CPU function consists of a microprocessor, RAM, ROM, an RS-232 asynchronous serial communication port, and various discrete inputs and outputs. A general serial control bus was created using CPU discrete I/Os to permit control of serial digital devices in the system; the integrity of this bus is not effected by interrupts. The QSM serial control bus was reserved for front panel control (display and front panel buttons/knobs) to simplify system software and minimize the overhead incurred by display control. Refer to figures 6-8, the main board schematic .

4.3.5.1   CPU

The CPU is a Motorola 68HC16Z1 microprocessor, U1014, with several integrated functions. It has a CPU16 core with 1MB address space made up of sixteen 64kbyte banks, and a maximum clock speed of 16.78Mhz. A System Integration Module (SIM), provides address decoding, an interrupt controller and discrete I/Os. The Queued Serial Module (QSM) contains synchronous and asynchronous serial I/Os. A General Purpose Timer (GPT) module provides flexible timing functions and, finally, an 8 channel Analog to Digital Convertor module (ADC), U1021, provides analog inputs.

The clock provided to the processor is a crystal controlled 32.768 kHz, Y1001.

The CPU uses a 5.0 VDC precision reference, U1010, that supplies the CPU's ADC unit. There is also a 5V power monitor, U1011, which resets the system if the voltage falls below a 4.75VDC safety limit.

U1019, is a flash memory device that holds the software that controls the CPU. The flash memory allows the unit to be reprogrammed via the RS-232 port at the rear connector as software upgrades become available. U1002, U1006, U1008, and U1013 are RAM that interface to the CPU, and serve as temporary storage for the CPU operation.

4.3.5.2   Configuration EEPROM

Configuration EEPROM, U1001, contains information unique to each unit that is required for nav and com operation such as channeling, program memories, electronic tuning, and etc.

4.3.5.3 Digital Interfaces to Other Modules

There are digital logic interfaces to other assemblies of KX155A, including the com/nav receiver, com transmitter, VOR/LOC convertor, glideslope, and the front panel with the display and input devices. These lines are either discrete logic level controls or synchronous serial data lines.

Many I/O lines to these assemblies are filtered with a 330pF ceramic cap and in some cases ferrite beads (lossy inductor) or series resistors.

4.3.5.4 Discrete Interfaces

There are a few discrete logic level inputs to other instruments and equipment on the airplane. All these inputs are isolated with a 330pF ceramic capacitor, diode and PNP transistor. An optional Zener clamp can be used for lightning protection per DO-160C. This buffer should be sufficient in keeping spikes and other harmful transients from damaging digital ICs on board. An example of this type of interface can be seen at CR1021, R1249, C1223, CR1044, Q1012, R1102, R1406. These inputs go directly to microprocessor discrete inputs. Analog/power/non-TTL logic outputs are driven by transistors or FETs and are also optionally zener protected.

4.3.5.5 Analog Interfaces

The HC16 has an 8 channel ADC. However, there are 15 analog voltages to monitor. Therefore, an analog multiplexer, U1021, is used to select some of the low-speed signals (mostly voltage monitors).

Signals monitored by the CPU ADC include:

- VOR 30Hz FM
- FILTERED_NAV_COMPOSITE
- FILTERED_GLIDESLOPE_COMPOSITE
- VOR/LOC_FILTERED_STATOR_F
- VOR/LOC_FILTERED_STATOR_D
- COM_VOLUME
- NAV_VOLUME
- ANALOG_MUX_OUT which is one of the following
- PHOTOCELLTEMPERATURE
- +5V (through divider)
- -200V (through divider)
- -12V (through divider)
- +9V (through divider)
- FILTERED_11-33_VDC_POWER

Volume controls are done by applying a +5V reference across the Com and Nav volume potentiometers on the front panel then reading the wiper voltage with the ADC. The audio volume is then adjusted using digital potentiometers in the audio circuit controlled through the general serial bus.

Digital potentiometers U1016, U1028, and U1032 also adjust the level of sidetone, intercom, transmitter power, receiver noise squelch, RF AGC, and etc.

The 68HC16Z1 also has one RS232 port. This port is level-shifted to RS232 logic levels through a MAX202, U1022, converter and optionally protected by a bidirectional zener. This port can be used for the KX165A to communicate with other devices, and may be used to update software in the field.

The unit also makes available the aircraft power bus as an output that is controlled by the on/off switch. Q1044 is turned on when the Power ON* line goes low.

LOC ENERGIZE* goes low when Q1017-A is turned on; this is used to signal external equipment. Q1019 goes low in order to turn on the internal glideslope receiver.

Audio Alert* goes low in order to activate a sound device such as a sonalert or other audio annunciator.

4.3.6   POWER SUPPLY

A flyback power supply is used to supply all of the low level power requirements. It consists of a hash filter, flyback transformer, rectifier/filters, current mode controller and power switch, a post regulator for the display voltage and on-off switch circuitry.

Aircraft power is applied to the hash filter, C1208, C1209, C2140, C1266, C1282, C1288, CR1042, L1020 and L1021. These components attenuate noise coming in on the 11-33_VDC_POWER line and switching noise from the flyback regulator. CR1042 suppresses transients on the 11-33_VDC_POWER line.

The Flyback transformer consists of T1003. When Q1045 is turned on, energy is stored in the primary of T1003. This energy is dumped into the rectifier capacitors when Q1045 is turned off.

The Rectifiers/Filters consist of CR1048, C1210, C1311 and C1312 (-200V), CR1051 and C1226 (-12V), CR1059 and C1269 (+9V), and CR1058 and C1252 (+5V).

The Current Mode Controller and switch consists of U1036, Q1045 and associated components. The switching frequency of the supply is 125.0 kHz. The power supply reference frequency is 125 kHz. This 125 kHz signal is derived from a 500 kHz ceramic oscillator, Y1002, and inverter U1024. U1026 divides the 500 kHz signal down by 4 before it is fed to inverter U1007-F and then to U1036 pin 4.

R1341 and C1280 are parts external to U1036 that set the frequency of oscillation until the supply has reached proper output voltage and synchronization is provided from the digital circuitry on the Main Board. The output of the +9V rectifier is feed back to U1036 via R1295, R311 and R1312. If this voltage is higher than the reference voltage (pin 8 of U1036) the peak current of the switch (Q1045) is reduced by reducing pulse width of the drive (U1036 pin 1) to the switch thereby lowering the output voltage of the +9V rectifier. U1036 senses the peak current through the switch by monitoring the voltage across R1319 and R1320. R1345 and C1290 attenuate high frequency noise that comes from the switch and CR1067 reduces the voltage needed across R1319 and R1320 in order to reach the level required by U1036. R1314, R1316 and CR1064 limits the maximum pulse width. A soft start feature is provided by C1264. R1312, R1313 and C1278 provide compensation for the power supply feedback loop.

The on-off switch circuitry consists of two current sources and a switch, all of which are turned on by the front panel on-off switch providing a short to ground. The current sources (Q1040 and Q1041 and associated components supply current to U36 until the soft start capacitor (C264) has charged to 1.95 volts. Above this voltage U1036 pin 13 sinks current to ground turning off Q1041. Q1040 supplies enough current to drive the Q1041 current source but not so much that U1036 pin 13 cannot turn off Q1041. If all is working normally, the voltage to U1036 pin 14 will be supplied by the +9V power supply output when the soft start is complete and U1036 pin 13 turns off Q1041. If the +9V output has not reached the required regulated voltage, the soft start will begin again. This cycle will be repeated until the +9V voltage reaches the required value. If the power supply is overloaded for any reason (any of the outputs drawing too much current) the supply will continually go through the soft start cycle until the overload is removed.

4.3.7   FRONT PANEL AND DISPLAY MODULE

The front panel board has two connectors. P2011 comes from the main board and J2012 goes to the display module. The display signals that control the anode driver are DOTCLOCK (P2011-

29), COLDATA (P2011-27), and COLDATA (P2011-25). These signals are routed directly to the display connector (J2012). ROWDATA (P2011-22) and ROWCLOCK (P2011-20) are buffered by U2009-A and U2009-B respectively. The buffered signals are level shifted from 5V/GND to -178V/ -190V by Q2002 and Q2003. The level shifted signals are buffered by U2003-A, U2003-B, and U2003-C. The buffered signals then go to the display connector J2012. DISPEN (P2011-23) is level shifted from 5V/GND to -178V/-190V by Q2004. The level shifted signal is then fed to the display connector. LUMCTRL (P2011-9) is a voltage level between 0.4VDC and 1.9VDC that is used in conjunction with the duty cycle of DISPEN to control the brightness of the display. LUM-CTRL is fed through to the display connector (J2012-16).

-190VDC (P2011-1,3) is sent to the display connector and is used to generate two more voltage levels. -178V is generated using zener diode CR2001. The -190V is pre-regulated to approximately -95V by Q2005 and then the -95V is regulated to -80V by U2014. The -178V and the -80V are fed to the display connector J2012.

RBSCLK (P2011-21) and RSP3* (P2011-6) are used to clock U2011 and U2012. U2011 and U2012 are parallel to serial shift registers that are chained together. The inputs to U2011 and U2012 are tied to the pushbuttons, push-pull switches, and the optical INC/DEC switches. The state of the inputs are shifted to the main board via SDI (P2011-16). The photocell R2040 is fed to the main board via FOTOCELL (P2011-14). DS2001, DS2002, DS2003, DS2004, DS2005, and DS2006 are the bulbs used to backlight the front panel. LIGHT_GND (P2011-12,19) is always tied to ground in the lighting bus. 14V/LGND (P2011-8,11) is connected to the lighting bus if a 14V lighting bus is in use and is left open if using a 28V lighting bus. 28V/LGND (P2011-10,13) is tied to the lighting bus if a 28V lighting bus is being used and is tied to ground if a 14V lighting bus is used.

The power switch is connected to the front panel via E18 (PWRSW) and E17 (PSWLO). PWRSW is fed to the main board via P2011-7 and PSWLO is fed to the main board via P2011-15. The COM volume pot is connected to the front panel at E19 (COM HI), E20 (COM WIPER), and E5 (COM LO). The COM volume pot connections are fed to the main board connector P2011 and the setting is read by an A to D converter on the main board processor. The COM volume is then controlled by setting digital pots on the main board. The NAV volume pot is connected to the front panel at E12 (NAV HI), E13 (NAV WIPER), and E14 (NAV LO). The NAV volume pot connections are fed to the main board connector P2011 and the setting is read by an A to D converter on the main board processor. The NAV volume is then controlled by setting digital pots on the main board.

4.3.8   VOR/LOC Converter I/O Board

Refer to figure 6-26 for VOR/LOC Converter I/O board schematic.

4.3.8.1   OBS resolver interface

A 30 hertz analog signal from the main board is applied to buffer amplifier U7-C. The output of this Buffer Amplifier drives the rotor of the Indicator OBS resolver. Returning from the indicator, are the three stators of the OBS resolver. Stators E and G are connected to the Voltage reference board output. Sine and Cosine stators D and F are each connected to low pass active filters consisting of U7-B, R23, R26, R30, C38 and C36, and U7-D, R24, R27, R32, C39 and C37 respectively. These filters are anti-aliasing filters required by the Analog to Digital Converter contained on the Main Board. The main board samples these signals and calculates the setting of the OBS.

4.3.8.2   D-Bar driver

The D-Bar output of the converter is produced by continuously updating the setting of the digital pot U1-A to correspond to the required D-bar offset as determined by the VOR/LOC converter software in the main processor. The update rate is about 15 Hz. The voltage at the wiper of this digital pot is filtered with a RC time constant of about 0.84 seconds. The +RIGHT and +LEFT outputs

are driven differentially by two buffer amplifiers U4 and U6. The maximum differential voltage is set by D-Bar slope adjust digital pot U1-B. Voltage reference IC U5 outputs a fixed 2.5 Vdc. R4 and R3 divides this to 1.25 V that is applied to the non-inverting input of OP-Amp U6. The output of this circuit is the Voltage Reference board output. This output drives the +LEFT D-Bar output. The fixed 2.5Vdc output from U5 is also connected to the voltage divider formed by R15, U1-A, and R14. The wiper of U1-A this applied to the non-inverting input of U4. The output from U4 drives the +RIGHT D-Bar output.

4.3.8.3   TO/FROM driver

The +TO and +FROM outputs are driven to produce a differential output pair. Logic levels are translated into a positive difference voltage +TO relative to +FROM for "TO" indication and a negative voltage +TO relative to +FROM for "FROM" indication. Q3 and Q1 form the +TO driver, while Q4 and Q2 form the +FROM driver.

4.3.8.4   Flag driver

The +FLAG output is driven by a buffer amplifier U7 with an output resistance a 1.5 kOhm. A logic level from the main board drives the input of this buffer. The -Flag output is connected to unit ground. A high logic input produces a more positive output voltage to generate a "Hidden Flag" indication.

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SECTION V

MAINTENANCE

5.1   GENERAL INFORMATION

This section contains information on tests, alignment, inspection, cleaning, repair and troubleshooting procedures for the KX 165A.

5.1.1   STANDARD TEST SIGNAL DESCRIPTION

A.   Standard VOR Test Signal
An RF carrier, amplitude modulated simultaneously (a) 30 $\pm$ 1% by a 9960Hz subcarrier, which is in turn, frequency modulated at a deviation ratio of 16 by a 30Hz $\pm$ 1% "reference phase signal" and (b) 30 $\pm$ 1% by a 30Hz $\pm$ 1% "variable phase signal" which can be varied in phase with respect to the reference phase signal.

B.   Standard Audio Test Signal
An RF carrier amplitude modulated 30% at 1000Hz.

C.   Standard Localizer Test Signal
An RF carrier modulated simultaneously with 90Hz $\pm$ .3% and 150Hz $\pm$ .3% signals so that the sum of their separate modulation percentages equals 40 $\pm$ 2%.

D.   Standard Localizer Centering Signal
A standard localizer test signal in which the difference in depth of modulation is less than .002 (.1dB).

E.   Standard Localizer Deviation Signal
A standard localizer test signal in which the difference in depth of modulation of the 90Hz and 150Hz signal is .093 $\pm$ .002 (4 $\pm$ .1dB).

F.   Standard Glideslope Test Signal
A -56 dBm RF carrier amplitude modulated simultaneously with 90Hz and 150Hz of each level so that when each signal is applied independently, the carrier is modulated 40 $\pm$ 2%.

G.   Standard Glideslope Centering Signal
A standard glideslope test signal in which the difference in depth of modulation of the 90Hz and 150Hz signals is less than .002.

H.   Standard Glideslope Deviation Signal
A standard glideslope test signal in which the difference in depth of modulation of the 90Hz and 150Hz signals is 0.091 $\pm$ .002 (2 $\pm$ .1dB).

NOTES:

1. All RF voltages are in dBm which implies NO 6 dB attenuator is used between the unit under test and the RF signal generator.

2. A standard modulator test signal is a .2VRMS, 1KHz tone, circuit with the network shown in Figure 5-3 measured at the mic audio input.

3. Maximum load driving capabilities are as follows:

Table 5-1 Maximum Load Driving Capacity

G/S Flag	5-1000 ohm loads
G/S D-Bar	5-1000 ohm loads
Audio Output	500 ohm load
To-From	3-200 ohm loads
VOR/LOC D-BAR	5-1000 ohm loads
VOR/LOC Flag	5-1000 ohm loads

4. Audio amplifier speaker output 4 ohms.

5. ≥ Means greater than or equal

5.2   TEST AND ALIGNMENT

5.2.1   TEST EQUIPMENT

The following test equipment or equivalent is required to properly align and test the KX 165A. All test equipment must be calibrated before attempting alignment.

A.   Power Supply:

Sorenson SRL 40-6 (27.5V @ 8 amps) or equivalent

B.   RF Signal Generator:

HP8656B or NAV 2000

C.   Audio Signal Generator:

HP 200CD Wide Range Oscillator or equivalent

D.   Digital Multimeter:

Fluke 8000A or equivalent

E.   RF Wattmeter:

Bird Model 611 or equivalent

F. Frequency Counter:

HP 53181 with 010 option timebase or equivalent counter with 1 PPM or better accuracy.

G. Audio Distortion Analyzer

HP 8903B or equivalent

H. Oscilloscope:

Tektronix Model 465 or equivalent

I. Linear Detector:

See **Figure 5-4**, for details

J. VOR/ILS Audio Signal Generator (If not included as part of the RF Generator) :

TIC Model T-20A or equivalent

K. Modulation Analyzer (optional)
HP8901B or equivalent

L. Attenuator
Narda 30dB, 30W

M. KX 155A/165A Test Harness, Shop Fabricated From Bench Test Harness Kit P/N 050-03379-0000 which contains:

Part Number	Description	Quantity
030-01107-0078	Terminal Conn 78T2	
030-00101-0002	Connector	3
030-01094-0088	Conn 25 Pos	1
030-01094-0060	Conn 18 Pos	2

N. Precision Track Selector:

Collins Model 479V-3 or equivalent (Consult Service Memo 105)
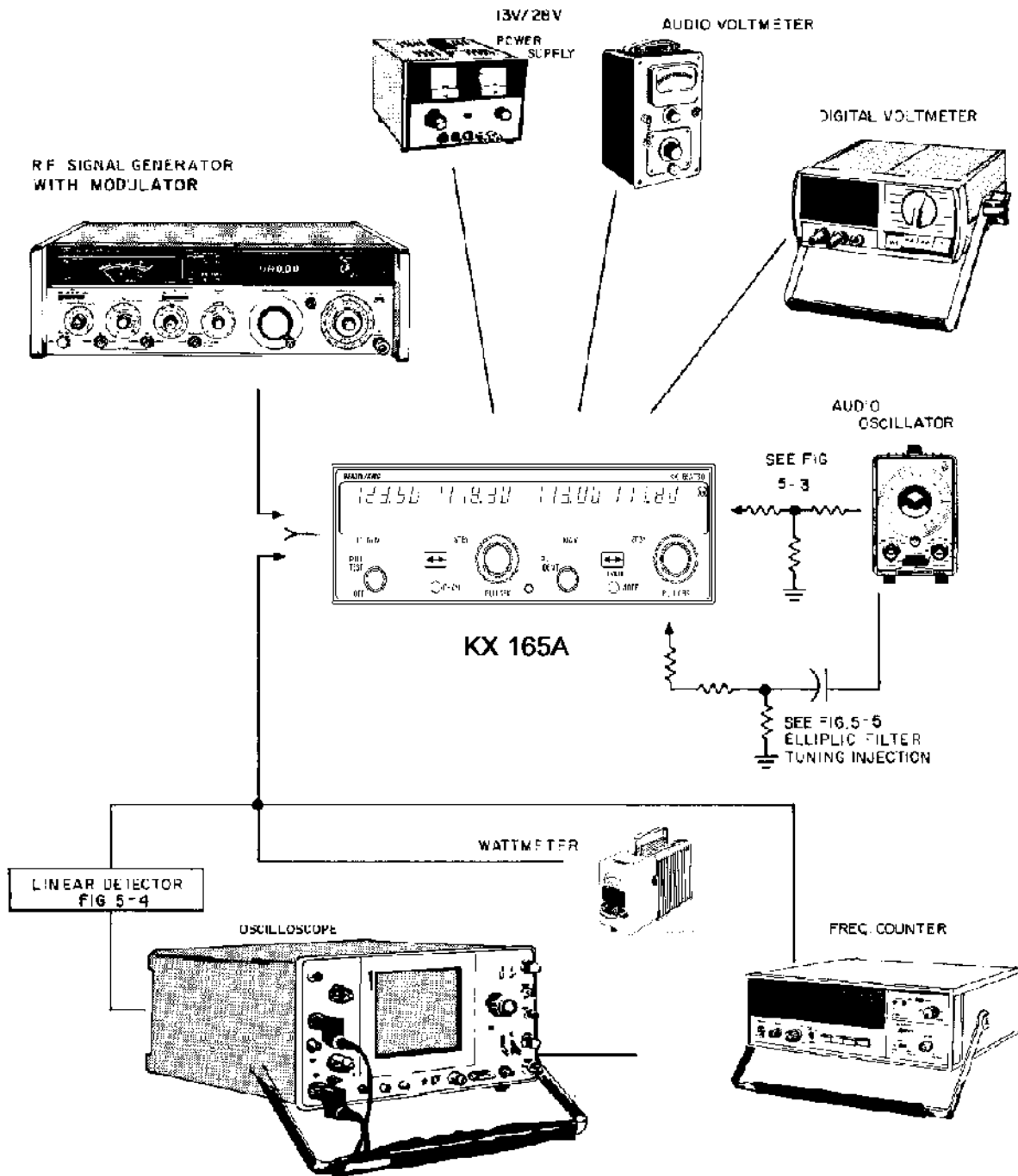
FIGURE 5-1 TYPICAL TEST EQUIPMENT SETUP

NOTES:

1. DME TUNING TO KN 62A, KN 64, KDI 572, KDI 574.

2. THIS TEST HARNESS CAN BE CONSTRUCTED AS ONE CABLE WITH THREE RADIO CONNECTORS. 1–P155A1, 1–P155A2 AND 1–P165A2. THE P155A1 CONNECTOR IS USED ON ALL UNITS AND P155A2 IS USED ON THE KX155A UNIT AND THE P165A2 IS USED ON THE KX165A UNIT.

3. BENCH TEST HARNESS KIT 050–03309–0000.

4. SERIAL OBI OUTPUT TO DRIVE KI 229, KNI 582 OR KDA 692

5. A/C POWER AND GND TO BE 2–18 AWG WIRES IN PARALLEL

6. WHEN TESTING KX155A'S, SHOP TEST PANEL SHOULD NOT LOAD NAV AND COMM 500 OHM AUDIO P155A1, PINS 9 AND 10. THE LOADS ARE PROVIDED BY THE AUDIO BOARD.

7. 15 VDC SOURCE IS REQUIRED ONLY TO CONDUCT COMM RECEIVER SELECTIVITY TESTS.

8. THIS IS PROVISION FOR LOADING OF SOFTWARE UPDATES INTO THE KX155A. TYPICALLY THESE LINES SHOULD INTERFACE TO THE SERIAL PORT OF AN IBM COMPATIBLE PC COMPUTER.

* INDICATES ACTIVE LOW

SHOP FABRICATED TEST PANEL

P155A1

Pin	Signal
25	LIGHTING 28V
24	LIGHTING 14V
Z	RS 232 IN
Y	RS 232 OUT
C	TEST
B	
19	
W	COMM REMOTE TRANSFER
23	CHANNEL REMOTE INCREMENT
A	A/C GROUND
21	
20	
X	
22	AUDIO ALERT
E	OBI CLOCK
4	OBI SYNC
C	OBI DATA
3	DME CLOCK
5	DME DATA
F	RNAV/CHAN REQUEST
A	RNAV MODE
D	DME COMMON
15	#18 AWG, A/C GROUND
S	#18 AWG, A/C GROUND
J	COMM IF AGC/TRANSMIT INTERLOCK
7	NAV IF AGC
1	COMM DETECTED AUDIO
14	#18 AWG, 14 VDC, A/C PWR (SEE NOTE 5)
R	#18 AWG, 14 VDC, A/C PWR
13	#18 AWG, 28 VDC, A/C PWR (SEE NOTE 5)
P	#18 AWG, 28 VDC, A/C PWR
8	LOC ENERGIZE
H	VOR/LOC COMPOSITE OUT
12	#20 AWG, SWITCHED POWER OUT
N	
11	
M	
6	COMM MIC KEY
2	COMM MIC AUDIO
B	INTERCOM MIC
L	NAV AUD LO
10	NAV AUD OUT
K	COMM/AUDIO/SIDETONE/INTERCOM LO
9	COMM/AUDIO/SIDETONE/INTERCOM OUT

15 VDC Ground Reference (SEE NOTE 7)
+15 VDC (SEE NOTE 7)
100 kΩ ½W
10A
(SEE NOTE 8)
(SEE NOTE 4)
(SEE NOTE 1)
(OPTIONAL)
(SEE NOTE 6)

VOR/LOC ANTENNA   RG 58 A/U   031–00101–0002

COMM ANTENNA   RG 58 A/U   031–00101–0002

GS ANTENNA   RG 58 OR RG 316   031–00101–0002

FIGURE 5-2 BENCH TEST HARNESS (SHEET 1 OF 2)

P165A2

KX 165A		SHOP FABRICATED TEST PANEL
V	GLIDESLOPE IF AGC	
S	GS + UP	
T	GS + DOWN	
U	GS + FLAG	
R	GS - FLAG	
5	+ RIGHT	
K	+ LEFT	
B	NAV FLAG +	
1	NAV FLAG -	
9	+ FROM	
H	+ TO	
11	OBS RESOLVER H	
2	OBS RESOLVER C	
C	OBS RESOLVER D	
10	OBS RESOLVER E	
3	OBS RESOLVER F	
L	OBS RESOLVER G	

Figure 5-2 Bench Test Harness
(Sheet 2 of 2)

5.2.2 UNIT LEVEL ALIGNMENT

Most adjustments of the transceiver can be aligned from the front panel. Before placing the radio in alignment mode, leave the radio in the Com and Nav Active Entry mode before turning off the radio. To place the unit in the alignment mode, ground Pin C_ of P155A1, depress CHAN while turning the unit on and hold until the display shows "ALGN" on the Nav side of the display. Each line below represents a page that can be accessed, by pushing the MODE button. The list of possible adjustments are shown in order below. The only adjustments that cannot be made via the front panel are Ident Bandstop Filter Adjust, R1096, VOR PLL ADJUST, R1008 and R1009 on the main board and R6024 (intercom mic gain) and R6046 (speaker power) on the audio board, as well as Nav preselector adjustments (C3303, C3220, C3236, C3252, and C3305) and Nav first IF filter adjustments (L3033 and L3034). Also most GS ADJUSTMENTS ARE MANUAL.

A chart (Table 5-4) suitable for photocopying is provided for recording the alignment settings for a given S/N KX 165A.

Table 5-2 Pages accessed by Mode button

Adjustment	Mne-monic	Freq	Seq	Min	Max	De-fault	Address	Assy
Minimum Display Brightness	BRIM		0	0	255	20	168	main
Photocell Offset	PHOT		0	-99	99	0	166	main
Photocell Calibration	PHOF		0	-99	99	0	167	main
Sidetone Level	SIDE	127.6	0	0	255	127	169	main
Intercom	INTC	127.5	0	0	255	127	170	main
RX Compressor Disable	RDIS		0	0	1	0	171	main
VOR Centering offset	VORC	113.5	0	-99	99	0	172	main
LOC Centering offset	LOCC	111.7	0	-99	99	0	173	main
Glide Slope Centering offset	GSC	111.7	0	-99	99	0	228	main
Comm VCO alignment	CVCO	127.5	0	0	63	32	20	receiver
VOR/LOC Composite Level	COMP	111.7	0	0	255	127	4	main
Nav VCO Alignment	NVCO	113.5	0	0	63	20	8	receiver
*Power Supply Voltage	PSV		0	0	27	0	183	main
Temperature offset	TOFF	-50	0	-99	99	0	168	receiver
Comm Preselector tuning	CPRS	118.10	1	0	63	18	49	receiver
Comm Preselector tuning	CPRS	118.10	2	0	63	18	50	receiver
Comm Preselector tuning	CPRS	118.10	3	0	63	18	51	receiver
Comm Preselector tuning	CPRS	118.10	4	0	63	13	52	receiver
Comm Preselector tuning	CPRS	122.75	1	0	63	0	53	receiver
Comm Preselector tuning	CPRS	122.75	2	0	63	0	54	receiver
Comm Preselector tuning	CPRS	122.75	3	0	63	0	55	receiver

Adjustment	Mne-monic	Freq	Seq	Min	Max	De-fault	Address	Assy
Comm Preselector tuning	CPS	122.75	4	0	63	0	56	receiver
Comm. Preselector tuning	CPRS	127.50	1	0	63	32	57	receiver
Comm Preselector tuning	CPRS	127.50	2	0	63	32	58	receiver
Adjustment	Mne-monic	Freq	Seq	Min	Max	De-fault	Address	Assy
Comm Preselector tuning	CPRS	127.50	3	0	63	32	59	receiver
Comm Preselector tuning	CPRS	127.50	4	0	63	28	60	receiver
Comm Preselector tuning	CPRS	132.25	1	0	63	0	61	receiver
Comm Preselector tuning	CPRS	132.25	2	0	63	0	62	receiver
Comm Preselector tuning	CPRS	132.25	3	0	63	0	63	receiver
Comm Preselector tuning	CPRS	132.25	4	0	63	0	64	receiver
Comm Preselector tuning	CPRS	136.97	1	0	63	47	65	receiver
Comm Preselector tuning	CPRS	136.97	2	0	63	47	66	receiver
Comm Preselector tuning	CPRS	136.97	3	0	63	47	67	receiver
Comm Preselector tuning	CPRS	136.97	4	0	63	42	68	receiver
NAV RF AGC Threshold	NRAG	113.50	0	0	68	63	5	receiver
COM S/N Squelch	SNSQ	127.50	0	0	63	63	14	receiver
COM S/N Squelch (8.33 kHz)	SNS8	127.5	0	0	63	63	224	receiver
Comm RF AGC Threshold	CRAG	127.50	0	0	63	63	23	receiver
RX Reference Frequency	REF	127.50	0	0	63	40	35	receiver
IF Filter	IFLT	127.50	1	0	63	32	73	receiver
IF Filter	IFLT	127.50	2	0	63	32	74	receiver
Transmitter power set at 10w	TPWR	118.00	1	0	255	148	174	main
Transmitter power set at 10w	TPWR	127.60	2	0	255	141	175	main
Transmitter power set at 10w	TPWR	136.80	3	0	255	137	176	main
Comm Mic Gain at 10w	MIC	118.00	1	0	255	38	177	main
Comm Mic Gain at 10w	MIC	127.60	2	0	255	22	178	main
Comm Mic Gain at 10w	MIC	136.80	3	0	255	16	179	main
Compressor threshold at 10w	COMT	118.00	1	0	255	3	180	main
Compressor threshold at 10w	COMT	127.60	2	0	255	15	181	main
Compressor threshold at 10w	COMT	136.80	3	0	255	23	182	main
Carrier Fade*	FADE	118.00	1	0	255	127	184	main

Carrier Fade*	FADE	127.60	2	0	255	127	185	main
Carrier Fade*	FADE	136.80	3	0	255	127	186	main
Transmitter power set at 5w	TPW5	118.00	1	0	255	84	187	main
Transmitter power set at 5w	TPW5	127.60	2	0	255	81	188	main
Transmitter power set at 5w	TPW5	136.80	3	0	255	79	189	main
Comm Mic Gain at 5w	MIC5	118.00	1	0	255	20	190	main
Comm Mic Gain at 5w	MIC5	127.60	2	0	255	14	191	main
Comm Mic Gain at 5w	MIC5	136.80	3	0	255	9	192	main
Compressor threshold at 5w	CMT5	118.00	1	0	255	17	193	main
Compressor threshold at 5w	CMT5	127.60	2	0	255	24	194	main
Compressor threshold at 5w	CMT5	136.80	3	0	255	31	195	main
Transmitter power set at 2w	TPW2	118.00	1	0	255	35	196	main
Transmitter power set at 2w	TPW2	127.60	2	0	255	33	197	main
Transmitter power set at 2w	TPW2	136.80	3	0	255	31	198	main
Adjustment	Mne-monic	Freq	Seq	Min	Max	De-fault	Address	Assy
Comm Mic Gain at 2w	MIC2	118.00	1	0	255	12	199	main
Comm Mic Gain at 2w	MIC2	127.60	2	0	255	9	200	main
Comm Mic Gain at 2w	MIC2	136.80	3	0	255	5	201	main
Compressor threshold at 2w	CMT2	118.00	1	0	255	27	202	main
Compressor threshold at 2w	CMT2	127.60	2	0	255	32	203	main
Compressor threshold at 2w	CMT2	136.80	3	0	255	37	204	main
Transmitter Ambient offset	TAOS		0	-99	99	-20	205	main
VOR/LOC Converter Offset	VLCO	111.7	0	-64	64	0	206	main
VOR/LOC Converter Offset	VLCW	111.7	0	0	255	127	207	main
GS Centering offset	GSCO	333.5	0	-99	99	0	226	main
**GS Converter Course Width	GSCW	333.5	0	0	255	127	227	main

* Not used. Reserved for special functions.

5.2.2.1   Display

5.2.2.1.1   Display Brightness

Sets the minimum brightness level of display.

>   1.   Go to the BRIM page.
>
>   2.   Adjust the Nav INC/DEC knob to achieve the desired brightness during minimum ambient light, i.e. completely darkened cockpit.

5.2.2.1.2   Photo Cell

Automatically calibrates the photo cell for specific brightness over varying ambient light conditions from one radio to another. Requires a calibrated light source of 40 footlamberts. **PHOT IS NOT RECOMMENDED FOR ALIGNMENT IN THE FIELD.** Instead use the Photo Cell Offset adjustment which is described below.

5.2.2.1.3   Photo Cell Offset

Manually calibrates photo cell for specific brightness over varying ambient light conditions from one radio to another. This can be used to adjust the display brightness to match other units in the airplane avionics panel.

>   1.   Go to the PHOF page
>
>   2.   Use Nav inner tuning knob to adjust brightness to desired level.

5.2.2.2   Communication Receiver Alignment

5.2.2.2.1   Reference Oscillator

Prior to making this adjustment, allow the unit to stabilize at room temperature with the unit turned off.

>   1.   Connect comm antenna to a frequency counter through appropriate attenuator. Turn the unit on and key the transmitter to read frequency at 127.500 MHz.
>
>   NOTE: If the frequency is in error by more than 122 Hz, enter the alignment mode.
>
>   2.   For radios lacking the 8.33 kHz option:
>
>   Go to REF page and adjust frequency using the NAV inc/dec knobs until the transmit frequency is within 127.500000 MHz $\pm$ 122 Hz.
>
>   For radios with the 8.33 kHz option:
>
>   Adjust the TCXO located on the COM/VOR Receiver board until the transmit frequency is 127.500000 MHz ± 122 Hz.

5.2.2.2.2   COM VCO

5.2.2.2.2.1   Radios lacking the 8.33 kHz option.

>   1.   Tune COM Receiver to 136.900MHz with the unit out of the alignment mode.
>
>   2.   Monitor the DC voltage at TP3003 (or P3001-12). It should be 8.4 +0.1/-0.4 V.
>
>   3.   If adjustment is necessary, enter the alignment mode and go to the CVCO page. Using the Nav inc/dec knobs, increase the value if the voltage at TP 3003 was too

high or decrease the value if the voltage at TP3003 was too low. Repeat steps 1 and 2.

Note: While in the CVCO alignment page, the frequency is limited to 127.5 MHz. In order to observe the effects of this adjustment at the other frequencies, it is necessary to exit the alignment mode by turning the unit off and back on again.

4.   Tune the receiver to 118.0 MHz and depress MIC KEY, P155A1-6 on the rear connector to engage TX mode. Caution: connect a dummy load to the Com antenna connector.

5.   Check that the tuning voltage is not less than 2.4 V. Select the value of C129 as required. If necessary, readjust the voltage upward to as high as 8.7 V max at 136.900 MHz RX, to ensure that it remains above 2.4 V min at 118 MHz TX. Do not exceed 8.50 V tuning voltage on any unit which has a 9 V line voltage (measured at P3001-17) of less than 9.1 V.

5.2.2.2.2   Radios having the 8.33 kHz option

1.   Tune COM Receiver to 136.900MHz.

2.   Monitor the DC voltage at TP3 (or P3001-12).

3.   Adjust C146 for 8.4 +.1/-.4 V tuning at TP3.

4.   Tune the receiver to 118.0 MHz and depress MIC KEY, P155A1-6 on the rear connector to engage TX mode. Caution: connect a dummy load to the Com antenna connector.

5.   Check that the tuning voltage is not less than 2.4 V. If necessary, readjust C146 tuning voltage upward to as high as 8.7 V max. at 136.9000 MHz RX, to ensure that it remains above 2.4 V min at 118 MHz TX. If it is necessary to increase the 136.900 MHz RX tuning voltage above 8.5 V, temporarily lower the 9 V live voltage down to 9.0 V (measured at P3001-17), and ensure that the Com synthesizer remains locked.

6.   Perform this step only if a component in the Q3015 circuit has been changed. Disconnect P4005 from J3005. Terminate the transmitter (P155A3) into 50 ohms. Monitor the level at J3005 when in the transmit mode at 127.5 MHz. Make this measurement with either a 50 ohm spectrum analyzer or a milliwattmeter preceded by an appropriate lowpass filter to exclude the effects of the harmonic energy. Select R3095, if necessary, to provide +15.5 dBm ±1 dB.

5.2.2.2.3   COM RF Preselector and IF Filter Alignment

NOTE: These steps are performed with the unit in the alignment mode.

1.   Monitor the DC RF AGC voltage on P3003-2. Ensure that the COM preselector cover is in place.

2.   Set the receiver frequency to 118.1 MHz receiver. Apply an input signal at the receiver input (J3006) at a frequency of 118.1 MHz. Adjust the input level such that an AGC voltage of NMT 1.5 V is observed.

3.   Sequentially adjust the CPRS1, CPRS2, CPRS3 and CPRS4 for maximum AGC voltage. Reduce the input level as required to keep the AGC voltage less than 1.5 V. Repeat this sequence as required until no further improvement is noted.

4.   Repeat the above steps at frequencies of 127.5 MHz and 136.9 MHz. (Frequencies 122.75 and 132.75 MHz are not programmed).

5.

For radios lacking the 8.33 kHz option:

Advance to the first IFLT page. Apply a 127.50MHz -50 dBm, FM signal sine wave modulated with 30 kHz peak deviation at a 100 Hz rate to the COM antenna input. Do not readjust signal generator power level. Monitor U3015-18 using a scope probe and oscilloscope. Set scope for .2 msec/div. and external trigger on the sine wave modulation generator. Adjust the Nav inc/dec knobs in each of the two IFLT pages so that the 21.4 MHz envelope is at a maximum flat response.

For radios having the 8.33 kHz option:

a.   Put the KX165A into alignment mode and push the NAV Mode button until the 'CRAG' page appears. Note the setting of 'CRAG' and then turn the Nav Channel knob until 'CRAG' is at 62.

b.   Turn the unit off and then back on. Tune the KX165A to either 127.500 to tune the wide crystal filters or 127.505 to tune the narrow. Only tune the filter that has been modified, and only tune the side of the filter (input or output) that has been modified. Leave all others at the factory setting.

c.   Apply a -45dBm rf signal at 127.500MHz to the Com antenna input. FM this signal at 30kHz peak deviation at a 30Hz rate.

d.   Monitor E13 on the IF filter board (200-09709-XXXX) with a scope probe and oscilloscope. Set the oscilloscope for 1ms/div and external trigger on the 30Hz sinewave modulation generator.

e.   Adjust either C35 or C36 of the wide filter or C33 or C34 of the Narrow filter for maximum amplitude with minimum ripple. Only adjust the capacitor on the side of the filter where a component was replaced. Capacitors on both sides of the filter will need to be readjusted if the crystal filter has been replaced.

f.   Remove the FM from the signal generator and adjust the rf power to -70dBm.

g.   Measure IF AGC at P3002 pin 3 using a DVM.

h.   Manually adjust the rf frequency ±2.7kHz (narrow) or ±8kHz (wide) in 300Hz steps. Ensure that the peak to peak voltage change of the IF AGC is less than 12mV. If necessary, readjust the trim capacitor(s).

i.   Re-enter alignment mode and return 'CRAG' to its original value.

5.2.2.2.4   COM RF AGC Alignment

NOTE: The Com RF AGC also sets the carrier-squelch threshold.

1.   Ensure that the Com preselector cover is in place. Tune the COM Receiver to 127.500 MHz. Note the Com RF AGC voltage on P3003-2 with no input signal applied to the receiver.

2.   Adjust the Signal Generator to 127.500 MHz with a level of -67 dBm 30% AM modulated with 1 kHz and apply the signal to the Com receiver.

3.   Continue to monitor the Com RF AGC voltage on P3003-2.

4.   Adjust the Nav inc/dec knobs so that CRAG value decreases until the RF AGC voltage drops to at least 0.5 V less than the voltage observed with no input signal.

5.   Increase the input level to +6dBm and monitor the Comm audio output at P3002-1. Ensure the audio signal is not noticeably distorted. If necessary, readjust the COM-AGC up to 2 steps in either direction to minimize distortion with the +6 dBm input.

5.2.2.2.5   COM RF Squelch Alignment

1.   Advance to the SNSQ page.

2.   Set Signal Generator to 127.500MHz, 1KHz 30% AM with a power level of -106dBm.

3.   Monitor the COM Audio at TP3001 (P3002-A) with an oscilloscope.

4.

      For radios lacking the 8.33 kHz option:

      Adjust Nav inc/dec knobs so that SNSQ opens at -106dBm.

      For radios having the 8.33 kHz option:

      Adjust Nav inc/dec knobs so that SNS8 opens at -106 dBm.

5.2.2.3   Navigation Receiver Alignment

5.2.2.3.1   NAV VCO

1.   Tune NAV Receiver to 117.950MHz with the unit out of the alignment mode.

2.   Monitor the DC voltage at TP3008 (or P3001-26). It should be 7.25 V +1.0/-0.75 V.

3.   If adjustment is necessary, enter the alignment mode and go to the NVCO page. Using the Nav inc/dec knobs, increase the value if the voltage at TP3008 was too high or decrease the value if the voltage at TP3008 was too low. Repeat steps 1 and 2.

NOTE: While in the NVCO alignment page, the frequency is limited to 113.5 MHz.
In order to observe the effects of this adjustment at the other frequencies, it is necessary exit the alignment mode by turning the unit off and back on again.

4.   Tune the NAV Receiver to 108.05MHz.

5.   Verify TP3008 voltage is not less than 3.0V. If it is not, adjust NVCO so that the 117.950MHz and 108.050MHz can be tuned while maintaining a maximum of 8.25 V and a minimum of 3.0 V.

5.2.2.3.2   NAV RF Preselector Alignment

NOTE: These steps are performed with the unit out of the alignment mode.

1.   Monitor the DC IF AGC voltage at TP3007 (or P3001-28) using a DVM.   Ground
        TP3022, TP3024, TP3026, and TP3028 (grounding can be done by placing a blob
        of solder between each of these testpoints and an adjacent grounded testpoints).
        Set signal generator for +10dBm power level initially. Signal Generator power level
        should be varied as necessary to keep the TP3007 AGC voltage between 1.2 and
        1.6V.

2.   Tune NAV receiver to 110.70 MHz. Apply a 110.70 MHz signal from a signal gen-
        erator to the NAV antenna input. Adjust C303 (Pole 1) for a maximum voltage at
        TP3007.

3.   Tune NAV receiver to 109.80 MHz. Apply a 109.80 MHz signal from a signal gen-
        erator to the NAV antenna input. Disconnect TP22 ground jumper and connect
        TP3020 ground jumper. Adjust C220 (Pole 2) for a maximum voltage at TP3007.

4.   Tune NAV receiver to 112.20 MHz. Apply a 112.20 MHz signal from a signal gen-
        erator to the NAV antenna input. Disconnect TP3024 ground jumper and connect
        TP3022 ground jumper. Adjust C326 (pole 3) for a maximum voltage at TP3007.

5.   Tune NAV receiver to 113.00 MHz. Apply a 113.00 MHz signal from a signal gen-
        erator to the NAV antenna input. Disconnect TP3026 ground jumper and connect
        TP3024 ground jumper. Adjust C252 (Pole 4) for a maximum voltage at TP3007.

6.   Tune NAV receiver to 113.80 MHz. Apply a 113.80 MHz signal from a signal gen-
        erator to the NAV antenna input. Disconnect TP3028 ground jumper and connect
        TP3026 ground jumper. Adjust C305 (Pole 5) for a maximum voltage at TP3007.

7.   Remove all ground jumpers.

5.2.2.3.3.   NAV IF Filter Alignment

1.   Tune NAV receiver to 113.50MHz. Apply a 113.50MHz, -50 dBm, FM signal sine
        wave modulated with 30 KHz peak deviation at a 30 Hz rate to the NAV antenna in-
        put.

2.   Monitor TP3030 (Q3035 collector) using a scope probe and oscilloscope. Set scope
        for 1msec/div and external trigger on the sine wave modulation generator. Adjust
        L3033 and L3034 so that the 20.5MHz envelope is at a maximum flat response.

5.2.2.3.4   NAV RF AGC Alignment

1.   In the alignment mode, advance to the NRAG page. Apply a -70 dBm, 113.50 MHz
        , 30 % modulated at 1kHz, input signal and adjust NRAG for 0 +/- 0.35VDC at
        P3001-29.   Increase the input level to +6 dBm and monitor the composite output
        (P3001-24) on a scope.   Ensure that the 1 kHz signal is not noticeably distorted.

5.2.2.3.5   PLL (This is a manual adjustment located on the main board)

1.   Attach a frequency counter to TP1001.

2. Use test leads or some other suitable means to short TP1004 to TP1002. When properly shorted, the output signal will be a very stable reading on the frequency counter.

3. Adjust potentiometer R1007 for an output frequency of 8930 Hz +/- 160 Hz.

4. Remove the short between TP1004 and TP1002. Short TP1004 to TP1003.

5. Adjust potentiometer R1008 for an output frequency of 11360 Hz +/- 250 Hz.

5.2.2.3.6   VOR converter

1. GO to VORC page and inject a standard VOR test signal with 0 degree "from" at 113.50MHz, -73 dBm.

2. Push the Nav Frequency Transfer button. The Unit display will flash as the calibration is performed automatically.

5.2.2.3.7   LOC converter

5.2.2.3.7.1   Centering offset correction.

1. Go to the VLCO page.

2. Monitor the voltage between +LEFT and +RIGHT (P165A2-J and P165A2-5) with a DVM set to show Volts to 4 decimal places.

3. Adjust VLCO using the NAV inc/dec knobs to achieve a reading of 0.0000 V ± 0.0002 V.

5.2.2.3.7.2   Course width correction.

1. Go to the VLCW page.

2. Adjust VLCW using the NAV inc/dec knobs to achieve a reading of 0.1500 V ± 0.0002 V.

5.2.2.3.7.3   Centering

1. Go to LOC C page and inject a standard LOC centering signal at 111.70 MHz, -73dBm.

2. Push the Nav Frequency Transfer button. The Unit display will flash as the calibration is performed automatically.

5.2.2.3.8   VOR/LOC Composite Level

1. Apply a standard localizer centering signal with the 90 Hz component removed at 111.7MHz, -73dBm to the NAV antenna.

2. Monitor the composite level at P155A1pin H with an rms voltmeter.

3. Adjust COMP using the NAV inc/dec knobs so that the composite level is NLT 0.267 VRMS and NMT 0.277 VRMS.

5.2.2.3.9   Ident (This is a manual adjustment located on the main board)

    1.   Input a standard VOR test signal with modulation of 1020Hz, -73dBm at 30%.

    2.   Push in the ident switch.

    3.   Adjust R1096 for a minimum audio output. Requirement is 15 dB of attenuation minimum with ident switch out vs in.

5.2.2.4   Comm Transmitter

NOTE:The unit is in the alignment mode for all transmitter alignment steps.

5.2.2.4.1   Power and Modulation

    1.   In the 10 watt ALIGN page, set output power for 10.8 to 11.2 watts at 118, 127.6, and 136.8 MHz with no modulation by adjusting TPWR.

    2.   With audio input of 150 ± 10 mVrms @ 1kHz sinewave and COMPRESOR pot, COMT, set to 0, adjust modulation for NLT 90% and NMT 95% at 118, 127.6, and 136.8 MHz by adjusting MIC.

    3.   Raise audio input level to 500 ± 10 mVrms. Adjust COMPRESSOR pot, COMT, for NLT 78% but NMT 82% modulation at 118, 127.6, and 136.8 MHz.

    4.   In the 5 watt ALIGN page, set output power for 10.8 to 11.2 watts at 118, 127.6, and 136.8 MHz with no modulation by adjusting TPW5.

    5.   With audio input of 150 ± 10 mVrms @ 1 kHz sinewave and COMPRESSOR pot, CMT5, set to 0, adjust modulation for NLT 90% and NMT 95% at 118, 127.6, and 136.8 MHz by adjusting MIC5.

    6.   Raise the audio input level to 500 ±10 mVrms. Adjust COMPRESSOR pot, CMT5, for NLT 78% but NMT 82% modulation at 118, 127.6, and 136.8 MHz.

    7.   In the 2 watt ALIGN page, set output power for 4 ± 0.5 watts at 118, 127.6, and 136.8 MHz with no modulation.

    8.   With audio input of 150 ± 10 mVrms @ 1 kHz sinewave and COMPRESSOR pot, CMT2, set to 0, adjust modulation for NLT 90% and NMT 95% at 118, 127.6, and 136.8 MHz by adjusting MIC2.

    9.   Raise audio input level to 500 ± 10 mVrms. Adjust COMPRESSOR pot, CMT2, for NLT 78% but NMT 82% modulation at 118, 127.6, and 136.8 MHz.

    10.   Verify that the temperature offset TOFF has been set properly (typical value is 0). Set Transmitter Ambient Offset TAOS to -7 for units with glideslope, -4 for units without glideslope.

5.2.2.4.2   Sidetone Level

    1.   Go to the SIDE page

    2.   Input a 200mVrms, 1kHz tone into the COMM MIC AUDIO INPUT P165A1-2. See Figure 5-3.

3.   Place the unit into transmit by grounding MIC KEY, P165A1-6.

4.   Monitor the audio level out of COMM AUDIO/SIDETONE/INTERCOM OUT, P165A1-9.

5.   Adjust Nav frequency knobs for NLT 1.3VRMS and NMT 1.5VRMS.

5.2.2.4.3   Intercom

1.   Go to INTC page

2.   Input a 100mVrms, 1kHz tone into the INTERCOM MIC P165A1-B.

3.   Monitor the audio level out of COMM AUDIO/SIDETONE/INTERCOM OUT, P165A1-9.

4.   Adjust Nav inc/dec knobs for NLT 7.07 Vrms

5.2.2.5   Glideslope Receiver Alignment

R25 fully CCW

5.2.2.5.1   Reference Crystal Oscillator

1.Monitor TP9 using a counter.

2.Adjust C66 so that the frequency is 20.950 MHz $\pm$20 Hz.

5.2.2.5.2   VCO Adjustment

1.Channel the NAV receiver to 109.3 MHz(332 MHz GS channel, 331.970 GS LO frequency).

2.Monitor the DC voltage at TP3.

3.Adjust C75 for 4.0 $\pm$ 0.1 V.

5.2.2.5.3   RF Front End Alignment

1.Channel the NAV receiver to 109.3 MHz(332 MHz GS channel, 331.970 GS LO frequency).

2.Monitor TP6 with a DVM having 1 mV resolution.

3.Apply a 332 MHz RF input at -87 dBm.

4.Adjust L5, L6, and L13 to maximize the voltage at TP6. If necessary, increase the RF input power so that TP6 voltage changes can be seen when adjusting L5, L6, and L13. Reduce input power to -87 dBm for final adjustment.

5.2.2.5.4   RF AGC Adjustment

1.Channel the NAV receiver to 109.3 MHz (332 MHz GS channel, 331.970 GS LO frequency).

2.Input a -87 dBm signal at 332 MHz.

3. Monitor TP6 with a DVM having 1 mV resolution.

4. Adjust R25 so that the voltage at TP6 drops 0.05 ± 0.01 V.

5.2.2.5.5   Convertor Width and Centering Adjustment

1. Monitor the voltage between the GS UP and GS DOWN pins (P2-15 and 16) with a DVM having at least 1 mV resolution.

2. Go to the GSCO Alignment page.

3. Adjust GSCO for 0.0 ±1 mV.

4. Go to the GSCW Alignment page.

5. Adjust GSCW for 150 ± 1 mW.

5.2.2.5.6   Glideslope Receiver Centering Alignment

1. Go to the GSC Alignment page.

2. Connect a -76 dBm, 0.00 ddm, 333.5 MHz Glideslope signal to the antenna port.

3. Press the timer button to start the alignment.

4. When the display stops flashing, a number should be visible. If "--" is displayed, the alignment was not good and must be repeated.

Table 5-3 Alignment Data

Parameter	Value
Min. Display Brightness (BRIM)	
Photocell Offset (PHOT)	
Photocell Calibration (PHOF)	
Sidetone Level (SIDE)	
Intercom (INTC)	
RX Compressor Disable (RDIS)	
VOR Centering offset (VORC)	
LOC Centering offset (LOCC)	
Glide Slope Centering offset (GSC)	
Comm VCO alignment (CVCO)	
VOR/LOC Composite Level	
Nav VCO Alignment (NVCO)	
Power Supply Voltage (PSV)	
Temperature offset (TOFF)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning (CPRS)	
Comm Preselector tuning CPRS	
Comm. Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	

Table 5-3 Alignment Data

Parameter	Value
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
Comm Preselector tuning CPRS	
NAV RF AGC Threshold NRAG	
COM S/N Squelch (25 kHz) SNSQ	
COM S/N Squelch (8.33 kHz) SNS8	
Comm RF AGC Threshold CRAG	
RX Reference Frequency REF	
IF Filter (Comm) IFLT	
IF Filter (Comm) IFLT	
Transmitter power set at 10w TPWR	
Transmitter power set at 10wTPWR	
Transmitter power set at 10wTPWR	
Comm Mic Gain at 10w MIC	
Comm Mic Gain at 10w MIC	
Comm Mic Gain at 10w MIC	
Compressor threshold at 10w (COMT)	
Compressor threshold at 10w (COMT)	
Compressor threshold at 10w (COMT)	
Carrier Fade (FADE)	
Carrier Fade (FADE)	
Carrier Fade (FADE)	
Transmitter power set at 5w TPW5	
Transmitter power set at 5w TPW5	
Transmitter power set at 5w TPW5	
Comm Mic Gain at 5w MIC5	

Table 5-3 Alignment Data

Parameter	Value
Comm Mic Gain at 5w MIC5	
Comm Mic Gain at 5w MIC5	
Compressor threshold at 5w CMT5	
Compressor threshold at 5w CMT5	
Compressor threshold at 5w CMT5	
Transmitter power set at 2w TPW2	
Transmitter power set at 2w TPW2	
Transmitter power set at 2w TPW2	
Comm Mic Gain at 2w MIC2	
Comm Mic Gain at 2w MIC2	
Comm Mic Gain at 2w MIC2	
Compressor threshold at 2w CMT2	
Compressor threshold at 2w CMT2	
Compressor threshold at 2w CMT2	
Transmitter Ambient offset TAOS	
VOR/LOC Converter Offset (VLCO)	
VOR/LOC Converter Width (VLCW)	
GS Centering offset GSCO	
GS Converter Course Width GSCW	

5.2.3   FINAL TEST PROCEDURE

The following test is provided to aid the technician in locating troubled areas within the radio.

The test is directed in two ways:

A.   A test before any troubleshooting work is accomplished.

B.   As a complete return to service test after any troubleshooting has been ac-
     complished.

To use the test in step A, accomplish and verify only those steps on the Test Data Sheet indicated by an asterisk. Complete all the steps before any maintenance is performed. This will help in determining the overall problem with the radio.

To use the test in step B, perform all the steps on the Test Data Sheet.

TEST DATA SHEET

SERIAL NUMBER _____

A. CONTROL FUNCTIONS AND FREQUENCY ERROR

NOTE

The term "OK" indicates that a particular function is
operating properly.

1. **Transmitter Frequency Error:**

The unit must have been turned off for at least one hour and allowed to stabilize at room
temperature (22 ±2°C) immediately prior to testing. The frequency counter accuracy must
be 1 ppm or better.

When transmitting at 126.50 MHz, the frequency error shall be NMT ±122 Hz

_____ Hz error

** When transmitting at 126.510 MHz, the frequency error shall be NMT ±122 Hz
(relative to 126.50833 MHz).

_____Hz error

If alignment is required, see paragraph 5.2.2.2.1.

2. **Display:** _____ OK

3. **Transfer Switches**

NAV: _____ OK (Switches from an active to standby freq.)

COMM: _____ OK (Switches from an active to standby freq.)

4. **Frequency Controls:**

Increment Decrement
Roll over Characteristics   Roll under Characteristics
COMM MHz (136 to 118 MHz)   (118 MHz to 136 MHz) _____ OK
COMM MHz (.975 to .000 kHz)   (.000 kHz to .975 kHz)   _____OK
**COMM MHz (.990 to .000 kHz)   (.000 kHz to .990 kHz)   _____OK
NAV MHz (117 to 108MHz)   (108 MHz to 117 MHz)   _____OK
NAV kHz (.95 to .00 kHz)   (.00 kHz to .95 kHz)   _____OK

5. **Memory:** _____ OK

>   When the unit is turned "OFF" and then back "ON" that the last active and stand-by frequencies entered are displayed.

6. **25 kHz Switch:** _____ OK (pull out Comm Inc/Dec inner knob)

>   **5.a 8.33 kHz Switch: _____ OK (pull out Comm Inc/Dec inner knob)

7. **Mode Switch**

>   With normal active and standby frequency displayed, press mode button once.
>
>   CDI readout _____ OK (Flag indication will be present if no signal is present)
>
>   Press mode button
>
>   TO (bearing readout) _____ OK ("TO" and 3 horizontal bars displayed if no sig-nal is present)
>
>   Press mode button
>
>   FROM (radial readout) _____ OK ("FR" and 3 horizontal bars displayed if no signal is present)
>
>   Press mode button
>
>   Elapsed timer readout _____ OK

8. **Channel button**

>   Press channel button
>
>   Channel # _____ OK (Channel # disappears after 5 seconds)

9. **Unit Current**

>   In receive mode: _____ NMT 0.6 A at 27.5 VDC
>
>   In transmit mode: _____ NMT 4.0 A at 27.5 VDC

>   ** ADDITIONAL data required for 8.33 kHz capable radios

TEST DATA SHEET

B. COMM RECEIVER

*1 **Receiver Sensitivity:**

Input a -107 dBm standard audio test signal into the unit. Disable the squelch by pulling the volume control knob out. Disable the audio compressor by entering the alignment mode (see sec 5.2.2) and setting RDIS to 1. (After completing the test, enable the receiver compressor by setting RDIS to 0.) Monitor receiver audio while switching modulation off.

    a.   S+N/N: 118.000 MHz   _____NLT 6dB

                  **118.010 MHz   _____NLT 6dB

                  126.50 MHz   _____NLT 6dB

                  126.510 MHz   _____NLT 6dB

                  136.95 MHz   _____NLT 6dB

                  136.990 MHz   _____NLT 6dB

    b.   Quieting _____NLT 25dB S+N/N (test at 126.500 MHz)

Input a -73 dBm standard audio test signal into the unit. Disable the receiver compressor by entering alignment mode (see sec. 5.2.2) and setting RDIS to 1. (After completing the test, enable the receiver compressor by setting RDIS to 0.) Monitor receiver audio and remove modulation.

2. **AGC Characteristics:** _____NMT 3dB

With the unit set to 126.5 MHz monitor the receiver audio output. Vary the input from -99 dBm to -27 dBm.

TEST DATA SHEET

3. **Selectivity:**

Using the AGC voltage produced by a -103 dBm standard signal reference, measure and record the frequencies which reproduce the AGC REF voltage at 6 dB and 60 dB above the reference input. To measure the relative AGC voltage it is necessary to provide a 100 kΩ pullup resistor from P155A1 pin J to +15 VDC.

     a.   6 dB Bandwidth:

126.5 MHz: **126.510 MHz:

         _____ V REF Voltage   _____ V REF Voltage

Above _____ ≥ 126.5089 MHz   Above _____ ≥ 126.5173 MHz

Below _____ ≤ 126.4911MHz   Below _____ ≤ 126.4994 MHz

     b.   60 dB Bandwidth:

Above _____ ≤ 126.522 MHz   Above _____ ≤ 126.5313 MHz

Below _____ ≥ 126.478 MHz   Below _____ ≥ 126.4854 MHz

4. **Volume Gain Control:** Min _____ 20mV Max. _____ NLT 7.07V across 500 ohm

5. **Audio Distortion:** 350 Hz = _____ (15% Max) 1 kHz = _____ (15% Max)
2.5 kHz = _____ (15% Max)

Input a -73 dBm 85% modulated signal between 350 Hz and 2500 Hz. (This is an optional test that requires a distortion analyzer)

6. **Audio Response:** 350 Hz = _____ NMT 6dB down 1 kHz = 0 dB
2.5 kHz = _____ NMT 6 dB down.

Input a standard -73 dBm signal into the unit. Disable the compressor. (See compressor disable in section 5.2.2). Monitor the receiver output as the modulation frequency is varied.

TEST DATA SHEET

7. **Compressor:** _____ NMT $\pm$ 3 dB

Input a standard -73 dBm signal into the unit. Monitor the Audio Output level, noting the variation in level as the percent of modulation is varied from 30% to 85%.

*8. **Squelch:**

a.   Set the unit at 126.50 MHz.

b.   Noise Squelch set to open at -107 dBm $\pm$ 6 dB and to close at NMT 6 dB below the squelch opening.

c.   Noise Squelch _____ OK.

d.   With the unit set to 126.50 MHz input a 8 kHz 85% modulated signal into the unit. The Carrier Squelch is to open between -97.5 dBm and -85.1 dBm.

e.   Carrier Squelch _____ OK

8. **Squelch:

a.   Set the unit at 126.510 MHz.

b.   Noise Squelch set to open at -107 dBm $\pm$ 6 dB and to close at NMT 6 dB below the squelch opening.

c.   Noise Squelch _____ OK.

d.   With the unit set to 126.510 MHz input a 8 kHz 85% modulated signal into the unit. The Carrier Squelch is to open between -97.5 dBm and -85.1 dBm.

e.   Carrier Squelch _____ OK

C. **TRANSMITTER**

*1. **Power Out:**

Connect a wattmeter to the antenna output and record the following unmodulated values.

Set DC voltage to   27.5 VDC @ Pin 13 & P _____

118.00 MHz _____ 10 Watts min. 126.50 MHz _____ 10 Watts min.
136.97 MHz _____ 10 Watts min.

Difference between highest and lowest reading _____ 2 W max.

TEST DATA SHEET

2. **Modulation Capabilities:**

Input a standard modulator test signal into the microphone audio. See Figure 5-3. The transmitter output should go to either a modulation analyzer or oscilloscope. Ensure that the transmitter is terminated into a 50Ω load capable of dissipating at least 15W.

*a.   118.00 MHz: _____ NLT 70%
        126.50 MHz: _____ NLT 70%
         136.97 MHz: _____ NLT 70%

b.   **Carrier Noise Level:**

Modulate the carrier with 70% at 1000 Hz. Noise on the carrier with modulation removed shall be NLT (use linear detector shown in Figure 5-4):

118 MHz _____ > 35 dB
126.5 MHz _____ > 35 dB
136.95 MHz _____ > 35 dB

c.   Demodulated Audio Distortion. This is an optional test that requires a distortion analyzer and the linear detector shown in fig 5-4

Distortion

350 Hz _____ ≤15%
1 kHz   _____ ≤15%
2.5 kHz _____ ≤15%

d.   **Headphone Sidetone:**

Input a 1000 Hz, tone into the microphone audio and adjust its level to produce 70% mod. Make sure the NAV volume control is set fully counter-clockwise. Monitor the Comm Audio output (loaded with 500Ω). Go to alignment mode and adjust SIDE from minimum (000) to maximum (256).

_____ 0.003 Volts (Min)
_____ 7.07 Volts (Max.)(Measured with 500 Ohm load)
_____ Set SIDE for 1.40 V at end of test.

TEST DATA SHEET

D. NAVIGATION RECEIVER (VOR)

*1. **VOR Flag Sensitivity:**

Input a standard Nav signal at -107 dBm. In the internal CDI mode (Ref fig. 3-4) monitor the flag.

<u>Frequency</u>	"Flag" not displayed
108.00	_____ OK
114.90	_____ OK
117.95	_____ OK

* 2. **RF Sensitivity:**

Input a -107 dBm standard audio test signal to any channel. Monitor the receiver audio while switching modulation off.

<u>Frequency</u>	<u>S + N/N</u>
108.00	_____6 dB min
114.90	_____6 dB min
117.95	_____6 dB min

TEST DATA SHEET

3. **Quieting:**

Input a standard audio signal at -73 dBm. Monitor receiver and remove modulation.

112.5 MHz: _____ dB (S+N/N NLT 20 dB)

4. **Selectivity:**

Using the AGC voltage product by a -93 dBm 112.5 MHz RF signal as a reference monitor and record the frequencies which reproduce the AGC REF voltage at 6 dB and 60 dB above the reference input.

112.5 MHz: _____ V REF AGC Voltage

Upper 6dB _____ $\geq$ 112.516

Lower 6dB _____ $\leq$ 112.484

Upper 60dB _____ $\leq$ 112.542 Max.

Lower 60dB _____ $\geq$ 112.458 Min.

TEST DATA SHEET

5. **VOR Indication**

   Input a -73 dBm standard VOR signal into the unit.

   *A.   **Course Accuracy:** (Internal course deviation Indicator)

   Set the internal OBS to the respective heading in the
   VOR CDI mode (Ref fig 3-2)

Radial (Degrees)	Bearing Error D-Bar (0.67°)* Max.
0° from	_____
120°	_____
240°	_____
270°	_____

   *(within 1 increment from center position)

   B.   **Course Accuracy:** (External Indicator Converter if installed)

   Set external PTS to the respective heading. Mea-
   sure voltage at D-Bar output.

Radial (Degrees)	Bearing Error D-Bar (2°) Max.
0° from	_____
90°	_____
180°	_____
270°	_____

TEST DATA SHEET

C. **VOR deflection** (internal CDI)

Set the generator to the 0° from radial. Note a centered VOR deflection. Change the units OBS setting to that indicated below and confirm the deviation indicated.

OBS 350°   _____ Deviation output within 1 increment of full scale right.

OBS 10°   _____ Deviation output within 1 increment of full scale left.

D. **Digital VOR Bearing**

Observe the bearing radial in the VOR Bearing mode (Ref. fig. 3-5; TO indication) and in the VOR Radial mode (Ref. fig. 3-7; FROM indication).

ERROR LESS THAN 2°

RADIAL	BEARING DISPLAY (TO)	RADIAL DISPLAY (FROM)
0°	_____	_____
30°	_____	_____
60°	_____	_____
90°	_____	_____
180°	_____	_____
270°	_____	_____

TEST DATA SHEET

E.   **VOR Alarm signal (Internal Display)**

Input a standard VOR signal into the unit, with the modulation modified as follows:

1.   In the VOR CDI mode (Ref fig. 3-4):

Ref. only applied   _____ "Flag" Displayed

Var. only applied   _____ "Flag" Displayed

2.   In the VOR Bearing mode (Ref. fig. 3-6):

Ref only Applied   _____ 3 dashes displayed

Var only Applied   _____ 3 dashes displayed

VOR Alarm signal (External Indicator drive)

Input a standard VOR signal into the unit and measure the voltage across the Flag outputs (with positive lead of voltmeter connected to +Flag), with the modulation modified as follows:

Ref. only applied   _____ NMT 125 mV

Var. only applied   _____ NMT 125 mV

VOR TO/FROM Flag (External Indicator drive)

Set the PTS to the 0 degree heading. Signal Generator set to respective FROM radial. Measure voltage across TO/FROM output. Positive lead of voltage connected to +TO output.

75 degree   _____ NMT -270 mV & NLT -900 mV

285 degree   _____ NMT -270 mV & NLT -900 mV

255 degree   _____ NMT +270 mV & NLT 900 mV

105 degree   _____ NMT +270 mV & NLT -900 mV

6. **AGC**

Vary the input from -99dBm to -27dBm with a standard audio test signal. Monitor the receiver output.

112.5 MHz: Audio level variation _____ dB (3dB Max)

Vary the input from -99dBm to -27dBm with a standard VOR test signal. Monitor the CDI with the OBS set to 0.

Bearing Variation _____ ($0.67°$ max[1] at 0 "FROM" radial, internal indicator)

Note1: (within 1 increment from center position).

*7. **NAV Audio Output:** _____ VRMS (7.07 VRMS Min - into a 500Ω load)

Input a -73dBm standard audio signal into the unit. Adjust the volume control to full clockwise.

8. **Minimum NAV Audio Output:** _____ VRMS (.02 VRMS Max - into a 500Ω load)

Input a -73dBm standard audio into the unit. Adjust the volume control to full counterclockwise.

9. **Audio Frequency Response:**

Input a -73 dBm RF signal into the unit with the volume knob at the 12 o'clock position. Monitor the Audio Output level as the modulation frequency is varied.

1kHz   Ref. 0 dB

350 kHz   _____ dB (6dB Max)

2500kHz   _____ dB (6dB Max)

10. **Voice/Ident:** _____ dB (15 dB Min)

Input a -73dBm 30% mod at 1020 Hz into the unit. Monitor receiver audio level while pulling ident filter switch.

E. **LOCALIZER RECEIVER**

1. **LOC Centering**

Input a standard -73 dBm LOC signal into the unit with a 0.000 ddm.

Internal CDI position _____ Within 1 increment of center position.

External Indicator drive _____ Voltage across D-Bar outputs NGT ±5mV

2. **LOC Deflection**

TEST DATA SHEET

Tone Ratio	Deflection Polarity		Internal CDI		External Indicator Drive Positive voltmeter lead Connected to +RIGHT
0.093 ddm (+4 dB) 150 Hz predominant	Left	____	Indicator within 3rd bar left of center	____	-90 ±6.3 mV
0.093 ddm (+4 dB) 90 Hz predominant	Right	____	Indicator within 3rd bar right of center	____	+90 ± 6.3 mV

3. **LOC Alarm**

Input a standard -73 dBm LOC signal into the unit with a 0.000 ddm modified as follows:

        a.   Standard Composite Signal

Internal Display   _____ "FLAG" not displayed

External Indicator drive   _____ Voltage across Flag outputs. Positive lead connected to +FLAG output. NLT 350mV & NMT 900mV

        b.   90 Hz only on composite

Internal Display   _____ "FLAG" displayed

External Indicator drive   _____ Voltage across Flag outputs. Positive lead connected to +FLAG output. NMT 125mV

        c.   150 Hz only on composite

Internal Display   _____ "FLAG" displayed

External Indicator drive   _____ Voltage across Flag outputs. Positive lead connected to +FLAG output. NMT 125mV

4. **LOC Composite Level**

Input a standard LOC centering signal at -53 dBm RF level with the 90 Hz tone turned off.

        Composite Level Set: _____ VACRMS (.272 ±0.005)

TEST DATA SHEET

F. GLIDESLOPE RECEIVER/CONVERTER

Input a standard GS deviation signal into the unit. Monitor flag for 190 mV or greater.

*1. Sensitivity:

329.15 MHz (108.95)_____ -87 dBm max

332.00 MHz (109.30)_____ -87 dBm max

335.30 MHz (110.30)_____ -87 dBm max

2. Selectivity:

Find RF level that produces 1/2 flag. Increase the RF level by 6 or 60 dB. Vary frequency until 1/2 flag occurs and record frequency.

Upper 6 dB Frequency_____ ($\geq$ 332.020 MHz)

Lower 6 dB Frequency_____ ($\leq$ 331.980 MHz)

Upper 60 dB Frequency_____ ($\leq$ 332.145 MHz)

Lower 60 dB Frequency_____ ($\geq$ 331.855 MHz)

3. Centering:

Input a -56 dBm, 0.000 ddm signal into the unit. Monitor the D-Bar.

332.00 MHz (109.3) _____ μA ($\pm$10 μA)

4. Deflection:

150 Hz Predominant (+2dB or 0.091 ddm)

332.00 MHz (109.30) -56 dBm RF level _____ μA (78 $\pm$10 μA)

90 Hz Predominant (2 dB or 0.091 ddm)

330.0 MHz (109.30) -56 dBm RF level _____ μA (78 $\pm$10 μA)

5. Flag Current:

RF Signal Absent _____ μA (125 μA max)

90 Hz Absent: _____ μA (125 μA max)

150 Hz Absent: _____ μA (125 μA max)

Standard Signal _____ μA NLT 260 μA
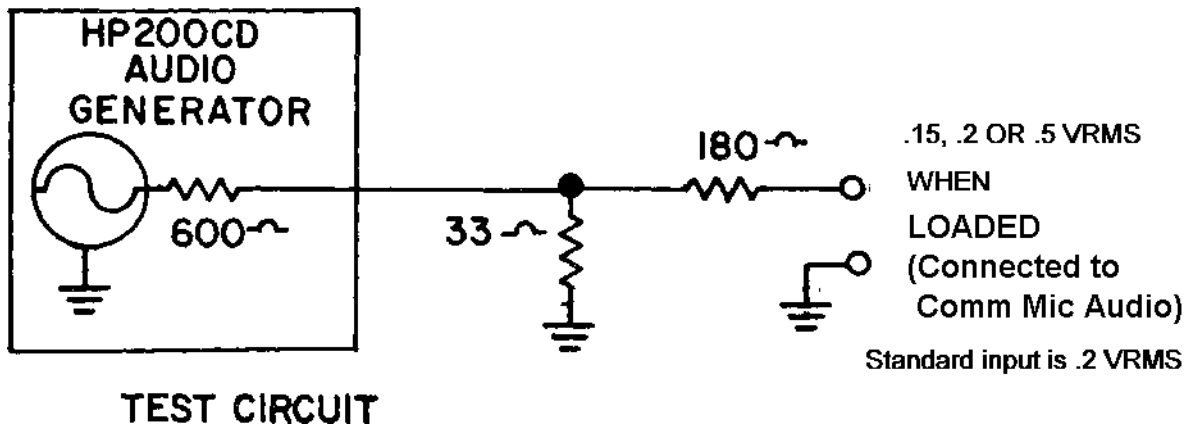
Figure 5-3 audio injection circuit
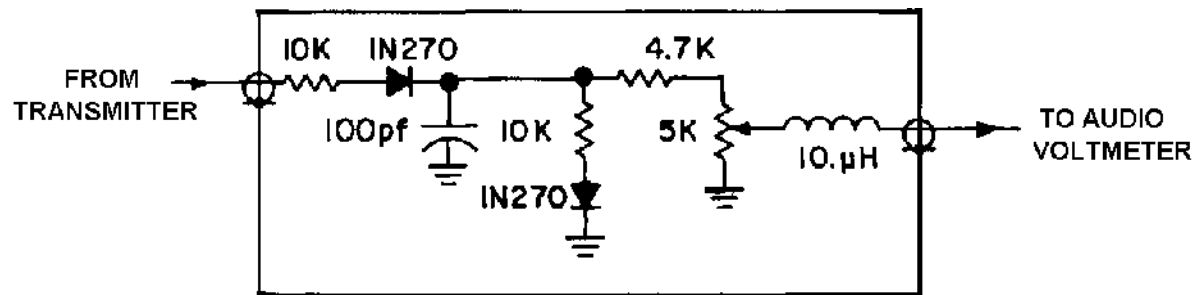
Figure 5-4 linear detector
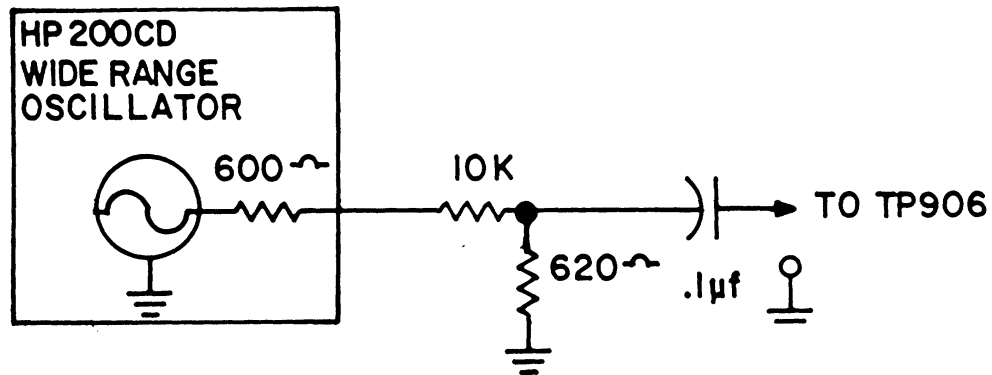
Figure 5-5 Elliptic Filter Tuning Injection Circuit

5.3   OVERHAUL

5.3.1   VISUAL INSPECTION

This section contains instructions to assist in determining, by inspection, the condition of KX 155A assemblies. Defects resulting from wear, physical damage, deterioration, or other causes can be found by these inspection procedures. To aid inspection, detailed procedures are arranged in alphabetical order.

A.   Capacitors, Fixed

Inspect capacitors for case damage, body damage, and cracked, broken, or charred insulation. Check for loose, broken, or corroded terminal studs, lugs or leads. Inspect for loose, broken, or improperly soldered connections.

B.   Capacitors, Variable

Inspect trimmers for chipped and cracked bodies, damaged dielectrics and damaged contacts.

C.   Chassis

Inspect the chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors, damaged fastener devices, loose or missing hardware, component corrosion, and damage to the finish.

D.   Connectors

Inspect connectors for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Also, check for corroded or damaged plating on contacts and for loose, improperly soldered, broken, or corroded terminal connections.

E.   Covers and Shields

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Also, check for damaged fastener devices, corrosion and damage to finish.

G.   Insulators

Inspect insulators for evidence of damage, such as broken or chipped edges, burned areas, and presence of foreign matter.

H.   Jacks

Inspect all jacks for corrosion, rust, deformations, loose or broken parts, cracked insulation, bad contacts, or other irregularities.

I.   Potentiometers

Inspect all potentiometers for evidence of damage or loose terminals, cracked insulation or other irregularities.

K.   Resistors, Fixed

Inspect the fixed resistors for cracked, broken, blistered, or charred bodies and loose, broken, or improperly soldered connections.

L.   RF Coils

Inspect all RF coils for broken leads, loose mountings, and loose, improperly soldered, or broken terminal connections. Check for crushed, scratched, cut or charred windings. Inspect the windings, leads, terminals and connections for corrosion or physical damage. Check for physical damage to forms and tuning slug adjustment screws.

M.   Terminal Connections Soldered

1.   Inspect for cold-soldered or resin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using the points of a tool.

2.   Examine the terminals for excess solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other components.

3.   Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at the terminal. Check for insulation that is stripped back too far from the terminal.

4.   Inspect for corrosion at the terminal.

N.   Transformers

1.   Inspect for signs of excessive heating, physical damage to case, cracked or broken insulation, and other abnormal conditions.

2.   Inspect for corroded, poorly soldered, or loose connecting leads or terminals.

O.   Wiring/Coaxial Cable

Inspect open and laced wiring of chassis, subassembly chassis and parts of equipment for breaks in insulation, conductor breaks, cut or broken lacing and improper dress in relation to adjacent wiring or chassis.

5.3.2   CLEANING

A.   Using a clean, lint-free cloth lightly moistened with a regular cleaning detergent, remove the foreign matter from the equipment case and unit front panels. Wipe dry using a clean, dry, lint-free cloth.

B.   Using a hand controlled dry air jet (not more than 15psi), blow the dust from inaccessible areas. Care should be taken to prevent damage by the air blast.

C.   Clean the receptacles and plugs with a hand controlled dry air jet (not more than 25psi), and a clean, lint-free cloth lightly moistened with an approved cleaning solvent. Wipe dry with a clean, dry, lint-free cloth.

5.3.3   REPAIR

This section describes the procedure along with any special techniques for replacing damaged or defective components.

A.   Connectors

When replacing a connector, refer to the appropriate PC board assembly drawing and follow notes to insure correct mounting and mating of each connector.

B.   Crystal

The use of other than a Honeywell crystal is considered an unauthorized modification.

C.   Wiring/Coaxial Cable

When repairing a wire that has broken from its terminal, remove all old solder and pieces of wire from the terminal, restrip the wire to the necessary length and resolder the wire to the terminal. Replace a damaged wire or coax with one of the same type, size and length.

D.   Transmitter Repair

No provision is made for component level troubleshooting on the Transmitter Board. When such work is necessary the radio should be returned to the factory.

5.3.4   KX 165A DISASSEMBLY

5.3.4.1 Removal of the Top Cover

A.   Remove the two (2) screws (See Figure 6-2) from the top surface of the unit.

B.   Remove the two screws on each side (4 total) that secure the top cover side wall tabs to the base casting.

C.   Lift the top cover and place the top cover along side the base assembly while maintaining the Glideslope Receiver Assembly ribbon cable and Converter Board cable connection to the Main Board.

D.   Remove the 2 foam EMI gaskets.

5.3.4.2   Removal of the Front Bezel Assembly

A.   Remove the two screws on each side of the front bezel (4 total) that secure the front bezel assembly to the base assembly.

B.   Disconnect the header connector P2011 by pulling the bezel assembly straight out from the base assembly.

5.3.4.3   Removal of the Front Panel Board

A.   Remove the front bezel assembly.

B.   Surface mount components located on the Front Panel Board can now be accessed. Continue the disassembly process to access the frequency switches, volume potentiometers, contact switches, light bulbs and the display assembly.

C.   Break the adhesive bond that secures the 'c' retaining clip at the end of each frequency knob shaft. Remove both retaining clips. Reinstallation will require applying adhesive to secure the clips.

D.   Remove both knob shafts and the outer frequency knobs.

E.   Loosen the volume knob set screw on each knob and remove both knobs.

F.   Remove the two (2) screws that secure the Front Panel Board to the front bezel located to the right of each frequency switch body.

G.   Remove the two (2) screws that secure the display heat sink to the front bezel located outboard of the Front Panel Board.

H.   Remove the joined Front Panel Board / display module from the front bezel.

I.   Remove the two (2) screws that secure the Front Panel Board to the display module standoffs located at upper corners of the Front Panel Board.

J.   Disconnect the socket connector J2012 to separate the Front Panel Board from the display module.

K.   The entire display module is a vendor supplied item. Honeywell does not maintain Driver Board service components -- only the complete display module.

5.3.4.4 Removal of the Converter Board

A.   Remove the top cover (paragraph 5.3.4.1)

B.   Disconnect cable connectors P4008 & P4009 from the Main Board.D.

C.   Remove the screw from the top of the cover which holds the Converter Board (Figure 6-24) .

D.   Depress the locking clip tabs on the outside of the Top cover to release the clip. Rotate the clip toward the Converter Board and lift to remove .

E.   Lift and remove the Converter Board.

5.3.4.5 Removal of the Glideslope Receiver Assembly

A.   Remove the top cover (paragraph 5.3.4.1).

B.   Disconnect the ribbon cable connector P5010 from the Main Board.

C.   Remove the four (6) screws from the top cover that secures the Glideslope Receiver to the cover. See Figure 6-24

D.   Remove the PC board from the glideslope casting by removing the (15) retaining screws.

NOTE: Most components may be accessed without removing the G/S assembly.
To access components, remove the 15 screws holding the cover to the casting and remove the casting.

5.3.4.6 Removal of the Main Board

A.   Remove the top cover (paragraph 5.3.4.1).

B.   Remove the front bezel assembly (paragraph 5.3.4.2).

C.   Disconnect the Transmitter Filter Board cable connector P4004 from the Main Board.

D.   Disconnect the Converter board cables P4008 AND P4009 from the Main Board.

E.   Remove the two (2) screws from the base casting side wall securing the power supply transistor heatsink.

F.   Remove the hex standoff located at the rear of the Main Board.

G.   Remove the ten (10) screws that secure the PC board to the base casting. One of these screws also attaches the audio filter board.

H.   Disengage the Main / RECEIVER BOARD header connections with slight fore - aft upward rocking motions until the Main Board works free.

5.3.4.7   Removal of the Bottom Cover

A.   Remove the eleven (11) screws from the bottom cover.

B.   Remove the bottom cover.

5.3.4.8   Removal of the Comm / Nav RECEIVER BOARD

A.   Remove the bottom cover (paragraph 5.3.4.7).

B.   Disconnect P4005 and P4006 from the RECEIVER BOARD.

C.   Desolder the Nav preselector lid to gain access to the P155A4 BNC connector. De-
        solder the Nav amp fence from the connector body. Desolder L3043 from the con-
        nector terminal.

D.   Remove the Main Board (paragraph 5.3.4.6).

E.   Remove the four (4) screws that secure the forward edge of the inner chassis. They
        are located on the bottom surface of the base casting.

F.   Remove the Receiver Board and inner shield from the top side of the base casting.

G.   Detach the inner shield from the Receiver Board by gently pulling the two apart.

5.3.4.9 Removal of the Transmitter Board

A.   Remove the top cover (paragraph 5.3.4.1)

B.   Remove the Main Board (paragraph 5.3.4.6).

C.   Remove the Receiver Board. (paragraph 5.3.4.8)

D.   Peel off the power suply insulator from the transmitter cavity lid. Avoid tension on
        the P4004 cable wires to prevent damage.

E.   Remove the five (5) screws securing the cavity lid to the base casting side wall and
        the three (3) screws securing the top of the lid. Remove the cavity lid.

F.   Remove the four (4) screws that secure Q4006 and Q4005. The screws for Q4005
        have a reduced head diameter to prevent grounding the device leads.

G.   Remove the two (2) screws and three (3) stand-offs that secure the PC board.

H.   Desolder the buss wire grounding the P155A3 BNC connector body. Reflow the PC
        board / connector terminal solder connection while unscrewing the connector from
        the base casting. Remove the connector.

I.   Guide the P4005 and P4006 coax cables up and out of their cavity side wass slots
        without breaking the solder connection to the grounding clip. Heat the center con-
        ductor of the P165A3 BNC connector until the solder flows and lift the Transmitter
        Board out of the cavity.

5.4   SOFTWARE UPDATES

Required equipment

>   An Application Image Diskette containing the software updates. The proper
>   version of the software will be described in the latest software bulletin.

>   A service shop supplied serial cable to connect to the KX155A RS232 pins and
>   to the COM MIC Key pin as shown in figure 5-2.

>   IBM compatible PC with a serial output port. A small number of disk drives are
>   incompatible with the Application Image Diskette. If your computer is unable
>   to read the diskette another computer/drive will be required.

Instructions:

>   1. Connect the KX155A to the Shop Fabricated Test Panel as shown in figure 5-2.

>   2. Apply power to the unit, but do not turn the unit on.

>   3. Connect the RS232 of the PC to the RS232 pins of the KX155A.

>   4. Insert the Application Image Diskette inot the floppy drive (assumed to be drive A:) of the
>   computer.

>   5. From the DOS prompt (Not a DOS shell underneath Windows), type a:\pcloader <enter>.
>   If the computer displays a message such as "disk may be corrupted", "incorrect disk
>   - insert disk", or "diskette compatibility error" then the computer's drive is incompatible
>   with the diskette.

>   6. Key (ground) the Com Mic key pin.

>   7. Turn on the unit.

>   8. Upon completion a blue bar will appear across the screen.

>   9. Check that the latest software version is displayed in the pilot configuration pages. this
>   is done by pressing and holding the Nav Mode button for more than 2 seconds, and
>   then pressing the Nav Transfer button for an additional 2 seconds while still holding
>   the Mode button. The software version is annunciated by "SWRV."

Proper loading of the application software requires previous loading of Boot software to the
KX155A. If the application software does not load properly the KX155A needs to be factory ser-
viced.

NOTE
The remaining pages in this section contain test volt-
ages and waveforms for various points on the main
board, the RECEIVER BOARD and the glideslope
board.

TABLE 5.5 KX 155A Mainboard Voltage Measurements

POINT	VDC	TEST CONDITIONS*	SHT	DESCRIPTION
U10 pin 6	5.0	Rx, Normal Operation	1	5 V Reference
U34 pin 1	3.0	Rx, Normal Operation	1	Temperature
CR101 cathode	8.2	Rx or Tx, Normal Operation	3	Mic Compressor Supply Voltage
CR62 anode/ C270	2.5 to 6 typ	Tx with normal microphone input signal	3	Mic Compressor Control Voltage
J11 pin 14	0.8 typ	Display bright	4	Photocell voltage
J11 pin 14	3.8 typ	Display dim	4	Photocell voltage
U16 pin 18	2.0 typ	Display bright	4	Display intensity
U16 pin 18	0.8 typ	Display dim	4	Display intensity
Q29 gate	0.0	Rx, Normal Operation	6	Power-up mute
Q43 drain	27 typ	Audio Amp Power	6	Audio Amp power
J1 pin 13	7.9	No Com Input Signal, Volume knob in (squelched)	7	Squelch Input
J1 pin 13	0.7	Valid Com Input Signal or Volume knob out (unsquelched)	7	Squelch Input
Q18 Col	9.3	No Com Input Signal, Volume knob in (squelched)	8	Squelch gate drive
Q18 Col	0.0	Valid Com Input Signal or Volume knob out (unsquelched)	8	Squelch gate drive
Q25 col	9.2	Rx, Normal Operation	8	Tx Sidetone Mute drive
Q25 col	0.0	Tx, Normal Operation	8	Tx Sidetone Mute drive
Q13 Gate	9.2	IDENT knob In	10	IDENT Filter Switch
Q13 Gate	0.8	IDENT knob Out	10	IDENT Filter Switch
U4 pin 1	4.0	Rx, Normal Operation	10	4 V Reference
U4 pin 6	2.5	Rx, Normal Operation	10	2.5 V Reference
CR42 Cathode	28 typ	Rx, Normal Operation	11	Aircraft Power
CR48 Anode	-220.0	Rx, Normal Operation	11	Unregulated Display Voltage
R219	-185.0	Rx, Normal Operation	11	Regulated display Voltage
R220	-14.4 typ	Rx, Normal Operation	11	-12V line
R287	5.4	Rx, Normal Operation	11	5V Line
R288	9.4	Rx, Normal Operation	11	9V Line
U36 pin 14	8.6	Rx, Normal Operation	11	PS Switching IC Power
*Note: Unless otherwise noted, a receiver input signal or transmitter modulation is not required for these measurements. All voltages are referenced to chassis ground.				

