Technical Manual

PCL 6000 SERIES
Studio-Transmitter Links

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Moseley

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GLOSSARY

AFC	Automatic frequency control
AGC	Automatic gain control
BPF	Band pass filter
dB	Decibel
dBm	Decibel relative to 1 mW
DVM	Digital Voltmeter
EMI	Electromagnetic Interference
FET	Field effect transistor
FMO	Frequency Modulation Oscillator
FSK	Frequency Shift Keying
IC	Integrated circuit
IF	Intermediate frequency
IMD	Intermodulation distortion
IPA	Intermediate power amplifier
kHz	Kilohertz
LED	Light-emitting diode
LO	Local Oscillator
MAI	Moseley Associates, Inc.
MUX	Multiplex
NC	Normally closed
NO	Normally open
PCB	Printed circuit board
PGM	Program
RCVR	Receiver
RX	Receiver
SCA	Subsidiary communications authority
SNR	Signal-to-Noise Ratio
SRD	Step Recovery Diode
STL	Studio-Transmitter Link
THD	Total harmonic distortion
TTL	Transistor-transistor logic
TX	Transmitter
µV	Microvolts
Vp	Volts peak
Vp-p	Volts peak-to-peak
VRMS	Volts, Root-Mean-Square
XMTR	Transmitter

Section One

System Characteristics

Contents

1.1 Introduction

The PCL 6000 Studio-to-Transmitter Link (STL) is designed to convey FM program material from a studio site to a transmitter site. The PCL 6000 also simultaneously conveys control and secondary programming subcarriers. This equipment may also be used to provide high-quality program transmission in intercity relay service.

The PCL 6000 series of equipment is a family of equipment that can operate in several bands from 150 MHz through 1.7 GHz. This operating manual covers the 220 MHz, 330 MHz, 450 MHz, 950 MHz, and 1.7 GHz bands of operation and the various configutions in those bands.

1.2 System Specifications

1.2.1 PCL 6020/6030/6060 Composite System

Frequency Range	148-174 MHz 215-240 MHz 300-330 MHz 440-470 MHz 890-960 MHz 1.5-1.7 GHz
Channel Spacing	100-500 kHz (500 kHz standard)
Frequency Response	± 0.2 dB or better, 30 Hz to 53 kHz ± 0.3 dB or better, 30 kHz to 75 kHz
Distortion:	
THD and IMD (6020)	0.2% or less, 30 Hz to 7.5kHz (typically better than 0.15% at 1 kHz) Convolved stereo demodulation products greater than 50 dB below the 100% modulation reference level (400 Hz) from 7.5 kHz to 15 kHz
THD and IMD (6030/6060)	0.1% or less, 30 Hz to 7.5 kHz (typically better than 0.1% at 1 kHz) Convolved stereo demodulation products greater than 50 dB below the 100% modulation reference level (400 Hz) from 7.5 kHz to 15 kHz
Stereo Separation (6020)	50 dB or better, 50 Hz to 15 kHz (typically 55 dB or better)

Stereo Separation (6030/6060)	51 dB or better, 50 Hz to 15 kHz (typically 55 dB or better)
Nonlinear Crosstalk:	
Sub to Main Channel (6020)	50 dB or better
Main to Sub Channel (6030/6060)	51 dB or better
Signal-to-Noise Ratio (6020)	72 dB or better (typically 75 dB) Demodulated,de-emphasized (left or right) Referenced to 100% modulation
Signal-to-Noise Ratio (6030/6060)	75 dB or better (typically 77 dB) Demodulated, de-emphasized (left or right) Referenced to 100% modulation
Emission	500F9

1.2.2 PCL 6020/6030/6060 Monaural System

Frequency Range	148-174 MHz 215-240 MHz 300-330 MHz 440-470 MHz 890-960 MHz 1.5-1.7 GHz
Frequency Response	± 0.3 dB or better, 30 Hz to 15 kHz
Distortion:	
THD and IMD (6020)	0.2% or less, 30 Hz to 15 kHz (typically better than 0.15% at 1 kHz)
THD and IMD (6030/6060)	0.1% or less, 30 Hz to 15 kHz (typically better than 0.10% at 1 kHz)
Signal-to-Noise Ratio (6020)	72 dB or better (typically 75 dB) Referenced to 100% modulation
Signal-to-Noise Ratio (6030/6060)	75 dB or better (typically 77 dB) Referenced to 100% modulation
Operating Temperature	-20 °C to +70 °C

Emission	110F3 (no subcarrier) 110F9 (w/ 26 kHz control subcarrier) 230F9 (w/ 67 kHz program subcarrier)

1.2.3 PCL 6010 Transmitter Specifications

Type	Solid state Direct FM Frequency synthesized Crystal referenced
RF Power Output (800-960 MHz)	5 watts minimum, 7 watts maximum
RF Power Output (148-470 MHz)	10 watts minimum, 15 watts maximum
RF Output Connector	Type N Female, 50 ohm
Deviation (100% Modulation)	± 50 kHz (Composite) ± 40 kHz (Monaural)
Frequency Stability	Better than 0.00025% from 0 °C to 50 °C
Spurious & Harmonic Emission	More than 60 dB below carrier level
Modulation Capability	One program and two subcarrier channels
Modulation Inputs:	Composite: 3.5 Vp-p @ 6 Kilohms, unbalanced Frequency range: 30 Hz-80 kHz (1 BNC connector) Monaural: +10 dBm @ 600 ohms, balanced,floating. Frequency range: 30 Hz-15 kHz (Barrier strip connector) MUX 1: 1.5 Vp-p @ 4 Kilohms, unbalanced Frequency range: 85-200 kHz (1 BNC connector) MUX 2: 1.5 Vp-p @ 4 Kilohms, unbalanced Frequency range: 85-200 kHz (1 BNC connector)
Power Source	100/120/220/240 VAC (± 10%), 50/60 Hz 70 Watts 12/24/48 VDC (optional)
Dimensions	3.5" (8.9 cm) high 19" (48.3 cm) wide 16.5" (41.9 cm) deep
Shipping Weight	12.7 kg (28 lb) domestic

1.2.4 PCL 6020/6030/6060 Receiver Specifications

RF Input Connector	Type N female, 50 ohm
Sensitivity (6020)	Composite: 120µV or less required for 60dB SNR; left or right channel de-emphasized, demodulated Monaural: 20µV or less required for 60dB SNR
Sensitivity (6030/6060)	Composite: 100µV or less required for 60dB SNR; left or right channel de-emphasized, demodulated Monaural: 20µV or less required for 60dB SNR
Selectivity:	
Composite	3 dB IF bandwidth: ± 125 kHz 80 dB IF bandwidth: ± 1.2 MHz
Monaural	3 dB IF bandwidth: ± 90 kHz 80 dB IF bandwidth: ± 1.2 MHz
Spectral Efficient Composite	3 dB IF bandwidth: ± 100 kHz 80 dB IF bandwidth: ± 1.0 MHz
Adjacent Channel Level (to degrade SNR by 3 dB):	
(6020)	+10 dBc
(6030/6060)	+20 dBc—wide band +10 dBc—narrow band
Modulation Outputs	Composite: 3.5 Vp-p @ 200 ohm, unbalanced Frequency range: 30 Hz-80 kHz (2 BNC connectors, parallel connection)

Modulation Outputs (cont.)	Monaural: +10dBm @ 600 ohms, balanced Frequency range: 30 Hz-15 kHz (Barrier strip connector) MUX: 1.5 Vp-p @ 100 ohm, unbalanced Frequency range: 85-200 kHz (2 BNC connectors, parallel connection)
Power Source	100/120/220/240 VAC (± 10%), 50/60 Hz 30 Watts 12/24/48 VDC optional
Dimensions	3.5" (8.9 cm) high 19" (48.3 cm) wide 16.5" (41.9 cm) deep
Shipping Weight	12.7 kg (28 lb) domestic

1.3 System Features

In addition to establishing a new industry standard for performance, the PCL 6000 incorporates many new and innovative features to aid in the installation, operation, and maintenance of a system. Some of the features are:

- Very low distortion ceramic IF filters offering unprecedented selectivity.
- Peak reading meter for all major functions.
- Two-decade logarithmic true signal strength meter.
- Important status functions implemented with bi-color LED indicators.
- Designed to have a minimum of adjustments for trouble-free operation.
- Modular construction that provides excellent shielding and at the same time allows easy access to components.
- Multichannel Option: Up to sixteen pre-programmed channels available with remote operation capabilities.

It is recommended that the manual be studied at least through Section 5 before attempting to install the system.

1.4 System Description

1.4.1 PCL 6010 Transmitter

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The PCL 6010 Transmitter is a high-fidelity broadband FM transmitter with a power output of 6 watts. It is capable of transmitting the program signal and two multiplex subcarriers with little degradation of signal quality over one link. The linearity and FM noise characteristics of the direct FM oscillator are exceptional. The transmitter is modular in construction and operation, and the system description given below follows the signal flow through the various modules.

The system assembly drawings are located in Section 7 along with the module schematics and assembly drawings. The system block diagrams and system schematics are at the end of this section.

Audio Processor

The Audio Processor is located in the TX Audio/Power Supply board. Three signal inputs are provided to the Audio Processor module: one audio (composite or monaural) signal and two multiplex signals. The composite input level is 3.5 Vp-p (5.7 kohms), mono input level is +10 dBm (600 ohms, selectable), mux input level is 1.5 Vp-p. 75 µs pre-emphasis is selectable. The board is jumper-programmable for composite, mono, or digital input operation and level adjustments are provided for all functions. Summing amplifiers combine the inputs into a single baseband signal that is passed on to the FMO Synthesizer in the RF module.

FMO Synthesizer

The baseband signal from the Audio Processor modulates the frequency modulated oscillator (FMO) in the RF module. The FMO consists of a 60-80 MHz ultralinear, very low noise VCO which is phase locked to a crystal-controlled reference oscillator. The phase lock loop contains the frequency programming switches which allow the synthesizer to be changed in frequency steps of 25 kHz. The RF output of the FMO is filtered to attenuate any harmonics. With 100% modulation, the RF signal will deviate ±50 kHz (composite) or ±40 kHz (monoraul) from the carrier. The output power of the FMO is approximately 1 milliwatt.

1st Local Oscillator (950 MHz)

The 1st Local Oscillator (LO1) section of the RF module consists of an oven controlled crystal oscillator, a doubler and a step recovery diode (SRD) multiplier. The oscillator operates at 102 MHz (nominal). The resultant multiplication factor of the LO is X10. The output (1020 MHz) is filtered and attenuated before being applied to the upconverter mixer. A level detector provides front panel metering information. The output power is approximately +10 dBm.

1st Local Oscillator (330/450 MHz)

The 1st Local Oscillator (LO1) section of the RF module consists of an oven controlled crystal oscillator, a doubler and a step recovery diode (SRD) multiplier. The oscillator operates at 96.25 MHz (nominal). The resultant multiplication factor of the LO is X4. The output (385 MHz) is externally filtered and then attenuated before being applied to the upconverter mixer. A level detector provides front panel metering information. The output power is approximately +10 dBm.

1st Local Oscillator (220 MHz)

The 1st Local Oscillator (LO1) section of the RF module consists of an oven controlled crystal oscillator and a step recovery diode (SRD) multiplier. The oscillator operates at 97 MHz (nominal). The resultant multiplication factor of the LO is X3. The output (291 MHz) is externally filtered and then attenuated before being applied to the upconverter mixer. A level detector provides front panel metering information. The output power is approximately +10 dBm.

1st Local Oscillator (1.7 GHz)

The TX RF module output frequency (850 MHz, nominal) is multiplied (X2) in the Doubler Assembly to achieve the desired carrier frequency (1.7 GHz, nominal). Therefore, the operating frequency of the 1st LO is nearly identical to the 950 MHz band configuration. The 1st LO (LO1) section of the RF module consists of an oven controlled crystal oscillator, a doubler and a step recovery diode (SRD) multiplier. The oscillator operates at 92 MHz (nominal). The resultant multiplication factor of the LO is X10. The output (920 MHz) is filtered and attenuated before being applied to the upconverter mixer. A level detector provides front panel metering information. The output power is approximately +10 dBm.

Up Converter

To preserve the low noise and low distortion characteristics of the FMO, the RF signal is up-converted to the required carrier frequency through the use of a double-balanced mixer and the 1st Local Oscillator (LO1). The appropriate mix product is selected with a bandpass filter. The Intermediate Power Amplifier (IPA) amplifies the signal to a level high enough to drive the RF power amplifier (RFA) or the Doubler Assembly in the 1.7 GHz system. The Upconverter/IPA is located in the RF module.

RF Amplifier (950 MHz)

The RF Amplifier module internally consists of a three-stage hybrid amplifier, which amplifies the input signal (40 mW, typ.) to the nominal 6-watt transmitter output. The output is filtered to attenuate all higher order harmonics to a level of at least -60 dBc. The output is sampled via a dual directional coupler with detectors that provide an indication of the forward and reflected power of the RF amplifier. The final stage current is sampled and metered in this module.

RF Amplifier (450 MHz)

The RF Amplifier module internally consists of a three-stage hybrid amplifier, which amplifies the input signal (100 mW, typical) to the nominal 10-watt transmitter output. The output is filtered to attenuate all higher order harmonics to a level of at least -60 dBc. The output is sampled via a dual directional coupler with detectors that provide an indication of the forward and reflected power of the RF amplifier. The final stage current is sampled and metered in this module.

RF Amplifier (330 MHz)

The RF Amplifier module internally consists of a three-stage discrete design, which amplifies the input signal (100 mW, typ.) to the nominal 10-watt transmitter output. The output is filtered to attenuate all higher order harmonics to a level of at least -60 dBc. The output is sampled via a dual directional coupler with detectors that provide an indication of the forward and reflected power of the RF amplifier. The final stage current is sampled and metered in this module.

RF Amplifier (220 MHz)

The RF Amplifier module internally consists of a two-stage discrete design, which amplifies the input signal (100 mW, typ.) to the nominal 10-watt transmitter output. The output is filtered to attenuate all higher order harmonics to a level of at least -60 dBc. The output is sampled via a dual directional coupler with detectors that provide an indication of the forward and reflected power of the RF amplifier. The final stage current is sampled and metered in this module.

Doubler Assembly (1.7 GHz)

The output frequency of the TX RF module is one-half the desired carrier frequency (850 MHz, nominal). The output is applied to the Doubler Assembly which multiplies the signal (X2) and is filtered before being amplified by the RFA (1.7 GHz, nominal).

RF Amplifier (1.7 GHz)

The RF Amplifier module internally consists of a four-stage discrete design, which amplifies the input signal (1 mW, typical) to the nominal 6-watt transmitter output. The output is filtered to attenuate all higher order harmonics to a level of at least -60 dBc. The output is sampled via a dual directional coupler with detectors that provide an indication of the forward and reflected power of the RF amplifier. The final stage current is sampled and metered in this module.

Transmitter Control

The Transmitter Control section of the Audio/Power Supply board has several functions. One of these is to sense the AFC LOCK detect signal from the RF module. If this module goes out of lock, then the radiate control logic circuit provides a signal to the power supply to turn off the +12.5 VDC supply (+22 VDC for 1.7 GHz) to the IPA and RFA, causing the transmitter to stop radiating. Remote control functions are implemented in this circuitry.

Metering and Status

The Metering and Status circuitry on the Audio/Power Supply board conditions the various system parameter samples for accurate meter indications, and drives the status LEDs on the front panel. Remote status indications are also provided by this circuitry.

Power Supply (AC)

The Power Supply section of the Audio/Power Supply board converts any of four AC input voltages (100, 120, 220, 240 VAC) into the five regulated DC voltages required for the operation of the transmitter. The outputs are +15, -15, and +5 VDC for the most of the system electronics. A high current +12.5 VDC (+22 VDC for 1.7 GHz) supplies the RFA. A regulated -12 VDC supply is provided to power the crystal ovens in the 1st LO and the FMO/Synthesizer.

Power Supply (DC)

Transmitters configured for DC operation only (±12, ±24, and ±48 VDC) have internal switching power supplies to provide the system voltages. These supplies can be isolated from chassis ground to allow negative DC source operation. The RFA supply may be powered directly from the battery, depending on the primary DC source.

Multichannel Operation (Option)

The Channel Control board is pre-programmed to select the transmitter carrier frequency by controlling the FMO/synthesizer (in the RF module) and the modulation compensation circuitry (located on board). This board has facilities for over-ride of the pre-programmed channel frequencies (CH. 0 operation). Remote control of the channel selection is also provided on this board through access to the back panel.

(Continued next page)

Channel selection and display is accessed by the user through the front panel. The Channel Control board connects to the RF module via a 25-pin D ribbon cable. The RF module must be compatible for multichannel operation. Please contact the factory for field retrofit of the system.

1.4.2 PCL 6020/6030/6060 Receivers

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6020

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Description	Drawing No.	Figure No.
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Description	Drawing No.	Figure No.
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The PCL 6000 System has three receivers which are designed for different RF environments. The PCL 6060 and 6030 are triple-conversion receivers which provide maximum out-of-band and adjacent channel protection. The PCL 6060 exhibits superior front end performance in the presence of extremely strong RF fields, as it uses modules from the time-proven Moseley PCL 606 STL. The PCL 6020 is a dual-conversion receiver that provides maximum performance in all but the most demanding environments. Both systems are switchable to support mono or composite operation. The receivers are modular in construction and operation, and the system description given below follows the signal flow in the block diagrams referenced above.

The system assembly drawings are located in Section 7 along with the module schematics and assembly drawings. The system block diagrams and system schematics are at the end of this section.

Preselector/Preamplifier (950 MHz, 6020/6030)

The Preselector/Preamplifier is located in the RF module. The antenna input signal is first passed through the preselector filter, which is a pcb-mounted helical bandpass filter with very low insertion loss. The output of the preselector filter is fed to the preamplifier providing low-noise gain. The postselector filter provides further filtering as well as image noise rejection.

Preselector Filter (950 MHz, 6060)

The antenna input signal is first passed through the Preselector Filter, which is a five-element, interdigital bandpass filter with a 20 Mhz bandwidth and maximum insertion loss of 1.5 db. This filter has superior rejection due to its mechanical implementation.

Preamp/1st Mixer (950 MHz, 6060)

The output of the Preselector Filter is fed to the Preamp/1st Mixer module. This module incorporates an adjustable PIN diode attenuator for user-adjustable front end protection. The low-noise, high-intercept point preamplifier is followed by the image noise filter. The 1st Mixer down-converts the carrier to the first IF (70 MHz) by mixing with the 1st LO and is buffered for transmission to the Double Converter/LO3 module.

Preselector Filter (220-450 MHz)

The antenna input signal is first passed through the Preselector Filter, which is a three-element, helical bandpass filter with an 8 Mhz bandwidth and maximum insertion loss of 1.5 db. This filter has superior rejection due to its mechanical implementation.

Preselector Filter (1.7 GHz)

The antenna input signal is first passed through the Preselector Filter, which is a five-element, interdigital bandpass filter with a 20 Mhz bandwidth and maximum insertion loss of 1.5 db. This filter has superior rejection due to its mechanical implementation.

Mixer (6020/6030)

The Mixer is located in the RF module when configured as a 6020 or 6030. The carrier frequency is mixed with the 1st Local Oscillator (LO1) signal to provide down conversion to the first intermediate frequency (IF) of 70 MHz (nominal). The IF signal is buffered to overcome mixer conversion loss.

1st Local Oscillator (950 MHz)

The receiver 1st LO is identical to the transmitter 1st LO referenced in section 1.4.1.

1st Local Oscillator (330/450 MHz)

The receiver 1st LO is identical to the transmitter 1st LO referenced in section 1.4.1.

1st Local Oscillator (220 MHz)

The receiver 1st LO is identical to the transmitter 1st LO referenced in section 1.4.1.

1st Local Oscillator (1.7 GHz)

The 1st Local Oscillator (LO1) section of the RF module consists of an oven controlled crystal oscillator, a doubler and a step recovery diode (SRD) multiplier. The oscillator operates at 102 MHz (nominal). The resultant multiplication factor of the LO is X16. The output (1632 MHz) is externally filtered and then attenuated before being applied to the upconverter mixer. A level detector provides front panel metering information. The output power is approximately +10 dBm.

2nd Local Oscillator

The 2nd Local Oscillator (LO2) is located in the RF module and is identical to the transmitter FMO except for operating frequency and modulation capability. LO2 consists of a 70-90 MHz ultralinear, very low noise VCO which is phase locked to a crystal-controlled reference oscillator. The phase lock loop contains the frequency programming switches which allow the synthesizer to be changed in frequency steps of 25 kHz. The RF output of LO2 is filtered to attenuate any harmonics. The output level is approximately +7 dBm.

Double Converter/LO3 (6030/6060)

The Double Converter/LO3 module provides the second and third down-conversions of the IF signal and establishes the selectivity characteristics of the receiver. The second IF is at 10.7 MHz and two phase-linear ceramic filters are used to provide system selectivity (composite or monaural). The second of these two filters is switch-selectable to allow the user to minimize distortion in those situations where the added selectivity is not necessary.

The 3rd Local Oscillator (LO3) is located in the Double Converter/LO3 module and is used for the third down-conversion to 3 MHz. LO3 is a crystal oscillator operating at 13.7 MHz. The output level is +7 dBm.

FM Demod (6030/6060)

The FM Demod module has three major functions. One is to extract the baseband information from the FM carrier. The second function is to generate the RF signal strength voltage that is applied to the meter in the RF LEVEL position, and the third is to establish the mute or squelch threshold of the receiver. The signal is first passed through a 3 MHz IF amplifier and a phase-linear 3 MHz bandpass filter. At this point, the signal is split and sent to both the FM demodulator and the log IF amplifier.

For FM demodulation, the signal runs through a four-stage limiting IF amplifier, the output of which passes on to the ultra-linear pulse-counting FM demodulator. This demodulator is extremely wideband and adjustment free. The output of the FM demodulator is low-pass filtered and sent to a low noise baseband amplifier, which raises the signal level to a useful system level. The output is then sent to the Audio/Power Supply board.

IF Demod (6020)

The IF Demod module provides down conversion to the second IF (10.7MHz), sets system selectivity in the second IF, extracts the baseband information from the carrier, provides the logarithmic RF signal strength voltage for metering, and establishes the mute threshold point of the receiver.

Baseband Processor

The main functions of the Baseband Processor circuitry on the Audio/Power Supply board are to split the baseband signal into two frequency bands: 30 Hz to 80 Hz for composite, and 85 kHz to 200 kHz for MUX. In the extended baseband version of the PCL 6000, the composite band spans 30 Hz to 110 kHz, and the MUX passband extends from 120 kHz to 200 kHz. For mono, the split is 30 Hz to 15 kHz for audio and 28-85 kHz for MUX. This module also contains the FET mute switch, which is controlled by the mute comparator output of the Mute and Transfer circuitry. The signal is then passed through a high-frequency amplitude corrector, which compensates for the baseband high-frequency roll-off caused by the 10.7 IF bandpass filters, to restore proper amplitude response to the baseband signal.

The signal is then fed to an audio amplifier and an 80 kHz (composite) or 15 kHz (mono) low-pass filter. The output of this filter passes through an active group delay equalizer, which compensates for the group delay variations of the low-pass filter. This signal is then buffered by an output amplifier that provides 3.5 V peak-to-peak output for 100% modulation. The output of the high-frequency amplitude corrector is also passed to a MUX high-pass filter (80 kHz composite, 22 kHz mono) and then goes to the MUX amplifier.

The output of this amplifier drives a MUX low-pass filter (200 kHz composite, 85 kHz mono) which is then buffered to yield the MUX nominal output of 1.5 V peak-to-peak.

Mute and Transfer

The Mute and Transfer circuitry located in the Audio/Power Supply board mutes the audio signal during periods of insufficient RF signal strength or for transferring operation to another receiver.

Metering and Status

The Metering and Status circuitry, located in the Audio/Power Supply board, conditions the metering samples and drives the status LED on the front panel and the front-panel meter. Remote status functions are also provided.

Power Supply (AC)

The Power Supply section of the Audio/Power Supply board converts any of four AC input voltages (100, 120, 220, 240 VAC) into the four regulated DC voltages required for the operation of the receiver. The outputs are +15, -15, and +5 VDC for the most of the system electronics. A regulated -12 VDC supply is provided to power the crystal ovens in the 1st and 2nd LO.

Power Supply (DC)

Receivers configured for DC operation only (±12, ±24, and ±48 VDC), have internal switching power supplies to provide the system voltages. These supplies can be isolated from chassis ground to allow negative DC source operation.

Multichannel Operation (Option)

The Multichannel Control board is pre-programmed to select the receiver frequency selection by controlling the LO2/synthesizer (in the RF module). This Control board has facilities for over-ride of the pre-programmed channel frequencies (CH. 0 operation). Remote control of the channel selection is also provided on this board through access to the back panel.

Channel selection and display is accessed by the user through the front panel. The Channel Control board connects to the RF module via a 25-pin D ribbon cable. The RF module must be compatible for multichannel operation. Please contact the factory for field retrofit of the system.

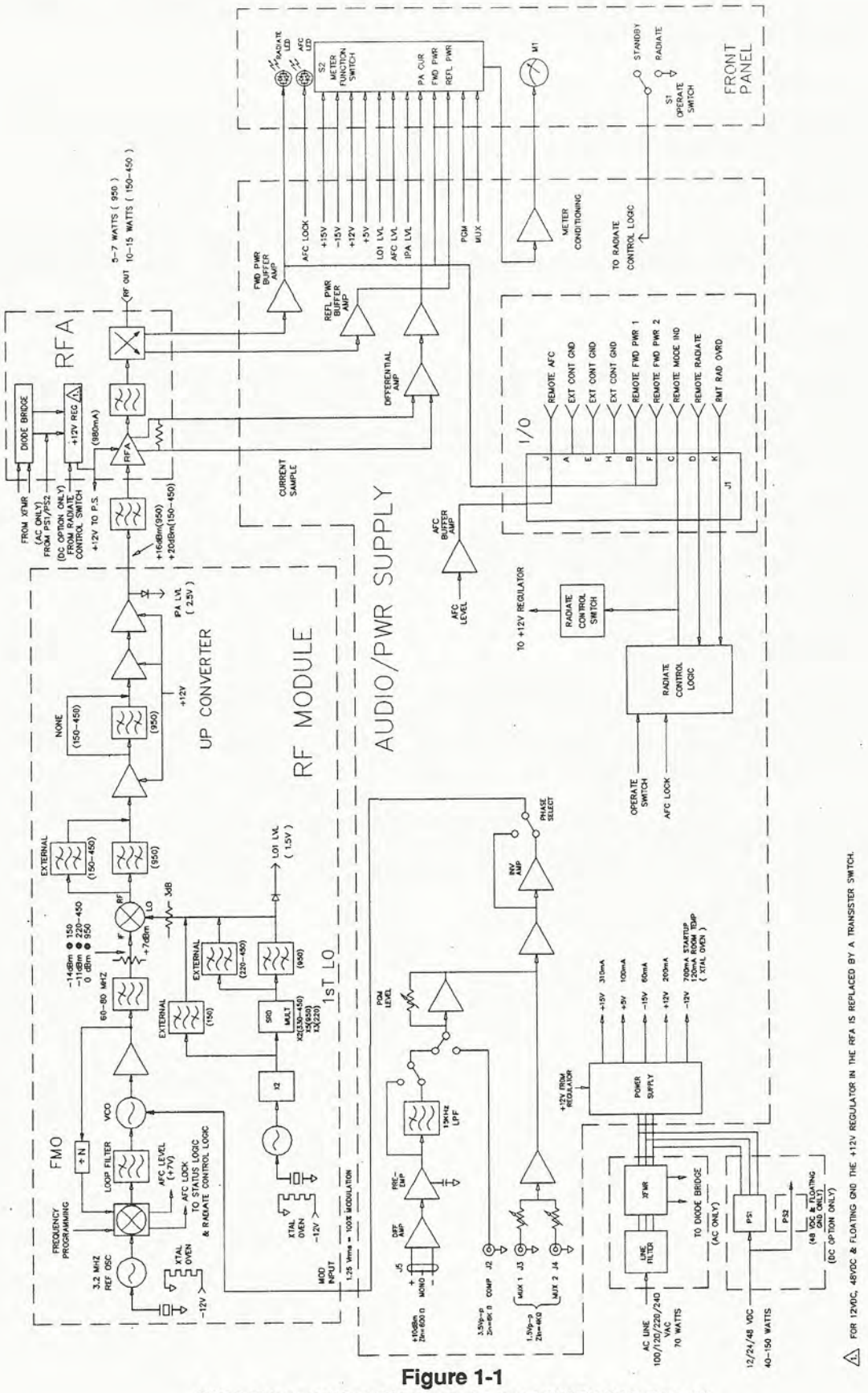


Figure 1-1
6010 Transmitter Block and Level (92D1319 Rev 4)

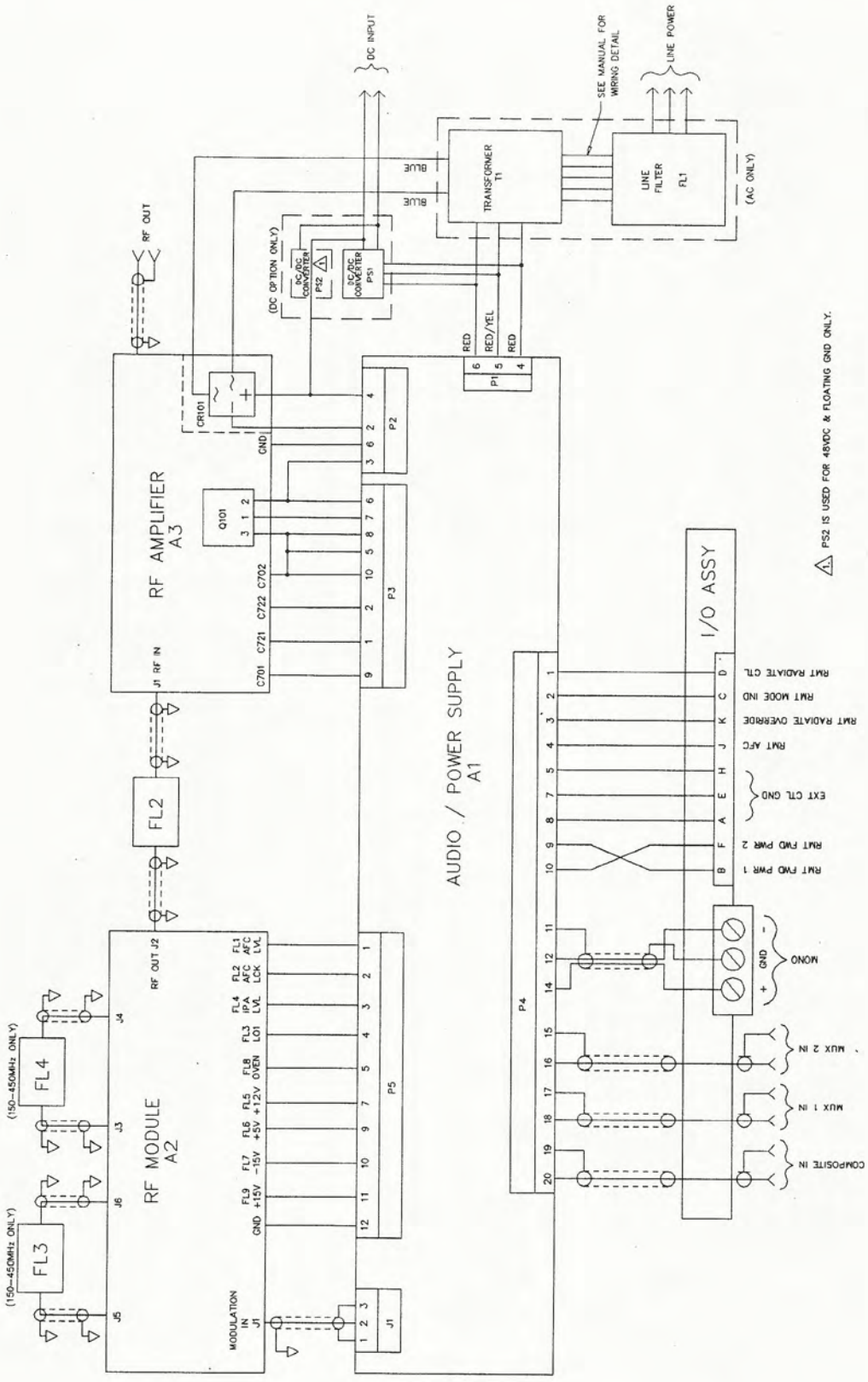


Figure 1-2
6010 Transmitter System Schematic (91D7448 Rev 6)

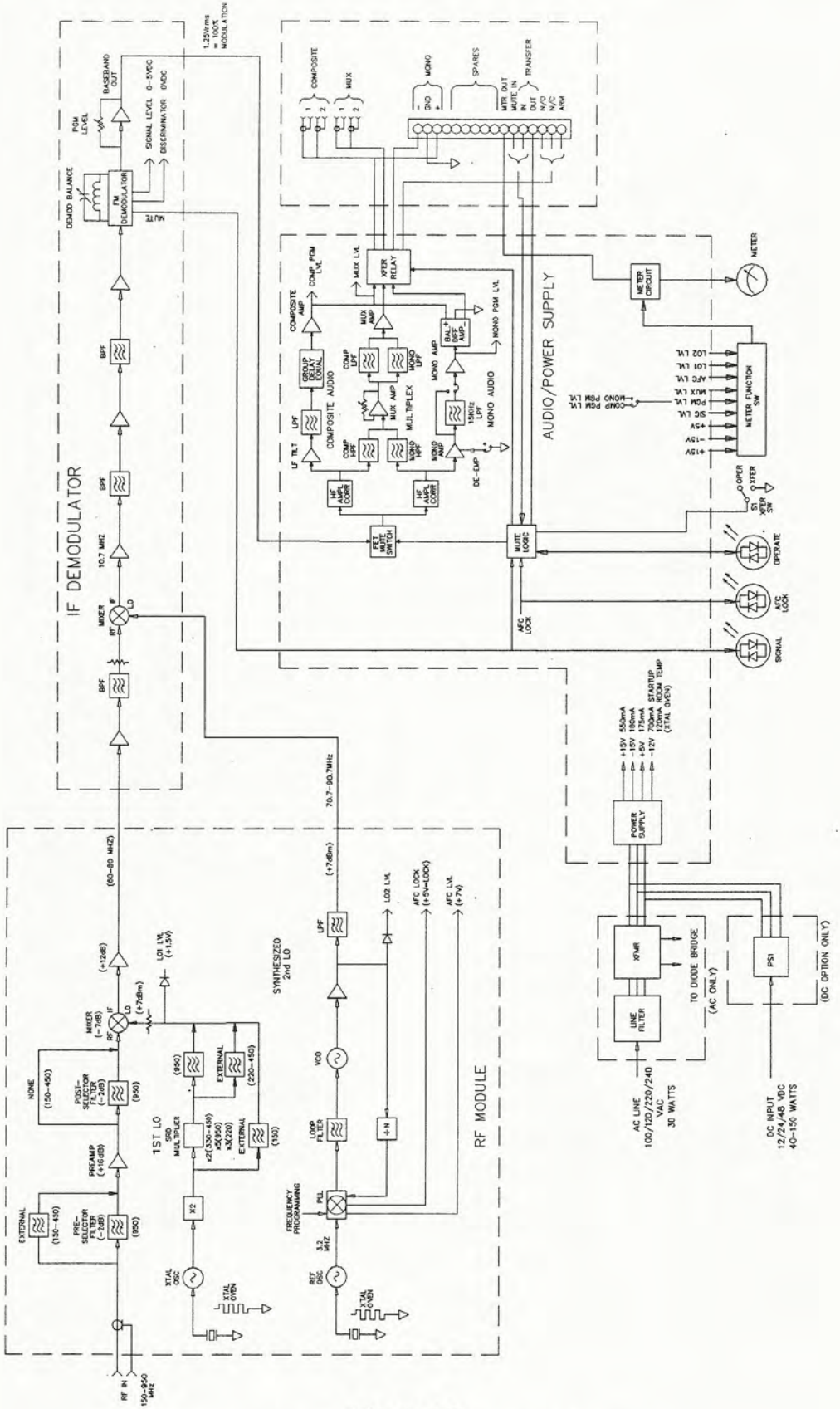


Figure 1-3
6020 Receiver Block and Level (92A1320 Rev 4)

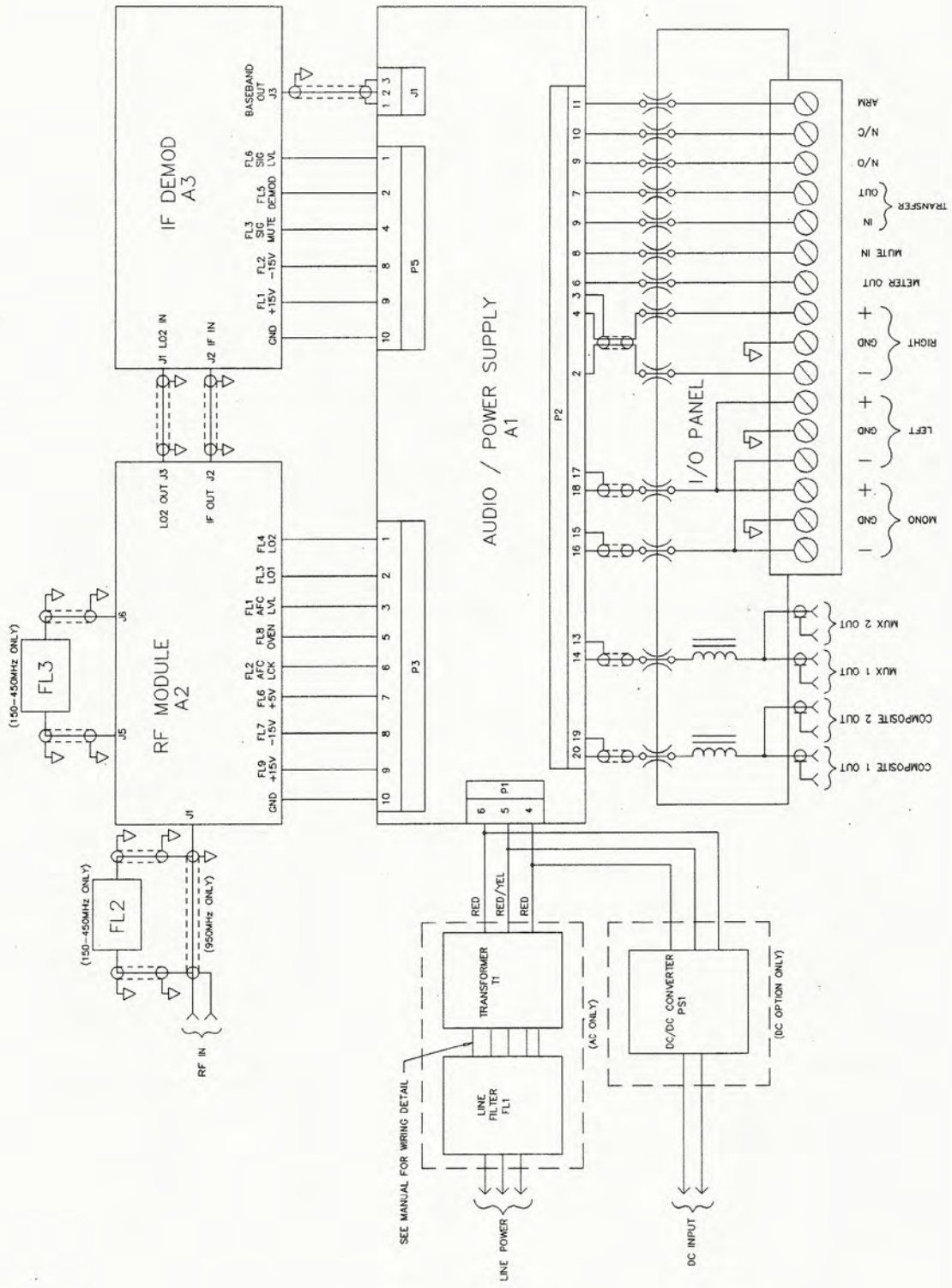


Figure 1-4
6020 Receiver System Schematic (91D7449 Rev 6)

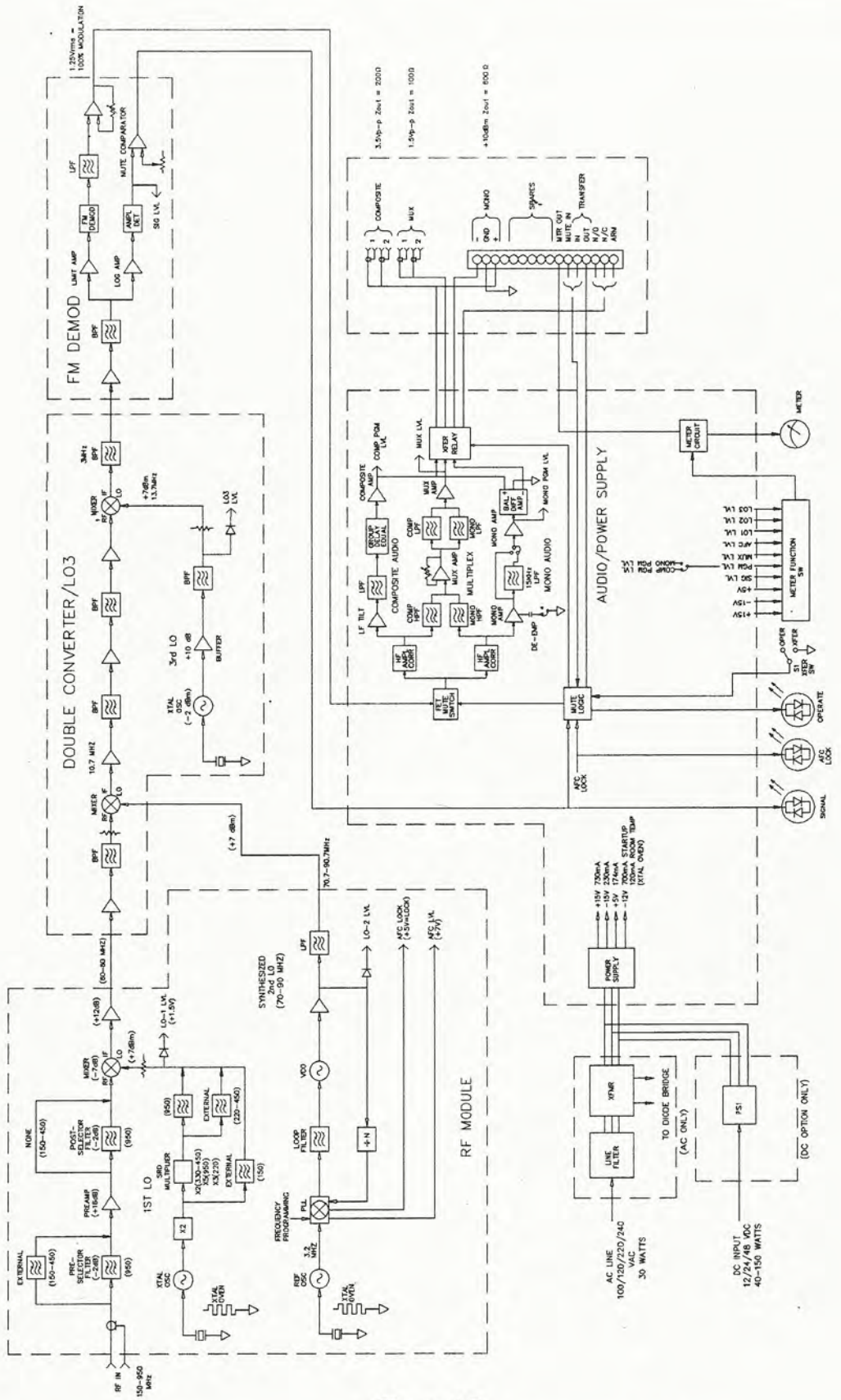


Figure 1-5
6030 Receiver Block and Level (92A1327 Rev 5)

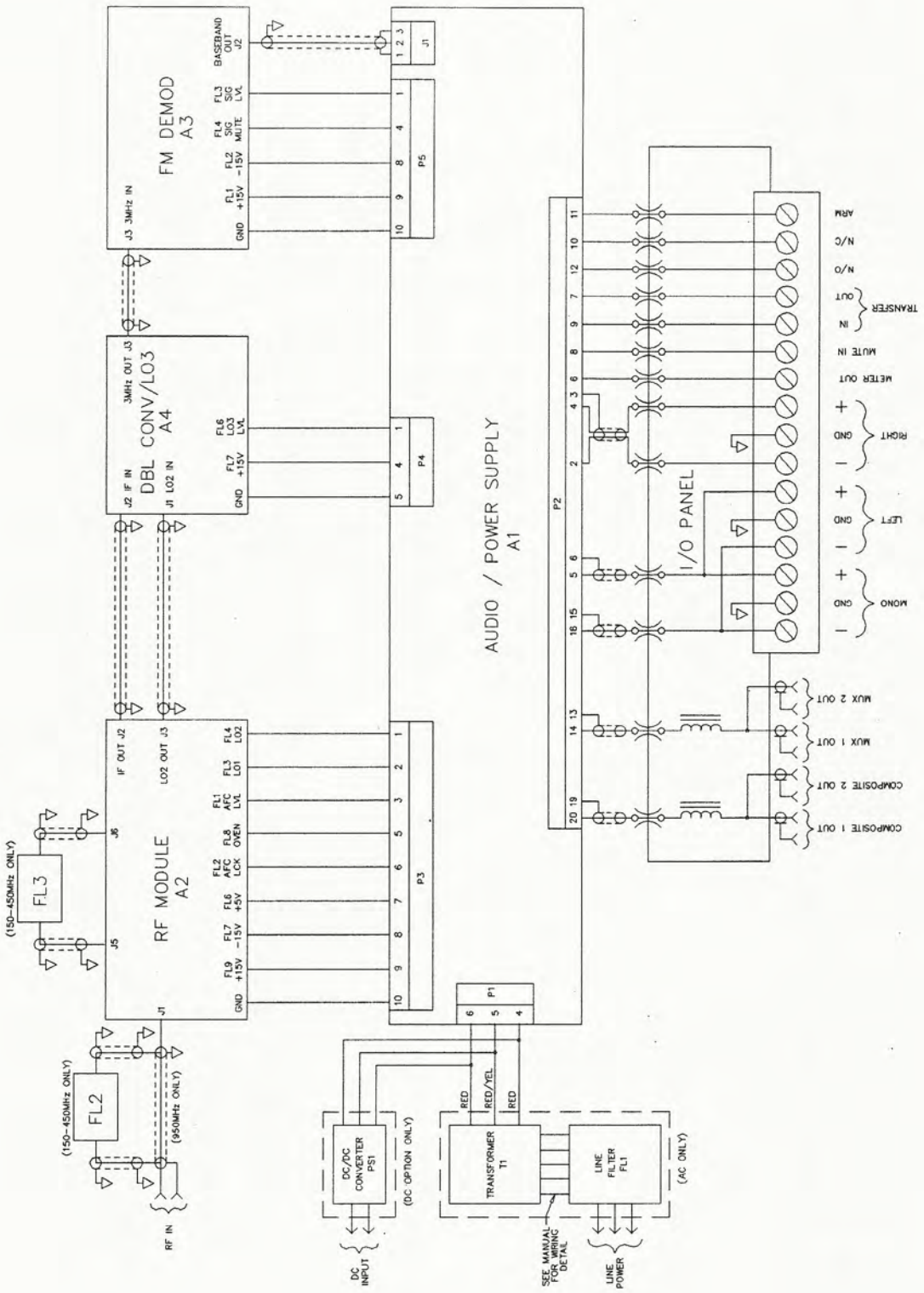


Figure 1-6
6030 Receiver System Schematic (91D7450 Rev 6)