Table 5.6 KX 155A Nav/Com Receiver Test Voltages

POINT	VDC	TEST CONDITIONS	SHT	DESCRIPTION
U9 pin 1	5.0	Rx, no input signal applied	1	Regulated 5 V
P3001 pin 19	5.2	Rx, no input signal applied	1	5 V Line
P3001 pin 17	9.4	Rx, no input signal applied	1	9 V Line
P3001 pin 23	-14.4	Rx, no input signal applied	1	-12 V Line
P3001 pin 2	0.0	Rx, no input signal applied	1	T_R Line
P3001 pin 2	5.3	Tx, no modulation applied	1	T_R Line
U1 pin 10	8.5	Rx, no input signal applied	1	Tx Switch
U1 pin 10	0.7	Tx, no modulation applied	1	Tx Switch
U1 pin 15	0.6	Rx, no input signal applied	1	Rx Switch
U1 pin 15	9.3	Tx, no modulation applied	1	Rx Switch
U5 pin 20	8.4	Rx, no input signal applied	1	D/A regulated voltage
U1 pin 5	0.0	Rx, Com Volume knob in, no input signal applied	1	Manual squelch
U1 pin 5	5.3	Rx, Com Volume knob out	1	Manual squelch
U1 pin 6	5.3	Tuned from 108-113.55MHz on Nav, no input signal applied	1	Nav Band
U1 pin 6	0.0	Tuned from 113.6-117.95MHz on Nav, no input signal applied	1	Nav Band
U2 pin 3	5.3	RDIS=001 (Compressor disabled), no input signal applied	1	Compressor Disable drive
U2 pin 3	0.0	RDIS=000 (Compressor endabled), no input signal applied	1	Compressor Disable drive
Q4 col	9.2	Rx, Standard Com Input	2	T_R switch Drive
Q4 col	-12 to -30 typ	Tx, no modulation applied	2	T_R switch Drive
Q10 drain	7.9	Rx, no input signal applied	2	RF Amp Drain
Q10 source	3.0	Rx, no input signal applied	2	RF Amp source
Q11 drain	8.2	Rx, no input signal applied	2	Mixer DC power
Q11 source	0.5	Rx, no input signal applied	2	Mixer source
C71,C69	8.8	Rx, no input signal applied	2	IF Amp power
C5	4.5 typ	Rx, No RF input, unit tuned to 118.00 MHz	2	Com Preselector tuning
C5	5.8 typ	Rx, No RF input, unit tuned to 127.00 MHz	2	Com Preselector tuning
C5	7.2 typ	Rx, No RF input, unit tuned to 136.80 MHz	2	Com Preselector tuning
C7	4.8 typ	Rx, No RF input, unit tuned to 118.00 MHz	2	Com Preselector tuning
C7	6.2 typ	Rx, No RF input, unit tuned to 127.00 MHz	2	Com Preselector tuning
C7	7.6 typ	Rx, No RF input, unit tuned to 136.80 MHz	2	Com Preselector tuning
C8	4.1 typ	Rx, No RF input, unit tuned to 118.00 MHz	2	Com Preselector tuning
C8	5.2 typ	Rx, No RF input, unit tuned to 127.00 MHz	2	Com Preselector tuning

POINT	VDC		TEST CONDITIONS	SHT	DESCRIPTION
C8	6.4 typ		Rx, No RF input, unit tuned to 136.80 MHz	2	Com Preselector tuning
C14	4.9 typ		Rx, No RF input, unit tuned to 118.00 MHz	2	Com Preselector tuning
C14	6.2 typ		Rx, No RF input, unit tuned to 127.00 MHz	2	Com Preselector tuning
C14	7.7 typ		Rx, No RF input, unit tuned to 136.80 MHz	2	Com Preselector tuning
U11 pin 3	7.1		Rx, Standard Comm Input	2	Synth IC power
P3001 pin 16	0.3		Rx, Standard Comm Input	2	Synth lock
U16 pin 1	0.7		Rx, Standard Comm Input	2	Synth lock
TP3	2.8 typ		Tx at 118MHz, no modulation	2	VCO Tuning Voltage
TP3	8.5		Rx at 136.9MHz No RF input	2	VCO Tuning Voltage
C128	8.5		Rx, no input signal applied	2	VCO Power
U12 pin 6	4.7		Rx, no input signal applied	2	MMIC Amplifer power
Q12 col	9.0		Tx at 127 MHz	2	Tx Driver power
Q12 col	0.2		Rx, Standard Comm Input	2	Tx Driver power
"R77,R317"	0.5		Tx at 127 MHz	2	Tx Driver emitter feedback
"R77,R317"	0.0		Rx, no input signal applied	2	Tx Driver emitter feedback
U15 pin 17	8.7		Rx, no input signal applied	3	AM Receiver IC power
U15 pin 1	9.2		Rx, no input signal applied	3	AM Receiver IC Mixer power
TP6	1.1		Rx, no input signal applied	3	IF AGC
TP6	1.6		Rx, Standard Com Input	3	IF AGC
3002 pin 2	8.5		Rx, no input signal applied	3	RF AGC
3002 pin 2	2 - 4 typ		Rx, -30 dBm input signal	3	RF AGC
C25	4.6		Rx, Standard Comm Input	3	LPF Reference voltage
	25kHz	8.33kHz			
U13 pin 8	8.0	8.0	Rx, No Input signal, Com Volume knob in	3	Squelch Comparator
U13 pin 8	0.7	0.7	Rx, Standard Comm Input, Com Volume knob out	3	Squelch Comparator
TP32	1.6	1.6	Rx, Standard Comm Input	3	Squelch Noise Detector output
TP32	2.0	2.0	Rx, no input signal applied	3	Squelch Noise Detector output
Q29 col	9.0		Nav tuned from 108.0 - 113.95 MHz	4	Nav Preselector Band Switch
Q29 col	-14.0 typ		Nav tuned from 113.6 - 117.95 MHz	4	Nav Preselector Band Switch
Q27 emitter	7.5		No input signal applied	4	RF Amp power
Q30 emitter	0.9		No input signal applied	4	LO Amp
R260	2.9		No input signal applied	4	Mixer LO Bias
U22 pin 13	-6.1		No input signal applied	4	Mixer Bias
U18 pin 3	7.1		No input signal applied	4	Synth IC power
TP8	3.6		Unit tuned to 108 MHz	4	VCO Tuning voltage
TP8	7.2		Unit tuned to 117.95 MHz	4	VCO Tuning voltage

POINT	VDC	TEST CONDITIONS	SHT	DESCRIPTION
"R267,R264"	8.4	No input signal applied	4	VCO power
Q34 source	2.2	No input signal applied	4	2nd IF Amp
U23 pin 17	8.7	No input signal applied	4	AM Receiver IC power
U23 pin 1	9.2	No input signal applied	4	AM Receiver IC Mixer power
TP7	1.12	No input signal applied	4	IF AGC
TP7	1.6	Standard Nav Input	4	IF AGC
TP7	1.7	Standard Nav Input, except -30 dBm signal	4	IF AGC
P3001 pin 29	-5 to -9	No input signal applied	4	RF AGC
P3001 pin 29	>0.8	Standard Nav Input, except -30 dBm signal	4	RF AGC
Notes:	Standard Comm Input: -76dBm, 127.00MHz, 1000Hz/30% modulated tone			
	Standard Nav Input: -76dBm, 113MHz, 1000Hz/30% modulated tone			
	When only single component is listed, reading is taken on non-ground side of component			
	All voltages are referenced to chassis ground.			

TABLE 5.7 KX 155A Glideslope Test voltages (200-09060-0000 Board)

JUNCTION	V_DC (no RF)	V_DC (RF_1)	V_DC (RF_2)	V_DC (RF_3)	V_DC (RF_4)	Sheet	Description
J14 pin 8	4.5	5.1	5.1	5.1		1	IF AGC
C134,R114	8.6					1	9 V line
J14_4	9.3					1	9 V line
C89,C82	5.4					1	5 V line
J14_6	5.4					1	5 V line
Q6 Drain	8.5					1	RF Amp
U2 pin 6	5.1					1	MMIC RF Amp
Q7 Drain	7.5					1	Mixer
Q5 Base	2.3					1	IF Amp 1
Q5 Collector	4.0					1	IF Amp 1
Q1 Base	3.1					1	IF Amp 2
Q1 Collector	6.5					1	IF Amp 2
U4 pin 2	8.1					1	IF Amp 3
Q2 Base	0.7					1	IF Amp 4
Q2 Collector	3.1					1	IF Amp 4
Q3 Base	0.6					1	Detector Bias
Q4 Base	0.6		0.6			1	Detector
TP4	5.0		5.0			1	Detector Output
TP5	7.3	3.9	3.9	4.1		1	RF AGC
TP6	4.6	5.1	5.1	5.1		1	IF AGC
J14 pin 2	4.7		4.7			1	Composite Audio
U6 pin 4	4.7		4.7			2	Synthesizer IC power
TP3		3.4	4.1	5.2		2	VCO Tuning voltage
TP10	0.0		0.7			3	Flag
U12 pin 6	5.0					3	5 V Reference
U10 pin 3	2.5					3	Reference input
U11 pin 18	2.5		2.5		2.6	3	Adjustment Centering
TP11	2.5		2.5		2.6	3	GS Down
TP12	2.5		2.5		2.5	3	GS Up
TP11 to TP12	0.000		0.000		0.078	3	Deviation
Notes:	RF_1 = 329.15 MHz, -76 dBm, 0.000 ddm glideslope signal with NAV set to 108.95 MHz						
	RF_2 = 332.0 Mhz, -76 dBm, 0.000 ddm glideslope signal with NAV set to 109.3 MHz						
	RF_3 = 335.0 MHz, -76 dBm, 0.000 ddm glideslope signal with NAV set to 110.3 MHz						
	RF_4 = 332.0 MHz, -76 dBm, 0.091 ddm glideslope signal with NAV set to 109.3 MHz						
	All voltages are referenced to chassis ground unless otherwise noted.						

Tek **Stop:** 10.0MS/s   55 Acqs

IMPORTANT WAVFORM NOTES

THIS MARKER SHOWS
THE TRIGGER LEVEL

IN EACH OF THE FOLLOWING
WAVEFORMS, THIS MARKER
REPRESENTS THE DC OFFSET
VOLTAGE PRINTED NEAR THE
LOWER RIGHT-HAND CORNER
OF THE WAVEFORM.

VOLTS/DIV   TIME/DIV   Offset V

Ch1 1.00 V ᵇʷ   M 500µs Ch1 ∫
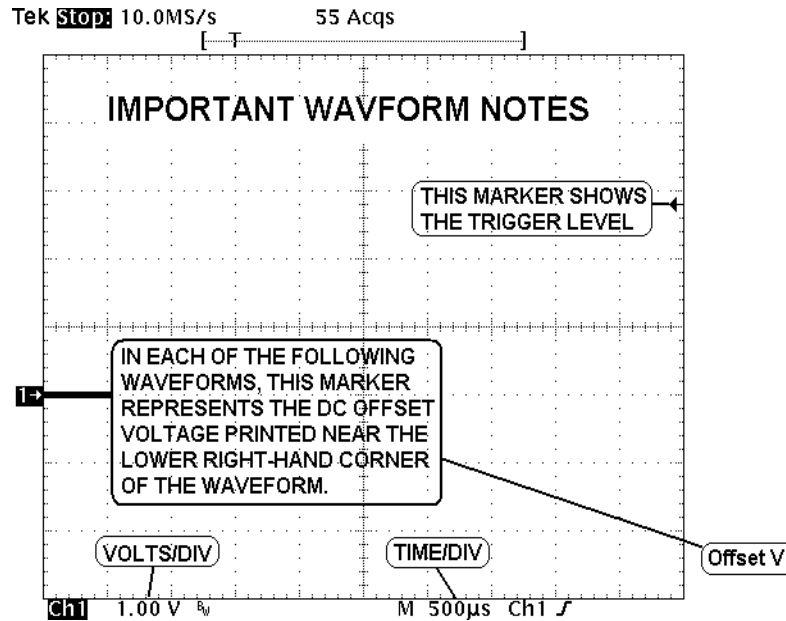
Figure 5-6 Waveform notes.

STANDARD INPUTS FOR RECEIVER BOARD WAVEFORMS:

1.Standard Comm Input: -76 dBm comm signal at 127 MHz with 1000 Hz tone at 30% modulation applied to radio input.

2.Standard VOR Input: -76 dBm VOR signal at 113 MHz, 30deg bearing, TO, 60%mod, 30Hz@ 30% mod, 9960 Hz @ 30% mod.

3.Standard LOC Input: -76 dBm LOC signal at 109.3 MHz, .000ddm, 40% mod.

Tek **Stop** 5.00MS/s   13 Acqs

P3001 PIN 3   CLOCK

C1   2.00 V   M 10.0µs Ch1   1.88 V
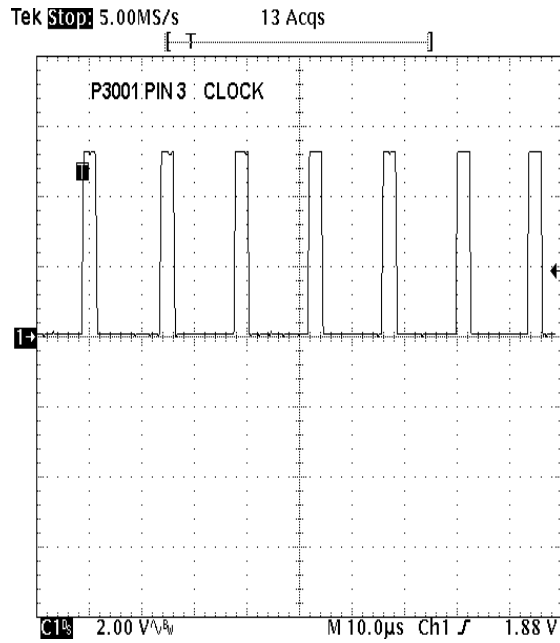
CLOCK

WAVEFORM TAKEN
IN NORMAL OPERATION

OFFSET   0.0 Vdc

**FIGURE 5-7 RCVR BD CLOCK WAVEFORM AT P3001-3
(DWG NO. 002-09061-0010, REV G, SHEET 1)**

Tek **Stop** 1.00MS/s   12 Acqs

P3001 PIN 5
TYPICAL DATA

C1   2.00 V   M 50.0µs Ch1   1.88 V
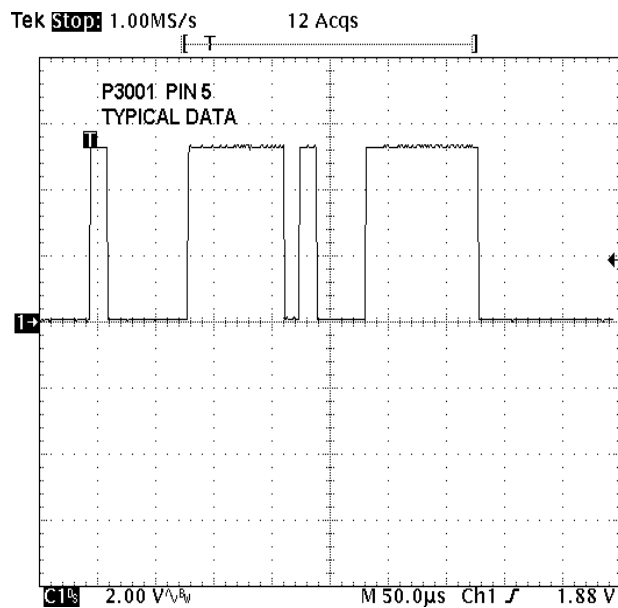
SERIAL DATA

WAVEFORM TAKEN
IN NORMAL OPERATION

OFFSET   0.0 Vdc

**FIGURE 5-8 RCVR BD DATA WAVEFORM AT P3001-5
(DWG NO. 002-09061-0010, REV G, SHEET 1)**

Tek **Stop:** 250kS/s   6 Acqs

ENABLE IN   TYPICAL

ENABLE IN

NORMAL OPERATION

Ch1   2.00 V   M2.00ms Ch1 ∿ 3.44 V

OFFSET   0.0 VDC
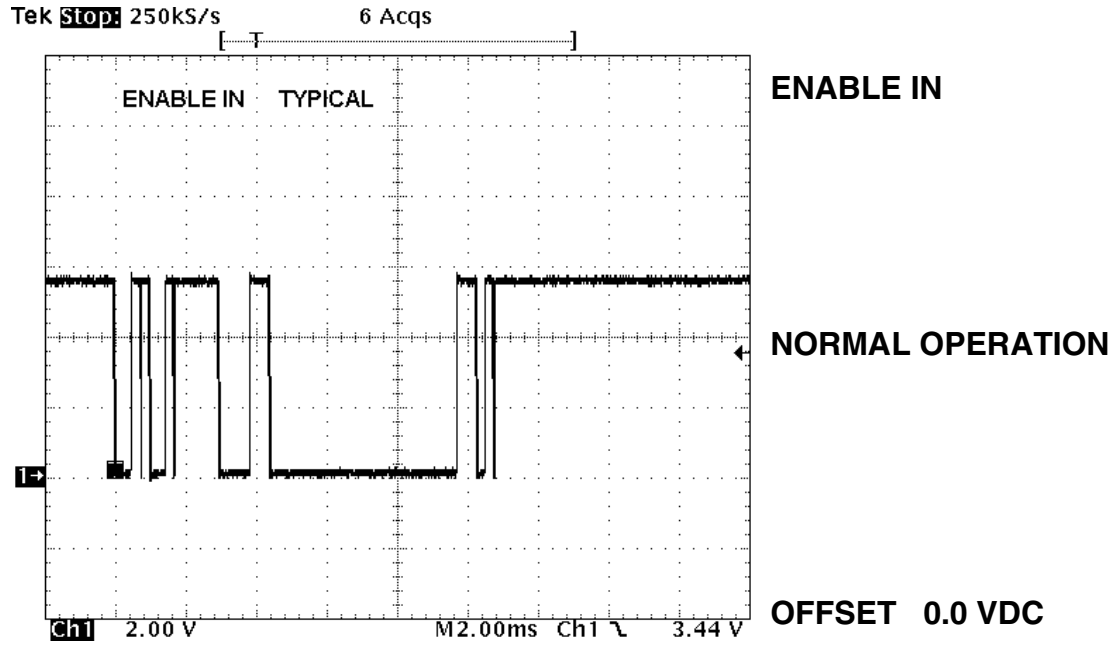
FIGURE 5-9 RCVR BD DATA WAVEFORM AT P3001-4
(DWG NO. 002-09061-0010, REV G, SHEET 1)

Tek **Stop:** 10MS/s   11 Acqs

ENABLE

U3 ENABLE
OUTPUTS TYPICAL

TYPICAL PULSE WIDTH

PIN 4   15 - 125 us
PIN 5   15 - 200 us (On Com
                   Frequency change)
PIN 6   1 - 7.5 ms
PIN 7   15 - 125 us
PIN 9   400 - 500 us (After Pwr Up)
PIN 10 1 - 5 ms

Ch1   2 V∿   M 5µs Ch1 ∫ 3.6 V

OFFSET   0.0 Vdc
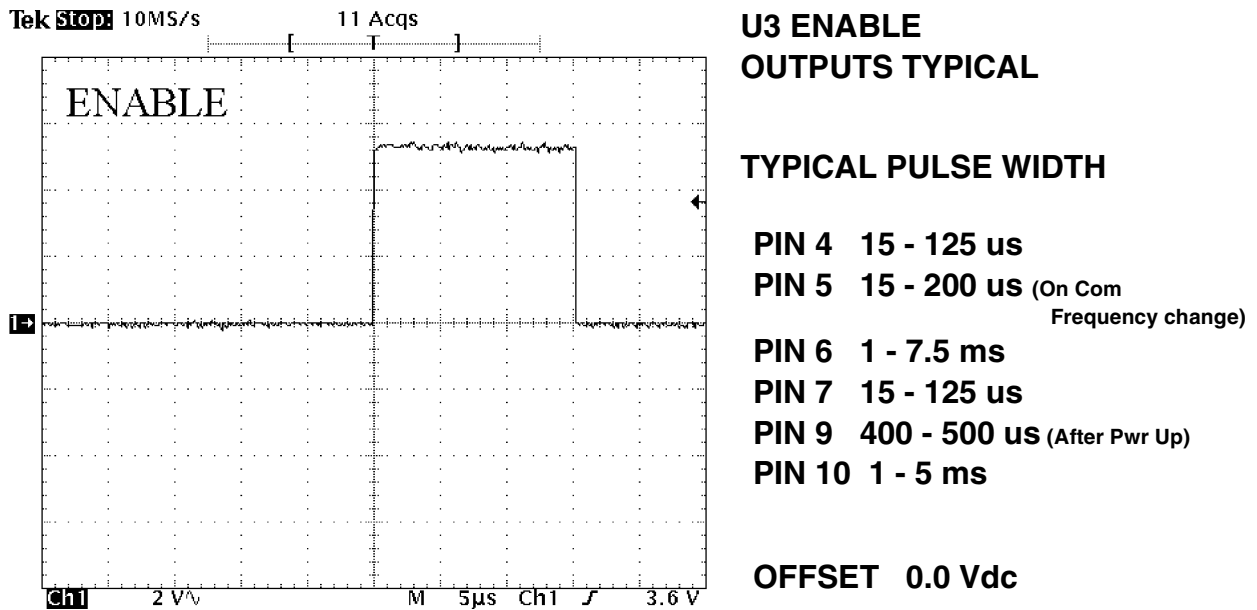
FIGURE 5-10 RCVR BD ENABLE WAVEFORM AT ENABLE DECODER
(DWG NO. 002-09061-0010, REV G, SHEET 1)
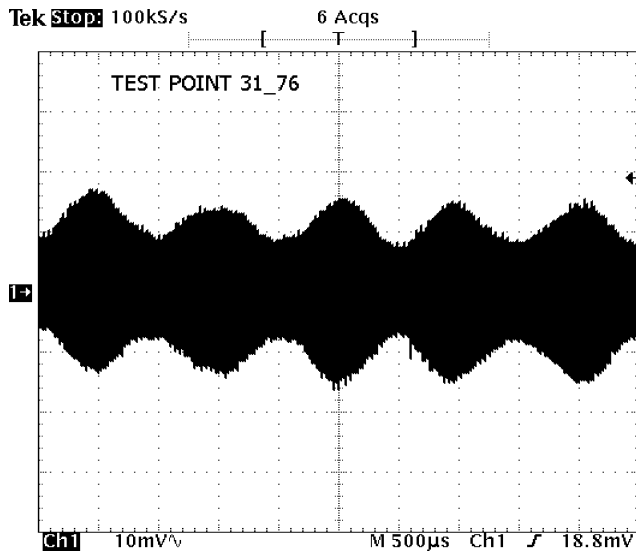
**Com First
IF Amp**

STD COMM INPUT

OFFSET   3 - 6 Vdc TYP.

**FIGURE 5-11 RCVR BD WAVEFORM AT TP 31 (STD COMM INPUT)
(DWG NO. 002-09061-0010, REV G, SHEET 2)**
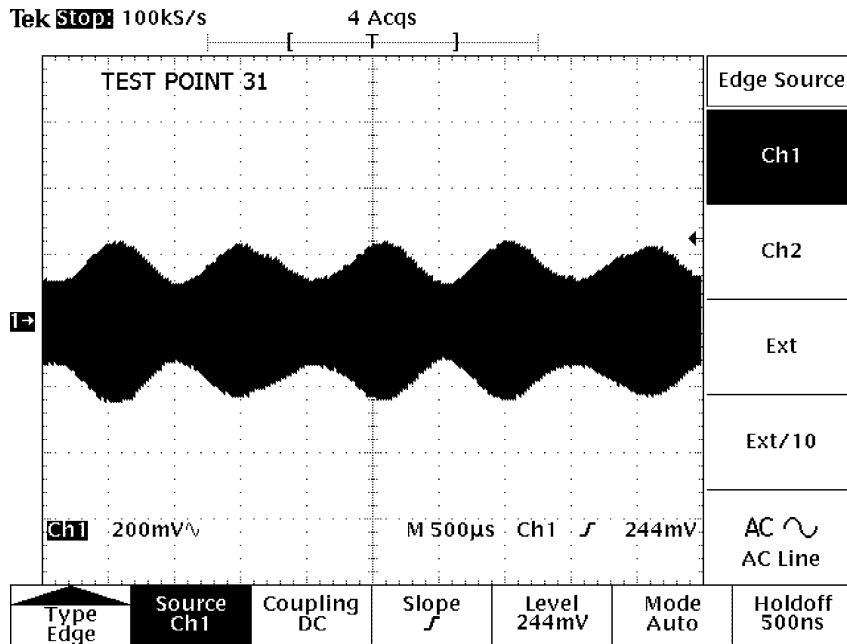
**Com First
IF Amp**

STD COMM INPUT

(EXCEPT 30 dB LEVEL)

**OFFSET   3 - 6 Vdc
TYP.**

**FIGURE 5-12 RCVR BD WAVEFORM AT TP 31 (-30 dBm INPUT)
(DWG NO. 002-09061-0010, REV G, SHEET 2)**

Tek Stop: 1GS/s   293 Acqs
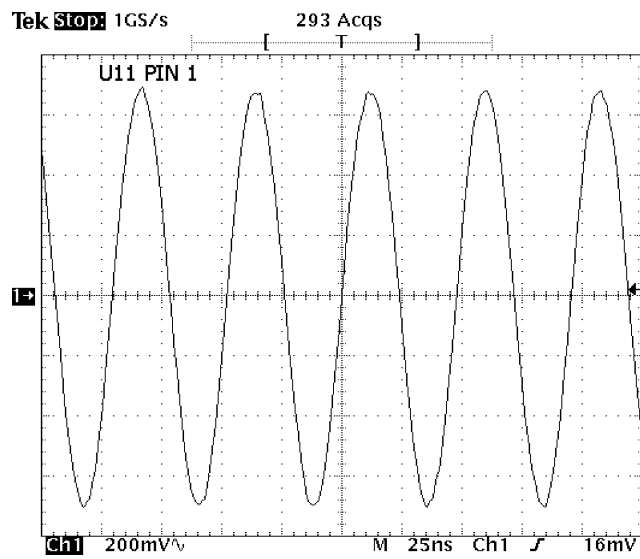
U11 PIN 1

**Com Synthesizer
20.5 MHz Ref
Osc input**

STD COMM INPUT

Ch1 200mV~   M 25ns Ch1 ∫   16mV

OFFSET   2.1 Vdc

**FIGURE 5-13 RCVR BD WAVEFORM AT U11 PIN 1
(DWG NO. 002-09061-0010, REV G, SHEET 2)**

Tek Stop: 25.0GS/s ET   7475 Acqs
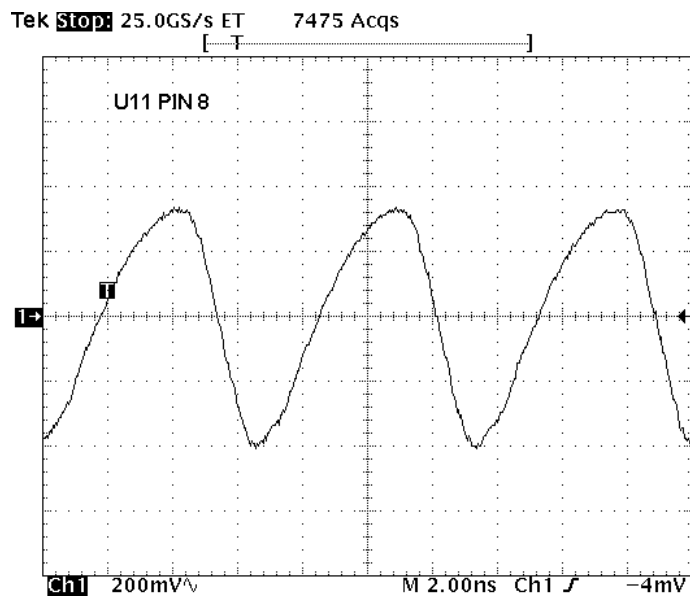
U11 PIN 8

*Com Synthesizer
RF input*

STD COMM INPUT

Ch1 200mV~   M 2.00ns Ch1 ∫   −4mV

OFFSET   3.3 Vdc

**FIGURE 5-14 RCVR BD WAVEFORM AT U11 PIN 8
(DWG NO. 002-09061-0010, REV G, SHEET 2)**
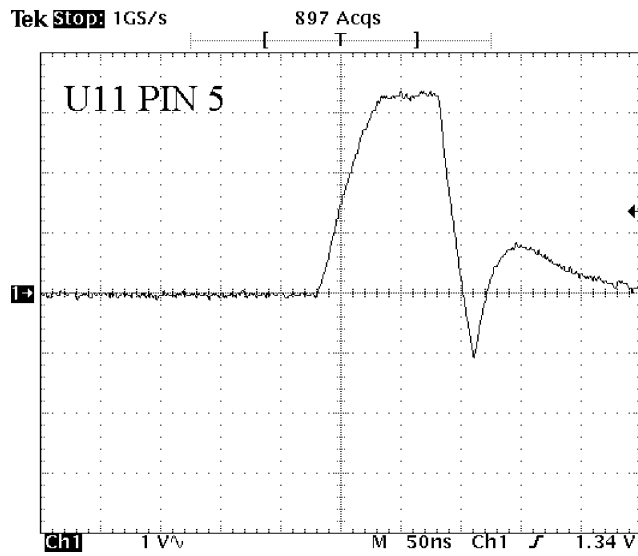
**Com Synthesizer
Phase Detector output
(NOTE: These pulses
occur every 40 microsec.)**

STD COMM INPUT

OFFSET 3.5 Vdc

**FIGURE 5-15 RCVR BD WAVEFORM AT U11 PIN 5
(DWG NO. 002-09061-0010, REV G, SHEET 2)**
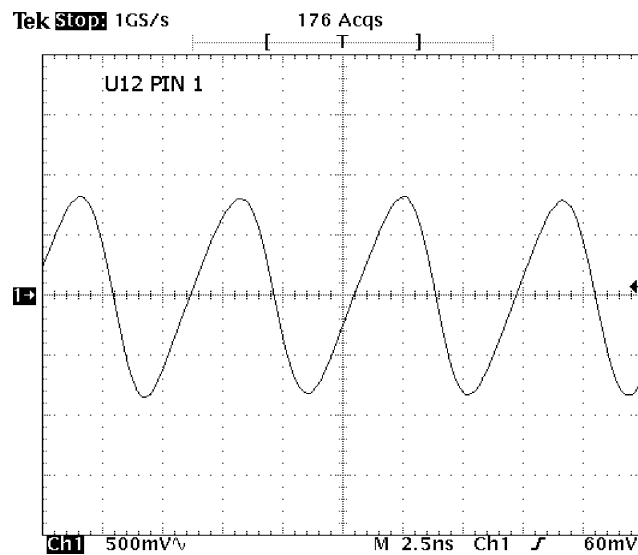
**Com Synthesizer
VCO output**

STD COMM INPUT

OFFSET 1.1 Vdc

**FIGURE 5-16 RCVR BD WAVEFORM AT U12 PIN 1
(DWG NO. 002-09061-0010, REV G, SHEET 2)**

Tek **Stop**: 25.0GS/s ET   28047 Acqs
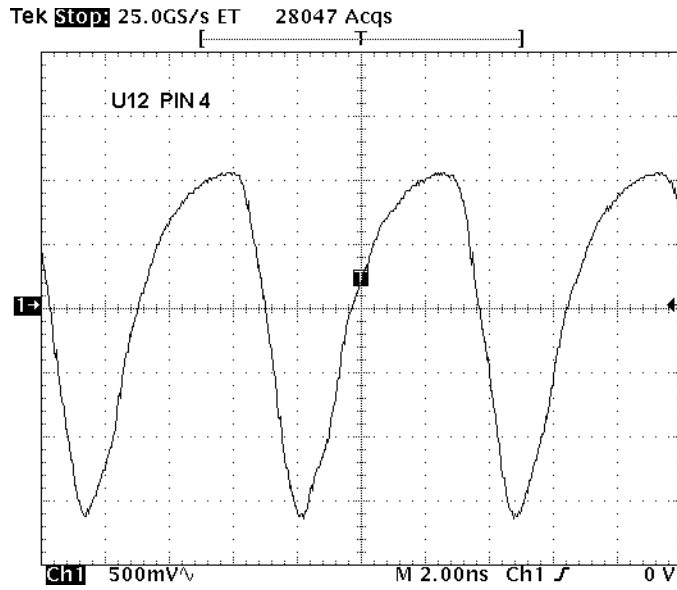
U12 PIN 4

**Com Synthesizer
Buffer Amp output**

STD COMM INPUT

Ch1 500mV   M 2.00ns Ch1   0 V

OFFSET   4.8 Vdc

**FIGURE 5-17 RCVR BD WAVEFORM AT U12 PIN 4
(DWG NO. 002-09061-0010, REV G, SHEET 2)**

Tek **Stop**: 100GS/s ET   5817 Acqs
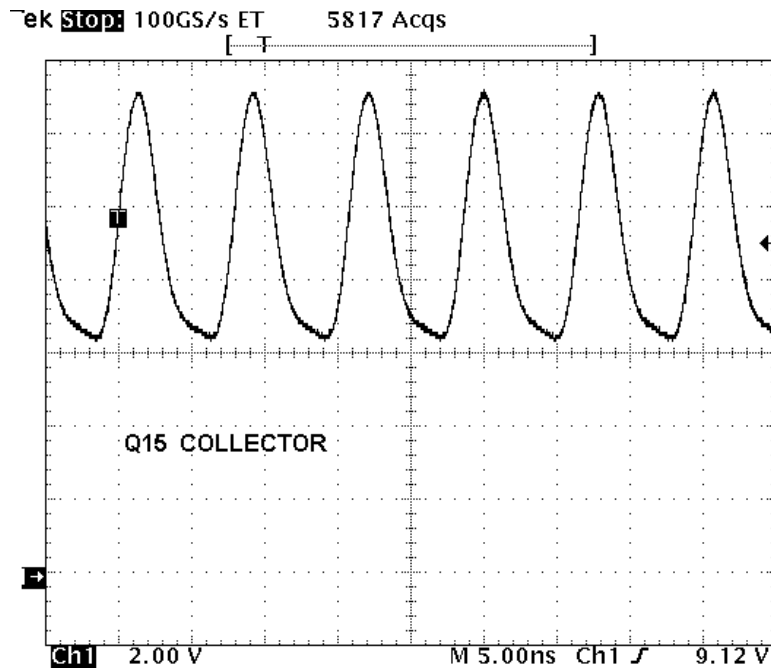
**Com Tx Drive
(In Transmit)**

Tx AT 127 MHz

Q15 COLLECTOR

Offset 8.9 V Typ.

Ch1   2.00 V   M 5.00ns Ch1   9.12 V

**FIGURE 5-18 RCVR BD WAVEFORM AT COLLECTOR OF Q15
(DWG NO. 002-09061-0010, REV G, SHEET 2)**
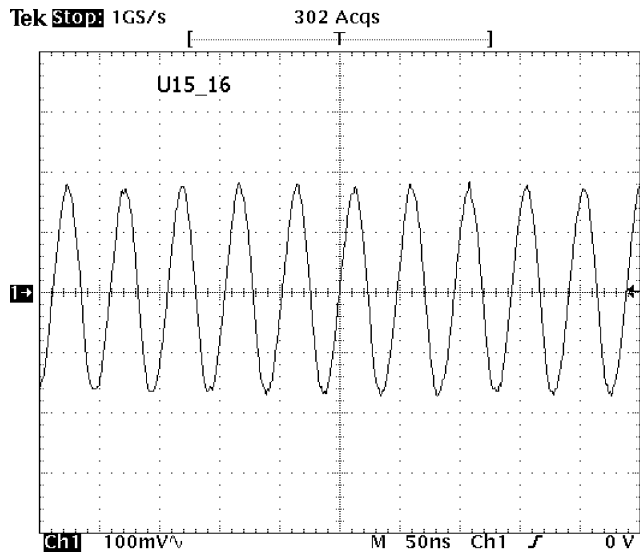
**Com Receiver
IC, 20.95 MHz input**

STD COMM INPUT

OFFSET   4.1 Vdc

**FIGURE 5-19 RCVR BD WAVEFORM AT U15 PIN 16
(DWG NO. 002-09061-0010, REV G, SHEET 3)**
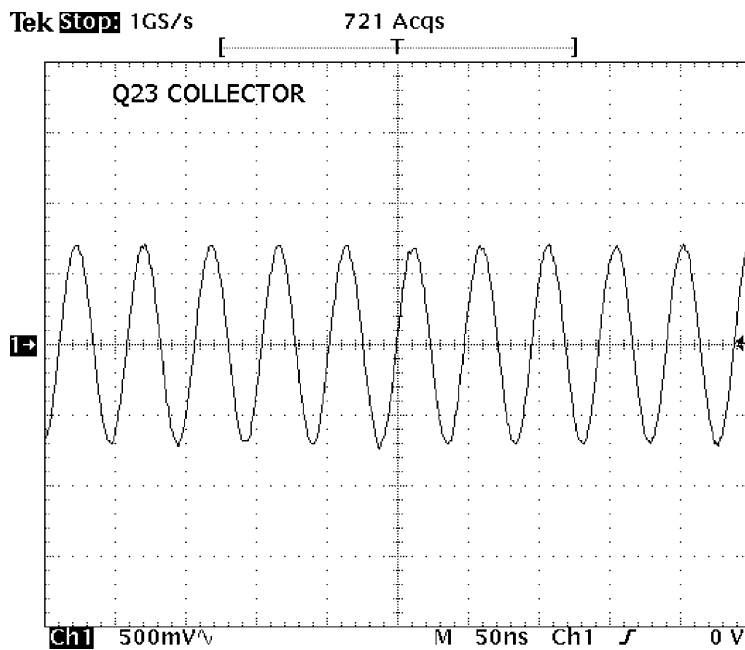
**20.95 MHz
Reference**

STD COMM INPUT

OFFSET   3 - 6 Vdc TYP.

**FIGURE 5-20 RCVR BD WAVEFORM AT THE COLLECTOR OF Q23
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

Tek ■Stop■ 250kS/s   2302 Acqs
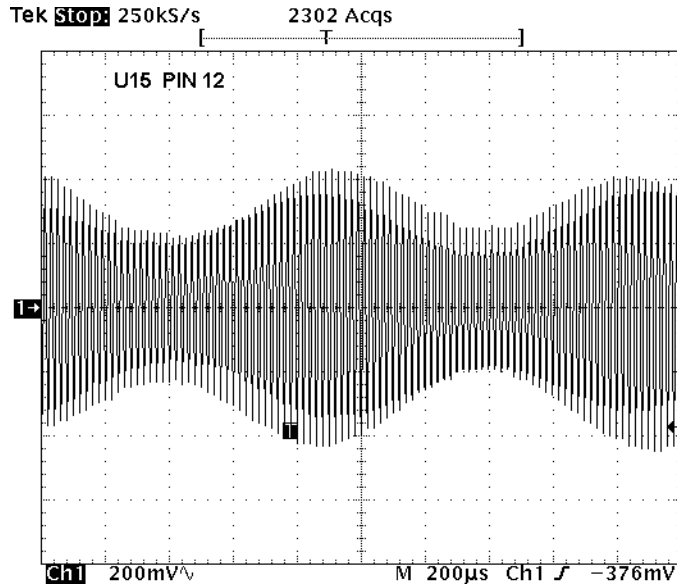
U15 PIN 12

Com second IF output

STD COMM INPUT

Ch1 200mV∿   M 200µs Ch1 ∫ −376mV

OFFSET   4.8 Vdc

FIGURE 5-21 RCVR BD WAVEFORM AT U15 PIN 12 TP5
(DWG NO. 002-09061-0010, REV G, SHEET 3)

Tek ■Stop■ 50kS/s   102 Acqs

U15_6

Com Receiver
IC Audio 1 out

Ch1 Freq
1kHz

STD COMM INPUT

Ch1 200mV∿   M 1ms Ch1 ∫ 0 V

OFFSET   2.2 Vdc

FIGURE 5-22 RCVR BD WAVEFORM AT U15 PIN 6
(DWG NO. 002-09061-0010, REV G, SHEET 3)
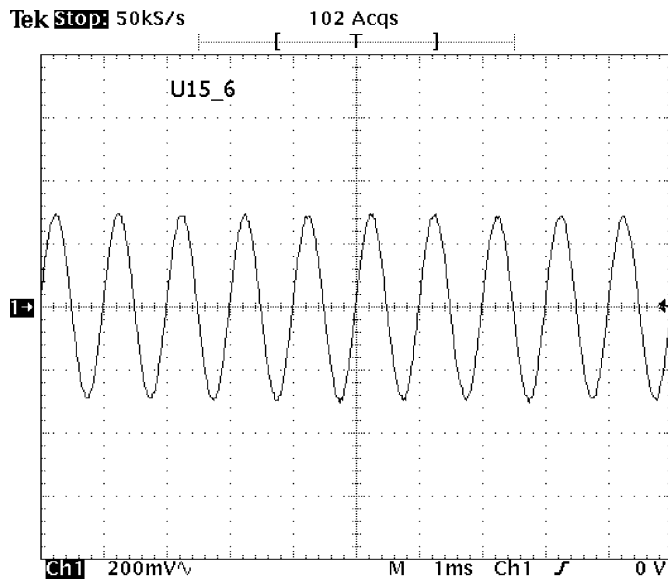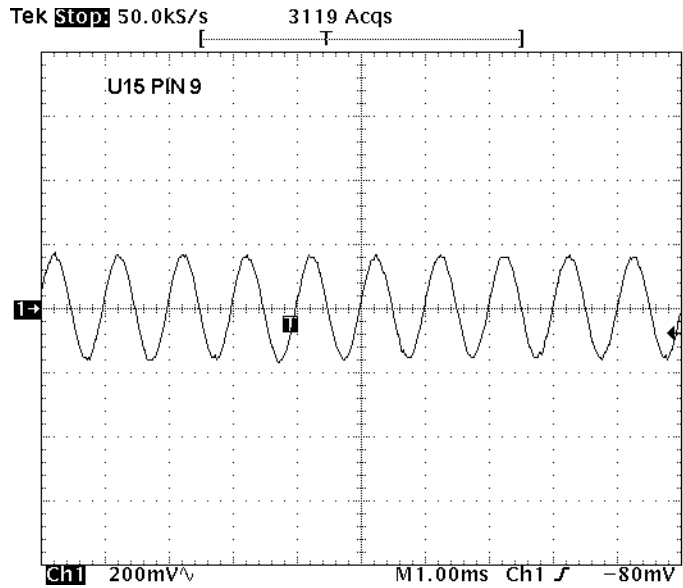
Com Receiver
IC Audio 2 out

STD COMM INPUT

OFFSET   2.2 Vdc

FIGURE 5-23 RCVR BD WAVEFORM AT U15 PIN 9
(DWG NO. 002-09061-0010, REV G, SHEET 3)
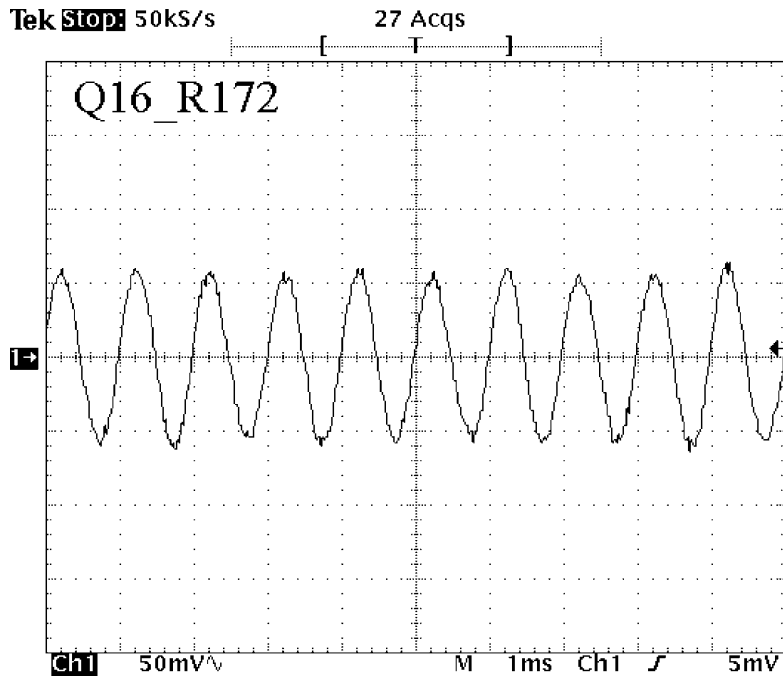
COM AUDIO AT THE
SQUELCH GATE INPUT

STD COMM INPUT

OFFSET   4.6 Vdc

FIGURE 5-24 RCVR BD WAVEFORM JUNCTION OF Q16 AND R172
(DWG NO. 002-09061-0010, REV G, SHEET 3)

**COMM AUDIO
LOW PASS FILTER**

STD COMM INPUT

OFFSET   4.6 Vdc
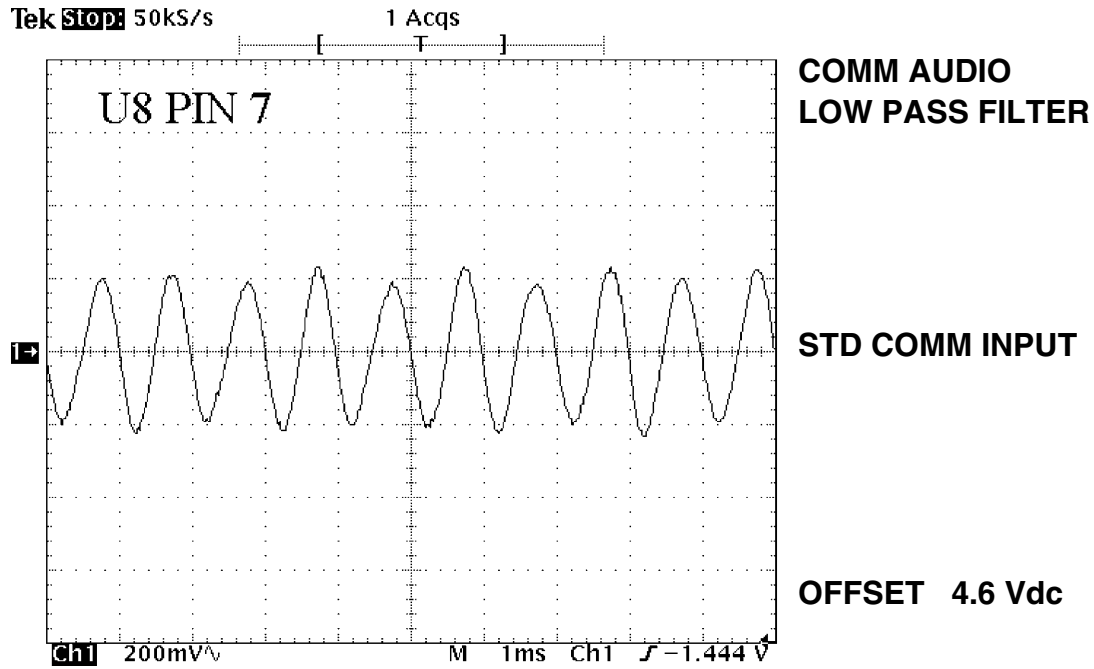
**FIGURE 5-25 RCVR BD WAVEFORM AT U8 PIN 7
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

**Filtered Com
Audio Output**

STD COMM INPUT

OFFSET   0.0 Vdc
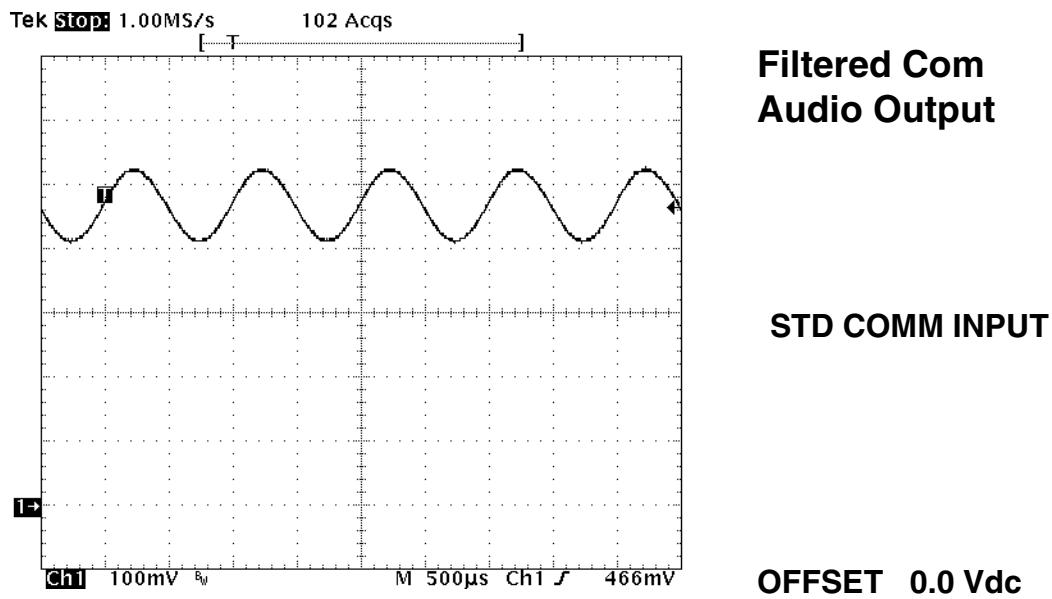
**FIGURE 5-26 RCVR BD WAVEFORM AT U8 PIN 1
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

Tek **Stop** 100kS/s   343 Acqs

**Com Audio
Compressor Detector Amp**

TEST POINT 2

STD COMM INPUT

Ch1   2 V∿   M 500µs   Ch1 ʃ −1.44 V

OFFSET   0.0 Vdc
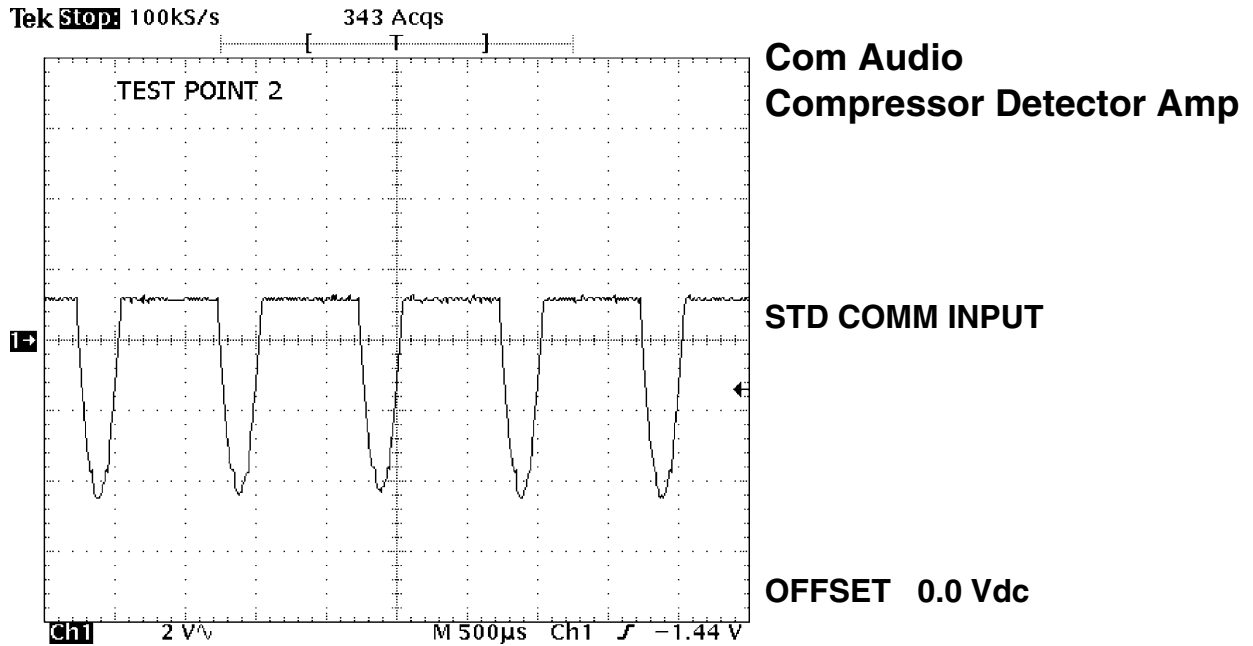
**FIGURE 5-27 RCVR BD WAVEFORM AT TP2
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

Tek **Stop** 50kS/s   1 Acqs

**SQUELCH DETECTOR
OUTPUT**

U13 14NO

NO RF APPLIED

Ch2   2 V∿ M   1ms   Ch2 ʃ   960mV

OFFSET   4.6 Vdc
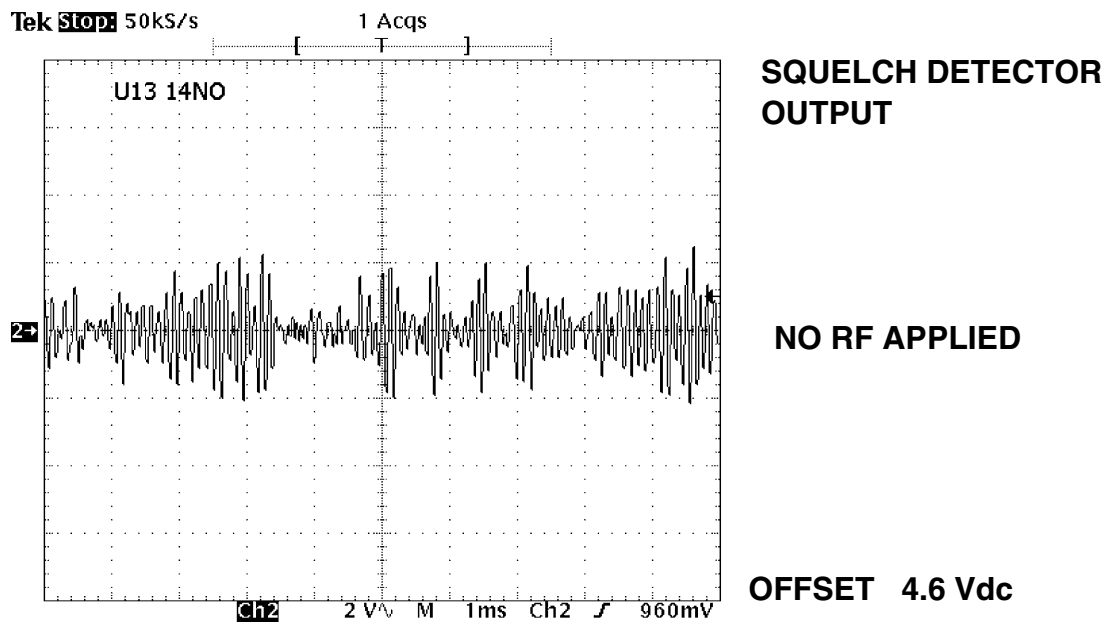
**FIGURE 5-28 RCVR BD WAVEFORM AT U13 PIN 14(NO RF APPLIED)
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

Tek **Stop:** 1.00MS/s　　　212 Acqs

U13 PIN 14　8kHz 80%

**SQUELCH DETECTOR
OUTPUT WITH 8 kHz MOD**

C1 Freq
8.0000kHz

**STD COMM INPUT
EXCEPT 8 kHz, 80% MOD**

OFFSET 4.6 VDC

Ch1　1.00 V∿ᴮw　　　M 50.0µs　Ch1 ƒ　−20mV
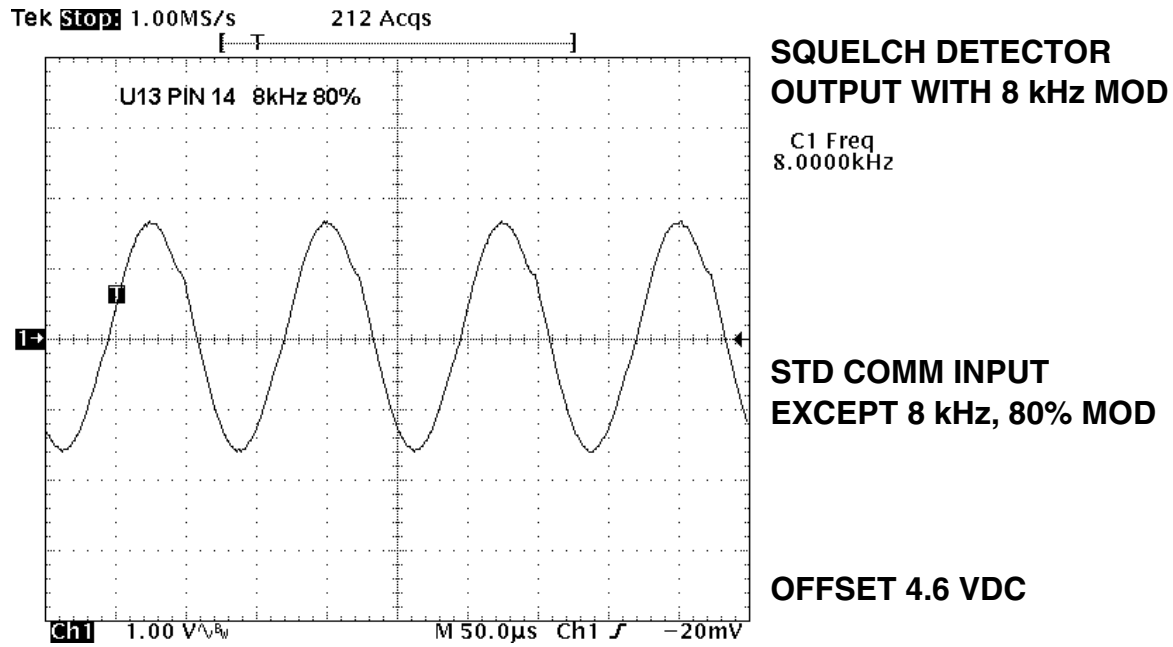
**FIGURE 5-29　RCVR BD WAVEFORM AT U13 PIN 14
(DWG NO. 002-09061-0010, REV G,　SHEET 3)**

Tek **Stop:** 2.50kS/s　　　426 Acqs

TP30　VOR

NAV FIRST IF AMP

STANDARD VOR INPUT

OFFSET　3 - 6 V TYP.

Ch1　10.0mV∿ᴮw　　　M 20.0ms　Ch2 ƒ　120mV
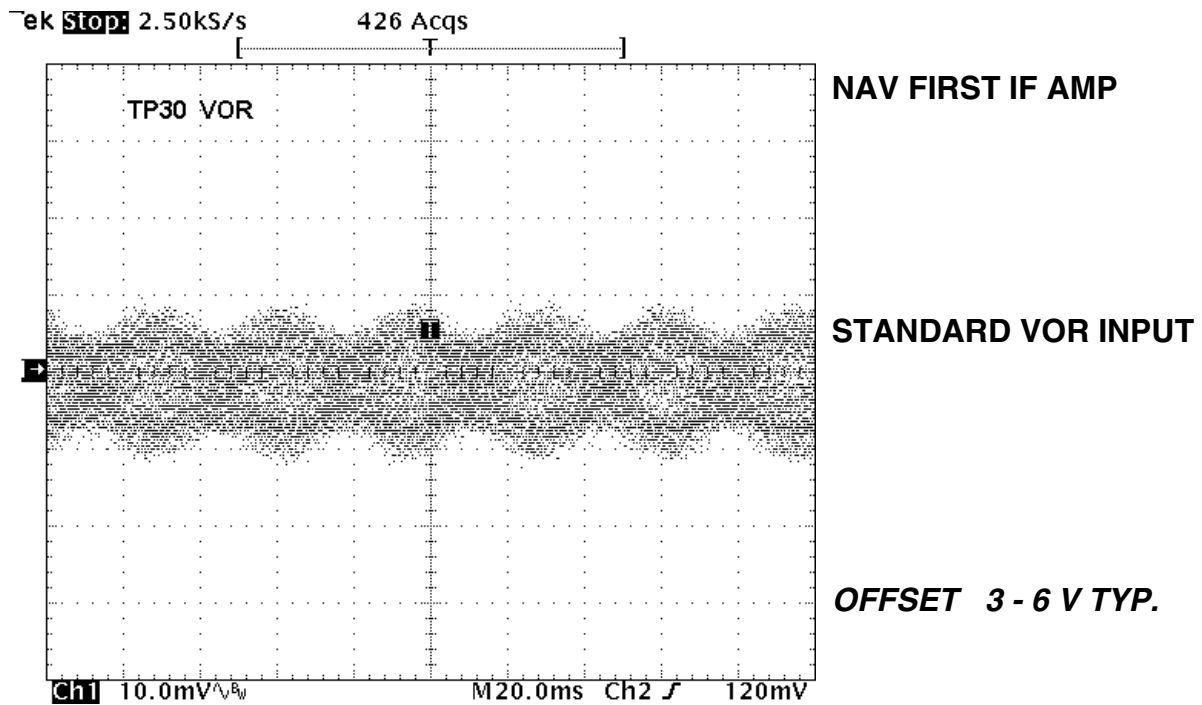
**FIGURE 5-30　RCVR BD WAVEFORM AT TP30
(DWG NO. 002-09061-0010, REV G,　SHEET 4)**
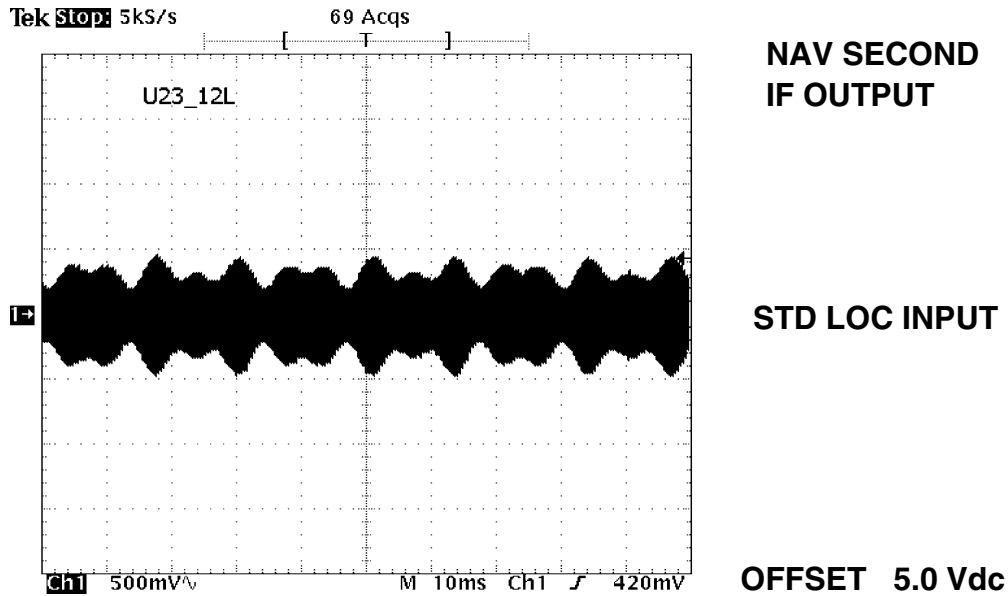
FIGURE 5-31 RCVR BD WAVEFORM AT U23 PIN 12 (TP9)
(DWG NO. 002-09061-0010, REV G, SHEET 4)
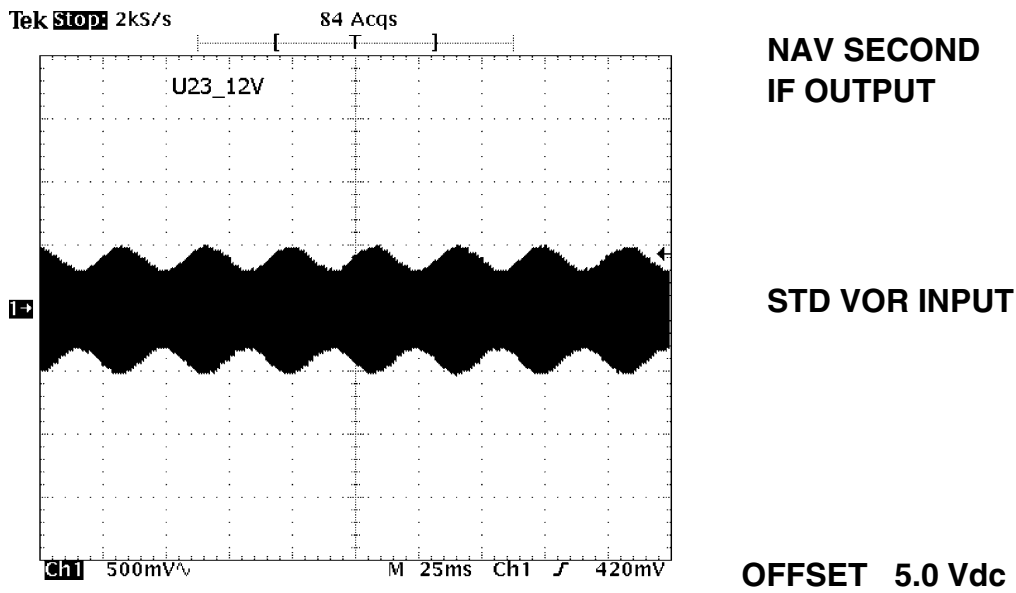
FIGURE 5-32 RCVR BD WAVEFORM AT U23 PIN 12 (TP9)
(DWG NO. 002-09061-0010, REV G, SHEET 4)

Tek **Stop:** 5.00kS/s   168 Acqs
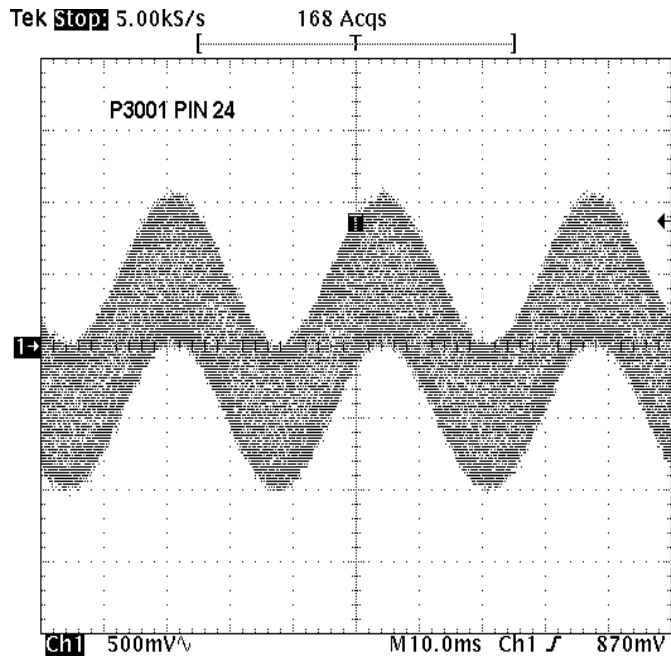
P3001 PIN 24

**NAV RECEIVER
VOR COMPOSITE**

STD VOR INPUT

OFFSET 2.5 V

Ch1 500mV∿   M10.0ms Ch1 ∫ 870mV

**FIGURE 5-33 RCVR BD WAVEFORM AT P3001 PIN 24
(DWG NO. 002-09061-0010, REV G, SHEET 4)**

Tek **Stop:** 25.0GS/s ET   1575 Acqs
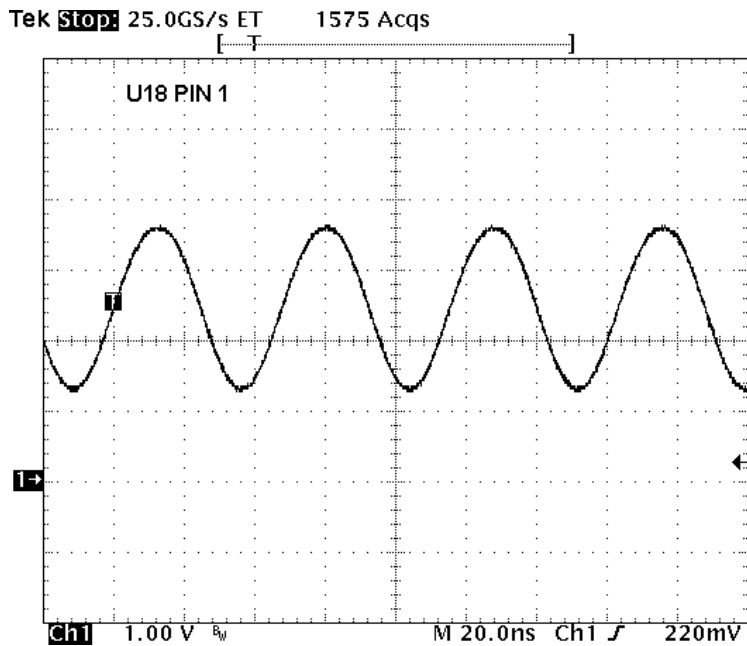
U18 PIN 1

**NAV SYNTHESIZER
IC REFERENCE INPUT**

STD VOR INPUT

OFFSET   0.0 Vdc

Ch1 1.00 V ᵇᵂ   M 20.0ns Ch1 ∫ 220mV

**FIGURE 5-34 RCVR BD WAVEFORM AT U18 PIN 1
(DWG NO. 002-09061-0010, REV G, SHEET 4)**

**NAV SYNTHESIZER
RF INPUT FROM VCO**

STD VOR INPUT

OFFSET 3.2 Vdc
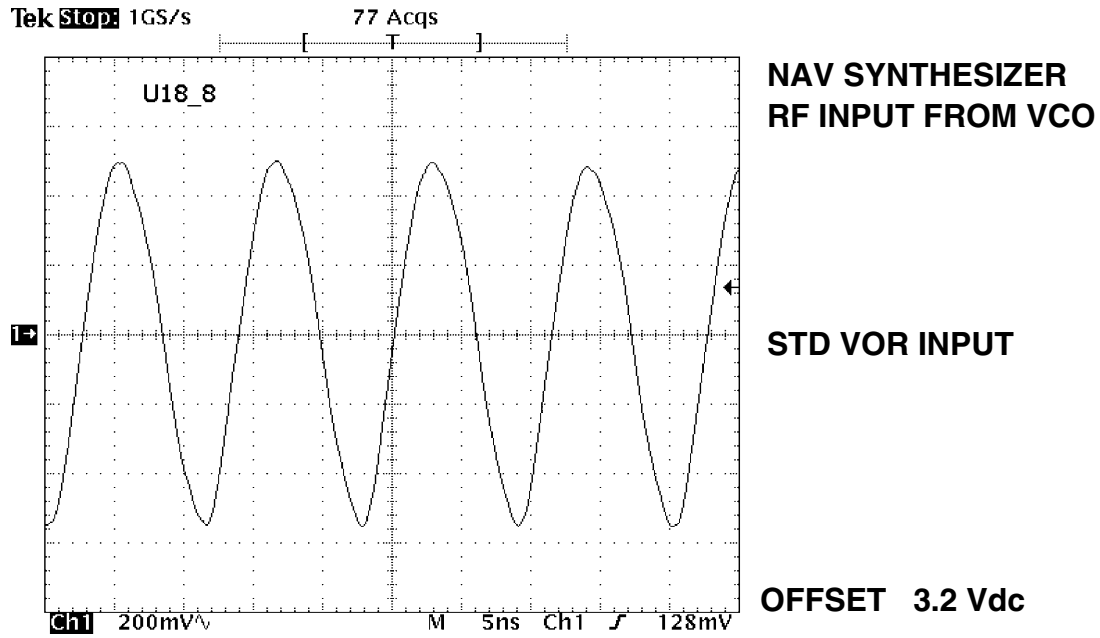
**FIGURE 5-35 RCVR BD WAVEFORM AT U18 PIN 8
(DWG NO. 002-09061-0010, REV G, SHEET 4)**

**NAV SYNTHESIZER
IC PHASE DETECTOR
OUTPUT**

**NOTE: THESE PULSES
OCCUR EVERY
20 MICROSECONDS**

STD VOR INPUT

OFFSET 3.5 Vdc
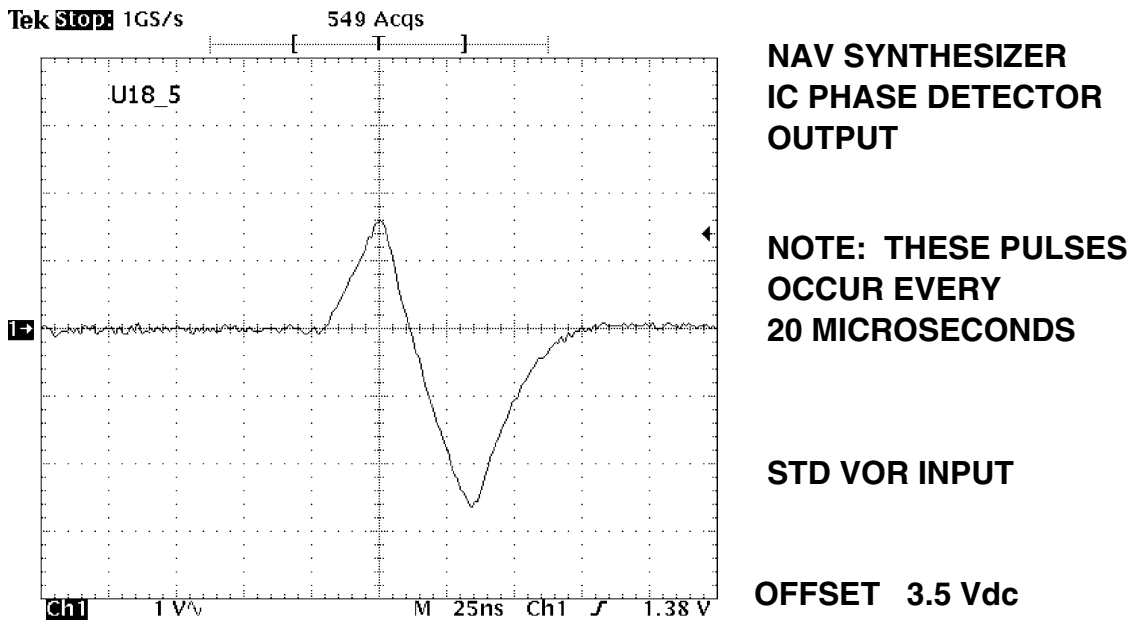
**FIGURE 5-36 RCVR BD WAVEFORM AT U18 PIN 5
(DWG NO. 002-09061-0010, REV G, SHEET 4)**

Tek **Stop:** 1GS/s   131 Acqs

U21_1   **NAV VCO OUTPUT**

STD VOR INPUT

OFFSET   0.9 Vdc

Ch1   200mV   M 10ns Ch1   −4mV
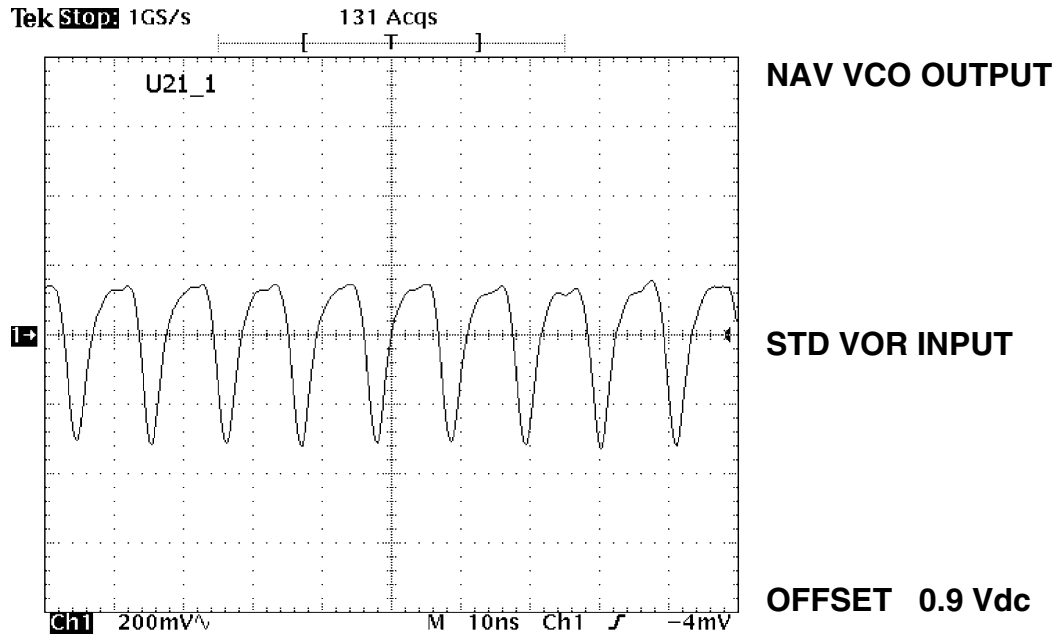
FIGURE 5-37 RCVR BD WAVEFORM AT U21 PIN 1
(DWG NO. 002-09061-0010, REV G, SHEET 4)

Tek **Stop:** 100GS/s ET   2352 Acqs

U21 PIN 4   **COMM SYNTHESIZER**
                                   BUFFER AMP OUTPUT

STD VOR INPUT

OFFSET   0.0 V

Ch1   1.00 V   M 5.00ns Ch1   3.26 V
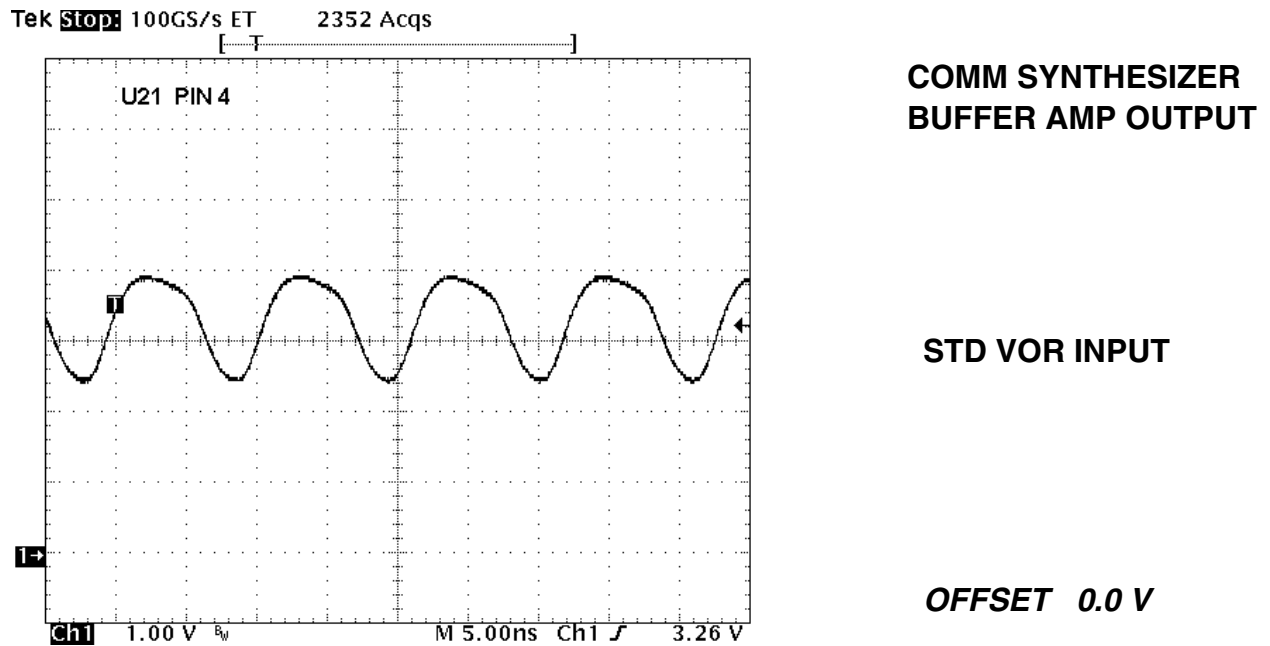
FIGURE 5-38 RCVR BD WAVEFORM AT U21 PIN 4
(DWG NO. 002-09061-0010, REV G, SHEET 4)
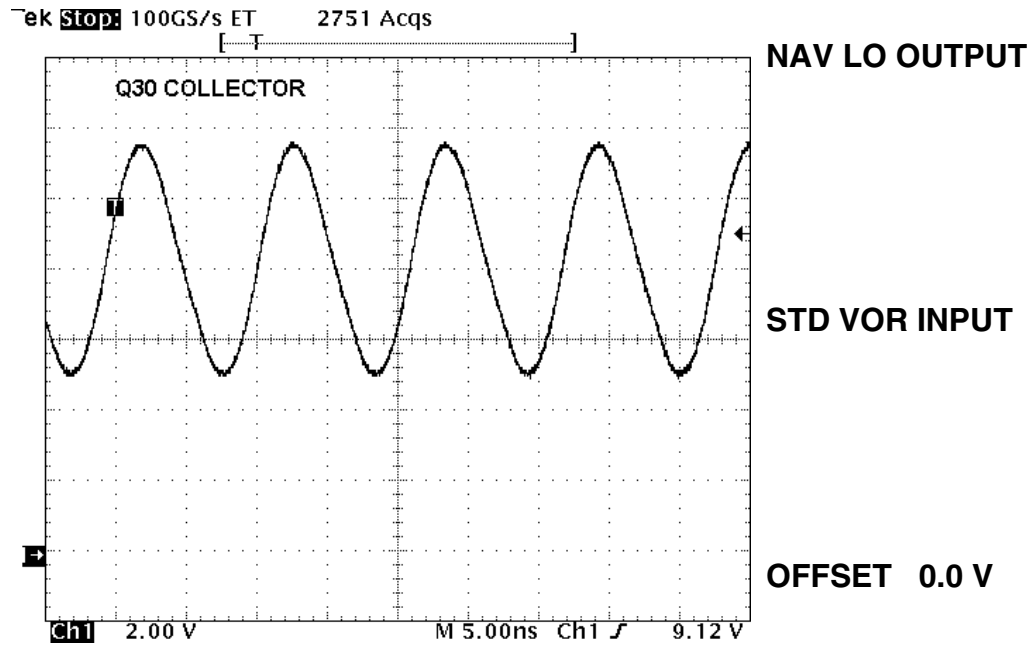
FIGURE 5-39 RCVR BD WAVEFORM AT COLLECTOR OF Q30
(DWG NO. 002-09061-0010, REV G, SHEET 4)
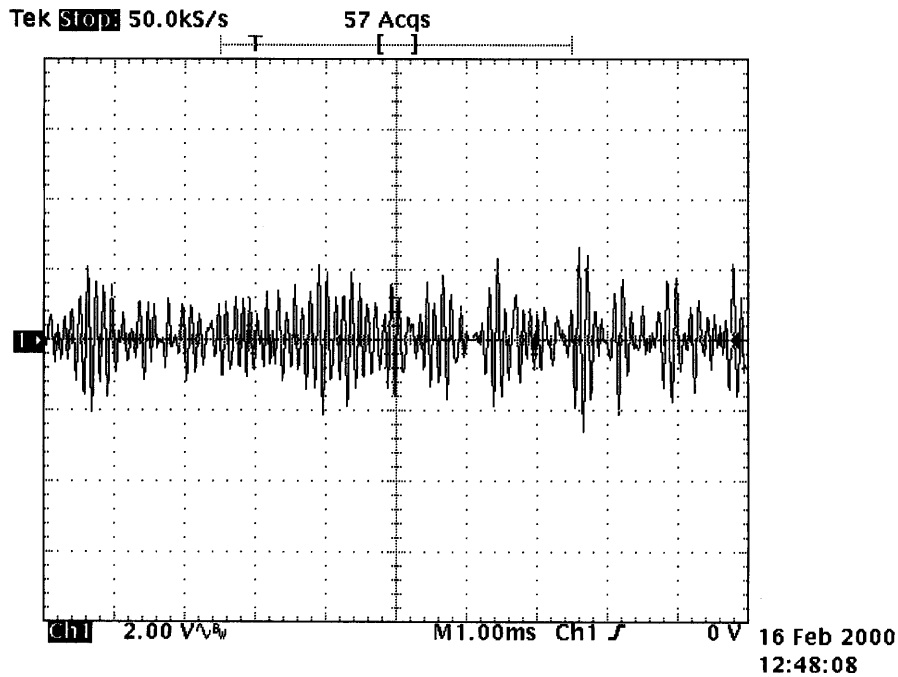
FIGURE 5-40 RCVR BD WAVEFORM AT U13 PIN 14 W/NO RF AT 25 KHZ
(DWG NO. 002-09061-0010, REV G, SHEET 3)
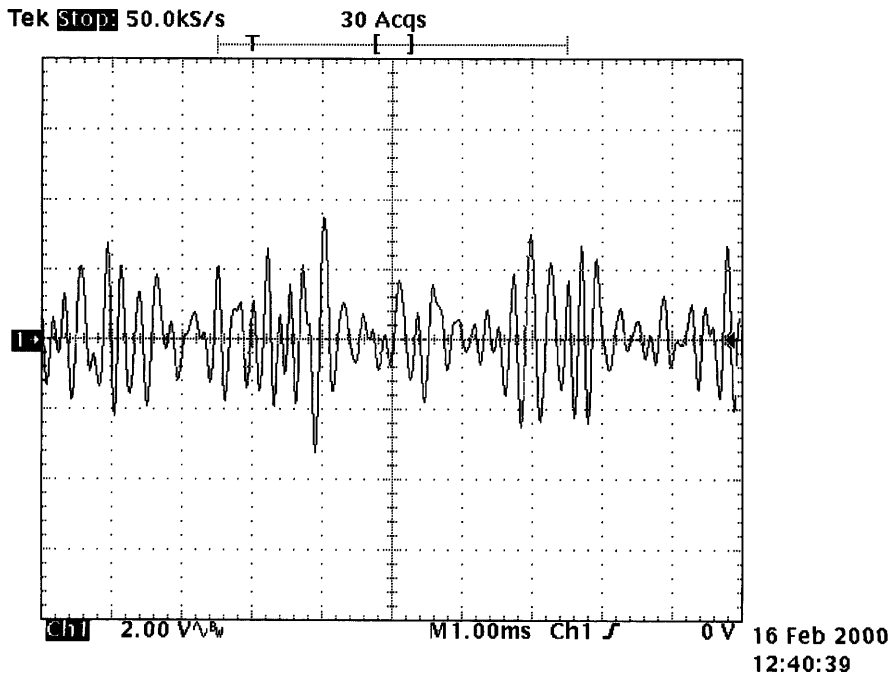
**FIGURE 5-41 RCVR BD WAVEFORM AT U13 PIN 14 W/NO RF AT 8.33 KHZ
(DWG NO. 002-09061-0010, REV G, SHEET 3)**
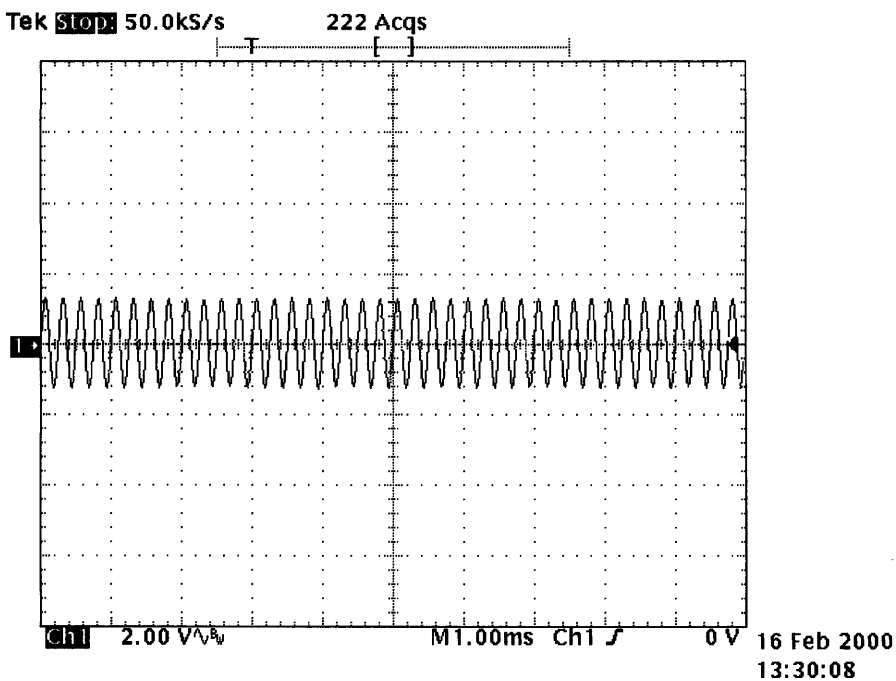
**FIGURE 5-42 RCVR BD WAVEFORM AT U13 PIN 14 W/4 KHZ, 80% MOD AT 8.33 KHZ
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

Tek Stop 50.0kS/s   39 Acqs

Ch1 2.00 V∿ᴮw   M1.00ms Ch1 ∫   0 V   16 Feb 2000
                                                    13:36:40
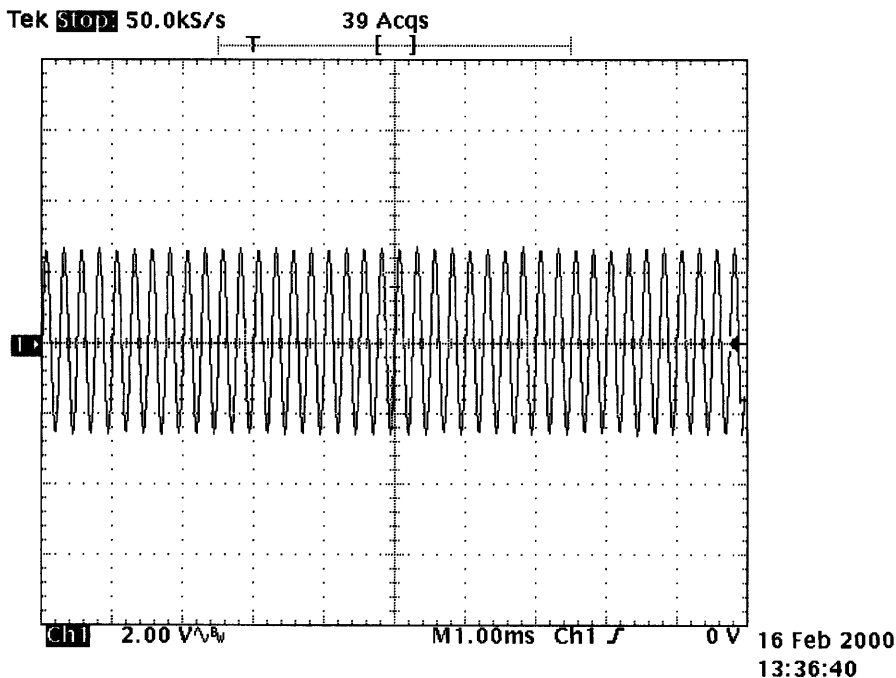
**FIGURE 5-43 RCVR BD WAVEFORM AT U13 PIN 1 W/4 KHZ, 80% MOD AT 8.33 KHZ
(DWG NO. 002-09061-0010, REV G, SHEET 3)**

STANDARD INPUTS FOR THE MAIN BOARD:

1.Standard VOR input: -76 dBm signal at 113 MHz, 60% total modulation (30%, 30 Hz, 30% 9960) 30 degrees "TO" tone mode.

2.Standard LOC input: LOC input @ 108.1 MHz, -53 dBm, @ 40% mod. (20% on 150 Hz, and 20% on 90 Hz) combined in space to 40%.