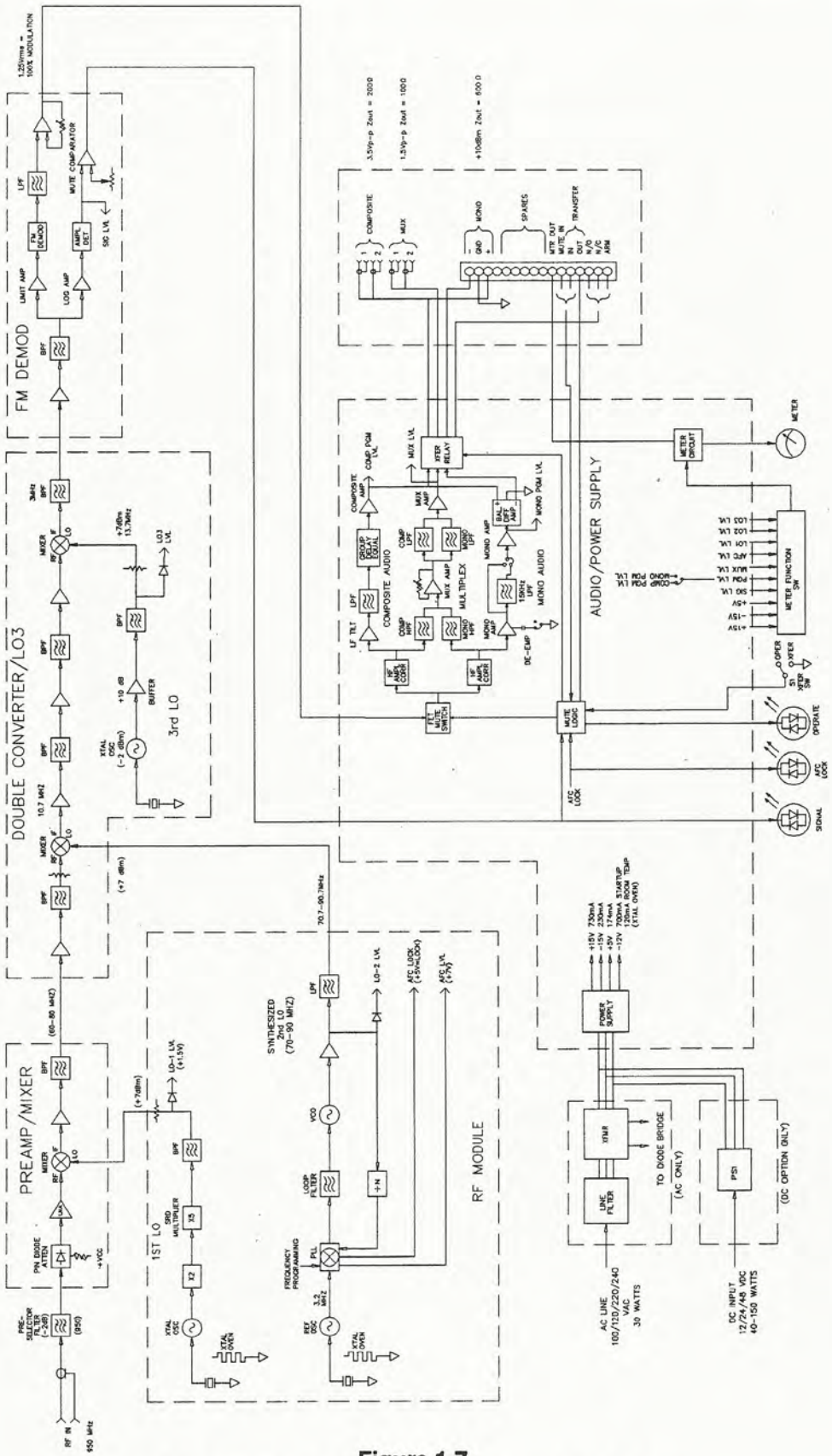


Figure 1-7
6060 Receiver Block and Level (92D1331 Rev 1)

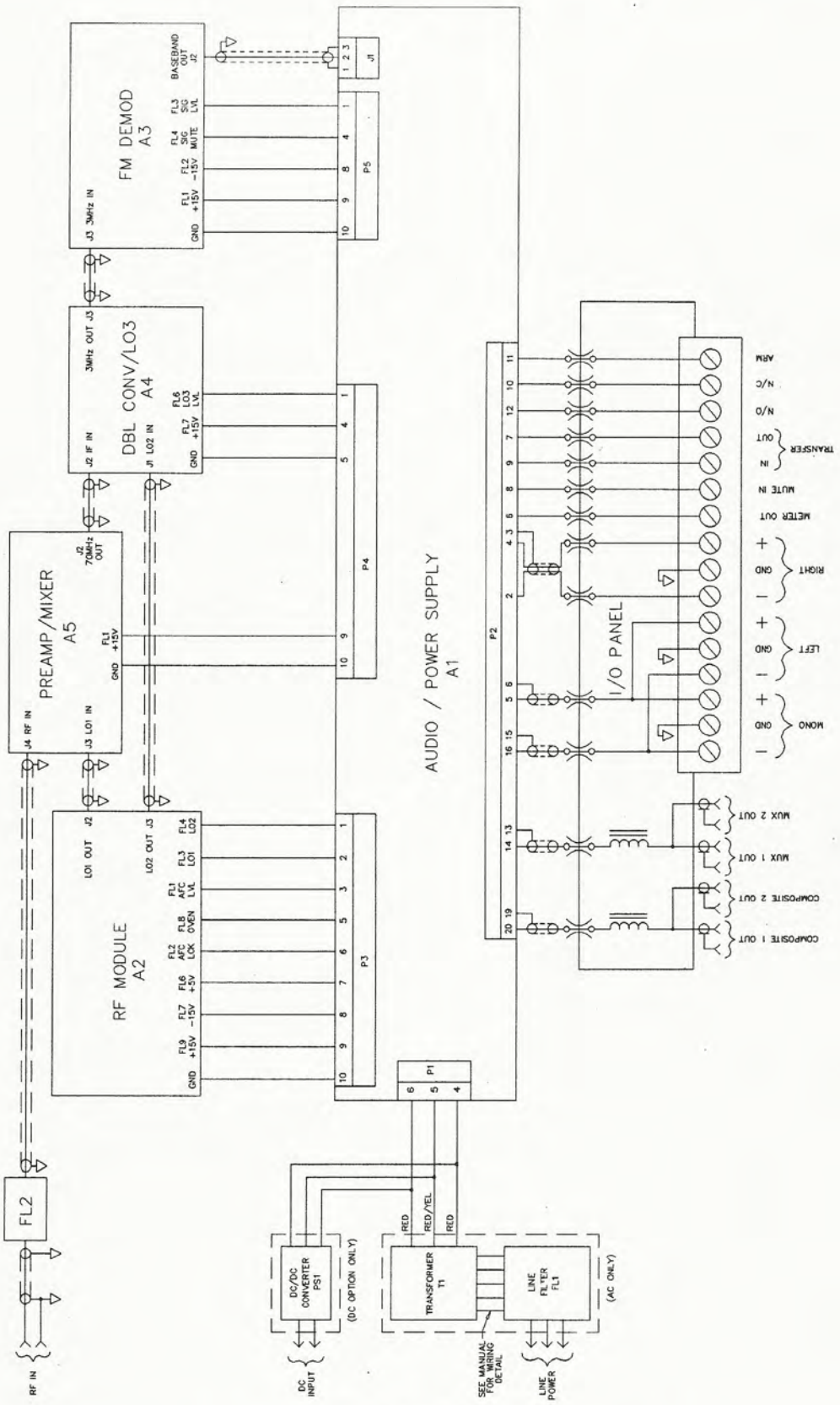


Figure 1-8
6060 Receiver System Schematic (91D7496 Rev 1)

Section Two

Installation

Contents

2.1 Unpacking

The PCL 6000 transmitter and receiver should be carefully unpacked and inspected for shipping damage. Should inspection reveal any shipping damage, visible or hidden, immediately file a claim with the carrier. Keep all packing materials until the performance of the system is confirmed.

We recommend that the top covers of both the transmitter and receiver be removed for a superficial inspection of the internal components. This should ascertain that all modules, assemblies, and cables are mechanically secure. After visually inspecting the internal components, replace the top covers.

CAUTION:

Do not attempt any adjustments of any kind until the nature of each adjustment is understood.

Do not apply power to the Receiver until the procedure in Section 2.2 is completed.

Do not apply power to the Transmitter until the procedure in Section 2.2 is completed and a proper load is connected to the RF output.

Do not remove the covers on the transmitter RF Amplifier module.

2.2 Line Voltage Selection

The transmitter and receiver each have the capability of operating at one of four nominal AC power source voltages: 100, 120, 220, or 240 VAC, 50-60 Hz. The units are shipped for 120 VAC operation, unless otherwise specified.

Select the operating voltage by programming the line filter / fuse holder on the back panel. Details can be found in Section 4.

If the operating voltage is changed, change the fuse in accordance with Table 2-1.

Table 2-1. Transmitter and Receiver Fuse Settings

Line Voltage	Transmitter Fuse (A)	Receiver Fuse (A)
100	2	1.0
120	2	1.0
220	1	0.5
240	1	0.5

2.3 Pre-installation Checkout

While the user has both the transmitter and receiver at the same location, we suggest that a pre-installation checkout of the system be performed before mounting the equipment in racks separated by many miles. Figure 2-1 shows one of the several possible bench test setups.

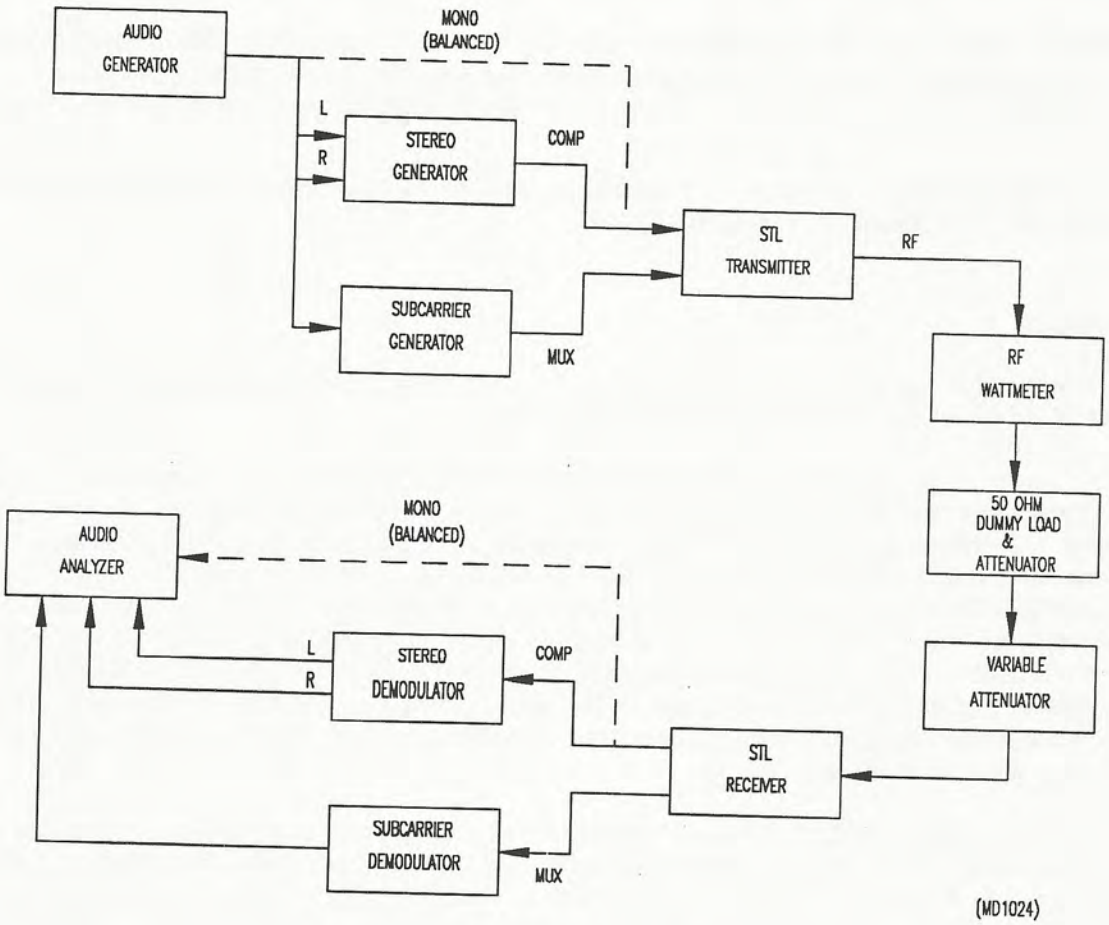


Figure 2-1
Typical Bench Test Setup

The minimum equipment to perform a bench test setup are:

1. An RF wattmeter with a measurement range of 5 to 15 watts (Bird 43 or equivalent).
2. A 50 Ohm, 10 watt dummy load with 30 dB attenuation output capability (Sierra 661A-30 or equivalent).
3. A low-distortion audio signal generator (Tektronix SG505 or equivalent).
4. An audio distortion analyzer (Tektronix AA501 or equivalent).
5. Variable attenuator, 0 to 100 dB (Kay Model 432D or equivalent).

More extensive testing can be accomplished using a stereo generator and demodulator combination and/or a subcarrier generator and demodulator combination.

Observe these precautions when performing any bench test:

CAUTION:

Always operate the transmitter terminated into a proper 50-ohm load.

Always attenuate the signal into the receiver to less than 3000 microvolts (Approximately 75 dB attenuation between the Transmitter and Receiver).

Failure to observe these precautions can cause the transmitter final transistor to be destroyed, or the receiver preamplifier transistors may be damaged.

Instructions:

With the wattmeter and dummy load connected to the transmitter, apply ac power to the Receiver. The OPERATE LED will be red, indicating that there is no RF.

Apply AC power to the transmitter and place the OPERATE/ STANDBY switch in the OPERATE position. "AFC LOCK" and "RADIATE" will be red for several seconds and then turn green. Observe that the wattmeter will indicate between 5 to 15 watts (depending on the frequency band of operation) and that the transmitter meter will provide readings of FWD PWR. A brief period after "RADIATE" becomes green, "OPERATE" on the receiver will change from red to green. The RF LEVEL meter position on the receiver may be selected to determine the strength of the RF signal applied to the receiver. Adjust the variable attenuator until an input signal strength of approximately 1000 microvolts is indicated. It should be mentioned that in any bench testing where the transmitter and receiver are in close proximity, there can be sufficient RF leakage from the cables to render computations of applied signal strength impractical based upon power and attenuation data.

Apply a 3.5 Vp-p signal (1.237 VRMS) from the audio signal generator at 400 Hz to the composite input of the transmitter. "PGM LEVEL" at the transmitter and receiver meters may be selected and should indicate 0 on the dB scale. The output voltage from a composite output of the receiver can be fed to an audio analyzer. The output voltage should be approximately 3.5 Vp-p (1.237 VRMS). The audio input signal may be removed and the broadband signal-to-noise ratio (SNR) determined:

$$SNR = 20\log\frac{(\text{RMS voltage with modulation})}{(\text{RMS voltage without modulation})}$$

(Note: Demodulated stereo SNR will be approximately 12 dB greater than broadband SNR.)

While this concludes the basic bench test of the units, the user may want to run further experiments to become familiar with the system. Sections 2, 5 and 6 should be consulted for a thorough understanding of the STL system before proceeding with any higher level testing. It must be noted that any testing for stereo performance must be accomplished with a very high quality stereo generator and stereo demodulator combination. The stereo generator and demodulator combination should be tested back to back to determine their performance independently of the STL link.

2.4 Rack Installation

The PCL 6000 units are designed for mounting in standard rack cabinets, preferably between waist and shoulder height. The transmitter and receiver have mounting holes for Chassis Trak C-300-5-1-14 chassis rack slides. If the rack will accept chassis rack slides, their use is recommended. If chassis rack slides are used, be sure to leave at least a 15-inch service loop in all cables to the equipment.

When mounting the transmitter or receiver in a rack, the unit must have an unobstructed free flow of air for cooling purposes across the rear panel. Continued operation in a confined environment can cause the ambient temperature to exceed specification, resulting in reduced life or catastrophic failure.

When a PCL 6000 Receiver is used with a PCL 606, PCL 600, PCL 505 or PCL 303 receiver, a transfer panel (such as a TPR-2) must be used to accomplish automatic switchover, and should be mounted between the two receivers. Receiver automatic switchover interconnections are detailed in Section 2.9.2.

When two transmitters are in a system at a site, an automatic transfer panel such as the TPT-2 should be mounted between them. The TPT-2 will allow interconnection of a PCL 6000 with another PCL 6000, PCL 600, PCL 606, PCL 505, or PCL 303 transmitter and can provide automatic switchover in the event of a detectable failure in the transmitter as shown in Section 2.9.1.

2.5 Antenna Installation

The installation of the antennas and associated feed lines determines to a large extent the long-term reliable operation of the STL. Experience has indicated that a reasonably clear path having an 0.6 Fresnel zone clearance along with good feed-line installation results in a highly predictable signal level at the receiver. The appendix contains a series of instructions, calculation sheets, typical gain and loss characteristics, and nomographs to enable the received signal level to be predicted. Since the PCL-6000 has a signal strength meter, it is possible to determine the quality of the antenna installation and path compared to the calculations.

Experience at 960 MHz has indicated that for reliable year-round operation with a predominantly overland path and 0.6 Fresnel zone clearance, a 20 dB fade margin should be used. At least a 25 dB fade margin should be allowed if the path is over water or flat terrain with little vegetation.

2.6 Transmission Cables

The transmission cable between antenna and transmitter or receiver should be coaxial cable whose loss characteristics are known. Typical quality low-loss foam dielectric lines such as Andrew LDF4-50, a 0.5 inch diameter cable, has a 2.4 dB loss per 100 feet at 950 MHz. This cable will generally be adequate where the total cable run (at both transmitter and receiver) is less than 300 feet and there is a good transmission path of less than 10 miles.

When the total transmission cable length exceeds 300 feet, an obstructed or grazing path occurs or the path length exceeds 10 miles, a lower loss cable such as Andrew LDF5-50, a 7/8 inch diameter cable with a loss of 1.4 dB per 100 feet, is recommended.

To reduce system losses, it is important to select type N connectors that are designed for the type of transmission cable used in the system. The connectors must then be installed in accordance with the manufacturer's recommendations. It sometimes will take only one improperly installed connector to reduce the received signal strength sufficiently to provide only marginal system performance.

Reasonable care should be exercised during the installation of the transmission cable. Never put a sharper bend radius in the cable than recommended by the manufacturer. Too sharp a bend can cause internal cable damage that is not observable on the outside of the cable. This damage can result in excessive loss in the cable. Since the higher quality transmission cables are relatively inflexible, Moseley Associates has several short "pigtail" assemblies available. These "pigtails" are designed to attach to the ends of the transmission cable and allow movement of the equipment or antenna with less chance of damaging the transmission cable or the connectors on the equipment. These "pigtails" and appropriate connectors are available in installation kits for the more popular types of transmission cable.

Figure 2-2 shows typical transmitter RF connections for the transmission cable to the antenna and Figure 2-3 shows typical receiver RF connections.

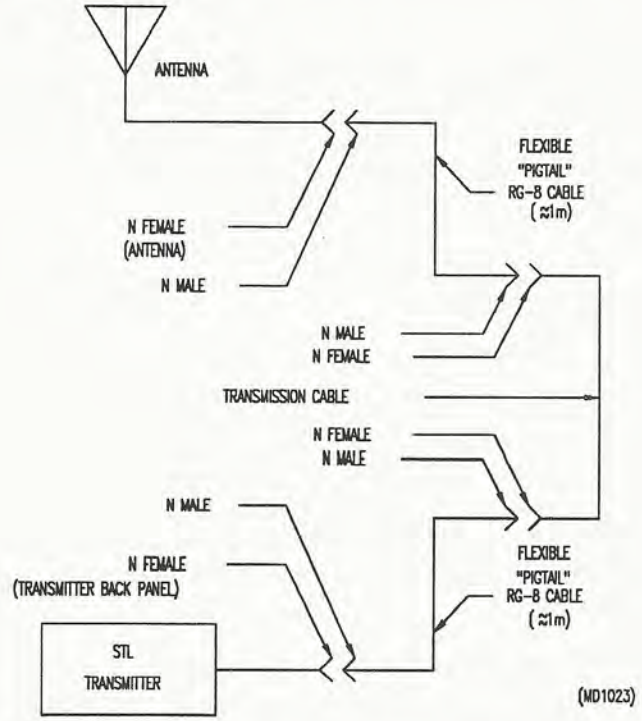


Figure 2-2
Typical PCL-6010 Transmitter RF Connects

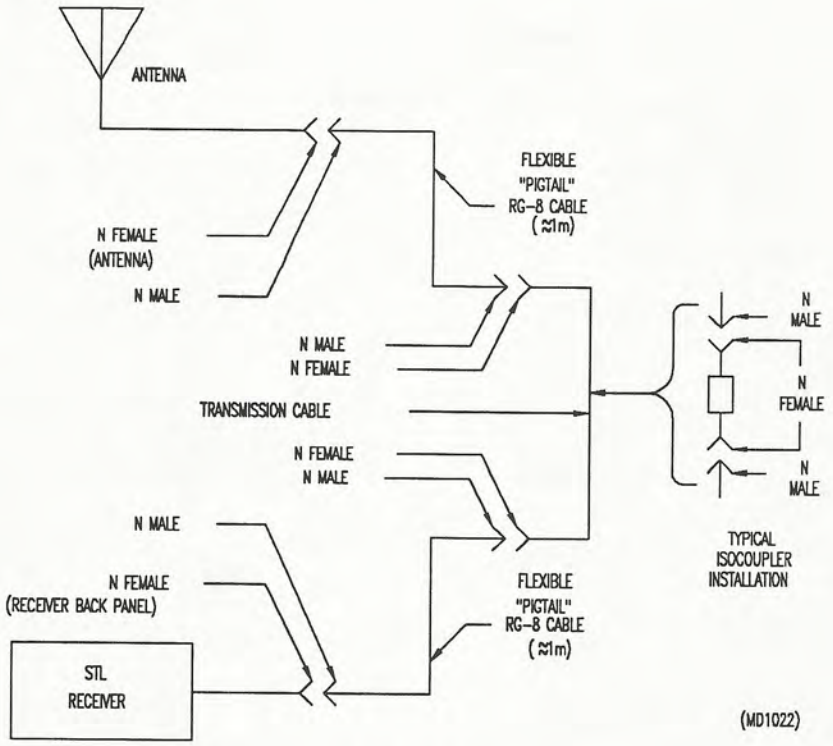


Figure 2-3
Typical PCL-6000 Receiver RF Connects

Should it be desired to mount the antenna on a series-fed standard broadcast tower, the required isolation can be obtained with the installation of a Moseley Associates Isocoupler at the base of the series-fed antenna. Isolation at standard broadcast frequencies is high, and the isocoupler introduces only approximately 1.5 dB loss at the STL frequency.

2.7 Program and Multiplex Installation (Transmitter)

Figure 2-4 depicts the typical interconnection of a PCL 6000 as would normally be found at the studio. The left and right program material is first passed through an automatic gain control (AGC) unit to first establish the nominal system levels. This is followed by a frequency-conscious audio limiter to prevent overmodulation of the system as the result of the normal pre-emphasis curve used in FM broadcasts.

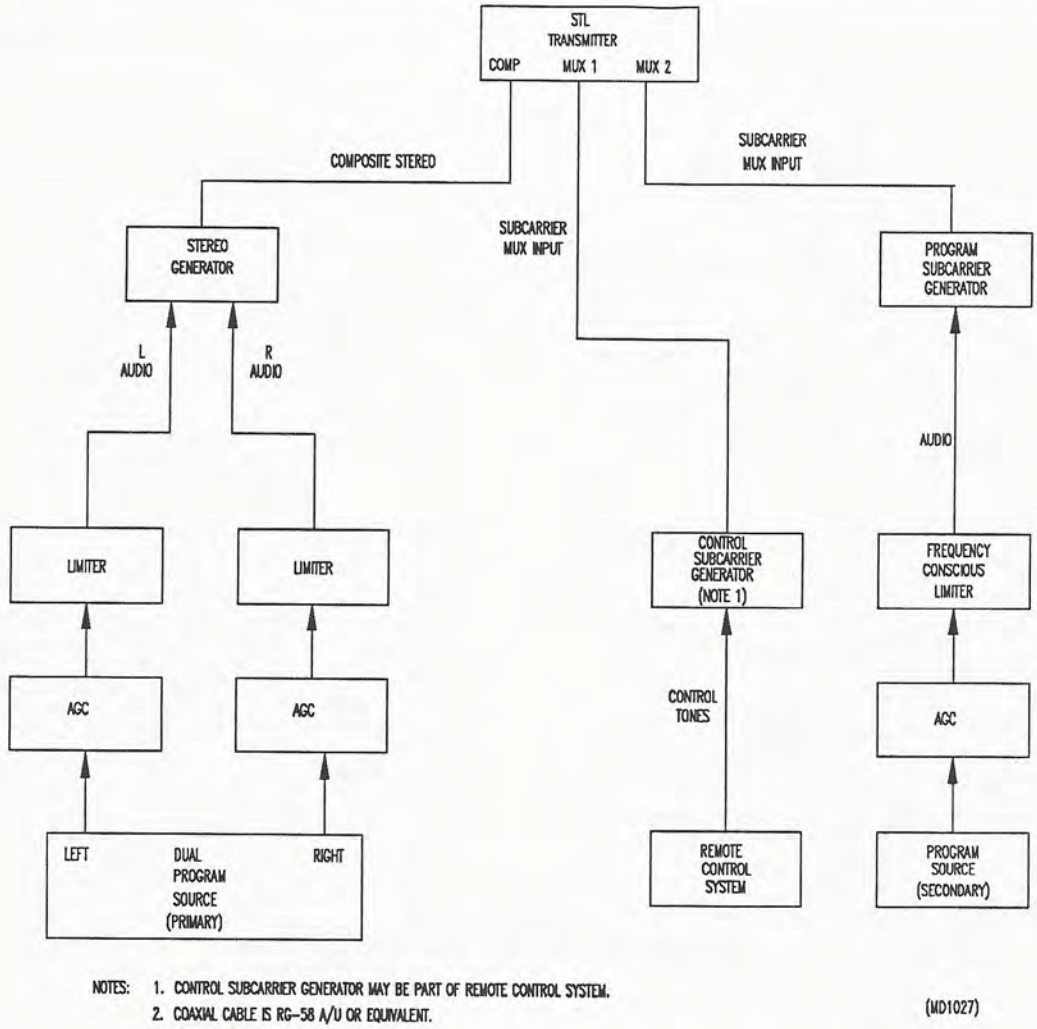


Figure 2-4
Transmitter PGM and MUX Interconnect—Composite

It is highly desirable that the gain control or limiting units for each channel be interconnected so that any processing that occurs on one channel is performed in the same manner on the other channel.