3.Standard Glideslope signal: -76 dBm, 334.70 MHz, (108.1 MHz LOC), 0.000 ddm

4.Standard Nav audio: 113 MHz, -76 dBm, 30% modulation @ 1 kHz or 1020 Hz.

5.Standard Com audio: 127 MHz, -76 dBm, 30% mod. with 1 kHz.

6.Standard Transmit Signal: 127 MHz: 1000 Hz modulated with 200 mVrms signal.

MICROPROCESSOR
CRYSTAL OSCILLATOR

Rx NORMAL OPERATION

OFFSET   0.0 Vdc
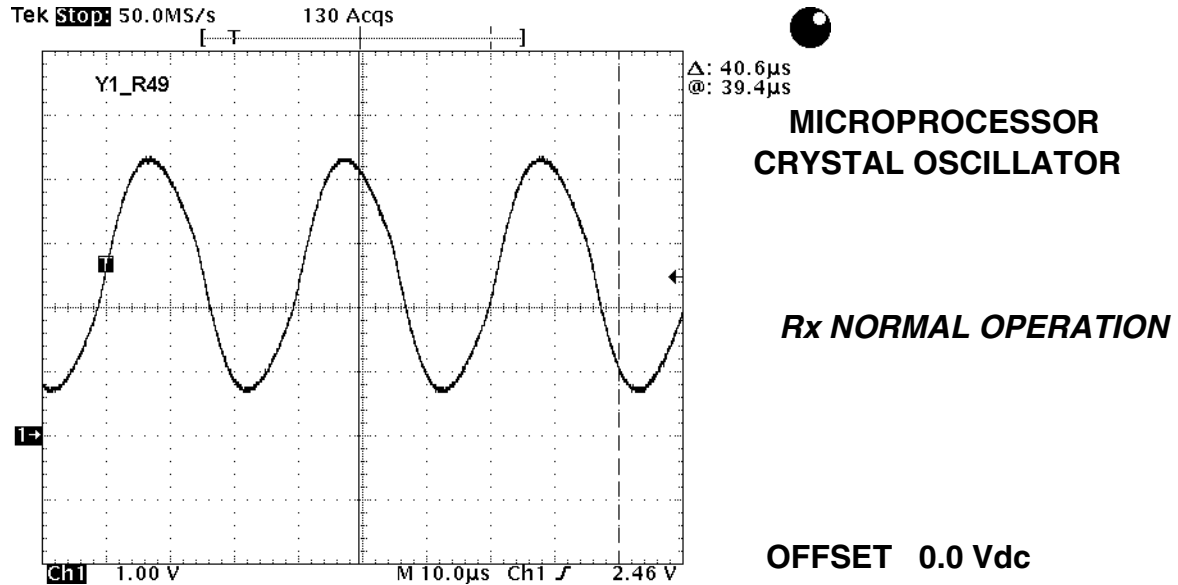
FIGURE 5-44 MAIN BOARD WAVEFORM AT Y1 AND R49
(DWG NO. 002-09059-0040, REV G, SHEET 1)

DISPLAY ENABLE

Rx NORMAL OPERATION

OFFSET   0.0 Vdc
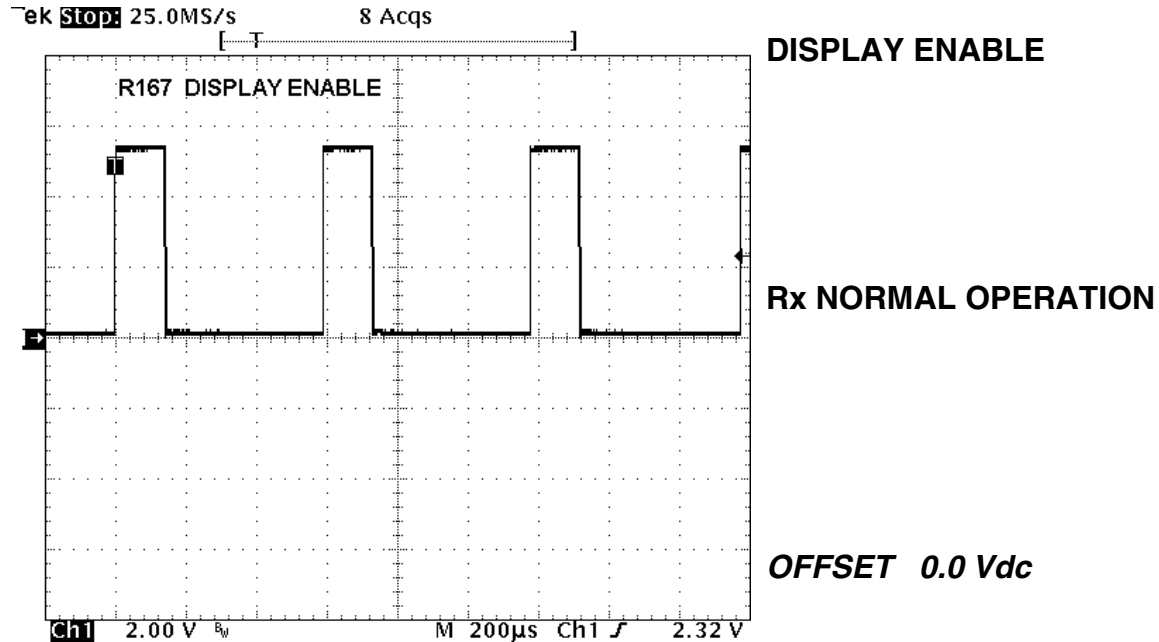
FIGURE 5-45 MAIN BOARD WAVEFORM AT U21 PIN 1
(DWG NO. 002-09059-0040, REV G, SHEET 1)

Tek **Stop:** 1.00GS/s   59 Acqs

U21 PINS 3, 4, 7, 8, 13, 14, 17, 18
TYPICAL

TYPICAL DATA FROM uP

Rx NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   2.00 V ᴮ�   M 500ns Ch1 ⌐   4.04 V
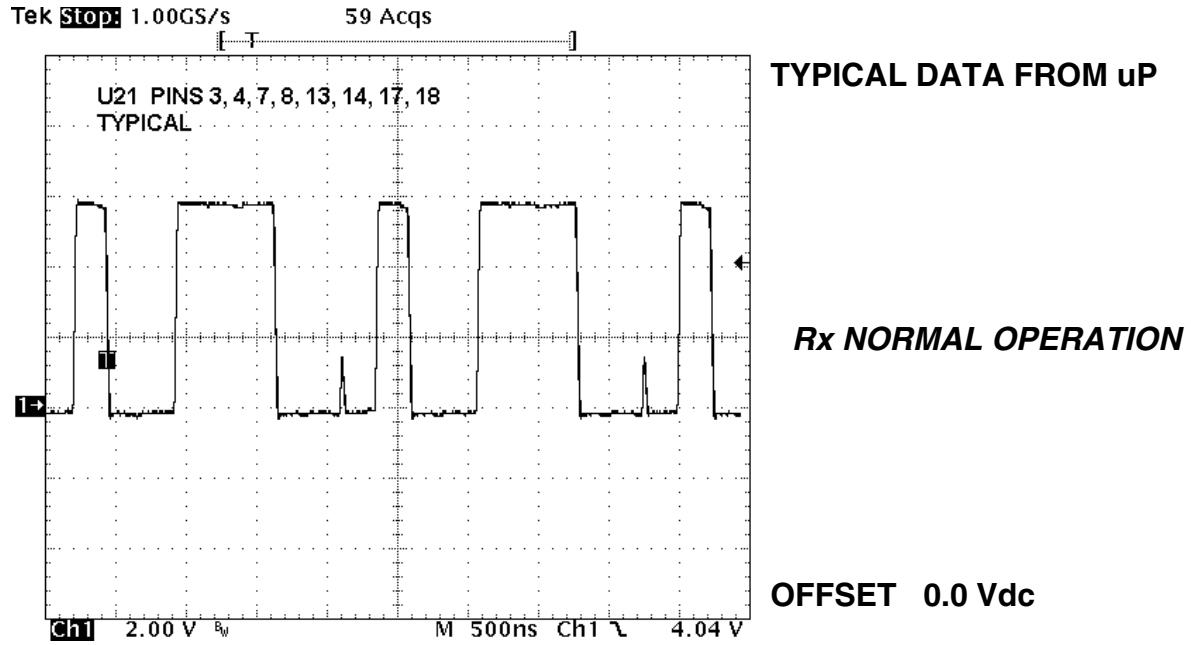
FIGURE 5-46 MAIN BOARD WAVEFORM AT U21 PIN 3
(DWG NO. 002-09059-0040, REV G, SHEET 1)

Tek **Stop:** 10.0GS/s ET   280 Acqs

U21 PIN 11

CLOCK FROM uP

Rx NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   2.00 V ᴮ�   M 50.0ns Ch1 ⌐   2.72 V
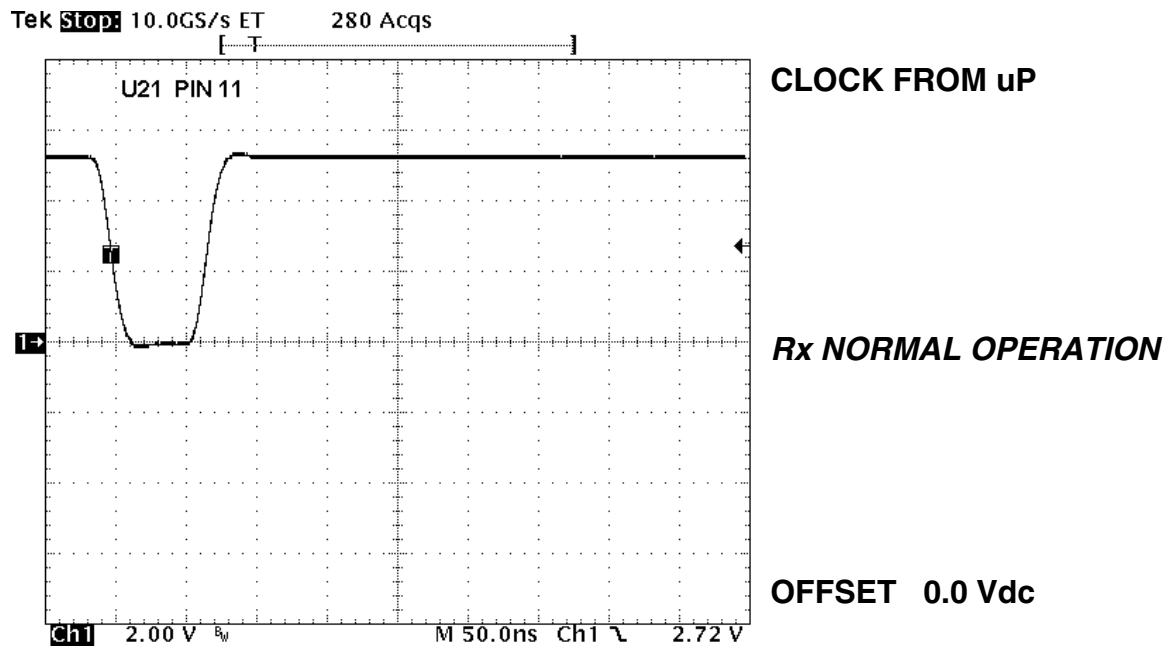
FIGURE 5-47 MAIN BOARD WAVEFORM AT U21 PIN 11
(DWG NO. 002-09059-0040, REV G, SHEET 1)

Tek **Stop:** 500MS/s   66 Acqs

U1 PIN 2

EPROM CLOCK

Rx NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   1.00 V Bw   M 10.0μs Ch1 ∫   2.06 V
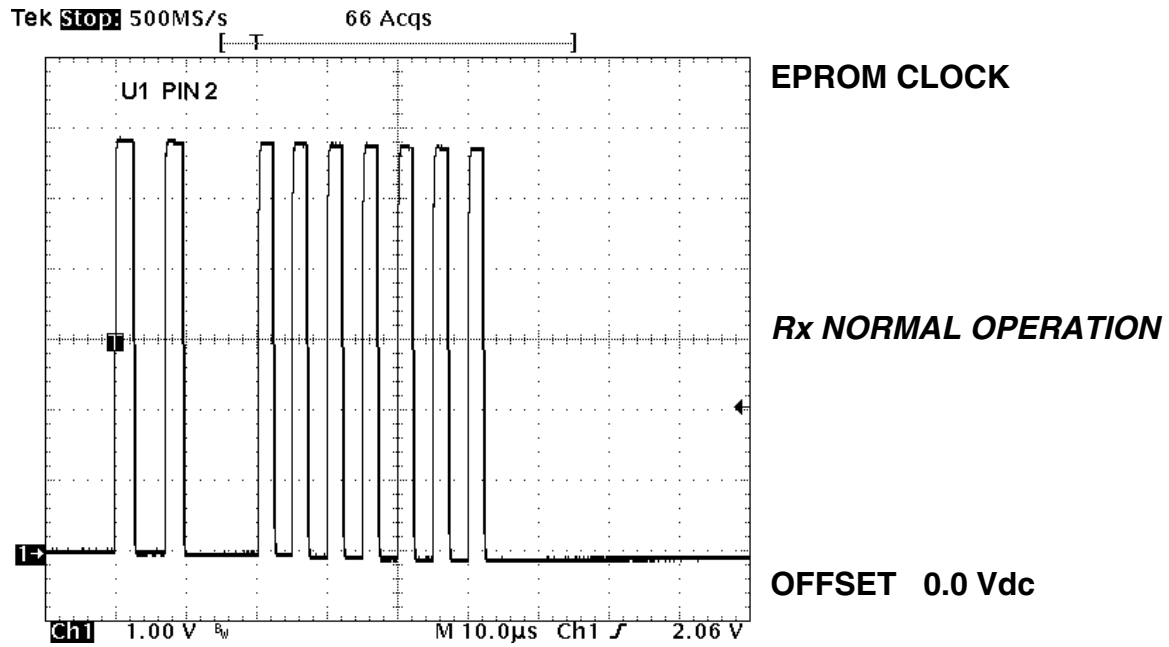
FIGURE 5-48 MAIN BOARD WAVEFORM AT U1 PIN 2
(DWG NO. 002-09059-0040, REV G, SHEET 2)

Tek **Stop:** 500MS/s   30 Acqs

U2 PIN 20

TYPICAL RAM ENABLE

Rx NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   2.00 V   M 1.00μs Ch1 ∫   2.52 V
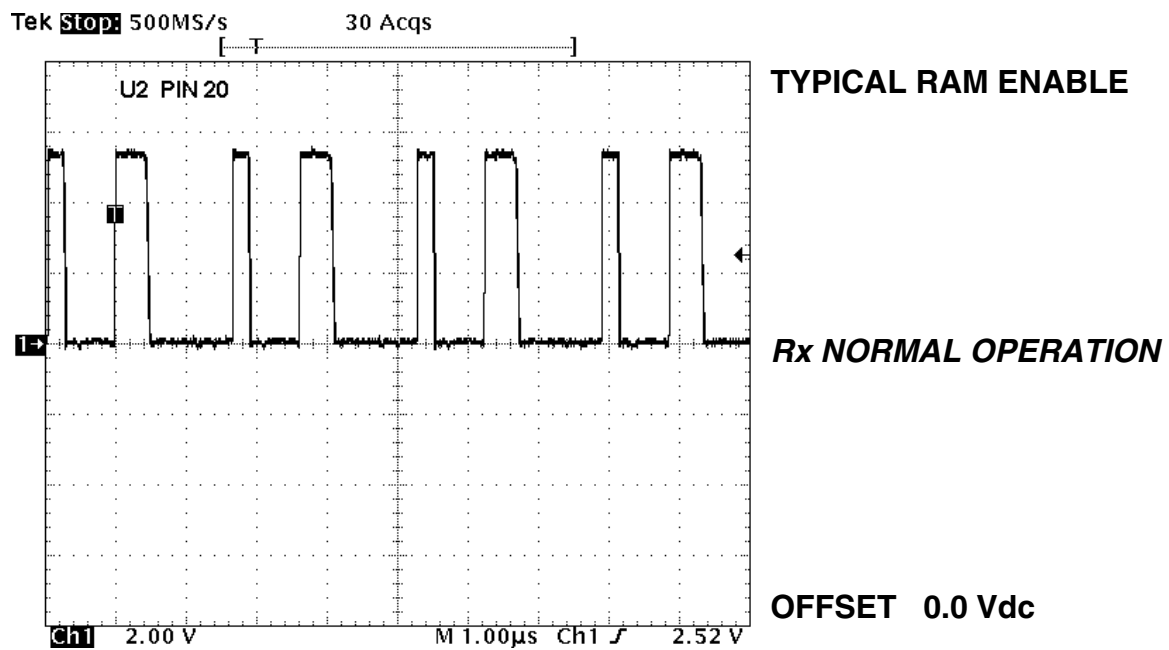
FIGURE 5-49 MAIN BOARD WAVEFORM AT U2 PIN 20
(DWG NO. 002-09059-0040, REV G, SHEET 2)

Tek **Stop:** 1.00GS/s   53 Acqs

U2 PIN 22 TYPICAL

Δ: 1.96µs
@: 2.04µs

**TYPICAL RAM
OUTPUT ENABLE**

RX NORMAL OPERATION

OFFSET 0.0 VDC

Ch1   2.00 V   ᴮᵂ   M 500ns Ch1 ⌐   4.04 V
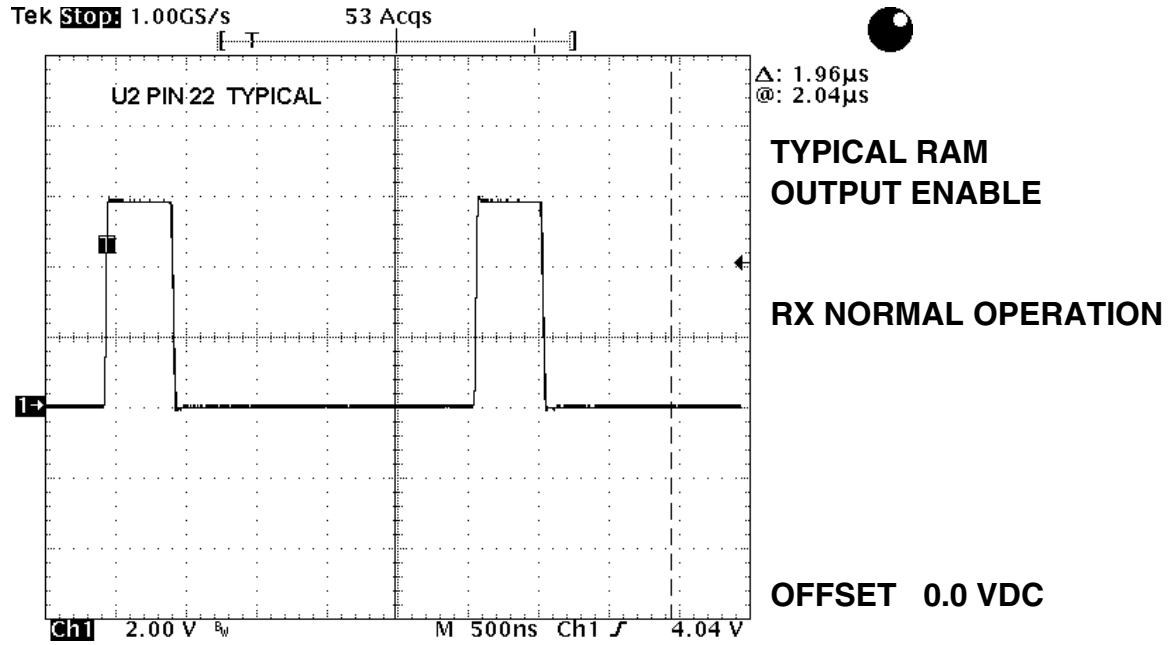
**FIGURE 5-50 MAIN BOARD WAVEFORM AT U2 PIN 22
(DWG NO. 002-09059-0040, REV G, SHEET 2)**

Tek **Stop:** 500MS/s   29 Acqs

U2 PIN 27 TYPICAL

TYPICAL RAM READ/WRITE

Rx NORMAL OPERATION

OFFSET 0.0 Vdc

Ch1   2.00 V   M 1.00µs Ch1 ⌐   2.52 V
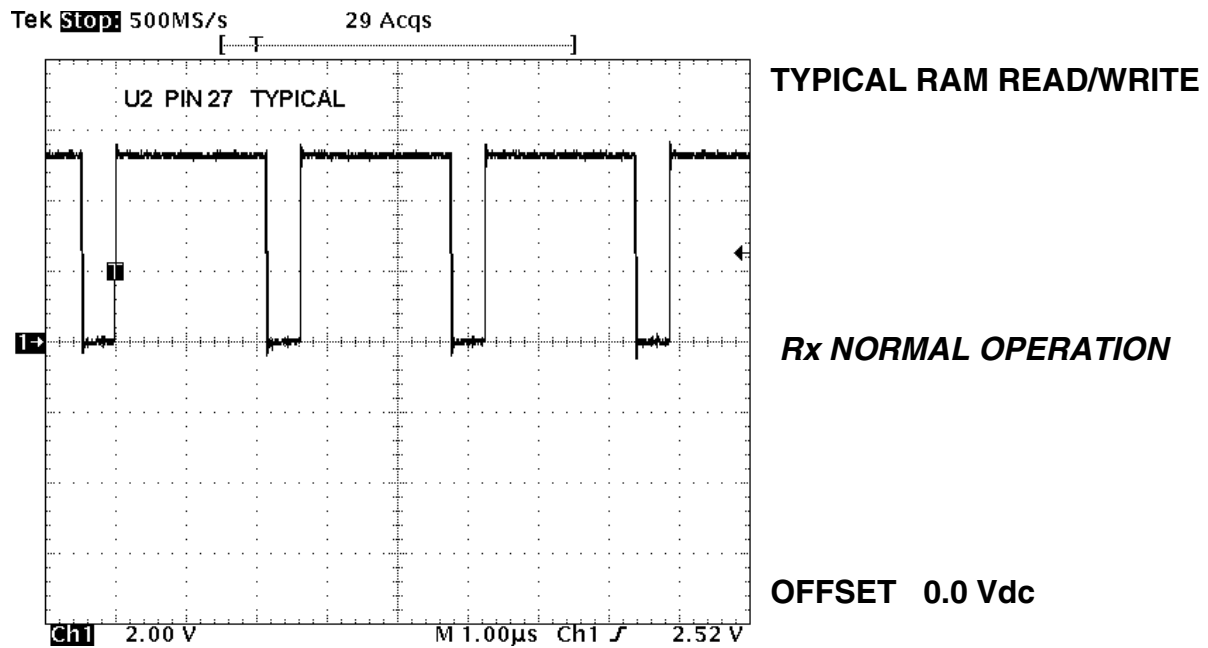
**FIGURE 5-51 MAIN BOARD WAVEFORM AT U2 PIN 27
(DWG NO. 002-09059-0040, REV G, SHEET 2)**

Tek **Stop:** 100kS/s 1283 Acqs

U34 PIN 8
300 mV MIC INPUT

**MIC COMPRESSOR/LIMITER
OUTPUT**

TX 300 mV RMS MIC INPUT

OFFSET   0.0 Vdc

Ch1 1.00 V M 500µs Ch1 20mV
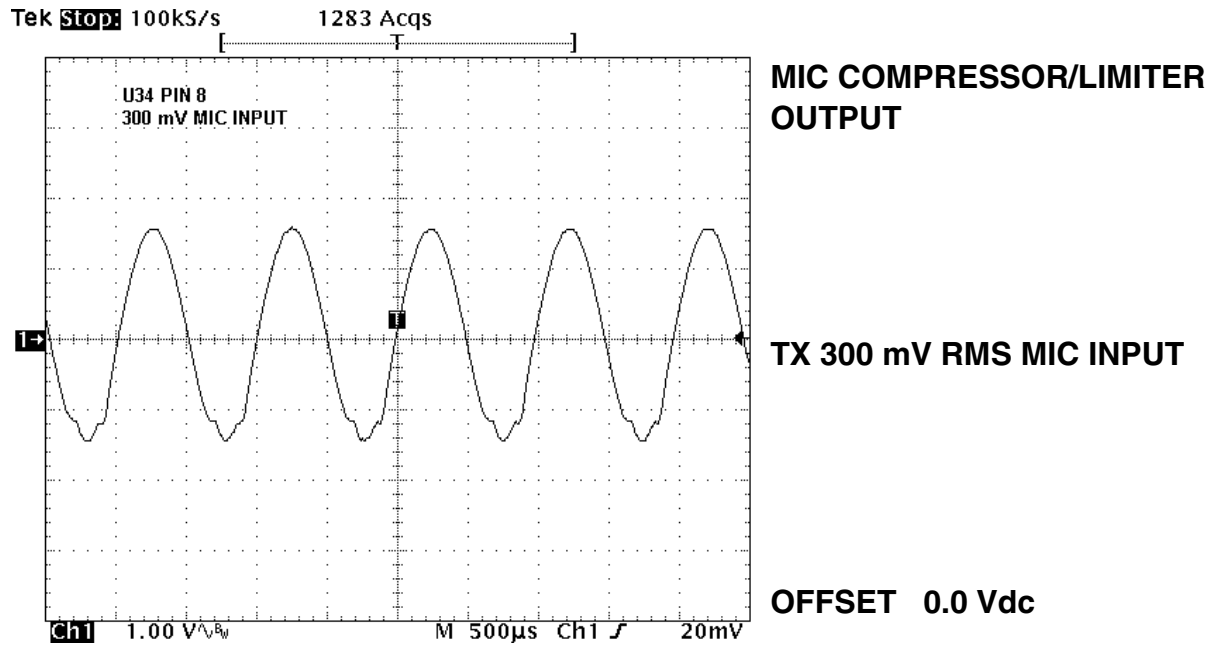
**FIGURE 5-52 MAIN BOARD WAVEFORM AT U34 PIN 8
(DWG NO. 002-09059-0040, REV G, SHEET 3)**

Tek **Stop:** 10.0MS/s 51 Acqs

U34 PIN 7
300 mV MIC INPUT

**COMPRESSION AMPLIFIER
OUTPUT**

Tx 300 mVrms MIC INPUT

OFFSET 0.0 Vdc

Ch1 2.00 V M 500µs Ch1 3.64 V
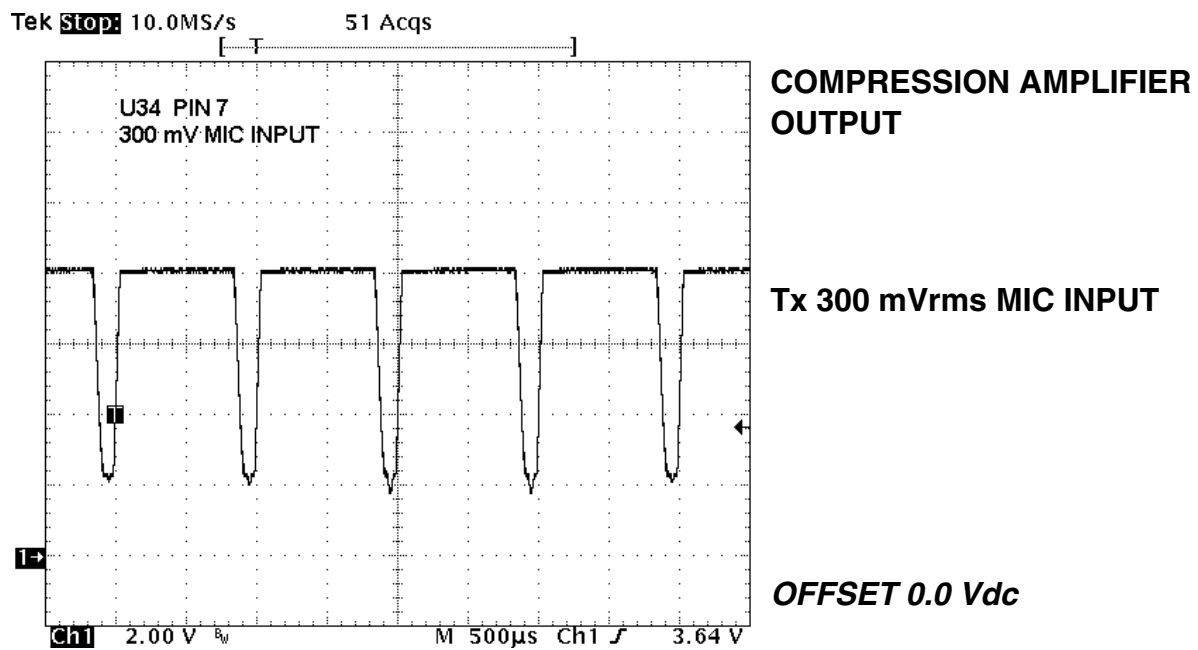
**FIGURE 5-53 MAIN BOARD WAVEFORM AT U34 PIN 7
(DWG NO. 002-09059-0040, REV G, SHEET 3)**

Tek **Stop:** 100kS/s   761 Acqs

U35 PIN 8   300 mV MIC INPUT

RESPONSE AMP OUTPUT

TX 300 mV RMS MIC INPUT

OFFSET   0.0 Vdc

Ch1   1.00 V∿ᴮw   M 500μs Ch1 ∫   20mV
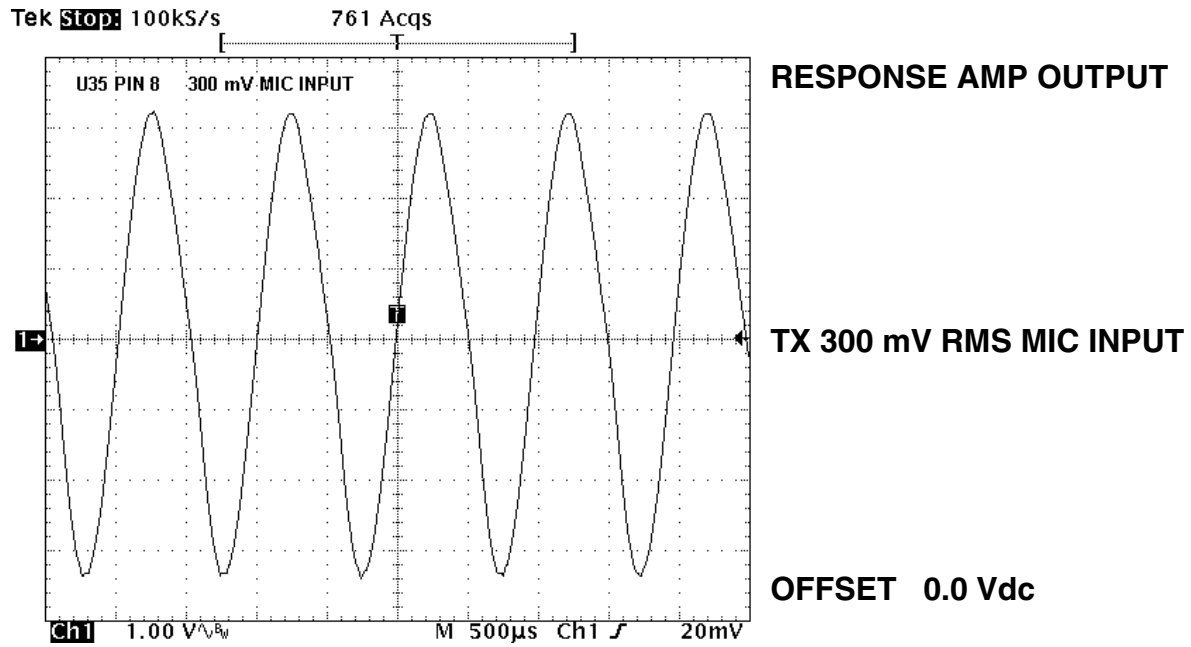
FIGURE 5-54 MAIN BOARD WAVEFORM AT U35 PIN 8
(DWG NO. 002-09059-0040, REV G, SHEET 3)

Tek **Stop:** 10.0MS/s   30 Acqs

J4 PIN 4

**LOW LEVEL
MODULATION TO
TRANSMITTER**

*TX, STANDARD
TRANSMIT SIGNAL*

OFFSET   3 - 5 Vdc TYP.

Ch1   500mV∿ᴮw   M 500μs Ch1 ∫   190mV
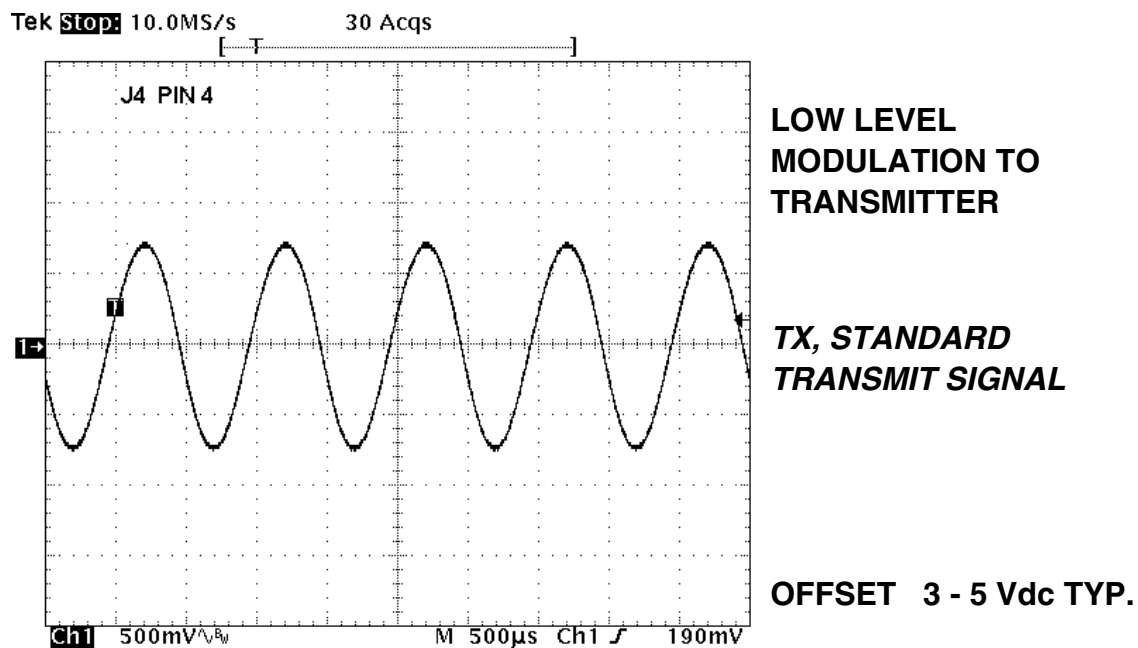
FIGURE 5-55 MAIN BOARD WAVEFORM AT J4 PIN 4
(DWG NO. 002-09059-0040, REV G, SHEET 3)

Tek **Stop:** 200kS/s   1 Acqs

J4 PIN 8

FINAL MODULATION
TO TRANSMITTER

*TX, STANDARD
TRANSMIT SIGNAL*

OFFSET -3V

Ch2   2 V∿   M 250µs   Ch2 ƒ   0 V
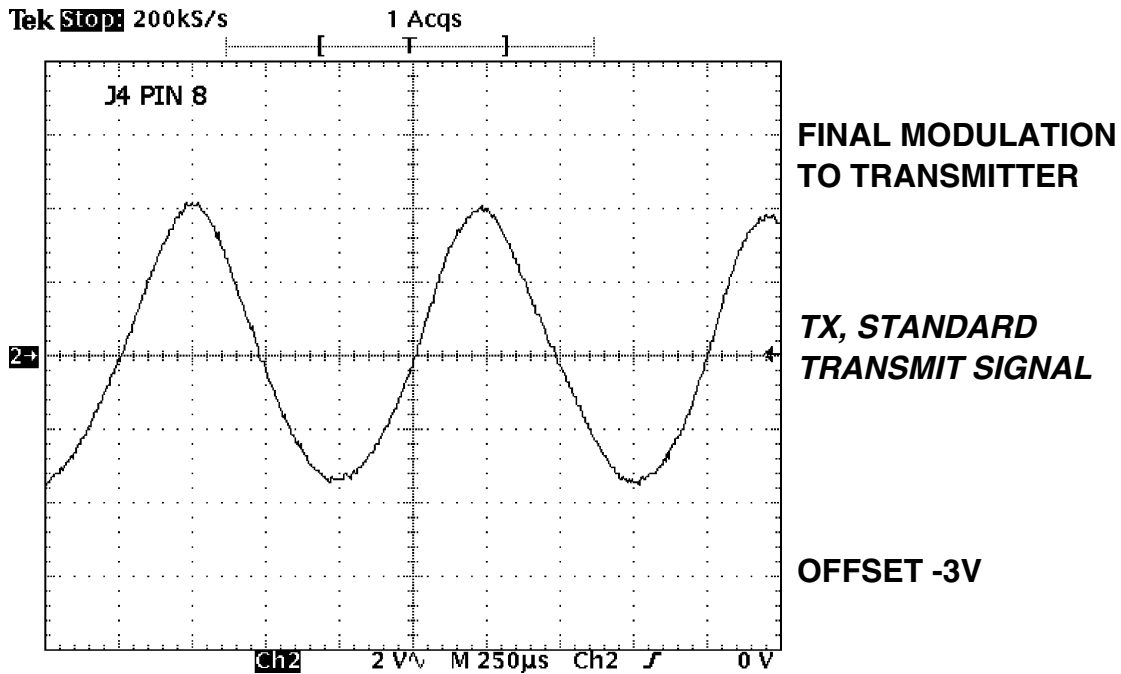
**FIGURE 5-56 MAIN BOARD WAVEFORM AT J4 PIN 8
(DWG NO. 002-09059-0040, REV G, SHEET 3)**

Tek Run: 10.0MS/s   Sample   **Trig?**

J4 PIN 2

FORWARD VOLTAGE
FROM TRANSMITTER

*Tx, STANDARD
TRANSMIT SIGNAL*

OFFSET 0.0 Vdc

Ch1   200mV ⅋   M 500µs Ch1 ƒ   3.00 V
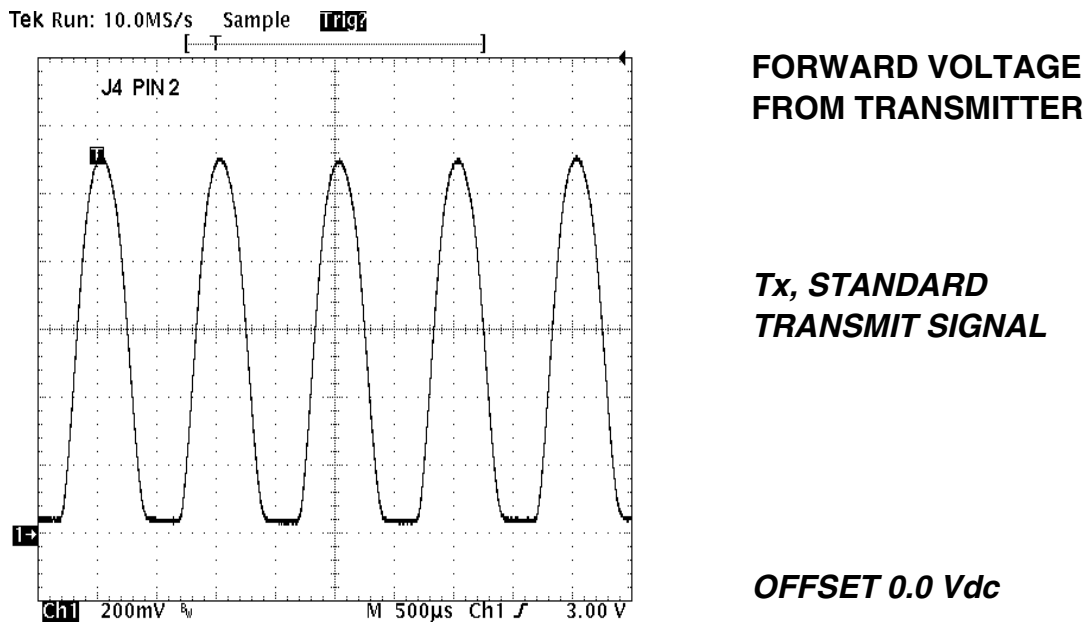
**FIGURE 5-57 MAINBOARD WAVEFORM AT J4 PIN 2
(DWG NO. 002-09059-0040, REV G, SHEET 3)**
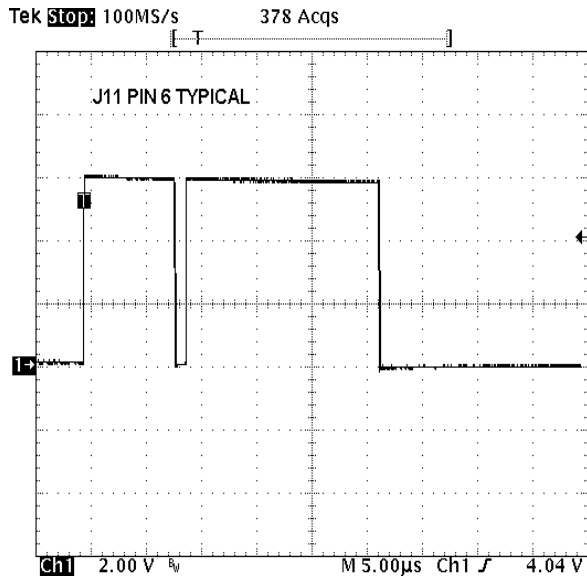
DISPLAY READ

RX, NORMAL OPERATION

OFFSET 0.0 Vdc

**FIGURE 5-58 MAIN BOARD WAVEFORM AT J11 PIN 6
(DWG NO. 002-09059-0040, REV G, SHEET 4)**
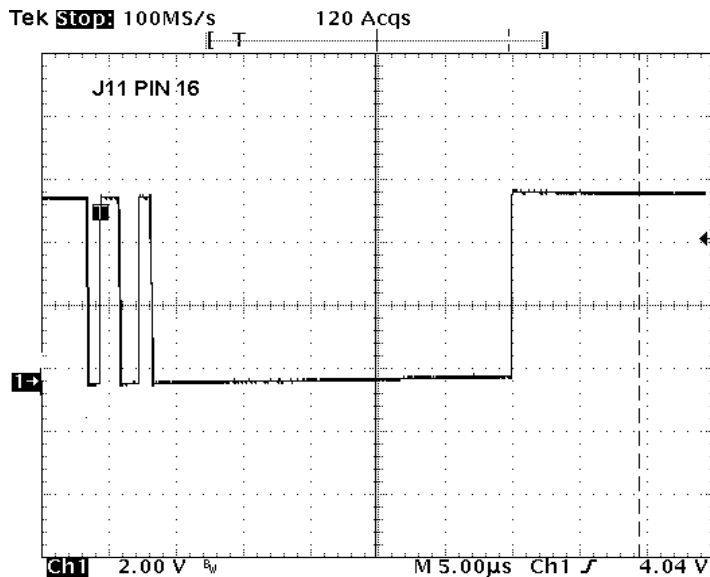
SERIAL DATA

RX, NORMAL OPERATION

OFFSET 0.0 Vdc

**FIGURE 5-59 MAIN BOARD WAVEFORM AT J11 PIN 16
(DWG NO. 002-09059-0040, REV G, SHEET 4)**
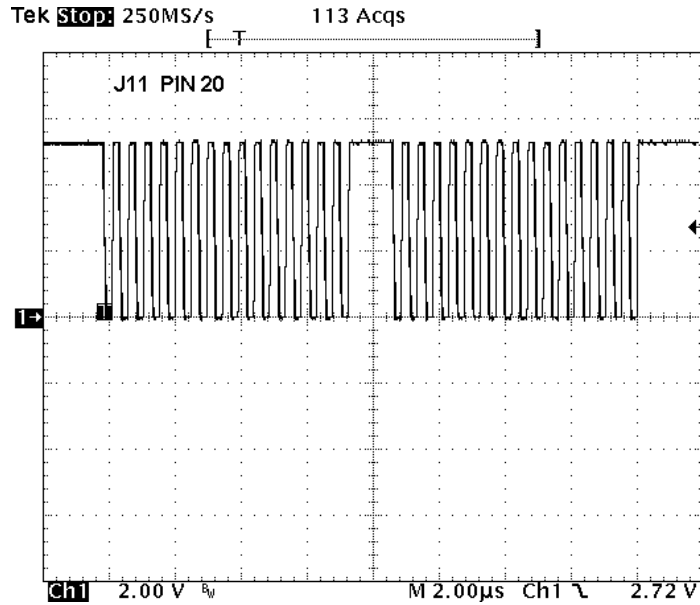
DISPLAY CLOCK

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

**FIGURE 5-60 MAIN BOARD WAVEFORM AT J11 PIN 20
(DWG NO. 002-09059-0040, REV G, SHEET 4)**
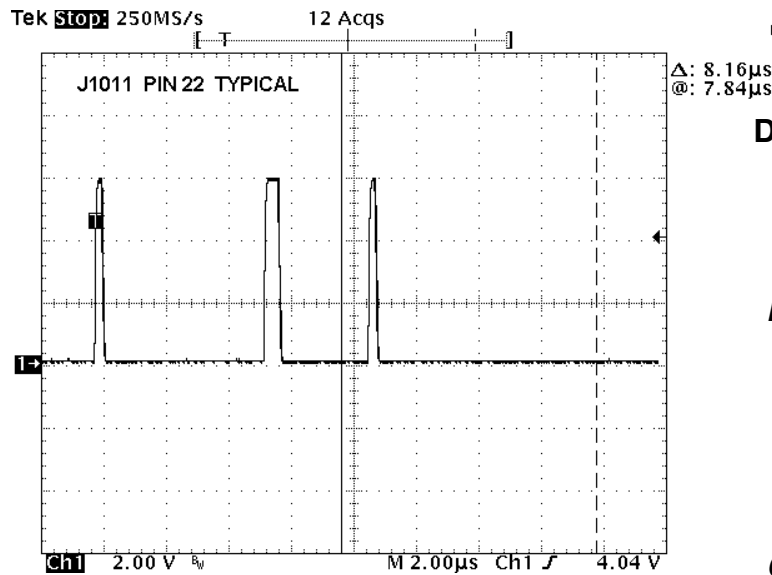
DISPLAY DATA

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

**FIGURE 5-61 MAIN BOARD WAVEFORM AT J11 PIN 22
(DWG NO. 002-09059-0040, REV G, SHEET 4)**

Tek **Stop:** 100kS/s   684 Acqs

COM AUDIO FILTER OUTPUT
VOL. CONT. MAX. CW

U29 PIN 7

C1 Freq
995.02 Hz

STANDARD COMM

OFFSET 2.5 Vdc

Ch1 100mV∿ℬw   M 500µs Ch1 ƒ   10mV   14 Sep 1998
10:03:09
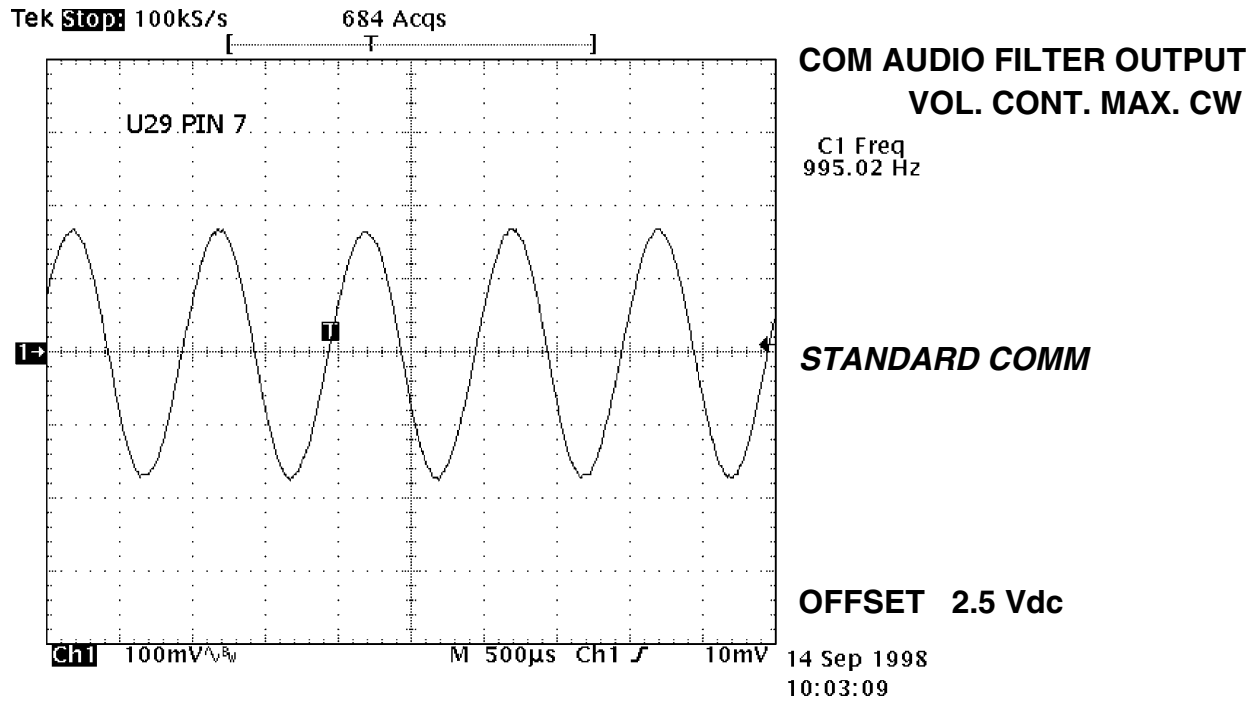
FIGURE 5-62 MAIN BOARD WAVEFORM AT U29 PIN 7
(DWG NO. 002-09059-0040, REV G, SHEET 6)

Tek **Stop:** 10.0MS/s   122 Acqs

NAV AUDIO FILTER OUTPUT
(VOL CONTROL MAX CW)

U29 PIN 8

STANDARD NAV AUDIO

OFFSET 0.0 Vdc

Ch1 500mV ℬw   M 500µs Ch1 ƒ   2.48 V
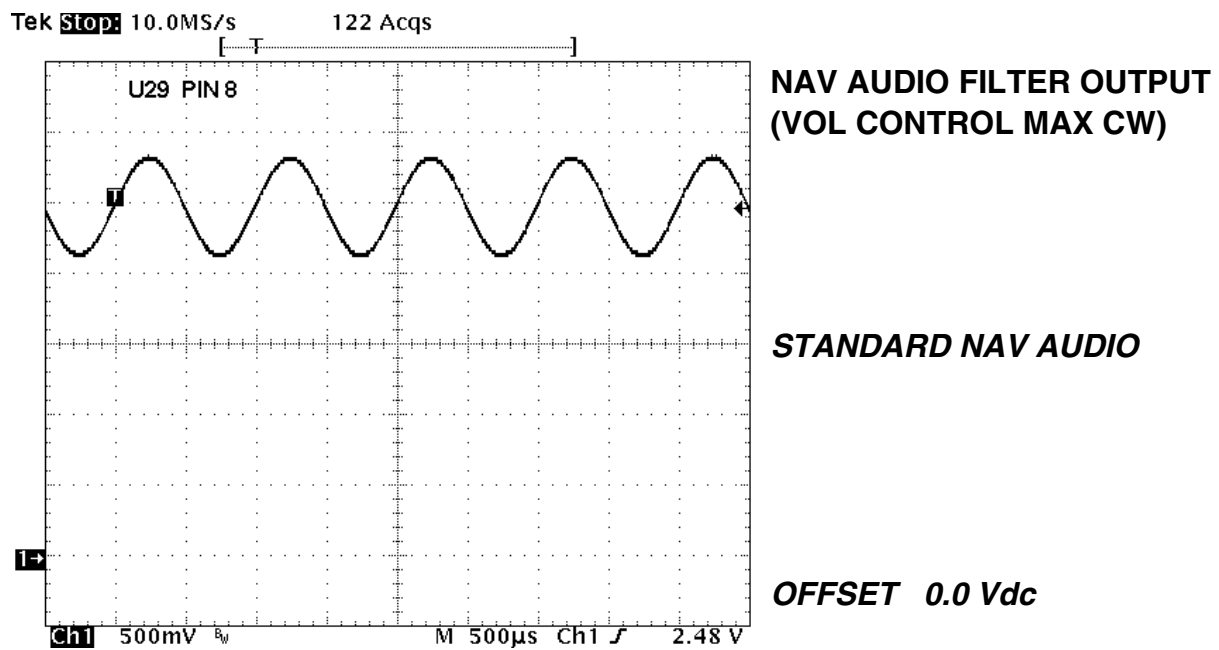
FIGURE 5-63 MAIN BOARD WAVEFORM AT U29 PIN 8
(DWG NO. 002-09059-0040, REV G, SHEET 6)
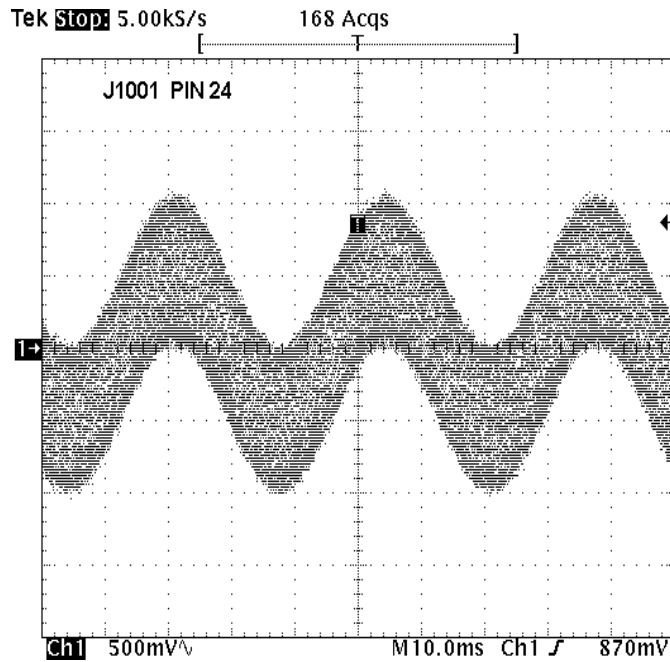
**FIGURE 5-64 MAIN BOARD WAVEFORM AT J1001 PIN 24
(DWG NO. 002-09059-0040, REV G, SHEET 7)**
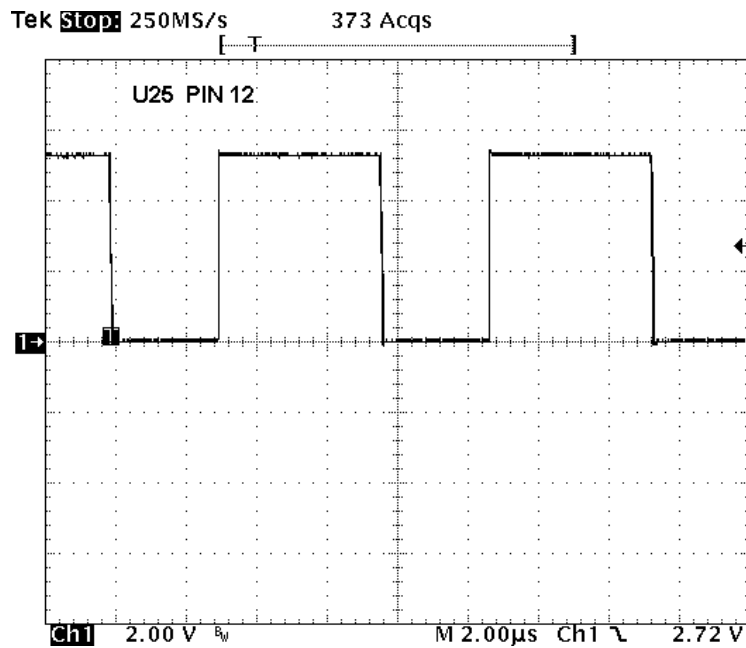
**FIGURE 5-65 MAIN BOARD WAVEFORM AT U25 PIN 12
(DWG NO. 002-09059-0040, REV G, SHEET 7)**

Tek **stop** 1.00GS/s   121 Acqs

Δ: 1.96μs
@: 2.04μs

U24 PINS 10 AND 11

POWER SUPPLY SYNC OSCILLATOR (MOD 5 UNITS ONLY)

RX NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   2.00 V   B_W   M 500ns Ch1   4.04 V
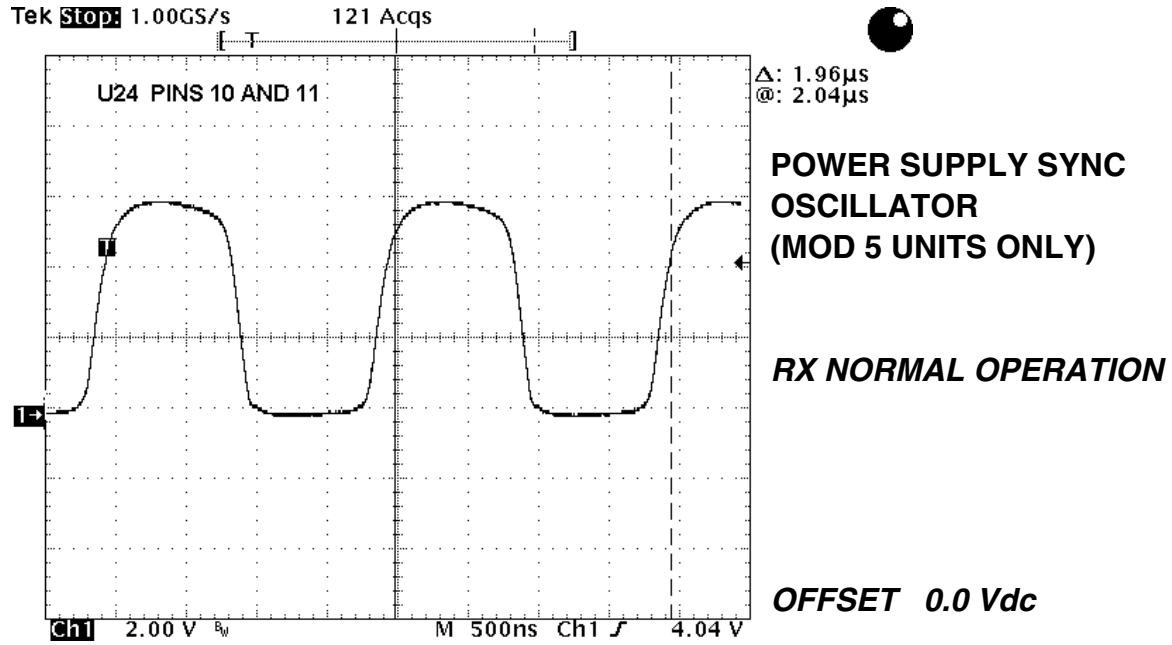
FIGURE 5-66 MAIN BOARD WAVEFORM AT U24 PIN 10
(DWG NO. 002-09059-0040, REV G, SHEET 7)

Tek Run: 1.00MS/s   Sample

Δ: 2.03ms
@: 1.97ms

U23 PIN 8

COM AUDIO AMP

STANDARD COMM

OFFSET   0.0 Vdc

Ch1   500mV   B_W   M 500μs Ch1   2.47 V
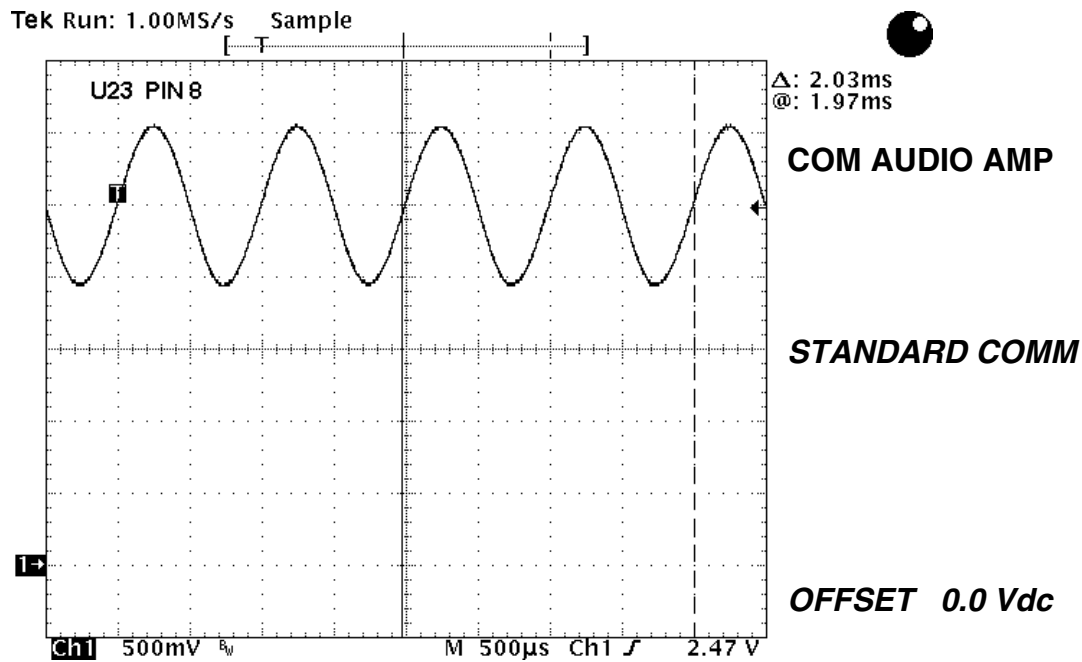
FIGURE 5-67 MAIN BOARD WAVEFORM AT U23 PIN 8
(DWG NO. 002-09059-0040, REV G, SHEET 8)

Tek **Stop:** 1.00MS/s   457 Acqs

U23 PIN 14

Δ: 2.03ms
@: 1.97ms

NAV AUDIO AMP

STANDARD NAV AUDIO

OFFSET   0.0 Vdc

Ch1   500mV   Bw   M 500µs Ch1 ƒ   2.47 V
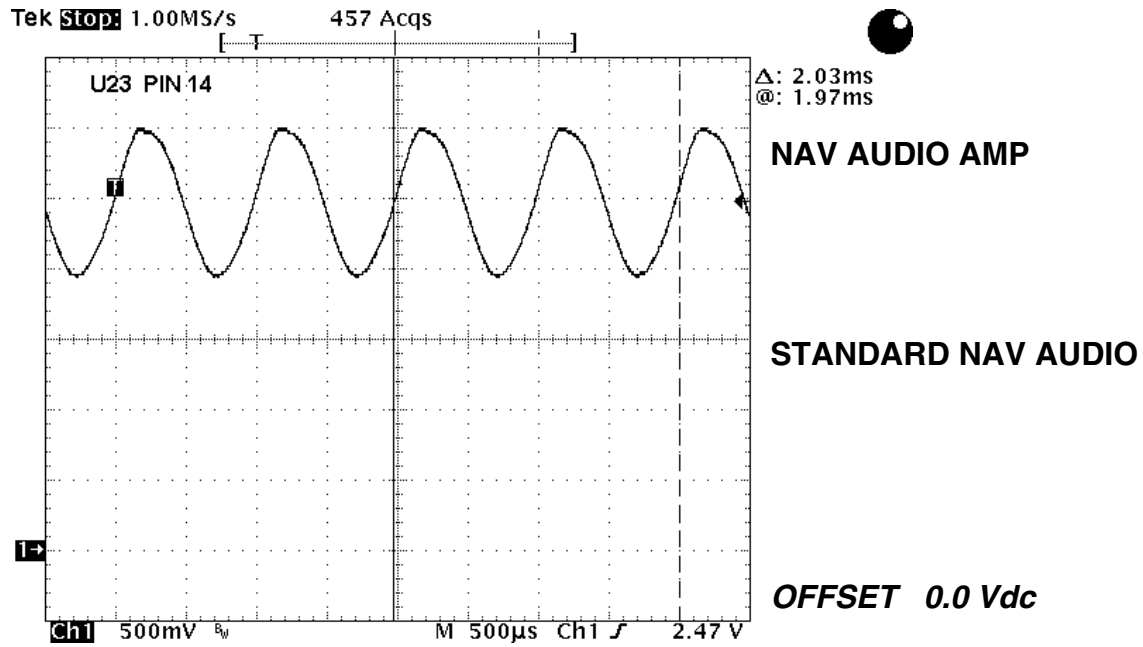
**FIGURE 5-68 MAIN BOARD WAVEFORM AT U23 PIN 14
(DWG NO. 002-09059-0040, REV G, SHEET 8)**

Tek **Stop:** 1.00MS/s   1089 Acqs

U15 PIN 8

**9960 Hz BPF
FILTER OUTPUT**

STANDARD VOR

OFFSET   2.5 VdC

Ch1   500mV   Bw   M 50.0µs Ch1 ƒ   1.23 V
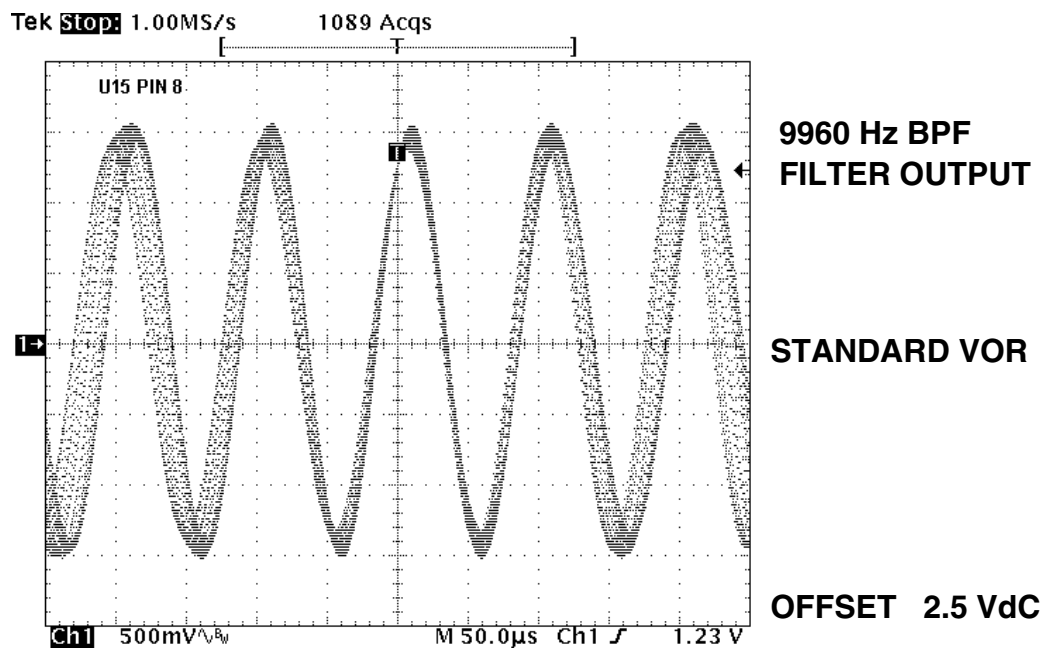
**FIGURE 5-69 MAINBOARD WAVEFORM AT U15 PIN 8 VOR SIGNAL
(DWG NO. 002-09059-0040, REV G, SHEET 9)**

Tek **Stop:** 5.00kS/s   67 Acqs

U15 PIN 14

DISCRIMINATOR
LOW PASS FILTER

STANDARD VOR INPUT

OFFSET   2.5 VdC

Ch1   1.00 V∿ʙᵥ   M10.0ms Ch1 ∫   0 V
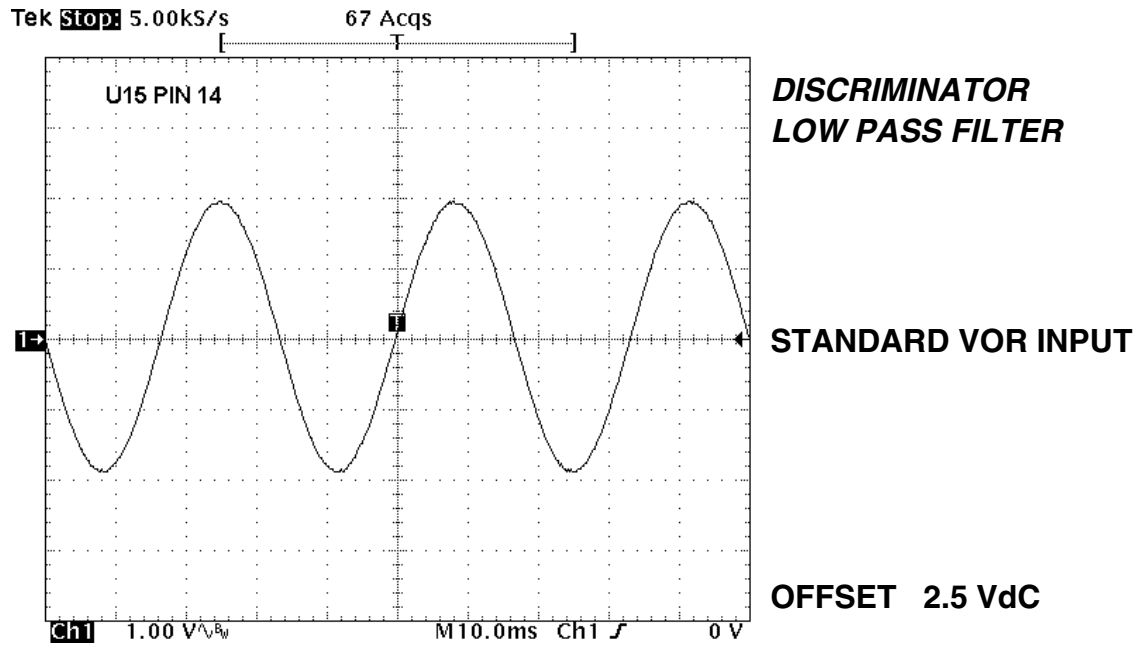
FIGURE 5-70 MAINBOARD WAVEFORM AT U15 PIN 14
(DWG NO. 002-09059-0040, REV G, SHEET 9)

Tek **Stop:** 2kS/s   4 Acqs

U15 PIN 7

REFERENCE
PHASE 30 HZ OUTPUT

STANDARD VOR INPUT

OFFSET   2.5 VdC

Ch1   1 V∿   M 25ms Ch1 ∫   −20mV
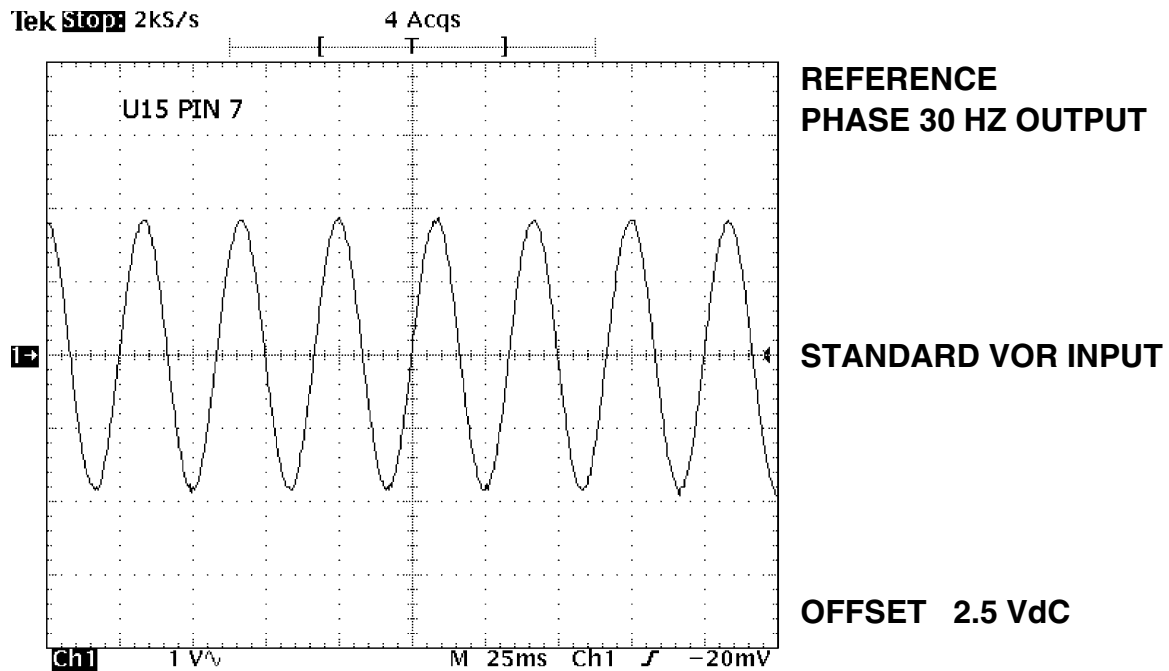
FIGURE 5-71 MAIN BOARD WAVEFORM AT U15 PIN 7
(DWG NO. 002-09059-0040, REV G, SHEET 9)

FILTERED NAV COMPOSITE
VARIABLE PHASE 30 HZ

STANDARD VOR INPUT

OFFSET   2.5 VdC
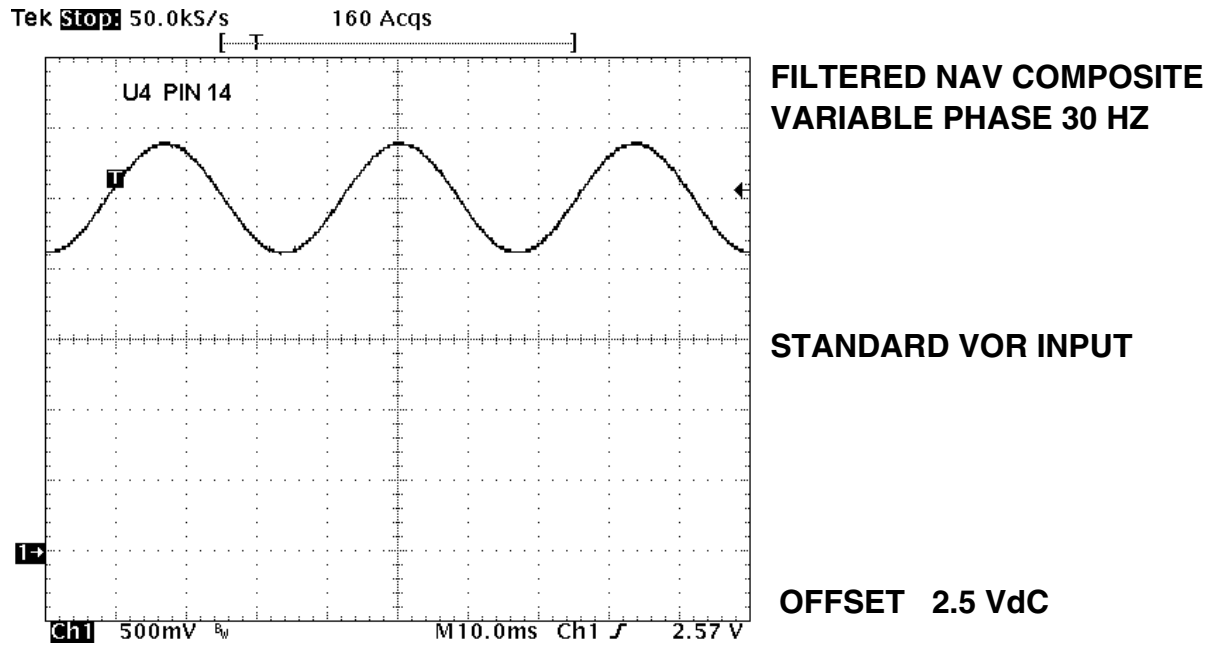
FIGURE 5-72 MAIN BOARD WAVEFORM AT U4 PIN 14
(DWG NO. 002-09059-0040, REV G, SHEET 9)

FILTERED GS COMPOSITE
(MOD 5 UNITS ONLY)

STD GS INPUT

OFFSET   2.5 VdC
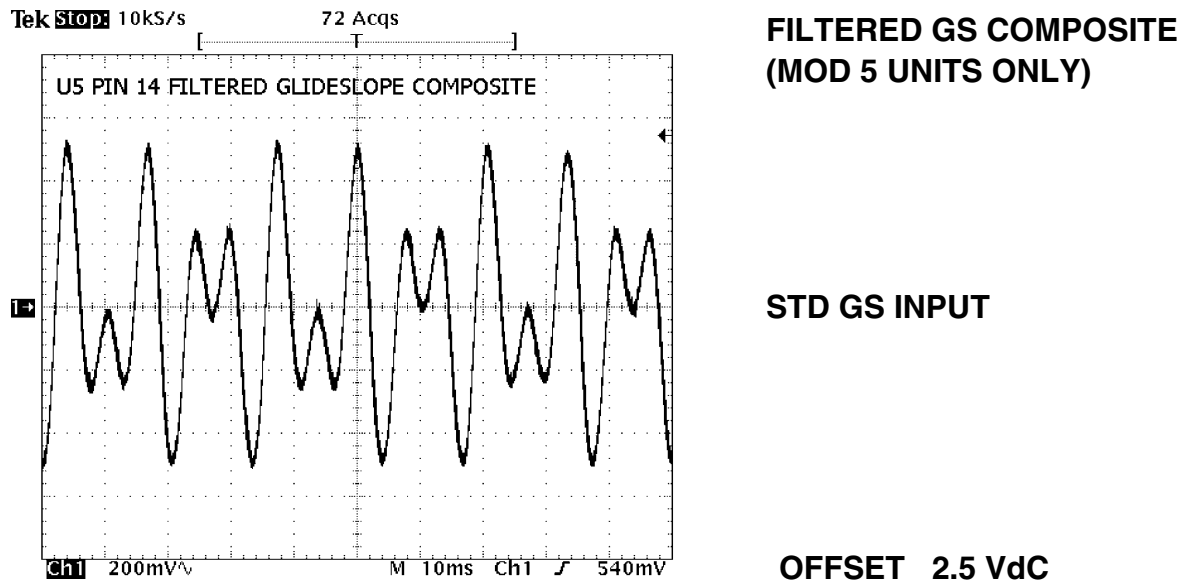
FIGURE 5-73 MAIN BOARD WAVEFORM AT U5 PIN 14
(DWG NO. 002-09059-0040, REV G, SHEET 9)

Tek **Stop** 100kS/s   468 Acqs

NAV AUDIO FILTER

U17 PIN 1

STANDARD NAV AUDIO

OFFSET   4.0 Vdc

Ch1   500mV∿ᴮw   M 500µs Ch1 ƒ   10mV
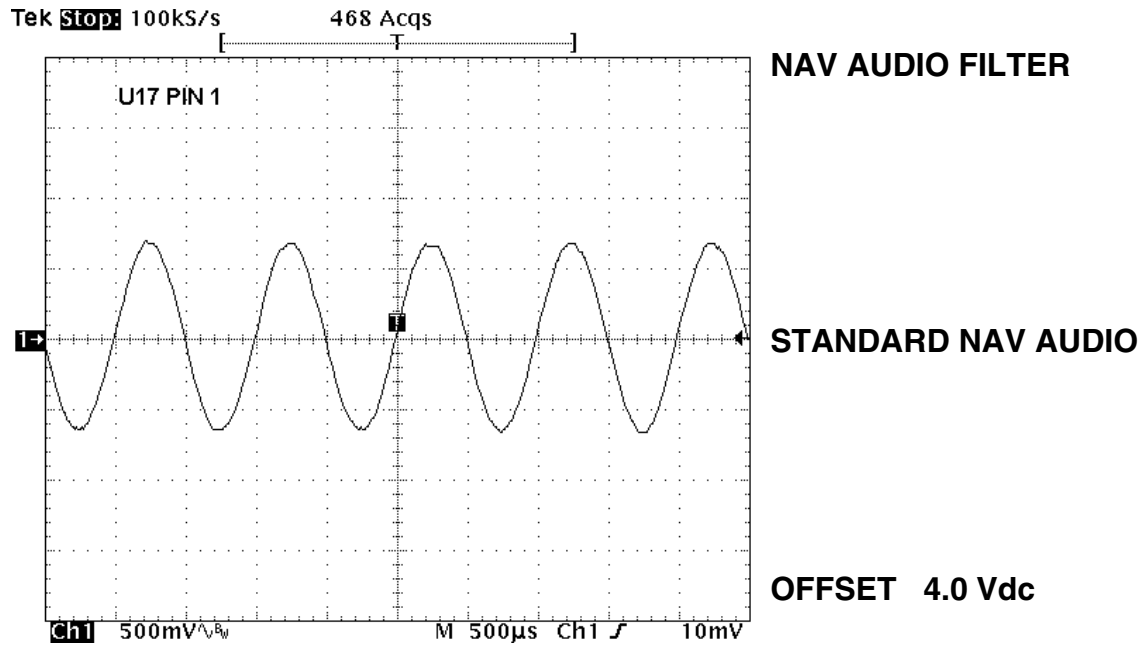
FIGURE 5-74 MAINBOARD WAVEFORM AT U17 PIN 1, 1KHZ 30% MOD.
(DWG NO. 002-09059-0040, REV G, SHEET 10)

Tek **Stop** 100kS/s   247 Acqs

NAV AUDIO FILTER
SECOND STAGE

U17 PIN 7

STANDARD NAV AUDIO

OFFSET   4.0 VdC

Ch1   500mV∿ᴮw   M 500µs Ch1 ƒ   10mV
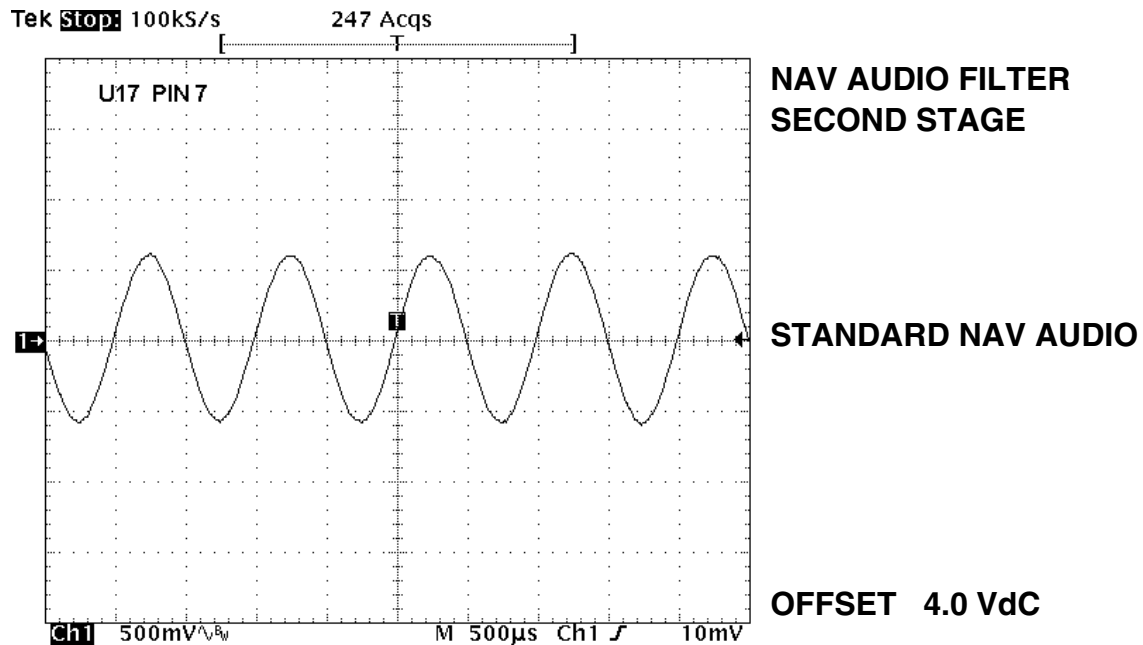
FIGURE 5-75 MAIN BOARD WAVEFORM AT U17 PIN 7
(DWG NO. 002-09059-0040, REV G, SHEET 10)

Tek **Stop:** 100kS/s   1507 Acqs

U29 PIN 14   IDENT SWITCH IN

NAV AUDIO AMP

IDENT SWITCH IN

STANDARD NAV AUDIO

OFFSET   2.5 VdC

Ch1   100mV∿ᴮᵂ   M 500µs   Ch1 ƒ   12mV
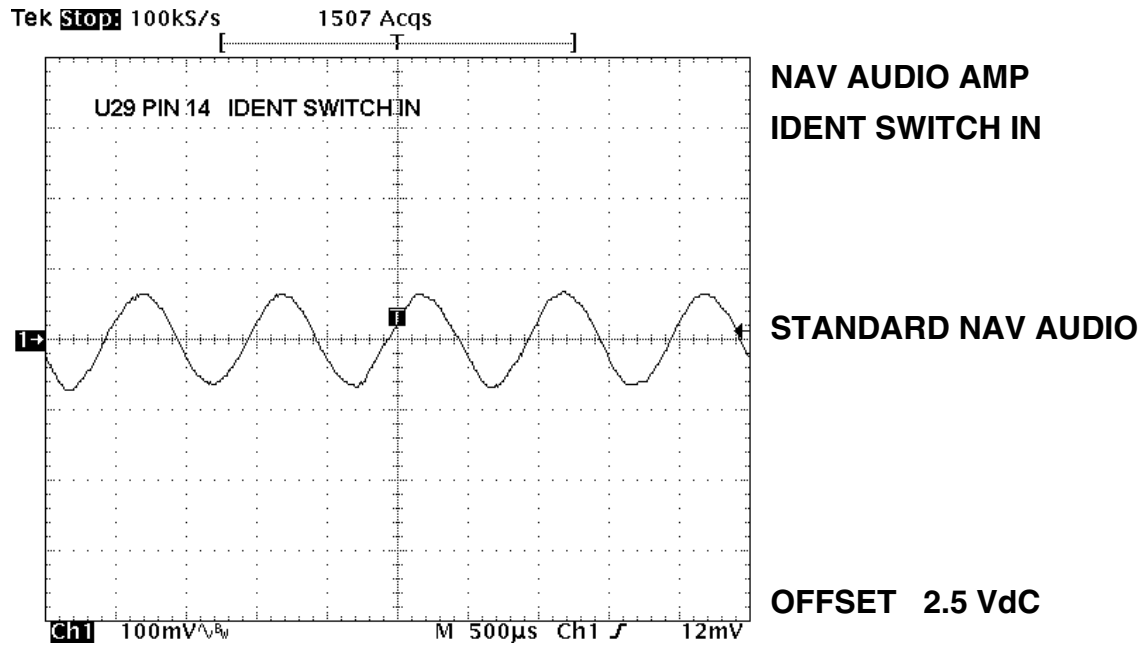
FIGURE 5-76 MAIN BOARD WAVEFORM AT U29 PIN 14
(DWG NO. 002-09059-0040, REV G, SHEET 10)

Tek **Stop:** 100kS/s   145 Acqs

U29 PIN 14   IDENT SWITCH OUT

NAV AUDIO FILTER

IDENT SWITCH OUT

STANDARD NAV AUDIO

OFFSET   2.5 VdC

Ch1   200mV∿ᴮᵂ   M 500µs   Ch1 ƒ   8mV
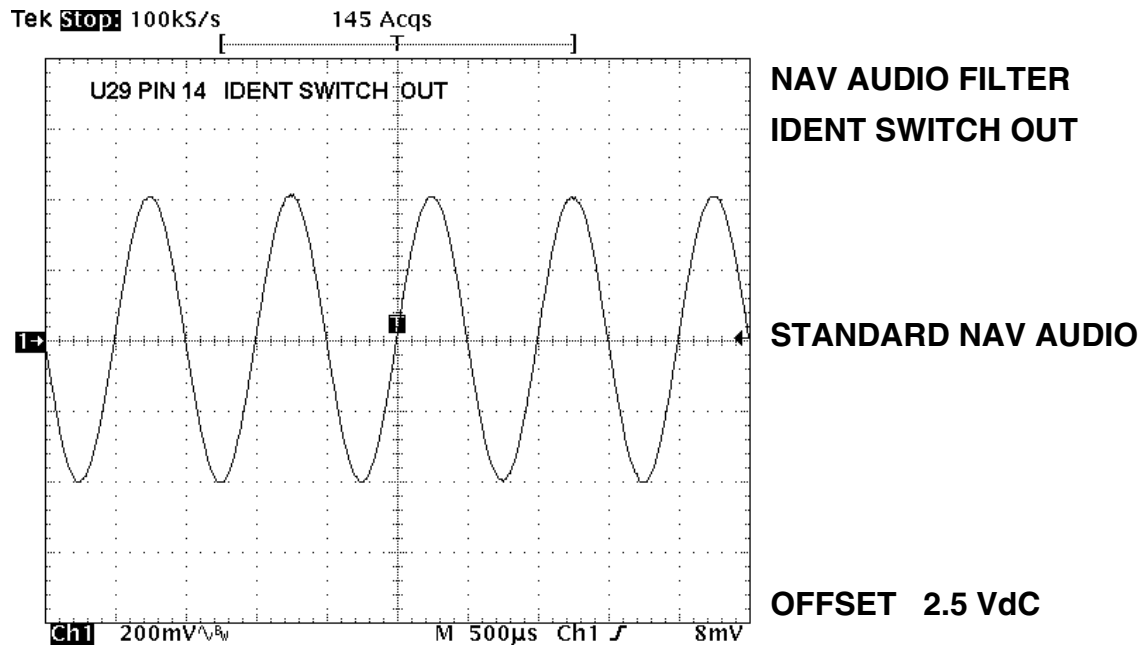
FIGURE 5-77 MAIN BOARD WAVEFORM AT U29 PIN 14
(DWG NO. 002-09059-0040, REV G, SHEET 10)

Tek Stop: 100kS/s   185 Acqs

△: 20.3ms
@: 19.7ms

P1001 PIN H
LOC COMPOSITE

LOCALIZER COMPOSITE

STANDARD LOCALIZER

OFFSET   2.8 Vdc

Ch1 500mV   M5.00ms Ch1   510mV
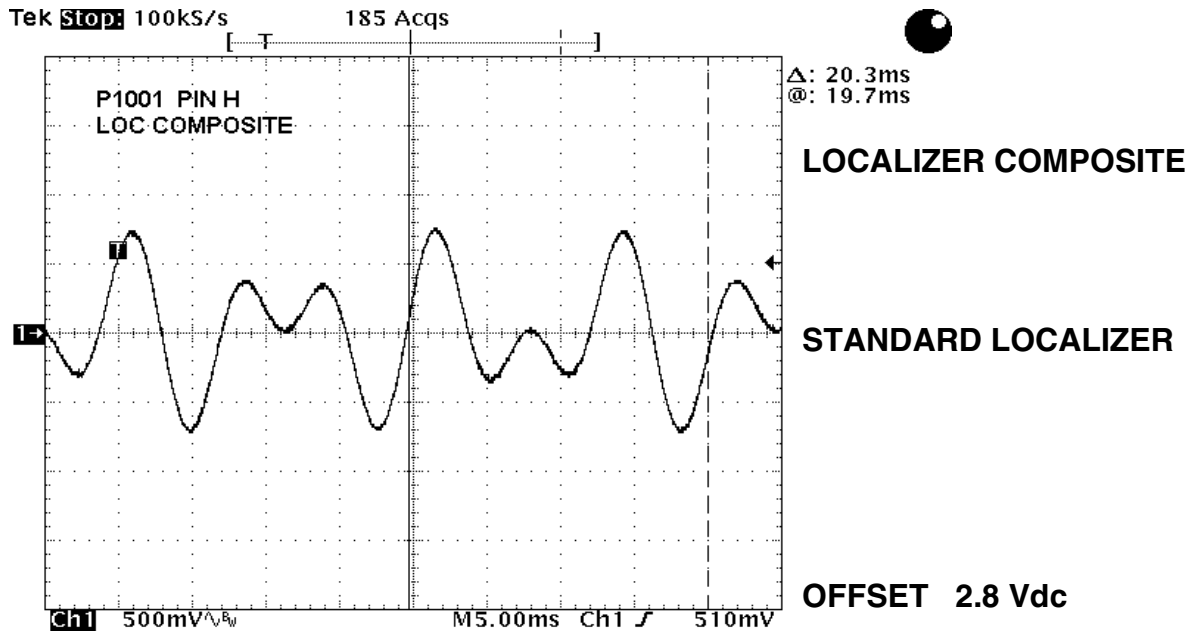
**FIGURE 5-78 MAIN BOARD WAVEFORM AT VOR/LOC COMPOSITE OUT, P1001 PIN H
(DWG NO. 002-09059-0040, REV G, SHEET 6)**

Tek Stop: 250MS/s   168 Acqs

Q45 DRAIN

**SWITCHING
FET, Q45 DRAIN**

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1 10.0 V   M 2.00µs Ch1   2.6 V
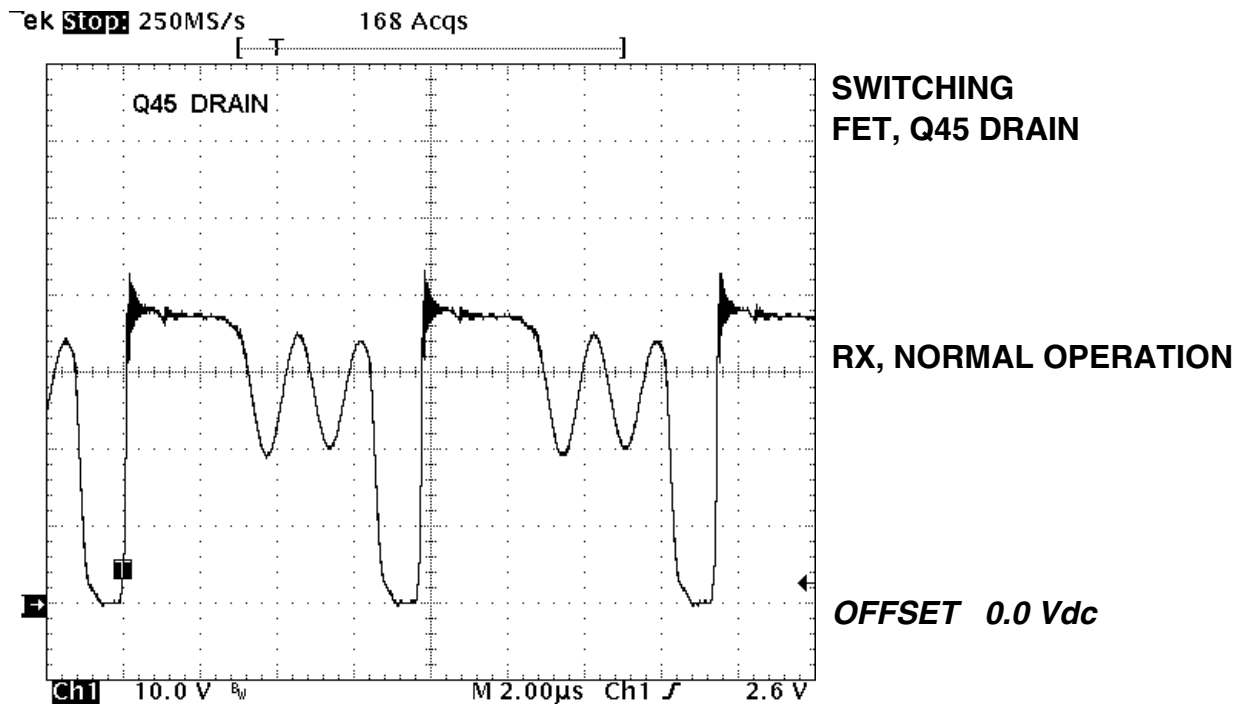
**FIGURE 5-79 MAIN BOARD WAVEFORM AT DRAIN OF Q45
(DWG NO. 002-09059-0040, REV G, SHEET 11)**

Tek **Stop** 20MS/s   1 Acqs

R346 AND R320

**SWITCHING
FET, Q45 SOURCE**

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1 50mV   M 2.5µs Ch1 ∫ 100mV
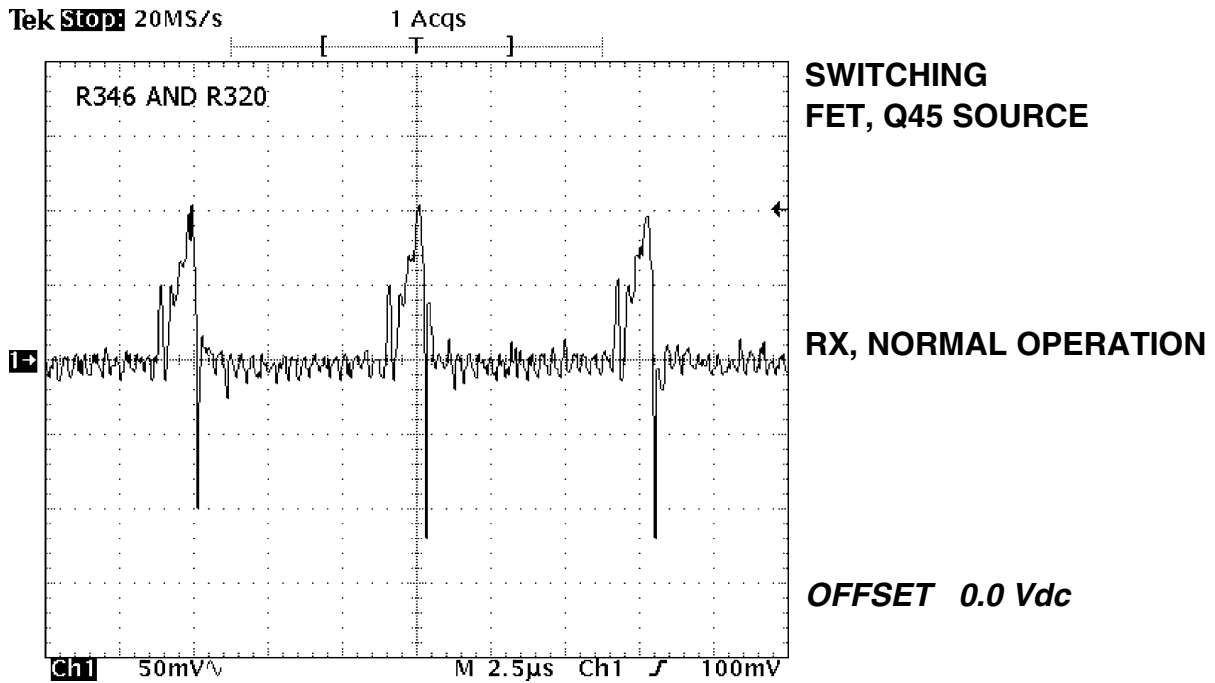
**FIGURE 5-80 MAINBOARD WAVEFORM AT Q45 SOURCE
(DWG NO. 002-09059-0040, REV G, SHEET 11)**

Tek **Stop** 20MS/s   18 Acqs

U 36 PIN 1

SWITCHER DRIVE

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1 5 V   M 2.5µs Ch1 ∫ 7.5 V
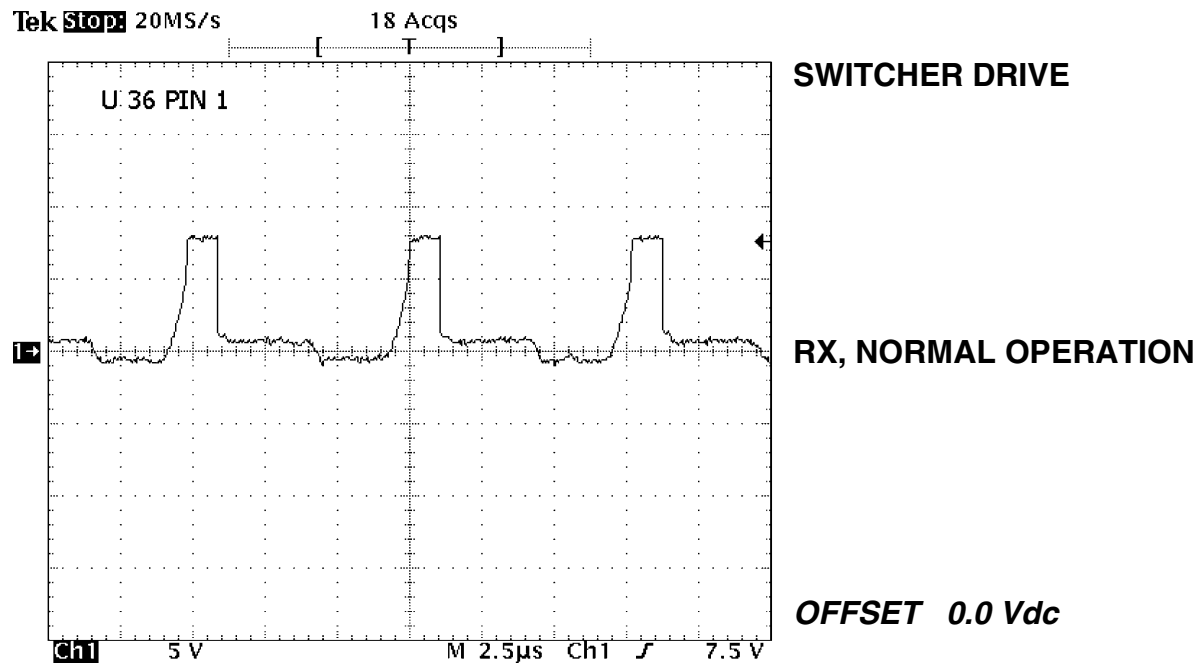
**FIGURE 5-81 MAINBOARD WAVEFORM AT U36 PIN 1
(DWG NO. 002-09059-0040, REV G, SHEET 11)**

Tek **Stop:** 20MS/s   613 Acqs

U36 PIN 4

PS SYNC

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   5 V   M 2.5µs Ch1 ƒ   1.5 V
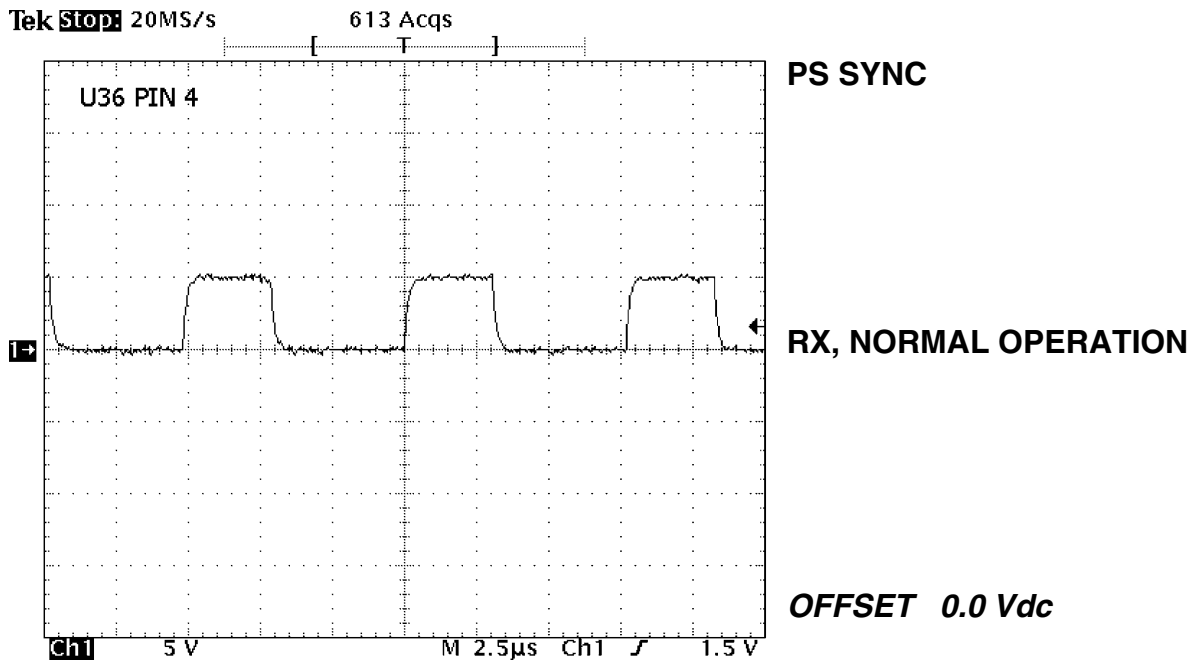
FIGURE 5-82 MAIN BOARD WAVEFORM AT U36 PIN 4
(DWG NO. 002-09059-0040, REV G, SHEET 11)

Tek **Stop:** 20MS/s   109 Acqs

U36 PIN 5

SWITCHER R/C

RX, NORMAL OPERATION

OFFSET   0.0 Vdc

Ch1   500mV   M   5µs Ch1 ƒ   950mV
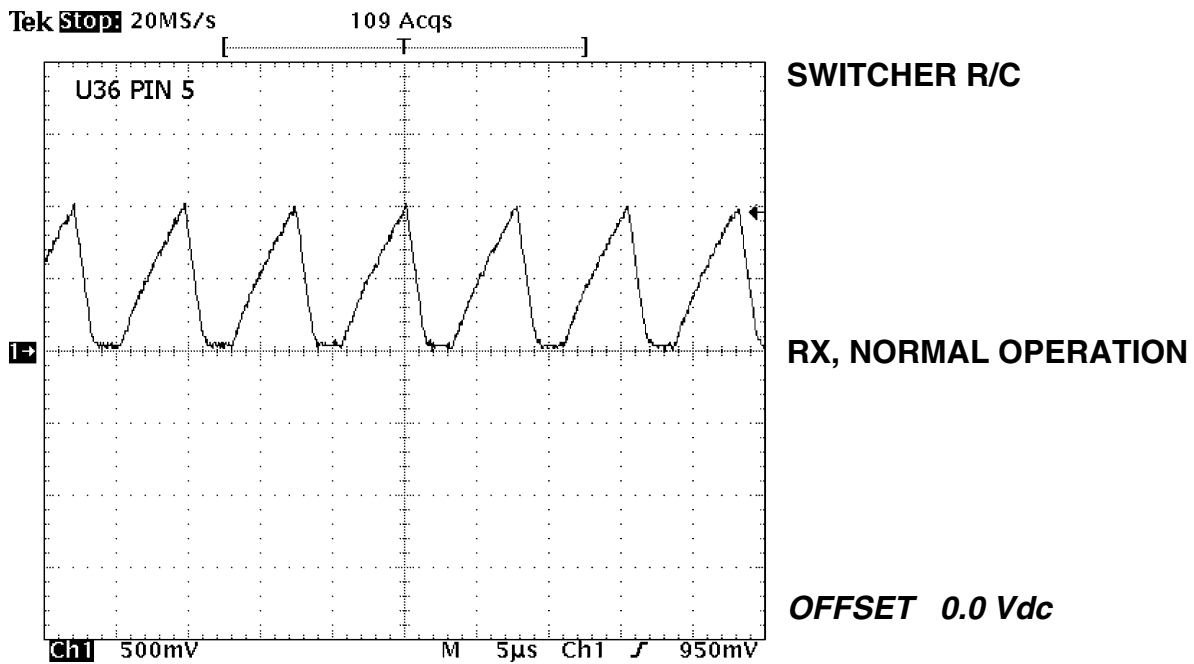
FIGURE 5-83 MAIN BD WAVEFORM AT U36 PIN 5
(DWG NO. 002-09059-0040, REV G, SHEET 11)
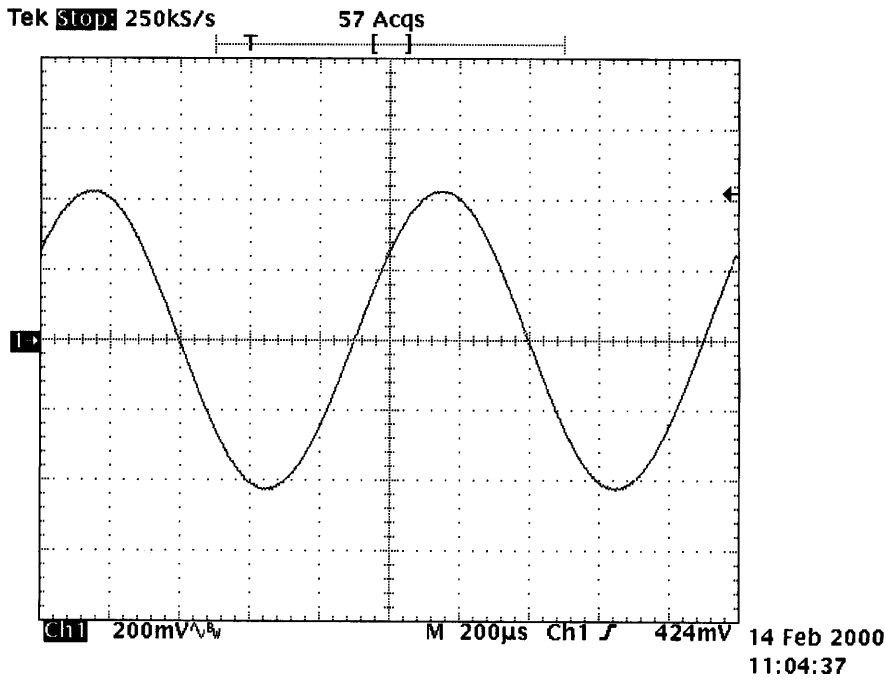
**FIGURE 5-84 MAIN BOARD WAVEFORM AT E3 DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET 11)**
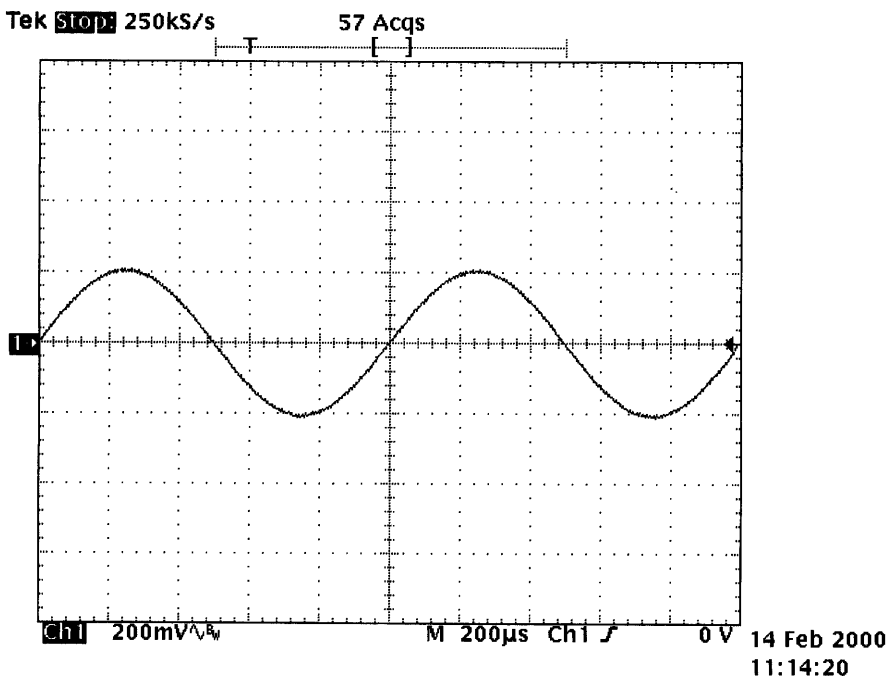
**FIGURE 5-85 MAIN BD WAVEFORM AT E5 DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET 11)**
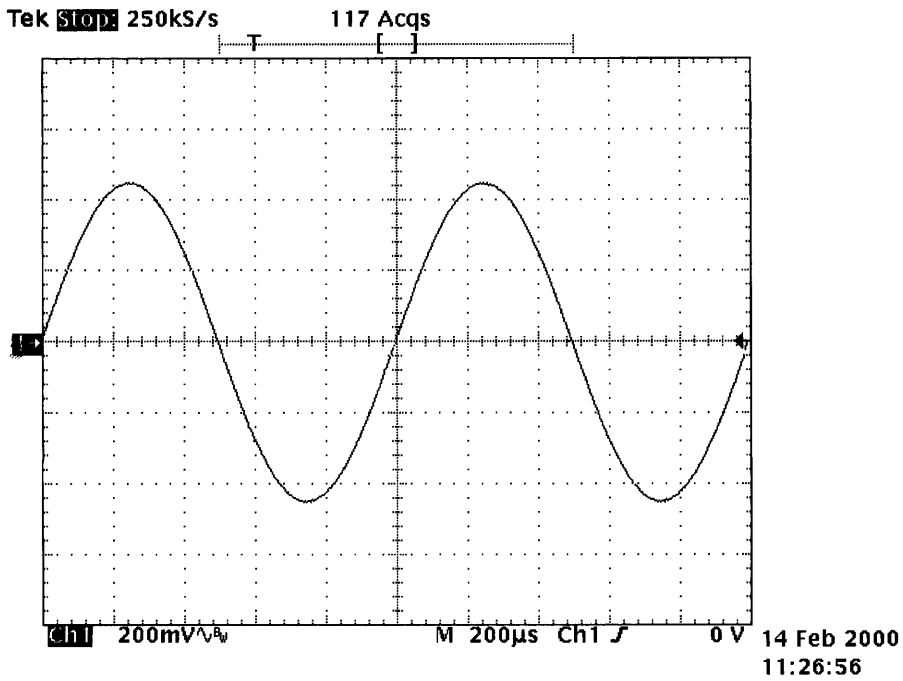
FIGURE 5-86 MAIN BOARD WAVEFORM AT U35 PIN 8 DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET 3)
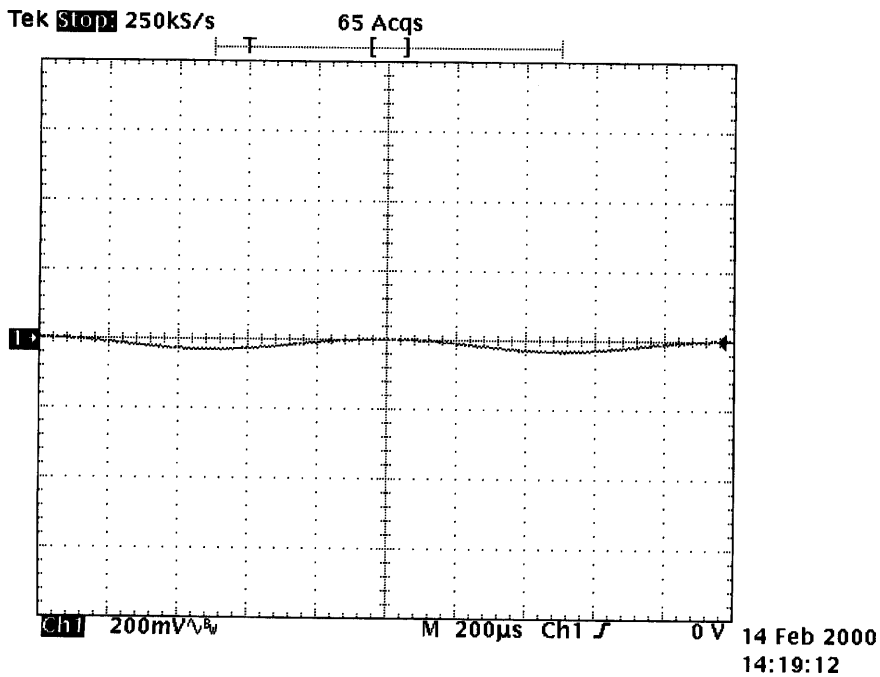
FIGURE 5-87 MAIN BOARD WAVEFORM AT U35 PIN 8 DURING RECEPTION
(DWG NO. 002-09059-0040, REV G, SHEET 3)

Tek Stop 250kS/s   73 Acqs

Ch1   1.00 V√√W   M 200µs Ch1 ∫   0 V   14 Feb 2000
                                                          14:29:25
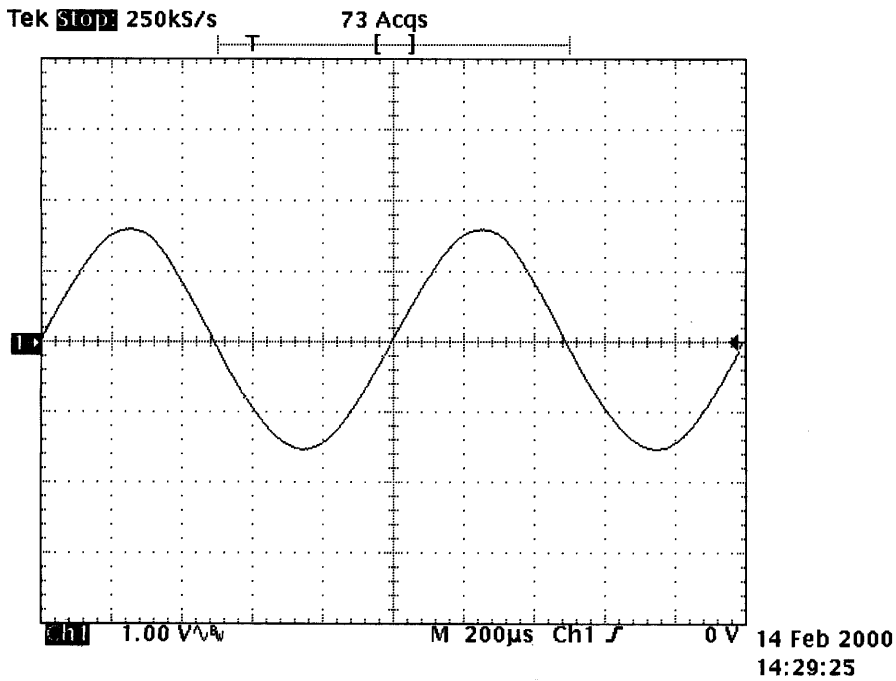
FIGURE 5-88 MAIN BOARD WAVEFORM AT J4 PIN 8 DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET 3)

Tek Stop 250kS/s   50 Acqs

Ch1   20.0mV√√W   M 200µs Ch1 ∫   0 V   14 Feb 2000
                                                          14:34:48
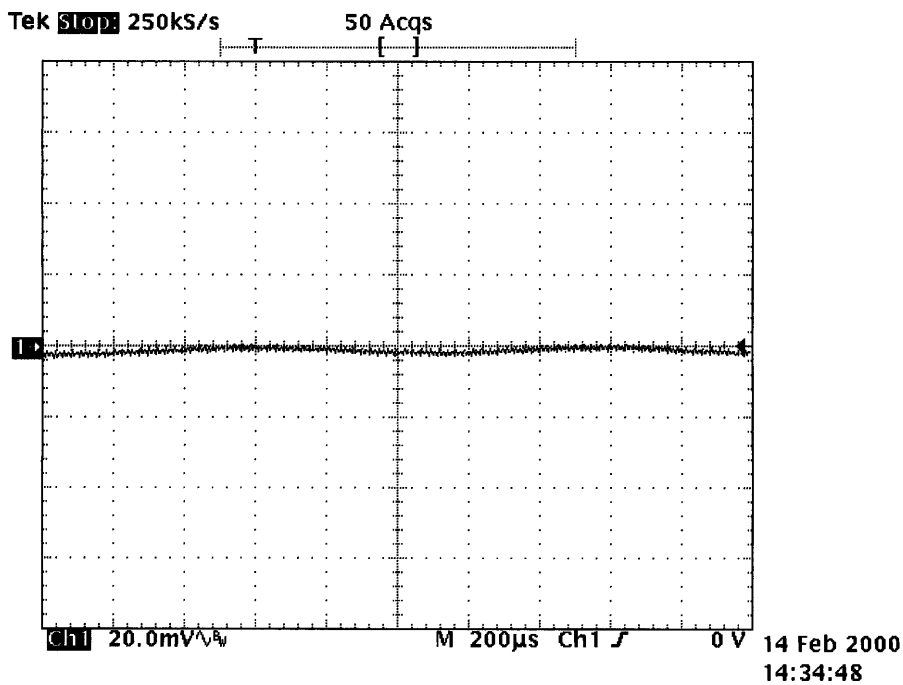
FIGURE 5-89 MAIN BOARD WAVEFORM AT J4 PIN 1 DURING RECEPTION
(DWG NO. 002-09059-0040, REV G, SHEET 3)

Tek **Stop**: 250kS/s   58 Acqs

Ch1   200mV∿ᵥ   M 200µs Ch1 ∫   0 V   14 Feb 2000
                                                              14:58:13
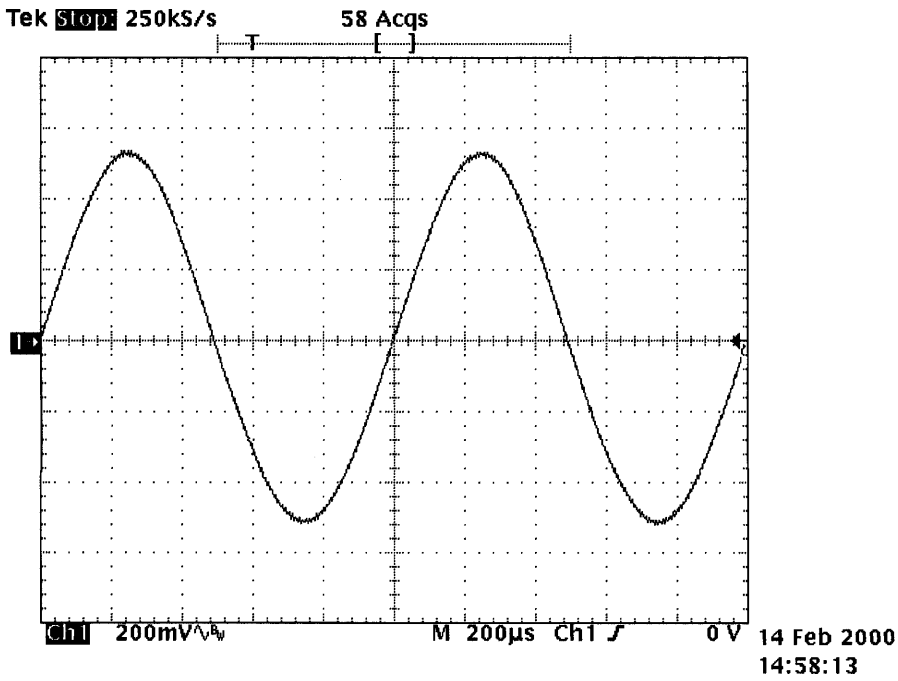
**FIGURE 5-90 MAIN BOARD WAVEFORM AT Q38 EMITTER DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET 3)**

Tek **Stop**: 250kS/s   0 Acqs

Ch1   200mV∿ᵥ   M 200µs Ch1 ∫   0 V   14 Feb 2000
                                                              15:19:36
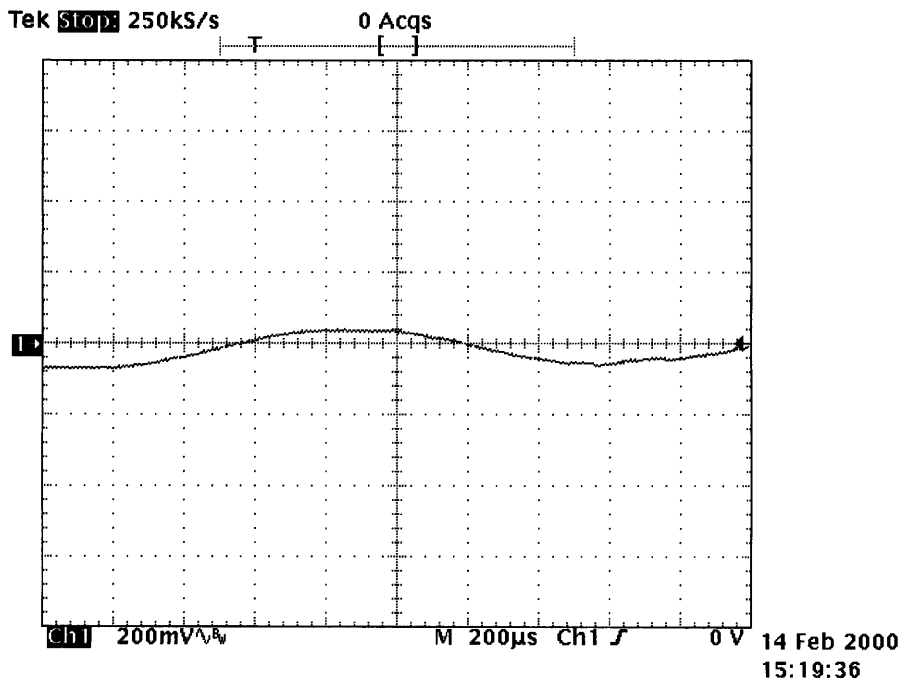
**FIGURE 5-91 MAIN BOARD WAVEFORM AT Q38 EMITTER DURING RECEPTION
(DWG NO. 002-09059-0040, REV G, SHEET 3)**

Tek **Stop** 250kS/s   124 Acqs

Ch1 500mV~~   M 200µs Ch1 ⌐   0 V   14 Feb 2000
                                                              15:29:13
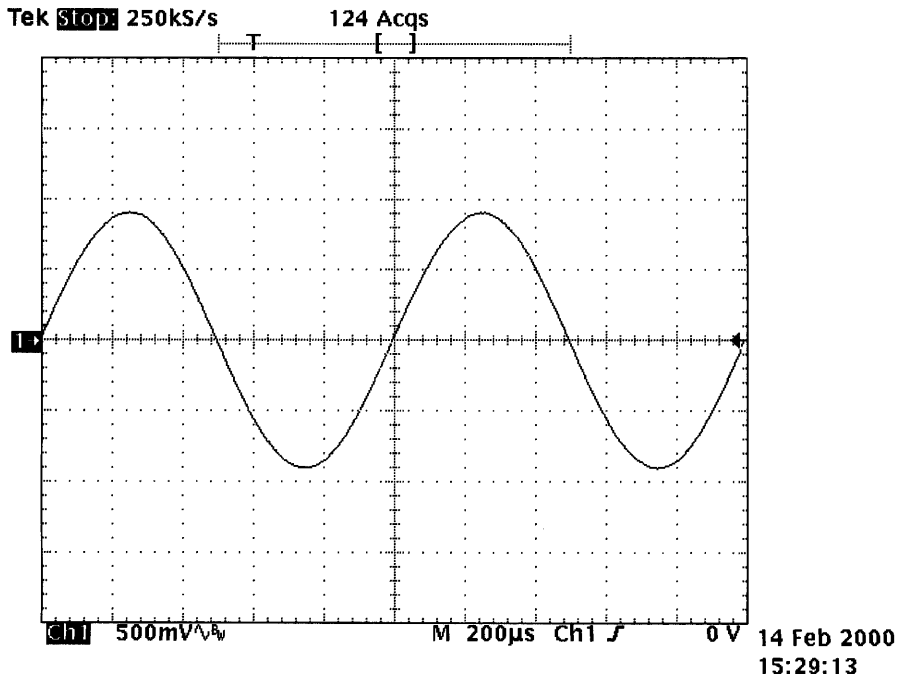
FIGURE 5-92 MAIN BOARD WAVEFORM AT J4 PIN 2 DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET 3)

Tek Run: 250kS/s   Hi Res   **Trig?**

Ch1 20.0mV~~   M 200µs Ch1 ⌐   0 V   14 Feb 2000
                                                              15:58:04
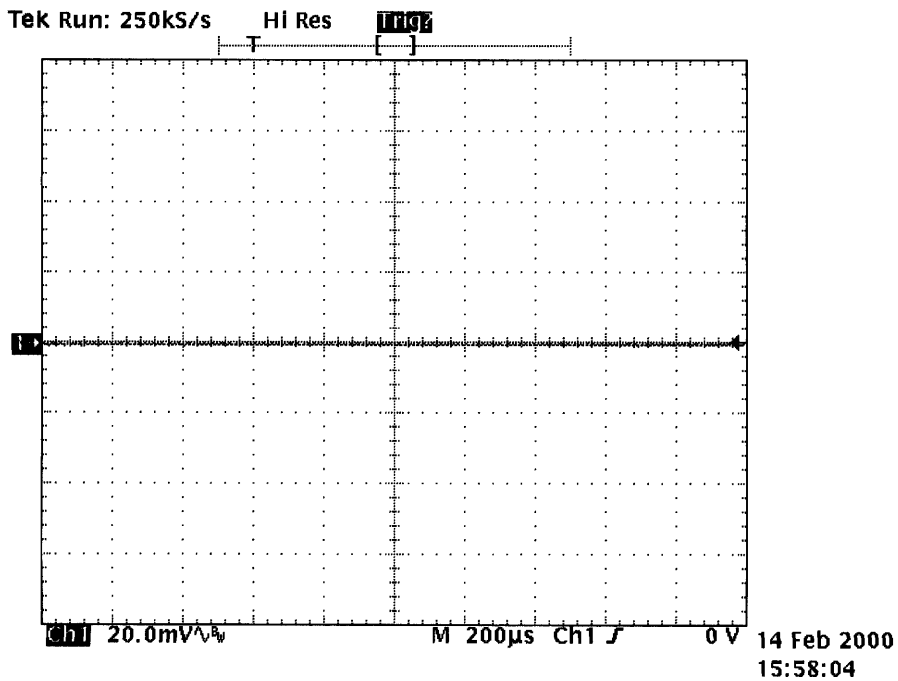
FIGURE 5-93 MAIN BOARD WAVEFORM AT J4 PIN 2 DURING RECEPTION
(DWG NO. 002-09059-0040, REV G, SHEET 3)
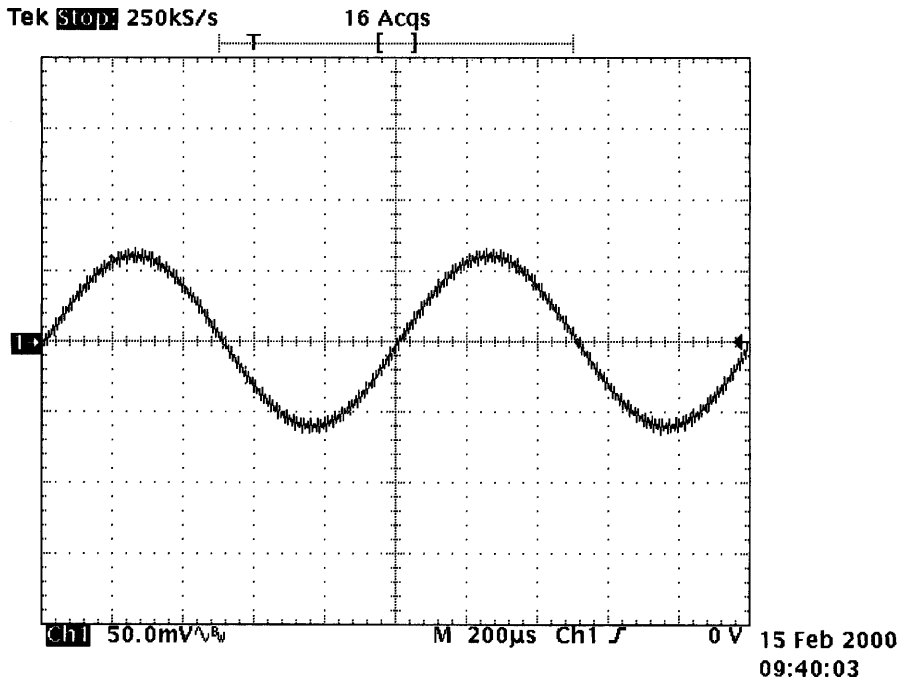
FIGURE 5-94 MAIN BOARD WAVEFORM AT U28 PIN 4 DURING TRANSMIT
(DWG NO. 002-09059-0040, REV G, SHEET
8)
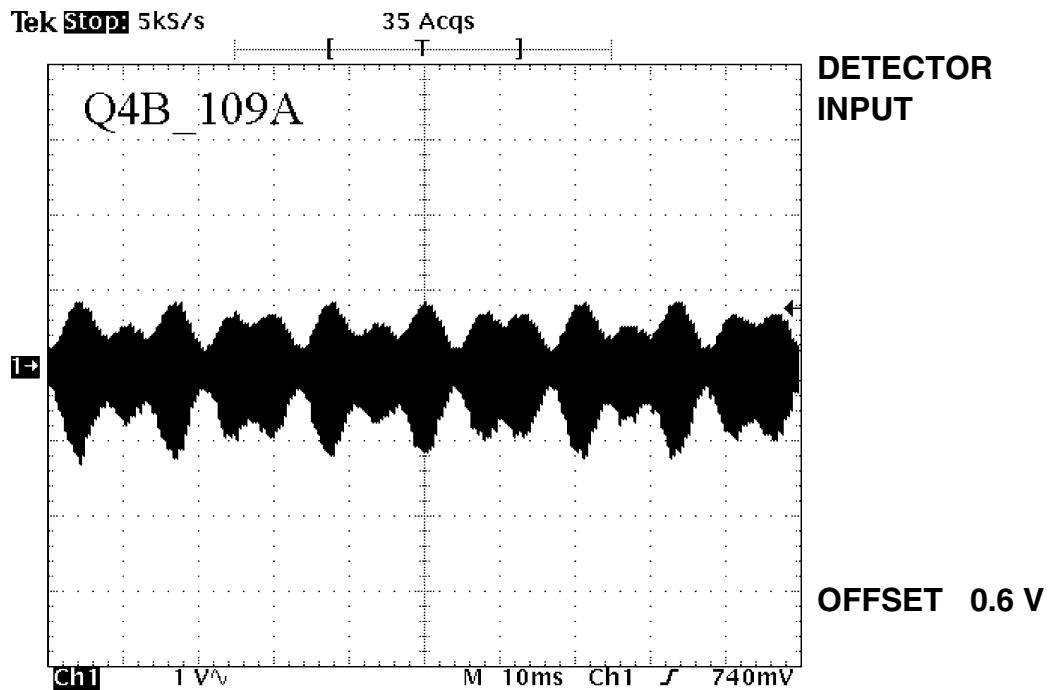
FIGURE 5-95 GLIDESLOPE WAVEFORM AT THE BASE OF Q4
(DWG NO. 002-09060-0000, REV C, SHEET 1)

Tek **Stop:** 5kS/s   15 Acqs

TP4_RF

DETECTOR OUTPUT

Ch1 Mean
−9.429mV

OFFSET   5 V

Ch1   1 V∿   M 10ms Ch1 ƒ 860mV
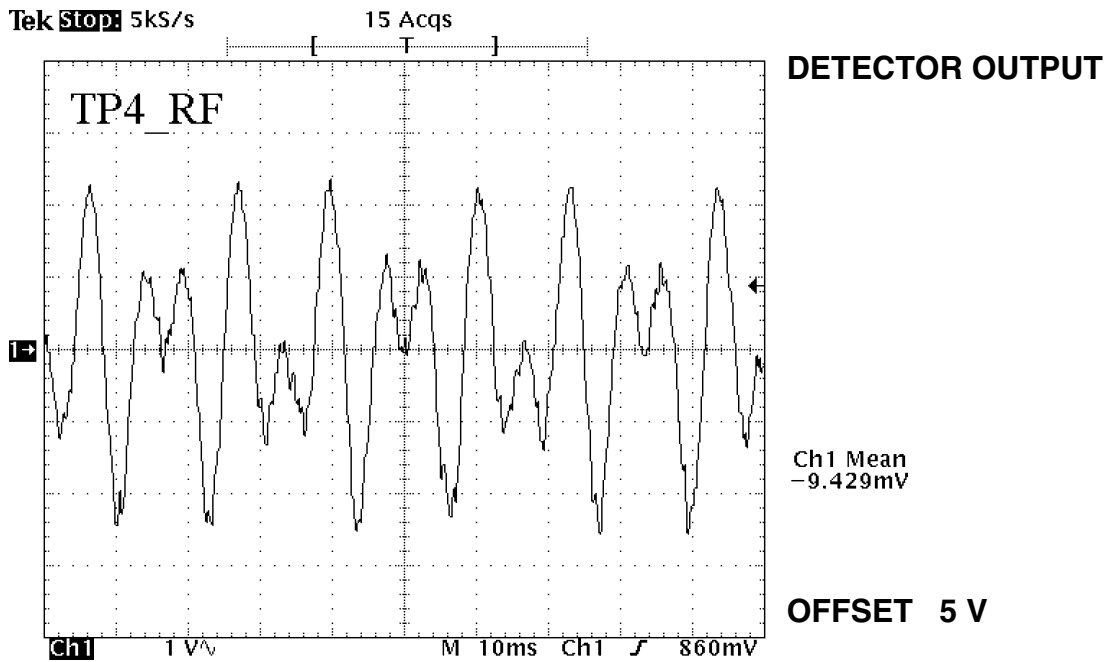
**FIGURE 5-96 GLIDESLOPE BOARD WAVEFORM AT TP4
(DWG NO. 002-09060-0000, REV C, SHEET 1)**

Tek **Stop:** 5kS/s   7 Acqs

J14_2_RF.BMP

**GLIDESLOPE
COMPOSITE**

Ch1 Mean
−9.99mV

OFFSET   5 V

Ch1   1 V∿   M 10ms Ch1 ƒ 0 V
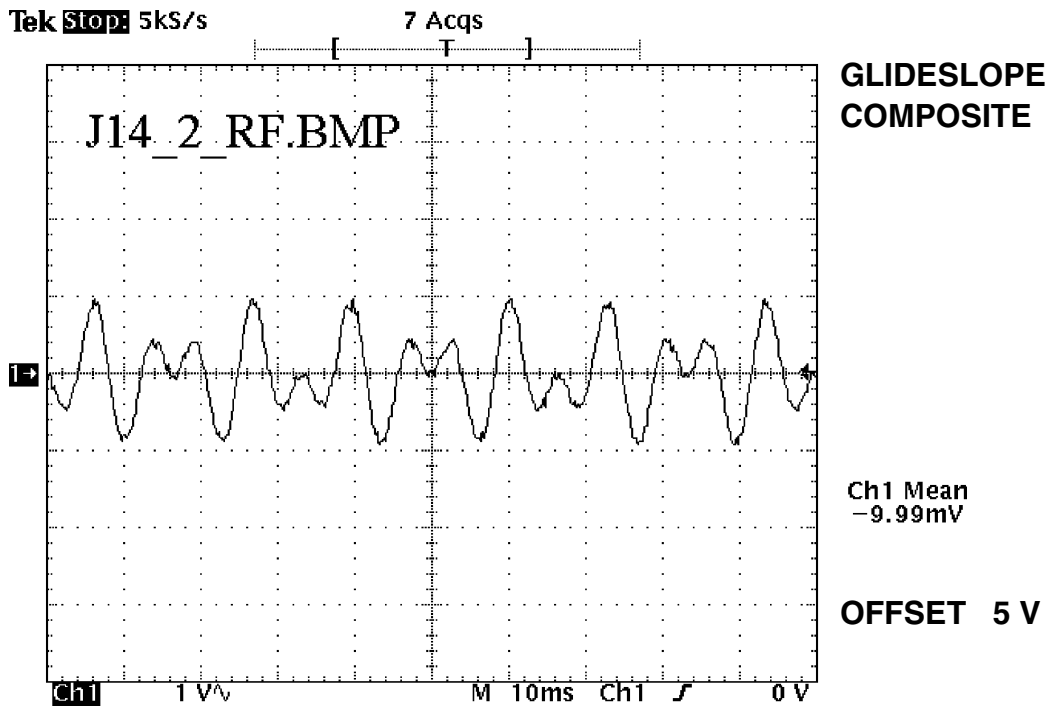
**FIGURE 5-97 GLIDESLOPE WAVEFORM AT J14 PIN 2
(DWG NO. 002-09060-0000, REV C, SHEET 1)**

Tek ■Stop■ 500MS/s   432 Acqs

U8PIN 2

L.O. DITHER CLOCK

Ch1 Mean
457.1mV

OFFSET   0 V

Ch1   2 V∿   M 100ns Ch1 ⌐   2.6 V
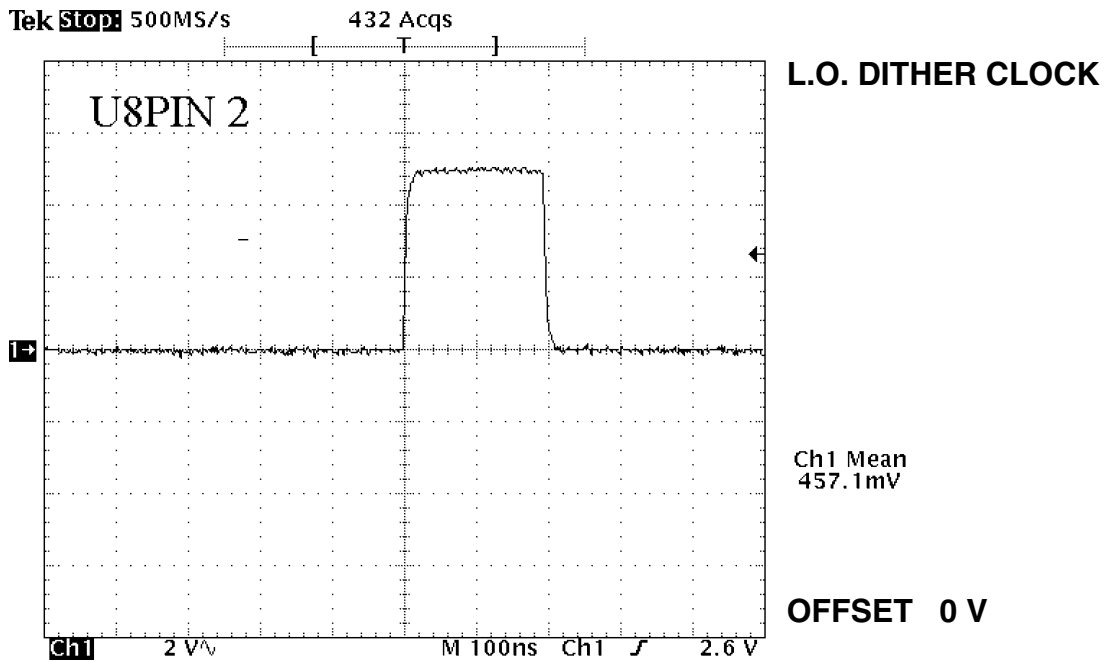
FIGURE 5-98 GLIDESLOPE BOARD WAVEFORM AT U8 PIN 2
(DWG NO. 002-09060-0000, REV C, SHEET 2)

Tek ■Stop■ 50kS/s   6 Acqs

R89_R91

L.O. DITHER

Ch1 Mean
133.7μV

OFFSET   2.7 V

Ch1   20mV∿   M 1ms Ch1 ⌐   3.2mV
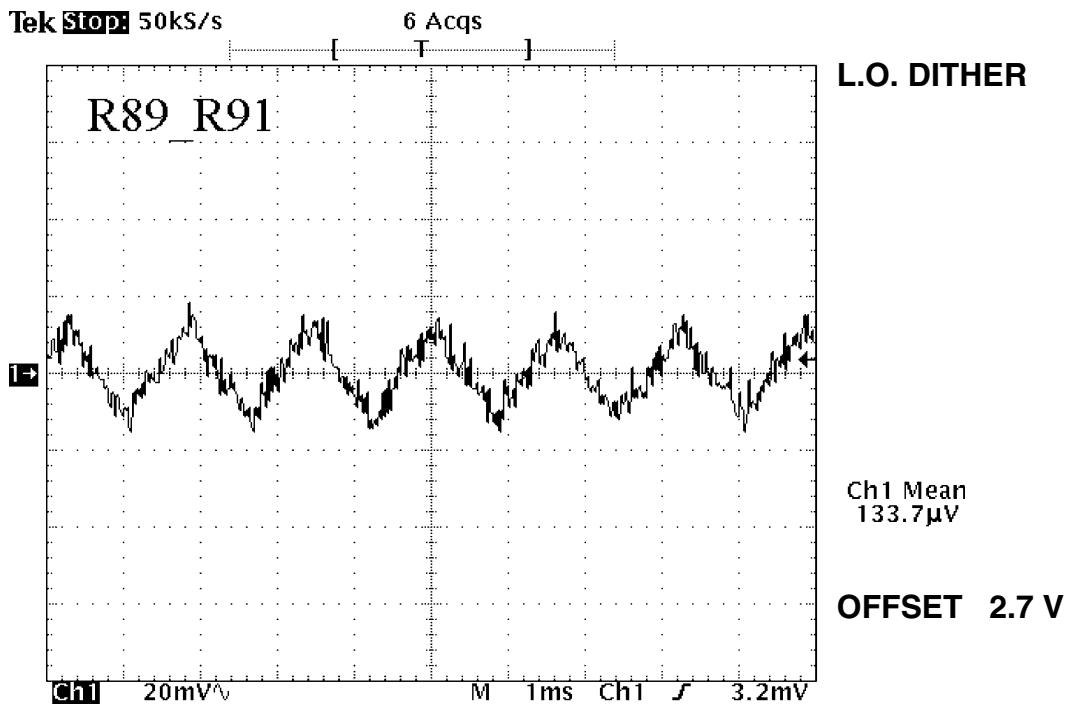
FIGURE 5-99 GLIDESLOPE BOARD WAVEFORM AT THE JUNCTION OF R89 AND R91
(DWG NO. 002-09060-0000, REV C, SHEET 2)

Tek ▮Stop▮ 1GS/s   260 Acqs

**CRYSTAL
OSCILLATOR OUTPUT**

Ch1 Freq
20.94MHz

TP9

OFFSET 2.2 V

Ch1 500mV͠   M 50ns Ch1 ƒ 990mV
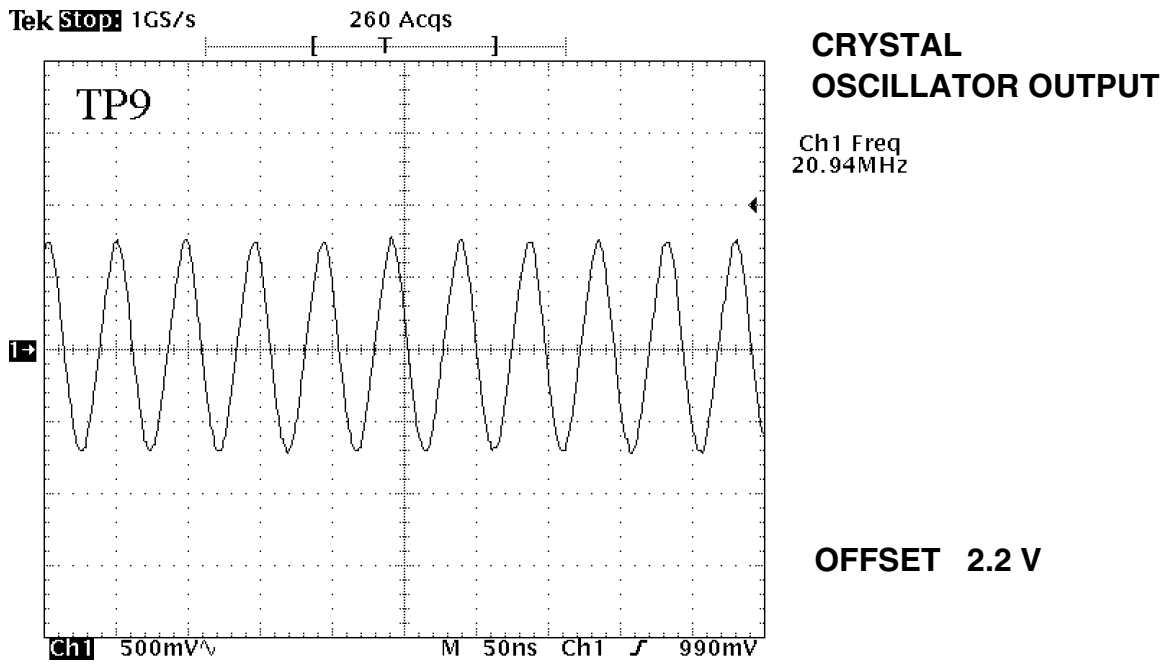
**FIGURE 5-100 CONVERTER BD WAVEFORM AT TP9
(DWG NO. 002-09060-0000, REV C, SHEET 2)**

Tek ▮Stop▮ 5.00kS/s   2 Acqs

Ch1 200mV͠   M10.0ms Ch1 ƒ 64mV   21 Feb 2000
                                                     17:00:09
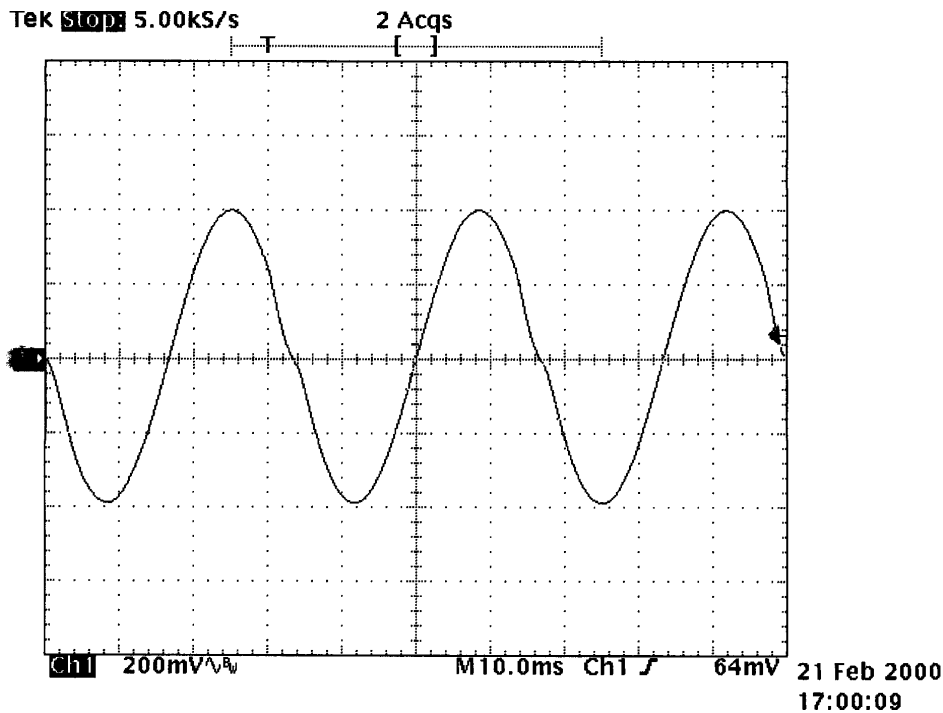
**FIGURE 5-101 CONVERTER BD WAVEFORM AT TP9
(DWG NO. 002-09060-0000, REV C, SHEET 2)**
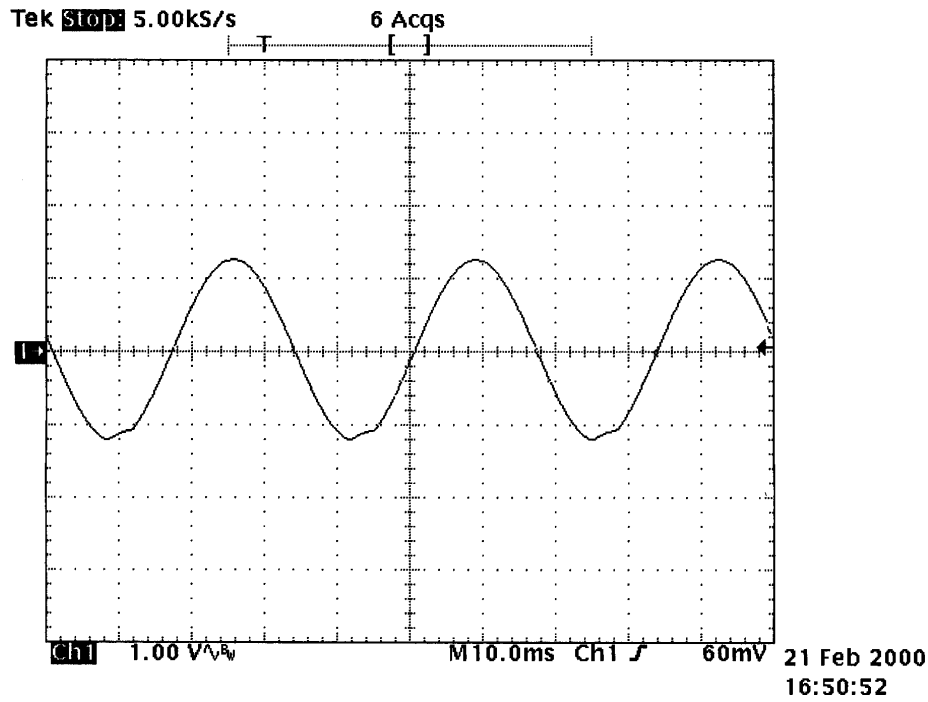
FIGURE 5-102 CONVERTER BD WAVEFORM AT TP9
(DWG NO. 002-09060-0000, REV C, SHEET 2)
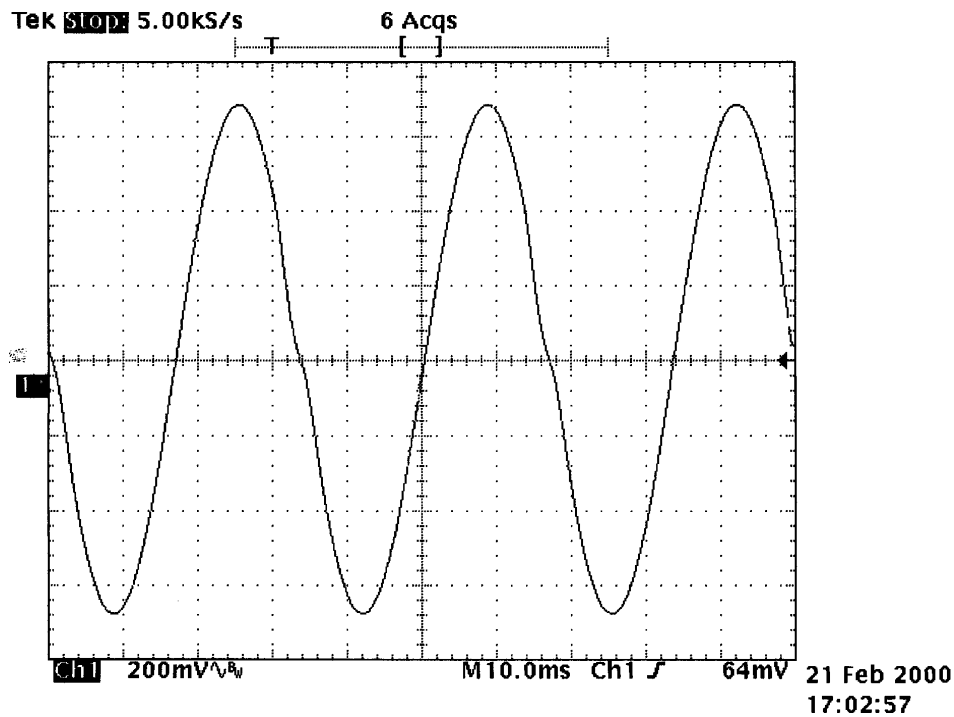
FIGURE 5-103 CONVERTER BD WAVEFORM AT TP9
(DWG NO. 002-09060-0000, REV C, SHEET 2)

SECTION VI
ILLUSTRATED PARTS LISTS

6.1   Introduction

The Illustrated Parts List (IPL) is a complete list of assemblies and parts required for the unit. The IPL also provides for the proper identification of replacement parts. Individual parts list within this IPL are arranged in numerical sequence starting with the top assembly and continuing with the sub-assemblies. All mechanical parts will be separated from the electrical parts used on the sub-assembly. Parts lists are occasionally referred to as "bills of material or BOM" and the terms may be used interchangeably. Each parts list is followed by the assembly drawing for that assembly.

Parts identified in this IPL by Honeywell part number meet design specifications for this equipment and are recommended replacement parts. Warranty information concerning replacement parts is contained in Service Memo #1, P/N 600-08001-00XX.

6.2   Bill of Material Description

This section describes the various items that may appear on parts lists. Refer to Figure 1 of this section for a parts list format.

(1)   Parts List Number

The parts list number appears at the top of the list as a 12-digit number which is also the Honeywell part number for the assembly. This number is followed by the assembly description and the revision level of the parts list.

Table 6-1 Reference Designator abbreviations

B	Motor or Synchro	P	Plug
C	Capacitor	Q	Transistor
CJ	Circuit Jumper	R	Resistor
CR	Diode	RT	Thermistor
DS	Lamp	S	Switch
F	Fuse	T	Transformer
FL	Filter	TP	Test Point
I	Integrated Circuit	U	Resistor/Capacitor Network, Integrated Circuit
J	Jack	V	Photocell/Vacuum Tube
L	Inductor	WG	Waveguide
M	Meter	Y	Crystal

(2)   Symbol Column

This column contains the reference designators of the electrical components of the assembly. Mechanical parts are not assigned reference designators. The reference designator consists of a letter abbreviation which indicates the type of component followed by the number assigned to the part (C101, Q101, etc.). Common reference designator abbreviations are listed above.

(3)   Part Number Column

This column contains the Honeywell Part Number for each part. Special purpose 999-09999-00XX series part numbers may appear in the parts list and are described below.

(a)   CR401 999-09999-0096   RESERVED

The Reference Designator CR401 has been reserved for future use; the assembly does not currently include a CR401.

(b)   CR401 999-09999-0097   SEE NEXT ASSEMBLY

CR401 is a part of the electrical circuit, but due to assembly or testing requirements, is actually part of a different assembly.

(c)   CR401 999-09999-0098   NOT USED

The Reference Designator CR401 is available for future assignment. The assembly does not currently include a CR401.

(d)   CR401 999-09999-0099   DO NOT USE

The Reference Designator CR401 has been previously used for this assembly and later deleted. It may not be reassigned on this assembly.

(e)   401 999-09999-0090   REF SFTWARE SET

401 is a programmed memory device. Refer to Section 2.H., Software Documentation, in this introduction, for a description of the software documentation system being used at the time of publication of this manual.

(4)   FIND_NO Column

The number in this column refers to selected items on the Assembly Drawing. This information is not supplied with every BOM. Lack of information in this column should not be interpreted as an omission.

(5)   Description Column

This column contains the description of each part in the assembly, Common Abbreviations, which may appear in this column, are listed as follows

Table 6-2: Description abbreviations

AL	Aluminum	PC	Polycarbonate
ASSY	Assembly	PF	Precision Film
BIFLR	Bifilar	PP	Paper
BOM	Parts List	PS	Polystyrene
CC	Carbon Composition	QW	Quarter Watt
CF	Carbon Film	RES	Resistor
CH	Choke	S	Silicon
CAP	Capacitor	SCR	Screw
CR	Ceramic	SM	Silver Mica
DC	Disc Ceramic	STDF	Standoff
DIO	Diode	SW	Switch
EL	Electrolytic	TERM	Terminal
EW	Eighth Watt	TN	Tantalum
FC	Fixed Composition	TST PT	Test Point
FERR	Ferrite	TW	Tenth Watt
FLTR	Filter	I, U	Integrated Circuit
FT	Feedthru	VA	Variable
HV	High Voltage	WW	Wire Wound
HW	Half Watt	XFMR	Transformer
MC	Monolithic	XSTR	Transistor Ceramic
MY	Mylar	XTAL	Crystal

(6)   Assembly (A) Column

An "A" in this column indicates that the part indicated is an assembly. If the P/N and description reads "200-0XXXX-9900 COMMON BOM" the parts for that assembly are included in the same parts list. The parts breakdown for an assembly with any other P/N will be found in the parts list with the same number.

(7)   Unit of Measure (UM) Column

This column indicates the Unit of Measure for each part. Common abbreviations found in this column are listed below

Table 6-3: Unit of Measure abbreviations

AR	As Required	IN	Inch
EA	Each	For Reference Only	RF
FT	Foot		

(8)   Quantity and Version Columns

Individual versions of an assembly are identified by the last four digits of the P/N. Part quantities for each version will be indicated under headings numbered 0000 through 9900 as required. The

parts indicated in the 9900 column are common to all other versions of the assembly and are considered the common parts list for the assembly.

Versions may be occasionally identified as flavors in
parts lists. The terms are interchangeable.

6.3   Software Documentation

The documentation of software involves the use of several unique types of part numbers. The following subsections list these part numbers with their description. In some cases, some specific versions of hardware must be used with specific versions of software. You will need to know the part number and the software revision level of the unit. The unit designator and part numbers are listed in the top box. One level down from that is a box for the 206-type system software parts list number, and boxes for the parts lists numbers for all other hardware assemblies that do not contain any software. The next level are boxes containing the 205-type parts lists for assemblies which use software under the system software box. Below these top parts lists boxes are two boxes. One box shows the hardware parts list number, and the other contains a list of reference designators and part numbers of individual integrated circuits used on the circuit board.

The last two digits of all software related P/N's, designated in the following text as -RN, indicate the revision number or level of the related software. This number is incremented with each revision of software. For example, -01 is revision 0, -02 is revision 1, and so on. When ordering specific integrated circuits or devices, the applicable 122-XXXXX-XXXX P/N is used. When ordering a circuit board which contains software, the applicable 205-XXXXX-XXXX P/N is used. Applicable assembly drawings and schematic diagrams will then follow in order.

(1)   GENERAL INFORMATION

The part number of the unit, typically the 065-, 066-, 069-, or 071- top assembly part number, contains a 206- item in its parts list. This 206- item is the configuration control mechanism for programmable electronic devices of the unit. Two different means exist to label the hardware/software configuration of the unit, depending on the part number of the unit.

(a)   When the part number of the unit is a 9-digit part as represented on the TSO label, the last 2 digits of the 206- item are the digits of the SoftWare IDentification tag that appears on the unit.

(b)   When the part number of the unit is a 12-digit part as represented on the TSO label, the last 4 digits of the 206- item are the digits of the SoftWare MODification tag that appears on the unit. In the example shown in Figure 1,   Sheet 1, the 206- item is flagged with an "A" in the right hand margin.

(2)   DEFINITION OF A HARDWARE/SOFTWARE SYSTEM

The 206- item represents the collection of all circuit boards in the unit which contain electronic programmable devices (software). The hardware/software system (206-) parts list contains two categories of items:

(a)   The part number of the unit label (i.e. the SoftWare IDentification or SoftWare MODification tag).

1   In the case of the 9-digit TSOed unit , the unit label part number is 057-03284-00XX, where XX is the last two digits of the 206- number.

2   In the case of the 12-digit TSOed unit, the unit label part number is 057-05287-YYYY, where YYYY is the last four digits of the 206- number. This number is also referred to as the software revision level of the unit. The software identification tag is illustrated below

```
┌─────┐
│ KRC │   ┌──────────┐
│     │   │  SW MOD  │
│ 01  │   │          │
│     │   │  01/02   │
│SW ID│   └──────────┘
└─────┘
```
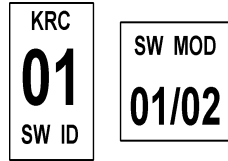
(b)   The 205- hardware/software board assemblies which constitute all the hardware/software boards which the unit contains. In the example, the item marked "B" is the 205- hardware/software board used in the rest of the example.

(3)   DEFINITION OF HARDWARE/SOFTWARE BOARD

The hardware/software board (205-) parts list contains four categories of items:

(a)   The part numbers of the board label.

1   For 12-digit 205-0XXXX-00YY board labels, the first 10 digits are contained on a label part number 057-05252-XXXX, and the last two digits are specified by 057-05335-00YY.

2   For 9-digit 205-WWWW-ZZ board labels, the first 7 digits are contained on a label part number 057-050WW-00WW, and the last two digits are specified by 057-05252-00ZZ.

The 205-0XXXX-00YY and the 057-05252-00YY part number is incremented whenever the revision number of any one, or more, of the 125-0XXXX-XXRN part number's is incremented. This means that the -RN part of the part number's for the 057-05252-XXRN and the 205-0XXXX-XXRN will be the same. A circuit board identification tag is illustrated below.

$$205 - 06616 - 0000$$
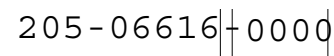
(b)   The software programmable device set assemblies (125-). Each 125- programmable device set constitutes all the software for a unique microprocessor on the hardware board. The group of 125- programmable device sets constitutes all of the software for all of the microprocessors.

1   125-0XXXX-XXRN Honeywell Part Numbers

The 125-0XXXX-XXRN part number is a parts list which lists all the 122-0XXXX-XXRN programmed devices in a software set for a given circuit board. There may be only one 122-0XXXX-XXRN part number listed, or there may be several. Whenever the revision number (RN) of any one, or more, of the 122-0XXXX-XXRN programmed devices is incremented in a new software release, the -XXRN part of the 125-0XXXX-XXRN part number is also incremented. This 125-0XXXX-XXRN parts list also identifies the "U" or "I" circuit designators used to identify the programmed devices on assembly drawings, and schematic diagrams.

2   The 122-0XXXX-XXRN part number is used to identify an individual integrated circuit, or other device, containing software.

(c)   The non-software programmable device set assemblies (126-) which fulfill software requirements.

(d)   The specification of the hardware board (200-).

In the example, the items marked "C", in the right margin, are all the programmable device assemblies which fulfill the software requirements.

(4)   DEFINITION OF A HARDWARE BOARD

The hardware board (200-) parts list contains two categories of items that relate to programmable devices:

(a)   The non-software programmable device sets (126s) that fulfill hardware requirements (Items D1 through D4, in the example.

(b)   The references to all of the programmable devices (122-) on the board. These references resolve device location on the board, in that they use the SYMBOL field of the parts list, to specify component location. These 122- numbers are of the form 122-3XXXX-9999 or 122-0YYYY-9999.

The 122- numbers of the form 122-3XXXX-9999 are used for non-software programmable devices (126-) that fulfill hardware requirements, and therefore these programmable device sets appear on the hardware board (200-) parts list (Items D5 through D10, in the example).

The 122- numbers of the form 122-0YYYY-9999 are used for both software programmable devices (125-) (Items D12 through D15, in the example), and non-software programmable devices (126-) (Item D11, in the example), that fulfill software requirements.

These programmable device sets appear on the hardware/software board (205-) parts list.

The exact programmable device (the resolution of the -9999, in the above items) is specified by the respective software programmable device set (125-), or the non-software programmable device set (126-) parts list.

Using the SYMBOL field as specified above, would discourage the use of the SYMBOL field for this purpose, in the programmable device sets (125- and 126-) parts list. This would then permit the specification of the same programmable device sets in different boards, hence different component designators. In the example, Figure 1:

- The items flagged D1 through D4, in the right margin, are non-software programmable device sets.
- The items flagged D5 through D10, in the right margin, are non-software programmable device designators, that fulfill hardware requirements.
- The item flagged D11, in the right margin, is a non-software programmable device designator, that fulfills software requirements.
- The items flagged D12 through D15, in the right margin, are software programmable device designators, that fulfill software requirements.

Figure 1, while closely related to a specific product, does not represent an exact configuration in use by that product. This example has been modified to clarify certain points.

```
Assy: 066-04020-0203  SG464 HSI W/O WX
Symbol    Part Number   Rev    Description      UM    Quantity   BxItm

          016-01008-0004  3   GLYPTAL 7526 BL   AR     1.00
          016-01131-0000  1   CNTCT CMT BND 1055 AR    1.00
          047-02579-0002  2   HANDLE ASSEMBLY   EA     1.00
             "       "    "   "   "   "    "     "       "
          047-09392-0001  0   SPACER RT W/FIN   EA     1.00
          057-02203-0002  3   FLAVOR STCKR      EA     1.00
          057-02203-0003  3   FLAVOR STCKR      EA     1.00
          057-05286-0000  0   SERIAL TAG SG 464 EA     1.00
          075-05082-0002  0   GUIDE PLATE TOP   EA     1.00
             "       "    "   "   "    "    "    "       "
          090-00277-0000  1   HOLD DOWN BRACKET EA     1.00
          155-02536-0001  1   CABLE ASSY        EA     1.00
          200-07703-0000  2   DPX CONN BD ASSY  EA     1.00
          200-07704-0000  8   LV PS BD ASSY     EA     1.00
          206-00118-0301  0   EFS40/50 HSI SET  EA     1.00     <--- A

Assy: 206-00118-0301  EFS40/50 HSI SET

Symbol    Part Number   Rev    Description      UM    Quantity   BxItm

          057-05287-0301  0   SW MOD TAG        EA     1.00
          205-00564-0002  0   EFIS 40/50 I/O PBS EA    1.00
          205-00565-0004  0   E40/50 HSI P/D PBS EA    1.00     <--- B

Assy: 205-00565-0004  E40/50 HSI P/D PBS

Symbol    Part Number   Rev    Description      UM    Quantity   BxItm

          057-02241-0016  1   IDENT LABEL       EA     1.00
          057-05252-0565  1   IDT 205-00565-0000 EA    1.00
          125-00602-0004  0   EFIS 40/50 NAV SDS EA    1.00     <--- C1
          125-00603-0002  0   EFIS40/50 DSPL SDS EA    1.00     <--- C2
          126-00019-0000  1   EFS40/50 CLIPPER  EA     1.00     <--- C3
          200-07706-0000  1   PRCSR/DSPL BD ASSY EA    1.00
```

Figure 6-1 Sample Parts List
(Sheet 1 of 3)

Assy: 200-07706-0000 PRCSR/DSPL BD ASSY

Symbol	Part Number	Rev	Description	UM	Quantity	BxItm
	009-07706-0000	0	PC BD PRCSR/DSPL	EA	1.00	
	" "	"	" " " " "	"	"	
	150-00004-0010	3	TUBING TFLN 22AWG	IN	2.00	
	200-04969-0000	0	EXT BD PRCSR/ADI A	RF	0.00	
	126-00005-0000	1	EFS40/50 INT LOGIC	EA	1.00	<--- D1
	126-00006-0000	1	EFS40/50 VIDEO MUX	EA	1.00	<--- D2
	126-00017-0000	1	EFS40/50 SM SET	EA	1.00	<--- D3
	126-00018-0000	1	EFS40/50 SINE SET	EA	1.00	<--- D4
C 5001	111-02104-0042	26	CAP MC100KPF50V20%	EA	1.00	
	" "	"	" " " " "	"	"	
I 5005	122-30001-9999	0	EFS40/50 VIDEO MUX	RF	0.00	<--- D5
I 5008	122-30002-9999	0	EFS40/50 INT LOGIC	RF	0.00	<--- D6
	" "	"	" " " " "	"	"	
I 5036	122-30003-9999	0	EFS40/50 SM HIGH	RF	0.00	<--- D7
I 5037	122-30004-9999	0	EFS40/50 SM LOW	RF	0.00	<--- D8
I 5038	122-30005-9999	0	EFS40/50 SINE HIGH	RF	0.00	<--- D9
I 5039	122-30006-9999	0	EFS40/50 SINE LOW	RF	0.00	<--- D10
	" "	"	" " " " "	"	"	
I 5075	122-00958-9999	0	EFS40/50 CLIPPER	RF	0.00	<--- D11
	" "	"	" " " " "	"	"	
I 5138	122-00918-9999	0	EFS40/50 HSI NAV-E	RF	0.00	<--- D12
I 5139	122-00919-9999	0	EFS40/50 HSI NAV-O	RF	0.00	<--- D13
	" "	"	" " " " "	"	"	
I 5158	122-00920-9999	0	EFS40/50 HSI DSP-E	RF	0.00	<--- D14
I 5159	122-00921-9999	0	EFS40/50 HSI DSP-O	RF	0.00	<--- D15

Assy: 126-00005-0000 EFS40/50 INT LOGIC

Symbol	Part Number	Rev	Description	UM	Quantity	BxItm
	122-30002-0000	0	EFS40/50 INT LOGIC	EA	1.00	

Assy: 122-30002-0000 EFS40/50 INT LOGIC

Symbol	Part Number	Rev	Description	UM	Quantity	BxItm
	120-02376-0000	1	EPLD EP320 (OTP)	EA	1.00	

Assy: 125-00602-0004 EFIS 40/50 NAV SDS

Symbol	Part Number	Rev	Description	UM	Quantity	BxItm
	122-00918-0004	0	EFS40/50 HSI NAV-E	EA	1.00	
	122-00919-0004	0	EFS40/50 HSI NAV-O	EA	1.00	

Assy: 125-00603-0002 EFIS40/50 DSPL SDS

Symbol	Part Number	Rev	Description	UM	Quantity	BxItm
	122-00920-0002	0	EFS40/50 HSI DSP-E	EA	1.00	
	122-00921-0002	0	EFS40/50 HSI DSP-O	EA	1.00	

Figure 6-1 Sample Parts List
(Sheet 2 of 3)

BOM NUMBER

```
200-08366-0000  MST67 IOP/DLP      R: 2   MST0067A
200-08366-0000  MST67 IOP/DLP      R: 2   MST0067A                    ASSEMBLY
                                                                      VERSION
       SYMBOL   PART NUMBER    DESCRIPTION       A  UM   0000    9900

                009-08366-0000  PC BD IOP/DLP     A  EA   1.00    1.00

                016-01040-0000  COATING TYPE AR      AR   1.00    1.00

                033-00114-0021  SOCKET IC DIP 28C A  EA   3.00    3.00

                047-09680-0001  KEYING BRACKET    A  EA   3.00    3.00

                090-00087-0000  CLIP CRYSTAL         EA   1.00    1.00
PROGRAMMABLE
DEVICE          092-05003-0015  EYELET .049          EA   2.00    2.00
SET
                126-00030-0000  MST67A ASIC SFTWR A  EA   1.00    1.00

       C  9001  106-04104-0047  CH 100KX7R/50V       EA   1.00    1.00
       C  9002  106-04104-0047  CH 100KX7R/50V       EA   1.00    1.00
       C  9003  106-04104-0047  CH 100KX7R/50V       EA   1.00    1.00

       CR 9001  007-06180-0000  DIO SW MMBD6050      EA   1.00    1.00
       CR 9002  007-08092-0000  QUAD SO DIODE        EA   1.00    1.00
       CR 9003  007-08092-0000  QUAD SO DIODE        EA   1.00    1.00

       DS 9001  007-06408-0000  COM CATH 7 SEG LED   EA   1.00    1.00
       J  9002  030-02174-0000  PIN CONT             EA  50.00    1.00

       P  9003  155-02688-0003  RIBBON CABLE ASSY A  EA   1.00    1.00  UNIT OF MEASURE

       Q  9003  007-00065-0001  XSTR 2N3906 (SOT)    EA   1.00    1.00
       Q  9006  007-00383-0004  SOT-23 2N2222A XST   EA   1.00    1.00
       Q  9011  007-00530-0000  XSTR NPN MMBT3903 A  EA   1.00    1.00

       R  9001  130-05104-0023  RES CH 100K EW 5%    EA   1.00    1.00  QUANTITY
REFERENCE  R  9002  015-00207-0020  OCTAL SO RESISTOR    EA   1.00    1.00
DESIGNATOR R  9003  130-05472-0023  RES CHIP 4.7KEW5%    EA   1.00    1.00
       R  9004  130-05471-0023  RES CHIP 470EW5%     EA   1.00    1.00
       R  9005  130-05104-0023  RES CH 100K EW 5%    EA   1.00    1.00
       R  9006  130-05104-0023  RES CH 100K EW 5%    EA   1.00    1.00
       R  9007  130-05000-0025  RES CHIP 0 EW CJ     EA   1.00    1.00

       TP 9001  008-00096-0001  TERMINAL TEST PNT    EA   1.00    1.00
       TP 9002  008-00096-0001  TERMINAL TEST PNT    EA   1.00    1.00

PART   U  9001  120-02208-0004  UPRGSSR 10MHZ16B.T A  EA   1.00    1.00
NUMBER U  9002  120-06129-0009  6264-15 8K X 8 RAM   EA   1.00    1.00
       U  9003  120-06129-0009  6264-15 8K X 8 RAM   EA   1.00    1.00
       U  9004  122-01195-9999  *MST67 PRGMD ODD  A  RF   X.
       U  9005  122-01194-9999  *MST67 PRGMD EVEN A  RF   X.
       U  9006  124-00574-0003  IC 74HCT574          EA   1.00    1.00
       U  9007  123-00138-0003  74HC138 SO PKG       EA   1.00    1.00

       Y  9001  044-00009-0019  XTAL 14.75MHZ        EA   1.00    1.00
       Y  9002  044-00293-0000  20 MHZ OSC           EA   1.00    1.00
```

DESCRIPTION

Figure 6-1 Sample Parts List
(Sheet 3 of 3)