The limiter outputs are then fed to a stereo generator for conversion of the left and right channels into the standard FM composite baseband signal. The composite signal is then fed into the composite input of the PCL 6000. The standard composite signal is unbalanced, 3.5 Vp-p for 100 percent modulation. BNC connectors with type RG-58 A/U coaxial cable are generally used for the interconnection.

CAUTION:

Never overmodulate the STL transmitter, as this will cause increased distortion in the received signal and, possibly, interference to other users in the STL band.

The secondary program audio is generally passed through an AGC stage and/or a frequency conscious limiter into a subcarrier generator with a center frequency of 185 kHz (67 kHz for mono). The subcarrier for the secondary program audio is fed to the PCL 6000 MUX 2 subcarrier input with an unbalanced

shielded cable (RG-58 A/U typical) with BNC connectors. An input level of 1.5 Vp-p corresponds to a main carrier deviation of 7.5 kHz (6 kHz mono) by the MUX 2 subcarrier.

Where a control subcarrier is desired, a subcarrier frequency of 110 kHz (26 kHz for mono) is typically used. The modulated subcarrier may be generated internally in the remote control equipment as in the case of the Moseley MRC series. In any case, the control subcarrier is applied to the MUX 1 input on the PCL 6010 transmitter at 1.5 Vp-p using BNC connectors on coaxial cable (RG-58 A/U typical). This signal will produce a main carrier deviation of 5 kHz (4 kHz mono) by the MUX 1 subcarrier.

The composite and multiplex inputs into the PCL 6010 transmitter are wideband inputs. It is assumed that the equipment supplying signals to be fed into the transmitter contain the band limiting filters necessary to limit the signals to the spectrum for the intended use, i.e., 53 kHz for stereo composite, 110 kHz for control subcarrier (26 kHz ±3 mono), and 185 kHz (67 kHz ±1.10 mono) for secondary program audio.

If the external equipment generates any spurious signals, these signals will be accepted by the transmitter and passed to the receiver. Any spurious signals may cause intermodulation among the composite and subcarrier information, and may increase the occupied bandwidth to the extent that interference will be experienced by neighboring users in the STL band.

Figure 2-5 shows the connections for a mono setup. The same cautions and considerations apply as for composite. The mono input has a selectable low-pass filter for bandwidth limiting.

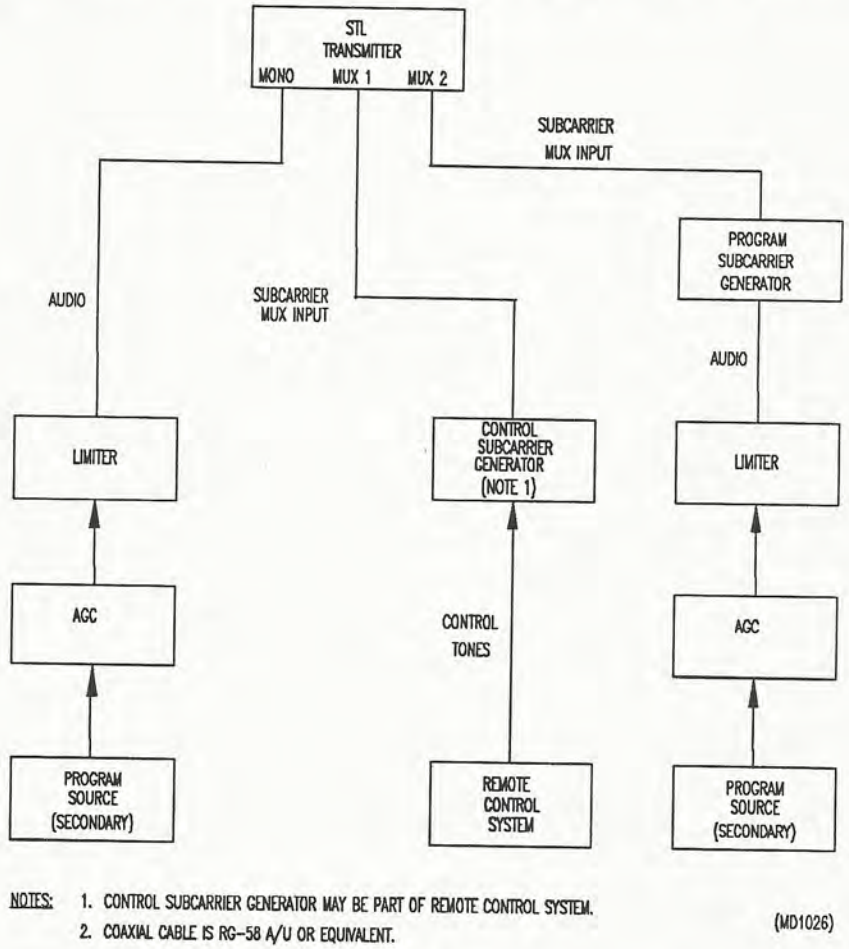


Figure 2-5
Transmitter PGM and MUX Interconnect—Mono

2.8 Program and Multiplex Installation (Receiver)

At the outputs of the PCL 6000 receivers, the baseband output of the IF demod is split and filtered into two bands. The audio outputs are from 30 Hz to approximately 85 kHz (15 kHz mono). The multiplex outputs are bandpass filtered to pass the frequency range of 100 kHz to 200 kHz (22 kHz to 85 kHz mono).

Figures 2-6 and 2-7 depict a typical interconnection of a PCL 6000 receiver at the remote transmitter site. The unbalanced output (3.5 Vp-p composite, +10 dBm mono) is interconnected to the wideband input of the transmitter with coaxial cable (RG-58 A/U typical) with BNC connectors, or twisted shielded pair for mono.

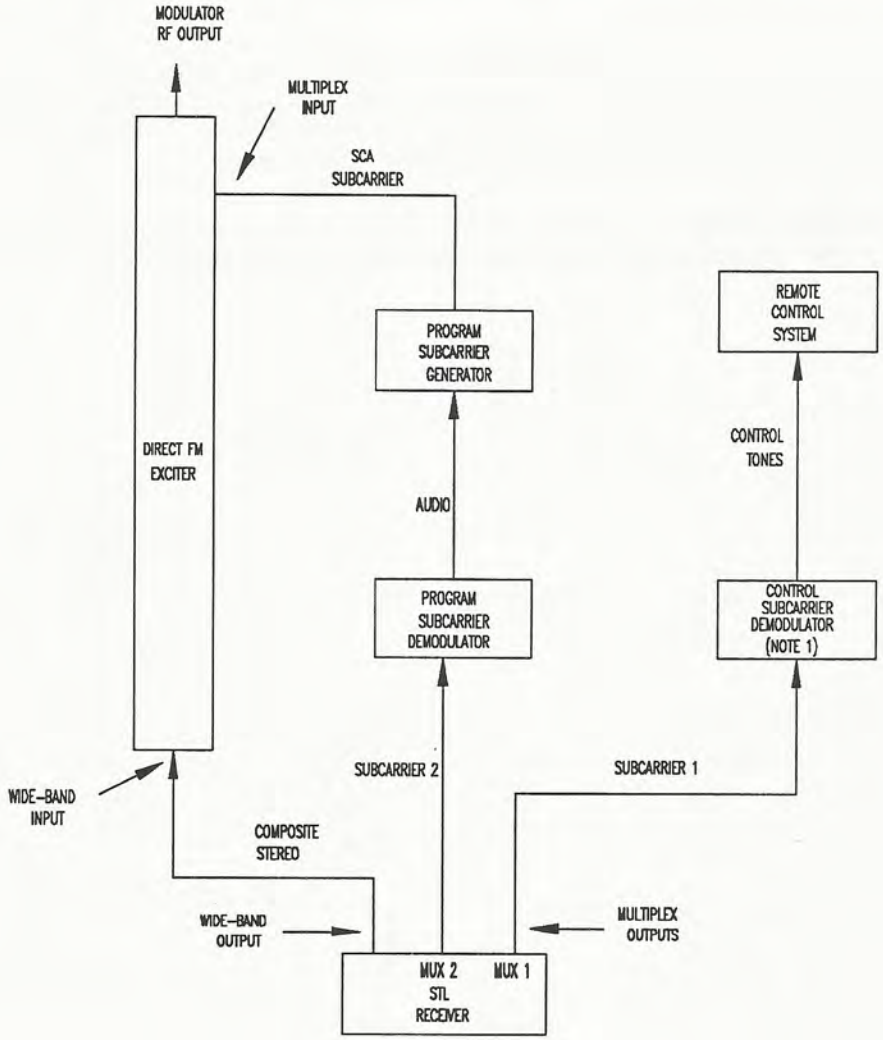
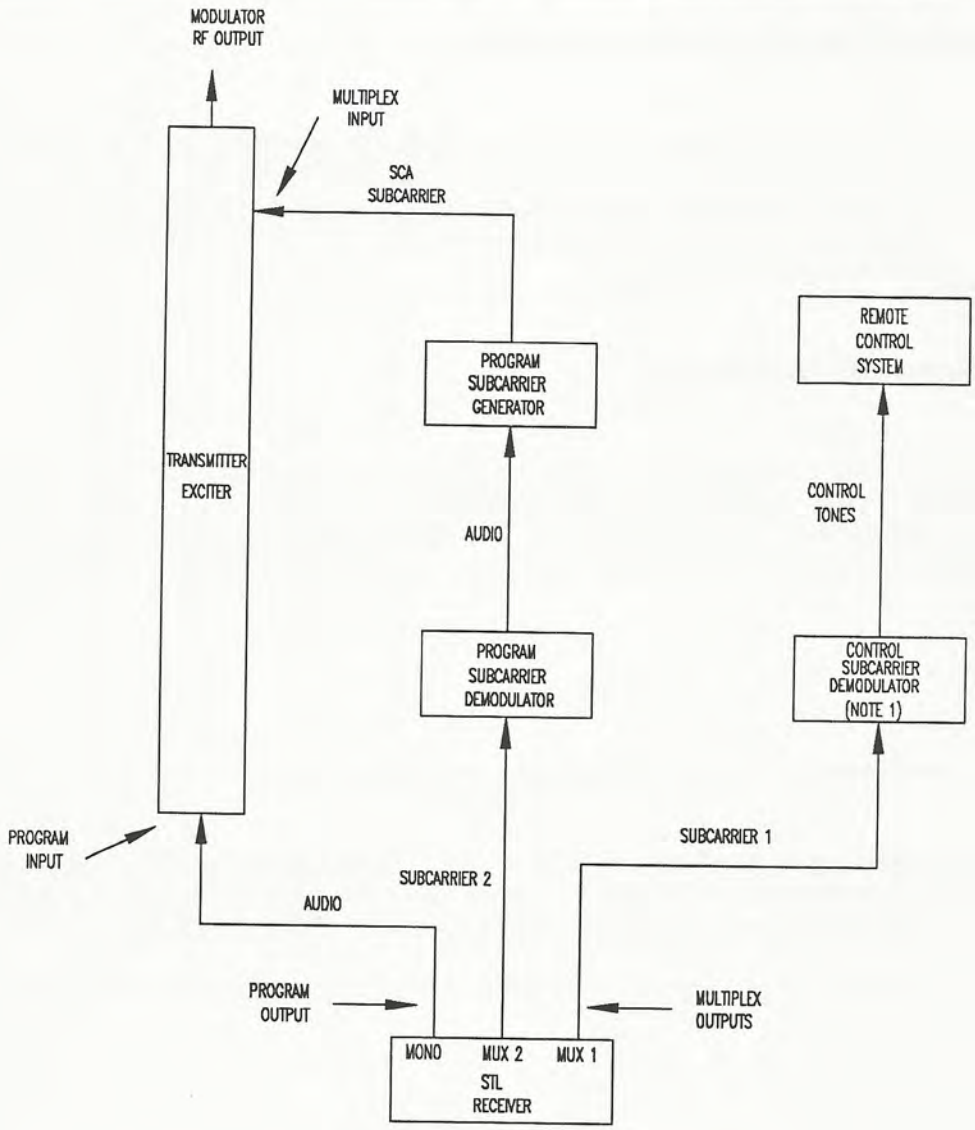


Figure 2-6
Receiver PGM and MUX Interconnect—Composite



NOTES: 1. CONTROL SUBCARRIER DEMODULATOR MAY BE PART OF REMOTE CONTROL SYSTEM.
2. COAXIAL CABLE IS RG-58 A/U OR EQUIVALENT.

(MD1028)

Figure 2-7
Receiver PGM and MUX Interconnect—Mono

The secondary program audio (on the STL 185 kHz subcarrier) is fed to the subcarrier demodulator. The baseband audio is passed to a subcarrier generator at 67 kHz, the normal SCA program carrier, which in turn is fed to the main transmitter multiplex input. The multiplex outputs may also be fed to the control subcarrier demodulator for use by the control system. Some control systems, such as the Moseley MRC series, have their own internal subcarrier demodulation capability, and an external demodulator is not required. Note that since both multiplex outputs contain the same 85 kHz to 200 kHz (20 kHz to 85 kHz mono) spectrum, the subcarrier demodulators are required to further filter the spectrum as required for their individual purposes.

2.9 Main/Standby Interconnect

The PCL 6000 transmitter and receiver can be interfaced with other PCL 6000, PCL 606, PCL 505 or PCL 303 systems to form a redundant backup system that provides for automatic changeover between equipment in the event a detectable failure occurs. The Moseley model TPT-2 is used to accomplish automatic switchover for transmitters in all combinations. The model TPR-2 (Transfer Panel Receiver) is required on certain receiver combinations.

2.9.1 Transmitter Interconnect

When two transmitters are interconnected with a TPT-2 to form a main/standby pair, the composite and subcarrier generator output is routed to each transmitter in parallel. The RF output of each transmitter is routed to the respective RF input on the TPT-2. The transmission cable to the antenna is connected to the antenna type N connector of the TPT-2. Figures 2-8 and 2-9 detail the interconnection of these signals.

> ***Note:***
>
> *For proper operation with a TPT-2, both transmitter RADIATE/ STANDBY switches should be in the STANDBY position. The remote connector between the transmitters and the TPT-2 should be wired as shown in Figures 2-8 and 2-9.)*

Table 2-2. Remote Connector Wiring Guide

TPT-2 Terminal	PCL 6000*	PCL 606	PCL 505	PCL 303
A	J1-2 (B)	A10-J1-B	J1-B	J403-F
B	J1-4 (D)	A10-J1-D	J1-D	J403-C
C	J1-3 (C)	A10-J1-C	J1-C	J403-D
GND	J1-1 (A)	A10-J1-A	J1-A	J403-A

* Refer to Section 2.10 (Fig 2-13) for current I/O Remote Connector pin assignments.

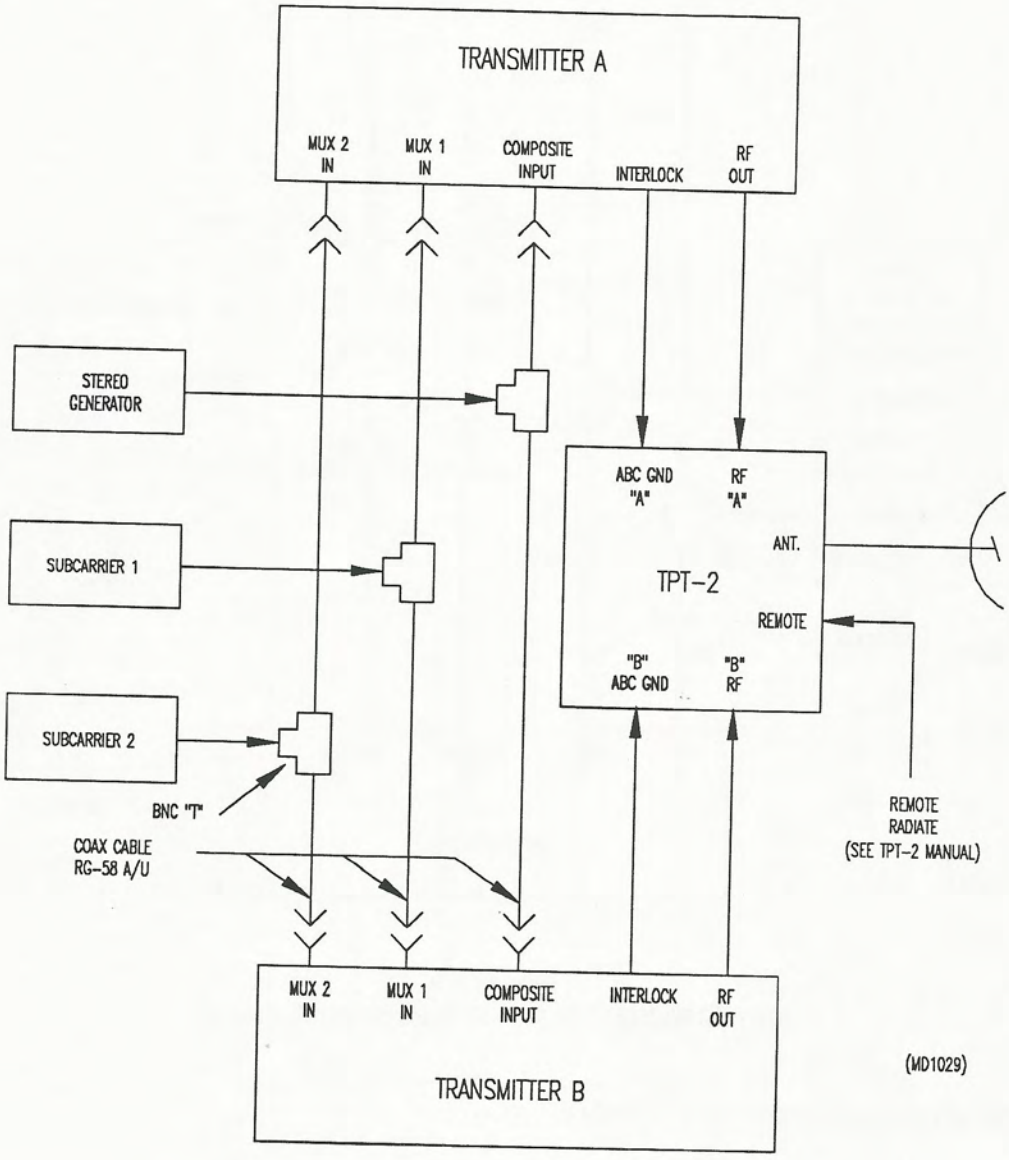


Figure 2-8
Main/Standby Transmitter Interconnect—Composite

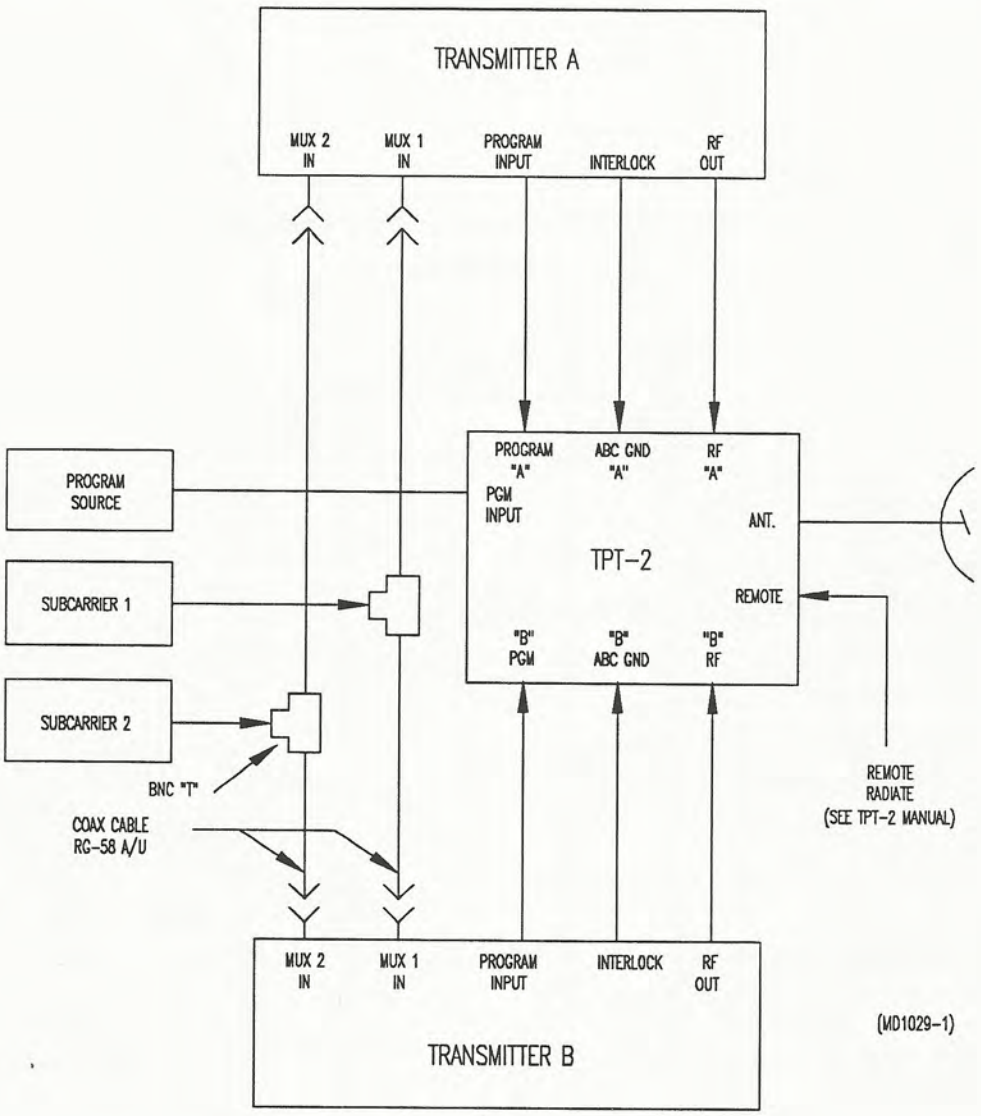


Figure 2-9
Main/Standby Transmitter Interconnect—Mono

2.9.2 Receiver Interconnect (Other)

The PCL 6000 receivers may be used with other Moseley STL receivers, such as the PCL 505 and PCL 303, may be used in a main/standby configuration, provided that a TPR-2 is used to perform the switching between the two receivers. A typical installation is detailed in Figure 2-10. Note that only one multiplex output can be used from the receivers; however, there are two parallel multiplex outputs on the TPR-2 to provide the control and secondary audio multiplex outputs.