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```
          069-01033-9900   KX 165A COM BOM          Rev.B
          069-01033-0201   28V 8.33 KHZ FINAL ASSY  Rev.A
          069-01033-0101   28V  25 KHZ FINAL ASSY   Rev.A
```

SYMBOL	PART NUMBER	FIND_NO	DESCRIPTION	UM	-0101	-0201	-9900
_	057-03186-0101	8	FLAVOR TAG	EA	1	.	.
_	057-03186-0201	8	FLAVOR TAG	EA	.	1	.
_	057-05964-0001	7	S/N TAG, KX 165A, 25KH	EA	1	.	.
_	057-05964-0002	7	S/N TAG, KX 165A, 8.33	EA	.	1	.
_	069-01033-9900		KX 165A COM BOM	EA	1	1	.
_	200-05660-0001	1	28V 8.33 KHZ BASE ASSY	EA	.	1	.
_	200-05660-0004	1	28V 25KHZ KX165A BASE	EA	1	.	.
_	200-05672-0002	3	25 KHZ BEZEL ASSY	EA	1	.	.
_	200-05672-0003	3	8.33 KHZ BEZEL ASSY	EA	.	1	.
_	206-00411-0106		KX 165A SOFTWARE SYSTE	EA	.	.	1
_ 2	200-05661-0002		KX165A TOP COVER ASSY	EA	.	.	1
_ 4	089-06008-0004		SCR FHP 4-40X1/4	EA	.	.	4
_ 5	089-06163-0003		SCR FHP 4-40X3/16	EA	.	.	4
_ 6	047-04874-0001		MTG RACK	EA	.	.	1
_ 9	057-05964-0101		MOD TAG, KX 165A	EA	.	.	1
_ 10	016-01134-0002		COPPER TAPE .50 IN	IN	.	.	1
_ 11	089-06008-0006		SCR FHP 4-40X3/8	EA	.	.	2
_ 12	187-01857-0001		EMI GASKET 13 IN.	EA	.	.	1
_ 13	012-01127-0000		TAG COVER	EA	.	.	1
_ 15	035-01361-0025		PROTECTIVE COVER	EA	.	.	1
_ 16	057-03187-0000		FCC LABEL	EA	.	.	1
_ 18	057-02311-0001		VOLTAGE TAG 28V	EA	.	.	2
_ 19	057-05635-0000		LABEL	EA	.	.	1
_ 20	057-03511-0001		DECAL, CAUTION	EA	.	.	1
_ 21	090-00991-0001		PROTECTIVE CLOSURE	EA	.	.	1
_ 22	090-00991-0002		PROTECTIVE CLOSURE	EA	.	.	1
_ 24	016-01004-0000		COMPOUND THRML JNT	AR	.	.	1
_ 25	047-12344-0002		SHIELD WITH FINISH	EA	.	.	1
_ 26	008-00005-0006		TND COP LUG	EA	.	.	1

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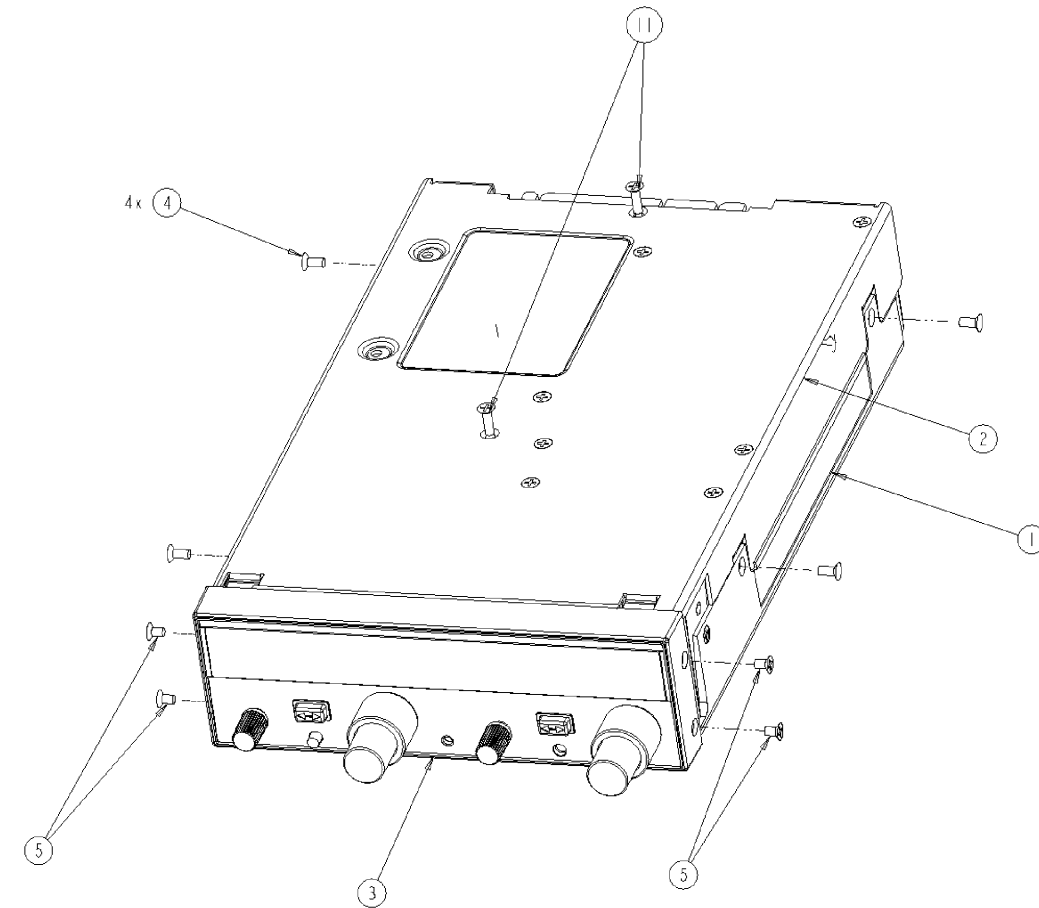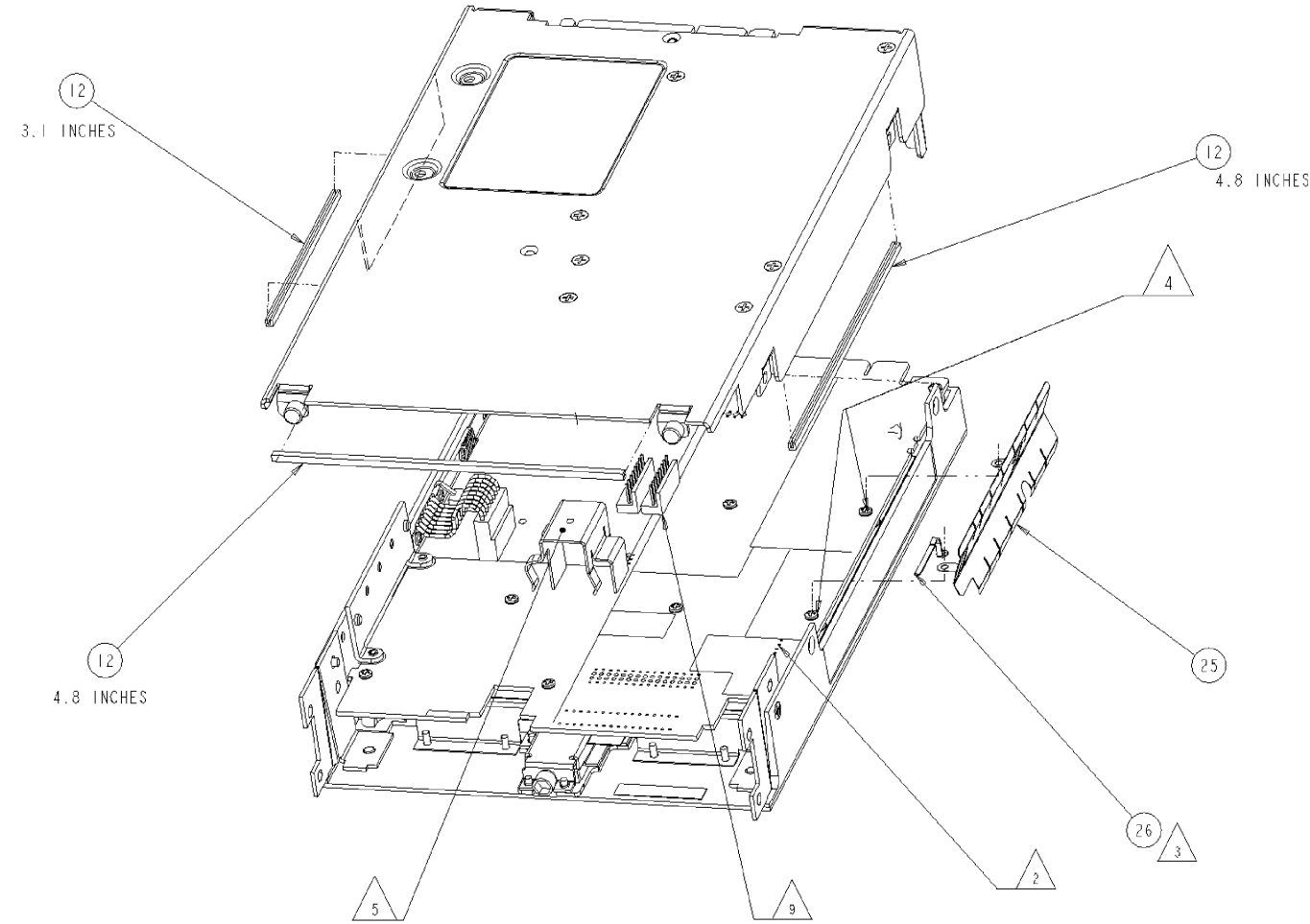
NOTES

1. CUT ITEM 12 TO INDICATED LENGTHS BEFORE INSTALLING.

2. CONNECT GLIDESLOPE CABLE (FROM ITEM 2) TO INDICATED LOCATION ON MAIN BOARD (PART OF ITEM 1). DRESS CABLE SO THAT IT WILL NOT BE PINCHED WHEN UNIT IS ASSEMBLED.

3. PREFORM ITEM 26 BEFORE INSTALLING. SEE DETAIL A.

4. INSTALL ITEMS 25 AND 26 USING INDICATED SCREWS.

5. APPLY THERMAL JOINT COMPOUND (ITEM 24) TO INDICATED SURFACE BEFORE INSTALLING ITEM 2.

6. LIQUID STAKE ALL FASTENERS PER SPECIFICATION 001-01080-0000.

7. APPLY SOFTWARE IDENTIFICATION TAG, 057-05287-XXXX (FROM 206-00379-XXXX). AS SHOWN.

8. UNIT IS SHIPPED IN MOUNTING RACK, ITEM 6.

9. CONNECT VOR/LOC CABLES (FROM ITEM 2) TO INDICATED LOCATION ON MAIN BOARD (PART OF ITEM 1). DRESS CABLES SO THAT THEY WILL NOT BE PINCHED WHEN UNIT IS ASSEMBLED.
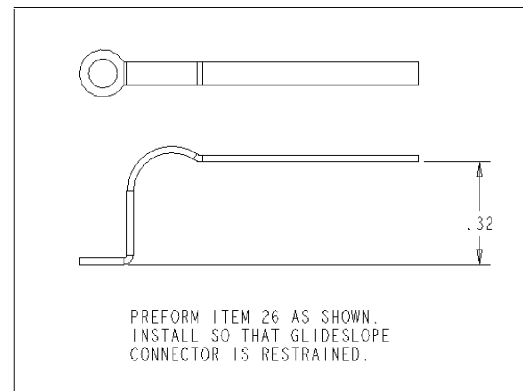
PREFORM ITEM 26 AS SHOWN. INSTALL SO THAT GLIDESLOPE CONNECTOR IS RESTRAINED.

DETAIL A

THIS DRAWING IS NOT COMPLETE WITHOUT PARTS LIST 069-01033-XXXX.

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Figure 6-2 Final Assembly
(Dwg No. 300-09095-0010 rev. B, Sheet 1 of 2)
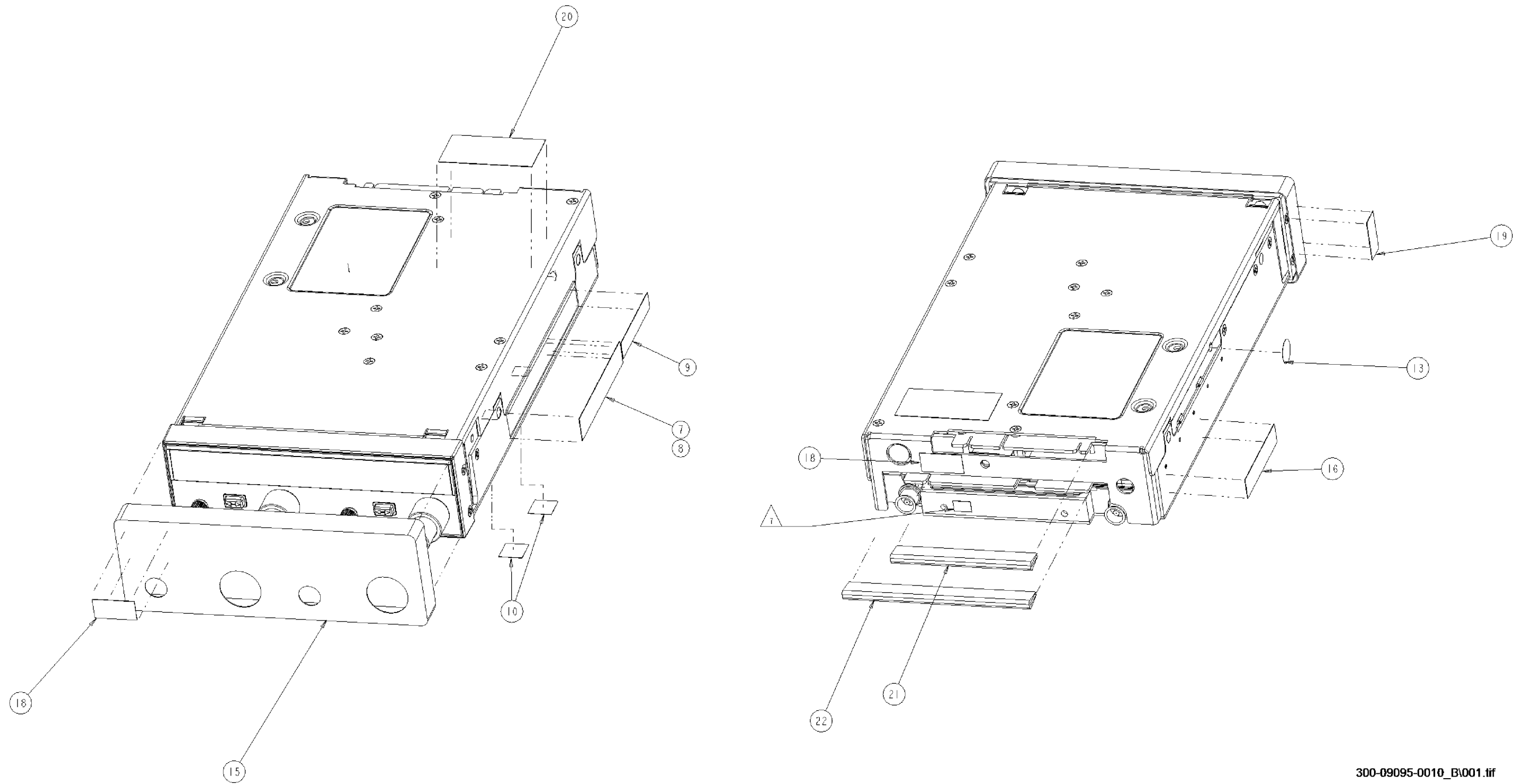
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Figure 6-2 Final Assembly
(Dwg No. 300-09095-0010 rev. B, Sheet 2 of 2)

200-05672-0003 8.33 KHZ BEZEL ASSY   Rev.A
200-05672-0002 25 KHZ BEZEL ASSY   Rev.A

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0002	-0003
1	037-05105-0001		SEGMENTED GAS DISC	EA	1	1
10	088-03217-0001		LIGHT PIPE	EA	1	1
11	088-03218-0001		BUTTONS, ACTUATORS	EA	2	2
12	088-03229-0004		KNOB INNER W/SHAFT	EA	2	2
13	089-05903-0004		SCR PHP 4-40X1/4	EA	8	8
14	089-06200-0003		SCR SET 2-56X3/32	EA	2	2
15	090-00499-0003		RING COMP .412	EA	2	2
16	200-09057-0000		KX 155A FRONT PANE	EA	1	1
17	090-00036-0004		RING RTNR .051	EA	2	2
22	026-00029-0000		WIRE, CU, 22AWG, T	IN	4	4
23	012-01005-0002		TAPE MYLAR .500 W	IN	4.75	4.75
24	016-01140-0000		SUPERBONDER 415	AR	1	1
25	088-03412-0003		KNOB W/ WASHER	EA	2	2
26	088-03172-0002		KNOB W/LGT BUSHING	EA	2	2
27	016-01144-0001		ACCELERATOR 11525	AR	1	1
28	200-09531-0002		25 KHZ KX 165A BEZ	EA	1	
28	200-09531-0003		8.33 KHZ KX 165A B	EA		1
6	076-02308-0000		SPOOL SWITCH PULL	EA	2	2
	300-05672-0000		BEZEL ASSY (KX 155	RF	0	0

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NOTE:

⚠1 (1.00 INCH LENGTH) SECURE UNDER SCREW HEADS.

⚠2 (1.00 INCH LENGTH) SECURE UNDER BEZEL BOSS SCREW HEAD AND SOLDER TO UNDERSIDE OF POT BODY.

⚠3 ALIGN THE LONG EDGE OF ITEM 23 WITH THE TOP EDGE OF THE HEATSINK ON ITEM 1. TAPE TOUCHING ITEM 16 IS ACCEPTABLE.

⚠4 AFTER ASSEMBLY, APPLY A SMALL AMOUNT OF ADHESIVE (ITEM 24) AND ACCELERATOR (ITEM 27) TO THE RETAINING RING (ITEM 17) TO SECURE IT TO THE SHAFT (ITEM 12). LIQUID STAKE ALL FASTENERS PER 001-01080-0000.

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Figure 6-3 Bezel Assembly
(Dwg No. 300-05672-0000 rev. AA)

```
200-09531-0003  8.33 KHZ KX 165A BEZEL              Rev.-
200-09531-0002  25 KHZ KX 165A BEZEL                Rev.-
```

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0002	-0003
1	073-00987-0004		BEZEL , PAINT	EA	1	1
2	088-03216-0001		LENS	EA	1	1
3	057-05800-0001		DECAL	EA	1	
3	057-05800-0002		DECAL	EA		1
4	057-05830-0002		DECAL, KX165A LOGO	EA	1	1
5	088-03170-0018		TRANSFER BUTTON	EA	2	2
6	016-01131-0000		CONTACT CEMENT	AR	1	1
	300-09531-0000		25 KHZ KX155A BEZE	RF	0	0

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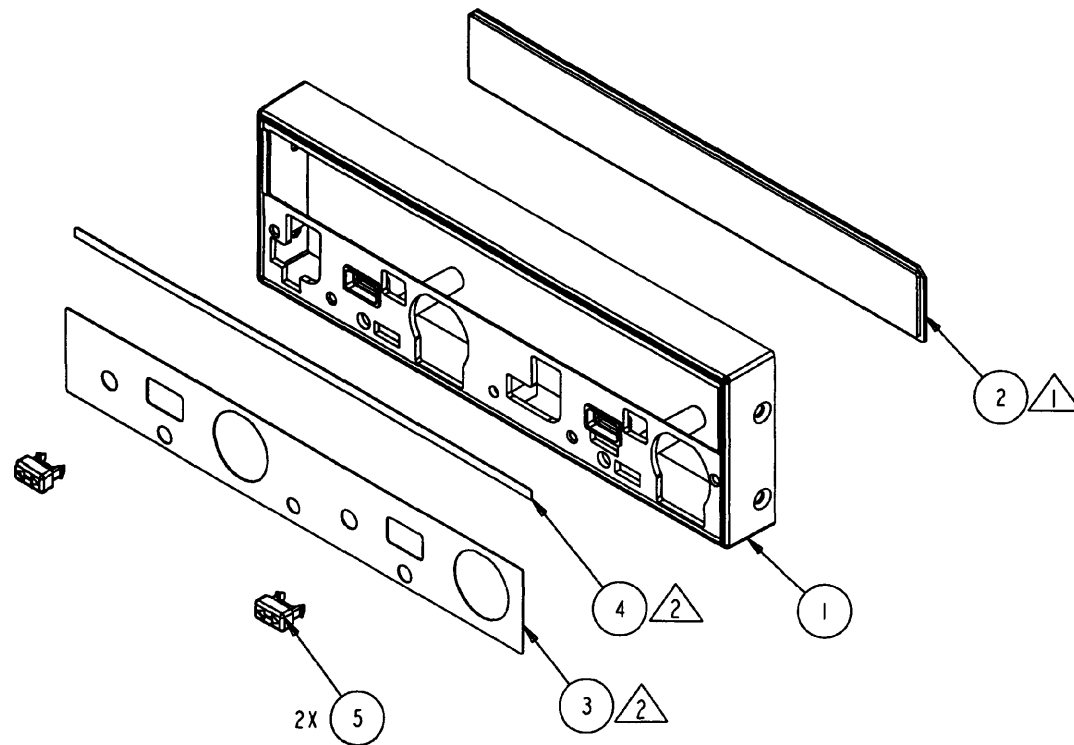
NOTE

⚠1 BOND LENS, ITEM 2, WITH CONTACT CEMENT, ITEM 6
CONTACT CEMENT, ITEM 6, TO BE PLACED ON THE
BACKSIDE PERIMETER OF LENS   CONTACT CEMENT TO
BE FREE FROM CONTAMINATING VIEWING AREA

⚠2 BURNISH ENTIRE SURFACE AREA OF ITEMS 3 AND 4 ON
FRONT SURFACE OF ITEM 1

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Figure 6-4 Bezel
(Dwg No. 300-09531-0000 rev. -)

200-09057-0000 KX 155A FRONT PANEL   Rev.AA

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
1	009-09057-0000		PCBD KX155A FRONT	EA	1
10	088-03030-0001		INC/DEC RTR WHITE	EA	2
11	089-05899-0008		SCR PHP 2-56X1/2	EA	4
12	090-00019-0005		RING RTNR .188	EA	4
13	090-01012-0001		STANDOFF, LAMP (LE	EA	6
14	090-01013-0001		STANDOFF, PHOTODET	EA	1
15	091-00580-0000		WASHER INSULATING	EA	2
16	133-00573-0002		POT/ DUAL SWITCH	EA	1
17	133-00574-0002		POT / DUAL	EA	1
2	031-00372-0001		SWITCH SLIDE SPDT	EA	2
20	025-00018-0000		WIRE 26 BLK	IN	1
21	025-00018-0011		WIRE 26 BRN	IN	1.5
22	025-00018-0022		WIRE 26 RED	IN	1.5
23	025-00018-0044		WIRE 26 YEL	IN	2.5
24	025-00018-0077		WIRE 26 VIO	IN	2.5
25	025-00018-0066		WIRE 26 BLU	IN	2.5
26	025-00018-0014		WIRE 26 BN/YL	IN	1.5
27	025-00018-0090		WIRE 26 WH/BK	IN	1.5
28	025-00018-0099		WIRE 26 WHT	IN	1.5
29	089-08309-0000		WASHER INSULATING	EA	2
3	047-09994-0001		SWITCH BRKT W/F	EA	2
4	073-00924-0001		HOUSING BACK MACH	EA	2
5	073-00980-0002		HUSING OPT INC/DEC	EA	2
6	073-00997-0001		SHAFT	EA	2
7	088-00769-0000		SLEEVE LOCKING	EA	2
8	088-03029-0001		INC/DEC REFLECTOR	EA	4
9	088-03030-0000		INC/DEC RTR BROWN	EA	2
C2001	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C2002	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C2003	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C2004	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C2005	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C2013	106-00124-0000		CAP CH CR .15 500V	EA	1
C2014	106-00124-0000		CAP CH CR .15 500V	EA	1
C2015	096-01186-0019		CAP 22UF 20V 10%	EA	1
CR2001	007-05117-0014		DIO Z 12V SOT	EA	1
CR2002	007-06398-0000		DIO DUAL SCHOTTKY	EA	1
CR2003	007-06181-0000		DIO DUAL MMBD2835	EA	1
CR2005	007-06398-0000		DIO DUAL SCHOTTKY	EA	1
CR2006	007-06181-0000		DIO DUAL MMBD2835	EA	1
DS2001	037-00034-0003		LMP 7268 T1 5V	EA	1
DS2002	037-00034-0003		LMP 7268 T1 5V	EA	1
DS2003	037-00034-0003		LMP 7268 T1 5V	EA	1
DS2004	037-00034-0003		LMP 7268 T1 5V	EA	1
DS2005	037-00034-0003		LMP 7268 T1 5V	EA	1
DS2006	037-00034-0003		LMP 7268 T1 5V	EA	1
J2012	030-03233-0001		CONN .050 X .050	EA	1
P2011	030-03139-0016		STRGHT DBL ROW HDR	EA	1
Q2002	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q2003	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q2004	007-00254-0001		XSTR S PNP SOT-23	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
Q2005	007-00254-0001		XSTR S PNP SOT-23	EA	1
R2001	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2002	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2003	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2004	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2005	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2006	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R2007	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R2008	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2009	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2010	139-01002-0010		RES CH 10K TW 1%	EA	1
R2011	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2012	139-01002-0010		RES CH 10K TW 1%	EA	1
R2013	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2014	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2015	139-01003-0010		RES CH 100K TW 1%	EA	1
R2016	139-01003-0010		RES CH 100K TW 1%	EA	1
R2017	139-01003-0010		RES CH 100K TW 1%	EA	1
R2018	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2019	139-01003-0010		RES CH 100K TW 1%	EA	1
R2020	139-01003-0010		RES CH 100K TW 1%	EA	1
R2021	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2022	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2023	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2024	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2025	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2026	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2033	139-01003-0010		RES CH 100K TW 1%	EA	1
R2035	139-01003-0010		RES CH 100K TW 1%	EA	1
R2040	134-05005-0002		PHOTODETECTOR	EA	1
R2048	139-01003-0010		RES CH 100K TW 1%	EA	1
R2049	139-01003-0010		RES CH 100K TW 1%	EA	1
R2050	139-01003-0010		RES CH 100K TW 1%	EA	1
R2051	139-01003-0010		RES CH 100K TW 1%	EA	1
R2052	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2053	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2054	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2055	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2056	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2057	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2058	139-01003-0010		RES CH 100K TW 1%	EA	1
R2059	139-01003-0010		RES CH 100K TW 1%	EA	1
R2060	139-01003-0010		RES CH 100K TW 1%	EA	1
R2061	139-01003-0010		RES CH 100K TW 1%	EA	1
R2062	139-01002-0010		RES CH 10K TW 1%	EA	1
R2063	139-04221-0010		RES CH 4.22K TW 1%	EA	1
R2064	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2065	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2066	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2067	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2078	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R2079	139-04221-0010		RES CH 4.22K TW 1%	EA	1
R2080	139-04221-0010		RES CH 4.22K TW 1%	EA	1
R2081	139-04221-0010		RES CH 4.22K TW 1%	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
R2082	139-04221-0010		RES CH 4.22K TW 1%	EA	1
R2083	139-04221-0010		RES CH 4.22K TW 1%	EA	1
R2084	139-05901-0010		RES CH 5.9K .1W 1%	EA	1
R2085	139-01652-0010		RES CH 16.5K TW 1%	EA	1
R2086	139-01102-0010		RES CH 11K .1W 1%	EA	1
R2087	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2088	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2089	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2090	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R2091	139-01652-0010		RES CH 16.5K TW 1%	EA	1
SW2001	031-00753-0000		SWITCH TACTILE	EA	1
SW2002	031-00753-0000		SWITCH TACTILE	EA	1
SW2003	031-00753-0000		SWITCH TACTILE	EA	1
SW2004	031-00753-0000		SWITCH TACTILE	EA	1
U2001	007-08094-0000		PHOTO INTERUPTER	EA	1
U2002	007-08094-0000		PHOTO INTERUPTER	EA	1
U2003	007-08094-0000		PHOTO INTERUPTER	EA	1
U2004	007-08094-0000		PHOTO INTERUPTER	EA	1
U2005	007-08094-0000		PHOTO INTERUPTER	EA	1
U2006	007-08094-0000		PHOTO INTERUPTER	EA	1
U2007	007-08094-0000		PHOTO INTERUPTER	EA	1
U2008	007-08094-0000		PHOTO INTERUPTER	EA	1
U2009	123-00086-0003		IC 74HC86 SO PKG	EA	1
U2011	123-00589-0003		IC 74HC589 (SO)	EA	1
U2012	123-00589-0003		IC 74HC589 (SO)	EA	1
U2013	120-06007-0003		IC HEF4011B	EA	1
U2014	120-03648-0001		LM337LM 3 TERMINA	EA	1
U2015	120-03672-0001		VOLTAGE REF, 10V	EA	1
	002-09057-0000		KX 155A FRONT PANE	RF	0
	016-01040-0000		COATING TYPE AR	AR	1
	300-09057-0000		KX 155A FRONT PANE	RF	0

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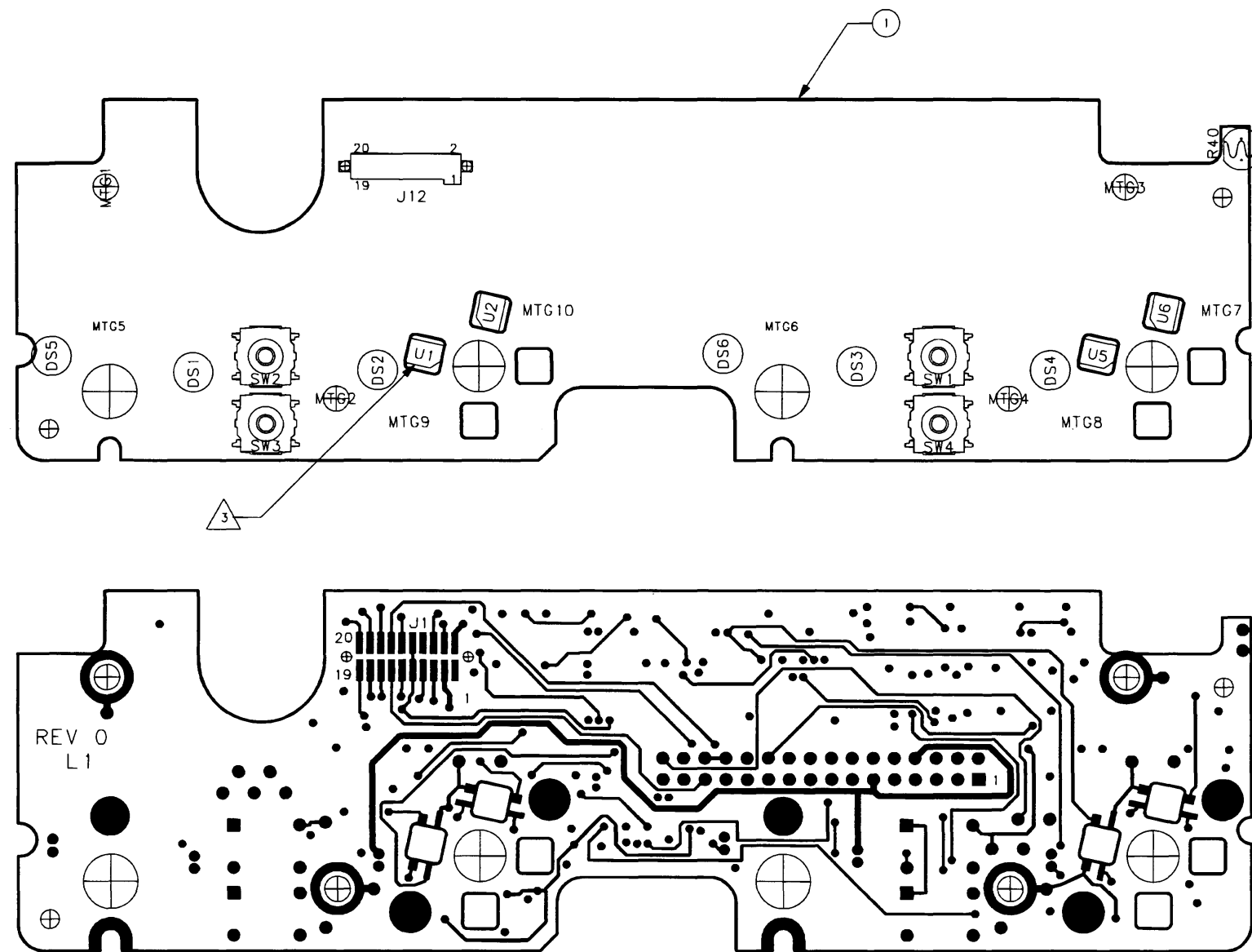
NOTES:
1. PRIOR TO POST COATING BOTH SIDES OF P.C. BOARD
   WITH KPN 016-01040-0000, MASK OFF ALL
   MOUNTING AREAS AND REFERENCE DESIGNATORS:
   DS1-DS6, E10-E20, E5-E9, J1,
   MTG1, MTG10, MTG2-MTG9, P1,
   SW1-SW4, U1 THRU U8, R40.

2. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN
   ACCORDANCE WITH SPEC. 001-01101-0000.

3. INSTALL U1 THRU U8 SO THAT BODY IS RECEDED IN PCB
   CUTOUT. PARTS SHOULD ALSO BE CENTERED IN CUTOUT
   AND PLANER TO PCB. MAXIMUM SOLDERING TEMPERATURE
   FOR U1 THRU U8 IS 500° F WITH A MAXIMUM DWELL TIME
   PER LEAD OF 5 SECONDS. ALLOW A MINIMUM OF 5 SECONDS
   FOR PART TO COOL AFTER SOLDERING EACH LEAD.

NEARSIDE VIEW OF PC BOARD

ADD 2000 TO ALL REFERENCE DESIGNATORS.

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09057-0000

300-09057-0000_4/000.tif

Figure 6-5 Front Panel Assembly
(Dwg No. 300-09057-0000 rev. 4, Sheet 1 of 3)

FARSIDE VIEW OF PC BOARD

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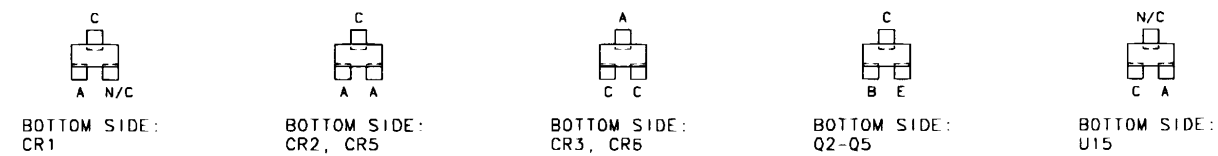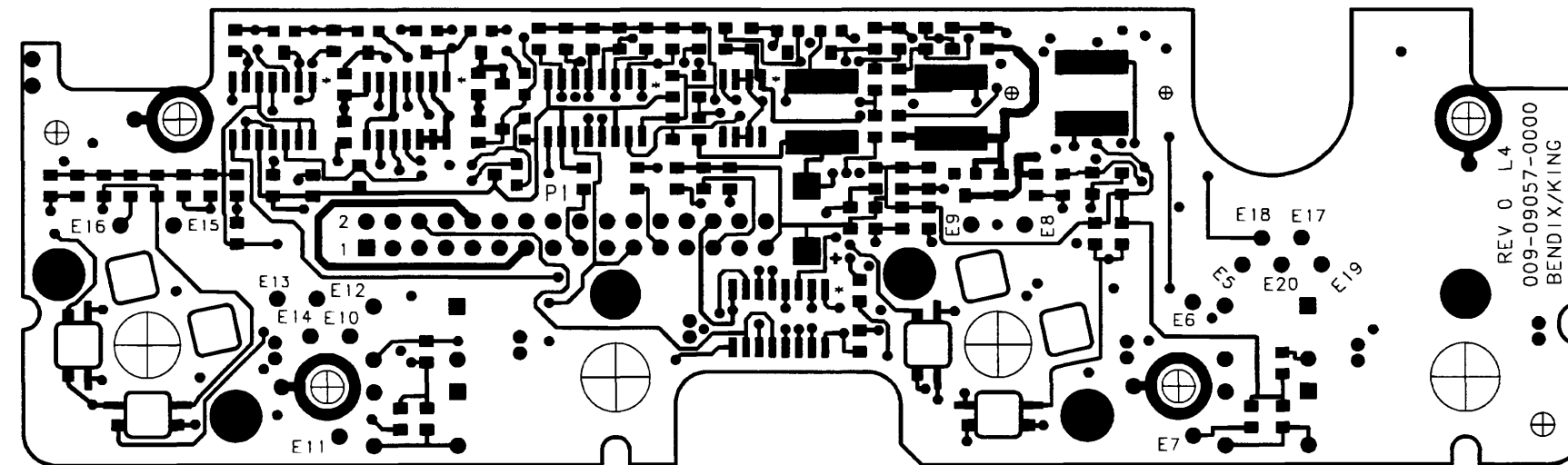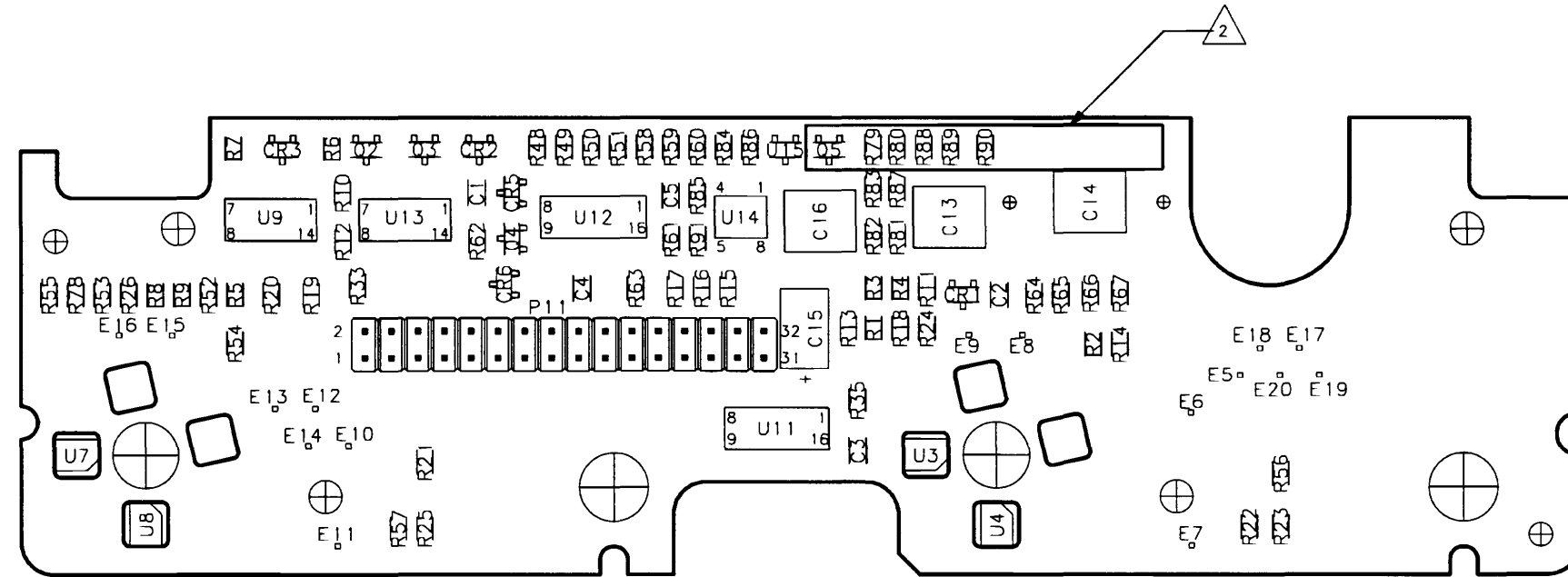
Figure 6-5 Front Panel Assembly
(Dwg No. 300-09057-0000 rev. 4, Sheet 2 of 3)
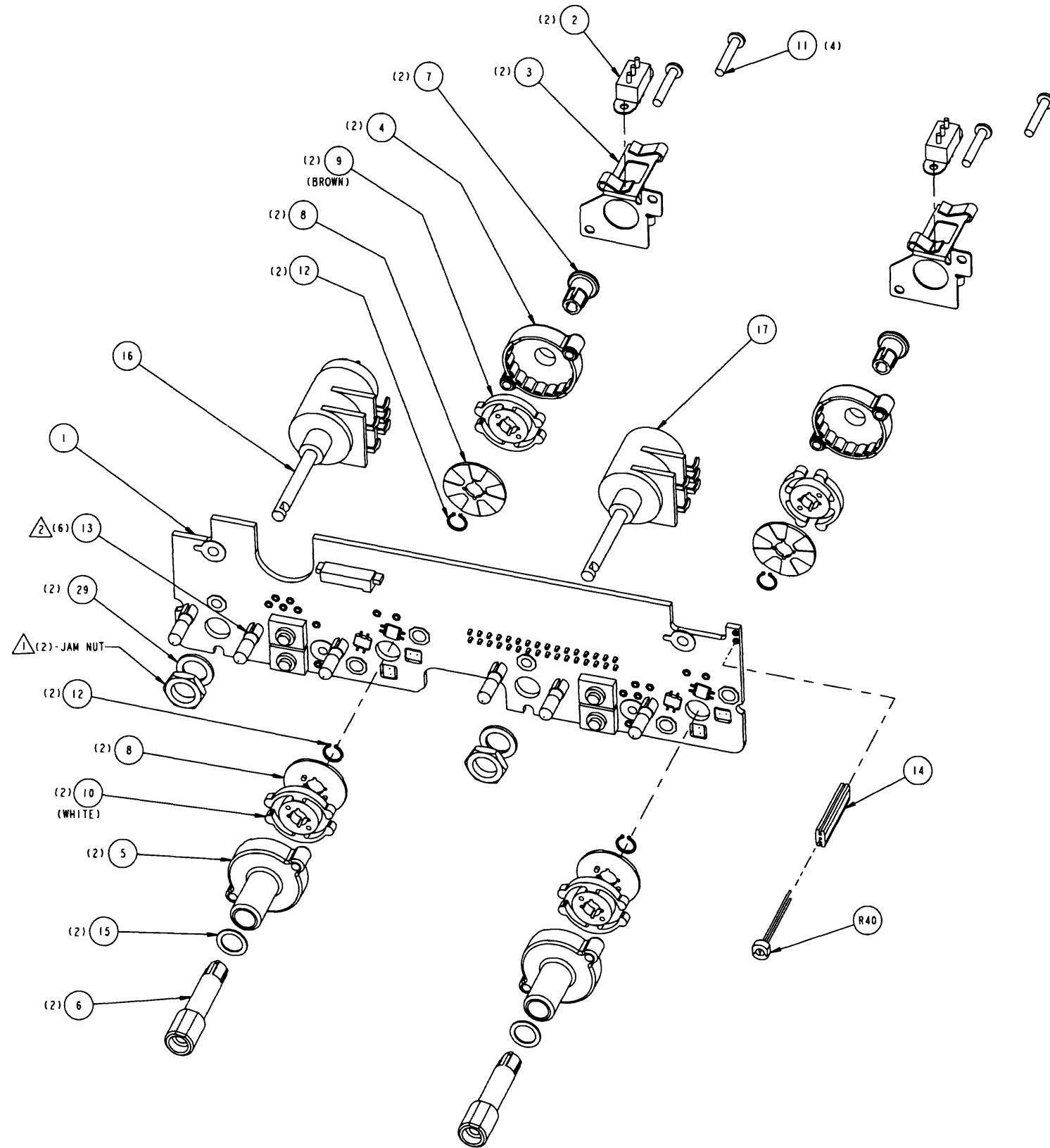
NOTES:

⚠ JAM NUT IS PART OF ITEM 16 AND 17.

⚠ DS1-DS6 MUST HAVE ITEM 13 IN PLACE BEFORE SOLDERED.

3. APPLY LIQUID STAKE TO THREADS PER 001-01080-0000.
   ITEM 11, 16 AND 17.

⚠ TRIM REAR PORTION OF TERMINALS E17 AND E18.
   (SEE DETAIL A) SOLDER WIRE TO REMAINING PORTION.

DETAIL A
SCALE 2.0

BACK VIEW SHOWING WIRING DETAIL
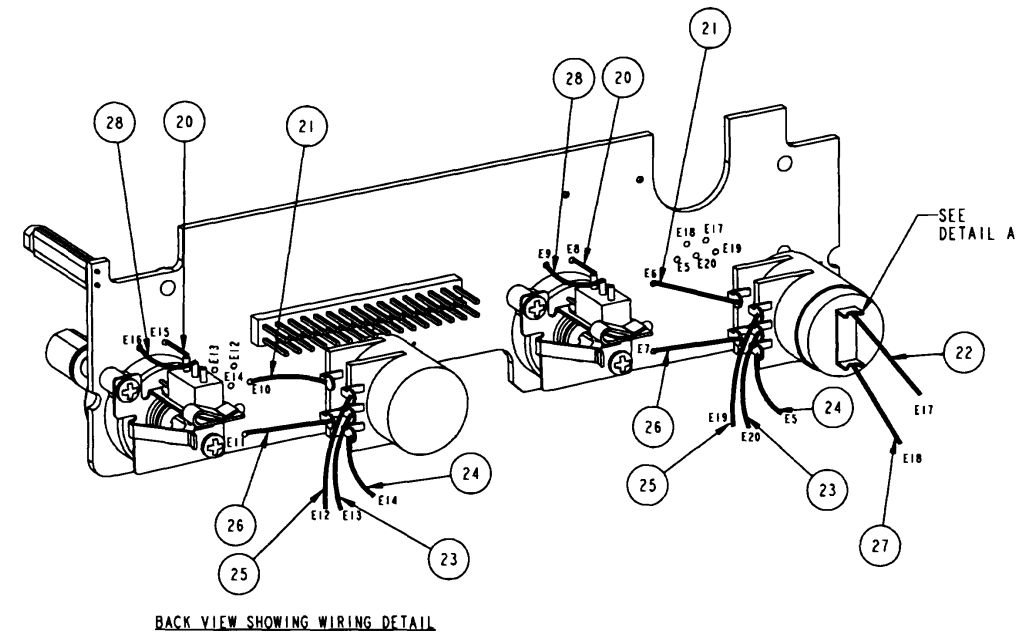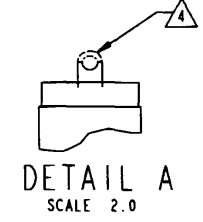
THIS DRAWING IS NOT COMPLETE
WITHOUT PARTS LIST (200-09057-0000).

300-09057-0000_4/002.tif

Figure 6-5 Front Panel Assembly
(Dwg No. 300-09057-0000 rev. 4, Sheet 3 of 3)
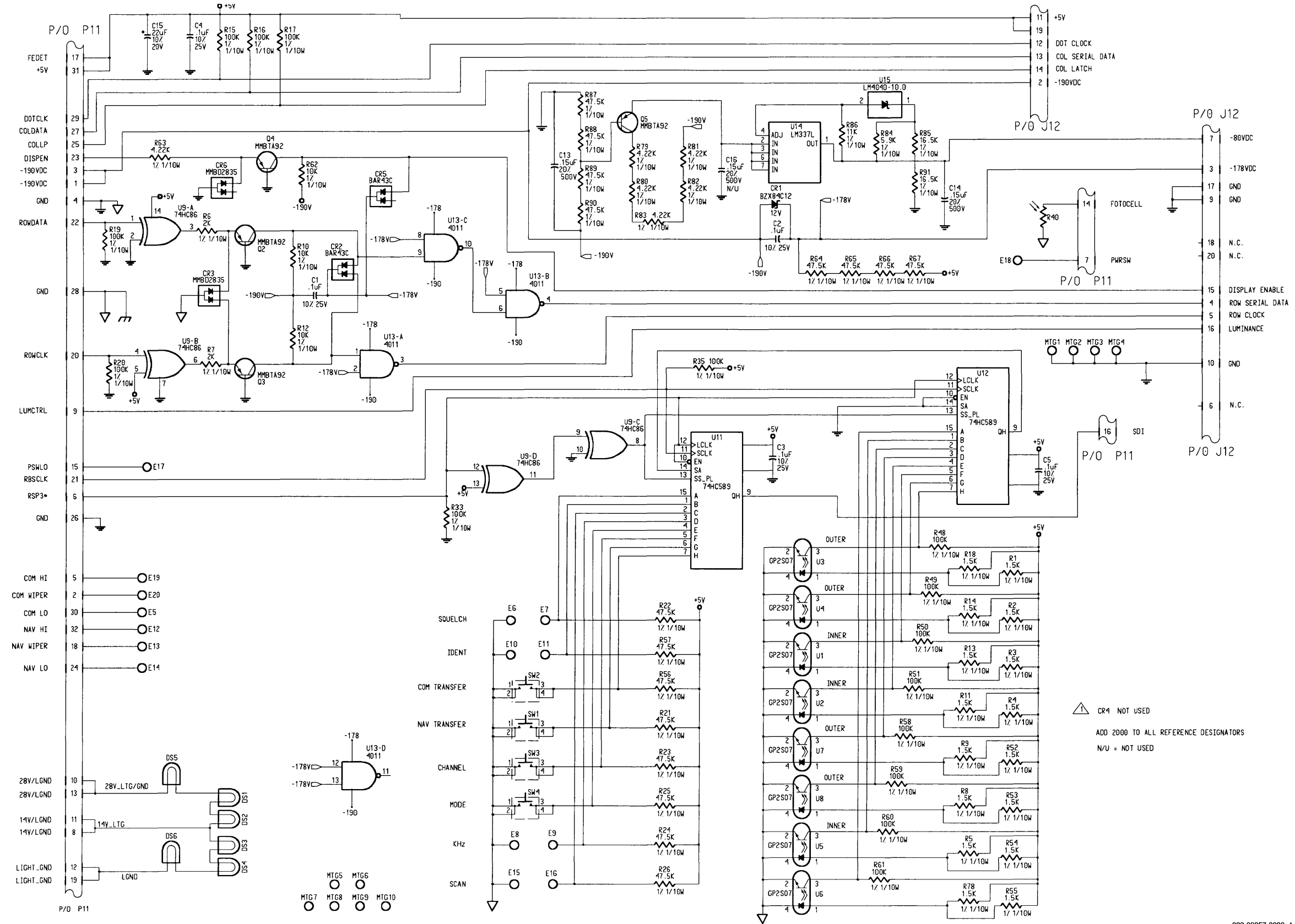
**Figure 6-6 Front Panel Schematic
(Dwg No. 002-09057-0000 rev. AA)**

206-00411-0106 KX 165A SOFTWARE SYSTEM   Rev.-

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0106
	000-00967-0010		KX 165A PRODUCT S	RF	0
	057-05287-0106		SFTW ID TAG V0106	EA	1
	205-00943-0005		MAIN BOARD - PROGR	EA	1
	225-00014-0005		APPLLICAT ION IMAG	RF	0
	225-00015-0000		BOOT IMAGE DISKETT	RF	0
	716-00321-0106		KX 155A/KX165A CON	RF	0

205-00943-0005 MAIN BOARD - PROGRAMMED   Rev.-

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0005
	057-05252-0943		KX 165A SOFTWARE L	EA	1
	057-05335-0005		DECAL 205 DASH 05	EA	1
	125-00943-0005		BD SW SET	EA	1
	200-09059-0040		KX 165A MAIN BOARD	EA	1
	300-09059-0040		KX 165A MAIN BOARD	RF	0

125-00943-0005 BD SW SET   Rev.-

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SYMBOL   PART_NUMBER      FIND_NO  DESCRIPTION        UN      -0005
U1019    122-49014-0005            KX 155A/165A PROGR  EA         1
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200-09059-0040 KX 165A MAIN BOARD   Rev.G

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
C1001	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1002	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1003	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1004	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1005	106-04333-0046		CAP CH 33K X7R/50V	EA	1
C1006	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1007	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1008	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1009	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1010	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1011	106-05221-0026		CAP CH220PFNPO/100	EA	1
C1012	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1013	106-05102-0026		CAP CH 1K NPO/100V	EA	1
C1014	106-05102-0026		CAP CH 1K NPO/100V	EA	1
C1015	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1016	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1017	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1018	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1019	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1020	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1021	106-05200-0016		CAPCH 20PF NPO 50V	EA	1
C1022	106-05200-0016		CAPCH 20PF NPO 50V	EA	1
C1023	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1024	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1025	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1026	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1027	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1028	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1029	097-00204-0027		CAP AL 100UF 16V 2	EA	1
C1030	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1031	106-05222-0016		CAP CH 2200PF NPO	EA	1
C1032	106-04122-0013		CAP CH 1200PF NPO/	EA	1
C1033	106-04122-0013		CAP CH 1200PF NPO/	EA	1
C1034	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1035	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1036	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1037	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1038	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1039	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1040	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1041	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1042	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1043	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1044	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1045	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1046	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1047	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1048	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1049	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1050	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1051	106-05104-0037		CAP CH 100KX7R/25V	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
C1052	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1053	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1054	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1055	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1056	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1057	097-00204-0027		CAP AL 100UF 16V 2	EA	1
C1058	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1059	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1060	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1061	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1062	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1063	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1064	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1065	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1066	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1067	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1068	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1069	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1070	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1071	106-05562-0057		CAP CH5600 PFX7R/1	EA	1
C1072	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1073	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1074	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1075	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1077	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1078	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1079	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1080	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1081	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1082	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1083	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1084	106-05222-0016		CAP CH 2200PF NPO	EA	1
C1085	106-04122-0013		CAP CH 1200PF NPO/	EA	1
C1086	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1087	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1088	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1091	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1092	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1093	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1094	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1095	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1096	106-05182-0057		CAPCH1800PFX7R/100	EA	1
C1097	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1100	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1101	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1102	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1103	106-05181-0026		CAP CH180PFNPO/100	EA	1
C1104	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1105	106-04333-0046		CAP CH 33K X7R/50V	EA	1
C1106	106-04122-0013		CAP CH 1200PF NPO/	EA	1
C1107	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1108	106-05472-0057		CAPCH4700PFX7R/100	EA	1
C1109	106-05473-0036		CAP CH .047X7R 25V	EA	1
C1110	106-05104-0037		CAP CH 100KX7R/25V	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
C1111	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1112	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1113	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1114	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1115	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1118	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1119	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1120	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1121	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1122	106-05511-0016		CAP CH510PFNPO/50V	EA	1
C1123	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1124	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1125	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1126	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1128	106-05102-0026		CAP CH 1K NPO/100V	EA	1
C1129	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1130	106-05511-0016		CAP CH510PFNPO/50V	EA	1
C1131	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1132	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1133	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C1134	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1137	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1138	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1141	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1142	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1143	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1144	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1146	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1147	106-04104-0047		CH 100KX7R/50V	EA	1
C1149	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1150	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1151	106-05682-0046		CAP CH 6.8KX7R/50V	EA	1
C1153	106-05101-0026		CAPCH100PFNPO/100V	EA	1
C1154	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1155	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1156	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1157	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1158	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1161	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1162	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1164	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1165	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1167	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1168	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1169	106-05102-0026		CAP CH 1K NPO/100V	EA	1
C1170	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1171	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1172	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1173	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1174	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1178	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1180	106-05511-0016		CAP CH510PFNPO/50V	EA	1
C1181	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1182	106-05511-0016		CAP CH510PFNPO/50V	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
C1183	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1184	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1185	106-05511-0016		CAP CH510PFNP0/50V	EA	1
C1186	106-05102-0026		CAP CH 1K NP0/100V	EA	1
C1187	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1188	097-00218-0009		CAP EL 10UF 350V 2	EA	1
C1189	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1191	106-05222-0016		CAP CH 2200PF NP0	EA	1
C1192	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1193	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1194	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1195	097-00214-0034		CAP AL 100UF 50V	EA	1
C1196	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1197	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1198	106-05511-0016		CAP CH510PFNP0/50V	EA	1
C1199	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1200	106-05222-0016		CAP CH 2200PF NP0	EA	1
C1201	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1202	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1203	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1204	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1205	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1206	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1207	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1208	106-04104-0047		CH 100KX7R/50V	EA	1
C1209	106-04104-0047		CH 100KX7R/50V	EA	1
C1210	097-00218-0009		CAP EL 10UF 350V 2	EA	1
C1211	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1212	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1213	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1214	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1215	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1216	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1217	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1218	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1219	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1220	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1222	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1223	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1224	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1225	106-05222-0016		CAP CH 2200PF NP0	EA	1
C1226	097-00217-0008		CAP AL/0 68UF 20V	EA	1
C1228	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1230	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1231	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C1232	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1233	106-05331-0026		CAP CH330PFNP0/100	EA	1
C1239	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1240	097-00214-0006		CAP AL 680UF 50V	EA	1
C1241	106-04181-0026		CAPCH180PFNP0/100V	EA	1
C1242	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1243	106-04181-0026		CAPCH180PFNP0/100V	EA	1
C1244	106-04820-0026		CAP CH82PFNP0/100V	EA	1
C1245	106-05104-0037		CAP CH 100KX7R/25V	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
C1246	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1247	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1248	106-05511-0016		CAP CH510PFNPO/50V	EA	1
C1249	106-04181-0026		CAPCH180PFNPO/100V	EA	1
C1250	111-00001-0022		CAP CR .1UF 100V	EA	1
C1251	106-04474-0037		CAP CH 0.47UF X7R	EA	1
C1252	097-00217-0012		CAP EL 150UF 16V	EA	1
C1253	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1255	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1257	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1258	106-04181-0026		CAPCH180PFNPO/100V	EA	1
C1259	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1261	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1262	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1263	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1264	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1265	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1266	097-00214-0006		CAP AL 680UF 50V	EA	1
C1267	096-01186-0019		CAP 22UF 20V 10%	EA	1
C1268	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1269	097-00217-0012		CAP EL 150UF 16V	EA	1
C1270	096-01186-0014		CAP 10.0UF 16V 10%	EA	1
C1271	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1272	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1273	106-04181-0026		CAPCH180PFNPO/100V	EA	1
C1274	106-04102-0026		CH 1KPF NPO/100V	EA	1
C1275	106-04181-0026		CAPCH180PFNPO/100V	EA	1
C1276	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1277	106-04181-0026		CAPCH180PFNPO/100V	EA	1
C1278	106-05392-0047		CAP CH3900PFX7R/50	EA	1
C1280	106-04331-0026		CAPCH330PFNPO/100V	EA	1
C1281	097-00217-0012		CAP EL 150UF 16V	EA	1
C1282	097-00214-0024		CAP AL 10UF 63V	EA	1
C1284	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1286	096-01186-0036		CAP 10UF 35V 10%	EA	1
C1287	106-04104-0047		CH 100KX7R/50V	EA	1
C1288	106-04104-0047		CH 100KX7R/50V	EA	1
C1290	106-04471-0026		CH 470PF NPO/100V	EA	1
C1300	096-01186-0030		CAP 1UF 35V 10%	EA	1
C1301	097-00204-0027		CAP AL 100UF 16V 2	EA	1
C1302	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1303	097-00204-0027		CAP AL 100UF 16V 2	EA	1
C1304	106-04122-0013		CAP CH 1200PF NPO/	EA	1
C1305	096-01186-0017		CAP 2.2UF 20V 10%	EA	1
C1307	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1308	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1309	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C1310	106-04104-0057		CAP CH .1UF 100V 1	EA	1
C1313	097-00204-0027		CAP AL 100UF 16V 2	EA	1
C1314	106-04473-0057		CAP CH 47K X7R/100	EA	1
C1315	106-04473-0057		CAP CH 47K X7R/100	EA	1
C1316	106-04473-0057		CAP CH 47K X7R/100	EA	1
C1317	106-04473-0057		CAP CH 47K X7R/100	EA	1
C1318	097-00204-0027		CAP AL 100UF 16V 2	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
C1319	106-05331-0026		CAP CH330PFNPO/100	EA	1
C1328	111-00001-0072		CAP CR 820PF 50V	EA	1
C1332	106-05101-0026		CAPCH100PFNPO/100V	EA	1
C1333	111-00001-0032		CAP CR 1UF 50V	EA	1
C1334	096-01186-0014		CAP 10.0UF 16V 10%	EA	1
C1335	097-00214-0008		CAP AL 1000UF 10V	EA	1
C1336	111-00001-0016		CAP CR 3300PF 50V	EA	1
C1337	106-00134-0000		CAP CH CR .001 200	EA	1
C1338	106-05104-0037		CAP CH 100KX7R/25V	EA	1
CR1001	007-06222-0000		DIO DAN202K	EA	1
CR1003	007-05117-0004		DIO Z 4.7V SOT	EA	1
CR1004	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1005	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR1006	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR1007	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1008	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1009	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1010	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1012	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1013	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1014	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1015	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1016	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1017	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1018	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR1019	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1020	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1022	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1024	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1025	007-05241-0200		TRANSORB BI-DIRECT	EA	1
CR1027	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1028	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1029	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1031	007-05117-0012		DIO Z 10V SOT	EA	1
CR1032	007-05241-0200		TRANSORB BI-DIRECT	EA	1
CR1033	007-05117-0004		DIO Z 4.7V SOT	EA	1
CR1034	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1036	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1037	007-05241-0203		TRNSRB 1500W 15V	EA	1
CR1038	007-05241-0203		TRNSRB 1500W 15V	EA	1
CR1039	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1040	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1041	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1042	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1043	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1044	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1047	007-05117-0004		DIO Z 4.7V SOT	EA	1
CR1048	007-06129-0000		DIO S HV VAR223-40	EA	1
CR1051	007-06175-0001		DIO RECT	EA	1
CR1052	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1054	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1055	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1056	007-05117-0012		DIO Z 10V SOT	EA	1
CR1057	007-06222-0000		DIO DAN202K	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
CR1058	007-06175-0001		DIO RECT	EA	1
CR1059	007-06175-0001		DIO RECT	EA	1
CR1060	007-06222-0000		DIO DAN202K	EA	1
CR1061	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1062	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1063	007-05117-0012		DIO Z 10V SOT	EA	1
CR1064	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1065	007-06122-0005		DIO 1N4937	EA	1
CR1066	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1067	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1101	007-05117-0010		DIO Z 8.2V SOT	EA	1
CR1104	007-05241-0007		TRNSRB 1500W 7V	EA	1
CR1107	007-06184-0000		DIO DUAL SWITCHING	EA	1
CR1108	007-05246-0011		ZENER 5.6 SMD	EA	1
CR1109	007-06419-0000		DIO IR EMITTING	EA	1
CR1110	007-06419-0000		DIO IR EMITTING	EA	1
CR1111	007-05241-0002		TRNSRB 150W 40V	EA	1
CR1112	007-05254-0007		TVS 48WV 100V CLAM	EA	1
E1001	008-00038-0001		TERM BIFUR .084L	EA	1
E1002	008-00038-0001		TERM BIFUR .084L	EA	1
E1003	008-00038-0001		TERM BIFUR .084L	EA	1
FL1001	017-08072-0004		CHIP EMI FILTER	EA	1
FL1002	017-08072-0004		CHIP EMI FILTER	EA	1
FL1003	017-08072-0004		CHIP EMI FILTER	EA	1
FL1004	017-08072-0004		CHIP EMI FILTER	EA	1
FL1005	017-08072-0004		CHIP EMI FILTER	EA	1
FL1006	017-08072-0004		CHIP EMI FILTER	EA	1
J1001	030-03006-0103		CONN RECEPT 2X15	EA	1
J1002	030-03004-0009		CONN RECPT 1X3	EA	1
J1003	030-03004-0009		CONN RECPT 1X3	EA	1
J1004	030-03371-0008		CONN, HDR, MALE, P	EA	1
J1008	030-03371-0008		CONN, HDR, MALE, P	EA	1
J1009	030-03371-0008		CONN, HDR, MALE, P	EA	1
J1011	030-03264-0016		SKT STRIP 32P	EA	1
J1014	030-03305-0006		HEADER 2MM 2X6	EA	1
L1001	019-02757-0005		SMD FERRITE BEAD	EA	1
L1002	019-02757-0005		SMD FERRITE BEAD	EA	1
L1003	019-02757-0005		SMD FERRITE BEAD	EA	1
L1004	019-02757-0005		SMD FERRITE BEAD	EA	1
L1005	019-02757-0005		SMD FERRITE BEAD	EA	1
L1006	019-02757-0005		SMD FERRITE BEAD	EA	1
L1007	019-02757-0005		SMD FERRITE BEAD	EA	1
L1008	019-02757-0005		SMD FERRITE BEAD	EA	1
L1009	019-02757-0005		SMD FERRITE BEAD	EA	1
L1010	019-02757-0005		SMD FERRITE BEAD	EA	1
L1011	019-02757-0005		SMD FERRITE BEAD	EA	1
L1012	019-02332-0000		CHOKE PARASITIC	EA	1
L1013	019-02757-0005		SMD FERRITE BEAD	EA	1
L1014	019-02757-0005		SMD FERRITE BEAD	EA	1
L1015	019-02757-0005		SMD FERRITE BEAD	EA	1
L1016	019-02757-0005		SMD FERRITE BEAD	EA	1
L1017	013-00028-0000		FERR BEAD W/LEAD	EA	1
L1018	019-02757-0005		SMD FERRITE BEAD	EA	1
L1019	019-02757-0005		SMD FERRITE BEAD	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
L1020	019-02209-0000		CHOKE FILTER	EA	1
L1022	019-02768-0001		INDUCTOR, TOROID,	EA	1
L1023	019-02696-0000		INDUCTOR 51UH	EA	1
L1024	019-02696-0000		INDUCTOR 51UH	EA	1
L1026	019-02768-0001		INDUCTOR, TOROID,	EA	1
L1027	019-02084-0092		CH 1KUH 5%	EA	1
Q1001	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1002	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1003	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1004	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1005	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1006	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1007	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1008	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1009	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1010	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1011	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1012	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1013	007-00903-0000		2N7002 MOSFET	EA	1
Q1014	007-00903-0000		2N7002 MOSFET	EA	1
Q1015	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1016	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1017	007-01023-0000		MOSFET DUAL SO-8	EA	1
Q1018	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1019	007-00903-0000		2N7002 MOSFET	EA	1
Q1020	007-00903-0000		2N7002 MOSFET	EA	1
Q1021	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1022	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1024	007-00903-0000		2N7002 MOSFET	EA	1
Q1025	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q1027	007-00903-0000		2N7002 MOSFET	EA	1
Q1028	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1029	007-00903-0000		2N7002 MOSFET	EA	1
Q1030	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1031	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1033	007-00903-0000		2N7002 MOSFET	EA	1
Q1035	007-00965-0000		XSTR NPN TIP50	EA	1
Q1036	007-08064-0000		XSTR PNP 10K, 10K	EA	1
Q1037	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1038	007-00977-0000		XSTR NPN MJD112	EA	1
Q1039	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1040	007-00254-0001		XSTR S PNP SOT-23	EA	1
Q1041	007-00257-0001		MMBTA42 SO PKG	EA	1
Q1042	007-00932-0000		JFET P-CHANNEL	EA	1
Q1043	007-00888-0000		IRF9533	EA	1
Q1044	007-00888-0000		IRF9533	EA	1
Q1045	007-00886-0000		XSTR MOSFET IRF540	EA	1
R1001	139-01002-0010		RES CH 10K TW 1%	EA	1
R1002	139-00000-0014		CKT JUMPER 0805	EA	1
R1003	139-01003-0010		RES CH 100K TW 1%	EA	1
R1004	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1005	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1006	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1007	133-00560-0011		RES VA SMD 50K QW	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
R1008	133-00560-0015		RES VA SMD 1000KQW	EA	1
R1009	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1010	139-01133-0010		RES CH 113K TW 1%	EA	1
R1011	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1012	139-02802-0010		RES CH 28K TW 1%	EA	1
R1013	139-02802-0010		RES CH 28K TW 1%	EA	1
R1014	139-01003-0010		RES CH 100K TW 1%	EA	1
R1015	139-02872-0010		RES CH 28.7K TW 1%	EA	1
R1016	139-02872-0010		RES CH 28.7K TW 1%	EA	1
R1017	139-01003-0010		RES CH 100K TW 1%	EA	1
R1018	139-03652-0010		RES CH 36.5K TW 1%	EA	1
R1019	139-01301-0010		RES CH 1.3K .1W 1%	EA	1
R1021	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1022	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1023	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1024	139-01002-0010		RES CH 10K TW 1%	EA	1
R1025	139-00000-0014		CKT JUMPER 0805	EA	1
R1026	139-01003-0010		RES CH 100K TW 1%	EA	1
R1027	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1028	139-02802-0010		RES CH 28K TW 1%	EA	1
R1029	139-07502-0010		RES CH 75.0K TW 1%	EA	1
R1030	139-07502-0010		RES CH 75.0K TW 1%	EA	1
R1031	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1032	139-01073-0010		RES CH 107K TW 1%	EA	1
R1033	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1034	139-02803-0010		RES CH 280K TW 1%	EA	1
R1035	139-03652-0010		RES CH 36.5K TW 1%	EA	1
R1036	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1037	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1038	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1039	139-01002-0010		RES CH 10K TW 1%	EA	1
R1040	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1041	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1042	139-07502-0010		RES CH 75.0K TW 1%	EA	1
R1043	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1044	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1045	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1046	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1047	139-00000-0014		CKT JUMPER 0805	EA	1
R1048	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1049	139-03323-0010		RES CH 332K TW 1%	EA	1
R1050	139-01005-0010		RES CH 10MEG .1W 1	EA	1
R1051	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1053	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1054	139-02211-0010		RES CH 2.21K TW 1%	EA	1
R1055	139-02212-0010		RES CH 22.1K TW 1%	EA	1
R1056	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1057	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1058	139-03920-0020		RES CH 392 QW 1%	EA	1
R1059	139-01003-0010		RES CH 100K TW 1%	EA	1
R1060	139-03091-0010		RES CH 3.09K TW 1%	EA	1
R1061	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1062	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1063	139-02001-0010		RES CH 2.00K TW 1%	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
R1064	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1065	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R1067	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R1068	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R1069	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R1070	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R1071	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1072	139-01002-0010		RES CH 10K TW 1%	EA	1
R1073	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1074	139-03920-0020		RES CH 392 QW 1%	EA	1
R1075	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1076	139-02612-0010		RES CH 26.1K TW 1%	EA	1
R1077	139-01003-0010		RES CH 100K TW 1%	EA	1
R1078	139-01003-0010		RES CH 100K TW 1%	EA	1
R1079	139-01003-0010		RES CH 100K TW 1%	EA	1
R1080	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1081	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1082	139-01003-0010		RES CH 100K TW 1%	EA	1
R1083	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1084	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1085	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1086	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1087	139-02212-0010		RES CH 22.1K TW 1%	EA	1
R1088	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1089	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1090	139-01133-0010		RES CH 113K TW 1%	EA	1
R1092	139-02672-0010		RES CH 26.7K .1W 1	EA	1
R1093	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1094	139-07501-0010		RES CH 7.5K .1W 1%	EA	1
R1095	139-07501-0010		RES CH 7.5K .1W 1%	EA	1
R1096	133-00560-0009		RES VA SMD 10K QW	EA	1
R1097	139-01003-0010		RES CH 100K TW 1%	EA	1
R1099	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1100	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1101	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R1102	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1103	139-01823-0010		RES CH 182KTW 1%	EA	1
R1104	139-08252-0010		RES CH 82.5K TW 1%	EA	1
R1105	139-06491-0010		RES CH 6.49K TW 1%	EA	1
R1106	139-01003-0010		RES CH 100K TW 1%	EA	1
R1107	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1108	139-02431-0010		RES CH 2.43K .1W 1	EA	1
R1109	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1110	139-04753-0010		RES CH 475K .1W 1%	EA	1
R1111	139-07501-0010		RES CH 7.5K .1W 1%	EA	1
R1112	139-03011-0010		RES CH 3.01K .1W 1	EA	1
R1113	139-01002-0010		RES CH 10K TW 1%	EA	1
R1114	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1115	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1116	139-01002-0010		RES CH 10K TW 1%	EA	1
R1117	139-01002-0010		RES CH 10K TW 1%	EA	1
R1118	139-02212-0010		RES CH 22.1K TW 1%	EA	1
R1119	139-00000-0014		CKT JUMPER 0805	EA	1
R1120	139-02673-0010		RES CH 267K TW 1%	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
R1121	139-01002-0010		RES CH 10K TW 1%	EA	1
R1122	139-02431-0010		RES CH 2.43K .1W 1	EA	1
R1123	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1124	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1125	139-00100-0010		RES CH 10 OHMS 1%	EA	1
R1126	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1127	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1128	139-02673-0010		RES CH 267K TW 1%	EA	1
R1130	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1131	139-05901-0010		RES CH 5.9K .1W 1%	EA	1
R1132	139-01212-0010		RES CH 12.1K .1W 1	EA	1
R1133	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1134	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1135	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1136	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1137	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1138	139-01002-0010		RES CH 10K TW 1%	EA	1
R1139	139-01002-0010		RES CH 10K TW 1%	EA	1
R1140	139-07501-0010		RES CH 7.5K .1W 1%	EA	1
R1141	139-01502-0010		RES CH 15 K .1W 1%	EA	1
R1142	139-02672-0010		RES CH 26.7K .1W 1	EA	1
R1143	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1144	139-01741-0010		RES CH 1.74K TW 1%	EA	1
R1145	139-01332-0010		RES CH 13.3K TW 1%	EA	1
R1146	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1147	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1148	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R1149	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1150	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1151	139-01622-0010		RES CH 16.2K .1W 1	EA	1
R1152	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1153	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1154	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1155	139-07501-0010		RES CH 7.5K .1W 1%	EA	1
R1156	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1157	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1158	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1159	139-02672-0010		RES CH 26.7K .1W 1	EA	1
R1160	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1161	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1162	139-08251-0010		RES CH 8.25K TW 1%	EA	1
R1163	139-08251-0010		RES CH 8.25K TW 1%	EA	1
R1164	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1165	139-02003-0010		RES CH 200K .1W 1%	EA	1
R1166	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1167	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1169	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1172	139-06812-0010		RES CH 68.1K TW 1%	EA	1
R1173	139-01622-0010		RES CH 16.2K .1W 1	EA	1
R1174	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1175	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1176	139-08251-0010		RES CH 8.25K TW 1%	EA	1
R1177	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1178	139-08251-0010		RES CH 8.25K TW 1%	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
R1179	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1180	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1181	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1182	139-02672-0010		RES CH 26.7K .1W 1	EA	1
R1183	139-02431-0010		RES CH 2.43K .1W 1	EA	1
R1185	139-09533-0010		RES CH 953K TW 1%	EA	1
R1187	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1188	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1189	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1190	139-01000-0010		RES CH 100 .1W 1%	EA	1
R1191	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1192	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1193	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1196	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1197	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1198	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1200	139-08251-0010		RES CH 8.25K TW 1%	EA	1
R1201	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1202	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1203	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1204	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1205	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1206	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1207	139-07502-0010		RES CH 75.0K TW 1%	EA	1
R1208	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1209	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1210	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1211	139-01000-0020		RES CH 100 QW 1%	EA	1
R1212	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1213	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1214	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1215	139-00100-0010		RES CH 10 OHMS 1%	EA	1
R1219	139-00000-0004		RES CH 0 EW	EA	1
R1220	139-00000-0004		RES CH 0 EW	EA	1
R1221	139-01000-0010		RES CH 100 .1W 1%	EA	1
R1222	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1223	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1224	139-09533-0010		RES CH 953K TW 1%	EA	1
R1225	139-09533-0010		RES CH 953K TW 1%	EA	1
R1226	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1228	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1229	139-01502-0010		RES CH 15 K .1W 1%	EA	1
R1230	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1231	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1232	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1233	139-04221-0010		RES CH 4.22K TW 1%	EA	1
R1234	139-02212-0010		RES CH 22.1K TW 1%	EA	1
R1235	139-00000-0014		CKT JUMPER 0805	EA	1
R1236	139-01000-0010		RES CH 100 .1W 1%	EA	1
R1237	139-00000-0014		CKT JUMPER 0805	EA	1
R1238	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1239	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1240	139-01003-0010		RES CH 100K TW 1%	EA	1
R1241	139-07501-0010		RES CH 7.5K .1W 1%	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
R1242	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1243	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1244	139-02802-0010		RES CH 28K TW 1%	EA	1
R1245	139-01502-0010		RES CH 15 K .1W 1%	EA	1
R1246	139-01502-0010		RES CH 15 K .1W 1%	EA	1
R1247	139-01002-0010		RES CH 10K TW 1%	EA	1
R1248	139-01003-0010		RES CH 100K TW 1%	EA	1
R1249	139-02212-0010		RES CH 22.1K TW 1%	EA	1
R1251	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1252	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1253	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1254	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1255	139-00100-0010		RES CH 10 OHMS 1%	EA	1
R1258	139-01000-0020		RES CH 100 QW 1%	EA	1
R1259	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1261	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1262	139-09533-0010		RES CH 953K TW 1%	EA	1
R1263	139-02212-0010		RES CH 22.1K TW 1%	EA	1
R1265	139-00000-0014		CKT JUMPER 0805	EA	1
R1266	139-01212-0010		RES CH 12.1K .1W 1	EA	1
R1267	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1268	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1270	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1272	139-01622-0010		RES CH 16.2K .1W 1	EA	1
R1273	139-01622-0010		RES CH 16.2K .1W 1	EA	1
R1274	139-01002-0010		RES CH 10K TW 1%	EA	1
R1275	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1276	139-03323-0010		RES CH 332K TW 1%	EA	1
R1281	139-00000-0014		CKT JUMPER 0805	EA	1
R1282	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1283	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1284	139-01003-0010		RES CH 100K TW 1%	EA	1
R1285	139-08253-0010		RES CH 825K TW 1%	EA	1
R1286	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1287	139-00000-0004		RES CH 0 EW	EA	1
R1288	139-00000-0004		RES CH 0 EW	EA	1
R1289	139-02002-0010		RES CH 20K TW 1%	EA	1
R1290	139-01502-0010		RES CH 15 K .1W 1%	EA	1
R1291	139-01002-0010		RES CH 10K TW 1%	EA	1
R1292	139-00000-0014		CKT JUMPER 0805	EA	1
R1293	139-04752-0010		RES CH 47.5K TW 1%	EA	1
R1294	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1295	139-06491-0010		RES CH 6.49K TW 1%	EA	1
R1296	139-01102-0010		RES CH 11K .1W 1%	EA	1
R1297	139-03011-0010		RES CH 3.01K .1W 1	EA	1
R1298	139-01003-0010		RES CH 100K TW 1%	EA	1
R1299	139-01002-0010		RES CH 10K TW 1%	EA	1
R1300	139-01502-0010		RES CH 15 K .1W 1%	EA	1
R1303	139-03321-0010		RES CH 3.32K TW 1%	EA	1
R1304	139-03321-0010		RES CH 3.32K TW 1%	EA	1
R1306	139-01002-0010		RES CH 10K TW 1%	EA	1
R1308	139-01003-0010		RES CH 100K TW 1%	EA	1
R1310	139-04222-0010		RES CH 42.2K .1W 1	EA	1
R1312	139-05621-0010		5.62K RESISTOR	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
R1313	139-02671-0010		RES CH 2.67K TW 1%	EA	1
R1314	139-09090-0010		RES CH 909 TW 1%	EA	1
R1315	139-06191-0010		RES CH 6.19K TW 1%	EA	1
R1316	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R1317	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1318	139-01000-0010		RES CH 100 .1W 1%	EA	1
R1319	130-09008-0010		RES CH 0.01 1 W, 1	EA	1
R1320	130-09008-0010		RES CH 0.01 1 W, 1	EA	1
R1322	139-04753-0010		RES CH 475K .1W 1%	EA	1
R1323	139-04753-0010		RES CH 475K .1W 1%	EA	1
R1324	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1325	139-03011-0010		RES CH 3.01K .1W 1	EA	1
R1326	139-03011-0010		RES CH 3.01K .1W 1	EA	1
R1328	139-01823-0010		RES CH 182KTW 1%	EA	1
R1329	139-06812-0010		RES CH 68.1K TW 1%	EA	1
R1330	139-00000-0014		CKT JUMPER 0805	EA	1
R1332	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1333	139-01002-0010		RES CH 10K TW 1%	EA	1
R1335	139-01003-0010		RES CH 100K TW 1%	EA	1
R1339	132-05145-0101		RES SM 1.0 2W 5%	EA	1
R1340	139-00619-0010		RES CH 61.9 TW 1%	EA	1
R1341	139-02612-0010		RES CH 26.1K TW 1%	EA	1
R1342	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1343	139-02211-0010		RES CH 2.21K TW 1%	EA	1
R1345	139-04750-0010		RES CH 475 .1W 1%	EA	1
R1346	139-01002-0010		RES CH 10K TW 1%	EA	1
R1400	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1401	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1402	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R1403	139-00750-0010		RES SM 75 OHM 1/10	EA	1
R1406	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1407	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1408	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1409	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R1410	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1411	139-02052-0010		RES CH 20.5K .1W 1	EA	1
R1412	139-00000-0014		CKT JUMPER 0805	EA	1
R1414	139-00000-0014		CKT JUMPER 0805	EA	1
R1416	139-02210-0010		RES CH 221 .1W 1%	EA	1
R1418	139-00221-0010		RES CH 22.1 TW 1%	EA	1
R1419	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R1426	136-04752-0062		RES PF 47.5K EW 1%	EA	1
R1427	139-09093-0000		RES CH 909K EW 1%	EA	1
R1429	131-00183-0013		RES CF 18K EW 5%	EA	1
T1001	019-05083-0000		XFMR AUD	EA	1
T1002	019-05083-0000		XFMR AUD	EA	1
T1003	019-06138-0002		TRANSFORMER, FLYBA	EA	1
TP1001	008-00309-0000		TEST POINT SURF MN	EA	1
TP1002	008-00309-0000		TEST POINT SURF MN	EA	1
TP1003	008-00309-0000		TEST POINT SURF MN	EA	1
TP1004	008-00309-0000		TEST POINT SURF MN	EA	1
U1001	120-02489-0000		4K SERIAL EE (SO)	EA	1
U1002	120-02713-0001		RAM. STATIC, 32K X	EA	1
U1003	120-06038-0003		IC 4046 SO PKG	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0040
U1004	120-03196-0000		IC LM2902D	EA	1
U1005	120-03196-0000		IC LM2902D	EA	1
U1007	123-00014-0003		IC HEX INVERTER	EA	1
U1008	120-02713-0001		RAM. STATIC, 32K X	EA	1
U1009	123-00008-0003		74HC08 SO PKG	EA	1
U1010	120-03400-0001		REF-02 PREC V REG	EA	1
U1011	120-03482-0001		MC33064 UNDVLT SNS	EA	1
U1012	123-00014-0003		IC HEX INVERTER	EA	1
U1014	120-02502-0010		PROC 68HC16 144PQF	EA	1
U1015	120-03196-0000		IC LM2902D	EA	1
U1016	133-00569-0000		DIGITAL POT 10K	EA	1
U1017	120-03196-0000		IC LM2902D	EA	1
U1018	123-00138-0003		74HC138 SO PKG	EA	1
U1019	122-49014-9999		PLACEHOLDER	RF	0
U1020	123-00000-1003		74AC00 SO PKG	EA	1
U1021	123-00273-0003		IC 74HC273 SO	EA	1
U1022	120-03597-0002		+5V RS-232 TRANCEI	EA	1
U1023	120-03552-0000		QUAD OP AMP	EA	1
U1024	120-06025-0005		INVERTER	EA	1
U1026	124-00074-0003		IC 74HCT74 SO PKG	EA	1
U1027	120-03653-0001		TDA1521 AUDIO POWE	EA	1
U1028	133-00569-0000		DIGITAL POT 10K	EA	1
U1029	120-03196-0000		IC LM2902D	EA	1
U1031	120-03653-0001		TDA1521 AUDIO POWE	EA	1
U1032	133-00569-0000		DIGITAL POT 10K	EA	1
U1033	123-04051-0004		74HC4051 ANALOG	EA	1
U1034	120-03552-0000		QUAD OP AMP	EA	1
U1035	120-03552-0000		QUAD OP AMP	EA	1
U1036	120-03641-0000		IC CURRENT MODE CO	EA	1
Y1001	044-00307-0000		32.768KHZ CRYS OSC	EA	1
Y1002	044-00352-0001		500KHZ CER RESONAT	EA	1
	002-09059-0040		KX 165A MAIN BOARD	RF	0
	009-09059-0000	1	PCBD KX155A MAIN B	EA	1
	012-01005-0002		TAPE MYLAR .500 W	AR	1
	016-01004-0000	11	COMPOUND THRML JNT	AR	1
	016-01032-0000		EPOXY BB-2112	AR	1
	016-01040-0000	16	COATING TYPE AR	AR	1
	016-01082-0000		DC RTV 3145	AR	1
	016-01140-0000		SUPERBONDER 415	AR	1
	016-01144-0000		TAK PAK ADV 122-92	AR	1
	016-01144-0001		ACCELERATOR 11525	AR	1
	024-05019-0000		WIRE #30 GREEN	IN	49
	047-12027-0002	2	PWR SUPPLY HEATSIN	EA	1
	047-12158-0001	10	HEATSINK, AUDIO AM	EA	1
	089-02076-0030	7	NUT FLAT 4-40	EA	3
	089-06004-0004	3	SCR FHP 2-56X1/4	EA	2
	089-06008-0004	6	SCR FHP 4-40X1/4	EA	3
	091-00156-0000	5	BUSHING	EA	3
	091-00606-0000	4	INSULATOR XSTR	EA	3
	150-00030-0010	8	TBG SHRNK 3/8&7/16	IN	2.25
	150-00032-0010	9	TBG SHRNK 1/2&5/8	IN	.9
	150-00034-0010	14	TBG SHRNK 3/4&7/8	IN	.9
	200-09680-0000	15	KX 165A TX AUDIO A	EA	1
	300-09059-0040		KX 165A MAIN BOARD	RF	0

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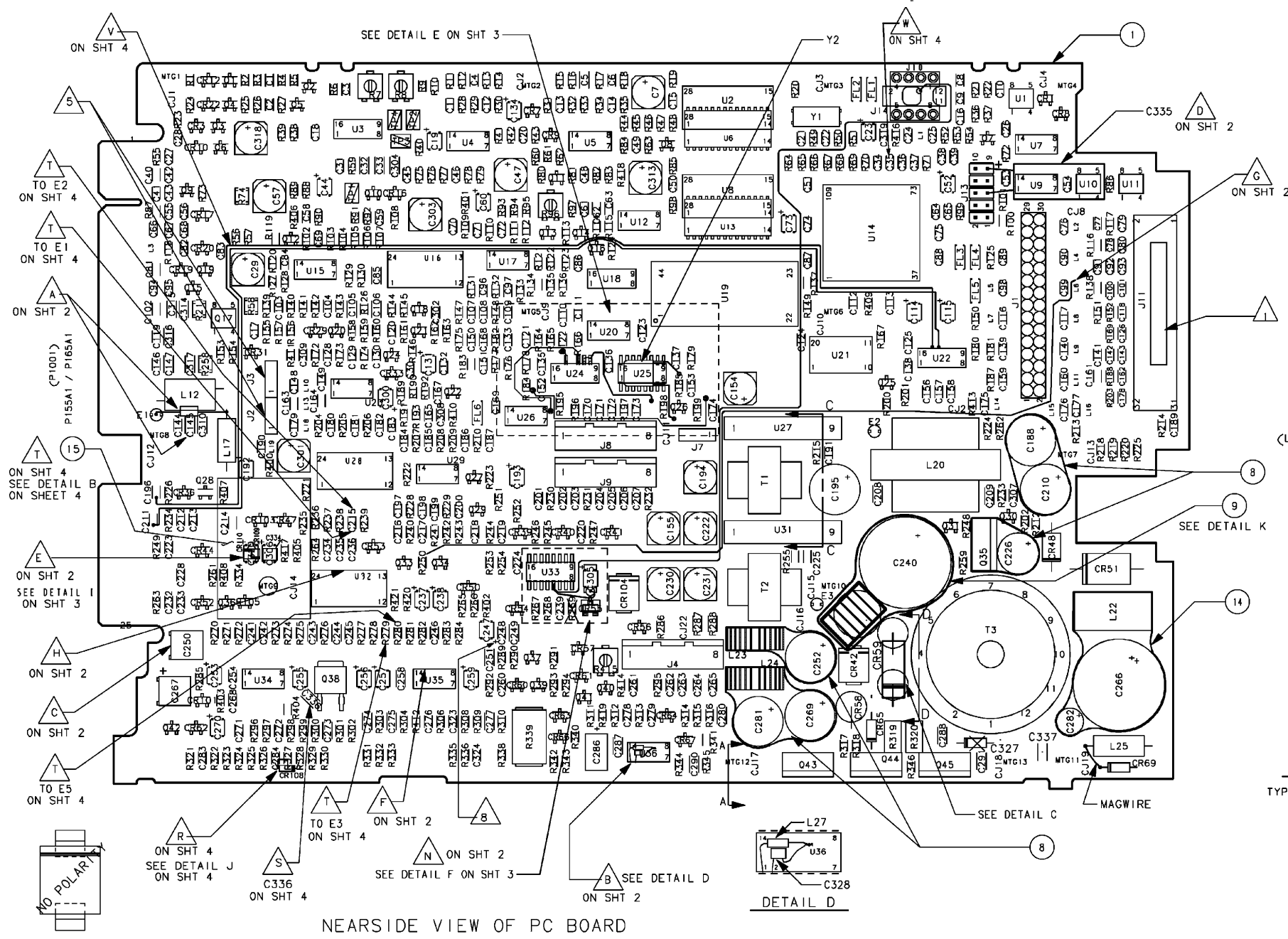
NOTES:

1. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN ACCORDANCE WITH SPEC. 001-01101-0000.

2. LIQUID STAKE ALL FASTENERS PER SPEC. 001-01080-0000.

3. OMITTED

4. ADD 1000 TO ALL REFERENCE DESIGNATORS EXCEPT P1001.

5. INSERT JACK LEADS THROUGH THE UNPLATED HOLES, BEND LEADS OUT AND SOLDER TO THE COPPER PADS BEING CAREFUL TO KEEP THE JACK VERTICAL TO THE PCB. SEE DETAIL A.

6. APPLY THERMAL COMPOUND, ITEM 11, TO METAL SIDE OF U27 AND U31 BEFORE PLACING ITEM 10. DO NOT ALLOW ITEM 10 TO REMAIN IN CONTACT WITH BOARD SURFACE.

7. APPLY COATING (016-01040-0000) TO U34, U35, C258, ROW OF COMPONENTS FROM C249 TO R270, C304, C33, C32, U3, U14, R7, R8, R10 AND R9.

8. IGNORE '+' SIGN. CAP IS NO LONGER POLARIZED.
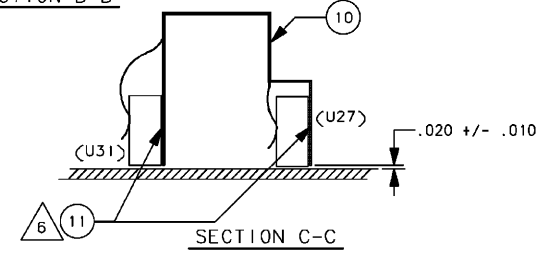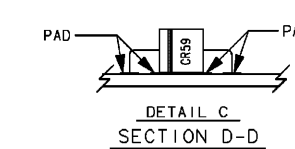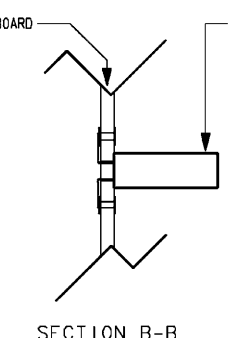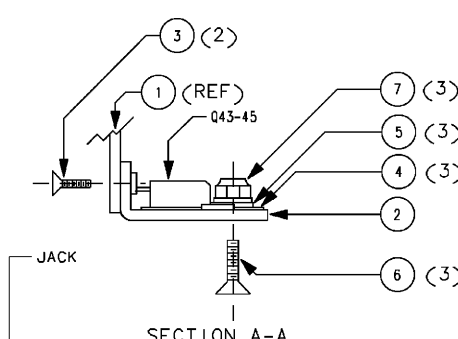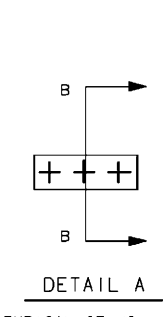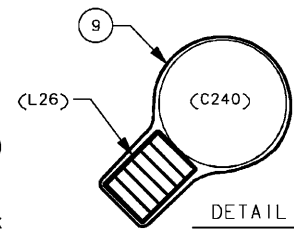
NEARSIDE VIEW OF PC BOARD

DETAIL K

SECTION A-A

DETAIL A
TYPICAL OF J2, J3

SECTION B-B

DETAIL C
SECTION D-D

SECTION C-C

THIS DRAWING IS NOT COMPLETE WITHOUT PARTS LIST 200-09059-0040

BOTTOM SIDE:
CR25, CR32
CR37, CR38
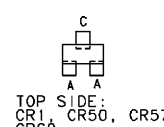
TOP SIDE:
CR1, CR50, CR57
CR60
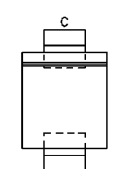
TOP SIDE:
CR42

BOTTOM SIDE:
CR4, CR11
CR13-CR15, CR18
CR21, CR23, CR24
CR26-CR28
CR34-CR35
CR43, CR45-CR46

TOP SIDE:
CR3, CR31, CR56
CR63
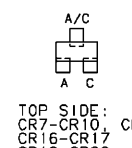
TOP SIDE:
CR7-CR10, CR12
CR16-CR17
CR19-CR20, CR22
CR29-CR30, CR33
CR36, CR39-CR41
CR44, CR47, CR49
CR52-CR55
CR61-CR62, CR64
CR66-CR67

TOP SIDE:
Q1-Q12, Q15-Q16
Q18, Q21-Q23
Q25-Q26, Q28
Q30-Q32, Q34
Q36-Q37, Q39-Q41

TOP SIDE:
Q13-Q14, Q19-Q20
Q24, Q27, Q29
Q33

TOP SIDE:
Q42

TOP SIDE:
Q38

TOP SIDE:
Q35

TOP SIDE:
Q43-Q45

T1, T2

Figure 6-7 KX 165A Main Board Assembly
(Dwg No. 300-09059-0040 rev. G, Sheet 1 of 4)

300-09059-0040_G\Page1.tif

NEARSIDE VIEW OF PC BOARD

VIA CONNECTED TO
U25 PIN 12

ON SHEET 4

ON SHEET 4

ON SHEET 4

REV 1

25

REWORK NOTES:

A. INSTALL CR112 IN C145 LOCATION.
INSTALL C333 FROM L17 TO E1.

B. ADHERE L27 & C328 TO U36 WITH 016-01082-0000.

C. PREFORM LEADS OF C250 UNDER CAP BODY AND SOLDER
TO MOUNTING PADS. RTV IN PLACE.

SOLDER TO SMD PAD

D. INSERT "+" LEAD OF C335 IN J13 PIN 9, NEGATIVE LEAD IN J13 PIN 5 HOLE.
SECURE C335 WITH RTV.

E. SEE DETAIL I, ON SHEET 3:
CUT NEARSIDE TRACE BETWEEN THE NEGATIVE SIDE OF C334 (FORMER C306)
AND THE VIA CONNECTED TO R417.
MOUNT C334 IN FORMER C306 POSITION.
MOUNT CR109 AND CR110 IN FORMER C320 POSITION.

CONNECT MAGWIRE 2 PLACES BETWEEN:
VIA OF J2 PIN 1 AND THE VIA CONNECTED TO FORMER C320 (NEGATIVE END).
NEGATIVE END OF C334 (FORMER C306 POSITION) AND GROUND VIA NEAR MTG9.

F. CUT NEARSIDE TRACE BETWEEN U35-13 AND R282. SOLDER MAG WIRE
FROM U35-12 TO R282 PAD WHICH IS CLOSEST TO U35.

G. CONNECT MAG WIRE FROM VIA CONNECTED TO L6
TO THE R250 PAD CONNECTED TO Q33.

H. CONNECT MAG WIRE FROM U32 PIN 18 TO C236 PAD
CLOSEST TO U32.

I. MAG WIRE JUMPERS MUST BE BONDED WITH TAK PAK (PN 016-01144-0000)
AND ACCELERATOR (PN 016-01144-0001) AT A POINT WITHIN .25" OF
THEIR TERMINATION AND AT INTERVALS OF APPROXIMATELY 1.0"
AND AT ALL CHANGES OF DIRECTION.
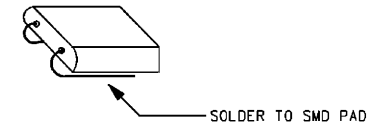
ADDITIONAL REWORK NOTES:

J. CUT TRACES ON NEARSIDE, (9 PLACES) SEE DETAIL E ON SHEET 3.
TRACE FROM U24 PIN 2 TO TOP SIDE OF R195
TRACE FROM U24 PIN 4 TO VIA
TRACE FROM U24 PIN 6 TO VIA
TRACE FROM U20 PIN 3 TO VIA
TRACE FROM FORMER U25 PIN 7 TO VIA
TRACE FROM FORMER U25 PIN 8 TO VIA
TRACE FROM FORMER U25 PIN 10 TO VIA
TRACE FROM TOP OF R185 TO VIA
TRACE FROM U24 PIN 10 TO VIA

K. INSTALL: C332 ACROSS B AND E OF FORMER Q26 POSITION

L. ROUTE MAGWIRE AND SOLDER TO POINTS AS DETAILED ON DRAWING (4 PLACES)
FROM U24 PIN 14 TO VIA AT BOTTOM SIDE OF C122
FROM U24 PIN 12 TO VIA AT BOTTOM SIDE OF R195
FROM U24 PINS 10 AND 11 TO VIA AT THE TOP AND JUST TO THE LEFT OF R198.
FROM VIA ON THE BOTTOM SIDE OF R184 TO VIA ON TRACE THAT
GOES TO FORMER U25 PIN 12

M. PREFORM THE LEADS OF Y2 PER DETAIL G ON SHEET 3.
WHEN INSTALLING Y2, INSURE THAT THE MANUFACTURER'S STAMP AND PART NUMBER
ARE FACE UP AND LEADS OF THE PART ARE ORIENTATED TO THE RIGHT.
INSTALL Y2 FLAT ON THE BOARD WITH ONE LEAD OF Y2 SOLDERED TO FORMER U25 PINS 7 AND 8
AND THE OTHER LEAD OF Y2 SOLDERED TO FORMER U25 PINS 9 AND 10.
SOLDER MAGWIRE FROM TOP LEAD OF Y2 TO TOP SIDE OF R185 PER DRAWING.
SOLDER MAGWIRE FROM BOTTOM LEAD OF Y2 TO VIA ON LEFT SIDE AND JUST BELOW C332 PER DRAWING.
RTV (PN 016-01082-0000) Y2 TO BOARD. SEE DETAIL E ON SHEET 3.

N. CUT THE TRACE FROM U33 PIN 5 TO VIA JUST BELOW PIN 5.

O. CUT MYLAR TAPE TO SIZE AND ADHERE TO THE BOARD AT J14 PIN 8 ON THE COMPONENT SIDE.
CUT J14 PIN 3 ON TOP SIDE OF CONNECTOR FLUSH WITH BODY OF CONNECTOR
SOLDER MAGWIRE TO J14 PIN 8 ON BOTTOM SIDE OF CONNECTOR AND CUT FLUSH TO THE MAGWIRE.
INSTALL J14 SPACED OFF BOARD ENOUGH TO PREVENT MAGWIRE OR PIN 8 FROM SHORTING TO BOARD.
ROUTE MAGWIRE ON J14 PIN 8 TO U33 PIN 5 AND SOLDER TO PIN.
SEE DETAIL H ON SHEET 3.

P. SOLDER R426 TO C305 AS SHOWN.
SOLDER CR107 TO CR55 AS SHOWN.
SOLDER MAGWIRE FROM TOP SIDE OF R426 TO U33 PIN 5.
RTV R426 AND CR107. SEE DETAIL F ON SHEET 3.

ADDITIONAL REWORK NOTES ON SHEET 4.

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09059-0040

300-09059-0040_G\Page2.tif

**Figure 6-7 KX 165A Main Board Assembly
(Dwg No. 300-09059-0040 rev. G, Sheet 2 of 4)**
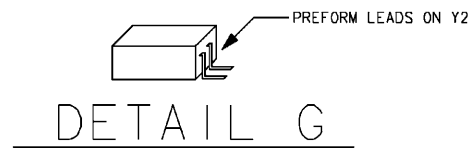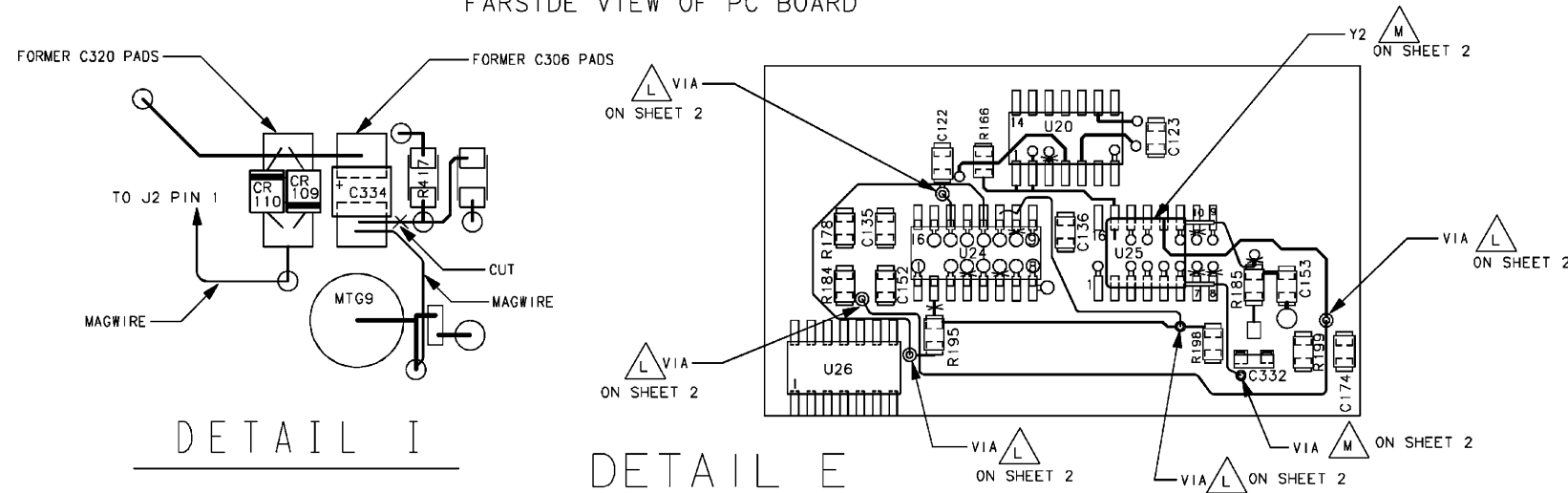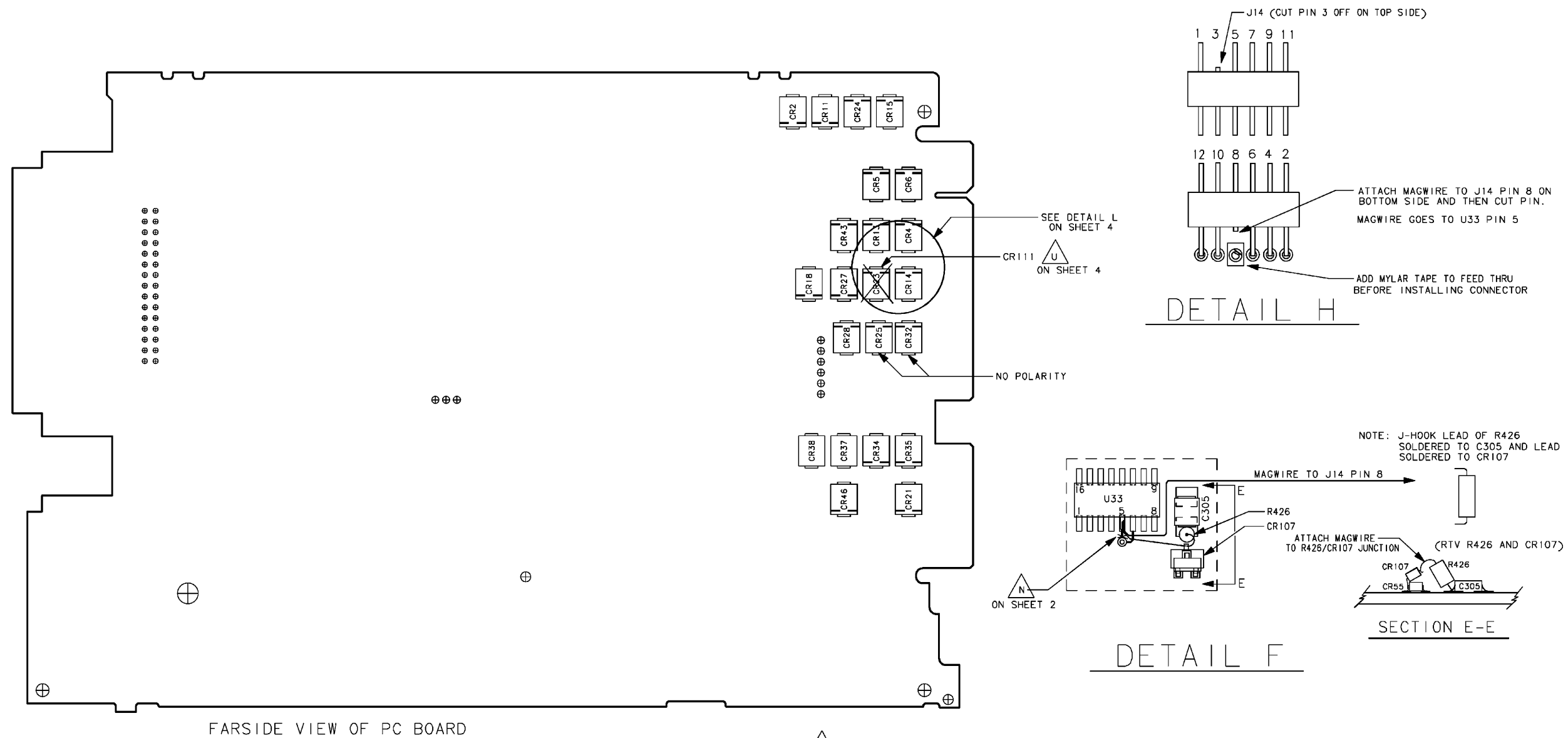
FARSIDE VIEW OF PC BOARD

DETAIL H

DETAIL F

SECTION E-E

DETAIL I

DETAIL E

DETAIL G

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09059-0040

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**Figure 6-7 KX 165A Main Board Assembly
(Dwg No. 300-09059-0040 rev. G , Sheet 3 of 4)**

REWORK NOTES CONTINUED FROM SHEET 2:
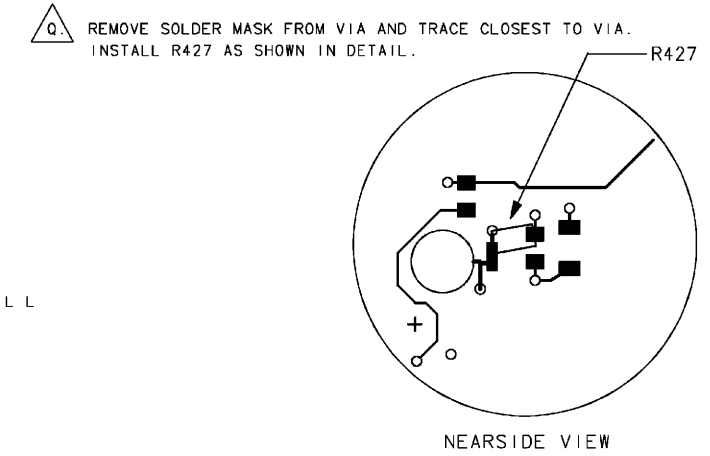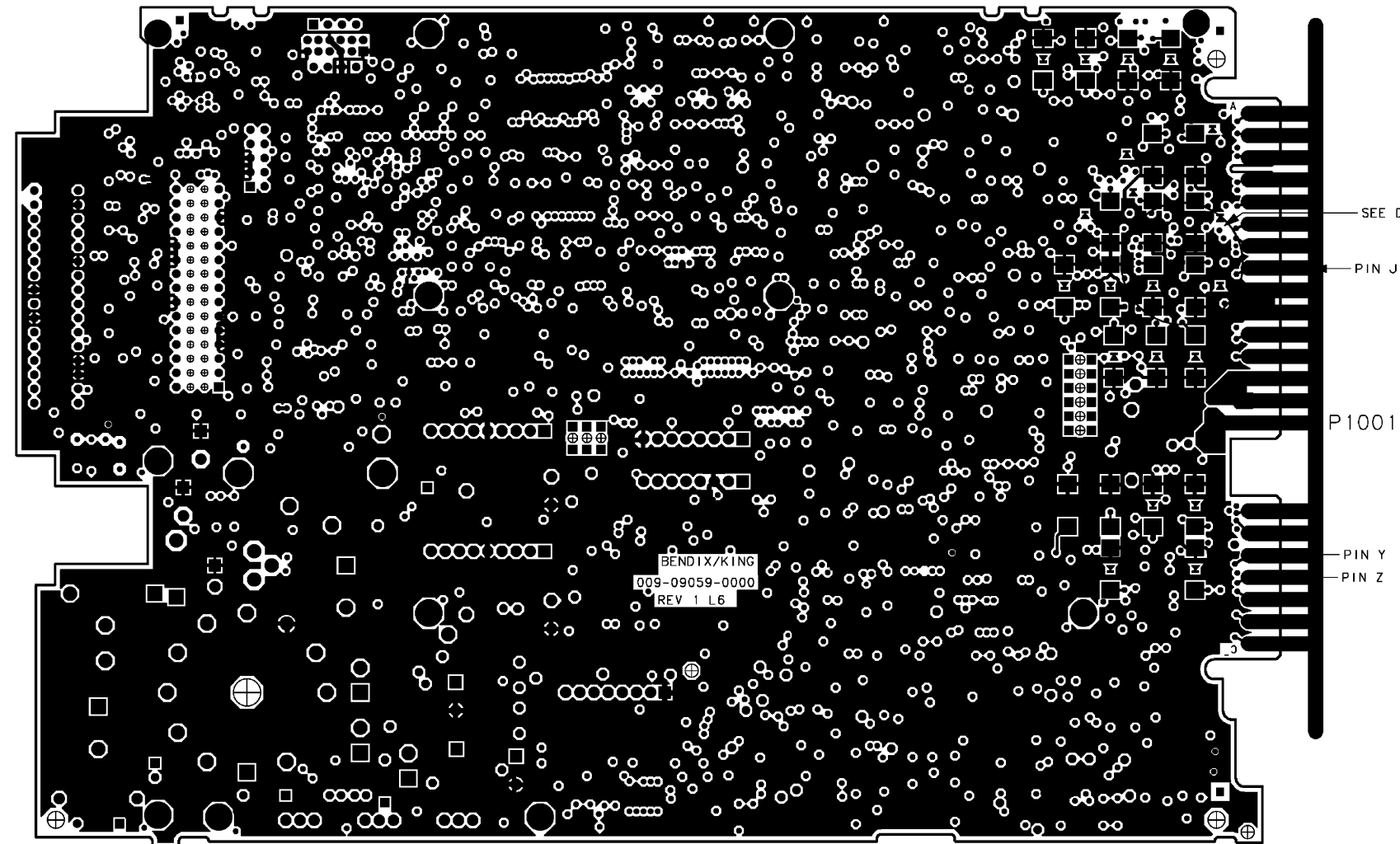
Q. REMOVE SOLDER MASK FROM VIA AND TRACE CLOSEST TO VIA.
INSTALL R427 AS SHOWN IN DETAIL.

R427

NEARSIDE VIEW

R. CUT NEARSIDE TRACE BETWEEN C284 AND U34 PIN 5 / R298.
SOLDER R328 BETWEEN C284 AND FORMER R327 PAD AS SHOWN.
SOLDER CR108 (MOUNTED ON ITS SIDE) BETWEEN C284 AND FORMER
R328 PAD AS SHOWN.
MAGWIRE C284-R328-CR108 JUNCTION TO C273 AS SHOWN.
SEE DETAIL J.

S. INSTALL LEADED C336 BETWEEN BASE OF Q38
AND GROUND PAD OF C255 (-).

T. PLACE ITEM 15'S MOUNTING HOLE WITH STAND OFF
ALIGNING WITH MAIN BOARD MOUNTING HOLE (MTG9).

ROUTE MAG WIRE AND SOLDER TO POINTS AS DETAILED ON DRAWING.
FROM ITEM 15, E1 TO C215 GND PAD (CLOSEST TO U32)
FROM ITEM 15, E2 TO C215 +5V PAD (CLOSEST TO U28)
FROM ITEM 15, E3 TO R279 PAD (CLOSEST TO C257)
FROM ITEM 15, E4 TO PIN 5 OF U26
FROM ITEM 15, E5 TO R280 PAD (CLOSEST TO R421)

U. CUT TRACE TO CATHODE CR23.
INSTALL CR111 AT CR23 LOCATION.
MAGWIRE CR23 CATHODE TO VIA PIN J.
SEE DETAIL L.

V. 1. DRILL OUT THE TWO VIAS USING A .041 +/-.002 INCH DIAMETER DRILL BIT.
2. USING AN OHMMETER, VERIFY THAT THE FOLLOWING CONNECTIONS ARE BROKEN:
P1001 PIN Y TO U22 PIN 14
P1001 PIN Z TO U22 PIN 13
3. SEAL THESE TWO HOLES WITH EPOXY (P/N: 016-01032-0000)
4. CUT THE TRACES TO U22 PINS 13 AND 14 AS SHOWN.
5. CONNECT A MAGWIRE FROM U22 PIN 13 TO C211. ROUTE WIRE AS SHOWN.
6. CONNECT A MAGWIRE FROM U22 PIN 14 TO C196. ROUTE WIRE AS SHOWN.

W. REFER TO "DETAIL K" FOR THE FOLLOWING REWORK NOTE.
POSITION C338 ON PCB AS INDICATED. SOLDER ONE END OF C338 TO C35,
AVOIDING VIA PAD TO THE RIGHT OF C338.
SOLDER LEADS OF R429 TO C338 AND C35.
SECURE R429 AND C338 WITH ADHESIVE (P/N: 016-01140-0000).

SEE DETAIL L

PIN J

P1001

PIN Y

PIN Z

BENDIX/KING
009-09059-0000
REV 1 L6

FARSIDE VIEW OF PC BOARD

PREVIOUS PADS OF CR23

MAGWIRE

VIA PIN J

CUT TRACE

U

FARSIDE VIEW

DETAIL L

J10

FL2 FL1

J14

R50 R51   C23 C319 R416 R24

C338

R68 R69 R70 R429

C319   R429
C338 C35

SIDEVIEW

DETAIL K

VIA TO AVOID

R1
C2

U1

C1

C3

C4

DETAIL B

U34
PIN 5

MAGWIRE

R298

CUT

C273

FORMER R327 POSITION
FORMER R328 POSITION

C284

R328

CR108

DETAIL J

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09059-0040
MENTOR GRAPHICS DRAWING; TO BE MAINTAINED BY P.C. DESIGN
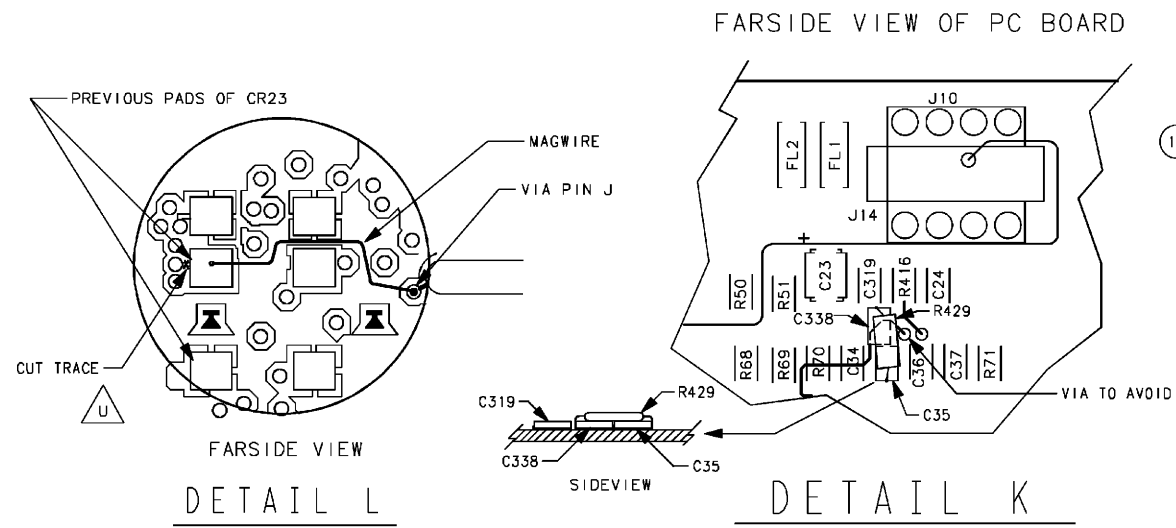
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**Figure 6-7 KX 165A Main Board Assembly
(DWG NO. 300-09059-0040 rev. G Sheet 4 of 4)**
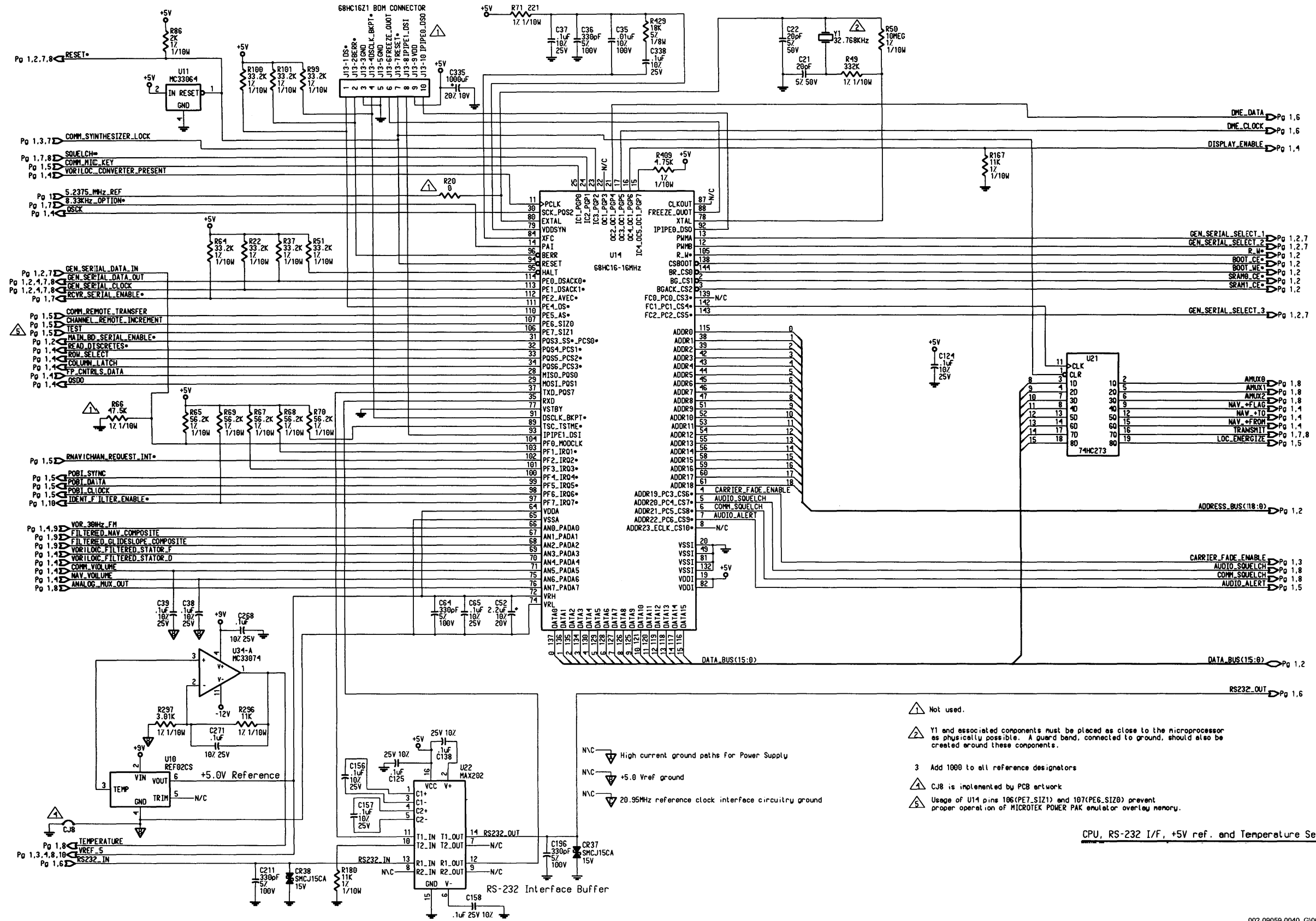
**Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 1 of 11)**

**Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 2 of 11)**

NOTES:

⚠ Not used.

⚠ U2 and U8 overlay U6 and U13 on the PCB; only one device pair may be used.

⚠ Use R98 for 8 bit or R47 for 16 bit SRAM interface.

⚠ U2 and U8 or U6 and U13 can be populated with 8K x 8 or 32K x 8 devices.

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Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 3 of 11)

Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 4 of 11)

Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 5 of 11)

Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 6 of 11)
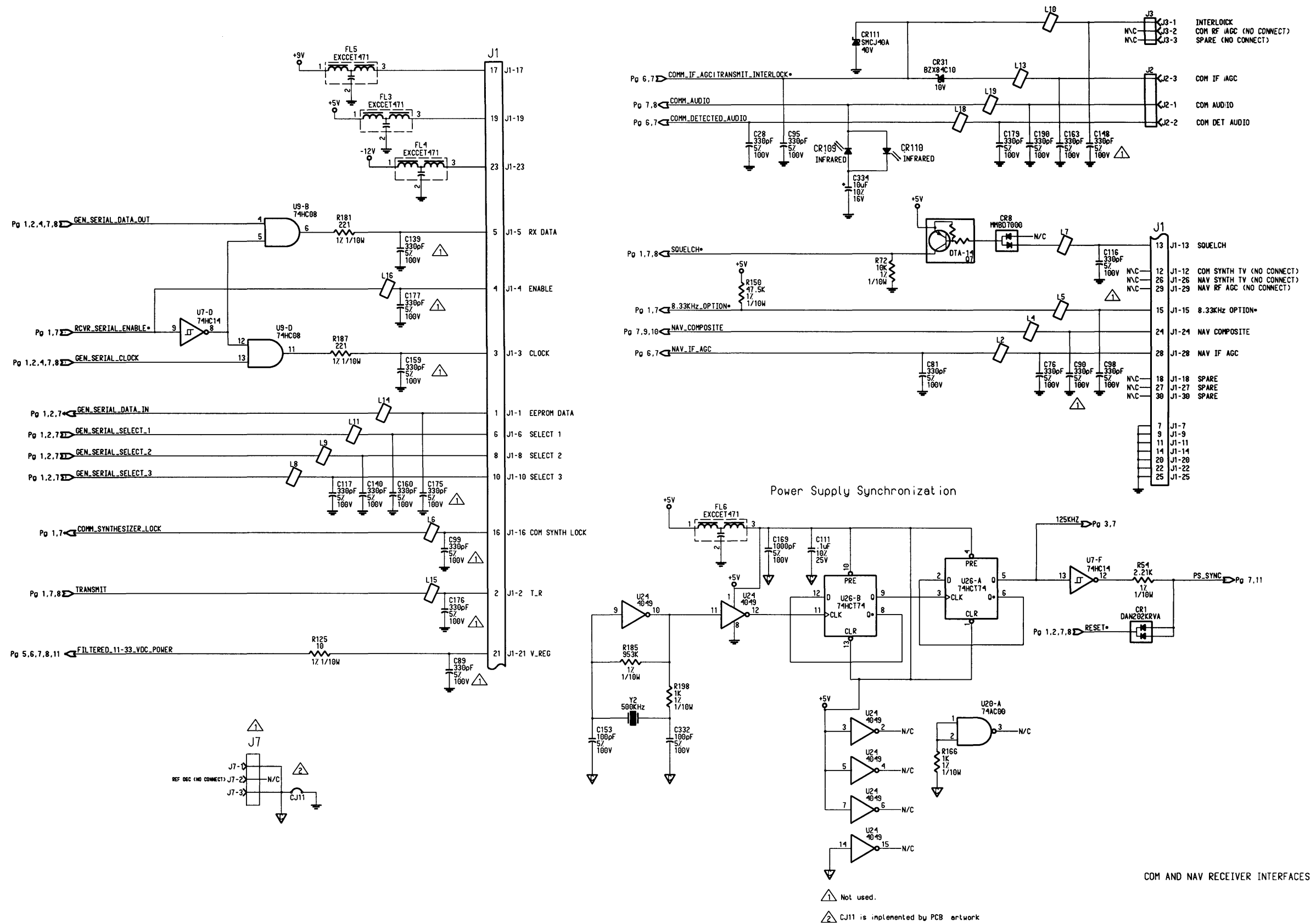
Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 7 of 11)

⚠️ Not used.

⚠️ CJ11 is implemented by PCB artwork

COM AND NAV RECEIVER INTERFACES

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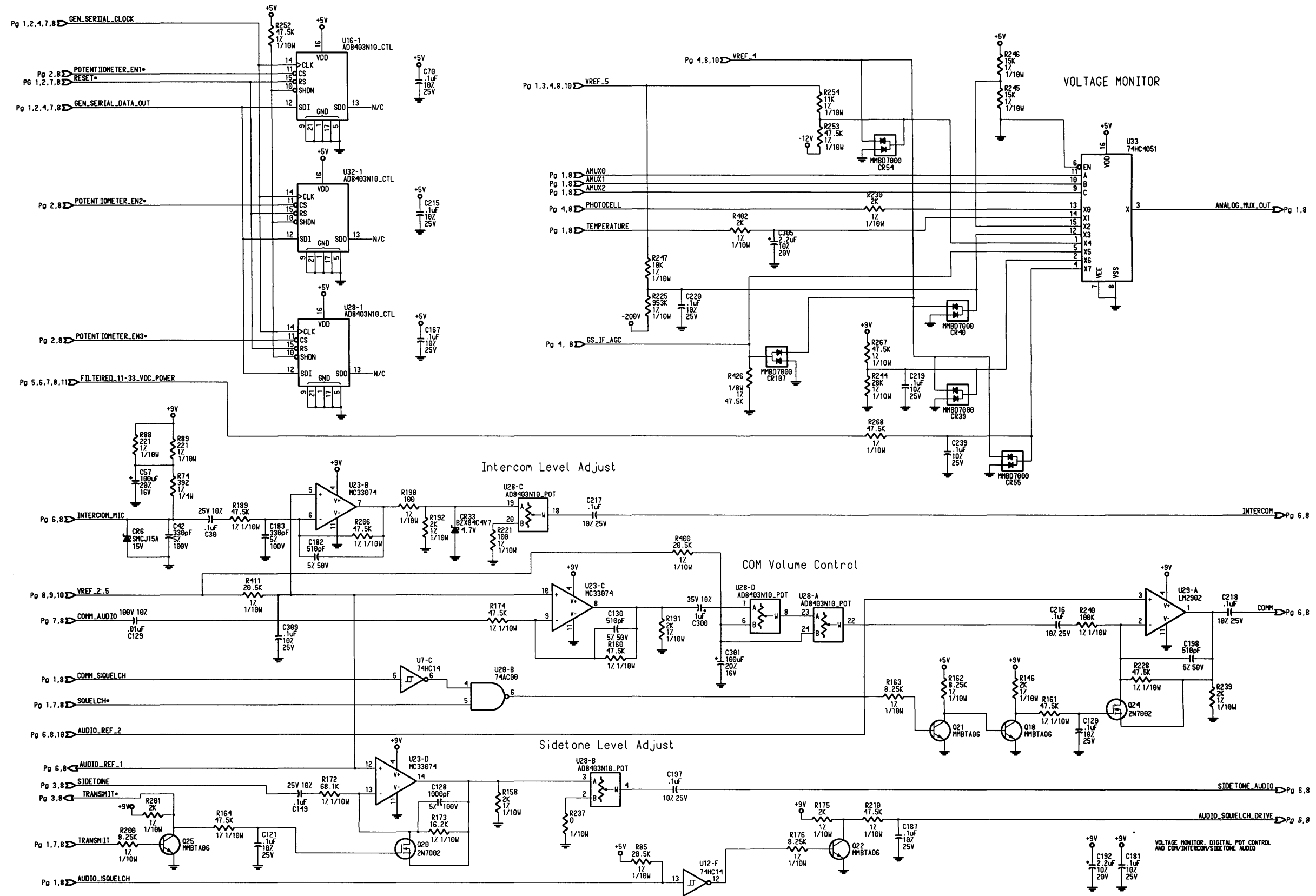
**Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 8 of 11)**
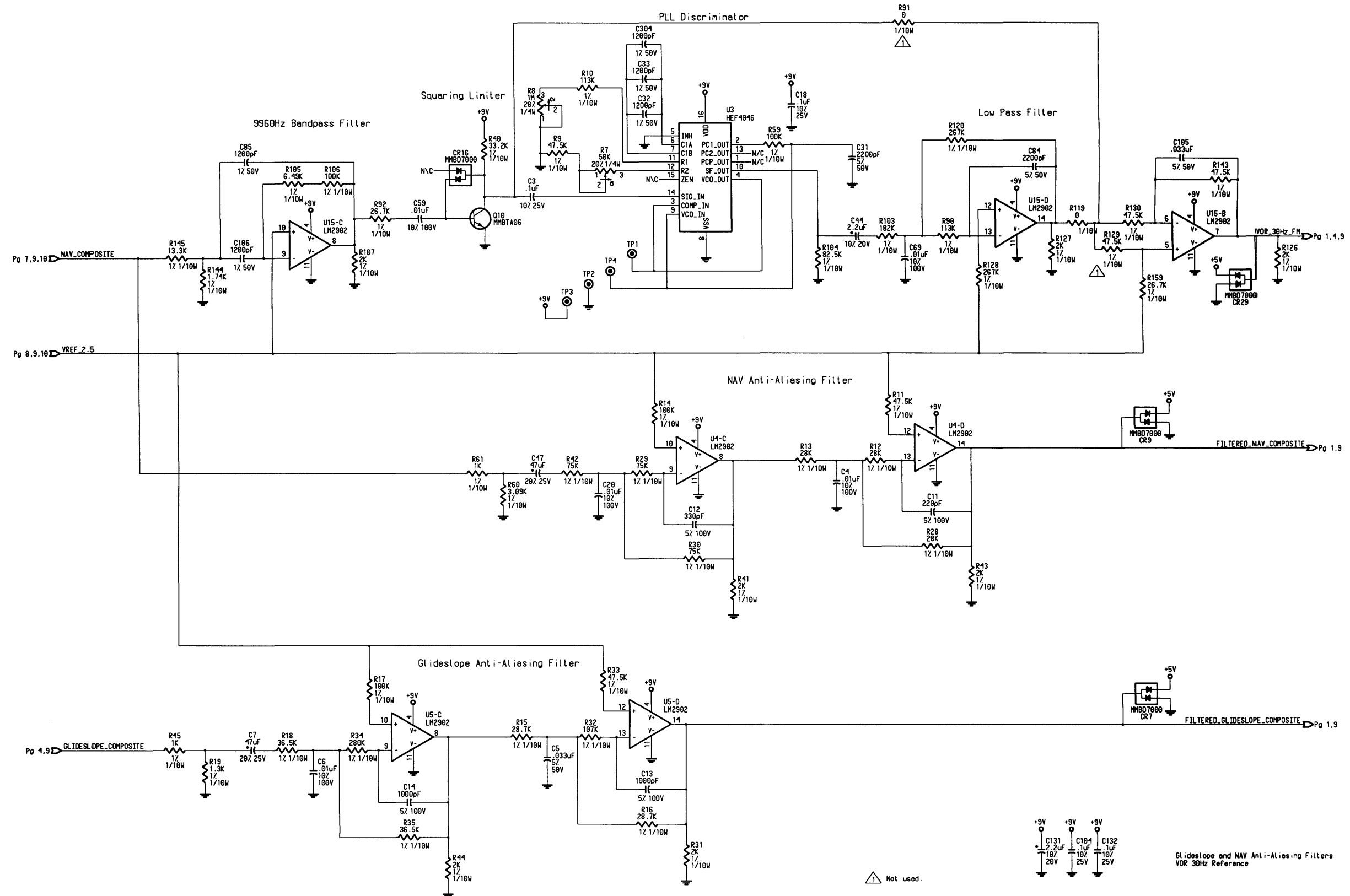
Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 9 of 11)
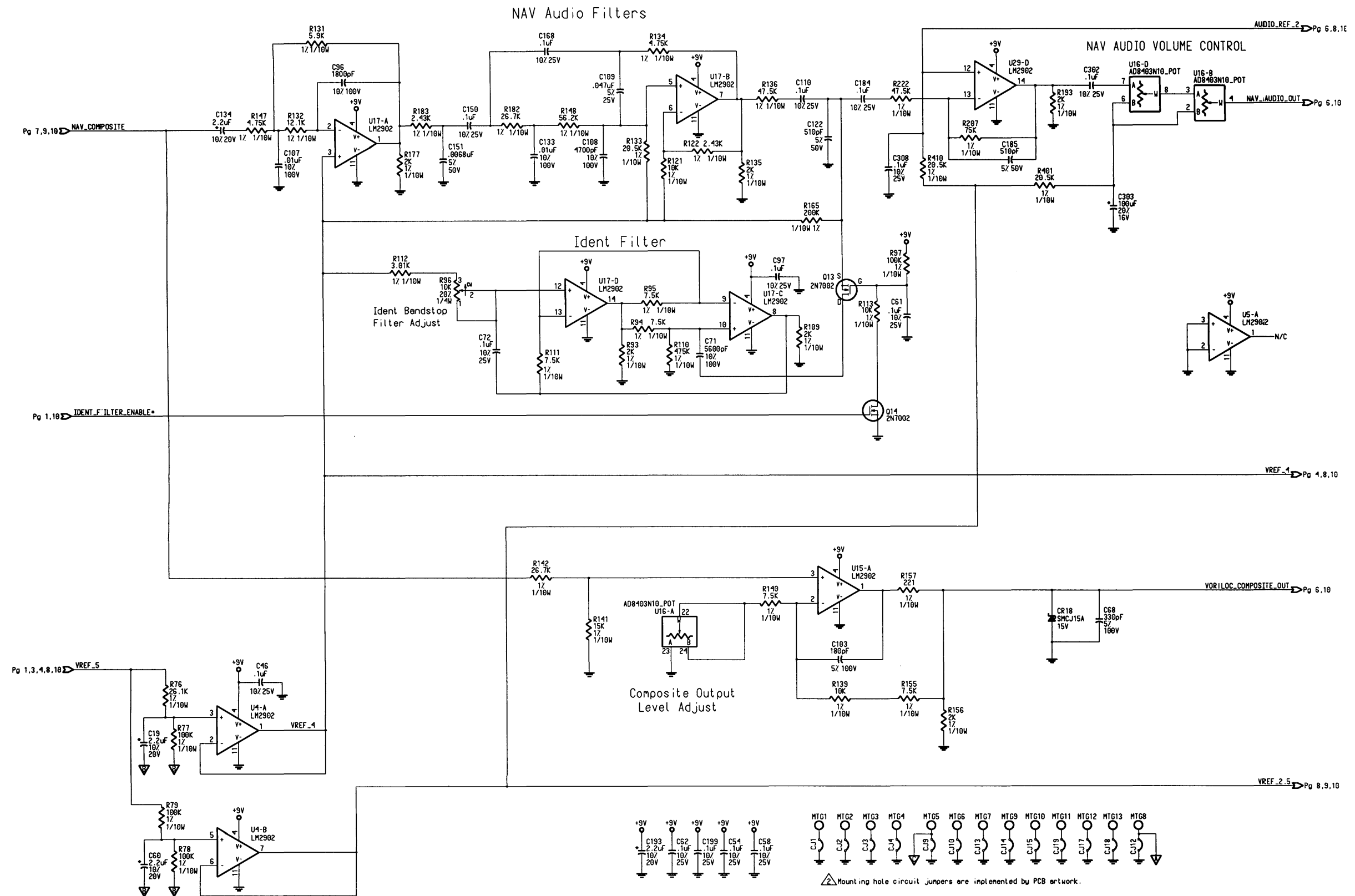
**Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 10 of 11)**
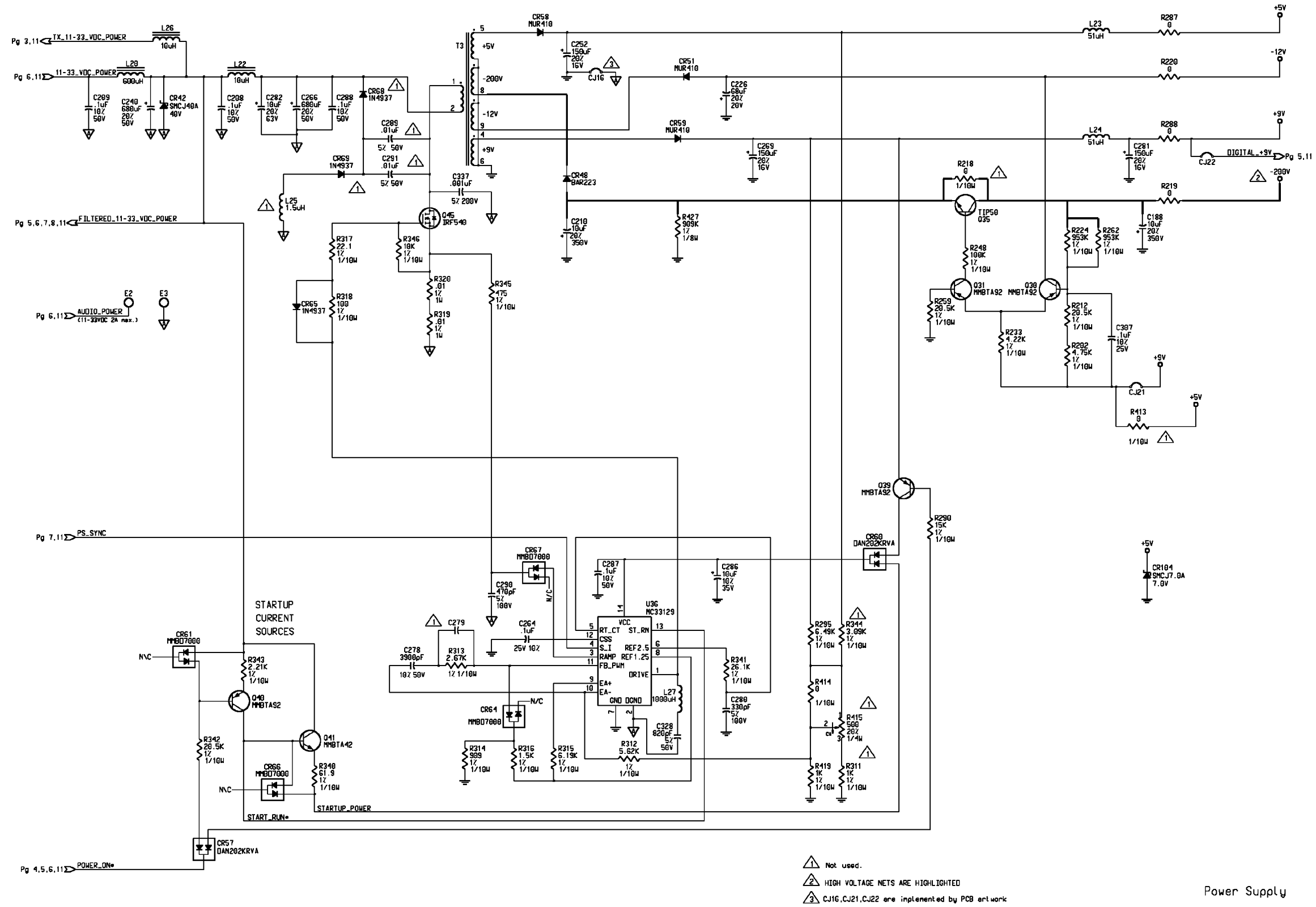
Figure 6-8 KX 165A Main Board Schematic
(Dwg No. 002-09059-0040 rev. G, Sheet 11 of 11)

200-09680-0000 KX 165A TX AUDIO ADAPTER BOARD   Rev.A

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
C1	106-04332-0016		CAP CH 3300PF NP0	EA	1
C2	106-04332-0016		CAP CH 3300PF NP0	EA	1
C3	106-04104-0046		CAP CH.1UFX7R50V	EA	1
C4	106-04104-0046		CAP CH.1UFX7R50V	EA	1
C5	096-01186-0012		CAP 1.0UF 16V 10%	EA	1
R1	139-04992-0000		RES CH 49.9K EW 1%	EA	1
R2	139-04992-0000		RES CH 49.9K EW 1%	EA	1
R3	139-01002-0000		RES CHIP 10K EW 1%	EA	1
R4	139-01002-0000		RES CHIP 10K EW 1%	EA	1
U1	120-03740-0001		FILTER, LOWPASS EL	EA	1
	002-09680-0000		TX AUDIO ADAPTER B	RF	0
	009-09680-0001	1	TX AUDIO ADAPTER B	EA	1
	016-01040-0000		COATING TYPE AR	AR	1
	090-00035-0008	2	SWAGE SPACER	EA	1
	090-01011-0001	3	RUBBER BUMPER	EA	1
	300-09680-0000		TX AUDIO ADAPTER B	RF	0

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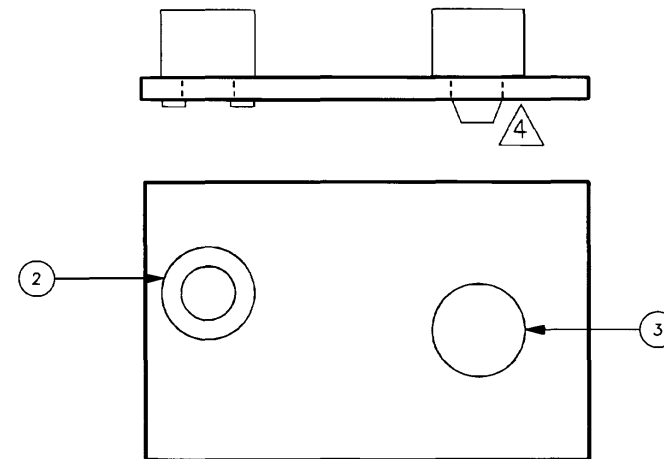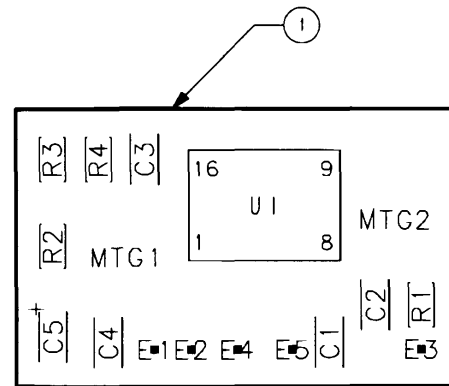
NOTES:
1. PRIOR TO POST COATING BOTH SIDES OF P.C. BOARD
   WITH PN 016-01040-0000, MASK OFF ALL
   MOUNTING AREAS AND REFERENCE DESIGNATORS:
   E1-E5, MTG1-MTG2

2. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN
   ACCORDANCE WITH SPEC. 001-01101-0000.

3. WHERE APPLICABLE, LIQUID STAKE ALL FASTENERS PER SPEC. 001-01080-0000.

4. CUT NIPPLE OFF OF RUBBER BUMPER (ITEM 3)
   AFTER INSTALLATION PER PICTORIAL.
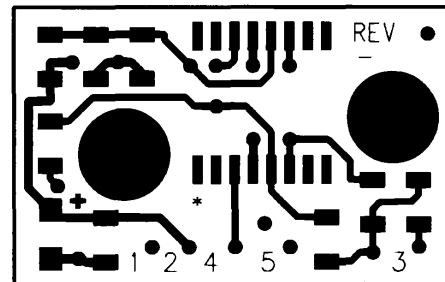
FARSIDE VIEW OF PC BOARD

NEARSIDE VIEW OF PC BOARD
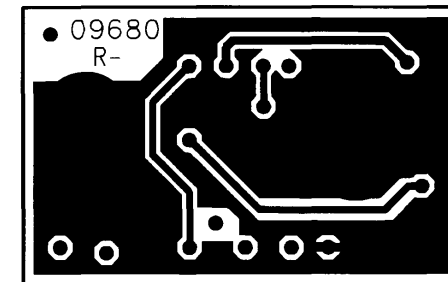
FARSIDE VIEW OF PC BOARD

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09680-0000

300-09680-0000_A\000.tif

**Figure 6-9 TX Audio Adapter
(Dwg No. 300-09680-0000 rev. A)**

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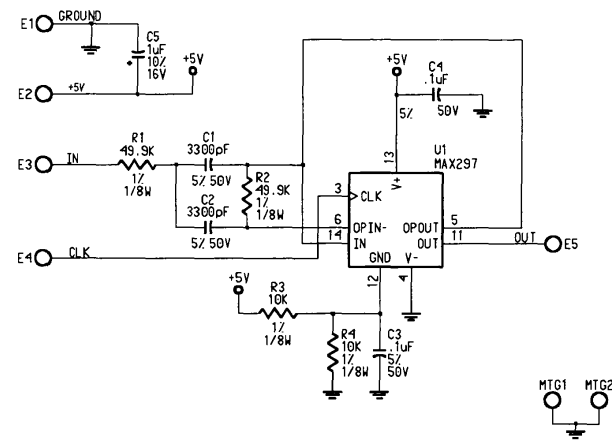
Figure 6-10 TX Audio Adapter Schematic
(Dwg No. 002-09680-0000 rev. -)

200-05660-0001 28V 8.33 KHZ BASE ASSY   Rev.-
200-05660-0004 28V 25KHZ KX165A BASE ASSY   Rev.-

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0001	-0004
1	008-00005-0006		TND COP LUG	EA	2	2
10	047-12097-0003		BEZEL MOUNTING TAB	EA	1	1
11	047-12097-0013		BEZEL MOUNTING TAB	EA	1	1
12	073-00379-0002		HOLD DOWN 80	EA	1	1
13	076-03071-0002		SPACER, INNER SHIE	EA	2	2
14	076-02980-0002		HEX STAND OFF .877	EA	1	1
15	090-00265-0000		GROOVE PIN .046 X	EA	1	1
16	089-05874-0004		SCR PHP 2-56X1/4	EA	4	4
17	089-05874-0007		SCR #2-56 X 7/16 S	EA	9	9
18	089-06004-0004		SCR FHP 2-56X1/4	EA	22	22
19	089-06008-0003		SCR FHP 4-40X3/16	EA	2	2
20	076-01528-0001		RETAING SCREW, KX	EA	1	1
21	089-08033-0030		WASHER, INTERNAL L	EA	2	2
22	089-08231-0000		WASHER FLAT	EA	2	2
23	205-00900-0004		KX 155A MAIN BD-PG	RF	0	0
24	200-09061-0010		25KHZ RCVR	EA		1
24	200-09061-0011		8.33KHZ RCVR	EA	1	
25	200-09062-0020		TRANSMITTER BOARD	EA	1	1
26	047-12336-0002		LID, TX CAVITY, W/	EA	1	1
27	047-12029-0001		LOCKING PAWL CLIP	EA	1	1
28	073-00994-0003		BASE CASTING W/FIN	EA		1
28	073-00994-0005		BASE CASTING (-000	EA	1	
29	089-05519-0003		SCR FLHP 2-56X3/16	EA	3	3
3	012-01655-0001		INNER CHASSIS INSU	EA	1	1
30	187-01896-0001		GASKET, TX CAVITY	EA	1	
30	187-01897-0001		EMI GASKET W/ADHES	IN		3
32	016-01412-0000		LOCTITE 425	AR	1	1
33	012-01687-0001		INSULATOR, SHIELD/	EA	1	1
34	012-01687-0002		INSULATOR, SHIELD	EA	1	1
35	012-01686-0001		INSULATOR, SHIELD	EA	1	1
36	012-01686-0002		INSULATOR, SHIELD	EA	1	1
37	089-05874-0011		SCR PHP 2-56X11/16	EA	1	1
38	012-01005-0002		TAPE MYLAR .500 W	AR	1	1
39	089-05899-0002		SCR PHP 2-56X1/8	EA	5	5
4	012-01664-0001		TX CAVITY INSILATO	EA	1	1
40	047-12172-0002		COAX GROUNG CLIP W	EA	2	2
44	089-06008-0004		SCR FHP 4-40X1/4	EA	2	2
47	016-01013-0000		VAC GREASE DC 976	AR	1	1
48	076-00466-0005		SPACER .360	EA	3	3
5	012-01665-0002		POWER SUPPLY INSUL	EA	1	1
6	016-01004-0000		COMPOUND THRML JNT	AR	1	1
7	030-00476-0001		CONN, RF, RECPT, P	EA	2	2
8	047-12515-0501		INNER SHIELD	EA	1	1
9	047-12089-0002		BOTTOM LID W / FIN	EA		1
9	047-12089-0004		BOTTOM LID W / REC	EA	1	
C3339	111-00001-0055		CAP CR 6.8PF 100V	EA	1	1
L3043	019-02099-0000		CHOKE .047UH 10%	EA	1	1
	300-05660-0020		KX 165A BASE ASSE	RF	0	0

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SEE Tx CAVITY DETAIL
PAGE 2
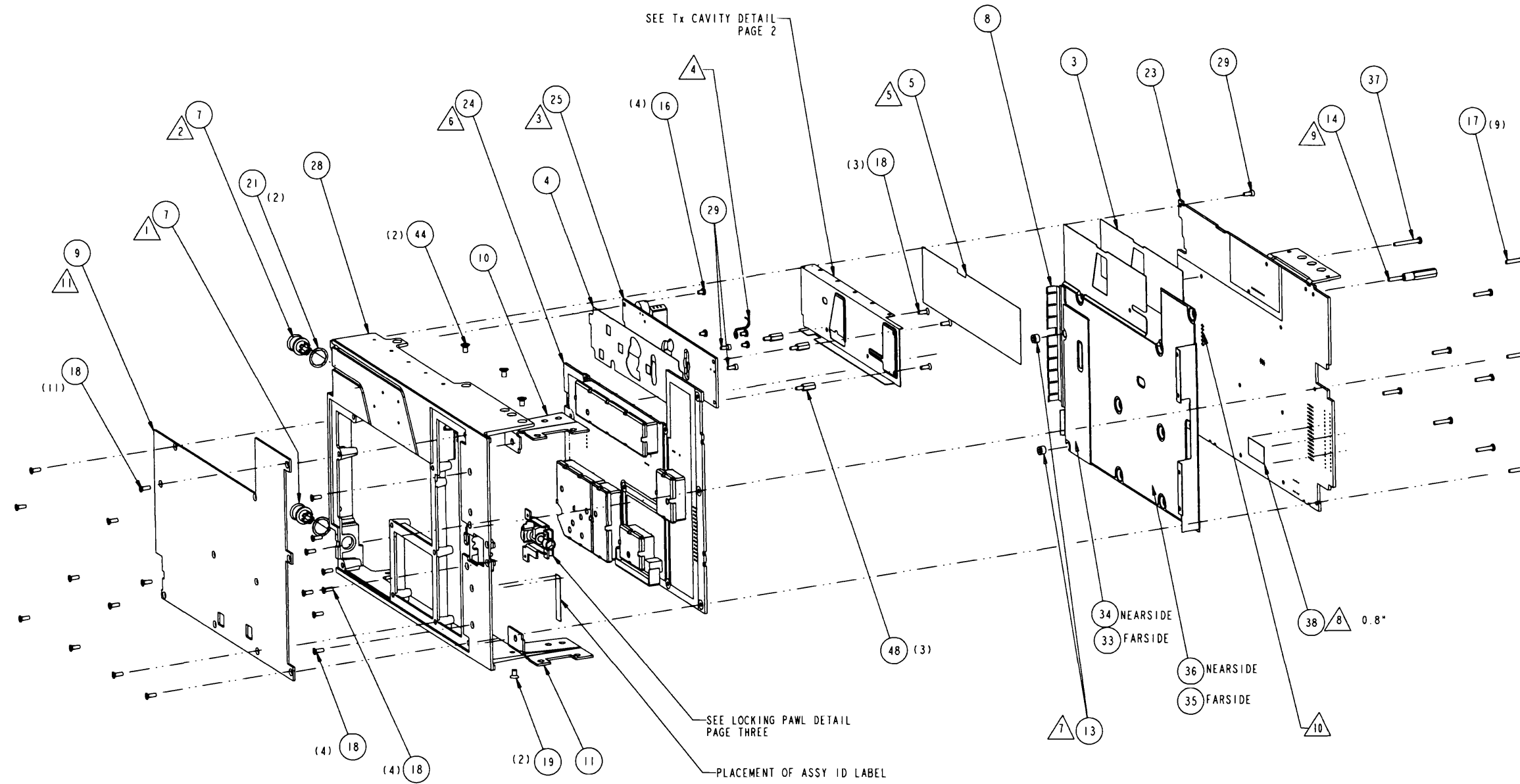
NOTES:

⚠1 SEE VIEW B, SHEET 3, FOR DETAILS OF COMPONENTS CONNECTED TO ITEM 7.

⚠2 SEE Tx CAVITY DETAIL, SHEET 2, FOR GROUNDING TECHNIQUE.

⚠3 APPLY THERMAL JOINT COMPOUND (ITEM 6) TO TRANSISTOR HEATSINK SURFACES BEFORE INSTALLING ITEM 25.

⚠4 PREFORM SOLDER TAB BEFORE INSTALLATION. SEE SECTION C-C, SHEET 2.

⚠5 DRESS WIRES OF P4004 (PART OF ITEM 25) TO PREVENT CROSSING AND PINCHING. SECURE WIRE POSITION USING ITEM 5 AND PER Tx WIRE DRESS DETAIL SHOWN ON SHEET 3.

⚠6 APPLY TAPE PER RECEIVER BD DETAIL ON SHEET 2.

⚠7 INSTALL AND SOLDER SPACERS (ITEM 13) TO SHIELD (ITEM 8). ORIENT SPACERS AS SHOWN.

⚠8 INSTALL WITH .2" OVERHANGING FRONT OF ITEM 23 (MAIN BD).

⚠9 FINGER TIGHTEN ONLY AFTER BOARDS AND INNER SHIELD HAVE SEATED TO CASTING BOSSES.

⚠10 AFTER ASSEMBLY, CLIP (6) PINS THAT PROTRUDE THROUGH INDICATED HOLES. CLIP PINS FLUSH WITH TOP OF RECEPTACLE (FARSIDE).

⚠11 ON 200-05660-0001 FLAVOR ONLY, APPLY TAPE (ITEM 38) TO RECESS IN LID (FARSIDE).

12. LIQUID STAKE ALL FASTENERS PER SPECIFICATION 001-01080-0000 USING ITEM 32.

SEE LOCKING PAWL DETAIL
PAGE THREE

PLACEMENT OF ASSY ID LABEL

34 NEARSIDE
33 FARSIDE
36 NEARSIDE
35 FARSIDE

0.8"

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-05660-00XX .

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Figure 6-11 Base Assembly
(Dwg No. 300-05660-0020 rev. -, sheet 1 of 3)

38 .6"   38 1.4"   24 REF

RECEIVER BD DETAIL

APPLY TAPE TO EDGE OF ITEM 24
(RECEIVER BD) AS SHOWN.

26   39
            (5)

30
ORIENT SO ADHESIVE STICKS
TO ITEM 26 (Tx LID).

40
SOLDER ITEM 40 (GROUND CLIP) TO
EXPOSED COAX BRAID OF ITEM 25
(Tx BOARD). TYP 2 PLCS

28 REF

SOLDER GROUND LUG ON ITEM 7
TO FENCE ON ITEM 25 (Tx BD).

40
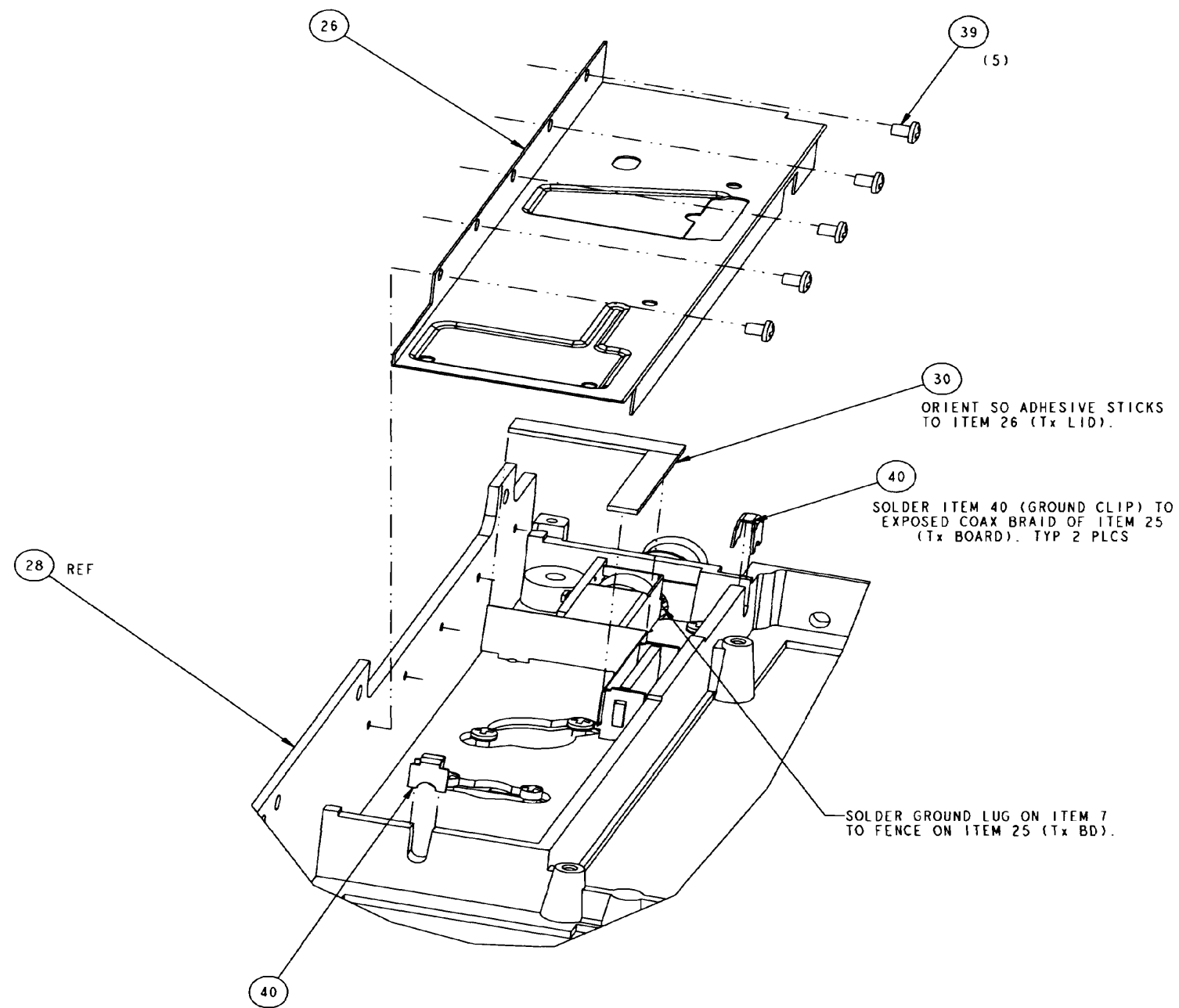
TX CAVITY DETAIL

SCALE 2/1

1

25
REF   (C4027)   16
                              REF

28
REF
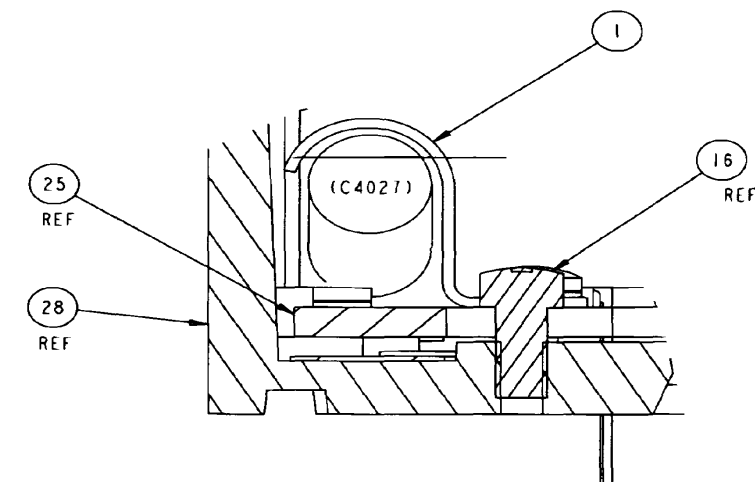
SECTION C-C

PREFORM ITEM 1 AS SHOWN TO RESTRAIN
THE MOVEMENT OF C4027

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Figure 6-11 Base Assembly
(Dwg No. 300-05660-0020 rev. -, sheet 2 of 3)
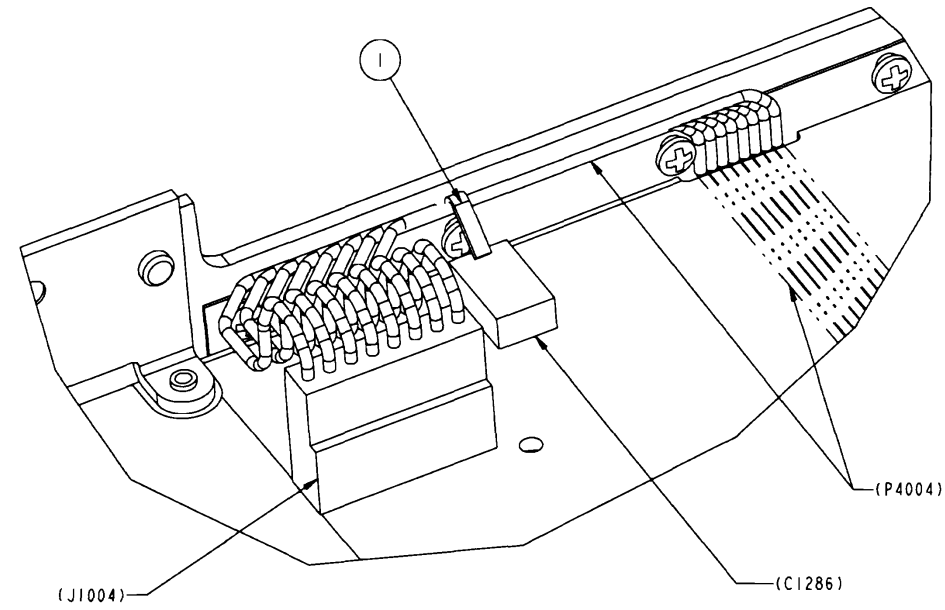
Tx WIRE DRESS DETAIL

RETAIN P4004 WIRE BUNDLE CLOSE TO CASTING SIDEWALL
BY FORMING ITEM I AROUND BUNDLE AND LEAVING TAB END
IN CONTACT W/ TOP SURFACE OF C1286. CONNECT J1004 TO
CONNECTOR ON ITEM 23 (MAIN BOARD) AS SHOWN.

LOCKING PAWL DETAIL

ASSEMBLY NOTE:
   APPLY ITM 47, SILICONE LUBRICANT, TO THREADS OF
   ITM 20, HOLD DOWN SCREW, AND TO ITMS 22, BOTH WASHERS.

VIEW B
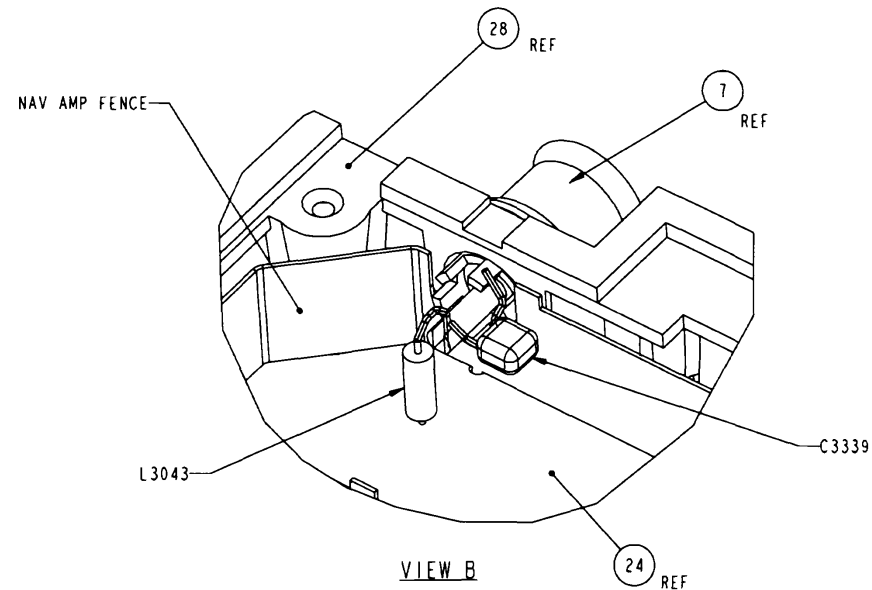
RECEIVER NAV COAX DETAILS
SOLDER THREE (MIN) GROUND LUGS ON ITEM 7 TO NAV AMP FENCE.
SOLDER L3043 BETWEEN EI OF ITM 24 AND CENTER PIN OF ITM 7.
SOLDER C3339 TO CENTER PIN AND SHELL OF ITM 7 WITH MINIMAL LEAD LENGTH.
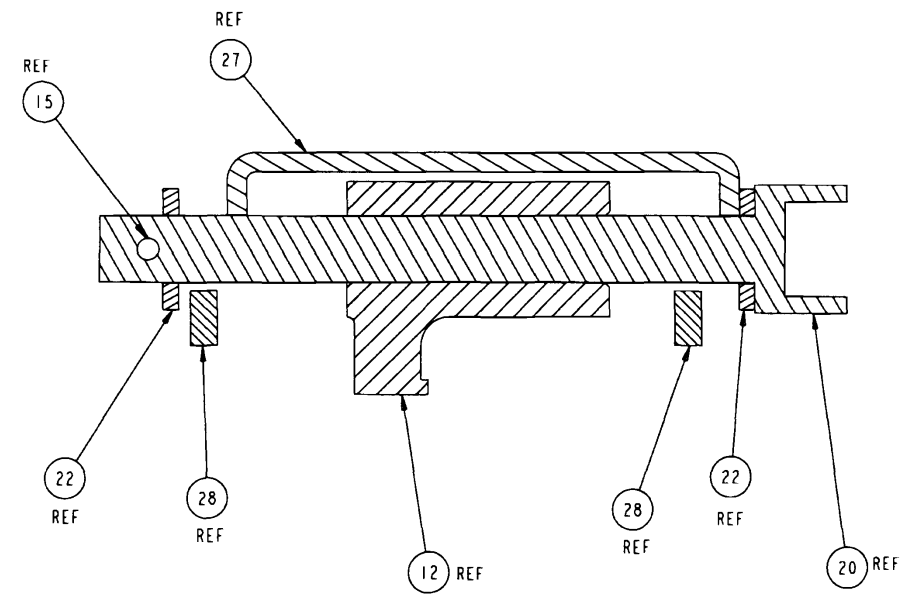
LOCKING PAWL COMPONENTS

300-05660-0020_-/002.tif

**Figure 6-11 Base Assembly
(Dwg No. 300-05660-0020 rev. -, sheet 3 of 3)**

200-09062-0020 TRANSMITTER BOARD   Rev.A

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0020
C4001	113-03047-0000		CAP DC 4.7PF 500V	EA	.3
C4001	113-03082-0000		CAP DC 8.2PF 500V	EA	.3
C4027	097-00214-0035		CAP AL 47UF 50V	EA	1
C4029	113-03390-0000		CAP DC 39PF 500V	EA	1
C4031	106-00044-0086		CAP CH 180PF 2% 30	EA	1
C4033	118-00017-0000		CAP DC 22PF 500V	EA	1
C4035	118-00017-0000		CAP DC 22PF 500V	EA	1
C4039	118-00018-0000		CAP DC 15PF 500V	EA	1
C4041	118-00065-0000		CAP DC 10PF 5%	EA	1
C4043	118-00006-0000		CAP DC 470PF 500V	EA	1
C4046	118-00019-0000		CAP DC 18PF 500V	EA	1
C4049	111-00001-0003		CAP CR .22UF 50V	EA	1
C4051	118-00017-0000		CAP DC 22PF 500V	EA	1
C4052	118-00018-0000		CAP DC 15PF 500V	EA	1
C4057	118-00006-0000		CAP DC 470PF 500V	EA	1
C4059	118-00038-0000		CAP DC 82PF 500V	EA	1
C4065	118-00006-0000		CAP DC 470PF 500V	EA	1
C4068	118-00048-0000		CAP DC .01UF 100V	EA	1
C4071	118-00006-0000		CAP DC 470PF 500V	EA	1
C4073	118-00065-0000		CAP DC 10PF 5%	EA	1
C4074	118-00038-0000		CAP DC 82PF 500V	EA	1
C4075	118-00006-0000		CAP DC 470PF 500V	EA	1
C4076	106-04104-0047		CH 100KX7R/50V	EA	1
C4077	106-04102-0026		CH 1KPF NPO/100V	EA	1
CR4001	007-06046-0000		DIO S 1N914	EA	1
CR4001A	007-06046-0000		DIO S 1N914	EA	1
CR4002	007-06046-0000		DIO S 1N914	EA	1
CR4003	007-06108-0000		DIO MA47475	EA	1
CR4005	007-07002-0000		DIO LE MV5074C	EA	1
L4002	019-02766-2507		COIL, 0.25X7 # 20	EA	1
L4003	019-02766-3018		COIL, 0.30 X18 # 2	EA	1
L4004	019-02718-0004		COIL 0.10X4T #20	EA	1
L4007	019-02718-0003		COIL 3T X .100 #20	EA	1
L4012	019-02718-0003		COIL 3T X .100 #20	EA	1
L4013	019-02718-0004		COIL 0.10X4T #20	EA	1
L4014	019-02718-0003		COIL 3T X .100 #20	EA	1
L4015	019-02718-0005		COIL 0.10X5T #20	EA	1
L4016	019-02718-0003		COIL 3T X .100 #20	EA	1
L4017	019-02718-0005		COIL 0.10X5T #20	EA	1
L4018	019-02718-0005		COIL 0.10X5T #20	EA	1
L4019	019-02718-0006		COIL 0.10X6T #20	EA	1
L4020	013-00028-0000		FERR BEAD W/LEAD	EA	1
L4021	013-00028-0000		FERR BEAD W/LEAD	EA	1
L4022	013-00028-0000		FERR BEAD W/LEAD	EA	1
L4025	013-00028-0000		FERR BEAD W/LEAD	EA	1
P4005	155-02872-0001		COAX CABLE ASSY	EA	1
P4006	155-02872-0001		COAX CABLE ASSY	EA	1
Q4004	007-00250-0000		XSTR 2N4427	EA	1
Q4005	200-09532-0000		RF POWER XSTR ASSY	EA	1
Q4006	007-01046-0000		MOSFET,RF PWR N-CH	EA	1
R4001	131-00202-0013		RES CF 2K EW 5%	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0020
R4002	131-00470-0023		RES CF 47 QW 5%	EA	1
R4005	136-01001-0062		RES PF 1K EW 1%	EA	1
R4009	131-00270-0033		RES CF 27 HW 5%	EA	1
R4012	136-00243-0072		RES PF 24.3 QW 1%	EA	1
R4018	136-03320-0032		RES PF 332 1W 1%	EA	1
R4020	136-00475-0102		RESISTOR, MF, 47.5	EA	1
R4021	136-03320-0032		RES PF 332 1W 1%	EA	1
R4022	136-01002-0062		RES PF 10K EW 1%	EA	1
R4025	131-00511-0033		RES CF 510 HW 5%	EA	1
R4026	136-01500-0062		RES PF 150 EW 1%	EA	1
R4028	139-03920-0000		392 OHM 1/8W 1%	EA	1
R4029	131-00391-0023		RES CF 390 QW 5%	EA	1
REF	002-09062-0020		KX 165A TRANSMITT	RF	0
REF	300-09062-0020		TRANSMITTER BOARD	RF	0
	009-09062-0000		PCBD KX155A TRANSM	EA	1
	024-05019-0000		WIRE #30 GREEN	IN	1.25
	026-00029-0000		WIRE, CU, 22AWG, T	IN	1.5
	026-00030-0000	3	WIRE, CU, 24AWG, T	IN	.5
	047-08944-0001		FINGER STOCK	EA	5
	047-12478-0002	1	TX FILTER BD SHIEL	EA	1
	047-12511-0002	2	TX GROUND FENCE W/	EA	1
	091-00210-0000		INSUL XSTR	EA	1
	150-00004-0010		TUBING TFLN 22AWG	IN	.5
	200-09174-0020		KX 165A TX FILTER	EA	1
	200-09362-0010		DIRECTIONAL COUPLE	EA	1

NOTE: ADD 4000 TO ALL REFERENCE DESIGNATORS EXCEPT P4005 AND P4006.
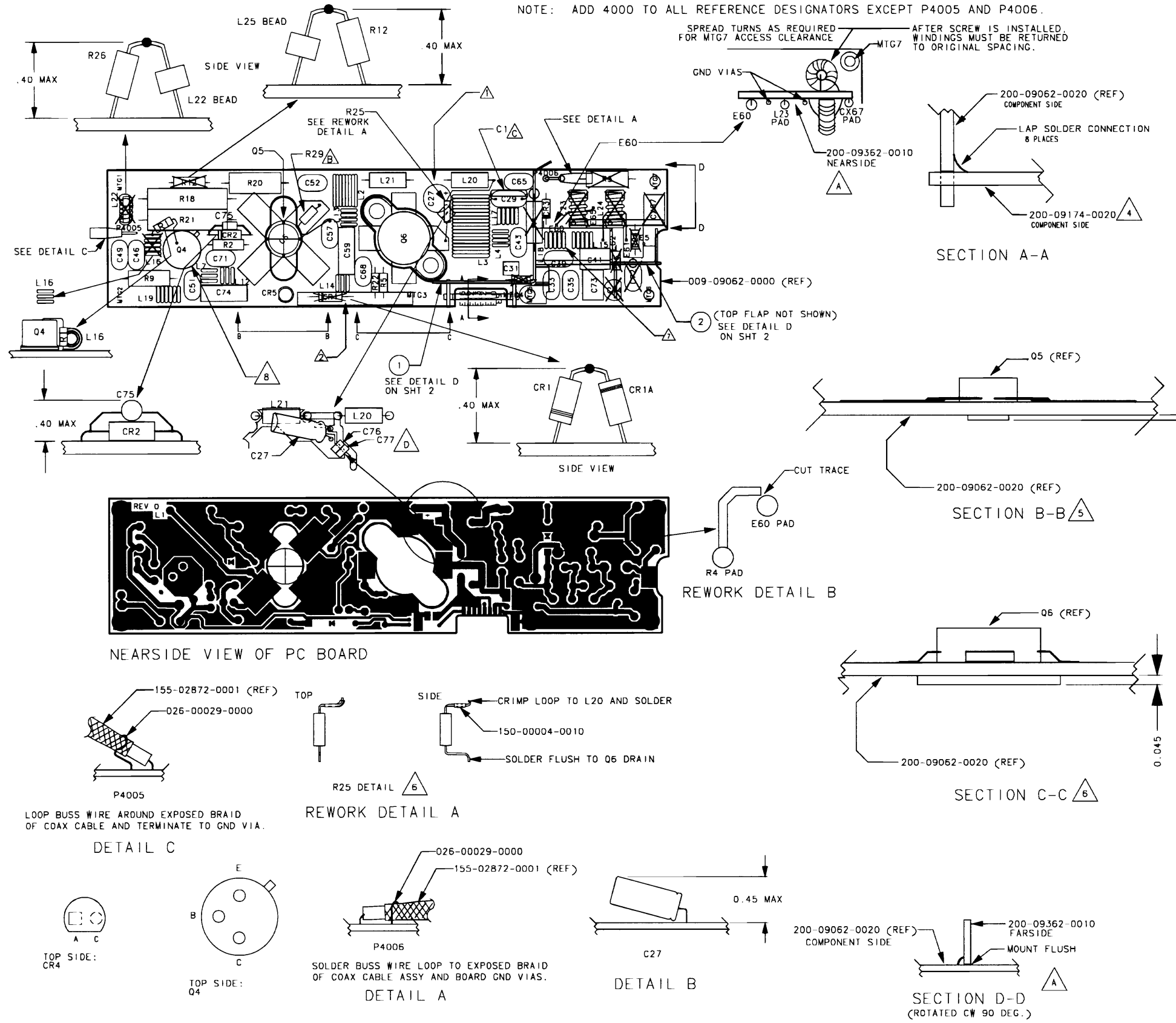
NOTES:

1. INSTALL C27 WITH 0.2 INCH LEAD EXPOSURE TO ALLOW THE CAPACITOR TO BE BENT DOWN BETWEEN Q6 & L21 SUCH THAT IT EXTENDS NO MORE THAN 0.45 INCH ABOVE THE BOARD SURFACE. SEE DETAIL B.

2. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN ACCORDANCE WITH SPEC. 001-01101-0000.

3. NOTE DELETED

4. INSTALL BOARD ASSEMBLY (200-09174-0020) IN MOUNTING HOLES #3 AND #4. SOLDER TABS TO BOARD SURFACE.

5. PREFORM LEADS TO ACHIEVE PROPER INSTALLED HEIGHT.

6. PREFORM LEADS TO ACHIEVE PROPER INSTALLED HEIGHT.

7. MAX HEIGHT OFF BOARD FOR ALL AIR COILS IS .05 INCH AS SHOWN (BOTTOM OF COIL BODY TO TOP OF PCB).

8. INSTALL SPACER (091-00210-0000) ONTO COMPONENT Q4.

REWORK NOTES:

A. INSTALL BOARD ASSEMBLY 200-09362-0010 IN 5 HOLES STARTING AT E60, ENDING AT CX67 PAD. TRIM EXCESS LEAD LENGTH ON BOTTOM. DO NOT OBSCURE MTG7 SCREW.

B. SOLDER R29 TO THE COLLECTOR LEAD OF Q5 AND TO THE NON-GROUNDED LEAD OF C57.

C. C1 TEST SELECT CAP MAY NOT BE INSTALLED OR IS SOLDERED TO THE LEADS OF C29, DEPENDING ON TEST RESULTS.

D. SCRAPE SOLDERMASK AWAY FROM GROUND AND FROM THE TRACE CONNECTING TO THE "+" SIDE OF C27.

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Figure 6-12 Transmitter Board
(Dwg No. 300-09062-0020 rev. A, sheet 1 of 2)

047-08944-0001 (5)

200-09062-0020
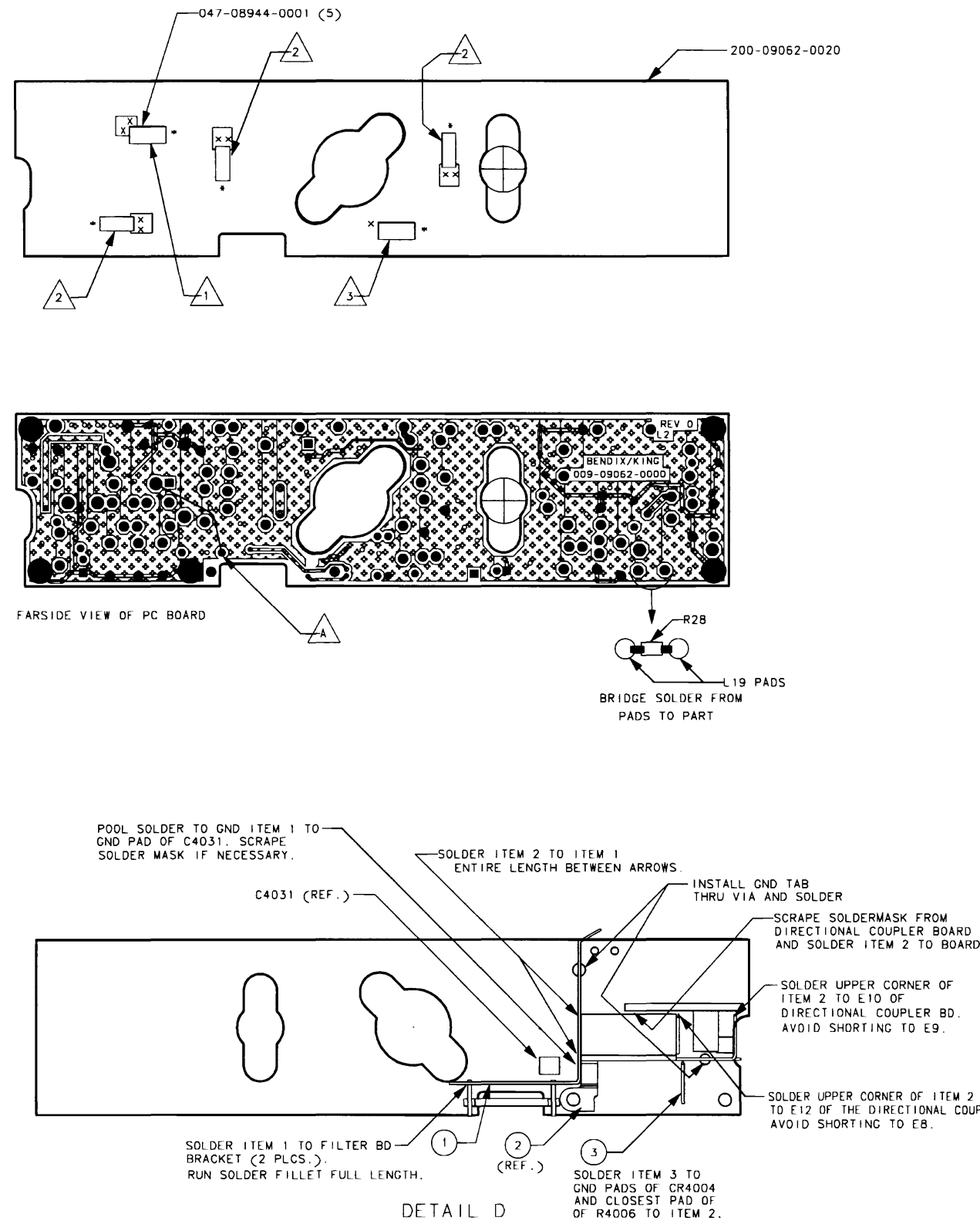
NOTES:

1. LOCATE ROUND END OF FINGER STOCK TOWARD THE ▪.
POSITION LEFT EDGE OF FINGER .135 +/- .020 (3.5 +/- 0.5) FROM
LEFT EDGE OF PAD. POSITION UPPER EDGE OF FINGER .065 +/- .020
(1.75 +/- 0.5) FROM UPPER EDGE OF PAD. SOLDER FINGER TO PAD,
2 PLACES EACH SHOWN AT X.

2. LOCATE ROUND END OF FINGER STOCK TOWARD THE ▪.
POSITION THE OPPOSITE END .135 +/- .020 (3.5 +/- 0.5) FROM
EDGE OF PAD. SOLDER FINGER TO PAD, 2 PLACES EACH SHOWN AT X.

3. LOCATE ROUND END OF FINGER STOCK TOWARD THE ▪.
POSITION LEFT EDGE ON THE CENTER OF 3 GROUND VIAS.
ALIGN UPPER EDGE TO THE ADJOINTING STRAIGHT EDGE OF
GROUND PLANE. SOLDER FINGER TO CENTER VIA AS SHOWN AT X.

4. DO NOT ALLOW SOLDER TO INHIBIT COMPRESSION OF FINGERSTOCK.

5. (OPTION) CHECK FINGERSTOCK ALIGNMENT WITH KPN 012-01664-0001.
TX CAVITY INSULATOR AS TEMPLATE.

6. TRIM COMPONENT LEADS TO 0.030 MAX.

REWORK NOTES:

A. ADD MAGWIRE FROM E60 PAD TO R23 PAD. ROUTE AS SHOWN.

REV 0
L2.7
BENDIX/KING
009-09062-0000

FARSIDE VIEW OF PC BOARD

R28

L19 PADS

BRIDGE SOLDER FROM
PADS TO PART

POOL SOLDER TO GND ITEM 1 TO
GND PAD OF C4031. SCRAPE
SOLDER MASK IF NECESSARY.

SOLDER ITEM 2 TO ITEM 1
ENTIRE LENGTH BETWEEN ARROWS.

INSTALL GND TAB
THRU VIA AND SOLDER

C4031 (REF.)

SCRAPE SOLDERMASK FROM
DIRECTIONAL COUPLER BOARD
AND SOLDER ITEM 2 TO BOARD

SOLDER UPPER CORNER OF
ITEM 2 TO E10 OF
DIRECTIONAL COUPLER BD.
AVOID SHORTING TO E9.

SOLDER UPPER CORNER OF ITEM 2
TO E12 OF THE DIRECTIONAL COUPLER BD.
AVOID SHORTING TO E8.

SOLDER ITEM 1 TO FILTER BD
BRACKET (2 PLCS.).
RUN SOLDER FILLET FULL LENGTH.

(REF.)

SOLDER ITEM 3 TO
GND PADS OF CR4004
AND CLOSEST PAD OF
OF R4006 TO ITEM 2.

DETAIL D

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Figure 6-12 Transmitter Board
(Dwg No. 300-09062-0020 rev. A, sheet 2 of 2)

**Figure 6-13 Transmitter Schematic
(Dwg No. 002-09062-0020 rev. A)**

200-09532-0000 RF POWER XSTR ASSY   Rev.A

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
1	007-01045-0003		XSTR, RF, PWR, NPN	EA	1
2	047-12065-0002		TX DRIVER FLANGE W	EA	1
	300-09532-0000		RF POWER XSTR ASSY	RF	0

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45.0°

① REF   ② REF

① ②

②

③
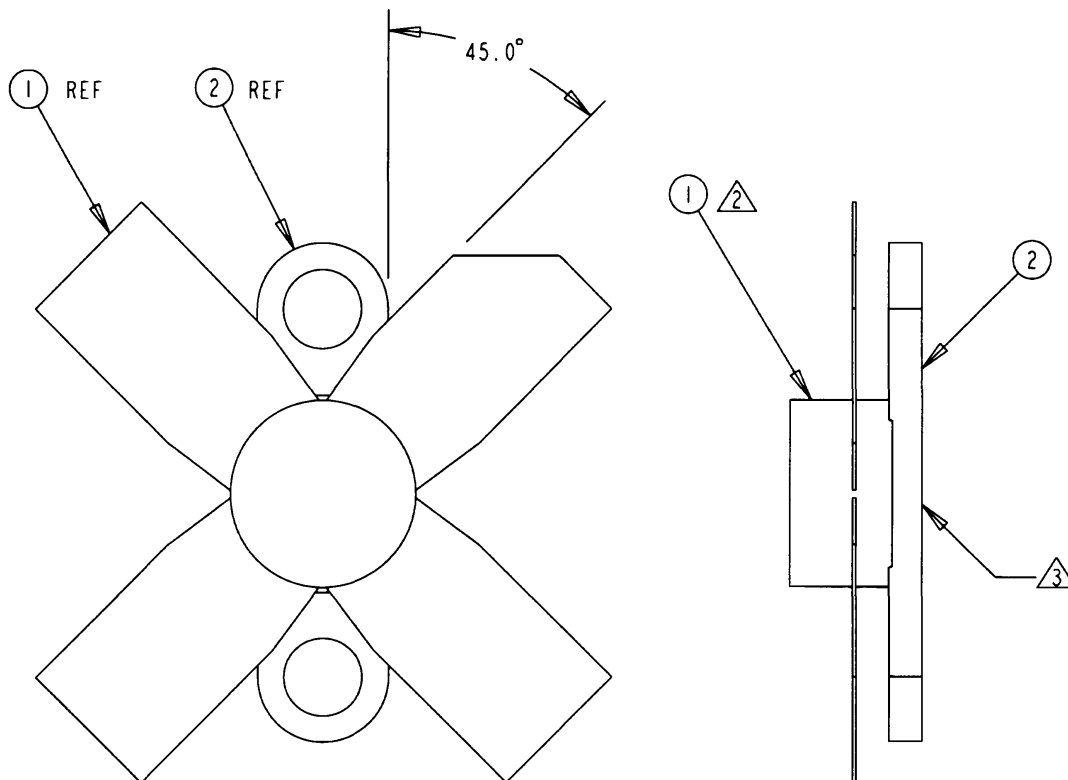
NOTES:

1. ITM 1 IS STATIC SENSITIVE - HANDLE AND STORE ITM 1
   AND THE COMPLETED ASSY IN A STATIC FREE ENVIRONMENT.
2. SOLDER ITM 1 TO ITM 2 USING A CONTROLLED I.R. PROCESS.
   USE FIXTURE TO MAINTAIN PROPER ORIENTATION. LOCATE ITM 1
   IN THE SHALLOW CIRCULAR RECESS IN ITM 2.
3. AVOID SOLDER CONTAMINATION OF THE FLAT HEAT SINK CONTACT SURFACE.
4. PACKAGE INDIVIDUAL ASSYS IN ANTI-STATIC PACKAGING MATERIAL.

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09532-0000

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Figure 6-14 RF Pwr Transistor Assembly
(Dwg No. 300-09532-0000 rev. 0)

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200-09174-0020 KX 165A TX FILTER BD   Rev.-

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0020
FL4101	017-08072-0004		CHIP EMI FILTER	EA	1
FL4102	017-08072-0004		CHIP EMI FILTER	EA	1
FL4103	017-08072-0004		CHIP EMI FILTER	EA	1
FL4104	017-08072-0004		CHIP EMI FILTER	EA	1
FL4105	017-08072-0004		CHIP EMI FILTER	EA	1
FL4106	017-08072-0004		CHIP EMI FILTER	EA	1
FL4107	017-08072-0004		CHIP EMI FILTER	EA	1
P4004	155-01709-0501		WIRE HARNESS, 8 CO	EA	1
REF	002-09174-0020		KX 165A TX FILTER	RF	0
REF	300-09174-0020		KX 165A TX FILTER	RF	0
	009-09174-0000		TX FILTER BD	EA	1
	016-01071-0000		DC RTV 3140	AR	1
	047-12479-0002		TX FILTER BD BRACK	EA	2

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P4004 ⚠2

SOLDER FILLET
2 PLCS.

RTV

E8 E7 E6 E5 E4 E3 E2 E1

L101 L102 L103 L104 L105 L106 L107

E9

009-09174-0000

RTV ⚠3

047-12479-0002 2X
SEE NOTE 1
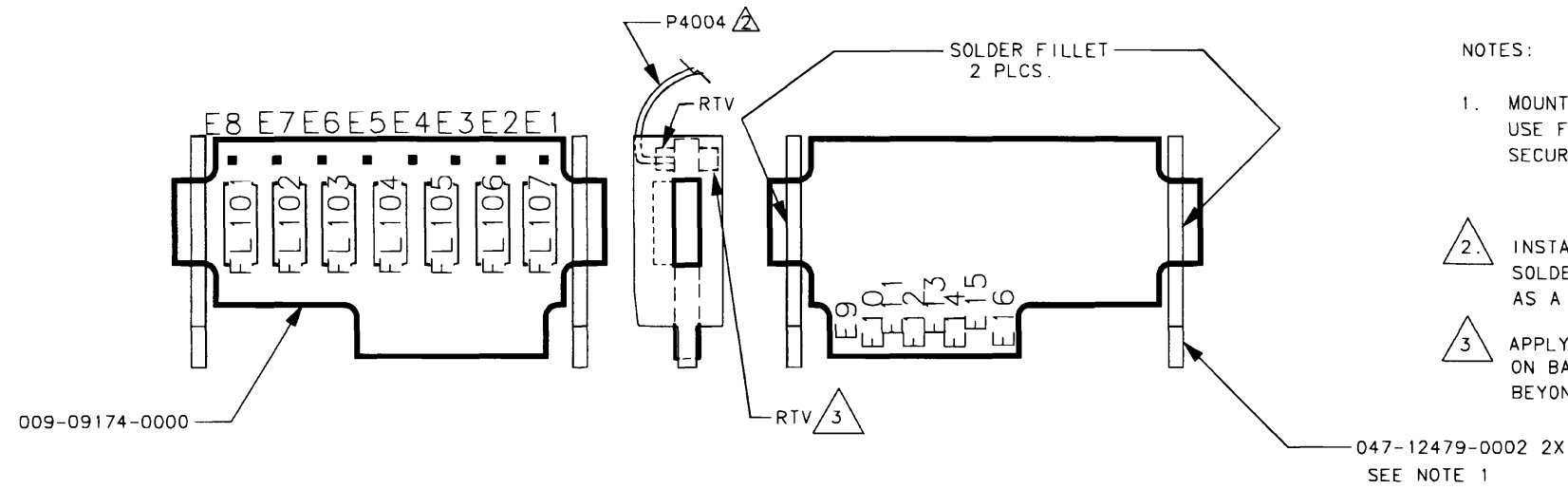
NOTES:

1. MOUNTING OF BRACKETS IS CRITICAL.
    USE FIXTURE CREATED FOR HOLDING BRACKETS
    SECURE WHEN SOLDERING IN PLACE.

⚠2. INSTALL P4004 AS SHOWN WITH BEND RADII OUTSIDE
    SOLDER JOINT AREA. APPLY RTV (016-01071-0000)
    AS A STRAIN RELIEF TO THE PCB AND CABLE ASSY.

⚠3 APPLY RTV TO INSULATE P4004 SOLDER JOINTS
    ON BACKSIDE OF BOARD. RTV MUST NOT PROTRUDE
    BEYOND TOP OR SIDE EDGE OF MOUNTING BRACKET.

NEARSIDE VIEW OF PC BOARD

9174-00 REV 0 L2
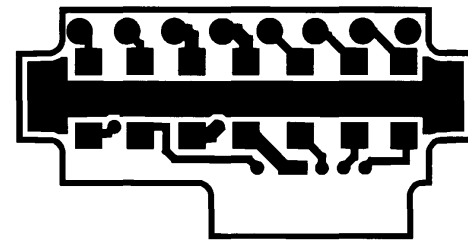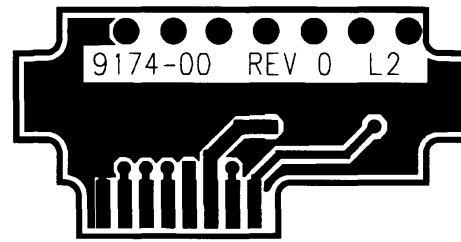
FARSIDE VIEW OF PC BOARD

WIRE HARNESS / FILTER BOARD SOLDER ATTACHMENT CHART	
FILTER BOARD	P4004 WIRE HARNESS LEAD
E1	#1 VIOLET
E2	#2 BLUE
E3	#3 GREEN
E4	#4 YELLOW
E5	#5 ORANGE
E6	#6 RED
E7	#7 BROWN
E8	#8 BLACK

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09174-0020

NOTE: ADD 4000 TO ALL REFERENCE DESIGNATORS EXCEPT P4004.

300-09174-0020_A\000.tif

**Figure 6-15 Transmitter Filter Board
(Dwg No. 300-09174-0020 rev. A)**
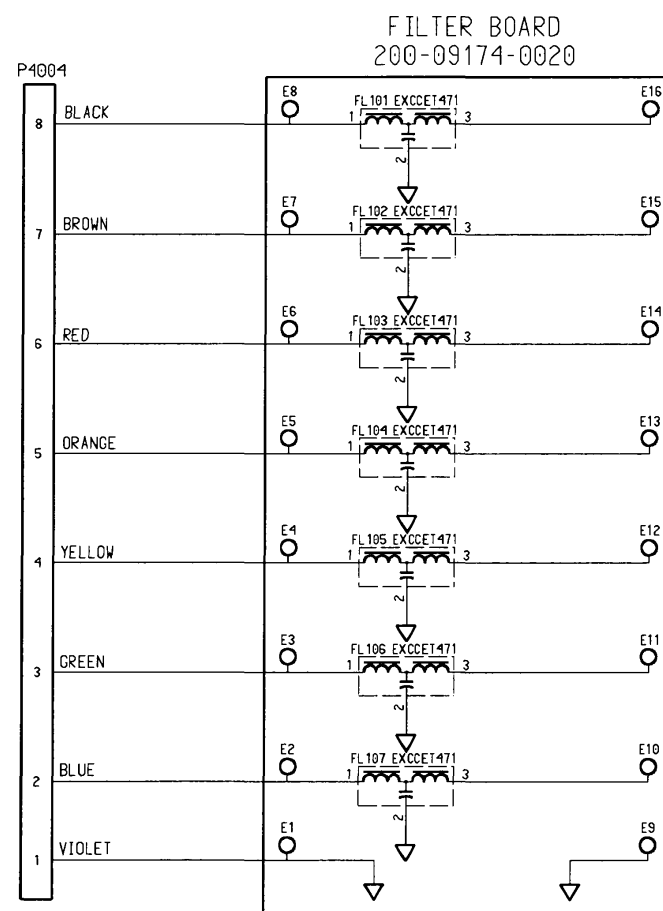
Figure 6-16 Transmitter Filter Board Schematic
(Dwg No. 002-09174-0020 rev. -)

200-09362-0010 DIRECTIONAL COUPLER BOARD   Rev.-

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0010
1	009-09362-0000		PCB DIRECTIONAL CO	EA	1
C1	106-05561-0016		CAP CH560PFNPO/50V	EA	1
C10	106-05180-0026		CAP CH18PFNPO/100V	EA	1
C2	106-05561-0016		CAP CH560PFNPO/50V	EA	1
C4	106-05629-0020		CH 6.2PF NPO / 100	EA	1
C5	106-05339-0020		CH 3.3PF NPO/100V	EA	1
C6	106-05629-0020		CH 6.2PF NPO / 100	EA	1
C8	106-05100-0026		CAP CH10PFNPO/100V	EA	1
C9	106-05270-0026		CAP CH27PFNPO/100V	EA	1
CR1	007-06443-0000		DIODE SI MMBD301L	EA	1
E1	026-00029-0000		WIRE, CU, 22AWG, T	IN	.5
E2	026-00031-0000		WIRE, CU, 26AWG, T	IN	.5
E3	026-00029-0000		WIRE, CU, 22AWG, T	IN	.5
E4	026-00031-0000		WIRE, CU, 26AWG, T	IN	.5
E5	026-00029-0000		WIRE, CU, 22AWG, T	IN	.5
L1	019-02767-0002		INDUCTOR, RF TOROI	EA	1
L2	019-02767-0002		INDUCTOR, RF TOROI	EA	1
L3	019-02660-0067		IND SM 47 5%	EA	1
R1	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R12	139-00499-0010		RES CH 49.9 .1W 1%	EA	1
R13	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R15	139-00000-0014		CKT JUMPER 0805	EA	1
R2	139-02001-0010		RES CH 2.00K TW 1%	EA	1
T1	026-00029-0000		WIRE, CU, 22AWG, T	IN	1
T2	026-00029-0000		WIRE, CU, 22AWG, T	IN	1
	002-09362-0010		DIRECTIONAL COUPLE	RF	0
	016-01040-0000		COATING TYPE AR	AR	1
	300-09362-0010		COUPLER BOARD	RF	0

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NOTES:
1. PRIOR TO POST COATING BOTH SIDES OF P.C. BOARD
   WITH KPN 016-01040-0000, MASK OFF ALL
   MOUNTING AREAS AND REFERENCE DESIGNATORS:
   E14-E16, E2, E4

2. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN
   ACCORDANCE WITH SPEC. 001-01101-0000.

3. LIQUID STAKE ALL FASTENERS PER SPEC. 001-01080-0000.

REWORK NOTES:

AA. DO NOT INSTALL R14 AND CR2.
    DO NOT INSTALL R3, R6, R7, R8, R9, R10, C7.

SEE NOTE AA

SEE DETAIL B

SEE DETAIL A

SEE NOTE AA
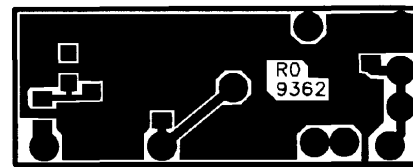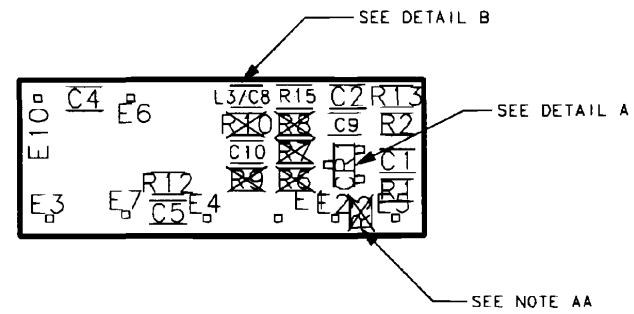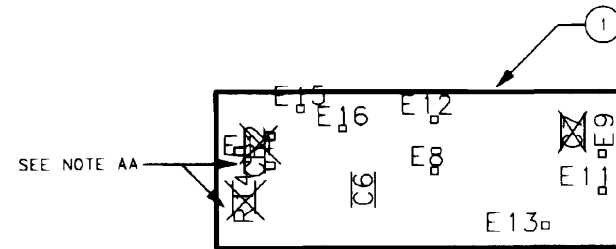
NEARSIDE VIEW OF PC BOARD
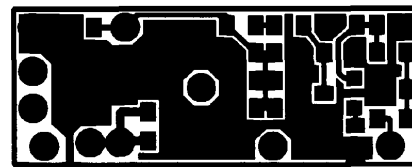
FARSIDE VIEW OF PC BOARD

CR1
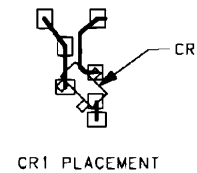
CR1 PLACEMENT

DETAIL A

C8   L3
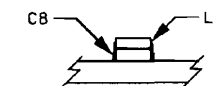
DETAIL B
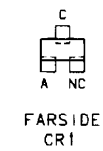
FARSIDE
CR1

THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09362-0010

300-09362-0010_-\000.tif

Figure 6-17 Directional Coupler
(Dwg No. 300-09362-0010 rev. -, Sheet 1 of 2)

.07 MIN.

① (REF)

E12

E8

E5 E2 E1 E4

E9

E11

E3

(22 AWG)

(26 AWG)

(22 AWG)

(26 AWG)

(22 AWG)

SCALE 4/1

②

③

L1

L2

E10

E6

C8/L3

④

E13

E7

SHEET 1 OF 2 IS MAINTAINED BY MENTOR GRAPHICS.
SHEET 2 OF 2 IS MAINTAINED BY PRO-E
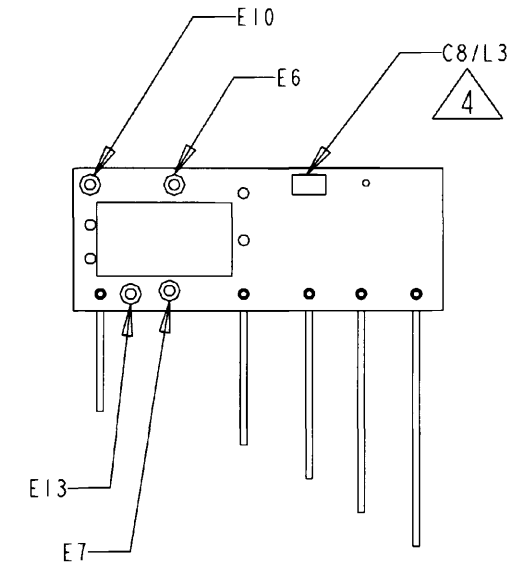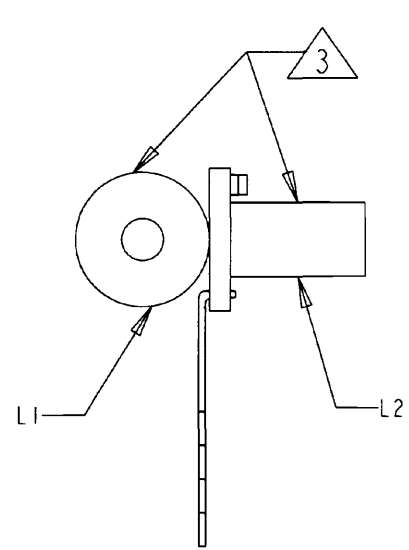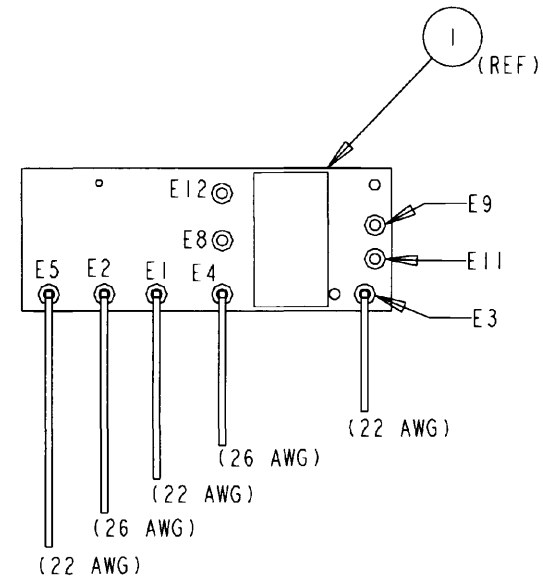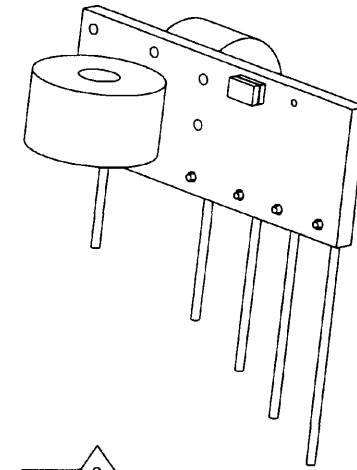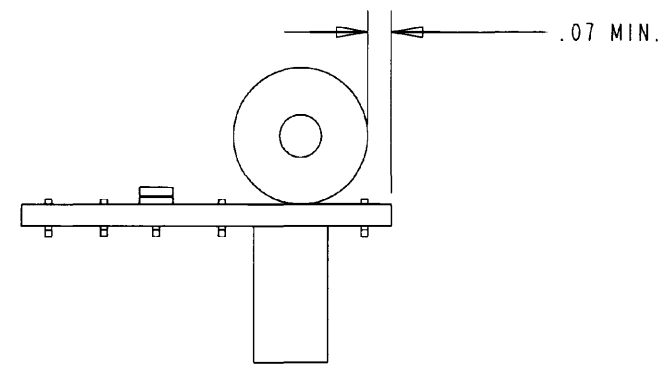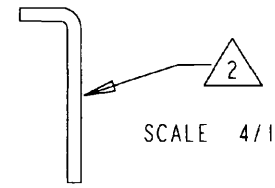
NOTES:

1. MAX COMPONENT HEIGHT FROM EITHER SIDE OF BOARD IS .400.

2. FORM AND SOLDER E1 THRU E5 TO ITEM 1.
   CLIP E1 THRU E5 TO VARIOUS LENGTHS TO AID INSTALLATION INTO NEXT ASSY.
   (FINISHED WIRE LENGTHS: .25 MIN TO .75 MAX.)

3. L1 ATTACHES TO E12 AND E13. T1 IS PLACED THRU L1 AND SOLDERED TO E8 AND E9.
   L2 ATTACHES TO E10 AND E11. T2 IS PLACED THRU L2 AND SOLDERED TO E6 AND E7.

4. C8/L3 INSTALLATION DETAIL IS SHOWN ON PAGE 1. TACKPACK MAY BE USED
   TO HOLD L3 TO C8 PRIOR TO SOLDERING. COMPONENT BODIES OF C8/L3 SHALL
   NOT PROTRUDE BEYOND BOARD OUTLINE.

5. ALL DIMENSIONS ARE IN INCHES.

300-09362-0010_-\001.tif

Figure 6-17 Directional Coupler
(Dwg No. 300-09362-0010 rev. -, Sheet 2 of 2)

Figure 6-18 Directional Coupler Schematic
(Dwg No. 002-09362-0010 rev. -)