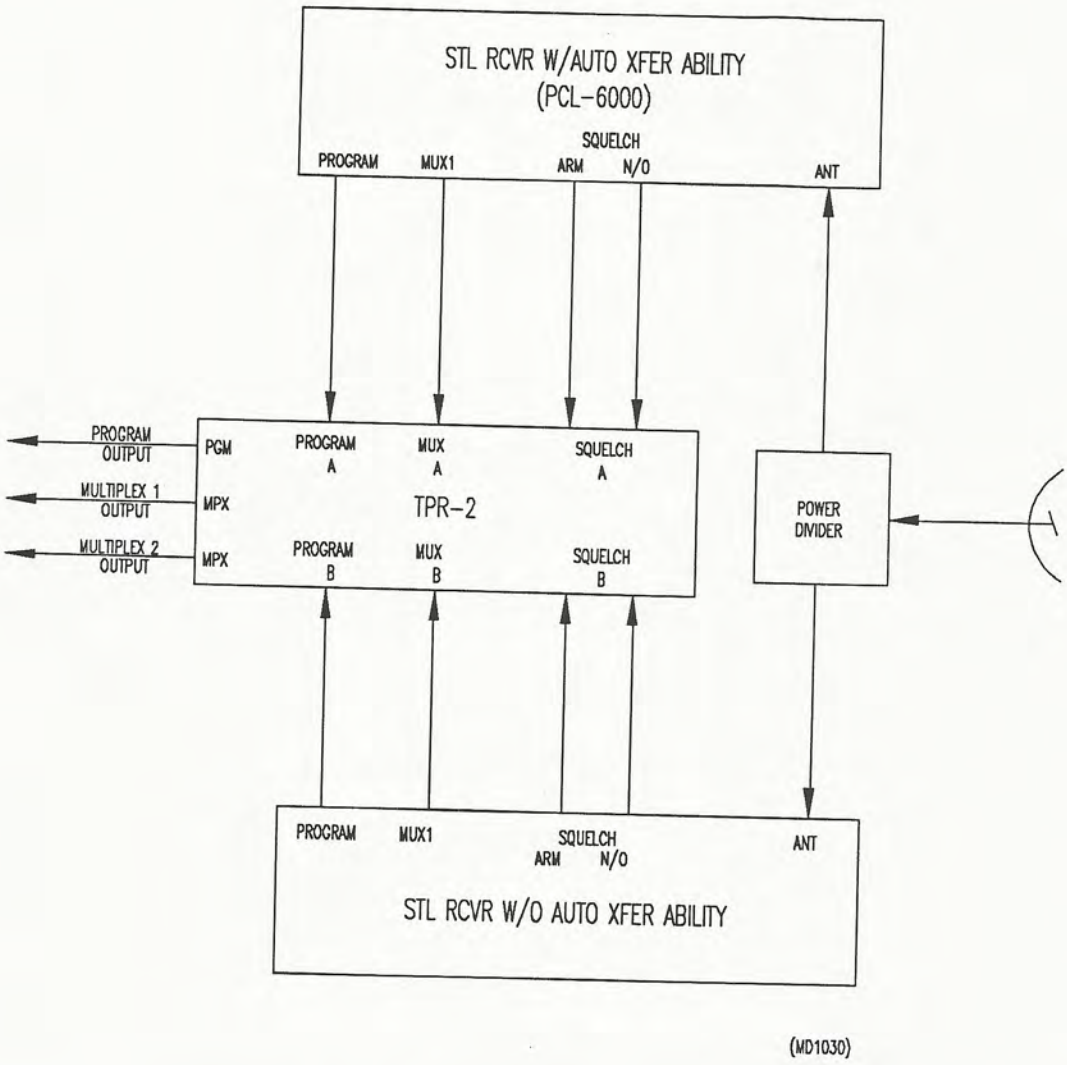


Figure 2-10
Main/Standby Receiver Interconnect (Other)

2.9.3 Receiver Interconnect (PCL 6000/606/600 Composite)

PCL 6000, PCL 606 and PCL 600 receivers used in a main/standby configuration can be interconnected to perform automatic switch over if detectable failure occurs in the on-line receivers. As shown in Figure 2-11, the antenna is routed to each receiver through a power divider such as the Moseley model PD-1000. The use of a power divider is recommended so that the impedance as seen by each receiver is approximately 50 ohms.

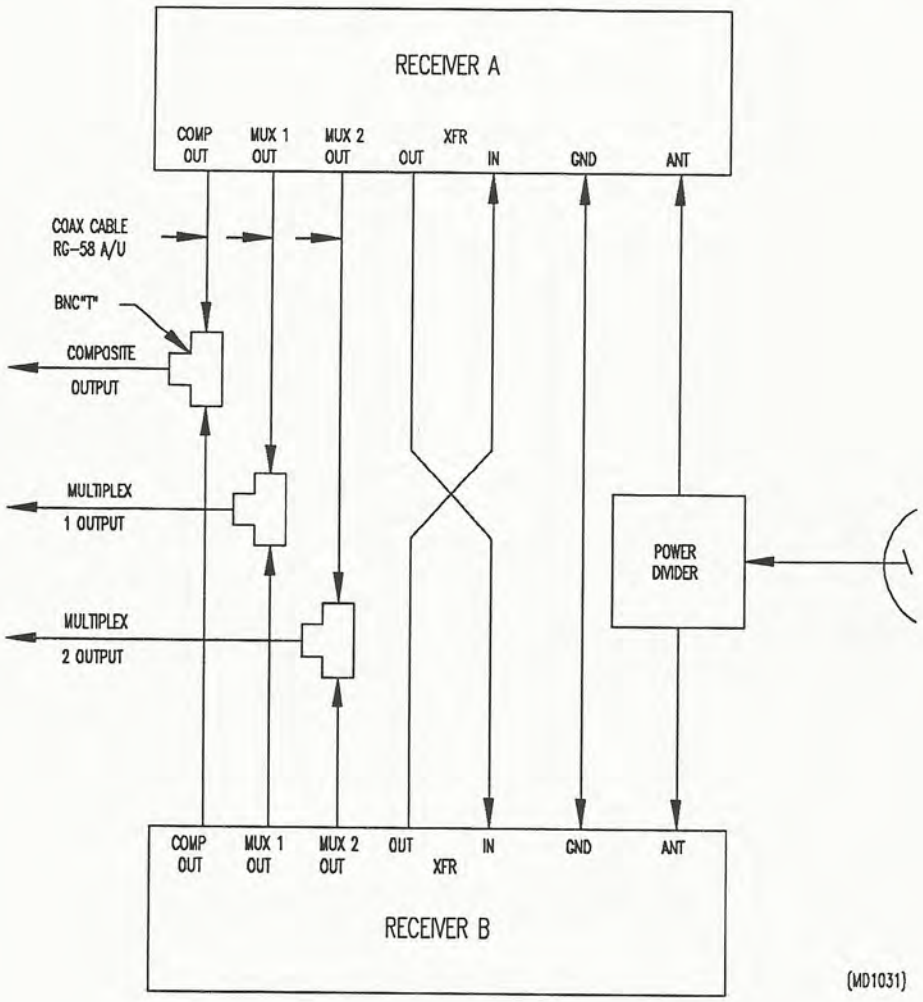


Figure 2-11
Main/Standby Receiver Interconnect PCL 6000 (Composite)

The composite and mux outputs are paralleled using a BNC "T" connector. This is permissible since the outputs are switched internal to the receiver. Only one of the receivers at a time will have any output. The interlock control is achieved by first interconnecting the ground (GND) on the two receivers. The XFR IN of each receiver is wired to XFR OUT of the other receiver. GND, XFR IN, and XFR OUT are located on the barrier strip on the rear of the receivers.

2.9.4 Receiver Interconnect (PCL 6000/606/600 Mono)

PCL 6000, PCL 606 and PCL 600 receivers used in a main/standby configuration can be interconnected to perform automatic switchover if a detectable failure occurs in the on-line receivers. As shown in Figure 2-12, the antenna is routed to each receiver through a power divider such as the Moseley model PD-1000. The use of a power divider is recommended so that the impedance as seen by each receiver is approximately 50 ohms.

The mono and mux outputs are paralleled using a BNC "T" connector. This is permissible since the mono and multiplex outputs are switched internal to the receiver. Only one of the receivers at a time will have any output. The interlock control is achieved by first interconnecting the ground (GND) on the two receivers. Then, XFR IN of each receiver is wired to XFR OUT of the other receiver. GND, XFR IN, and XFR OUT are located on the barrier strip on the rear of the receivers.

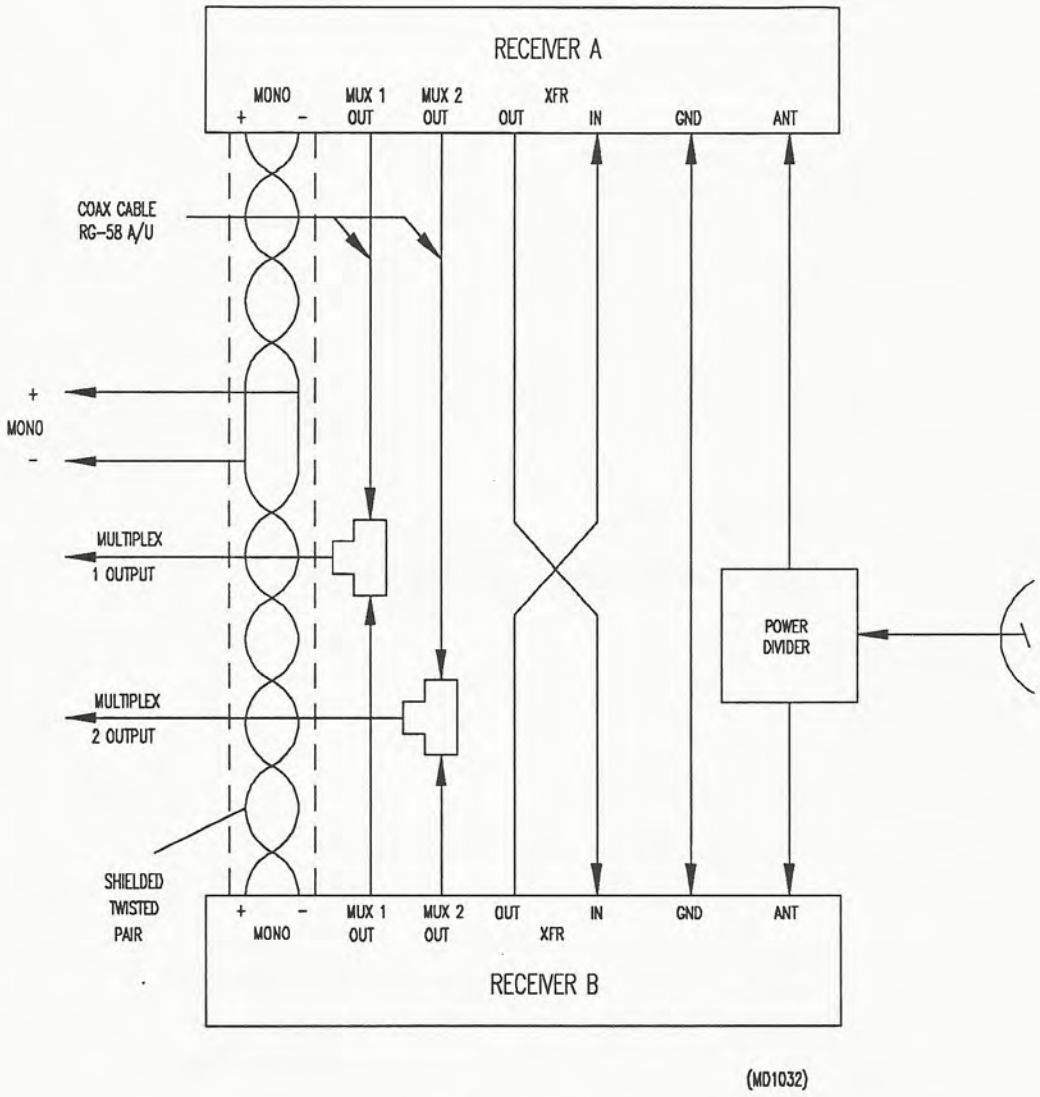


Figure 2-12
Main/Standby Receiver Interconnect PCL 6000 (Mono)

2.10 Remote Control of the STL Transmitter

The PCL 6010 transmitter has been designed to be operated by remote control. Radiate/standby control capability, as well as metering outputs for power and AFC, are built in. Figure 2-13 shows the back panel I/O connector schematic that is required for remote control interface with the transmitter. Figure 2-13a is

the pin-out for the revision A transmitters using the circular 9-pin connector. Figure 2-13b is the pin-out for the revision B transmitters using the 9-pin D (female) connector.

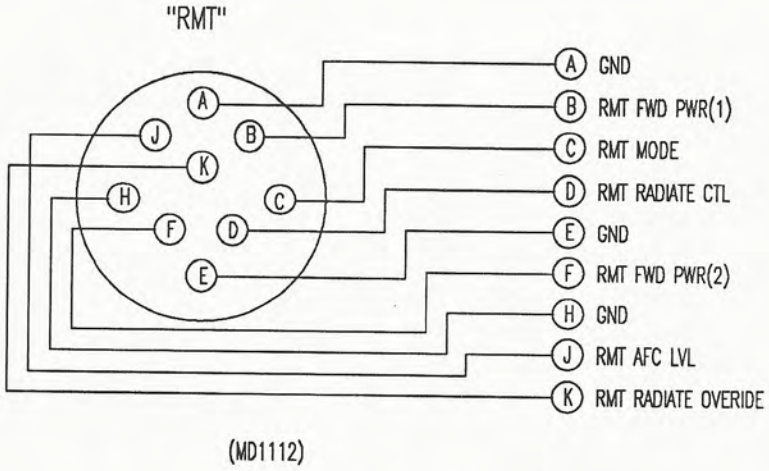


Figure 2-13a
Transmitter I/O Remote Connector Pin-Out (Rev. A)

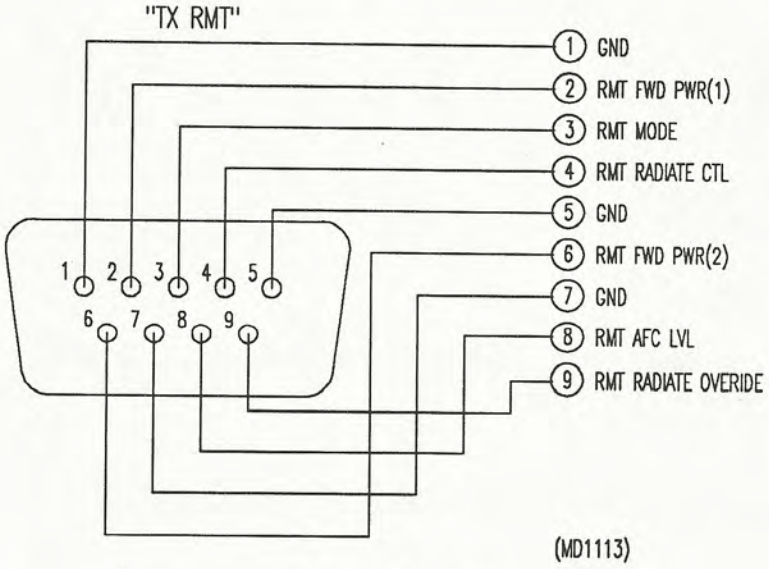


Figure 2-13b
Transmitter I/O Remote Connector Pin-Out (Rev. B)

2.11 Multichannel Remote Interconnect (option)

The PCL-6000 MC (Multichannel) is equipped with a CHANNEL CONTROL connector located on the back panel of both transmitter and receiver. The 9-pin D (male) connector pin-out is shown in Fig. 2-14.

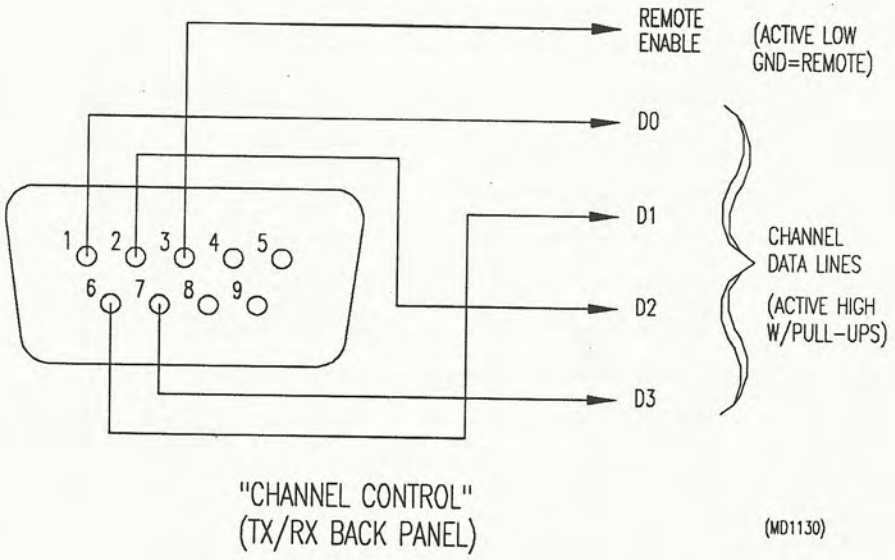


Figure 2-14
Transmitter I/O Channel Control Connector Pin-Out

The REMOTE ENABLE line requires a contact closure to GND or logic level 0 (low) to enable the system for remote operation. The remote logic is ACTIVE HIGH with internal pull-up resistors and follows a standard BCD input standard utilizing contact closure or TTL logic levels. Fig. 2-15 shows the truth table for channel selection.

REMOTE CONTROL TRUTH TABLE

REM ENABLE	D3	D2	D1	D0	CHANNEL
X	X	X	X	X	0
X	X	X	X	0	1
X	X	X	0	X	2
X	X	X	0	0	3
X	X	0	X	X	4
X	X	0	X	0	5
X	X	0	0	X	6
X	X	0	0	0	7
X	0	X	X	X	8
X	0	X	X	0	9
X	0	X	0	X	10
X	0	X	0	0	11
X	0	0	X	X	12
X	0	0	X	0	13
X	0	0	0	X	14
X	0	0	0	0	15

(0=OPEN CIRCUIT, X=GND CONTACT CLOSURE)

(MD1131)

Figure 2-15
Channel Control Remote Interface Logic

See Section 3 for complete instructions on the user operation of the Multichannel System

Section Three

Operation

Contents

3.1 Introduction

This section describes the controls and adjustments of a PCL 6000 system that the user will encounter in normal operation and initial setup. Front panel metering and controls, as well as rear panel connectors, are shown and described. Standard single channel STL and Multichannel configurations are discussed and the appropriate panel diagrams can be found in the corresponding Figures (referenced in the text).

3.2 Transmitter Operational Controls

3.2.1 Transmitter Front Panel

The 6010 transmitter front panel (standard) is depicted in Figure 3-1. The meter functions and scales are described in Table 3-1. The top scale is calibrated in dB, below which is a 0 to 25 linear scale. On the bottom is a center arc for relative indications. The meter is an absolute value peak-reading type with fast ballistics, since the purpose of the meter is to observe the peak values of modulation which affect the deviation of the transmitter.

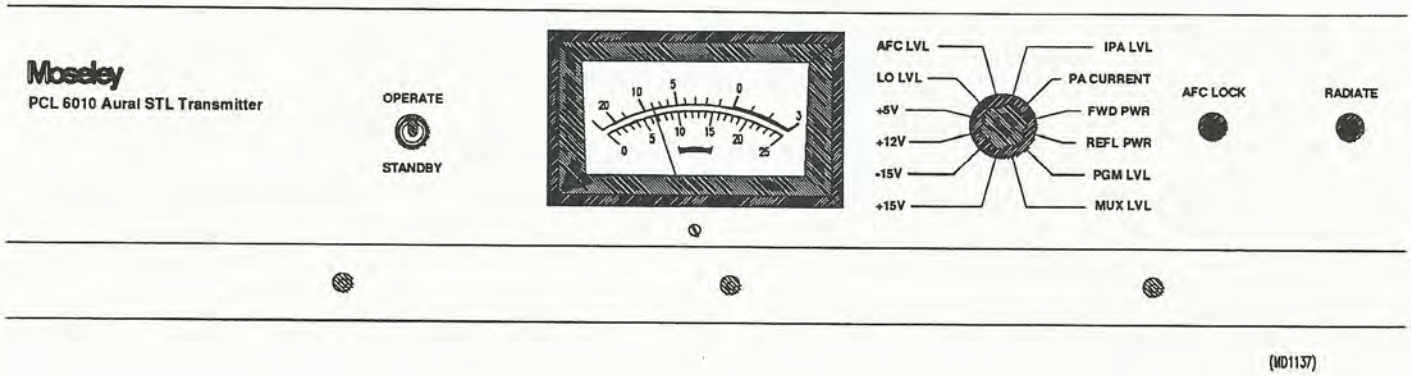


Figure 3-1
6010 Transmitter Front Panel (Standard)

The two transmitter status LEDs are red-green type bi-color LEDs. "AFC LOCK" is green when the FMO Synthesizer has achieved a lock condition. When "AFC LOCK" is red, it indicates that an unlock condition exists. This inhibits any radiation of RF power, resulting in "RADIATE" being red. When power is initially applied to the transmitter, it is normal for "AFC LOCK" to be red for several seconds.

"RADIATE" will be green when the transmitter is supplying RF power and red when not supplying RF power. "RADIATE" is controlled by the internal interlock controls, the RADIATE/STANDBY switch, and any external logic associated with main/standby operation.

The OPERATE/STANDBY switch functions as an on/off switch for the RF power output. In the OPERATE position, the RF power will be on, provided all of the internal interlocks are enabled. In the STANDBY position, transmitter operation is controlled by external switching control and the internal interlocks.

Table 3-1. Transmitter Meter Functions and Scales.

Function	Scale	Units	Notes
FWD PWR	dB	dB	RFA Forward Power in dB 0 dB = 100% power output
PGM LVL	dB	dB	Peak Program Meter 0 dB = 3.5 Vp-p @ 100% modulation
MUX LVL	Linear	kHz	Subcarrier deviation.
REFL PWR	dB	dB	RFA Reflected Power in dB 0 dB = 100% reflected power -10 dB to -20 dB = safe
AFC LVL	Center Arc	Relative	AFC voltage (relative level-calibrated to center)
LO LVL	Center Arc	Relative	Local Oscillator (relative level-calibrated to center)
IPA LVL	Center Arc	Relative	Intermediate Power Amplifier (relative level-calibrated to center)
PA CURR	Linear	X 0.1 Amps	RFA final stage current
+5 V	Linear	Volts	Power Supply
+12 V	Linear	Volts	RFA supply, STBY=1.5 VDC
+15 V	Linear	Volts	Power Supply
-15 V	Linear	Volts	Power Supply

3.2.2 Transmitter Rear Panel

The 6010 transmitter rear panel (standard AC power) is depicted in Figure 3-2. All of the program inputs (COMP/MONO) and MUX inputs are shown. The RF power output is a type N connector. TX REMOTE is used for external remote operation and standby/transfer interconnections. CHNL REMOTE is used for the Multichannel option. All of the necessary interconnections are found in Section 2. The fused AC input is line voltage programmable (see Figure 4-1).

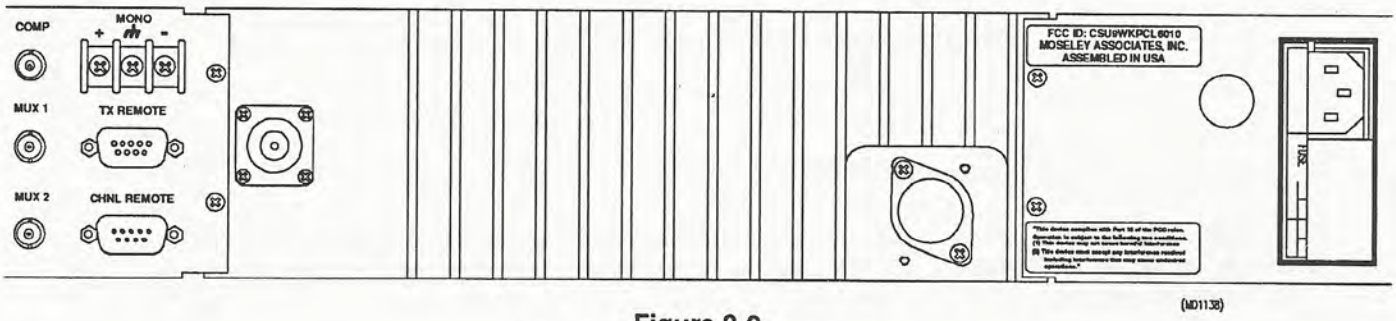


Figure 3-2
6010 Transmitter Rear Panel

The 6010 transmitter rear panel (DC power option) is depicted in Figure 3-3. The DC input panel is marked in the factory for the DC input voltage, the internal ground configuration (NEG GND for positve DC input, ISO GND for negative or positive DC input), and fuse rating. See Section 4.2 for further technical information concerning the internal DC configuration.