```
        200-09061-0010        25KHZ RCVR         H
        200-09061-0011        8.33KHZ RCVR       D
        200-09061-0098        COMMON RECEIVER    M
```

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
C3001	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3002	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3003	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3005	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3006	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3007	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3008	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3009	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3010	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3012	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3013	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3014	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3015	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3016	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3017	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3019	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3020	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3021	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3022	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3023	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3024	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3025	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3027	106-05331-0026		CAP CH330PFNPO/100	EA	.	.	1.00
C3028	106-05560-0026		CAP CH56PFNPO/100V	EA	.	.	1.00
C3029	106-05399-0020		CH 3.9PF NPO/100V	EA	.	.	1.00
C3031	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3032	106-05271-0026		CAPCH270PFNPO/100V	EA	.	.	1.00
C3033	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3034	106-05100-0026		CAP CH10PFNPO/100V	EA	.	.	1.00
C3035	106-05399-0020		CH 3.9PF NPO/100V	EA	.	.	1.00
C3036	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3037	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	.00
C3038	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3039	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3040	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3041	106-05681-0016		CAP CH680PFNPO/50V	EA	.	.	1.00
C3042	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3043	106-05919-0020		CH 9.1 PF NPO / 10	EA	.	.	1.00
C3045	106-05331-0026		CAP CH330PFNPO/100	EA	.	.	1.00
C3046	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3049	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.
C3050	106-05120-0026		CAP CH12PFNPO/100V	EA	1.00	.	.
C3050	139-00000-0014		CKT JUMPER 0805	EA	.	1.00	.
C3051	106-05473-0036		CAP CH .047X7R 25V	EA	.	.	1.00
C3052	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3054	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3056	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3057	106-05750-0026		CH 75PF NPO 100V	EA	.	.	1.00
C3059	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
C3062	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3063	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3064	106-05223-0047		CAP CH 22K X7R/50V	EA	.	.	1.00
C3065	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3066	106-05560-0026		CAP CH56PFNPO/100V	EA	.	.	1.00
C3067	106-05750-0026		CH 75PF NPO 100V	EA	.	.	1.00
C3068	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3069	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3070	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3071	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3072	106-05270-0026		CAP CH27PFNPO/100V	EA	1.00	.	.
C3072	139-00000-0014		CKT JUMPER 0805	EA	.	1.00	.
C3074	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.
C3075	106-05399-0020		CH 3.9PF NPO/100V	EA	1.00	.	.
C3076	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.
C3077	106-05399-0020		CH 3.9PF NPO/100V	EA	1.00	.	.
C3079	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.
C3080	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3081	106-05182-0057		CAPCH1800PFX7R/100	EA	.	.	1.00
C3087	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3088	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3089	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3092	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3093	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3094	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3095	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3096	106-05560-0026		CAP CH56PFNPO/100V	EA	.	.	1.00
C3097	106-00147-9R1C		CAP CH 9.1PF 100V	EA	.	.	1.00
C3098	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3099	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3100	106-05182-0057		CAPCH1800PFX7R/100	EA	.	.	1.00
C3101	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3102	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3103	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3104	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3105	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3106	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3107	106-05103-0057		CAP CH 10KX7R/100V	EA	.	1.00	.
C3108	097-00204-0026		CAP AL 47UF 25V 20	EA	1.00	.	.
C3109	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3111	106-05479-0020		CH 4.7PF NPO/100V	EA	.	.	1.00
C3112	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3113	106-00147-100J		CAP CH 10PF 100V 5	EA	.	.	1.00
C3114	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3115	106-05182-0057		CAPCH1800PFX7R/100	EA	.	1.00	.
C3116	106-05562-0057		CAP CH5600 PFX7R/1	EA	.	1.00	.
C3117	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3118	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3119	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3120	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3121	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3122	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3123	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3124	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
C3125	105-00175-0680		CAP, FILM, AXIAL 0	EA	.	1.00	.
C3126	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3127	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3128	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3129	106-05100-0026		CAP CH10PFNPO/100V	EA	.	1.00	.
C3129	106-05159-0020		CH 1.5PF NPO/100V	EA	.10	.	.
C3129	106-05220-0026		CAP CH22PFNPO/100V	EA	.10	.	.
C3129	106-05279-0020		CH 2.7PF NPO 100V	EA	.10	.	.
C3129	106-05330-0026		CAP CH33PFNPO/100V	EA	.10	.	.
C3129	106-05479-0020		CH 4.7PF NPO/100V	EA	.10	.	.
C3129	106-05919-0020		CH 9.1 PF NPO / 10	EA	.50	.	.
C3130	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3131	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3132	106-05562-0057		CAP CH5600 PFX7R/1	EA	.	1.00	.
C3133	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3134	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3135	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3136	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3137	106-05391-0026		CAP CH390PFNPO/100	EA	1.00	.	.
C3138	106-05820-0026		CAP CH 82PFNPO/100	EA	1.00	.	.
C3139	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00	.	.
C3140	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3141	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3142	096-01082-0005		CAP TN 10UF 20V	EA	1.00	1.00	.
C3143	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3144	106-05473-0036		CAP CH .047X7R 25V	EA	1.00	.	.
C3145	105-00175-0100		CAP, FILM, AXIAL 0	EA	.	1.00	.
C3146	102-00085-0005		CAP VAR SURF MTG	EA	.	1.00	.
C3147	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3148	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3149	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3150	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3151	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3152	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3155	106-05223-0047		CAP CH 22K X7R/50V	EA	.	.	1.00
C3156	106-05120-0026		CAP CH12PFNPO/100V	EA	.10	.	.
C3156	106-05150-0026		CAP CH15PFNPO/100V	EA	.90	.	.
C3158	097-00204-0005		CAP AL 2.2UF 50V 2	EA	.	1.00	.
C3159	105-00175-0068		CAP, FILM, RADIAL	EA	.	1.00	.
C3160	106-05153-0047		CAP CH 15K X7R/50V	EA	1.00	.	.
C3161	097-00204-0010		CAP AL 10UF 25V 20	EA	.	1.00	.
C3161	097-00204-0026		CAP AL 47UF 25V 20	EA	1.00	.	.
C3162	097-00204-0009		CAP AL 10UF 16V 20	EA	1.00	.	.
C3163	105-00175-0010		CAP, FILM, RADIAL	EA	.	1.00	.
C3163	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.
C3164	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00	.	.
C3165	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3166	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
C3167	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3168	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3169	106-05331-0026		CAP CH330PFNPO/100	EA	.	.	1.00
C3170	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3171	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3172	106-05271-0026		CAPCH270PFNPO/100V	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
C3173	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3174	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00	.	.
C3175	105-00175-0680		CAP, FILM, AXIAL O	EA	.	1.00	.
C3176	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3177	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3178	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3180	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3181	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3182	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3183	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3184	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3185	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3186	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3187	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3188	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3189	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3190	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3191	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3192	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3193	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3194	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3197	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3198	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3199	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3200	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3201	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3202	106-05479-0020		CH 4.7PF NPO/100V	EA	.	.	1.00
C3203	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3204	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3205	106-05229-0020		CH 2.2PF NPO/100V	EA	.	.	1.00
C3206	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3207	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3208	106-05510-0026		CAP CH51PFNPO/100V	EA	.	.	1.00
C3209	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3212	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3213	111-00001-0030		CAP CR .68UF 50V	EA	.	.	1.00
C3214	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3217	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3218	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3219	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3220	102-00098-0005		CAP VAR 3PF - 10PF	EA	.	.	1.00
C3221	106-00147-6R2C		CAP CH 6.2PF 100V	EA	.	.	1.00
C3222	106-05150-0026		CAP CH15PFNPO/100V	EA	.	.	1.00
C3223	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3224	106-00147-120J		CAP CH 12PF 100V 5	EA	.	.	1.00
C3225	106-05510-0026		CAP CH51PFNPO/100V	EA	.	.	1.00
C3227	106-05150-0026		CAP CH15PFNPO/100V	EA	.	.	1.00
C3228	106-05683-0036		CAP CH 68K X7R/25V	EA	.	.	1.00
C3230	096-01186-0019		CAP 22UF 20V 10%	EA	.	.	1.00
C3231	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3234	106-00147-9R1C		CAP CH 9.1PF 100V	EA	.	.	1.00
C3235	106-00147-2R2B		CAP CH 2.2PF 100V	EA	.	.	1.00
C3236	102-00098-0005		CAP VAR 3PF - 10PF	EA	.	.	1.00
C3237	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
C3238	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3239	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3240	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3241	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3242	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3243	106-05682-0046		CAP CH 6.8KX7R/50V	EA	.	.	1.00
C3244	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3248	097-00104-0042		CAP AL 100UF 10V	EA	.	.	1.00
C3249	096-01186-0019		CAP 22UF 20V 10%	EA	.	.	1.00
C3251	106-00147-100J		CAP CH 10PF 100V 5	EA	.	.	1.00
C3252	102-00098-0005		CAP VAR 3PF - 10PF	EA	.	.	1.00
C3254	106-05222-0057		CAPCH2200PFX7R/100	EA	.	.	1.00
C3255	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3256	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3257	106-05100-0026		CAP CH10PFNPO/100V	EA	.	.	1.00
C3259	106-05561-0016		CAP CH560PFNPO/50V	EA	.	.	1.00
C3260	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3261	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3262	106-05103-0057		CAP CH 10KX7R/100V	EA	.	1.00	.
C3263	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3265	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3266	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3267	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3268	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3269	106-00147-1R8B		CAP CH 1.8PF 100V	EA	.	.	1.00
C3270	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3272	106-00147-2R4B		CAP CH 2.4PF 100V	EA	.	.	1.00
C3273	106-00147-150J		CAP CH 15PF 100V 5	EA	.	.	1.00
C3274	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3275	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3276	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3277	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3278	106-05120-0026		CAP CH12PFNPO/100V	EA	.	.	1.00
C3279	106-05100-0026		CAP CH10PFNPO/100V	EA	.	.	1.00
C3281	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3282	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3283	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3284	106-05330-0026		CAP CH33PFNPO/100V	EA	.	.	1.00
C3285	096-01186-0019		CAP 22UF 20V 10%	EA	.	.	1.00
C3286	097-00204-0026		CAP AL 47UF 25V 20	EA	.	.	1.00
C3288	106-00147-6R2C		CAP CH 6.2PF 100V	EA	.	.	1.00
C3289	106-05279-0020		CH 2.7PF NPO 100V	EA	.	.	1.00
C3291	106-05121-0026		CAPCH120PFNPO/100V	EA	.	.	1.00
C3292	106-00147-270J		CAP CH 27PF 100V 5	EA	.	.	1.00
C3293	106-05331-0026		CAP CH330PFNPO/100	EA	.	.	1.00
C3296	106-05560-0026		CAP CH56PFNPO/100V	EA	.	.	1.00
C3297	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3298	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3299	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3302	106-00147-100J		CAP CH 10PF 100V 5	EA	.	.	1.00
C3303	102-00098-0005		CAP VAR 3PF - 10PF	EA	.	.	1.00
C3304	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3305	102-00098-0005		CAP VAR 3PF - 10PF	EA	.	.	1.00
C3306	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
C3307	106-05120-0026		CAP CH12PFNPO/100V	EA	.	.	1.00
C3308	106-05059-0020		CH 0.5PF NPO 100V	EA	.	.	1.00
C3309	106-05059-0020		CH 0.5PF NPO 100V	EA	.	.	1.00
C3310	106-05059-0020		CH 0.5PF NPO 100V	EA	.	.	1.00
C3311	106-05120-0026		CAP CH12PFNPO/100V	EA	.	.	1.00
C3312	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3313	106-05103-0057		CAP CH 10KX7R/100V	EA	.	.	1.00
C3314	106-05750-0026		CH 75PF NPO 100V	EA	.	.	1.00
C3315	106-05680-0026		CH 68PF NPO 100V	EA	.	.	1.00
C3316	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3317	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3318	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3319	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3320	097-00204-0009		CAP AL 10UF 16V 20	EA	.	.	1.00
C3321	106-05104-0037		CAP CH 100KX7R/25V	EA	.	.	1.00
C3325	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3326	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3327	097-00204-0004		CAP AL 1UF 50V 20%	EA	.	.	1.00
C3329	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00	.	.
C3333	096-01186-0012		CAP 1.0UF 16V 10%	EA	.	.	1.00
C3334	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3335	106-05330-0026		CAP CH33PFNPO/100V	EA	.	.	1.00
C3336	106-05330-0026		CAP CH33PFNPO/100V	EA	.	.	1.00
C3337	106-05100-0026		CAP CH10PFNPO/100V	EA	.	.	1.00
C3338	106-05100-0026		CAP CH10PFNPO/100V	EA	.	.	1.00
C3339	111-00001-0055		CAP CR 6.8PF 100V	RF	.	.	.00
C3340	106-05102-0026		CAP CH 1K NPO/100V	EA	.	.	1.00
C3344	106-05220-0026		CAP CH22PFNPO/100V	EA	.	.	1.00
C3345	096-01186-0017		CAP 2.2UF 20V 10%	EA	.	.	1.00
C3346	106-05561-0016		CAP CH560PFNPO/50V	EA	.	.	1.00
C3347	106-05101-0026		CAPCH100PFNPO/100V	EA	.	.	1.00
CR3001	007-06223-0000		DIO DA204K	EA	.	.	1.00
CR3004	007-06178-0000		DIO PIN MMBV3401	EA	.	.	1.00
CR3005	007-06178-0000		DIO PIN MMBV3401	EA	.	.	1.00
CR3006	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3007	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3008	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3009	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3010	007-04056-0000		DIO V MMBV109	EA	1.00	.	.
CR3011	007-04057-0000		DIO V MMBV105G	EA	1.00	.	.
CR3012	007-04145-0001		HYPERABRUPT TUNING	EA	1.00	.	.
CR3013	007-04057-0000		DIO V MMBV105G	EA	1.00	.	.
CR3014	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3015	007-06226-0000		SOT23 DIO MMBD352	EA	.	.	1.00
CR3016	007-06181-0000		DIO DUAL MMBD2835	EA	.	.	1.00
CR3017	007-06223-0000		DIO DA204K	EA	.	.	1.00
CR3018	007-06223-0000		DIO DA204K	EA	.	1.00	.
CR3019	007-06223-0000		DIO DA204K	EA	.	.	1.00
CR3020	007-06178-0000		DIO PIN MMBV3401	EA	.	.	1.00
CR3021	007-06561-0001		MA4P274 PIN DIODE	EA	.	.	1.00
CR3022	007-06178-0000		DIO PIN MMBV3401	EA	.	.	1.00
CR3023	007-06223-0000		DIO DA204K	EA	.	.	1.00
CR3025	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3026	007-06178-0000		DIO PIN MMBV3401	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
CR3027	007-06561-0001		MA4P274 PIN DIODE	EA	.	.	1.00
CR3028	007-04056-0000		DIO V MMBV109	EA	.	.	1.00
CR3029	007-06226-0000		SOT23 DIO MMBD352	EA	.	.	1.00
CR3030	007-06226-0000		SOT23 DIO MMBD352	EA	.	.	1.00
CR3032	007-06223-0000		DIO DA204K	EA	.	.	1.00
CR3033	007-06178-0000		DIO PIN MMBV3401	EA	.	.	1.00
CR3034	007-06436-0000		LED SUBMIN RED	EA	.	.	1.00
FL3001	017-00268-0001		XTAL FILTER 21.4 M	EA	1.00	.	.
FL3006	017-00266-0001		450 KHZ CERAMIC FI	EA	.	.	1.00
FL3008	017-00267-0001		450 KHZ CERAMIC FI	EA	.	.	1.00
FL3011	017-00269-0001		XTAL FILTER 20.5 M	EA	.	.	1.00
ITM3001	009-09061-0041		COM / NAV RX BOARD	EA	.	.	1.00
ITM3002	047-12107-0002		RCVR COMM PARTITIO	EA	.	.	3.00
ITM3003	047-12034-0002		NAV MIXER LID W /	EA	.	.	1.00
ITM3004	047-12095-0002		NAV PRESEL FENCE W	EA	.	.	1.00
ITM3005	047-12096-0002		NAV POLES LID W /	EA	.	.	1.00
ITM3006	047-12023-0002		VCO COVER W/ FINIS	EA	1.00	.	1.00
ITM3007	047-12030-0002		COMM FENCE W/ FINI	EA	.	.	1.00
ITM3008	047-12031-0002		COMM LID W/ FINISH	EA	.	.	1.00
ITM3009	047-12032-0002		NAV AMP FENCE W/ F	EA	.	.	1.00
ITM3010	047-12033-0002		NAV MIXER FENCE W	EA	.	.	1.00
ITM3011	047-12106-0002		VCO FENCE W/ FINIS	EA	.	.	2.00
ITM3012	091-00523-0000		INSULATOR XTAL	EA	.	.	1.00
ITM3013	047-08944-0003		FINGER STOCK 3	EA	.	.	1.00
ITM3014	047-08944-0007		FINGER STOCK	EA	.	.	1.00
ITM3016	047-12271-0002		CRYSTAL FILTER SHI	EA	.	.	1.00
ITM3017	012-01682-0001		POLYMIDE W/ADHESI	EA	.	.	1.00
ITM3018	047-12343-0002		SHIELDS, WITH FINI	EA	.	.	1.00
ITM3019	047-12484-0002		VCO COVER WITH FIN	EA	.	1.00	.
ITM3020	088-03441-0001		VIBRATION STOP	EA	.	1.00	.
ITM3021	088-03447-0002		VIBRATION STOP, TO	EA	.	1.00	.
ITM3022	012-01005-0002		TAPE MYLAR .500 W	IN	.	.60	.
J3005	030-00244-0000		ANTENNA CONN RECTP	EA	.	.	1.00
J3006	030-00244-0000		ANTENNA CONN RECTP	EA	.	.	1.00
L3001	019-02769-0152		INDUCTOR, SM, 1.5	EA	.	.	1.00
L3002	019-02769-0182		INDUCTOR, SM, 1.8	EA	.	.	1.00
L3003	019-02769-0182		INDUCTOR, SM, 1.8	EA	.	.	1.00
L3004	019-02769-0152		INDUCTOR, SM, 1.5	EA	.	.	1.00
L3005	019-02084-0006		CH .27UH 5%	EA	.	.	1.00
L3006	019-02764-0005		64 NH	EA	.	.	1.00
L3007	019-02084-0030		CH 2.7UH 5%	EA	.	.	1.00
L3008	019-02764-0005		64 NH	EA	.	.	1.00
L3009	019-02764-0005		64 NH	EA	.	.	1.00
L3010	019-02084-0030		CH 2.7UH 5%	EA	.	.	1.00
L3011	019-02764-0005		64 NH	EA	.	.	1.00
L3012	019-02769-0182		INDUCTOR, SM, 1.8	EA	1.00	.	.
L3015	019-02728-0037		IND, SM, SHLD, 100	EA	.	.	1.00
L3016	019-02771-0001		RF IND 1.5UH 10%	EA	1.00	.	.
L3017	019-02764-0004		47 NH	EA	.	.	1.00
L3019	019-02660-0016		IND SM 180 10%	EA	.	.	1.00
L3020	019-02084-0032		CH 3.3UH 5%	EA	.	.	1.00
L3022	019-02084-0024		CH 1.5UH 5%	EA	.	.	1.00
L3023	019-02764-0005		64 NH	EA	.	.	1.00
L3024	019-02660-0067		IND SM 47 5%	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
L3025	019-02764-0005		64 NH	EA	.	.	1.00
L3027	019-02764-0005		64 NH	EA	.	.	1.00
L3028	019-02660-0067		IND SM 47 5%	EA	.	.	1.00
L3029	019-02764-0005		64 NH	EA	.	.	1.00
L3030	019-02769-0182		INDUCTOR, SM, 1.8	EA	.	.	1.00
L3031	019-02084-0032		CH 3.3UH 5%	EA	.	.	1.00
L3033	019-08272-0001		1.8 UH VAR IND	EA	.	.	1.00
L3034	019-08272-0001		1.8 UH VAR IND	EA	.	.	1.00
L3035	019-02764-0005		64 NH	EA	.	.	1.00
L3036	019-02764-0005		64 NH	EA	.	.	1.00
L3037	019-02084-0006		CH .27UH 5%	EA	.	.	1.00
L3038	019-02084-0092		CH 1KUH 5%	EA	.	.	1.00
L3040	019-02660-0067		IND SM 47 5%	EA	.	.	1.00
L3041	019-02660-0061		IND SM 27 10%	EA	.	.	1.00
L3042	019-02660-0049		IND SM 68 10%	EA	.	.	1.00
L3043	019-02099-0000		CHOKE .047UH 10%	RF	.	.	.00
L3044	019-02769-0152		INDUCTOR, SM, 1.5	EA	.	.	1.00
L3045	019-02769-0101		INDUCTOR, SM1008,	EA	.	.	1.00
L3046	019-02769-0120		INDUCTOR, SM1008,	EA	.	.	1.00
L3047	019-02769-0680		INDUCTOR, SM1008,	EA	.	.	1.00
L3140	019-02782-0011		IND 0.68 +/-20% UH	EA	.	.	1.00
L3141	019-02660-0040		IND SM 10000 10%	EA	.	.	1.00
P3001	030-03333-0015		HEADER 2 X 15	EA	.	.	1.00
P3002	030-03332-0003		HEADER, 1X3	EA	.	.	1.00
P3003	030-03332-0003		HEADER, 1X3	EA	.	.	1.00
P3007	030-03332-0003		HEADER, 1X3	EA	.	1.00	.
Q3001	007-08064-0014		XSTR PNP 4.7K, 10K	EA	.	.	1.00
Q3002	007-08064-0017		XSTR NPN 47K. 47K	EA	.	.	1.00
Q3003	007-08064-0014		XSTR PNP 4.7K, 10K	EA	.	.	1.00
Q3004	007-00254-0001		XSTR S PNP SOT-23	EA	.	.	1.00
Q3005	007-08064-0017		XSTR NPN 47K. 47K	EA	.	.	1.00
Q3007	007-08064-0017		XSTR NPN 47K. 47K	EA	.	.	1.00
Q3009	007-08064-0017		XSTR NPN 47K. 47K	EA	.	.	1.00
Q3010	007-00957-0000		TSTR MOS FET BF996	EA	.	.	1.00
Q3011	007-01052-0001		MRF 5711L	EA	.	.	1.00
Q3012	007-08064-0014		XSTR PNP 4.7K, 10K	EA	.	.	1.00
Q3013	007-08064-0017		XSTR NPN 47K. 47K	EA	.	.	1.00
Q3015	007-00907-0000		XSTR BFQ17	EA	.	.	1.00
Q3016	007-00903-0000		2N7002 MOSFET	EA	.	.	1.00
Q3017	007-00821-0000		XSTR RF MMBR901	EA	.	.	1.00
Q3018	007-00932-0000		JFET P-CHANNEL	EA	.	1.00	.
Q3020	007-00821-0000		XSTR RF MMBR901	EA	.	.	1.00
Q3021	007-00821-0000		XSTR RF MMBR901	EA	.	.	1.00
Q3022	007-00821-0000		XSTR RF MMBR901	EA	1.00	.	.
Q3023	007-00821-0000		XSTR RF MMBR901	EA	.	.	1.00
Q3024	007-00932-0000		JFET P-CHANNEL	EA	.	.	1.00
Q3025	007-08064-0014		XSTR PNP 4.7K, 10K	EA	.	.	1.00
Q3026	007-01056-0001		N-CHANNEL MOSFET S	EA	.	1.00	.
Q3027	007-00466-0000		XSTR S PNP MMBTA56	EA	.	.	1.00
Q3028	007-01052-0001		MRF 5711L	EA	.	.	1.00
Q3029	007-08064-0014		XSTR PNP 4.7K, 10K	EA	.	.	1.00
Q3030	007-00907-0000		XSTR BFQ17	EA	.	.	1.00
Q3032	007-00821-0000		XSTR RF MMBR901	EA	.	.	.00
Q3033	007-00821-0000		XSTR RF MMBR901	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
Q3034	007-00427-0005		XSTR JFET J310 SMD	EA	.	.	1.00
Q3035	007-00821-0000		XSTR RF MMBR901	EA	.	.	1.00
Q3036	007-08064-0017		XSTR NPN 47K. 47K	EA	.	.	1.00
R3001	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3003	139-01501-0010		RES CH 1500 .1W 1%	EA	.	1.00	.
R3005	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3006	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3007	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3008	139-01501-0010		RES CH 1500 .1W 1%	EA	.	1.00	.
R3010	139-01001-0020		RES CH 1000 QW 1%	EA	.	.	1.00
R3011	139-00301-0030		RES CH 30.1 HW 1%	EA	.	.	1.00
R3012	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3014	139-02052-0010		RES CH 20.5K .1W 1	EA	.	.	1.00
R3015	139-02052-0010		RES CH 20.5K .1W 1	EA	.	.	1.00
R3016	139-02052-0010		RES CH 20.5K .1W 1	EA	.	.	1.00
R3017	139-02052-0010		RES CH 20.5K .1W 1	EA	.	.	1.00
R3018	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3022	139-02431-0010		RES CH 2.43K .1W 1	EA	.	.	1.00
R3023	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3024	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3025	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3027	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3028	139-05110-0010		RES CH 511 .1W 1%	EA	.	.	1.00
R3032	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3033	139-00301-0010		RES CH 30, TW 1%	EA	.	.	1.00
R3034	139-01301-0010		RES CH 1.3K .1W 1%	EA	.	.	1.00
R3035	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3036	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3037	139-04222-0010		RES CH 42.2K .1W 1	EA	.	.	1.00
R3038	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3039	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3040	139-01301-0010		RES CH 1.3K .1W 1%	EA	.	.	1.00
R3041	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3042	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3043	139-02210-0010		RES CH 221 .1W 1%	EA	.	.	1.00
R3044	139-02431-0010		RES CH 2.43K .1W 1	EA	.	.	1.00
R3045	139-00274-0000		RESISTOR CHIP 27.4	EA	.	.	1.00
R3047	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3048	139-02052-0010		RES CH 20.5K .1W 1	EA	1.00	.	.
R3053	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3054	139-04222-0010		RES CH 42.2K .1W 1	EA	.	.	1.00
R3055	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3056	139-03011-0010		RES CH 3.01K .1W 1	EA	.	.	1.00
R3057	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3058	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3059	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3060	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3061	139-00000-0014		CKT JUMPER 0805	EA	.	1.00	.
R3061	139-03320-0010		RES CH 332 .1W 1%	EA	1.00	.	.
R3062	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	1.00
R3063	139-02431-0010		RES CH 2.43K .1W 1	EA	.	.	1.00
R3064	139-04222-0010		RES CH 42.2K .1W 1	EA	.	.	1.00
R3065	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3066	139-04222-0010		RES CH 42.2K .1W 1	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
R3067	139-01472-0010		RES CH 14.7K .1W 1	EA	.	.	1.00
R3068	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3068	139-01332-0010		RES CH 13.3K TW 1%	EA	.	1.00	.
R3069	139-01001-0020		RES CH 1000 QW 1%	EA	.	.	1.00
R3070	139-02210-0010		RES CH 221 .1W 1%	EA	.	.	1.00
R3071	139-00301-0010		RES CH 30, TW 1%	EA	.	.	1.00
R3072	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3073	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3074	139-01003-0010		RES CH 100K TW 1%	EA	.	.	1.00
R3075	139-03323-0010		RES CH 332K TW 1%	EA	1.00	.	.
R3075	139-05623-0010		RES CH 562K .1W 1%	EA	.	1.00	.
R3076	139-02672-0010		RES CH 26.7K .1W 1	EA	1.00	.	.
R3076	139-02742-0010		RES CH 27.4K TW 1%	EA	.	1.00	.
R3077	139-00100-0010		RES CH 10 OHMS 1%	EA	.	.	1.00
R3079	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3080	139-01212-0010		RES CH 12.1K .1W 1	EA	1.00	.	.
R3080	139-01272-0010		RES CH 12.7K TW 1%	EA	.	1.00	.
R3081	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3081	139-08251-0010		RES CH 8.25K TW 1%	EA	.	1.00	.
R3082	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3083	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3083	139-07501-0010		RES CH 7.5K .1W 1%	EA	.	1.00	.
R3086	139-02672-0010		RES CH 26.7K .1W 1	EA	.	.	1.00
R3087	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3088	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	1.00
R3089	139-05110-0010		RES CH 511 .1W 1%	EA	.	.	1.00
R3091	139-02431-0010		RES CH 2.43K .1W 1	EA	.	.	1.00
R3092	139-05622-0010		RES CH 56.2K TW 1%	EA	1.00	.	.
R3094	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3095	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	.25
R3095	139-00301-0010		RES CH 30, TW 1%	EA	.	.	.10
R3095	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	.25
R3095	139-00619-0010		RES CH 61.9 TW 1%	EA	.	.	.25
R3095	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	.25
R3096	139-01472-0010		RES CH 14.7K .1W 1	UM	.	.	1.00
R3097	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00	.	.
R3097	139-06811-0010		RES CH 6.81K .1W 1	EA	.	1.00	.
R3098	139-01501-0010		RES CH 1500 .1W 1%	EA	.	1.00	.
R3099	139-01002-0010		RES CH 10K TW 1%	EA	.	1.00	.
R3105	139-03322-0010		RES CH 33.2K TW 1%	EA	.	.	1.00
R3106	139-03011-0010		RES CH 3.01K .1W 1	EA	.	.	1.00
R3107	139-05622-0010		RES CH 56.2K TW 1%	EA	1.00	.	.
R3109	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3110	139-02001-0010		RES CH 2.00K TW 1%	EA	1.00	.	.
R3111	139-02210-0010		RES CH 221 .1W 1%	EA	.	.	1.00
R3112	139-00100-0010		RES CH 10 OHMS 1%	EA	.	.	1.00
R3113	139-00301-0010		RES CH 30, TW 1%	EA	.	.	1.00
R3114	139-03320-0010		RES CH 332 .1W 1%	EA	.	.	1.00
R3115	139-03652-0010		RES CH 36.5K TW 1%	EA	.	1.00	.
R3116	139-01472-0010		RES CH 14.7K .1W 1	EA	.	.	1.00
R3117	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3118	139-01003-0010		RES CH 100K TW 1%	EA	.	.	1.00
R3119	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3120	139-02672-0010		RES CH 26.7K .1W 1	EA	.	1.00	.

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
R3121	139-01472-0010		RES CH 14.7K .1W 1	EA	.	1.00	.
R3122	139-02052-0010		RES CH 20.5K .1W 1	EA	1.00	.	.
R3123	139-03320-0010		RES CH 332 .1W 1%	EA	.	1.00	.
R3123	139-06810-0010		RES CH 681 .1W 1%	EA	1.00	.	.
R3124	139-01621-0010		RES CH 1.62K TW 1%	EA	1.00	.	.
R3124	139-02001-0010		RES CH 2.00K TW 1%	EA	.	1.00	.
R3125	139-02672-0010		RES CH 26.7K .1W 1	EA	.	.	1.00
R3126	139-02210-0010		RES CH 221 .1W 1%	EA	.	.	1.00
R3127	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3128	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	1.00
R3129	139-01212-0010		RES CH 12.1K .1W 1	EA	.	.	1.00
R3130	139-06811-0010		RES CH 6.81K .1W 1	EA	.	.	1.00
R3131	139-01000-0010		RES CH 100 .1W 1%	EA	.	1.00	.
R3132	139-01000-0010		RES CH 100 .1W 1%	EA	1.00	.	.
R3133	139-05623-0010		RES CH 562K .1W 1%	EA	.	.	1.00
R3134	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	1.00
R3135	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3136	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3137	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3138	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3139	139-04121-0010		RES CH 4.12K TW	EA	.	1.00	.
R3140	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3141	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3142	139-03322-0010		RES CH 33.2K TW 1%	EA	.	.	1.00
R3144	139-03011-0010		RES CH 3.01K .1W 1	EA	.	.	1.00
R3146	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3147	139-02210-0010		RES CH 221 .1W 1%	EA	1.00	.	.
R3147	139-06810-0010		RES CH 681 .1W 1%	EA	.	1.00	.
R3148	139-05622-0010		RES CH 56.2K TW 1%	EA	1.00	.	.
R3149	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3150	139-03011-0010		RES CH 3.01K .1W 1	EA	.	.	1.00
R3151	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3152	139-01272-0010		RES CH 12.7K TW 1%	EA	1.00	.	.
R3152	139-02212-0010		RES CH 22.1K TW 1%	EA	.	1.00	.
R3153	139-02003-0010		RES CH 200K .1W 1%	EA	.	.	1.00
R3154	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3155	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3156	139-01212-0010		RES CH 12.1K .1W 1	EA	.	.	1.00
R3157	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3158	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3159	139-05110-0010		RES CH 511 .1W 1%	EA	.	.	1.00
R3160	139-03322-0010		RES CH 33.2K TW 1%	EA	.	.	1.00
R3161	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3162	139-04642-0010		RES CH 46.4K .1W 1	EA	.	1.00	.
R3162	139-04751-0010		RES CH 4.75K .1W 1	EA	1.00	.	.
R3163	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3164	139-01212-0010		RES CH 12.1K .1W 1	EA	.	1.00	.
R3165	139-01003-0010		RES CH 100K TW 1%	EA	1.00	.	.
R3165	139-09092-0010		RES CH 90.9K TW 1%	EA	.	1.00	.
R3166	139-06812-0010		RES CH 68.1K TW 1%	EA	.	.	1.00
R3167	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3168	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3169	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3170	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
R3171	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3172	139-02003-0010		RES CH 200K .1W 1%	EA	.	.	1.00
R3173	139-02003-0010		RES CH 200K .1W 1%	EA	.	.	1.00
R3174	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3175	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3176	139-03011-0010		RES CH 3.01K .1W 1	EA	.	.	1.00
R3178	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3180	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3181	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3182	139-01001-0010		RES CH 1000 .1W 1%	EA	.	1.00	.
R3183	139-02003-0010		RES CH 200K .1W 1%	EA	.	1.00	.
R3184	139-07501-0010		RES CH 7.5K .1W 1%	EA	.	.	1.00
R3185	139-01002-0010		RES CH 10K TW 1%	EA	1.00	.	.
R3185	139-06811-0010		RES CH 6.81K .1W 1	EA	.	1.00	.
R3186	139-01212-0010		RES CH 12.1K .1W 1	EA	.	1.00	.
R3187	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3188	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3189	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3190	139-02001-0010		RES CH 2.00K TW 1%	EA	1.00	.	.
R3192	139-01003-0010		RES CH 100K TW 1%	EA	.	.	1.00
R3193	139-00000-0014		CKT JUMPER 0805	EA	.	.	1.00
R3194	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3196	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3197	139-00000-0014		CKT JUMPER 0805	EA	.	1.00	.
R3198	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3199	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3200	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3201	139-01212-0010		RES CH 12.1K .1W 1	EA	.	.	1.00
R3202	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3203	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3204	139-00365-0010		RES CH 36.5 OHM TW	EA	.	.	1.00
R3205	139-06811-0010		RES CH 6.81K .1W 1	EA	.	.	1.00
R3206	139-00301-0010		RES CH 30, TW 1%	EA	.	.	1.00
R3207	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3208	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3209	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3210	139-02431-0010		RES CH 2.43K .1W 1	EA	.	.	1.00
R3211	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3212	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3213	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3214	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3216	139-01003-0010		RES CH 100K TW 1%	EA	.	.	1.00
R3217	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3218	139-01472-0010		RES CH 14.7K .1W 1	EA	.	.	1.00
R3219	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3220	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3221	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3222	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3223	139-01472-0010		RES CH 14.7K .1W 1	EA	.	.	1.00
R3224	139-05110-0010		RES CH 511 .1W 1%	EA	.	.	1.00
R3229	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3230	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3232	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3233	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
R3234	139-01301-0010		RES CH 1.3K .1W 1%	EA	.	.	1.00
R3235	139-03011-0010		RES CH 3.01K .1W 1	EA	.	.	1.00
R3236	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3237	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3238	139-04751-0010		RES CH 4.75K .1W 1	EA	.	.	1.00
R3239	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3242	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3243	139-00100-0010		RES CH 10 OHMS 1%	EA	.	.	1.00
R3244	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3246	139-02672-0010		RES CH 26.7K .1W 1	EA	.	.	1.00
R3247	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3248	139-02210-0010		RES CH 221 .1W 1%	EA	.	.	1.00
R3249	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3254	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3255	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3257	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3258	139-06810-0010		RES CH 681 .1W 1%	EA	.	.	1.00
R3260	139-01212-0010		RES CH 12.1K .1W 1	EA	.	.	1.00
R3261	139-00100-0010		RES CH 10 OHMS 1%	EA	.	.	1.00
R3262	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3263	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3264	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	1.00
R3265	139-01212-0010		RES CH 12.1K .1W 1	EA	.	.	1.00
R3266	139-04642-0010		RES CH 46.4K .1W 1	EA	.	.	1.00
R3267	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3268	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3269	139-05110-0010		RES CH 511 .1W 1%	EA	.	.	1.00
R3272	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3274	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3275	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3277	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3280	139-06811-0010		RES CH 6.81K .1W 1	EA	.	.	1.00
R3281	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3282	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3283	139-02210-0010		RES CH 221 .1W 1%	EA	.	.	1.00
R3288	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3289	139-04222-0010		RES CH 42.2K .1W 1	EA	.	.	1.00
R3290	139-03320-0010		RES CH 332 .1W 1%	EA	.	.	1.00
R3291	139-00499-0010		RES CH 49.9 .1W 1%	EA	.	.	1.00
R3292	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3294	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3295	139-05622-0010		RES CH 56.2K TW 1%	EA	.	.	1.00
R3297	139-06812-0010		RES CH 68.1K TW 1%	EA	.	.	1.00
R3298	139-05110-0010		RES CH 511 .1W 1%	EA	.	.	1.00
R3299	139-02672-0010		RES CH 26.7K .1W 1	EA	.	.	1.00
R3300	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3303	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3304	139-00200-0010		RES CH 20.0 .1W 1%	EA	.	.	1.00
R3310	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3311	139-04751-0013		RES CH 4.75K TW .1	EA	.	.	1.00
R3313	139-01472-0010		RES CH 14.7K .1W 1	EA	.	.	1.00
R3314	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3315	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3317	139-00100-0010		RES CH 10 OHMS 1%	EA	.	.	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010	0011	0098
R3318	139-01001-0010		RES CH 1000 .1W 1%	EA	.	.	1.00
R3319	139-01501-0010		RES CH 1500 .1W 1%	EA	1.00	.	.
R3319	139-02431-0010		RES CH 2.43K .1W 1	EA	.	1.00	.
R3321	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
R3323	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	1.00
R3324	139-02001-0010		RES CH 2.00K TW 1%	EA	.	.	.00
R3325	139-01000-0010		RES CH 100 .1W 1%	EA	.	.	1.00
R3326	139-08252-0010		RES CH 82.5K TW 1%	EA	.	.	1.00
R3327	131-00221-0013		RES CF 220 EW 5%	EA	.	.	1.00
R3328	139-01002-0010		RES CH 10K TW 1%	EA	.	.	1.00
T3001	019-03361-0016		16 DB COUPLER	EA	.	.	1.00
T3002	019-03357-0000		BALUN,4:1,5/600MHZ	EA	.	.	1.00
T3003	019-03362-0001		16:1 TRANSFORMER	EA	.	.	1.00
T3004	019-03357-0000		BALUN,4:1,5/600MHZ	EA	.	.	1.00
T3005	019-03357-0000		BALUN,4:1,5/600MHZ	EA	.	.	1.00
U3001	120-03117-0023		ULN2004D SO PKG	EA	.	.	1.00
U3002	123-00595-0003		IC 74HC595 SO	EA	.	.	1.00
U3003	123-00259-0003		74HC259 SO PKG	EA	.	.	1.00
U3004	120-03117-0023		ULN2004D SO PKG	EA	.	.	1.00
U3005	120-03531-0000		HEX D-A CONVERTER	EA	.	.	1.00
U3006	120-03531-0000		HEX D-A CONVERTER	EA	.	.	1.00
U3007	120-02489-0000		4K SERIAL EE (SO)	EA	.	.	1.00
U3008	120-03196-0000		IC LM2902D	EA	.	.	1.00
U3009	120-03065-0026		IC MC78L05ABD	EA	.	.	1.00
U3010	123-04066-0003		IC ANA/DIG SW	EA	.	1.00	.
U3011	120-03606-0000		SYNTHESIZER	EA	.	.	1.00
U3012	120-03571-0000		MMIC WIDE-BAND AMP	EA	.	.	1.00
U3013	120-03196-0000		IC LM2902D	EA	.	.	1.00
U3015	120-03645-0000		AM RECEIVER	EA	.	.	1.00
U3016	120-03632-0000		MC33202 OPAMP	EA	.	.	1.00
U3017	123-04066-0003		IC ANA/DIG SW	EA	.	1.00	.
U3018	120-03606-0000		SYNTHESIZER	EA	.	.	1.00
U3019	120-03632-0000		MC33202 OPAMP	EA	.	.	1.00
U3020	120-03196-0000		IC LM2902D	EA	.	.	1.00
U3021	120-03643-0000		MMIC AMPLIFIER	EA	.	.	1.00
U3022	007-01022-0000		WIDEBAND RING DEMO	EA	.	.	1.00
U3023	120-03645-0000		AM RECEIVER	EA	.	.	1.00
U3027	120-03436-0002		ADJ. SHUNT REGULAT	EA	.	.	1.00
U3028	015-00285-0001		MIXER, SURFACE MOU	EA	.	.	1.00
Y3001	044-00346-0001		TCXO, 20.95 MHZ	EA	.	1.00	.
Y3002	044-00343-0000		20.950 MHZ CRYSTAL	EA	1.00	.	.
	002-09061-0010		KX155A / 165A RE	RF	.	.	.00
	016-01071-0000		DC RTV 3140	AR	.	.	1.00
	016-01085-0000		ADHESIVE C-7	AR	.	1.00	.
	016-01134-0002		COPPER TAPE .50 IN	IN	.40	.	.
	024-05019-0000		WIRE #30 GREEN	AR	.	1.00	.
	024-05019-0000		WIRE #30 GREEN	IN	.	.	2.00
	026-00013-0000		WIRE, COAX, RG-178	IN	.	6.00	.
	026-00030-0000		WIRE, CU, 24AWG, T	AR	.	1.00	.
	091-00196-0000		STANDOFF BEAD	EA	.	2.00	.
	200-09061-0098		COMMON RECEIVER	EA	1.00	1.00	.
	200-09709-0010		KX 165A SWITCHED I	EA	.	1.00	.
	300-09061-0010		KX 165A COMM/VOR	RF	.00	.	.
	300-09061-0020		KX 165A COM / VO	RF	.	.00	.

NOTE: ADD 3000 TO ALL REFERENCE DESIGNATORS.

NOTES:

1. UNLESS NOTED, SOLDER ALL FENCES TO P.C. BOARD AT THE MOUNTING TABS ONLY. SOLDER TABS ON ITEM 2 INTO SLOTS OF ITEM 7, 6 PLACES.

2. ON FARSIDE OF BOARD, TRIM ALL LEADS AND FENCE MOUNTING TABS TO .030" MAX EXCEPT IN INDICATED AREA TRIM LEADS TO .020" MAX.

3. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN ACCORDANCE WITH SPEC. 001-01101-0000.

4. ITEM 13 IS ATTACHED TO THE TOP OF NAV MIXER COVER (ITEM 3). ITEM 14 IS ATTACHED TO THE TOP OF THE NAV PRESELECTOR COVER (ITEM 5).

5. POSITION COM PRESELECTOR COVER (ITEM 8) TO MINIMIZE OVERHANG ON THE EDGE OF THE BOARD.

6. TACK SOLDER THE EARS OF FILTER SHIELD (ITEM 16) TO L33 AND L34.

7. APPLY ITEM 17 TO THE SIDE OF ITEM 18 THAT WILL FACE THE PCB (ITEM 1). SOLDER SHIELD, ITEM 18, TO FARSIDE OF THE BOARD AS SHOWN IN DETAIL N. ITEM 18 AND SOLDER SHOULD NOT TOUCH ITEM 11 TABS ON FARSIDE.

8. SECURE CR34 AND R327 WITH RTV 016-01071-0000

NOTES CONTINUED ON SHEET 2.

Figure 6-19 COM/VOR Receiver Board
(Dwg No. 300-09061-0010 rev. E, sheet 1 of 4)

NOTES: CONTINUED FROM SHEET 1

9. MAG WIRE JUMPERS MUST BE BONDED AT A POINT WITHIN .25" OF THEIR TERMINATION
AND AT INTERVALS OF APPROXIMATELY 1.0" AND ALL CHANGES OF DIRECTION.

10. RUN MAGWIRE FROM ONE END OF R327 TO THE VIA LOCATED BETWEEN R74 AND R80.
RUN MAGWIRE FROM THE OTHER END OF R327 TO THE CATHODE OF CR34.

11. CAPACITORS, C220, C236, C252, C303, AND C305 MAY BE MOUNTED
AS THEY ARE SHOWN OR ROTATED 180 DEGREES FROM THE POSITION SHOWN.

12. INSTALL C345 SO THE "+" SIDE IS ON L14 PAD AND GROUND.
SCRAPE SOLDERMASK FOR GROUND CONNECTION. RUN MAGWIRE FROM FL4-1 TO VIA BELOW Q9.

13. ADD SHIM STOCK (024-05002-0000) TO AREAS WITH DIAGONAL LINES
AND AVOID NON-GROUNDED VIAS.

Figure 6-19 COM/VOR Receiver Board
(Dwg No. 300-09061-0010 rev. E Sheet 2 of 4)

300-09061-0010_E\001.tif

NEARSIDE VIEW OF PC BOARD

NOTE: ANY FILL AREAS ON THE TRACE LAYER SHOWN MAY NOT REPRESENT
FINAL ARTWORK AS THERMAL RELIEFS MAY NOT BE SHOWN.

300090610010_E\002.tif

Figure 6-19 COM/VOR Receiver Board
(Dwg No. 300-09061-0010 rev. E, sheet 3 of 4)

REV - L4
BENDIX/KING
009-09061-0010

/13\
ON SHT 2

FARSIDE VIEW OF PC BOARD

NOTE: ANY FILL AREAS ON THE TRACE LAYER SHOWN MAY NOT REPRESENT
        FINAL ARTWORK AS THERMAL RELIEFS MAY NOT BE SHOWN.

300-09061-0010_E\003.tif

Figure 6-19 COM/VOR Receiver Board
(Dwg No. 300-09061-0010 rev. E, sheet 4 of 4)

Figure 6-20 COM/VOR Receiver Board
(Dwg No. 300-09061-0020 rev. B, sheet 1 of 5)

NOTES: CONTINUED FROM SHEET 1

9. MAG WIRE JUMPERS MUST BE BONDED AT A POINT WITHIN .25" OF THEIR TERMINATION
    AND AT INTERVALS OF APPROXIMATELY 1.0" AND ALL CHANGES OF DIRECTION.

⚠10 RUN MAGWIRE FROM ONE END OF R327 TO THE VIA LOCATED BETWEEN R74 AND R80.
     RUN MAGWIRE FROM THE OTHER END OF R327 TO THE CATHODE OF CR34.

⚠11 C146 TO BE INSTALLED AFTER ALL WASH OPERATIONS TO PREVENT CONTAMINATION.

⚠12 CAPACITORS, C220, C236, C252, C303, AND C305 MAY BE MOUNTED
     AS THEY ARE SHOWN OR ROTATED 180 DEGREES FROM THE POSITION SHOWN.

⚠13 PLACE A BEAD OF EPOXY (016-01085-0000) BETWEEN L17 AND C163 IN THE VCO
     TO STABILIZE THEM TO THE BOARD. CAUTION! DO NOT GET ANY EPOXY ON C146.

⚠14 INSTALL C345 SO THE "+" SIDE IS ON L14 PAD AND GROUND
     SCRAPE SOLDERMASK FOR GROUND CONNECTION.
     RUN MAGWIRE FROM FL4-1 TO VIA BELOW Q9.

⚠15 PLACE A BEAD OF EPOXY (016-01085-0000) TO C125, C159, C145,
     AND C175 AS SHOWN IN DETAIL O.

⚠16 ADD SHIM STOCK (024-05002-0000) TO AREAS WITH DIAGONAL LINES
     AND AVOID NON-GROUNDED VIAS.
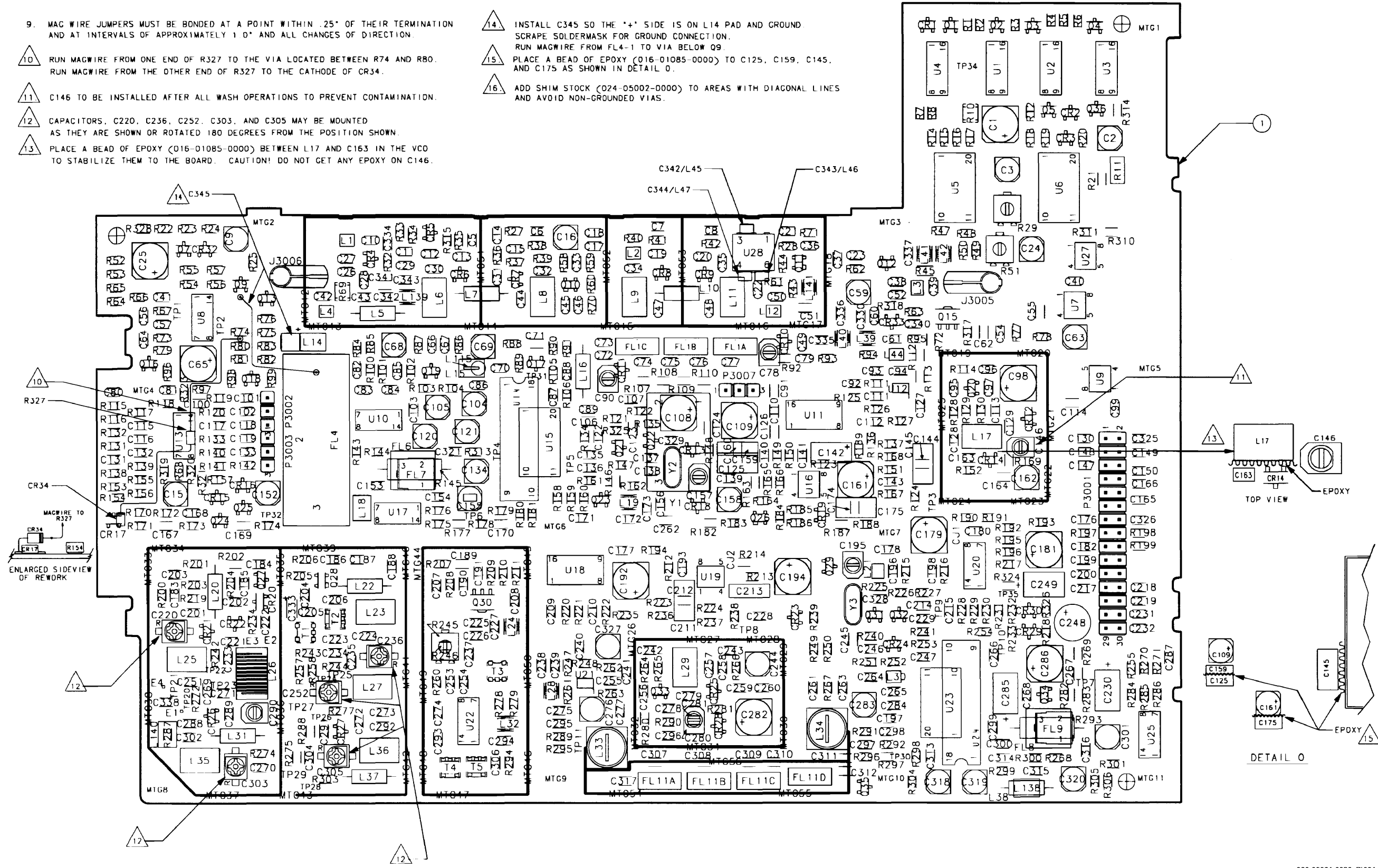
Figure 6-20 COM/VOR Receiver Board
(Dwg No. 300-09061-0020 rev. B, sheet 2 of 5)

300-09061-0020_B\001.tif

NEARSIDE VIEW OF PC BOARD

NOTE: ANY FILL AREAS ON THE TRACE LAYER SHOWN MAY NOT REPRESENT
       FINAL ARTWORK AS THERMAL RELIEFS MAY NOT BE SHOWN.

300-09061-0020_B\002.tif

**Figure 6-20 COM/VOR Receiver Board
(Dwg No. 300-09061-0020 rev. B, sheet 3 of 5)**

REF. (21)

(20) REF.

(1) REF.

200-09709-00XX
REF.

VIEW B-B

L16 — SOLDER TO GROUND

DETAIL A
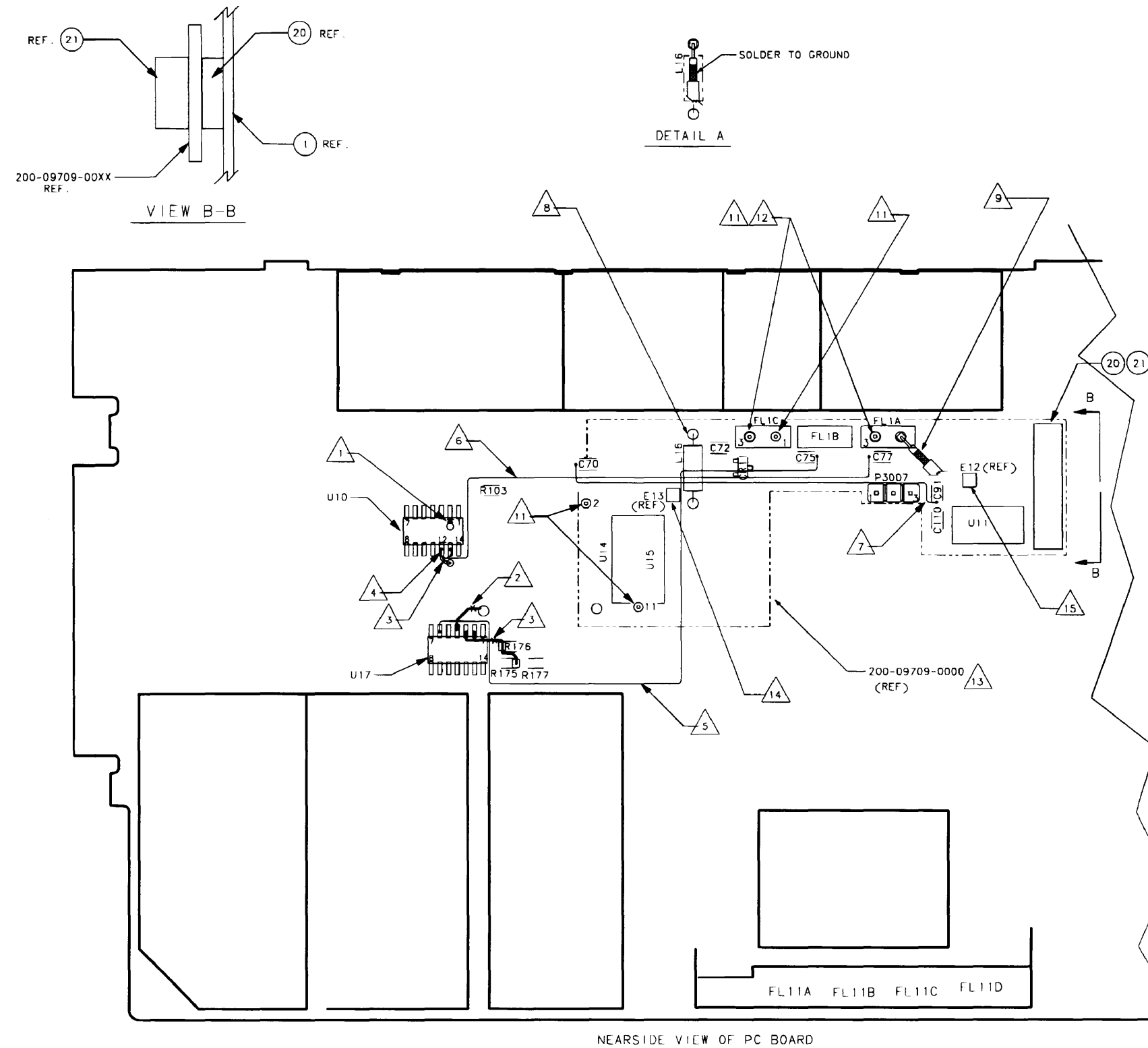
NOTES FOR INSTALLING THE SWITCHABLE FILTER BOARD:

/1\ CUT TRACE (NEARSIDE) THAT RUNS BETWEEN U10-PIN 2
AND FEEDTHRU BENEATH U10.

/2\ CUT TRACE (NEARSIDE) CLOSE TO FL6, THAT RUNS BETWEEN
U17-PIN 4 AND FL6-PIN 3.

/3\ CUT TRACE (NEARSIDE) CLOSE TO R176, THAT RUNS FROM
PINS 2 & 3 OF U17 TO R176.
CUT TRACE FROM U10-12 TO VIA.

/4\ JUMPER FROM U10-PIN 13 TO U10-PIN 12.

/5\ JUMPER FROM U17-PIN 6 TO C75 PAD THAT CONNECTS
TO FL1C (NOT INSTALLED) PIN 1.

/6\ JUMPER FROM U10-PIN 12 TO C77 PAD THAT CONNECTS
TO FL1A (NOT INSTALLED) PIN 3.

/7\ JUMPER FROM C91 PAD THAT CONNECTS TO P3007 PIN 2 TO
C70 (+9V) PAD.

/8\ SCRAPE SOLDER MASK ON BOARD TO SOLDER COAX SHIELD.
SOLDER (3.5') COAX SHIELD TO GROUND UNDER L16 (NOT INSTALLED)
AND CENTER CONDUCTOR TO L16 (PAD CLOSEST TO FENCE). SEE DETAIL A.

/9\ SCRAPE SOLDER MASK ON BOARD TO SOLDER COAX SHIELD.
SOLDER (2.5') COAX SHIELD TO GROUND ADJACENT TO FL1A
AND CENTER CONDUCTOR TO FL1A PIN 1.

10. INSTALL P3007 AND CUT LEADS FLUSH (0.05') TO HEADER ON FARSIDE.

/11\ INSTALL AWG 24 BUSS WIRE (026-00030-0000) IN FL1A PIN 3,
FL1C PINS 1 & 3, AND U14 (NOT INSTALLED) PIN 2 & 11.
LEAVE LEADS UP 3/8' ABOVE COMPONENT SIDE
AND CUT FLUSH (0.040') TO FARSIDE.

/12\ PLACE SPACER BEADS (091-00196-0000) ON BUSS WIRE
IN FL1A PIN 3 AND FL3C PIN 3.

/13\ PLACE FILTER BOARD ASSY (200-09709-0000) OVER THE BUSS WIRE LEADS
AND P3007 AND SOLDER IN PLACE FLUSH AGAINST THE SPACERS, U11 AND U15.

/14\ SOLDER THE OTHER END OF THE COAX ATTACHED TO L16 TO THE FILTER BOARD
E13 AND SOLDER THE SHIELD TO THE GROUND PAD.

/15\ SOLDER THE OTHER END OF THE COAX ATTACHED TO FL1A TO FILTER BOARD
E12 AND SOLDER THE SHIELD TO THE GROUND PAD.

U10

R103

C70

FL1C

C72

FL1B

FL1A

C75

C77

E12 (REF)

P3007

E13
(REF)

U14

U15

U11

U17

R176

R175 R177

200-09709-0000
(REF)

NEARSIDE VIEW OF PC BOARD

FL11A FL11B FL11C FL11D

300-09061-0020_B\003.tif
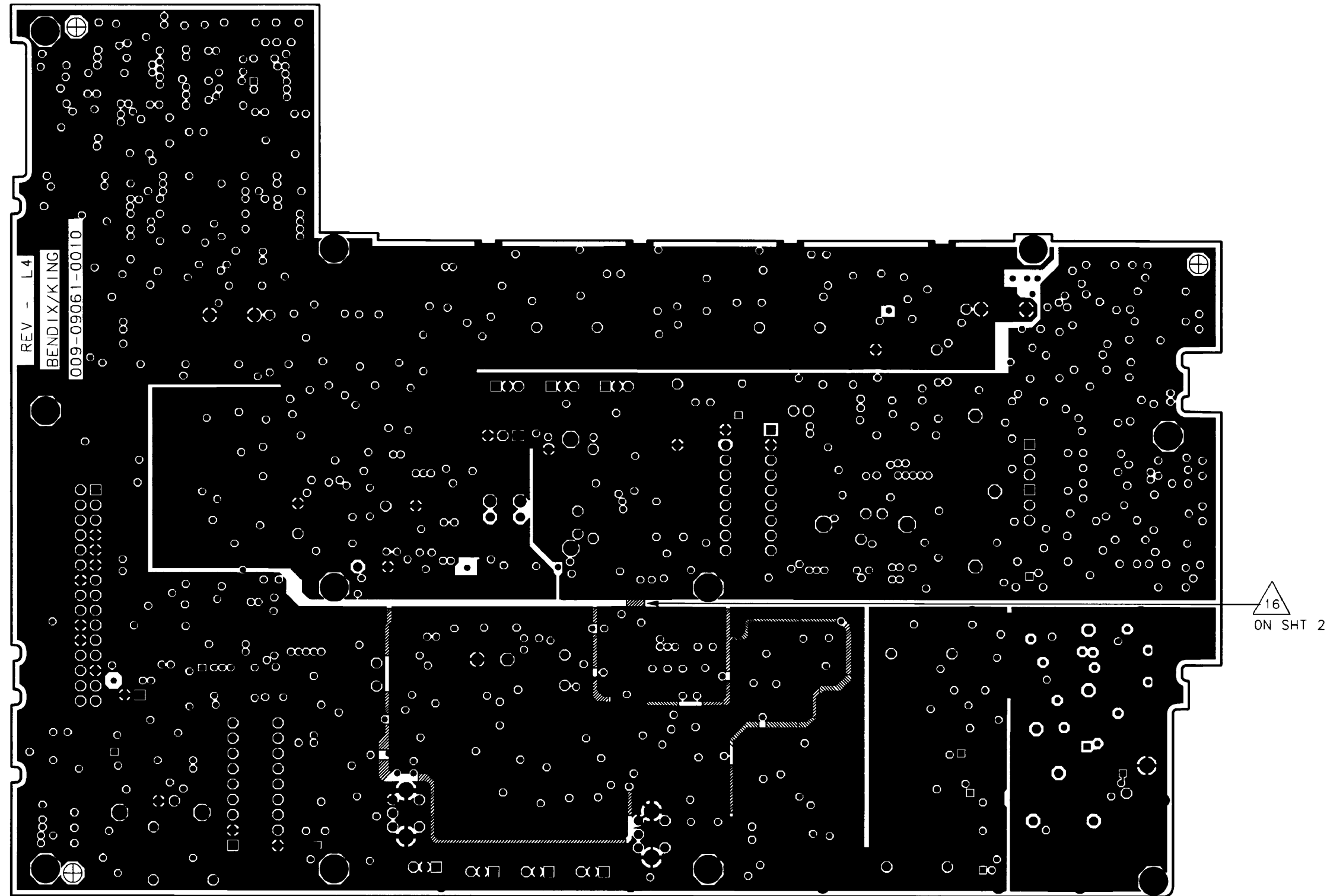
Figure 6-20 COM/VOR Receiver Board
(Dwg No. 300-09061-0020 rev. B, sheet 4 of 5)

FARSIDE VIEW OF PC BOARD

NOTE: ANY FILL AREAS ON THE TRACE LAYER SHOWN MAY NOT REPRESENT
FINAL ARTWORK AS THERMAL RELIEFS MAY NOT BE SHOWN

300-09061-0020_B\004.tif

**Figure 6-20 COM/VOR Receiver Board
(Dwg No. 300-09061-0020 rev. B, sheet 5 of 5)**
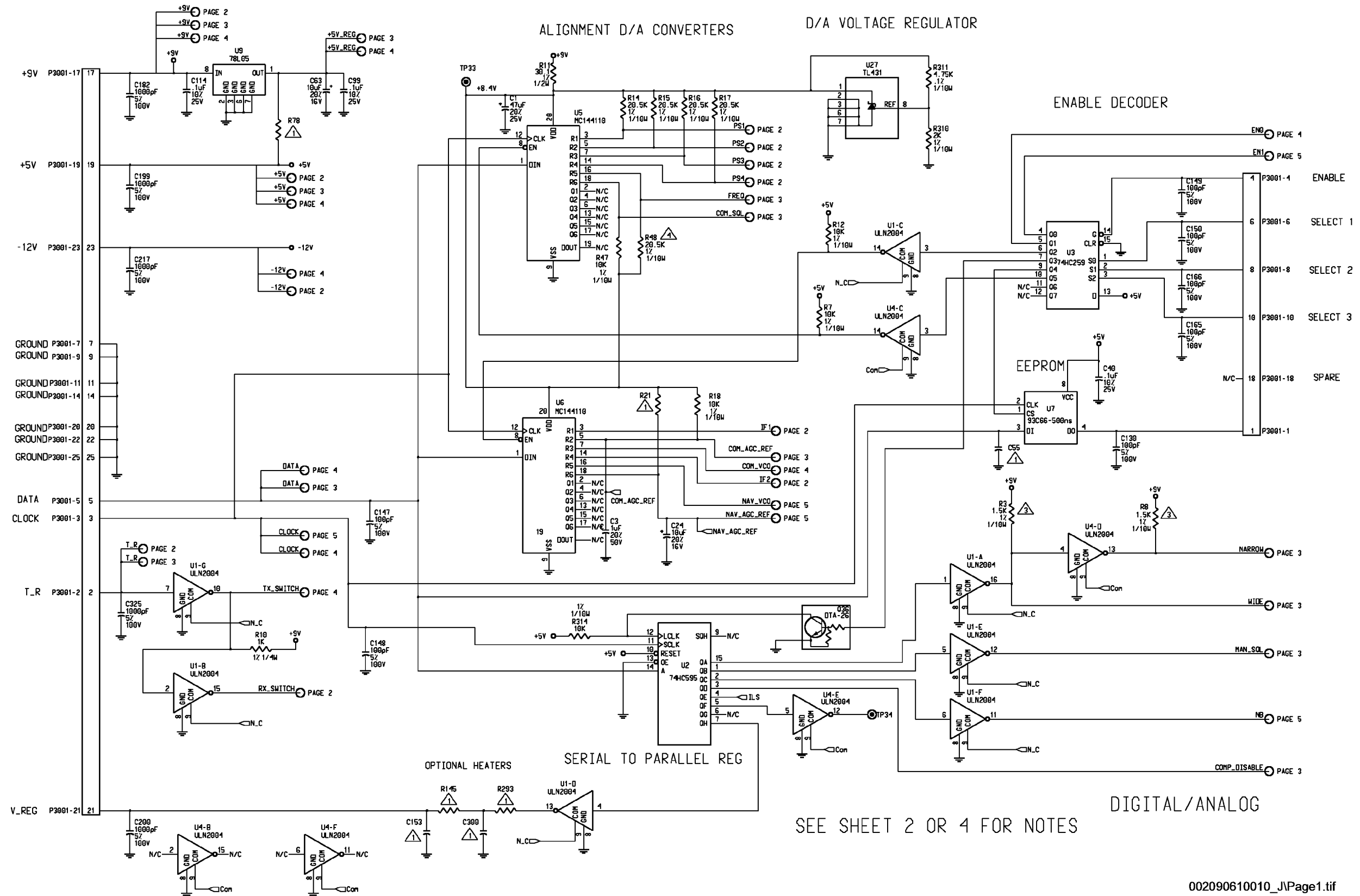
**Figure 6-21 COM/VOR Receiver Board Schematic
(Dwg No. 002-09061-0010 rev. J, Sheet 1 of 5)**

NOTES: /1\ THESE COMPONENTS ARE NOT USED

/2\ SEE TABLE FOR COMPONENT VALUES

/3\ THESE COMPONENTS & CONNECTIONS ARE USED ONLY ON -0011 (8.33kHz) BOARDS

/4\ THESE COMPONENTS & CONNECTIONS ARE USED ONLY ON -0010 (25kHz) BOARDS
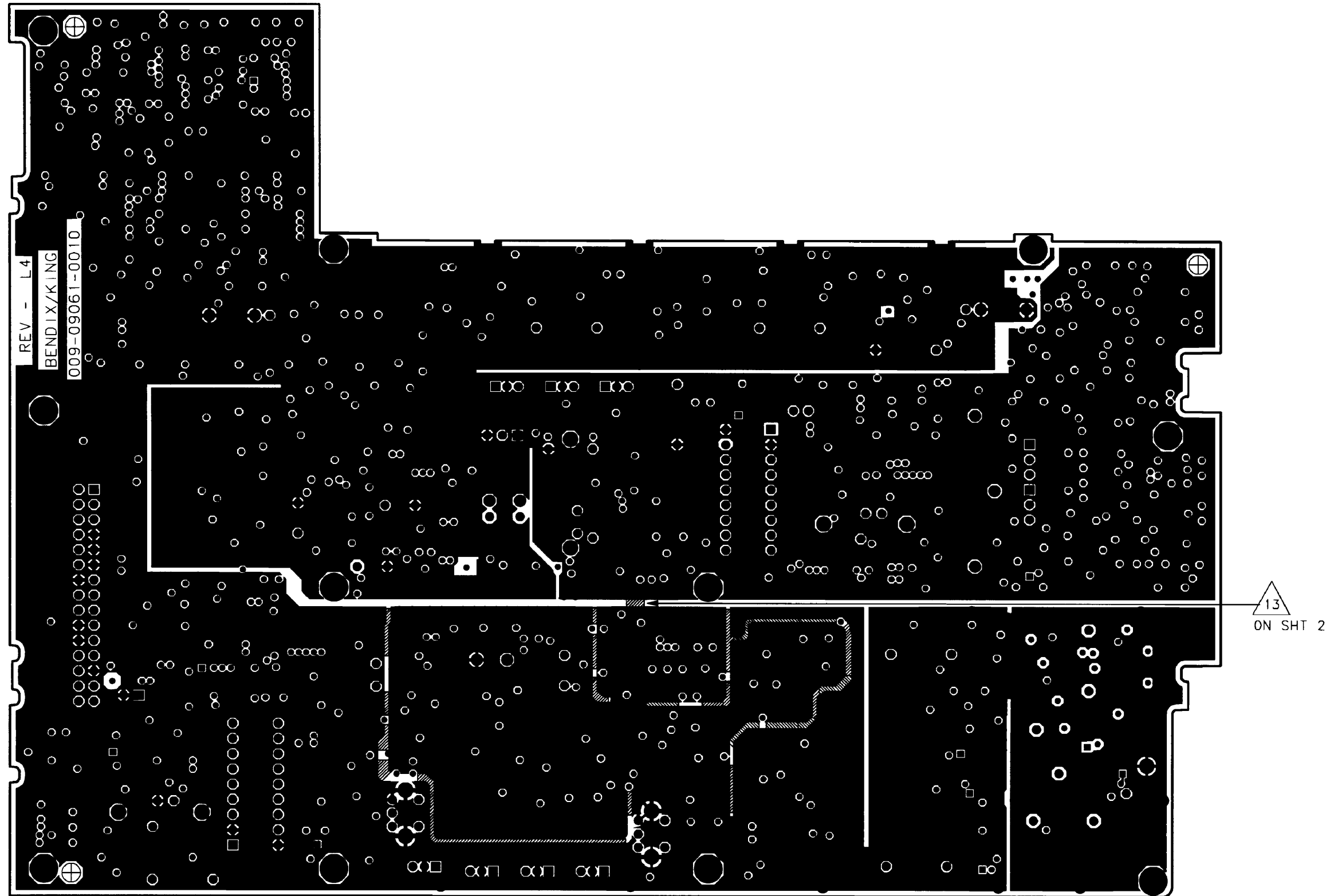
/5\ THESE CONNECTIONS ARE CUT ON -0011 (8.33kHz) BOARDS

	-0010 (25KHZ)	-0011 (8.33HZ)
C50	12 pF	0 ohm
R61	332 ohm	0 ohm
C72	27 pF	0 ohm

Figure 6-21 COM/VOR Receiver Board Schematic (Dwg No. 002-09061-0010 rev. J, Sheet 2 of 5)
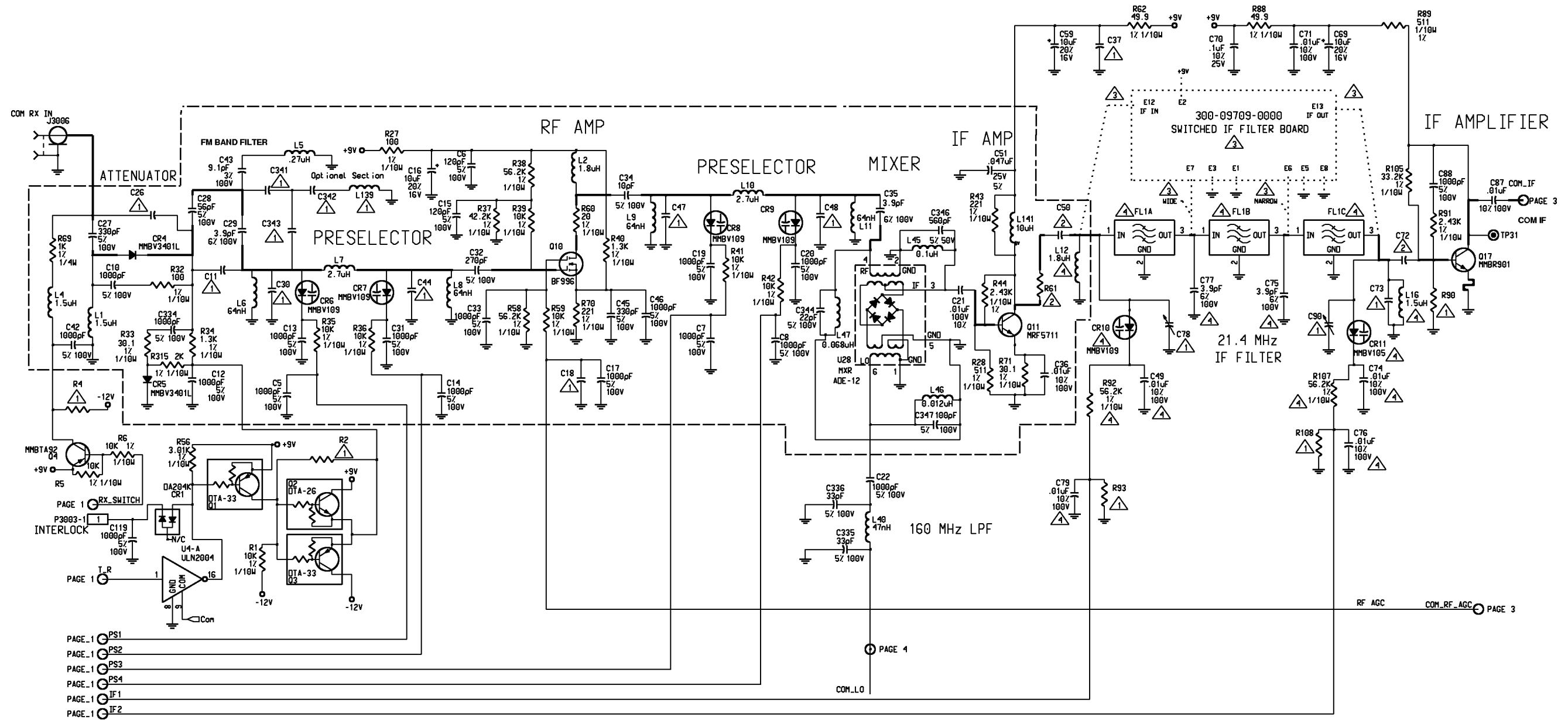
BOLD LINES INDICATE NORMAL SIGNAL PATH

COM FRONT END

002-09061-0010_J\Page2.tif
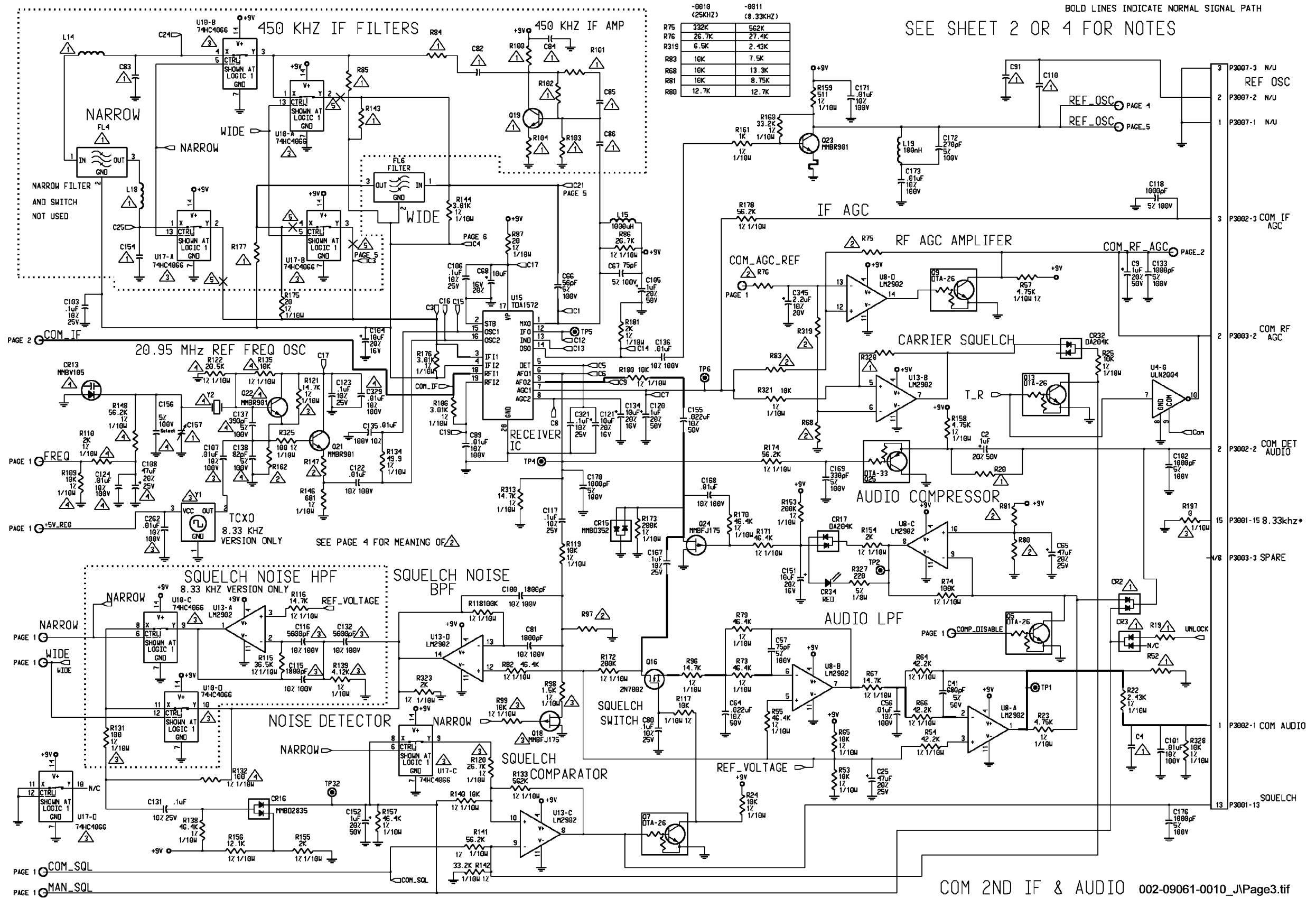
Figure 6-21 COM/VOR Receiver Board Schematic
(Dwg No. 002-09061-0010 rev. J, Sheet 3 of 5)

NOTES:

⚠ THESE COMPONENTS ARE NOT USED

⚠ SEE TABLE FOR COMPONENT VALUES

⚠ THESE COMPONENTS & CONNECTIONS ARE USED ONLY ON -0011 (8.33kHz) BOARDS

⚠ THESE COMPONENTS & CONNECTIONS ARE USED ONLY ON -0010 (25kHz) BOARDS

⚠ THESE CONNECTIONS ARE CUT ON -0011 (8.33kHz) BOARDS

BOARD	-0010 (25KHZ)	-0011 (8.33KHZ)
C125	-----	.68uF
C139	.1 uF	-----
C144	0.047uF	-----
C160	.015uF	-----
C174	.1 uF	-----
C175	-----	.68uF
C129	SELECT	10 pF
R123	681	332
R124	1.62k	2.00K
R152	12.7K	22.1K
R165	100K	90.9K
R185	10K	6.81K
R147	221	681
R162	4.75k	46.4K
R97	1.00k	6.81K
C163	.01uF	.01 uf
C159	---	.068 uf
C145	---	.1 uf
C161	47uF 25V	10uF 25V

R147, R162, and R97 are located on Page 3

INTEGRATOR

21.4 MHZ TRAP

COM_LO

FILTER

VCO

AMPLIFIER

TX DRIVER

SYNTHESIZER IC
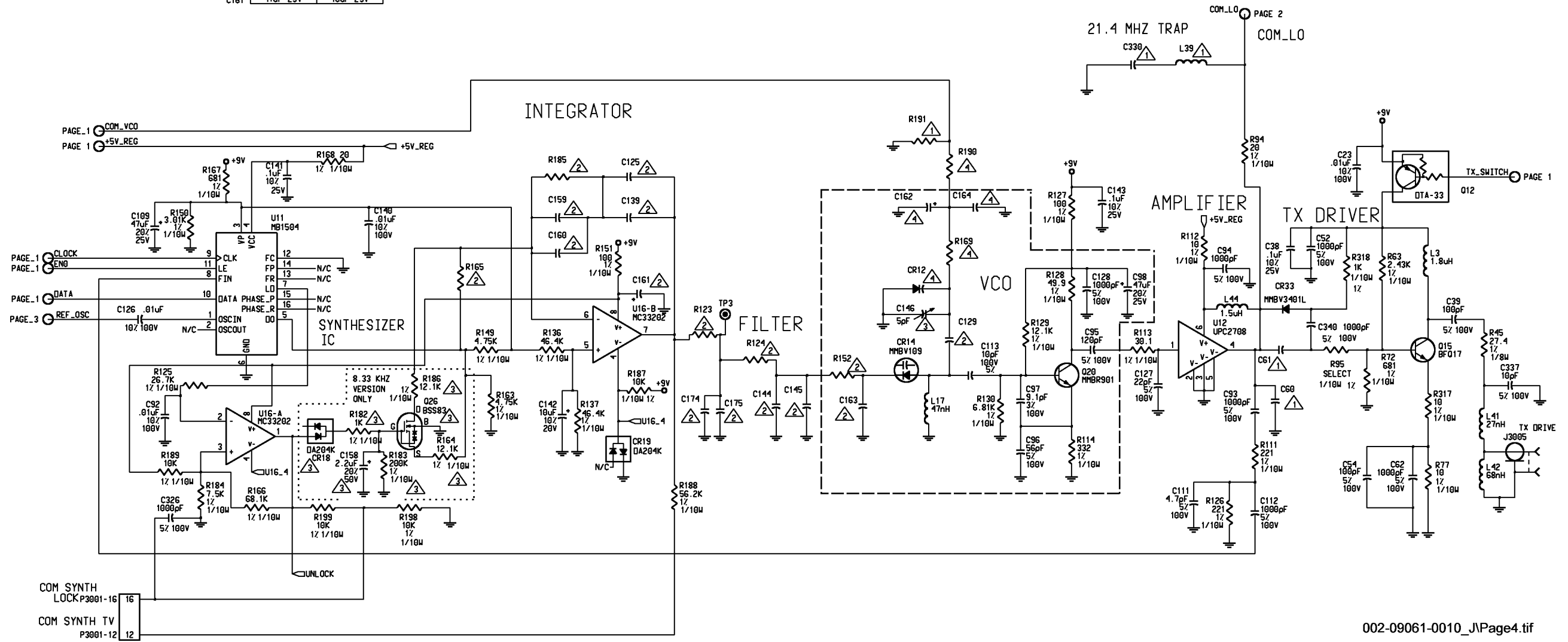
Figure 6-21 COM/VOR Receiver Board Schematic
(Dwg No. 002-09061-0010 rev. J, Sheet 4 of 5)

002-09061-0010_J\Page4.tif

Figure 6-21 COM/VOR Receiver Board Schematic
(Dwg No. 002-09061-0010 rev. J, Sheet 5 of 5)

200-09709-0010 KX 165A SWITCHED IF FILTER BOARD   Rev.A

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0010
1	009-09709-0011		SWITCHED IF FILTER	EA	1
2	047-12555-0002		FENCE, IF FILTER B	EA	1
3	091-00523-0000		INSULATOR XTAL	EA	7
C1	106-05339-0020		CH 3.3PF NPO/100V	EA	1
C12	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C13	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C14	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C18	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C19	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C2	106-05339-0020		CH 3.3PF NPO/100V	EA	1
C21	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C22	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C27	106-05220-0026		CAP CH22PFNPO/100V	EA	1
C28	106-05680-0026		CH 68PF NPO 100V	EA	1
C29	106-05270-0026		CAP CH27PFNPO/100V	EA	1
C3	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C30	106-05270-0026		CAP CH27PFNPO/100V	EA	1
C31	106-05270-0026		CAP CH27PFNPO/100V	EA	1
C33	102-00094-0002		CAP VAR 2.5-10 PF	EA	1
C34	102-00094-0002		CAP VAR 2.5-10 PF	EA	1
C35	102-00094-0002		CAP VAR 2.5-10 PF	EA	1
C36	102-00094-0002		CAP VAR 2.5-10 PF	EA	1
C37	106-05560-0026		CAP CH56PFNPO/100V	EA	1
C38	106-05390-0026		CAP CH39PFNPO/100V	EA	1
C5	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C7	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C8	106-05103-0057		CAP CH 10KX7R/100V	EA	1
FL1	017-00280-0001		21.4MHZ FILTER	EA	1
FL2	017-00268-0001		XTAL FILTER 21.4 M	EA	1
L1	019-02781-0002		IND SM SHIELDED 1.	EA	1
L2	019-02781-0034		IND SM SHIELDED 0.	EA	1
L3	019-02781-0001		IND SM SHIELDED 1	EA	1
L4	019-02781-0003		IND SM SHIELDED 1.	EA	1
R18	139-03920-0010		RES CH 392 OHMS 1%	EA	1
R19	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R20	139-03920-0010		RES CH 392 OHMS 1%	EA	1
R5	139-01272-0010		RES CH 12.7K TW 1%	EA	1
R7	139-01272-0010		RES CH 12.7K TW 1%	EA	1
R8	139-01272-0010		RES CH 12.7K TW 1%	EA	1
RF	002-09709-0010		KX 165A SWITCHED I	RF	0
RF	300-09709-0010		KX 165A SWITCHED I	RF	0
U1	120-08237-0001		MMIC SWITCH, SPDT,	EA	1
U2	120-08237-0001		MMIC SWITCH, SPDT,	EA	1
	016-01040-0000		COATING TYPE AR	AR	1

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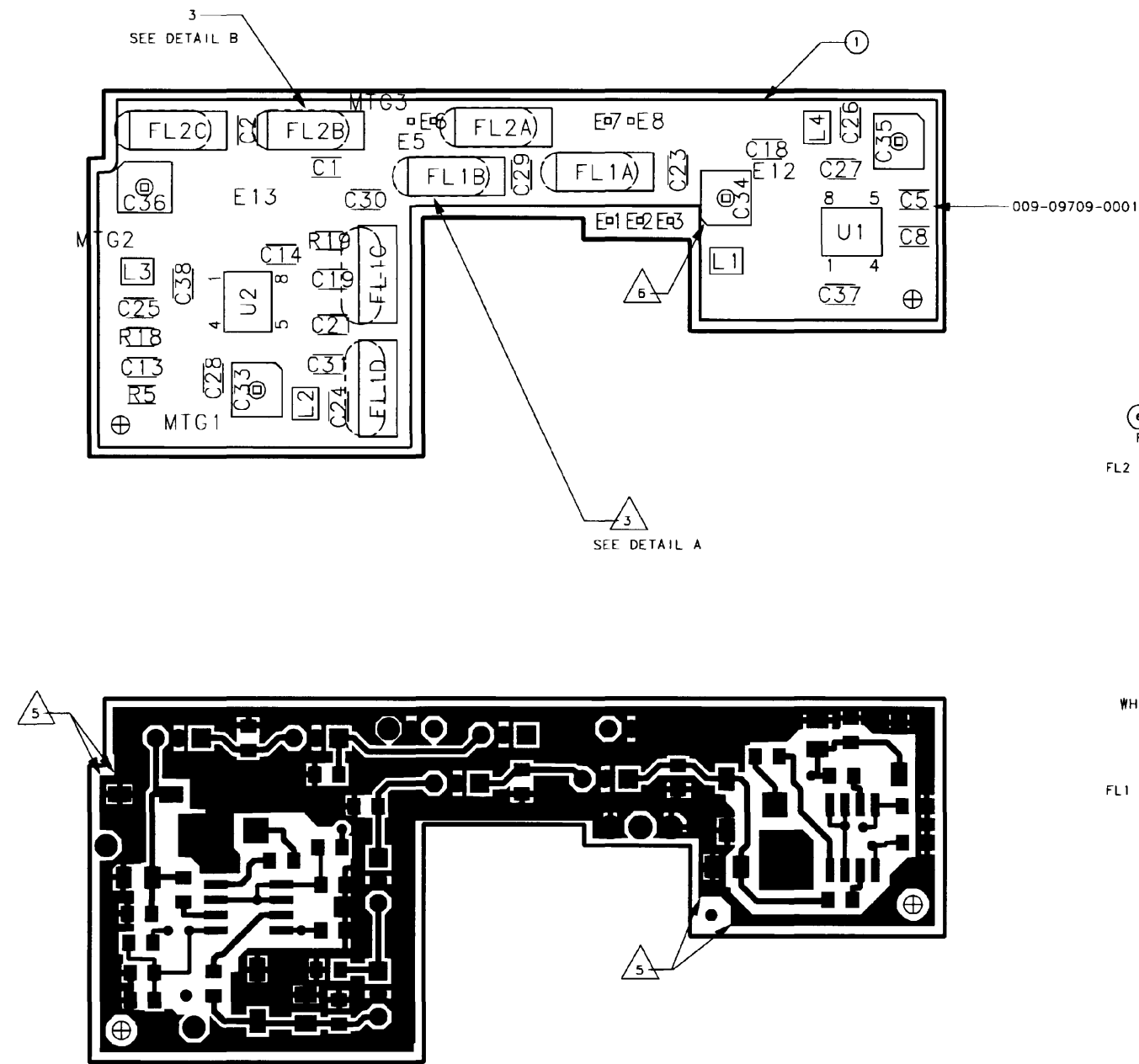
NOTES:
1. PRIOR TO POST COATING BOTH SIDES OF P.C. BOARD
   WITH PN 016-01040-0000, MASK OFF ALL
   MOUNTING AREAS AND REFERENCE DESIGNATORS:
   C33-C36, E1, E12-E13, E2-E3, E5-E8,
   MTG1-MTG3

2. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN
   ACCORDANCE WITH SPEC. 001-01101-0000.

3. FL1 IS A MATCHED SET OF 4 PIECES.
   FL2 IS A MATCHED SET OF 3 PIECES.
   REMOVE INSULATOR SHIPPED WITH CRYSTALS
   INSTALL INSULATOR 091-00523-0000 UNDER EACH PIECE.

4. MAX. COMPONENT HEIGHT ABOVE PCB: 0.331".

5. REWORK FOR FENCE (ITEM 1):
   SCRAPE MASKING OFF OF BOARD AROUND THE PERIMETER
   WHERE FENCE WILL SIT. DO NOT SCRAPE BETWEEN ARROWS.
   TIN GROUND AREA WHERE SCRAPED. INSTALL AND TACK FENCE
   ONTO BOARD. MAKE SURE FENCE SITS FLAT ON BOARD.
   FLOW SOLDER AROUND FENCE WHERE GROUND AREAS ARE TINNED.

6. NEEDS TO BE POSITIONED STRAIGHT AS DRAWN.

009-09709-0001

FL2 IS A MATCHED SET OF THREE PIECES.
(VIEWED FROM TOP)

DETAIL B

FL1 IS A MATCHED SET OF FOUR PIECES.
(VIEWED FROM TOP)

DETAIL A
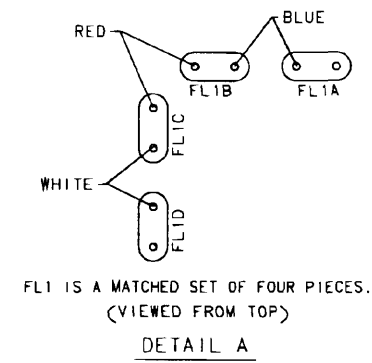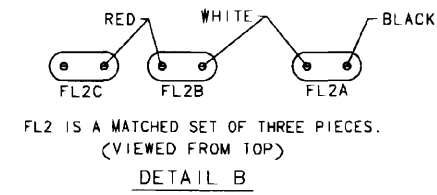
THIS DRAWING IS NOT COMPLETE WITHOUT
PARTS LIST 200-09709-0000

SEE DETAIL B

SEE DETAIL A

NEARSIDE VIEW OF PC BOARD

300-09709-0000_A\000.tif

Figure 6-22 IF Filter Board
(Dwg No. 300-09709-0010 rev. C)
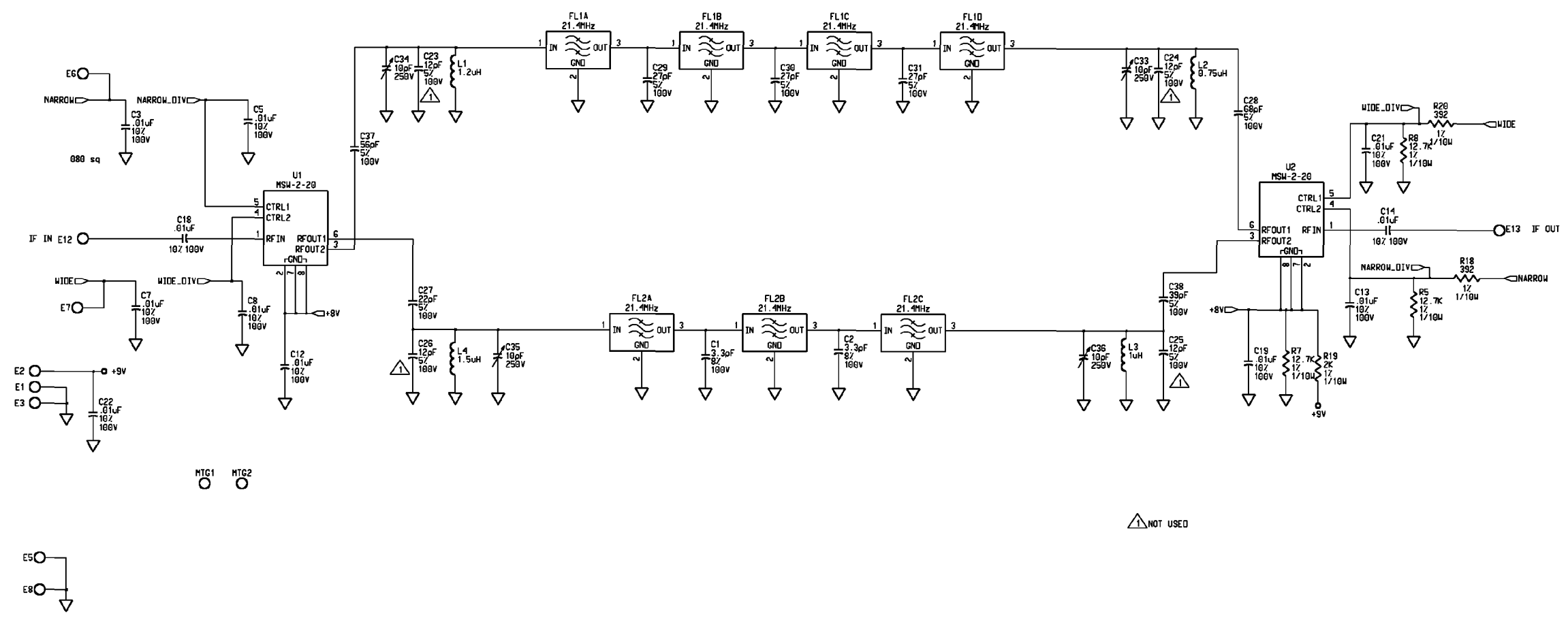
Figure 6-23 IF Filter Board Schematic
(Dwg No. 002-09709-0010 rev. A)

200-05661-0002   KX165A TOP COVER ASSY   Rev.-

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0002
1	047-12035-0013		COVER W/ HARDWARE	EA	1
15	012-01670-0001		AUDIO BOARD INSULA	EA	1
2	090-01011-0001		RUBBER BUMPER	EA	2
4	047-12028-0001		AUDIO AMP CLIP	EA	1
5	089-06008-0006		SCR FHP 4-40X3/8	EA	7
6	200-09447-0000		GLIDESLOPE ASSY	EA	1
7	200-09063-0000		KX165A VOR/LOC CON	EA	1
	300-05661-0020		TOP COVER ASSEMBLY	RF	0

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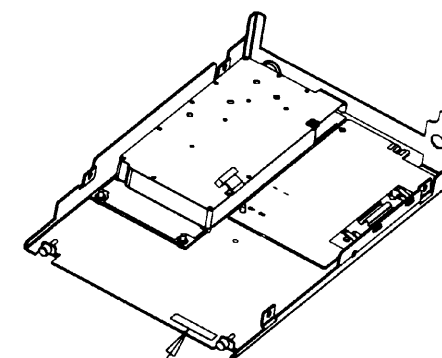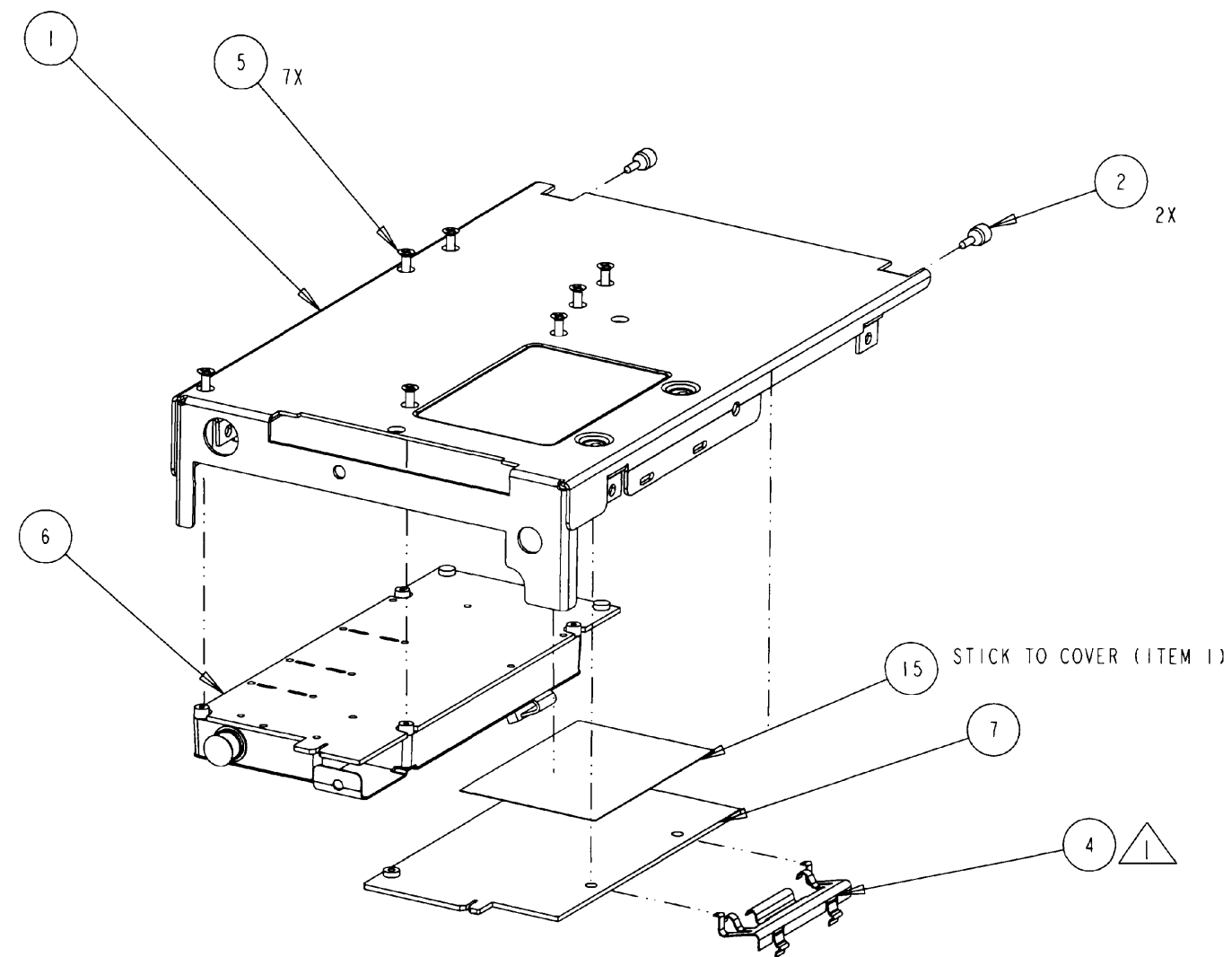
LOCATION OF ASSEMBLY ID LABEL

STICK TO COVER (ITEM 1)

⚠️1 INSTALL CLIP (ITEM 4) SO THAT 2 TABS EXTEND THRU
PCB (ITEM 7) AND GRIP THE DIMPLED HOLES
IN THE TOP COVER (ITEM 1).

2. LIQUID STAKE ALL FASTENERS PER 001-01080-0000.

300-05661-0020_-/000.tif

Figure 6-24 Top Cover Assembly
(Dwg No. 300-05661-0020 rev. -)

200-09063-0000 KX165A VOR/LOC CON   Rev.AF

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
1	009-09063-0000		PCBD KX165A VOR/LO	EA	1
2	076-03018-0002		TOP COVER STANDOFF	EA	1
3	076-03018-0004		TOP COVER STANDOFF	EA	1
C7004	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C7007	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7008	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7009	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7010	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7011	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C7012	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C7013	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7014	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7015	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7016	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7017	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7018	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7019	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7020	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7021	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7022	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7023	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7024	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7025	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7026	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7027	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7028	096-01188-0012		CAP,TANT, 22 UF /	EA	1
C7031	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C7032	106-05103-0057		CAP CH 10KX7R/100V	EA	1
C7034	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C7036	106-04122-0016		CAPCH1200PFNPO/50V	EA	1
C7037	106-04122-0016		CAPCH1200PFNPO/50V	EA	1
C7038	106-05682-0046		CAP CH 6.8KX7R/50V	EA	1
C7039	106-05682-0046		CAP CH 6.8KX7R/50V	EA	1
C7040	106-05331-0026		CAP CH330PFNPO/100	EA	1
C7041	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C7042	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C7043	106-05104-0037		CAP CH 100KX7R/25V	EA	1
C7044	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C7046	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C7047	097-00204-0026		CAP AL 47UF 25V 20	EA	1
C7048	106-05331-0026		CAP CH330PFNPO/100	EA	1
CR7001	007-06177-0000		SMD DIO SI MMBD914	EA	1
CR7002	007-06177-0000		SMD DIO SI MMBD914	EA	1
CR7003	007-06177-0000		SMD DIO SI MMBD914	EA	1
CR7004	007-06177-0000		SMD DIO SI MMBD914	EA	1
CR7005	007-06177-0000		SMD DIO SI MMBD914	EA	1
CR7006	007-05241-0212		TRANSORB 1500W 6.5	EA	1
CR7007	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR7008	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR7009	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR7010	007-05241-0003		TRNSRB 1500W 15V	EA	1

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
CR7011	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR7012	007-05241-0003		TRNSRB 1500W 15V	EA	1
CR7013	007-05241-0003		TRNSRB 1500W 15V	EA	1
L7001	019-02757-0005		SMD FERRITE BEAD	EA	1
L7002	019-02757-0005		SMD FERRITE BEAD	EA	1
L7003	019-02757-0005		SMD FERRITE BEAD	EA	1
L7004	019-02757-0005		SMD FERRITE BEAD	EA	1
L7005	019-02757-0005		SMD FERRITE BEAD	EA	1
L7006	019-02757-0005		SMD FERRITE BEAD	EA	1
L7007	019-02757-0005		SMD FERRITE BEAD	EA	1
L7008	019-02757-0005		SMD FERRITE BEAD	EA	1
P7008	155-01709-0501		WIRE HARNESS, 8 CO	EA	1
P7009	155-01709-0501		WIRE HARNESS, 8 CO	EA	1
Q7001	007-00466-0000		XSTR S PNP MMBTA56	EA	1
Q7002	007-00466-0000		XSTR S PNP MMBTA56	EA	1
Q7003	007-00467-0000		XSTR S NPN MMBTA06	EA	1
Q7004	007-00467-0000		XSTR S NPN MMBTA06	EA	1
R7003	139-01002-0010		RES CH 10K TW 1%	EA	1
R7004	139-01002-0010		RES CH 10K TW 1%	EA	1
R7005	139-01002-0010		RES CH 10K TW 1%	EA	1
R7006	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R7007	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R7008	139-02210-0010		RES CH 221 .1W 1%	EA	1
R7009	139-04751-0010		RES CH 4.75K .1W 1	EA	1
R7010	139-01501-0010		RES CH 1500 .1W 1%	EA	1
R7011	139-02210-0010		RES CH 221 .1W 1%	EA	1
R7012	139-02210-0010		RES CH 221 .1W 1%	EA	1
R7014	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R7015	139-03322-0010		RES CH 33.2K TW 1%	EA	1
R7016	139-00499-0010		RES CH 49.9 .1W 1%	EA	1
R7017	139-00000-0014		CKT JUMPER 0805	EA	1
R7018	139-00000-0014		CKT JUMPER 0805	EA	1
R7020	139-02802-0010		RES CH 28K TW 1%	EA	1
R7021	139-02612-0010		RES CH 26.1K TW 1%	EA	1
R7022	139-06812-0010		RES CH 68.1K TW 1%	EA	1
R7023	139-01623-0010		RES CH 162000 .1W	EA	1
R7024	139-01623-0010		RES CH 162000 .1W	EA	1
R7025	139-02210-0010		RES CH 221 .1W 1%	EA	1
R7026	139-01133-0010		RES CH 113K TW 1%	EA	1
R7027	139-01133-0010		RES CH 113K TW 1%	EA	1
R7030	139-04753-0010		RES CH 475K .1W 1%	EA	1
R7031	139-02673-0010		RES CH 267K TW 1%	EA	1
R7032	139-04753-0010		RES CH 475K .1W 1%	EA	1
R7033	139-02673-0010		RES CH 267K TW 1%	EA	1
R7034	139-01001-0010		RES CH 1000 .1W 1%	EA	1
R7035	139-00000-0014		CKT JUMPER 0805	EA	1
R7038	139-05622-0010		RES CH 56.2K TW 1%	EA	1
R7041	139-02210-0010		RES CH 221 .1W 1%	EA	1
R7042	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R7043	139-02001-0010		RES CH 2.00K TW 1%	EA	1
R7044	139-01001-0010		RES CH 1000 .1W 1%	EA	1
U7001	133-00569-0000		DIGITAL POT 10K	EA	1
U7004	120-03119-0020		LM308/A OP AMP	EA	1
U7005	120-03400-0001		REF-02 PREC V REG	EA	1