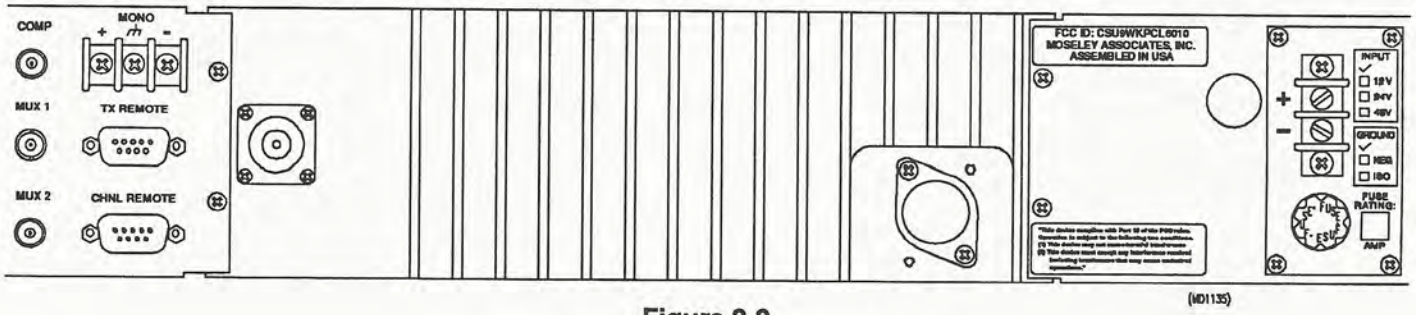


Figure 3-3
6010 Transmitter Rear Panel (DC Option)

3.2.3 Multichannel Transmitter Operation

The Multichannel transmitter is preprogrammed for up to 16 channels of operation. The frequencies are predetermined by the customer and are factory set at time of manufacture. The 6010 transmitter front panel for the Multichannel option is depicted in Figure 3-4. The front panel display indicates the CHANNEL number that is currently active. A label on the rear panel lists the particular channel assignment frequencies. The front panel SELECT knob enables the user to change channels as necessary. The transmitter and receiver are matched with respect to channel assignment.

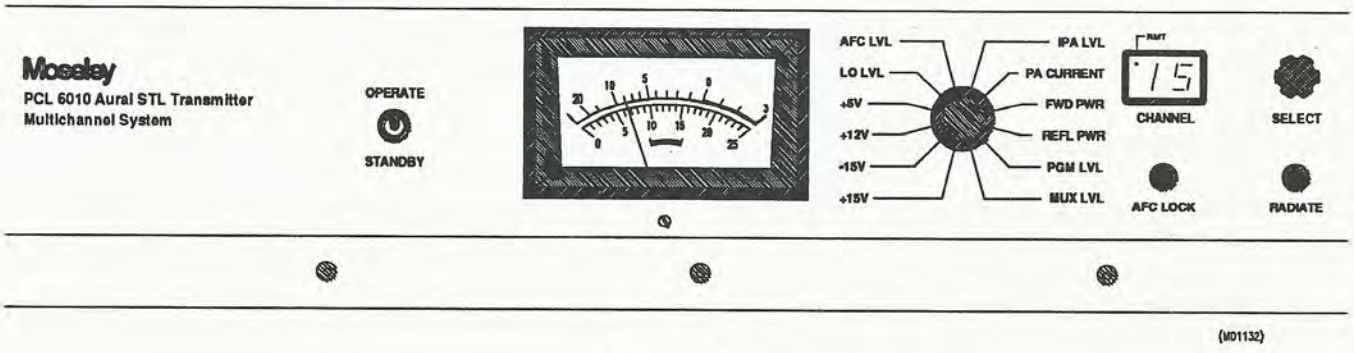


Figure 3-4
6010 Transmitter Front Panel (Multichannel Option)

3.2.3.1 User Programmable "CHANNEL 0"

CHANNEL 0 is provided as a user-programmable channel for backup or testing purposes. This channel is set to duplicate CHANNEL 1 in the factory. To set a new channel frequency, see section 5.3 (Alignment Procedures) or contact the Moseley Technical Services Department.

3.2.3.2 Remote Control Operation

The channel selection function of the Multichannel transmitter can be accessed via the back panel connector marked "CHNL CONTROL". The schematic diagram of the 9-pin D connector and the required interface logic is shown in Figures 2-15 and 2-16. Additionally, the 5 position INTERNAL REMOTE dip switch (SW6) on the Channel Control board must have all switches in the "OPEN" or "1" position for proper remote control operation.

The front panel CHANNEL display will indicate the current remote control state of the transmitter with a red light in the upper left-hand corner (RMT). The displayed channel number represents the actual channel the transmitter is operating in. The SELECT knob will have no effect on the transmitter in this mode. But the position of the SELECT knob retains its memory. Changing the knob position will change the channel that the transmitter will return to if the REMOTE ENABLE is disabled.

3.2.3.3 Front Panel Control "LOCKOUT" Operation

To prevent any unauthorized or accidental changing of the channel via the SELECT knob, the front panel can be "locked out" by programming the 5 position INTERNAL REMOTE dip switch (SW6) on the Channel Control board. This switch emulates the remote control function internally and the unit will appear to be in remote control operation. Switching out the INT RMT ENABLE (S6) will return the transmitter to front panel control.

3.3 Receiver Operational Controls

3.3.1 Receiver Front Panel

The operation of the receiver front panel controls is very similar to the transmitter controls. Figure 3-5, 3-6, and 3-7 shows the 6020, 6030, and 6060 receiver front panels (standard). The meter functions and scales are described in Table 3-2 (below). The top scale is calibrated in dB, followed by a four-decade logarithmic scale, below which is a 0 to 25 linear scale. On the bottom is a center arc for relative indications. The meter is an absolute value peak-reading type with fast ballistics, since the purpose of the meter is to observe the peak values of program material.

Three bi-color status LEDs indicate the operational status of the receiver. "SIGNAL" is green when there is sufficient RF signal to exceed a user-established threshold of RF signal that correlates to the minimum SNR that is acceptable to the user. When "SIGNAL" is red, there is insufficient signal to meet the minimum SNR requirements and the receiver is placed in a non-operating muted condition, which is indicated when "OPERATE is red. When the receiver is operating properly, "OPERATE" is green. "AFC LOCK" indicates the condition of the synthesized second LO. It is green when the PLL is locked.

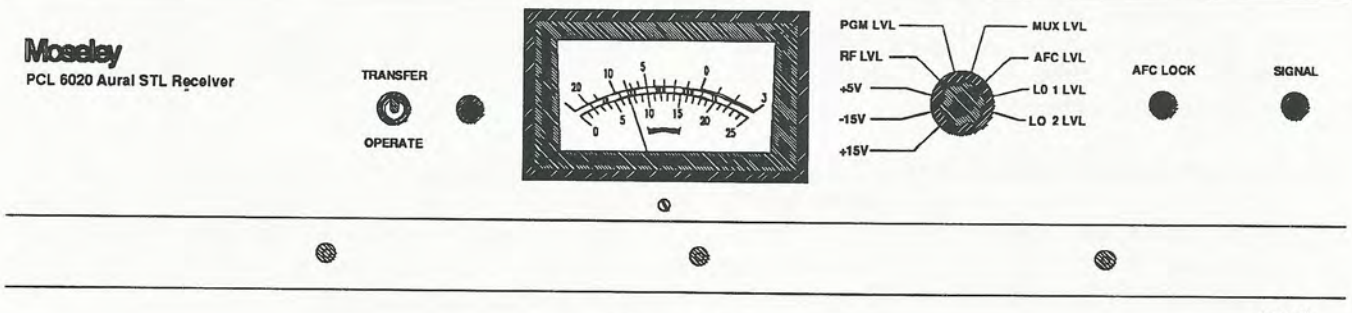


Figure 3-5
6020 Receiver Front Panel (Standard)

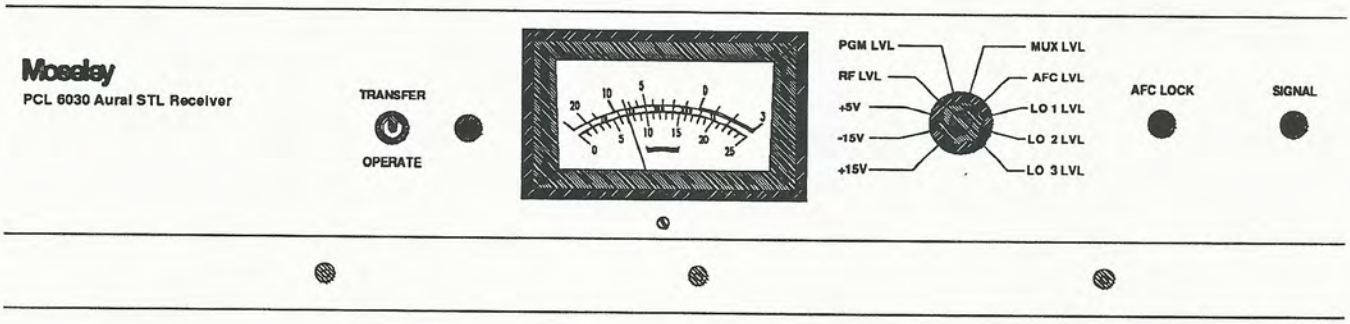


Figure 3-6
6030 Receiver Front Panel (Standard)

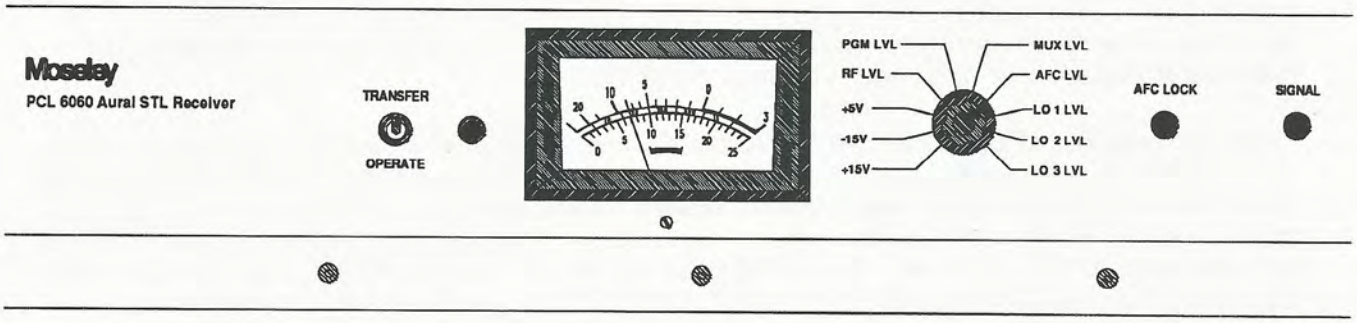


Figure 3-7
6060 Receiver Front Panel (Standard)

Table 3-2. Receiver Meter Functions and Scales.

Function	Scale	Units	Notes
RF LVL	Logarithmic	Microvolts	RF signal level at receiver input
LO1 LVL	Center	Rel	First Local Oscillator (relative level-calibrated to center)
LO2 LVL	Center	Rel	Second Local Oscillator (relative level-calibrated to center)
LO3 LVL	Center	Rel	Third Local Oscillator (relative level-calibrated to center) 6030/6060 ONLY
PGM LVL	dB	dB	Peak program meter 0 dB = 3.5 Vp-p @ 100% modulation
MUX LVL	Linear	kHz	Subcarrier deviation
AFC LVL	Center	Rel	AFC voltage (relative level-calibrated to center)
+5 V	Linear	Volts	Power Supply
+15 V	Linear	Volts	Power Supply
-15 V	Linear	Volts	Power Supply

Figure 3-8 depicts the basic shape of the SNR curve with and without high-level signals in the band. It should be emphasized that it is not necessarily only high-level adjacent channels that can cause interference. There are many combinations of signals that can give rise to intermodulation distortion, which will cause the resultant product to fall within the desired passband.

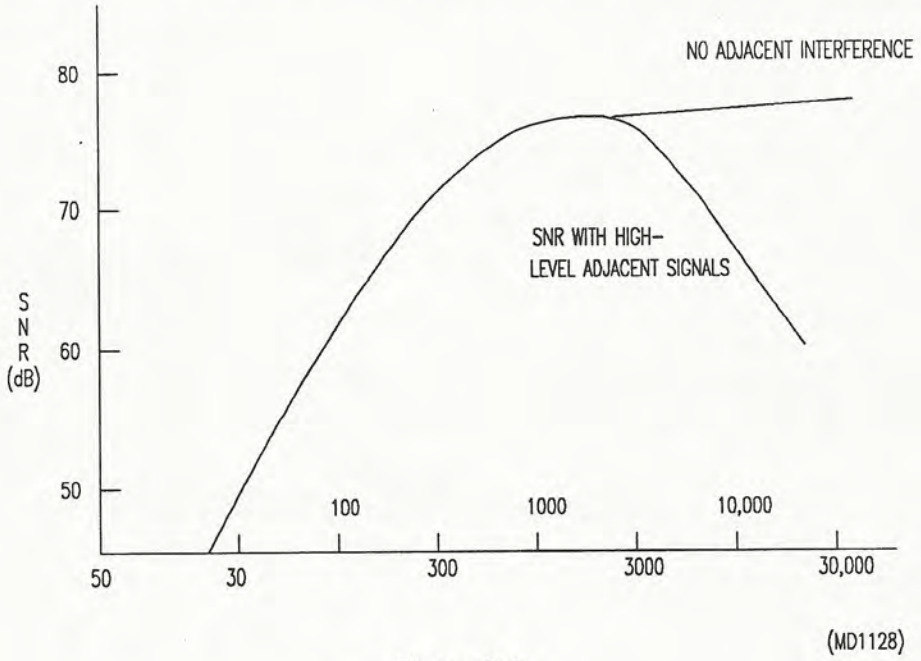


Figure 3-8
Typical SNR Curves

3.3.2 Receiver Rear Panel

The 6000 receiver rear panel (standard AC power) is depicted in Figure 3-9. All of the program outputs (COMP/MONO) and MUX outputs are shown. The RF signal input is a type N connector. The other functions on the barrier strip panel are used for standby/transfer interconnections. CHNL REMOTE is used for the Multichannel option. All of the necessary interconnections are found in Section 2. The fused AC input is line voltage programmable (see Figure 4-1).

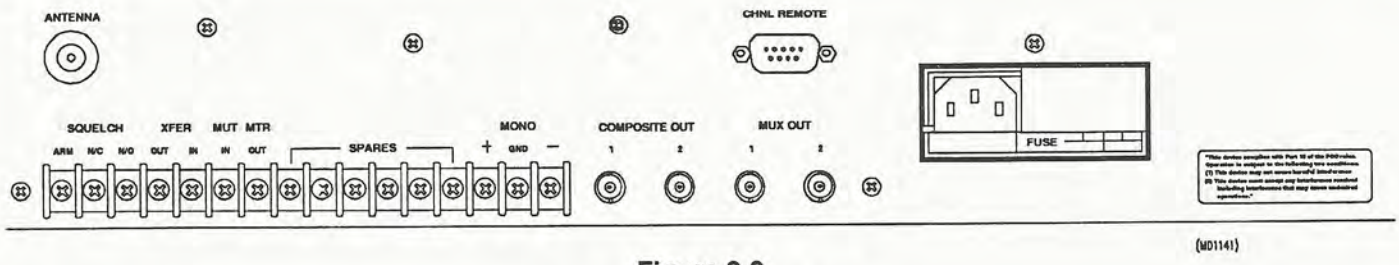


Figure 3-9
6000 Receiver Rear Panel

The 6000 receiver rear panel (DC power option) is depicted in Figure 3-10. The DC input panel is marked in the factory for the DC input voltage, the internal ground configuration (NEG GND for positve DC input, ISO GND for negative or positive DC input), and fuse rating. See Section 4.3 for further technical information concerning the internal DC configuration.

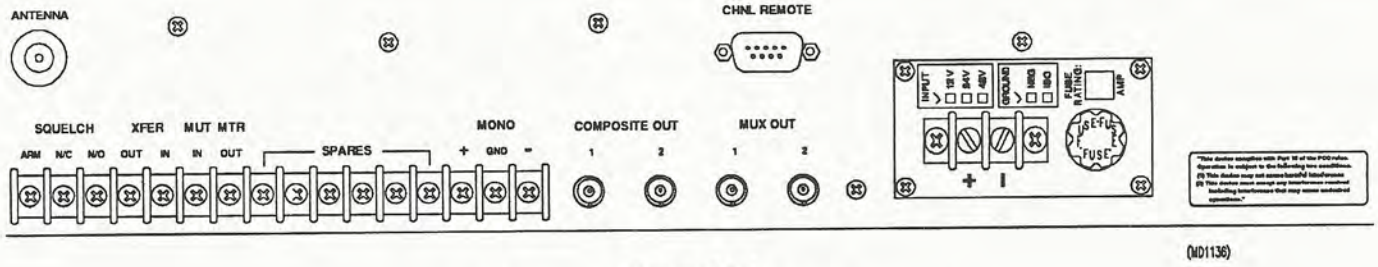


Figure 3-10
6000 Receiver Rear Panel (DC Option)

3.3.3 Multichannel Receiver Operation

The Multichannel receiver is preprogrammed for up to 16 channels of operation. The frequencies are predetermined by the customer and are factory set at time of manufacture. The 6020 receiver front panel for the Multichannel option is depicted in Figure 3-11. The front panel display indicates the CHANNEL number that is currently active. A label on the rear panel lists the particular channel assignment frequencies. The front panel SELECT knob enables the user to change channels as necessary. The transmitter and receiver are matched with respect to channel assignment.

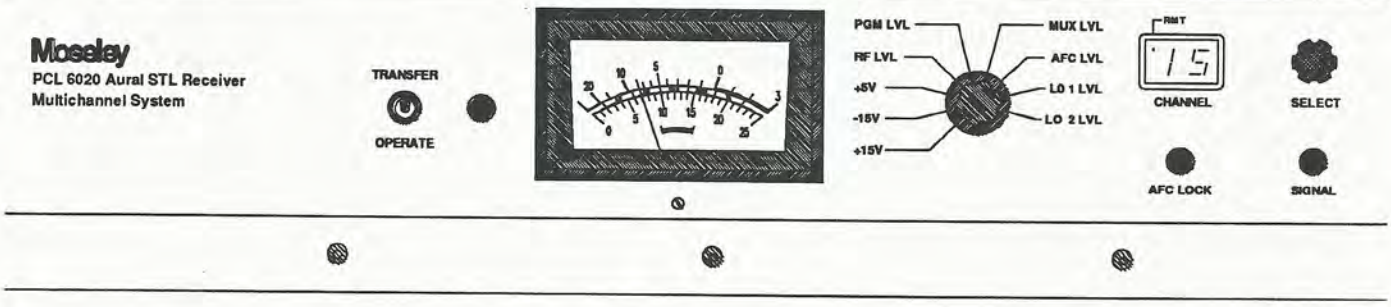


Figure 3-11
6020 Receiver Front Panel (Multichannel Option)

3.3.3.1 User Programmable "CHANNEL 0"

CHANNEL 0 is provided as a user-programmable channel for backup or testing purposes. This channel is set to duplicate CHANNEL 1 in the factory. To set a new channel frequency, see Section 5.3 (Alignment Procedures) or contact the Moseley Technical Services Department.

3.3.3.2 Remote Control Operation

The channel selection function of the Multichannel receiver can be accessed via the back panel connector marked "CHNL REMOTE". The schematic diagram of the 9-pin D connector and the required interface logic is shown in Figures 2-15 and 2-16. Additionally, the 5 position INTERNAL REMOTE dip switch (SW6) on the Channel Control board must have all switches in the "OPEN" or "1" position for proper remote control operation.

The front panel CHANNEL display will indicate the current remote control state of the transmitter with a red light in the upper left-hand corner (RMT). The displayed channel number represents the actual channel the transmitter is operating in. The SELECT knob will have no effect on the transmitter in this mode. But the position of the SELECT knob retains its memory. Changing the knob position will change the channel the transmitter will return to if the REMOTE ENABLE line is disabled.

3.3.3.3 Front Panel Control "LOCKOUT" Operation

To prevent any unauthorized or accidental changing of the channel via the SELECT knob, the front panel can be "locked out" by programming the 5 position INTERNAL REMOTE dip switch (SW6) on the Channel Control board. This switch emulates the remote control function internally and the unit will appear to be in remote control operation. Switching out the INT RMT ENABLE (S6) will return the receiver to front panel control.

Section Four

Module Characteristics

Contents

Contents (*continued*) Page

4.1 Introduction

This section provides theory of operation for the PCL 6000 modules. Please refer to the listed schematic and assembly drawings for the receiver configuration (PCL-6020/6030/6060), frequency band of operation (950, 450, 330, 220 MHz or 1.7 GHz), and Multichannel Option that applies to your system. Due to the many different system configurations, your particular drawing package has been supplied with the manual.

All of the Figure numbers for the referenced drawings can be found in the Table of Contents at the beginning of Section 7: "Schematic and Assembly Drawings".

4.2 Transmitter Theory of Operation

4.2.1 Audio/Power Supply

Drawings:
Schematic: 91D7444 Assembly: 20D3023

4.2.1.1 Power Supply (AC)

The power supply consists of an AC power connector (P1), transformer, rectifier (CR1), capacitive filters (C4, C5), and fixed linear regulators (VR1, VR2, VR3, VR4). The power supply has four output voltages: +15, -15, +5, and -12 VDC. The RFA supply is adjustable (R6) and factory set to +12.5 VDC when the transmitter is radiating. This voltage is reduced to +1.5 VDC if the AFC loses lock or if the transmitter is placed in STANDBY (see section 4.2.1.3). The rectifier and regulator for the +12.5 VDC supply are mounted on the RFA heat sink. Capacitive ripple filters C6, C7, C8 are mounted on the board and accessed through connector P2. The regulated -12 VDC is used to power the crystal ovens for the 1st LO and FMO reference oscillator crystals.

CAUTION:

Failure to ground the third lead of the input power cord may result in hazardous shocks to personnel.

The AC power connector includes an RF filter. The transformer primary windings support the following four input voltage ranges listed in Table 4-1.

Table 4-1.
Transmitter Power Supply AC Connector Voltage Ranges

Nominal Voltage (rms)	Minimum Voltage (rms)	Maximum Voltage (rms)	Line Fuse
100	90	110	2.0 A
120	108	132	2.0 A
220	198	242	1.0 A
240	216	264	1.0 A

The transformer has been prewired and the line voltage can be selected by programming the line filter/ fuse holder on the back panel as shown in Figure 4-1.

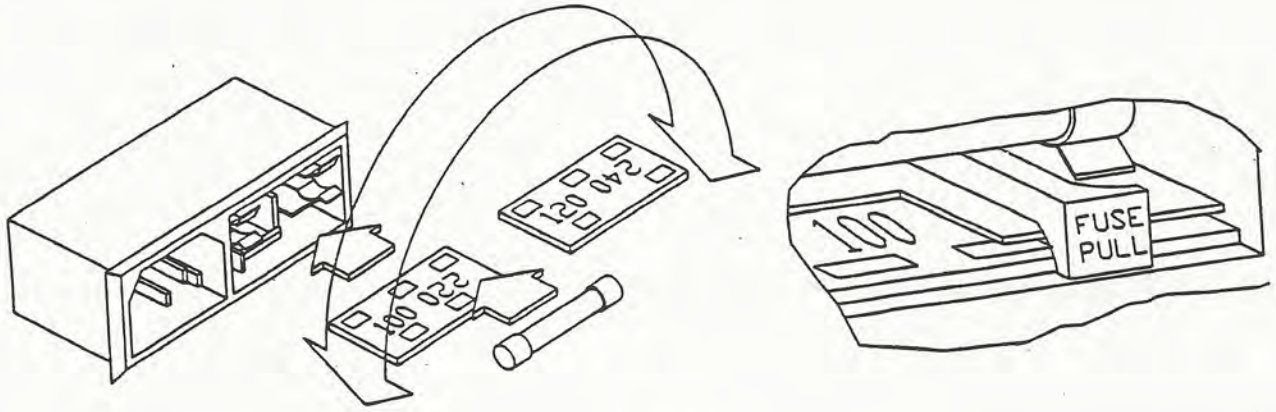


Figure 4-1
Line Filter/Fuse Holder Programming

4.2.1.2 Power Supply (DC)

The transmitter can be optionally configured as a DC input (only) system. All DC systems can be input isolated for negative DC operation. The back panel has a barrier strip for the DC input and is fused. The value of the fuse and the system ground configuration is listed on the back panel.