```
SYMBOL    PART_NUMBER      FIND_NO  DESCRIPTION          UN     -0000
U7006     120-03119-0020            LM308/A OP AMP       EA       1
U7007     120-03196-0000            IC LM2902D           EA       1
          002-09063-0000             VOR/LOC CONVERTE    RF       0
          016-01144-0000            TAK PAK ADV 122-92   AR       1
          016-01144-0001            ACCELERATOR 11525    AR       1
          024-05019-0000            WIRE #30 GREEN       IN       1
          300-09063-0000             VOR/LOC CONVERTE    RF       0
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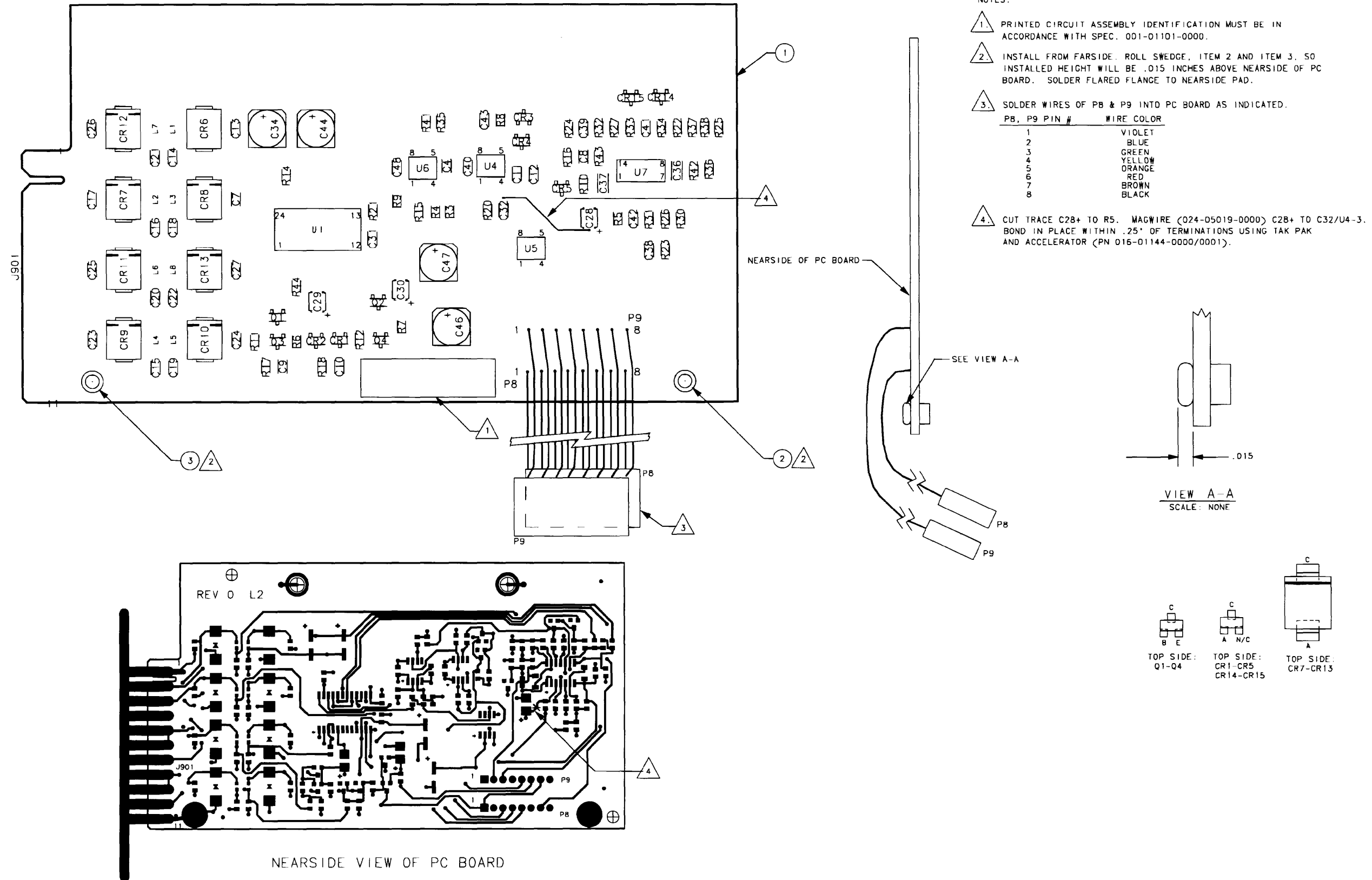
**Figure 6-25 VOR/LOC Converter Board
(Dwg No. 300-09063-0000 rev. AC)**

NOTES:

1. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN ACCORDANCE WITH SPEC. 001-01101-0000.

2. INSTALL FROM FARSIDE. ROLL SWEDGE, ITEM 2 AND ITEM 3, SO INSTALLED HEIGHT WILL BE .015 INCHES ABOVE NEARSIDE OF PC BOARD. SOLDER FLARED FLANGE TO NEARSIDE PAD.

3. SOLDER WIRES OF P8 & P9 INTO PC BOARD AS INDICATED.

P8, P9 PIN #	WIRE COLOR
1	VIOLET
2	BLUE
3	GREEN
4	YELLOW
5	ORANGE
6	RED
7	BROWN
8	BLACK

4. CUT TRACE C28+ TO R5. MAGWIRE (024-05019-0000) C28+ TO C32/U4-3. BOND IN PLACE WITHIN .25' OF TERMINATIONS USING TAK PAK AND ACCELERATOR (PN 016-01144-0000/0001).

NEARSIDE OF PC BOARD

SEE VIEW A-A

VIEW A-A
SCALE: NONE

.015

TOP SIDE: Q1-Q4
TOP SIDE: CR1-CR5 CR14-CR15
TOP SIDE: CR7-CR13

NEARSIDE VIEW OF PC BOARD

300-09063-0000_AC\000.tif

**Figure 6-26 VOR/LOC Converter Board Schematic
(Dwg No. 002-09063-0000 rev. AF, Sheet 1 of 2)**
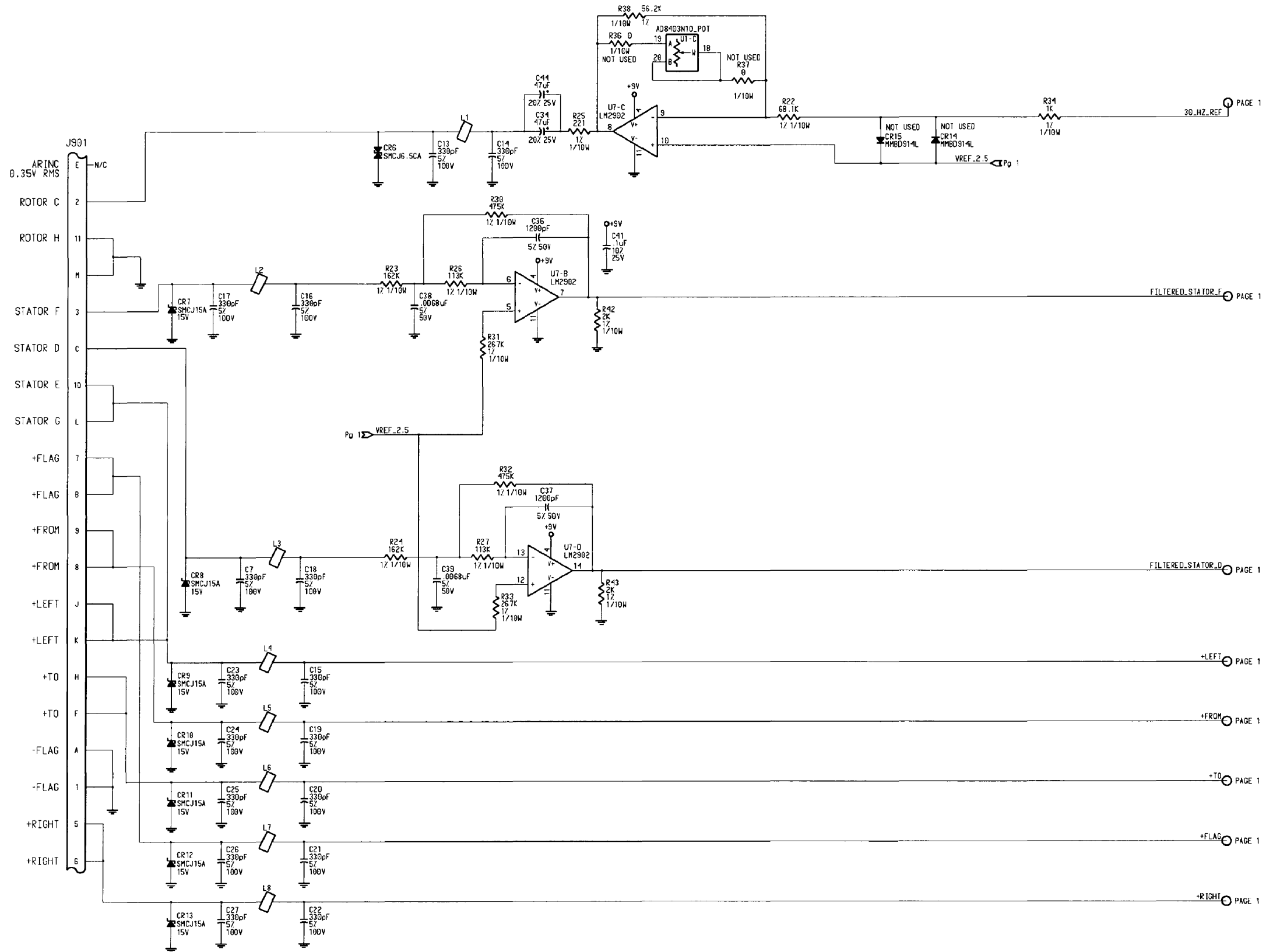
Figure 6-26 VOR/LOC Converter Board Schematic
(Dwg No. 002-09063-0000 rev. AF, Sheet 2 of 2)

200-09447-0000 GLIDESLOPE ASSY   Rev.C

SYMBOL	PART_NUMBER	FIND_NO	DESCRIPTION	UN	-0000
1	026-00029-0000		WIRE, CU, 22AWG, T	IN	.5
10	155-02892-0001		CABLE ASSY, 2MM, 1	EA	1
2	030-00152-0000		CONN BNC HEX	EA	1
3	047-12208-0012		KX155A GLIDESLOPE	EA	1
4	073-01006-0003		CASTING W/FINISH,	EA	1
5	089-05899-0002		SCR PHP 2-56X1/8	EA	1
6	089-05899-0003		SCR PHP 2-56X3/16	EA	28
7	089-08033-0030		WASHER, INTERNAL L	EA	1
8	200-09060-0000		KX155A GLIDESLOPE	EA	1
9	187-01355-0000		CUSHION	EA	.25
	300-09447-0000		GLIDESLOPE ASSY	RF	0

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Figure 6-27 Glideslope Assembly
(Dwg No. 300-09447-0000 rev. A)

SCALE 0.750
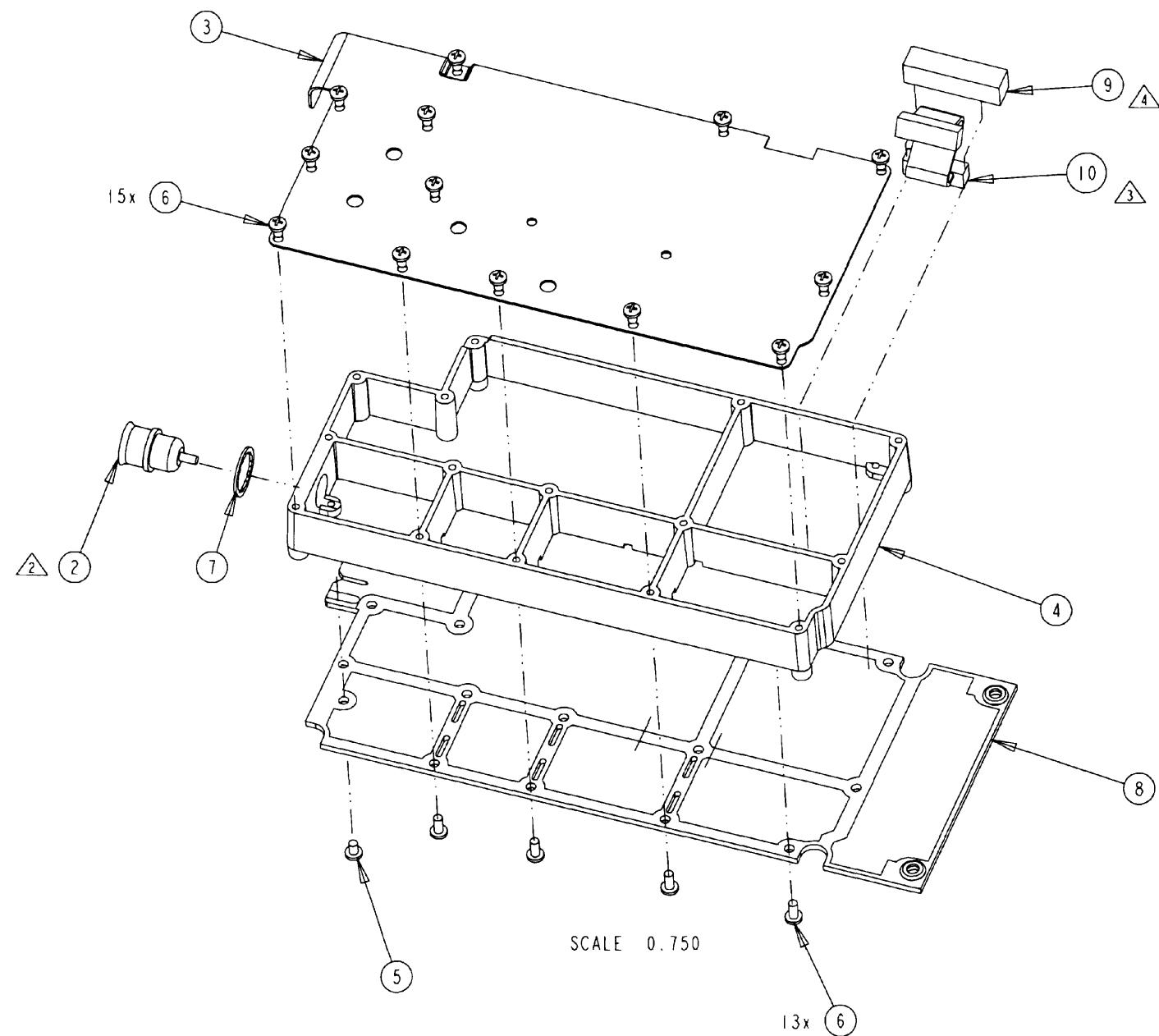
NOTES:

1. LIQUID STAKE ALL FASTENERS PER 001-01080-0000.

2. AFTER INSTALLATION, PREFORM AND SOLDER ITM 1, BUSS WIRE BETWEEN CENTER TERMINAL OF ITM 2 AND E1 PAD ON PC BOARD.

3. INSTALL THE CABLE HOUSING (ITM 10) WITHOUT KEY TO ITM 8 HEADER.

4. MOUNT CUSHION (ITM 9) ON TOP OF HOUSING (ITM 10) TO PREVENT DISCONNECTION DUE TO VIBRATION.

THIS DRAWING IS NOT COMPLETE WITHOUT PARTS LIST 200-09447-0000.

300-09447-0000_A\000.tif

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        200-09060-0000      KX155A GLIDESLOPE    Rev. K


SYMBOL    PART NUMBER    FIND NO  DESCRIPTION       UM   0000
C1        106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C100      106-05102-0026          CAP CH 1K NPO/100V EA  1.00
C101      106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C102      106-05102-0026          CAP CH 1K NPO/100V EA  1.00
C104      106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C106      106-05102-0026          CAP CH 1K NPO/100V EA  1.00
C107      106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C108      097-00204-0026          CAP AL 47UF 25V 20 EA  1.00
C109      106-05102-0026          CAP CH 1K NPO/100V EA  1.00
C11       097-00204-0026          CAP AL 47UF 25V 20 EA  1.00
C110      106-05102-0026          CAP CH 1K NPO/100V EA  1.00
C111      106-05102-0026          CAP CH 1K NPO/100V EA  1.00
C114      111-00001-0081          CAP CR 8200PF 50V  EA  1.00
C115      111-00001-0075          CAP CR .01UF 50V   EA  1.00
C116      111-00001-0081          CAP CR 8200PF 50V  EA  1.00
C117      106-05103-0057          CAP CH 10KX7R/100V EA  1.00
C118      106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C119      106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C12       106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C120      106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C121      106-05103-0057          CAP CH 10KX7R/100V EA  1.00
C122      106-05103-0057          CAP CH 10KX7R/100V EA  1.00
C123      106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C125      096-01186-0005          CAP 22UF 6V 10%    EA  1.00
C126      106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C128      106-05103-0057          CAP CH 10KX7R/100V EA  1.00
C129      106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C13       106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C130      106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C131      106-05399-0020          CH 3.9PF NPO/100V  EA   .00
C132      106-05399-0020          CH 3.9PF NPO/100V  EA   .00
C133      097-00204-0027          CAP AL 100UF 16V 2 EA  1.00
C134      096-01191-0003          CAP TANT LOW ESR   EA  1.00
C135      106-05103-0057          CAP CH 10KX7R/100V EA  1.00
C136      106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C137      097-00204-0009          CAP AL 10UF 16V 20 EA   .00
C138      096-01186-0014          CAP 10.0UF 16V 10% EA  1.00
C139      111-00001-0067          CAP CR 47PF 50V    EA  1.00
C14       096-01186-0014          CAP 10.0UF 16V 10% EA  1.00
C140      111-00001-0067          CAP CR 47PF 50V    EA  1.00
C15       106-05104-0037          CAP CH 100KX7R/25V EA  1.00
C16       096-01186-0019          CAP 22UF 20V 10%   EA  1.00
C17       097-00204-0026          CAP AL 47UF 25V 20 EA  1.00
C19       097-00204-0009          CAP AL 10UF 16V 20 EA  1.00
C2        106-05331-0026          CAP CH330PFNPO/100 EA  1.00
C20       096-01186-0014          CAP 10.0UF 16V 10% EA  1.00
C21       096-01186-0014          CAP 10.0UF 16V 10% EA  1.00
C22       096-01186-0014          CAP 10.0UF 16V 10% EA  1.00
```

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
C23	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C24	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C25	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C26	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C27	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C28	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C29	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C3	106-05339-0020		CH 3.3PF NPO/100V	EA	1.00
C30	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C31	111-00001-0030		CAP CR .68UF 50V	EA	1.00
C32	106-05683-0036		CAP CH 68K X7R/25V	EA	1.00
C33	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C34	106-04473-0057		CAP CH 47K X7R/100	EA	1.00
C35	111-00001-0081		CAP CR 8200PF 50V	EA	1.00
C36	111-00001-0081		CAP CR 8200PF 50V	EA	1.00
C37	111-00001-0075		CAP CR .01UF 50V	EA	1.00
C38	111-00001-0091		CAP CR .018UF 50V	EA	1.00
C39	111-00001-0091		CAP CR .018UF 50V	EA	1.00
C4	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C40	111-00001-0091		CAP CR .018UF 50V	EA	1.00
C41	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00
C42	106-05683-0036		CAP CH 68K X7R/25V	EA	1.00
C43	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00
C44	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00
C45	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C46	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C47	106-04333-0046		CAP CH 33K X7R/50V	EA	1.00
C48	106-05189-0020		CH 1.8PF NPO/100V	EA	.10
C48	106-05249-0020		CAP CH 2.4PF 100V	EA	.80
C48	106-05279-0020		CH 2.7PF NPO 100V	EA	.10
C49	106-05159-0020		CH 1.5PF NPO/100V	EA	1.00
C50	106-05270-0026		CAP CH27PFNPO/100V	EA	1.00
C51	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C52	106-05820-0026		CAP CH 82PFNPO/100	EA	1.00
C54	106-05102-0026		CAP CH 1K NPO/100V	UM	1.00
C56	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C57	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C58	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C59	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C6	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C60	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00
C61	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C62	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C63	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C64	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C65	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C66	102-00085-0005		CAP VAR SURF MTG	EA	1.00
C67	106-05683-0036		CAP CH 68K X7R/25V	EA	1.00
C68	106-05180-0026		CAP CH18PFNPO/100V	EA	.10
C68	106-05200-0016		CAPCH 20PF NPO 50V	EA	.80
C68	106-05220-0026		CAP CH22PFNPO/100V	EA	.10
C7	106-05249-0020		CAP CH 2.4PF 100V	EA	1.00
C70	106-05919-0020		CH 9.1 PF NPO / 10	EA	1.00
C71	106-05680-0026		CH 68PF NPO 100V	EA	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
C72	106-05220-0026		CAP CH22PFNPO/100V	EA	1.00
C73	106-05399-0020		CH 3.9PF NPO/100V	EA	.10
C73	106-05629-0020		CH 6.2PF NPO / 100	EA	.80
C73	106-05919-0020		CH 9.1 PF NPO / 10	EA	.10
C74	106-05150-0026		CAP CH15PFNPO/100V	EA	1.00
C75	102-00085-0005		CAP VAR SURF MTG	EA	1.00
C76	106-05059-0020		CH 0.5PF NPO 100V	EA	1.00
C77	111-00001-0030		CAP CR .68UF 50V	EA	1.00
C78	097-00204-0009		CAP AL 10UF 16V 20	EA	1.00
C79	106-05121-0026		CAPCH120PFNPO/100V	EA	.00
C8	096-01186-0014		CAP 10.0UF 16V 10%	EA	1.00
C80	106-05391-0026		CAP CH390PFNPO/100	EA	1.00
C81	097-00204-0027		CAP AL 100UF 16V 2	EA	1.00
C82	097-00204-0027		CAP AL 100UF 16V 2	EA	1.00
C83	097-00204-0009		CAP AL 10UF 16V 20	EA	1.00
C84	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C85	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C86	106-05103-0057		CAP CH 10KX7R/100V	EA	1.00
C87	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C88	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C89	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C9	111-00001-0081		CAP CR 8200PF 50V	EA	1.00
C90	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C91	106-05399-0020		CH 3.9PF NPO/100V	EA	1.00
C93	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C94	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C95	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C96	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
C97	106-05104-0037		CAP CH 100KX7R/25V	EA	1.00
C98	106-05102-0026		CAP CH 1K NPO/100V	EA	1.00
C99	106-05331-0026		CAP CH330PFNPO/100	EA	1.00
CR2	007-04056-0000		DIO V MMBV109	EA	1.00
CR3	007-05241-0003		TRNSRB 1500W 15V	EA	1.00
CR4	007-06223-0000		DIO DA204K	EA	1.00
CR5	007-05241-0003		TRNSRB 1500W 15V	EA	1.00
CR6	007-06223-0000		DIO DA204K	EA	1.00
CR7	007-05241-0003		TRNSRB 1500W 15V	EA	1.00
CR8	007-05241-0003		TRNSRB 1500W 15V	EA	1.00
L1	019-02660-0016		IND SM 180 10%	EA	1.00
L11	019-02751-0001		INDCTR 5.0NH 2T	EA	1.00
L12	019-02660-0016		IND SM 180 10%	EA	1.00
L13	019-02311-0041		IDCTR V 1.5T	EA	1.00
L14	019-02728-0037		IND, SM, SHLD, 100	EA	1.00
L15	019-02757-0005		SMD FERRITE BEAD	EA	1.00
L16	019-02757-0005		SMD FERRITE BEAD	EA	1.00
L17	019-02757-0005		SMD FERRITE BEAD	EA	1.00
L18	019-02757-0005		SMD FERRITE BEAD	EA	1.00
L19	019-02764-0005		64 NH	EA	1.00
L2	019-02728-0037		IND, SM, SHLD, 100	EA	1.00
L3	019-02728-0037		IND, SM, SHLD, 100	EA	1.00
L4	019-02728-0037		IND, SM, SHLD, 100	EA	1.00
L5	019-02311-0041		IDCTR V 1.5T	EA	1.00
L6	019-02311-0041		IDCTR V 1.5T	EA	1.00
L8	019-02660-0024		IND SM 680 10%	EA	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
L9	019-02660-0024		IND SM 680 10%	EA	1.00
P1	030-03305-0006		HEADER 2MM 2X6	EA	1.00
Q1	007-00187-0002		XSTR SOT-23 2N5089	EA	1.00
Q10	007-00821-0000		XSTR RF MMBR901	EA	1.00
Q2	007-00187-0002		XSTR SOT-23 2N5089	EA	1.00
Q3	007-00187-0002		XSTR SOT-23 2N5089	EA	1.00
Q4	007-00187-0002		XSTR SOT-23 2N5089	EA	1.00
Q5	007-00187-0002		XSTR SOT-23 2N5089	EA	1.00
Q6	007-00957-0000		TSTR MOS FET BF996	EA	1.00
Q7	007-00957-0000		TSTR MOS FET BF996	EA	1.00
Q8	007-00821-0000		XSTR RF MMBR901	EA	1.00
Q9	007-00821-0000		XSTR RF MMBR901	EA	1.00
R1	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R10	139-00499-0010		RES CH 49.9 .1W 1%	EA	1.00
R100	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R101	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R102	139-03322-0010		RES CH 33.2K TW 1%	EA	1.00
R103	139-03322-0010		RES CH 33.2K TW 1%	EA	1.00
R104	139-04751-0010		RES CH 4.75K .1W 1	EA	1.00
R105	139-02210-0010		RES CH 221 .1W 1%	EA	1.00
R106	139-02802-0010		RES CH 28K TW 1%	EA	1.00
R107	139-02210-0010		RES CH 221 .1W 1%	EA	1.00
R108	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00
R109	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00
R11	139-00499-0010		RES CH 49.9 .1W 1%	EA	1.00
R110	139-00499-0010		RES CH 49.9 .1W 1%	EA	1.00
R111	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R112	139-02052-0010		RES CH 20.5K .1W 1	EA	1.00
R113	133-00560-0009		RES VA SMD 10K QW	EA	.00
R114	139-00100-0000		RES CHIP 10 EW 1%	EA	1.00
R115	139-00000-0014		CKT JUMPER 0805	EA	1.00
R12	139-05110-0010		RES CH 511 .1W 1%	EA	1.00
R13	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R14	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00
R15	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00
R16	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00
R17	139-01001-0010		RES CH 1000 .1W 1%	EA	1.00
R19	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R2	139-01000-0010		RES CH 100 .1W 1%	EA	1.00
R20	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R21	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R22	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R23	139-03571-0010		RES CH 3.57K TW 1%	EA	1.00
R24	139-02213-0010		RES CH 221K TW 1%	EA	1.00
R25	133-00560-0006		RES VA SMD 1K QW	EA	1.00
R26	139-04752-0010		RES CH 47.5K TW 1%	EA	1.00
R27	139-04752-0010		RES CH 47.5K TW 1%	EA	1.00
R28	139-06812-0010		RES CH 68.1K TW 1%	EA	1.00
R29	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R3	139-01000-0010		RES CH 100 .1W 1%	EA	1.00
R31	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R32	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R33	139-05622-0010		RES CH 56.2K TW 1%	EA	1.00
R34	139-01002-0010		RES CH 10K TW 1%	EA	1.00

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SYMBOL    PART NUMBER     FIND NO   DESCRIPTION       UM   0000
R35       139-01212-0010            RES CH 12.1K .1W 1  EA   1.00
R36       139-02212-0010            RES CH 22.1K TW 1%  EA   1.00
R37       139-04642-0010            RES CH 46.4K .1W 1  EA   1.00
R38       139-01301-0010            RES CH 1.3K .1W 1%  EA   1.00
R39       139-01001-0010            RES CH 1000 .1W 1%  EA   1.00
R4        139-01000-0010            RES CH 100 .1W 1%   EA   1.00
R40       139-02000-0010            RES CH 200 OHMS 1%  EA   1.00
R41       139-02000-0010            RES CH 200 OHMS 1%  EA   1.00
R42       139-02000-0010            RES CH 200 OHMS 1%  EA   1.00
R43       139-02491-0010            RES CH 2.49K TW 1%  EA   1.00
R44       139-01502-0010            RES CH 15 K .1W 1%  EA   1.00
R45       139-01502-0010            RES CH 15 K .1W 1%  EA   1.00
R46       139-01621-0010            RES CH 1.62K TW 1%  EA   1.00
R47       139-04750-0010            RES CH 475 .1W 1%   EA   1.00
R48       139-04750-0010            RES CH 475 .1W 1%   EA   1.00
R49       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R5        139-01000-0010            RES CH 100 .1W 1%   EA   1.00
R50       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R51       139-06811-0010            RES CH 6.81K .1W 1  EA   1.00
R52       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R53       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R54       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R56       139-03320-0010            RES CH 332 .1W 1%   EA   1.00
R57       139-01623-0010            RES CH 162000 .1W   EA   1.00
R58       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R59       139-02000-0010            RES CH 200 OHMS 1%  EA   1.00
R6        139-00499-0010            RES CH 49.9 .1W 1%  EA   1.00
R61       139-02001-0010            RES CH 2.00K TW 1%  EA   1.00
R62       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
R63       139-01102-0010            RES CH 11K .1W 1%   EA   1.00
R64       139-01002-0010            RES CH 10K TW 1%    EA   1.00
R65       139-06811-0010            RES CH 6.81K .1W 1  EA   1.00
R67       139-02210-0010            RES CH 221 .1W 1%   EA   1.00
R68       139-00100-0010            RES CH 10 OHMS 1%   EA   1.00
R69       139-04642-0010            RES CH 46.4K .1W 1  UM   1.00
R7        139-01000-0010            RES CH 100 .1W 1%   EA   1.00
R70       139-04642-0010            RES CH 46.4K .1W 1  EA   1.00
R71       139-01000-0010            RES CH 100 .1W 1%   EA   1.00
R72       139-01000-0010            RES CH 100 .1W 1%   EA   1.00
R73       139-02052-0010            RES CH 20.5K .1W 1  EA   1.00
R74       139-06810-0010            RES CH 681 .1W 1%   EA   1.00
R75       139-06810-0010            RES CH 681 .1W 1%   EA   1.00
R76       139-06810-0010            RES CH 681 .1W 1%   EA   1.00
R77       139-05110-0010            RES CH 511 .1W 1%   EA   1.00
R78       139-02002-0010            RES CH 20K TW 1%    EA   1.00
R79       139-09092-0010            RES CH 90.9K TW 1%  EA   1.00
R8        139-00499-0010            RES CH 49.9 .1W 1%  EA   1.00
R80       139-01000-0010            RES CH 100 .1W 1%   EA   1.00
R81       139-03320-0010            RES CH 332 .1W 1%   EA   1.00
R82       139-03011-0010            RES CH 3.01K .1W 1  EA   1.00
R83       139-09092-0010            RES CH 90.9K TW 1%  EA   1.00
R84       139-00750-0010            RES SM 75 OHM 1/10  EA   1.00
R85       139-00750-0010            RES SM 75 OHM 1/10  EA   1.00
R86       139-04751-0010            RES CH 4.75K .1W 1  EA   1.00
```

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
R87	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R88	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R89	139-01002-0010		RES CH 10K TW 1%	EA	1.00
R9	139-00499-0010		RES CH 49.9 .1W 1%	EA	1.00
R90	139-01000-0010		RES CH 100 .1W 1%	EA	1.00
R91	139-01502-0010		RES CH 15 K .1W 1%	EA	1.00
R92	139-00200-0010		RES CH 20.0 .1W 1%	EA	1.00
R93	139-05622-0010		RES CH 56.2K TW 1%	EA	1.00
R95	139-00681-0010		RES CH 68.1 OHMS 1	EA	1.00
R96	139-01500-0010		RES CH 150 OHMS 1%	EA	1.00
R97	139-00681-0010		RES CH 68.1 OHMS 1	EA	1.00
R99	139-00499-0010		RES CH 49.9 .1W 1%	EA	1.00
TP10	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP11	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP12	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP4	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP5	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP6	008-00309-0000		TEST POINT SURF MN	EA	1.00
U10	120-03770-0001		LOW OFFSET OP AMP,	EA	1.00
U11	133-00569-0000		DIGITAL POT 10K	EA	1.00
U12	120-03400-0001		REF-02 PREC V REG	EA	1.00
U2	120-03643-0000		MMIC AMPLIFIER	EA	1.00
U3	120-03196-0000		IC LM2902D	EA	1.00
U4	120-03020-0001		IC IF AMP SO	EA	1.00
U5	120-03632-0000		MC33202 OPAMP	EA	1.00
U6	120-03606-0000		SYNTHESIZER	EA	1.00
U7	120-03643-0000		MMIC AMPLIFIER	EA	1.00
U8	124-00161-1003		74ACT161 DECADE CO	EA	1.00
U9	120-03770-0001		LOW OFFSET OP AMP,	EA	1.00
Y1	044-00343-0000		20.950 MHZ CRYSTAL	EA	1.00
	002-09060-0000		KX 155A GLIDESLOP	RF	.00
	009-09060-0000	1	PCBD KX155A GLIDES	EA	1.00
	076-03018-0002	4	TOP COVER STANDOFF	EA	2.00
	091-00121-0000	3	INSULATOR	EA	3.00
	091-00523-0000	2	INSULATOR XTAL	EA	1.00
	300-09060-0000		PCBD KX 155A GLIDE	RF	.00

NOTES:

1. PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN ACCORDANCE WITH SPEC. 001-01101-0000.

2. INSTALL ITEM 4 FROM FARSIDE AND SWAGE IN PLACE. SOLDER SWAGED FLANGE TO MOUNTING HOLE PAD TO PREVENT STAND OFF ROTATION.

3. INSTALL C3 ON TOP OF R12. SEE DETAIL A.

4. INSTALL C140 FROM PIN 2 TO PIN 6 OF U10. INSTALL C139 FROM PIN 2 TO PIN 6 OF U9. SEE DETAIL B.

   PLEASE APPLY RTV 3145 016-01082-0000 BETWEEN BODY OF C139, C140 AND U9, U10.

SECTION A-A
SCALE: NONE

DETAIL A

DETAIL B

NEARSIDE VIEW OF PC BOARD

FARSIDE VIEW OF PC BOARD

THIS DRAWING IS NOT COMPLETE WITHOUT PARTS LIST 200-09060-0000

300-09060-0000_B\000.tif

TOP SIDE: CR2

TOP SIDE: CR4, CR6

TOP SIDE: Q1-Q5, Q8-Q10

TOP SIDE: Q6-Q7

TOP SIDE: CR3, CR5 CR7-CR8

Figure 6-28 Glideslope Board
(Dwg No. 300-09060-0000 rev. B)

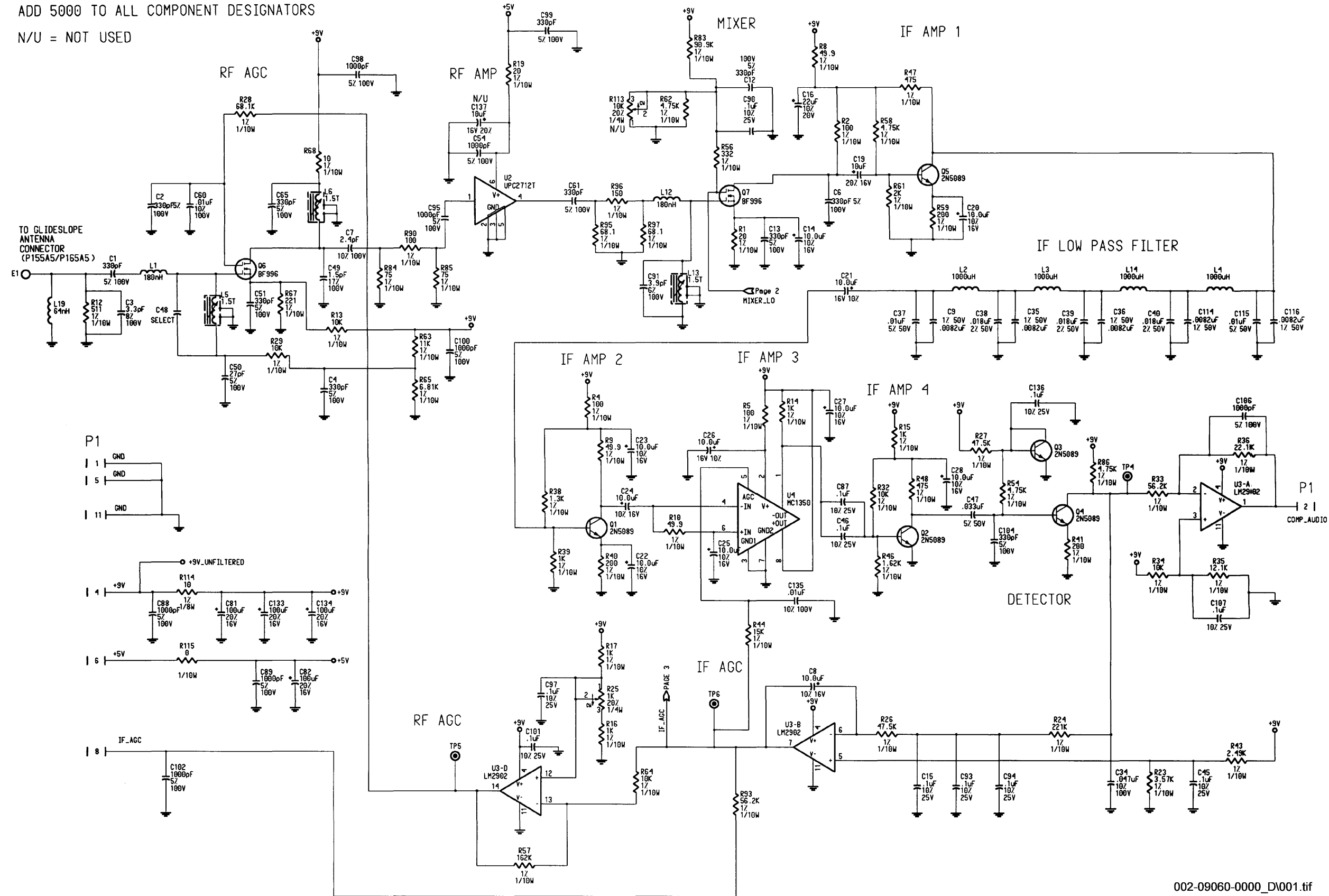**Figure 6-29 Glideslope Board Schematic**
(Dwg No. 002-09060-0000 rev. D, Sheet 1 of 3)

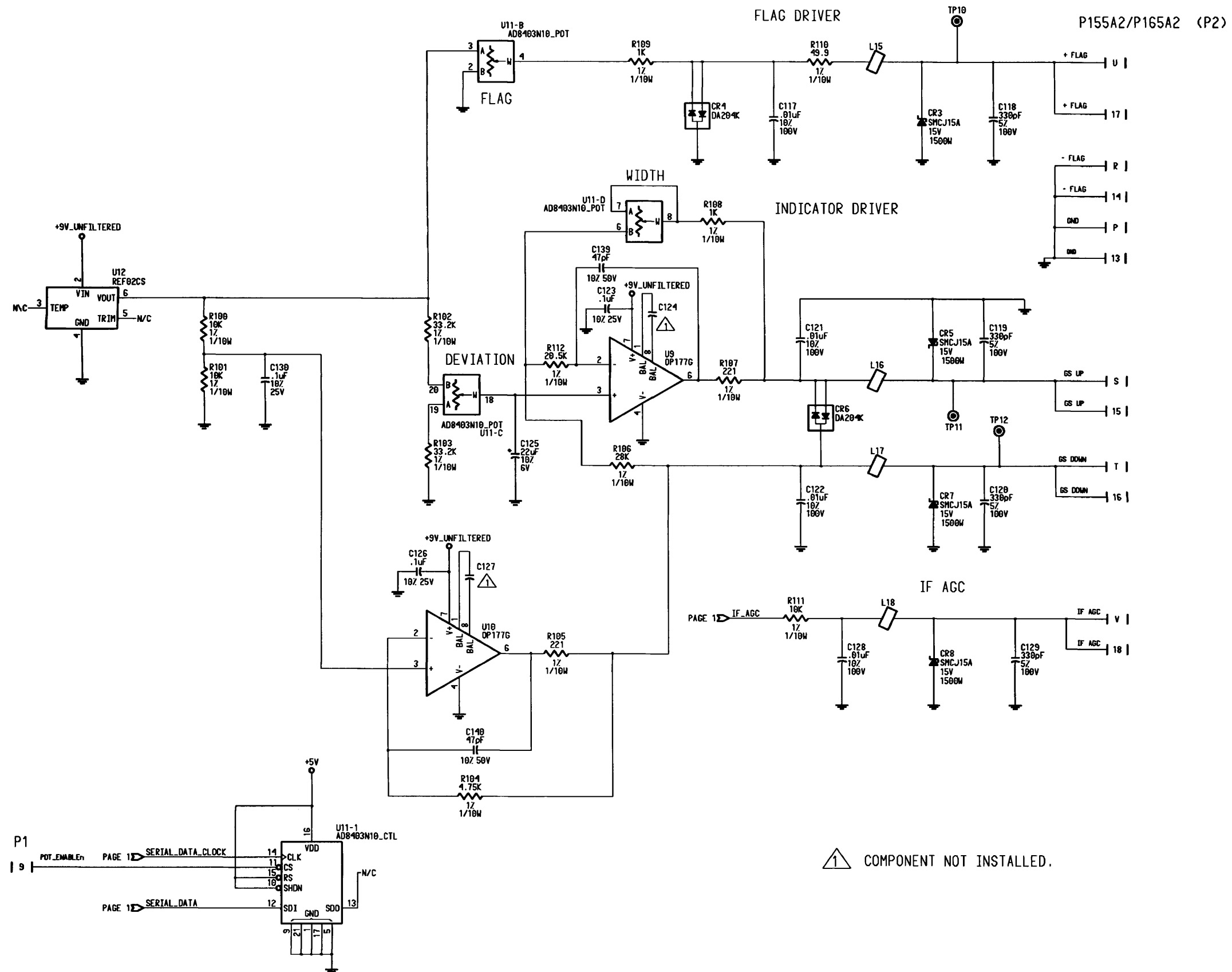**Figure 6-29 Glideslope Board Schematic
(Dwg No. 002-09060-0000 rev. D, Sheet 2 of 3)**

**Figure 6-29 Glideslope Board Schematic
(Dwg No. 002-09060-0000 rev. D, Sheet 3 of 3)**

APPENDIX S
HARDWARE/SOFTWARE CONFIGURATIONS

INTRODUCTION

Each possible configuration of hardware and software is presented in Appendix S to provide a means to identify the compatibility of particular configurations of hardware with specific configurations and revision levels of software.

DESCRIPTION OF HARDWARE/SOFTWARE CONFIGURATION DIAGRAMS

Each drawing illustrates one and only one specific combination of hardware and software. Hardware is defined as the circuit boards and assemblies used to configure the complete unit of a particular version. Software is defined as the ROM's or other programmed devices containing programs which are used in the particular version of the complete unit.

The drawings are arranged with the top box containing the unit part number. The unit part number is identical to the top Bill of Materials (BOM) number. The versions of the units to which the drawing applies are listed. The last four digits of the unit part number define the hardware/software level of the equipment (the first two digits defining the hardware, the last two digits defining the software).

The next level under the top BOM are boxes containing the BOM numbers of hardware circuit boards and hardware/software assemblies used in the particular versions of the units listed. The 200 designation defines the hardware assembly and the 206 number defines the software set assembly. The final two digits of this 206 number correspond to the number on the software ID tag on the outside of the unit.

The next level down are the top BOM for individual circuit boards or individual assemblies using software devices. Below these boxes may be a box or boxes, listing the hardware BOM (125 numbers) and the other/s listing the individual software devices (122 numbers).

The drawing titles identify the unit by: nomenclature; unit version number; the middle four digits of the software top bill of material number; and revision level of the software as indicated by the last two digits of the four digit version number.

Table S1: LIST OF SOFTWARE DIAGRAMS

UNIT	P/N	SOFTWARE	SOFTWARE DIAGRAM	PAGE
KX 165A	069-01033-0101	206-00411-0106	S-1	S-3
KX 165A	069-01033-0201	206-00411-0106	S-2	S-5

THIS PAGE RESERVED

KX165A FINAL ASSY
069-01033-0101
300-09095-0010

BEZEL ASSY
200-05672-0002
300-05672-0000

KX165A
SOFTWARE CONFIGURATION
206-00411-0106

KX155A BASE ASSY
200-05660-0004
300-05660-0020

TOP COVER ASSY
200-05661-0002
300-05661-0020

FRONT PANEL BD
200-09057-0000
300-09057-0000
002-09057-0000

BEZEL
200-09531-0002
300-09531-0000

28V TRANSMITTER BD
200-09062-0020
300-09062-0020
002-09062-0020

COM/VOR RECEIVER BD
200-09061-0010
300-09061-0010
002-09061-0010

VOR/LOC CONVERTER BD
200-09063-0000
300-09063-0000
002-09063-0000

GLIDESLOPE ASSY
200-09447-0000
300-09447-0000

KX165A
MAIN BOARD
205-00943-0005

IF FILTER BOARD
200-09709-0010
300-09709-0010
002-09709-0010

GLIDESLOPE BOARD
200-09060-0000
300-09060-0000
002-09060-0000

KX155A/165A
SOFTWARE SET
125-00943-0005

MAIN BOARD
200-09059-0040
300-09059-0040
002-09059-0040

RF PWR XSTR ASSY
200-09532-0000
300-09532-0000

TX FILTER BD
200-09174-0020
300-09174-0020
002-09174-0020

DIRECTIONAL COUPLER BD
200-09362-0010
300-09362-0010
002-09362-0010

TX AUDIO ADAPTER BD
200-09680-0000
300-09680-0000
002-09680-0000

FIGURE S-1 KX 165A, 069-01033-0101, SW ID 0106

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                              ┌─────────────────────┐
                              │  KX165A FINAL ASSY  │
                              │   069-01033-0201    │
                              │   300-09095-0010    │
                              └─────────────────────┘
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KX165A FINAL ASSY
069-01033-0201
300-09095-0010

BEZEL ASSY
200-05672-0003
300-05672-0000

KX165A SOFTWARE CONFIGURATION
206-00411-0106

KX155A BASE ASSY
200-05660-0001
300-05660-0020

TOP COVER ASSY
200-05661-0002
300-05661-0020

FRONT PANEL BD
200-09057-0000
300-09057-0000
002-09057-0000

BEZEL
200-09531-0003
300-09531-0000

28V TRANSMITTER BD
200-09062-0020
300-09062-0020
002-09062-0020

COM/VOR RECEIVER BD
200-09061-0011
300-09061-0020
002-09061-0010

VOR/LOC CONVERTER BD
200-09063-0000
300-09063-0000
002-09063-0000

GLIDESLOPE ASSY
200-09447-0000
300-09447-0000

KX165A MAIN BOARD
205-00943-0005

IF FILTER BOARD
200-09709-0010
300-09709-0010
002-09709-0010

GLIDESLOPE BOARD
200-09060-0000
300-09060-0000
002-09060-0000

KX155A/165A SOFTWARE SET
125-00943-0005

MAIN BOARD
200-09059-0040
300-09059-0040
002-09059-0040

RF PWR XSTR ASSY
200-09532-0000
300-09532-0000

TX FILTER BD
200-09174-0020
300-09174-0020
002-09174-0020

DIRECTIONAL COUPLER BD
200-09362-0010
300-09362-0010
002-09362-0010

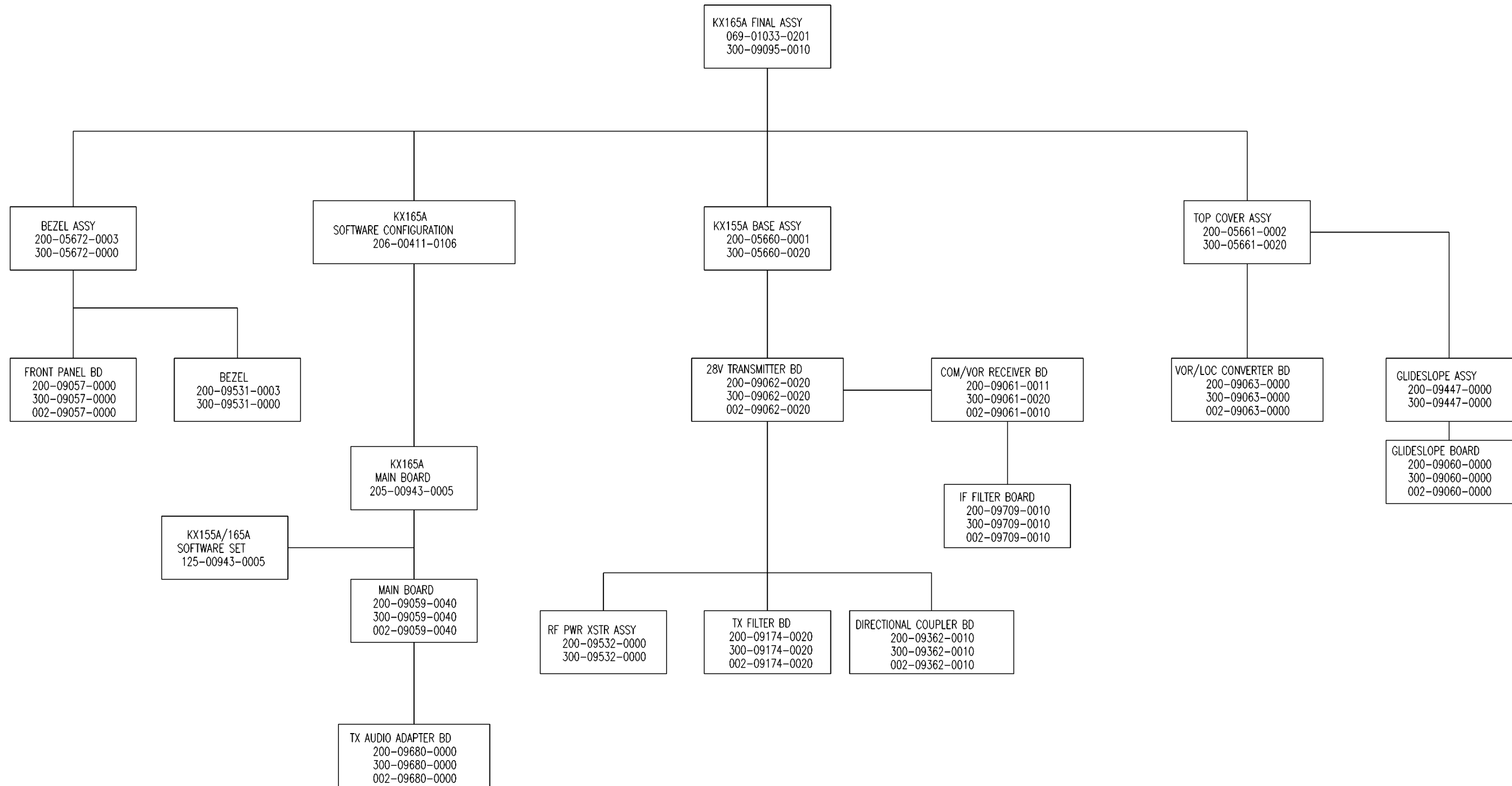**TX AUDIO ADAPTER BD**
200-09680-0000
300-09680-0000
002-09680-0000

FIGURE S-2, KX 165A, 069-01033-0201, SW ID 0106