The Audio/Power Supply board is modified by bypassing the bridge rectifier (CR1) and the ±15 VDC regulators (VR1 and VR2). The DC input from the switching supplies enters the board at P1. See notes 2 and 3 in the schematic for further details.

4.2.1.3 Radiate Control Logic

The Radiate Control Logic circuitry consists of Q3, S1 and U1. This circuit will allow the transmitter to radiate when the following conditions are simultaneously met:

1. The OPERATE/STANDBY switch (S1) is in the OPERATE position, or the OPERATE/ STANDBY switch (S1) is in the STANDBY position and pin 4 (D) of the transmitter I/O panel remote connector (RMT RAD) is at ground potential (see fig. 2-13).

2. The AFC LOCK signal from the RF module (P4-2) is HIGH (+5 VDC).

3. Pin 9 (K) of the back-panel remote connector (RMT OVRD) is floating (not connected to ground). This will appear as +5 VDC on this pin (see fig. 2-13).

When all of the above conditions occur, the base of Q3 will go from +3 V to 0 V, enabling the +12.5 VDC power supply. The IPA and RFA will operate thus allowing the transmitter to radiate.

The OPERATE/STANDBY switch (S1) on the front panel is a double-pole, double-throw switch used to activate logic circuits within the transmitter and is connected through the harness to pin C of the back-panel remote connector (RMT-MODE) for remote indication of the OPERATE/ STANDBY mode.

For ±12, ±24, and ±48 VDC supply configuration, Q3 provides a logic level output to switch the internal DC supply on and off according to the RADIATE status. The schematic references this option.

4.2.1.4 PA Current Signal Conditioner

Differential amplifier U10 and associated circuitry condition and amplify the PA current sample. The voltage drop appearing across the PA current sampling resistor (in the RFA module) is presented to the Audio/Power Supply board on P3-9 and P3-10. The current-to-voltage conversion is different for the various frequency bands:

950 MHz	0.16 VDC per Ampere
450 MHz	0.20 VDC per Ampere
330 MHz	0.20 VDC per Ampere
220 MHz	0.20 VDC per Ampere

The sample voltage is measured at the input terminals of the RFA module. This voltage contains a +12.5 VDC common mode component which is removed by the differential amplifier.

4.2.1.5 Metering and Status

The Metering Functions are selected by the front panel meter switch (S2) and are calibrated by potentiometers R151 (+15V), R153 (-15V), R155 (+12V), R157 (+5V), R166 (LO1), R165 (AFC LVL), R164 (IPA LVL), R163 (PA CURRENT), R162 (FWD PWR), R161 (REFL PWR), R201 (COMP PGM MTRG), R202 (MONO PGM MTRG), R203 (DIG PGM MTRG). The signals are processed by absolute value amplifier and peak detector U11. This output is followed by a buffer and meter ballistics amplifier U12. R131 (METER ZERO) is used to electrically zero the meter. R286 (METER BALLISTICS) is used to adjust the meter acceleration and ballistics response.

The forward power sample from the RFA enters the Audio/Power Supply board on P3-1 and is amplified by U13b. The output is fed to the meter circuit for front-panel meter display. This output also appears on P4-9 (RMT-FWD1) for remote metering and hot standby purposes. Output P4-10 (RMT-FWD2) is available after the TPT THRESHOLD (R138) adjustment to be used in conjunction with the MOSELEY Transmitter Transfer Panel (TPT-2) to optimize the switchover point in a hot standby configuration. The output of U13b is also fed to differential amplifier U14a, where it is used to control the front panel radiate status indicator (CR21).

The reflected power sample from the RFA enters the board on P3-2 and is amplified by U13a to a usable level for metering.

U10b buffers the RF module AFC LVL signal (P5-1) for remote metering (RMT-AFC) that appears on pin J of the back panel remote connector.

U14b is an LED driver for the AFC LOCK status indicator (CR20) on the front panel; the LED is red when the AFC is out of lock, and green when locked.

4.2.1.6 Audio Processor

The audio processor supports either monaural or composite operation. The balanced monaural input is converted to an unbalanced signal with the active balanced input amplifier (U9 and U8). Jumper E6 enables the user to optimize the network for different nominal input impedance and levels (see the table in the schematic). The second half of U8 is an active 75µS pre-emphasis network (enabled by jumper E5). F1 (R77) and F2 (R78) adjust the low and high frequency break points for optimum frequency response. The monaural signal is routed through a seven pole active filter (U7, U6, and U5) with 15 kHz cut-off. Adjustments FA (R76), FB (R75), and FC (R49) are used to tune the roll-off of the filter and align the phase linearity of a dual-mono STL link. LF TILT (R47) compensates for low frequency tilt caused by IF filter non-linearities. LPF GAIN (R45) sets the overall monaural low pass filter unity gain. Jumper E4 selects the active filter to be in or out of the monaural audio processing path.

Jumper E3 selects either the monaural or composite input to the audio processor. U3a is a non-inverting amplifier to set the program levels of the audio processor for all configurations: MONO (R199), COMPOSITE (R28), and DIGITAL (R28). The MUX inputs are summed into U3b and the levels are independently adjustable: MUX1 (R29) and MUX2 (R40). The PROGRAM and MUX signals are summed into U2b and both levels are routed to the metering circuits at this point. U2a is an inverter which is selectable (E2) to match the STL link audio phase when using different receivers. The baseband output is at J1 which is applied to the transmitter RF module.

4.2.2 Transmitter RF Module

Drawings:	
950 MHz	Schematic: 91D7436 Assembly: 20D3020-1
950 MHz (Multichannel)	Schematic: 91A7517 Assembly: 20D3106-1
330/450 MHz	Schematic: 91D7460 Assembly: 20D3020-4
330/450 MHz (Multichannel)	Schematic: 91A7519 Assembly: 20D3106-4
220 MHz	Schematic: 91D7463 Assembly: 20D3020-3
1.7 GHz	Schematic: 91D7454 Assembly: 20D3020-2

4.2.2.1 FMO Synthesizer

The FMO Synthesizer consists of three main subgroups: the RF group, the digital group, and the loop filter. The RF group includes the frequency modulated oscillator (FMO), buffer, reference oscillator, and low-pass filter. The digital group includes a dual modulus prescaler and an integrated PLL IC that provides multiple functions to be described later.

These three groups provide an RF signal source that has good short-term stability, low noise, and is tunable over a wide frequency range. Selecting the appropriate divide ratio synthesizes the crystal-controlled reference oscillator and ensures long-term stability.

The FMO consists of low-noise field effect transistor Q3 in an RF grounded base configuration. The drain of Q3 is connected to the resonant circuit inductor and capacitors. The capacitance for this circuit is provided by C30, C29 and C31. The inductance consists of a stripline inductor on the PC board. Feedback to cause oscillation is from the drain to the source consisting of C29 and C31. The normal frequency range of the oscillator is 60 to 80 MHz.

The modulation signal enters the RF module at J1. The modulation signal is then applied to CR6, which is a variable capacitance diode. CR6 is coupled to the resonant circuit by C28. R37 (VARICAP BIAS ADJUST) adjusts the bias on CR6 and is set for minimum modulation distortion, usually approximately -5 V. R33 (MODULATION ADJUST) adjusts the amount of modulation on the bias voltage applied to CR6. A 3.5 Vp-p input at J1 will produce 100% modulation (50 kHz deviation, composite).

The signal is buffered by U4 which drives the seven section elliptical low-pass filter comprised of C47, L5, C49 ,C52, L6, C51, C50, L7, C48, and C43. This sharp cut-off filter attenuates the harmonics of the FMO. The output is buffered by the resistive attenuator (R46, R49, R50) to provide a level at the mixer of -6 dBm.

R53 is used to sample the FMO output as feedback for the high speed dual-modulus prescaler (U2). The prescaler divides the 70 MHz signal by 10 or 11, depending on the divide ratio selected by the integrated PLL chip (U1). This technique enables one divider IC to be used for small step sizes. The PLL chip contains programmable dividers (/N, /A, /R), a digital phase detector, modulus control logic and lock detect circuitry to reduce chip count and increase reliability in synthesizer designs. The output frequency is programmed by switches SW0, SW1, SW2, and SW3 for a step size of 25 kHz.

Y1, Q1, Q2 and associated circuitry comprise a stable, low phase noise, oven-controlled reference oscillator for the phase lock loop. Frequency trim control C11 (FREQ TRIM) is used to set the output frequency of this oscillator and compensates for slight differences in the 1st LO frequency. The internal phase detector compares the VCO and reference oscillator inputs and delivers a series of pulses to the integrating loop filter.

Loop filter U3 is an integrating low-pass filter that removes most of the reference frequency component of the phase comparator output. It also provides DC gain to decrease the very low frequency noise of the FMO. Further filtering of the AFC voltage is then delivered to CR5 through R38, closing the AFC loop. The frequency stability of the FMO is maintained by CR5, which is attached to the stripline inductor through C27. A voltage generated by the AFC circuitry changes the capacitance of CR5, which is also part of the tuning of the FMO resonant circuit. AFC level adjust C30 (AFC LVL) is used to place the phase-locked loop in the center of its operating control range. This is indicated by a nominal +7 VDC AFC level.

The lock detect signal at U1-28 is a series of pulses at the step size rate (25 kHz) when the loop is locked. The low pass filter (R9 and C2) provide an average voltage at U3-5 of +5 VDC when the loop is locked. If the loop becomes unlocked, the average voltage drops to 2.5 VDC. This causes the output of comparator U3 to change state which lights the red LOSS OF LOCK LED on the module. Also, the

voltage at FL2 drops from +5 to 0 VDC, causing the radiate control circuitry to put the transmitter in STANDBY.

The output frequency of the FMO is set by the values of switches SW0-SW3. The output frequency is determined by adding the resultant frequency values set by each switch. SW0 is a one bit switch that sets 64 MHz. SW1, SW2, and SW3 are four-bit switches set to a hex value (0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F), where A - F corresponds to 10 - 15. The transmitter frequency example below illustrates the math.

Transmitter frequency example:

1st LO = 1020.000 MHz

Carrier freq.= - 950.500

FMO freq.= 70.500 MHz

Switch settings:

SW0	1	X	64	=	64.000	MHz
SW1	1	X	4	=	4.000	
SW2	A	X	.25	=	2.500	
SW3	0	X	.025	=	0.000	
					70.500	MHz

(Note: See section 5.3.9 for changing the STL frequency in the field)

4.2.2.2 FMO Synthesizer (Multichannel Option)

The FMO Synthesizer consists of three main subgroups: the RF group, the digital group, and the loop filter. The RF group includes the frequency modulated oscillator (FMO), buffer, reference oscillator, and low-pass filter. The digital group includes a dual modulus prescaler and an integrated PLL IC that provides multiple functions to be described later.

These three groups provide an RF signal source that has good short-term stability, low noise, and is tunable over a wide frequency range. Selecting the appropriate divide ratio synthesizes the crystal-controlled reference oscillator and ensures long-term stability.

The FMO consists of low-noise field effect transistor Q4 in an RF grounded base configuration. The drain of Q4 is connected to the resonant circuit inductor and capacitors. The capacitance for this circuit is provided by C35, C40 and C41, as well as the three switching networks that control the capacitors C26, C30, and C34. The inductance consists of a stripline inductor on the PC board. Feedback to cause oscillation is from the drain to the source consisting of C40 and C41. The normal frequency range of the oscillator is 60 to 80 MHz.

If the Multichannel option is being utilized in the system, the modulation signal enters the RF module at J11-25 from the programmed compensation circuit located on the Channel Control board. The modulation gain varies at different frequency settings, therefore the gain must be compensated for. If the RF module is being used as a stand-alone, the modulation signal enters the RF module at J1. The signal is then applied to CR12, which is a variable capacitance diode. CR12 is coupled to the resonant circuit by C39. R37 (VARICAP BIAS ADJUST) adjusts the bias on CR12 and is set for minimum modulation distortion, usually approximately -5 V. R33 (MODULATION ADJUST) adjusts the amount of modulation on the bias voltage applied to CR12. A 3.5 Vp-p input at J1 will produce 100% modulation (50 kHz deviation, composite).

The signal is buffered by U4 which drives the seven section elliptical low-pass filter comprised of C55, L6, C56 ,C57, L7, C58, C59, L8, C60, and C61. This sharp cut-off filter attenuates the harmonics of the FMO. The output is buffered by the resistive attenuator (R78, R79, R80) to provide a level at the mixer of -6 dBm.

R48 is used to sample the FMO output as feedback for the high speed dual-modulus prescaler (U2). The prescaler divides the 70 MHz signal by 10 or 11, depending on the divide ratio selected by the integrated PLL chip (U1). This technique enables one divider IC to be used for small step sizes. The PLL chip contains programmable dividers (/N, /A, /R), a digital phase detector, modulus control logic and lock detect circuitry to reduce chip count and increase reliability in synthesizer designs.

OSC1 is a temperature compensated crystal oscillator (TCXO) that provides a stable, low phase noise reference oscillator for the phase lock loop. The internal phase detector compares the VCO and reference oscillator inputs and delivers a series of pulses to the integrating loop filter.

Loop filter U3 is an integrating low-pass filter that removes most of the reference frequency component of the phase comparator output. It also provides DC gain to decrease the very low frequency noise of the FMO. Further filtering of the AFC voltage is then delivered to CR10 and CR11 through R30, closing the AFC loop. The frequency stability of the FMO is maintained by CR10 and CR11, which is attached to the stripline inductor through C62. A voltage generated by the AFC circuitry changes the capacitance of CR10 and CR11, which is also part of the tuning of the FMO resonant circuit. Depending upon which capacitors are switched into the resonant circuit; F1 (C34), F2 (C30), or FIX (C26), the AFC level adjustment is used to place the phase-locked loop in the center of its operating control range. This is indicated by a nominal +7 VDC AFC level.

For Multichannel operation, different capacitors are switched in to maintain an AFC range between 5-9 VDC for different channel frequencies. These switching networks are labeled F1, F2, and FIX. A logic level of +5 VDC at the input of the buffers (Q3, Q2, Q1) will connect that corresponding capacitor into the resonant circuit. If the Multichannel option is being utilized in the system, these settings come from the Channel Control board's programmed inputs at J11-5, -18, -6, and switch S4 must be disabled (open circuit). If the RF module is being used as a stand-alone, switch S4 is used to switch in the required capacitors. In either case, green LED indicators CR6 (F1) and CR5 (F2) will light to indicate which setting is active. The FIX capacitor is normally used to band-switch to a frequency far removed from the initial setting.

The lock detect signal at U1-28 is a series of pulses at the step size rate (25 kHz) when the loop is locked. The low pass filter (R19 and C13) provide an average voltage at U3-5 of +5 VDC when the loop is locked. If the loop becomes unlocked, the average voltage drops to 2.5 VDC. This causes the output of comparator U3 to change state which lights the red LOSS OF LOCK LED on the module. Also, the voltage at FL2 drops from +5 to 0 VDC, causing the radiate control circuitry to put the transmitter in STANDBY.

The output frequency of the FMO is determined by the divider values programmed into the PLL chip U1. If the Multichannel option is being utilized in the system, these settings come from the Channel Control board's parallel inputs at J11 and the internal switches S1, S2, S3, and S4 must be disabled (S4: open

circuit and S1,2,3: set to "F"). If the RF module is being used as a stand-alone, the frequency is set by the values of switches S1, S2, S3, and S4. The output frequency is determined by adding the resultant frequency values set by each switch. S4-1 is a one bit switch that sets 64 MHz. S1, S2, and S3 are four-bit switches set to a hex value (0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F), where A - F corresponds to 10 - 15. The transmitter frequency example below illustrates the math.

Transmitter frequency example:

1st LO = 1020.000 MHz

Carrier freq.= - 950.500

FMO freq.= 70.500 MHz

Switch settings:

S4-1	1	X	64	=	64.000	MHz
S1	1	X	4	=	4.000	
S2	A	X	.25	=	2.500	
S3	0	X	.025	=	0.000	
					70.500	MHz

(Note: See section 5.3.9 for changing the STL frequency in the field)

4.2.2.3 1st Local Oscillator (950 MHz)

The 1st LO signal is derived from crystal-controlled oscillator Q6. The fifth overtone crystal (Y2, 102.000 MHz) is temperature stabilized by a 65°C proportionally controlled oven (HR1). Oscillator buffers Q8 and AR3 isolate the oscillator and amplify the signal, preventing frequency pulling when adjusting the multipliers.

The output of the buffer is doubled in an active push-push doubler. The single-ended input from the buffer is split into two out-of-phase voltages in T1 and applied to the bases of Q9 and Q10. The output of these two transistors is summed at their collectors.

The output of the doubler is tuned by C101 and L8 and is impedance matched to the step-recovery diode multiplier by C64 and C109. The diode self-bias current is determined by RT1. The step-recovery diode (CR9) forms the heart of an X5 multiplier (C63, C100, and the 12 nH printed inductor). The multiplier converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L9 and C56) which is tuned to the desired output frequency. The three pole helical filter (FL10) is tuned to the LO output frequency (1020 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.2.2.4 1st Local Oscillator (330/450 MHz)

The 1st LO signal is derived from crystal-controlled oscillator Q6. The fifth overtone crystal (96.250 MHz nominal) is temperature stabilized by a 65°C proportionally controlled oven. Oscillator buffers Q8 and AR3 isolate the oscillator and amplify the signal, preventing frequency pulling when adjusting the multipliers.

The output of the buffer is doubled in an active push-push doubler. The single-ended input from the buffer is split into two out-of-phase voltages in T1 and applied to the bases of Q9 and Q10. The output of these two transistors is summed at their collectors.

The output of the doubler is tuned by C101 and L8 and is impedance matched to the step-recovery diode multiplier by C64 and C109. The diode self-bias current is determined by RT1. The step-recovery diode (CR9) forms the heart of a X2 multiplier (C63, C100, and the 12 nH printed inductor). The multiplier converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L9 and C56) which is tuned to the desired output frequency. The multiplier output is routed through an external three pole helical filter and is tuned to the LO output frequency (385 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.2.2.5 1st Local Oscillator (220 MHz)

The 1st LO signal is derived from crystal-controlled oscillator Q6. The fifth overtone crystal (97.000 MHz nominal) is temperature stabilized by a 65°C proportionally controlled oven. Oscillator buffers Q8 and AR3 isolate the oscillator, preventing frequency pulling when adjusting the multiplier. The output of the AR3 is amplified by Q9 to a sufficient level to drive the SRD multiplier.

The output of Q9 is tuned by C101 and L8 and is impedance matched to the step-recovery diode multiplier by C64 and C109. The diode self-bias current is determined by RT1. The step-recovery diode (CR9) forms the heart of a X3 multiplier (C63, C100, and the 12 nH printed inductor). The multiplier converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L9 and C56) which is tuned to the desired output frequency. The multiplier output is routed through an external three pole helical filter and is tuned to the LO output frequency (291 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.2.2.6 1st Local Oscillator (1.7 GHz)

The 1.7 GHz PCL-6010 utilizes a doubler to achieve the carrier frequency, therefore the 1st LO is nearly identical to the 950 MHz band 1st LO. The 1st LO signal is derived from crystal-controlled oscillator Q6. The fifth overtone crystal (92.000 MHz nominal) is temperature stabilized by a 65°C proportionally controlled oven. Oscillator buffers Q8 and AR3 isolate the oscillator and amplify the signal, preventing frequency pulling when adjusting the multipliers.

The output of the buffer is doubled in an active push-push doubler. The single-ended input from the buffer is split into two out-of-phase voltages in T1 and applied to the bases of Q9 and Q10. The output of these two transistors is summed at their collectors.

The output of the doubler is tuned by C101 and L8 and is impedance matched to the step-recovery diode multiplier by C64 and C109. The diode self-bias current is determined by RT1. The step-recovery diode (CR9) forms the heart of a X5 multiplier (C63, C100, and the 12 nH printed inductor). The multiplier

converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L9 and C56) which is tuned to the desired output frequency. The three pole helical filter (FL10) is tuned to the LO output frequency (1020 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.2.2.7 1st Local Oscillator (950 MHz, Multichannel Option)

The 1st LO signal is derived from crystal-controlled oscillator Q5. The fifth overtone crystal (Y1, 102.000 MHz) is temperature stabilized by a 65°C proportionally controlled oven (HR1). Oscillator buffers Q6 and AR1 isolate the oscillator and amplify the signal, preventing frequency pulling when adjusting the multipliers.

The output of the buffer is doubled in an active push-push doubler. The single-ended input from the buffer is split into two out-of-phase voltages in T1 and applied to the bases of Q7 and Q8. The output of these two transistors is summed at their collectors.

The output of the doubler is tuned by C94 and L14 and is impedance matched to the step-recovery diode multiplier by C95 and C96. The diode self-bias current is determined by RT1. The step-recovery diode (CR14) forms the heart of a X5 multiplier (C98, C99, and the 12 nH printed inductor). The multiplier converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L16 and C101) which is tuned to the desired output frequency. The three pole helical filter (FL10) is tuned to the LO output frequency (1020 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.2.2.8 1st Local Oscillator (330/450 MHz, Multichannel Option)

The 1st LO signal is derived from crystal-controlled oscillator Q5. The fifth overtone crystal (96.250 MHz nominal) is temperature stabilized by a 65°C proportionally controlled oven. Oscillator buffers Q6 and AR1 isolate the oscillator and amplify the signal, preventing frequency pulling when adjusting the multipliers.

The output of the buffer is doubled in an active push-push doubler. The single-ended input from the buffer is split into two out-of-phase voltages in T1 and applied to the bases of Q7 and Q8. The output of these two transistors is summed at their collectors.

The output of the doubler is tuned by C94 and L14 and is impedance matched to the step-recovery diode multiplier by C95 and C96. The diode self-bias current is determined by RT1. The step-recovery diode (CR14) forms the heart of a X2 multiplier (C98, C99, and the 12 nH printed inductor). The multiplier converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L16 and C101) which is tuned to the desired output frequency. The multiplier output is routed through an external three pole helical filter and is tuned to the LO output frequency (385 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.2.2.9 Up Converter Chain (950 MHz)

The Up Converter Chain consists of a mixer, high gain amplifier, and filters. The mixer (HY1) translates the FMO signal (60-80 MHz) up to the carrier frequency (950 MHz). The mixer is double-balanced for LO rejection and the conversion loss is 8 dB.

The Intermediate Power Amplifier (IPA) is a three-stage broadband RF amplifier (AR2, AR5, AR4) with 30 dB of gain and an output power of +16 dBm. FL12 is a two-pole helical filter that prevents intermodulation in the IPA. AR2 is a shielded two-stage amplifier and FL11 is a three-pole helical filter that provides the necessary spurious rejection for the RF module. The output stage (AR4) operates in compression to minimize any changes in gain over a wide temperature range.

An output power detector (C83, CR10, R72, C82) is provided for the IPA. Relative power is detected and relayed to the Audio/Power Supply board. This voltage should be approximately 2 volts.

The output of the RF module is sent through an external three-pole helical filter before being applied to the RFA to further reduce unwanted spurious emissions (see system block diagram in section 1.4.1).

4.2.2.10 Up Converter Chain (220-450 MHz)

The Up Converter Chain consists of a mixer, high gain amplifier, and filters. The mixer (HY1) translates the FMO signal (60-80 MHz) up to the carrier frequency . The mixer is double-balanced for LO rejection and the conversion loss is 8 dB.

The output of the mixer is sent to an external 3-pole helical filter and then routed back to the RF module IPA. The Intermediate Power Amplifier (IPA) is a three-stage broadband RF amplifier (AR2, AR5, AR4) with 30 dB of gain and an output power of +20 dBm. The output stage (AR4) operates in compression to minimize any changes in gain over a wide temperature range.

An output power detector (C83, CR10, R72, C82) is provided for the IPA. Relative power is detected and relayed to the Audio/Power Supply board for metering. This voltage should be approximately 2 to 3 volts.

The output of the RF module is sent through an external three-pole helical filter before being applied to the RFA to further reduce unwanted spurious emissions (see system block diagram in section 1.4.1).

4.2.2.11 Up Converter Chain/Doubler Assembly (1.7 GHz)

The 1.7 GHz PCL-6010 utilizes a doubler to achieve the carrier frequency, therefore the Upconverter is nearly identical to the 950 MHz band Upconverter. The Up Converter Chain consists of a mixer, high gain amplifier, and filters. The mixer (HY1) translates the FMO signal (60-80 MHz) up to the RF module output frequency (850 MHz). The mixer is double-balanced for LO rejection and the conversion loss is 8 dB.

The Intermediate Power Amplifier (IPA) is a three-stage broadband RF amplifier (AR2, AR5, AR4) with 30 dB of gain and an output power of +16 dBm. FL12 is a two-pole helical filter that prevents intermodulation in the IPA. AR2 is a shielded two-stage amplifier and FL11 is a three-pole helical filter that provides the necessary spurious rejection for the RF module. The output stage (AR4) operates in compression to minimize any changes in gain over a wide temperature range.

An output power detector (C83, CR10, R72, C82) is provided for the IPA. Relative power is detected and relayed to the Audio/Power Supply board. This voltage should be approximately 2 volts.

The output of the RF module is sent to the Doubler Assembly which multiplies the modulated signal (X2) to bring the carrier to the 850 MHz (nominal) operating frequency. The output of the doubler is filtered by an external 5-pole interdigital coupled resonator filter to select the appropriate harmonic before being applied to the RFA to (see system block diagram in section 1.4.1).

4.2.2.12 Up Converter Chain (950 MHz, Multichannel Option)

The Up Converter Chain consists of a mixer, high gain amplifier, and filters. The mixer (HY1) translates the FMO signal (60-80 MHz) up to the carrier frequency (950 MHz). The mixer is double-balanced for LO rejection and the conversion loss is 8 dB.

The Intermediate Power Amplifier (IPA) is a four stage broadband RF amplifier (AR2, AR3, AR4, AR5) with 30 dB of gain and an output power of +16 dBm. FL12 is a two-pole helical filter that prevents intermodulation in the IPA. FL11 is a three-pole helical filter that provides the necessary spurious rejection for the RF module. The output stage (AR5) operates in compression to minimize any changes in gain over a wide temperature range.

An output power detector (C124, CR16, R85, C125) is provided for the IPA. Relative power is detected and relayed to the Audio/Power Supply board. This voltage should be approximately 2 volts.

The output of the RF module is sent through an external three-pole helical filter before being applied to the RFA to further reduce unwanted spurious emissions (see system block diagram in section 1.4.1).

4.2.2.13 Up Converter Chain (220-450 MHz, Multichannel Option)

The Up Converter Chain consists of a mixer, high gain amplifier, and filters. The mixer (HY1) translates the FMO signal (60-80 MHz) up to the carrier frequency . The mixer is double-balanced for LO rejection and the conversion loss is 8 dB.

The output of the mixer is sent to an external 3-pole helical filter and then routed back to the RF module IPA. The Intermediate Power Amplifier (IPA) is a four-stage broadband RF amplifier (AR2, AR3, AR4, AR5) with 30 dB of gain and an output power of +20 dBm. The output stage (AR5) operates in compression to minimize any changes in gain over a wide temperature range.

An output power detector (C124, CR16, R85, C125) is provided for the IPA. Relative power is detected and relayed to the Audio/Power Supply board for metering. This voltage should be approximately 2 to 3 volts.

The output of the RF module is sent through an external three-pole helical filter before being applied to the RFA to further reduce unwanted spurious emissions (see system block diagram in section 1.4.1).

4.2.3 RF Amplifier

Drawings:	
950 MHz	Schematic: 91C7379 Assembly: 20D2937-3
450 MHz	Schematic: 91B7396 Assembly: 20D2958-5
330 MHz	Schematic: 91B7459 Assembly: 20D3038
220 MHz	Schematic: 91B7456 Assembly: 20D3037
1.7 GHz	Schematic: 91D7470 Assembly: 20C3057-2

4.2.3.1 RF Amplifier (950 MHz)

The RF Amplifier module is a three-stage power amplifier designed to produce 6 watts nominal output power over the 890-960 MHz band when driven with a +16 dBm nominal input signal. The heart of the module is a high gain UHF power amplifier hybrid device (AR1) that exhibits excellent stability and ruggedness. AR1 provides 22 dB of gain that is factory-set in the transmitter for 6 watts by adjustment of R1. Field adjustment of R1 is not recommended since other design considerations will be compromised (i.e., DC power consumption, temperature stability, efficiency, etc.).

CAUTION:

Power must be limited to +19 dBm (80mW) or permanent damage to the module may result.

The PA current sample is derived across R2 plus any additional line losses to provide 0.16 volt/amp sensitivity at the RFA input terminals (C701 and C702). This sample is fed to the Audio/Power Supply Board and a test point is provided for monitoring.

The seven-section low-pass filter following AR1 is realized in a semi-lumped configuration utilizing microstripline inductors, open-circuited stubs and lumped capacitors C8 and C9. The filter attenuates the harmonics of the final stage to better than -60 dBc per FCC requirements.

The dual-directional coupler is fabricated using stripline technology to provide high-directivity, therefore assuring accurate forward and reflected power sampling. Detectors CR1 and CR2 provide DC meter samples for reflected and forward power, respectively. These sample voltages are fed to the Audio/Power Supply board. The forward and reflected power sample is conditioned and fed to the meter for monitoring. Forward power voltage level at C721 is approximately 2.5 VDC for the nominal 10 watts output. Reflected power voltage level at C722 is approximately 2.5 VDC for the 100% reflected power.

The RFA supply bridge diode (CR101) and regulator (Q101) are mounted to the heat sink of the RFA and are discussed in more detail in sections 4.2.1.1 and 4.2.1.2.

4.2.3.2 RF Amplifier (450 MHz)

The RF Amplifier module is a three-stage power amplifier designed to produce 10 watts (nominal) output power over the 440-470 MHz band when driven with a +20 dBm (nominal) input signal. The heart of the module is a high gain UHF power amplifier hybrid device (AR1) that exhibits excellent stability and ruggedness. AR1 provides 20 dB of gain and the power output is factory-set in the transmitter for 10 watts by adjustment of the +12.5 Volt supply on the Audio/Power Supply board. Field adjustment of the power supply is not recommended since other design considerations will be compromised (i.e., DC power consumption, temperature stability, efficiency, etc.).

CAUTION:

Power must be limited to +23 dBm (200 mW) or permanent damage to the module may result.

The PA current sample is derived across R2 plus any additional line losses to provide 0.2 volt/amp sensitivity at the RFA input terminals (C701 and C702). This sample is fed to the Audio/Power Supply board and a test point is provided for monitoring.

The seven-section low-pass filter following AR1 is realized in a lumped element configuration utilizing air-coil inductors (L3, L4, L5) and chip capacitors (C6, C7, C8, C9). The filter attenuates the harmonics of the final stage to better than -60 dBc per FCC requirements.

The dual-directional coupler (DC1) is fabricated using a copper shielded twisted-pair coaxial line to provide high-directivity, therefore assuring accurate forward and reflected power sampling. Detectors CR2 and CR3 provide DC meter samples for reflected and forward power, respectively. These sample voltages are fed to the Audio/Power Supply Board. The forward and reflected power sample is conditioned and fed to the meter for monitoring. Forward power voltage level at C721 is approximately 2.5 VDC for the nominal 10 watts output. Reflected power voltage level at C722 is approximately 2.5 VDC for the 100% reflected power.

The RFA supply bridge diode (CR101) and regulator (Q101) are mounted to the heat sink of the RFA and are discussed in more detail in sections 4.2.1.1 and 4.2.1.2.

4.2.3.3 RF Amplifier (330 MHz)

The RFA module is a three-stage discrete bipolar amplifier utilizing lumped elements for impedance matching and tuning. The amplifier provides 20 dB of gain to an output level of 10 watts.

The input applied at J1 is nominally +20 dBm (100 mW). The first stage (Q1) is operated class A and its input matched by C5, C8, and L1. This stage provides a 9 dB of gain. The output of the first stage is tuned and matched to the input of the second stage by L2, C8 and C11. The second stage is operated class C and provides 7 dB of gain. The output of the second stage is tuned and matched to the input of the final stage by L4, C13 and C16. The final is operated class C and provides 6 dB of gain. L5, L6, C18, and C17 match the final output impedance into the 5-element low pass filter (C19, L7, C20, L8, C21). The filter attenuates harmonics of the final stage to better than -60 dBc per FCC requirements. The output impedance of the filter is 50 ohms.

The dual directional coupler is composed of two coupled-line microstrip sections. The forward and reflected power levels are rectified by diodes CR1 and CR2, respectively. These levels are filtered with RC low-pass networks to reduce EMI in the meter sample output lines. The final current sample (0.2 VDC/Amp) is provided by R5 and is metered (nominal 2.2 amp).

The RFA supply bridge diode (CR101) and regulator (Q101) are mounted to the heat sink of the RFA and are discussed in more detail in sections 4.2.1.1 and 4.2.1.2.

4.2.3.4 RF Amplifier (220 MHz)

The RF Amplifier is a two-stage discrete bipolar amplifier utilizing lumped elements for impedance matching and tuning. The amplifier provides 20 dB of gain to an output level of 10 watts.

The input applied at J1 is nominally +20 dBm (100 mW). The first stage (Q1) is operated class C and its input matched by C1, C2, and L1. This stage provides a 12 dB of gain. The output of the first stage is tuned and matched to the input of the final stage by L3, C5 and C6. The final stage is operated class C and provides 8 dB of gain. L6, L7, C11 and C10 match the final output impedance into the 6-element low pass filter (L8, C12, L9, C13, L10, C14). The filter attenuates harmonics of the final stage to better than -60 dBc per FCC requirements. The output impedance of the filter is 50 ohms.

The dual directional coupler is composed of two coupled-line microstrip sections. The forward and reflected power levels are rectified by diodes CR1 and CR2, respectively. These levels are filtered with RC low-pass networks to reduce EMI in the meter sample output lines. The final current sample (0.2 Vdc/Amp) is provided by R4 and is metered (nominal 2.2 amp).

The RFA supply bridge diode (CR101) and regulator (Q101) are mounted to the heat sink of the RFA and are discussed in more detail in sections 4.2.1.1 and 4.2.1.2.

4.2.3.5 RF Amplifier (1.7 GHz)

The RFA module is a four-stage discrete amplifier utilizing microstrip matching elements for impedance matching and tuning. The amplifier provides 38 dB of gain to an output level of 6 watts.

The input applied at J1 is nominally 0 dBm (1 mW). The first three stages are common-source class A FET amplifier stages utilizing a bipolar DC bias scheme requiring the -15 VDC supply. The gain of each stage is set by the gate bias adjustment. The final stage is a common-base class C bipolar design that is matched directly into the 7-element low-pass filter. The filter attenuates harmonics of the final stage to better than -60 dBc per FCC requirements. The output impedance of the filter is 50 ohms.

The dual directional coupler is composed of two coupled-line microstrip sections. The forward and reflected power levels are rectified by diodes D2 and D1, respectively. These levels are filtered with RC low-pass networks to reduce EMI in the meter sample output lines. The final current sample (0.2 Vdc/Amp) is provided by R31 and is metered (nominal 2.0 amp).

The RFA supply bridge diode (CR101) and regulator (Q101) are mounted to the heat sink of the RFA and are discussed in more detail in sections 4.2.1.1 and 4.2.1.2.

4.2.4 Channel Control Board (Multichannel Option)

Drawings:	
Schematic:	91A7515
Assembly:	20D3104-1

The Channel Control Board is used to control the RF module frequency selection, provide front panel display, and implement the remote control facilities for channel selection. The transmitter version (-1) provides gain compensation for the FMO modulation sensitivity variation with frequency change.

Mux IC (U4) selects either the front panel CHANNEL SELECT switch (S1) or the CHANNEL REMOTE INPUT (P1-1, -2, -3, -4), providing a BCD output to the address lines of the EPROMs (U1, U2, U3) for

channels 0 - 15. The remote input is toggled active by the REM ENABLE line (P1-5) which also controls the RMT LED on the display (DP). Board mounted INTERNAL MODE switch (S6) emulates the remote input function for internal security lockout of the front panel channel selection.

Logic IC (U5) decodes and detects channel address number 0 to toggle between EPROM control (PROM ENABLE) and on-board manual programming control (CHNL 0 ENABLE) via switches S2, S3, S4 and S5. The EPROM outputs (PROM PROGRAM) are buffered by bus drivers U7, U8, U9. The switch outputs are buffered by bus drivers U10, U11, U12. The driver outputs are parallel connected (PROGRAM OUTPUT BUS) and enable bank switching of the outputs. When channel number 0 is selected, the switches take control and the RF module may be programmed for a user-specified frequency. The programming bits are assigned as follows:

Bit Name	Assignment	Comments
N8	64 MHz	
N7	32 MHz	
N6	16 MHz	
N5	8 MHz	
N4	4 MHz	
N3	2 MHz	
N2	1 MHz	
N1	500 kHz	
N0	250 kHz	
A3	200 kHz	
A2	100 kHz	
A1	50 kHz	
A3	200 kHz	
C5	"FIX" CAP ACTIVE	(RF MODULE CKT)
C4	"F2" CAP ACTIVE	(RF MODULE CKT)
C3	"F1" CAP ACTIVE	(RF MODULE CKT)
C2	"MOD1" ADJ ACTIVE	(TX ONLY)
C1	"MOD2" ADJ ACTIVE	(TX ONLY)
C0	"MOD3" ADJ ACTIVE	(TX ONLY)

The two digit display (DGT1, DGT2) is controlled by the EPROM outputs D0 - D4. D0 controls the 10's digit and D1-D4 (BCD DISPLAY) are decoded by U13 to provide the 1's display. For systems with less than 16 channels, the display will blank and no programming is available. DGT1 may be tested by shorting jumper E1 (DGT1 TEST).

Analog switch IC (U6) is used to compensate for modulation gain variations with frequency in the FMO (located in the transmitter's RF Module). Each pot adjustment (R12, R13, R14) operates independent of each other and is factory set for each system configuration.

4.3 Receiver

4.3.1 Receiver Audio/Power Supply

Drawings:	
Schematic:	91D7443
Assembly:	20D3024-1 (80 kHz BW) 20D3024-2 (115 kHz BW)

4.3.1.1 Power Supply (AC)

The power supply consists of an AC power connector (P1), transformer, rectifier (CR1), capacitive filters (C4, C5), and fixed linear regulators (VR1, VR2, VR3, VR4). The power supply has four output voltages: +15, -15, +5, -12. The regulated -12 VDC is used to power the crystal ovens for the 1st LO and 2nd LO crystals.

CAUTION:

Failure to ground the third lead of the input power cord may result in hazardous shocks to personnel.

The AC power connector includes an RF filter. The transformer primary windings support the following four input voltage ranges listed below:

Table 4-2.
Receiver Power Supply AC Connector Voltage Ranges

Nominal Voltage (rms)	Minimum Voltage (rms)	Maximum Voltage (rms)	Line Fuse
100	90	100	1.0 A
120	108	132	1.0 A
220	198	242	0.5 A
240	216	264	0.5 A

The transformer has been prewired and the line voltage can be selected by programming the line filter/ fuse holder on the back panel as shown in Figure 4-1 (see section 4.2.1).

4.3.1.2 Power Supply (DC)

The receiver can be optionally configured as a DC input (only) system. All DC systems can be input isolated for negative DC operation. The back panel has a barrier strip for the DC input and is fused. The value of the fuse and the system ground configuration is listed on the back panel.

The Audio/Power Supply board is modified by bypassing the bridge rectifier (CR1) and the ±15 VDC regulators (VR1 and VR2). The DC input from the switching supplies enters the board at P1. See the schematic for further details.

4.3.1.3 Mute and Transfer

The Mute and Transfer circuitry contains the necessary logic to squelch the receiver during periods of insufficient RF signal strength. The receiver will mute whenever one or more of the following conditions are present:

1. The signal mute line (SIGMUTE, P5-4) from the IF Demod module (6020) or FM Demod module (6030/6060) is at a logic low level (0 VDC).

2. The rear panel remote mute input (MUTEIN, P2-8) is grounded.

3. The rear panel auto transfer input (XFERIN, P2-9) is at a logic high level (+5 VDC). This signal will force the collector of Q1 to a logic low level.

4. The front panel momentary manual transfer switch (S1) is activated, also forcing the collector of Q1 to a logic low level.

5. The AFC LOCK signal from the RF module (P3-6) is at a logic low level, indicating a loss of lock condition in the 2nd LO.

When one of the above conditions is present, pin 6 of U15a will go to a logic high level. This signal activates the FET mute switch (U1). This signal is inverted by U15b to control the front panel "OPERATE" status LED and activate the driver/inverter U16.

U16c is a high current relay driver for the mute relay (K1). When the receiver is muted, pin 6 of U16 will go high and no current will flow through the relay coil. This condition is also true if power to the receiver is lost. In the mute mode, K1 disconnects the program signal at P2-20 (composite), P2-18 (MONO+), P2-16 (MONO-), and P2-14 (MUX). The armature contacts of K1 are connected to the rear panel to activate alarms.

U16a and U16b form a non-inverting relay driver for remote transfer to another receiver in a hot standby installation. This output (XFEROUT) appears at P2-7 and is routed to the rear I/O panel. Refer to section 2 of this manual for further information.

4.3.1.4 Metering and Status

The Metering Functions are selected by the front panel meter switch (S2) and are calibrated by potentiometers R210 (+15V), R212 (-15V), R213 (+5V), R172 (SIG LVL), R171 (PGM LVL), R170 (MUX LVL), R169 (AFC LVL), R169 (LO1), R168 (LO2), R167 (LO3). The signals are processed by absolute value amplifier and peak detector U19. This output is followed by a buffer and meter ballistics amplifier U20. R186 (METER ZERO) is used to electrically zero the meter. R196 (METER BALLISTICS) is used to adjust the meter acceleration and ballistics response.

Amplifier U17b drives the "SIGNAL" LED (CR20) on the front panel. "SIGNAL" is red when a carrier signal is not present, and green when a carrier signal is present.

Amplifier U17a drives the "AFC LOCK" LED (CR19) on the front panel. Green indicates the 2nd LO/Synthesizer is properly locked. Red indicates a loss of lock.

Amplifier U18a drives the "OPERATE" LED (CR21) on the front panel. Green indicates the receiver is not muted as determined from the Mute and Transfer circuitry. Red indicates a mute or standby condition.

4.3.1.5 Audio Processor

The baseband input enters the Audio/Power Supply board at J1. U1 is a FET mute switch that is controlled by the Mute and Transfer circuitry and prevents high level noise from entering the audio processor under a mute condition. Amplifier U2 is configured as a high frequency tilt compensation circuit for the IF filter nonlinearities. R7 (COMP HF TILT) is used for composite operation and R208 (MONO HF TILT) is used for monaural operation. The output of U2 is split into low-frequency audio and high-frequency mux signals.

Jumpers E1 and E6 select the composite high pass MUX filter or the monaural high pass MUX filter and route the audio to the appropriate processing circuitry. The high-pass filtered mux signal is buffered by U3, which has a MUX gain adjustment (R12, MUX LVL). Jumpers E7 and E8 select the composite or monaural MUX low pass filters that improve selectivity performance in the MUX channel. Buffer U4 drives the MUX output and provides a metering point.

The composite signal is processed by U5 where R61 (COMP LF TILT) is used to set the low-frequency gain compensation. The seven pole elliptical composite low pass filter (C70-C76, L9-L11) attenuates MUX signals and high frequency distortion products. Buffer U6b isolates and controls the impedance as seen by the filter. U7 is a all-pass delay equalization circuit to correct for IF response and optimize stereo seperation. U6a is a summing amplifier for the delay equalizer and R111 (DELAY EQ) optimizes the circuit for each receiver. The audio is monitored at this point for metering. Jumper E9 bypasses the composite LPF and delay equalizer for digital STL applications. Jumper E5 selects the audio for composite or monaural operation.

The monaural signal is processed by U8 which is an active 75 µS de-emphasis network. Adjustments F1 (R23) and F2 (R22) accurately set the de-emphasis curve for optimum response. Jumper E2 enables (IN) or disables (OUT) de-emphasis. The mono signal is optionally routed through a seven pole active filter (U9, U10, and U11) with a 15 kHz cut-off. Adjustments FA (R30), FB (R78), and FC (R82) are used to tune the roll-off of the filter and align the phase linearity of a dual-mono STL link. MONO LF TILT (R88) compensates for low frequency tilt caused by IF filter non-linearities. LPF GAIN (R89) sets the overall mono low pass filter unity gain. Jumper E3 selects the active filter to be in or out of the mono audio processing path. Amplifier U12b enables monaural program level adjustment with R98 (MONO PGM LVL). The program level is metered at this point and R90 (MONO PGM MTRG) compensates for level changes between composite and monaural system switching. U13 and U14 comprise an active balanced output driver stage capable of +10 dBm audio power.

4.3.2 Receiver RF Module

Drawings:	
950 MHz (6020/6030):	
Schematic:	91D7442
Assembly:	20D3022-1
950 MHz (6060):	
Schematic:	91D7492
Assembly:	20D3077
950 MHz (Multichannel)	
Schematic:	91A7521
Assembly:	20D3107-1
330/450 MHz	
Schematic:	91D7461
Assembly:	20D3022-4
330/450 MHz (Multichannel)	
Schematic:	91A7524
Assembly:	20D3107-4
220 MHz	
Schematic:	91D7464
Assembly:	20D3022-3
1.7 GHz	
Schematic:	91D7455
Assembly:	20D3022-6

4.3.2.1 2nd LO/Synthesizer

The 2nd LO/Synthesizer consists of three main subgroups: the RF group, the digital group, and the loop filter. The RF group includes the voltage controlled oscillator (VCO), buffer, reference oscillator, and low-pass filter. The digital group includes a dual modulus prescaler and an integrated PLL IC that provides multiple functions to be described later.

These three groups provide a RF signal source that has good short-term stability, low noise, and is tunable over a wide frequency range. Selecting the appropriate divide ratio synthesizes the crystal-controlled reference oscillator and ensures long-term stability.

The VCO consists of low-noise field effect transistor Q3 in an RF grounded base configuration. The drain of Q3 is connected to the resonant circuit inductor and capacitors. The capacitance for this circuit is provided by C30, C29 and C31. The inductance consists of a stripline inductor on the PC board. Feedback to cause oscillation is from the drain to the source consisting of C29 and C31. The normal frequency range of the oscillator is 70.7 to 90.7 MHz.

The signal is buffered by U4 which drives the seven section elliptical low-pass filter comprised of C47, L5, C49 ,C52, L6, C51, C50, L7, C48, and C43. This sharp cut-off filter attenuates the harmonics of the 2nd LO. Low pass filter FL13 attenuates any frequencies above 550 Mhz.

R53 is used to sample the VCO output as feedback for the high speed dual-modulus prescaler (U2). The prescaler divides the 80.7 MHz signal by 10 or 11, depending on the divide ratio selected by the integrated PLL chip (U1). This technique enables one divider IC to be used for small step sizes. The PLL chip contains programmable dividers, a digital phase detector, modulus control logic and lock detect

circuitry to reduce chip count and increase reliability in synthesizer designs. The output frequency is programmed by switches SW0, SW1, SW2, and SW3 for a step size of 25 kHz.

Y1, Q1, Q2 and associated circuitry comprise a stable, low phase noise, oven-controlled reference oscillator for the phase lock loop. Frequency trim control C11 (FREQ TRIM) is used to set the output frequency of this oscillator and compensates for slight differences in the 1st LO frequency. The internal phase detector compares the VCO and reference oscillator inputs and delivers a series of pulses to the integrating loop filter.

Loop filter U3 is an integrating low-pass filter that removes most of the reference frequency component of the phase comparator output. It also provides DC gain to decrease the very low frequency noise of the 2nd LO. Further filtering of the AFC voltage is then delivered to CR5 through R38, closing the AFC loop. The frequency stability of the 2nd LO is maintained by CR5, which is attached to the stripline inductor through C27. A voltage generated by the AFC circuitry changes the capacitance of CR5, which is also part of the tuning of the VCO resonant circuit. AFC level adjust C30 (AFC LVL) is used to place the phase lock loop in the center of its operating control range. This is indicated by a nominal +7 VDC AFC level.

The lock detect signal at U1-28 is a series of pulses at the step size rate (25 kHz) when the loop is locked. The low pass filters (R9 and C2) provide an average voltage at U3-5 of +5 VDC when the loop is locked. If the loop becomes unlocked, the average voltage drops to 2.5 VDC. This causes the output of comparator U3 to change state which lights the red LOSS OF LOCK LED on the module. Also, the voltage at FL2 drops from +5 to 0 VDC, causing the mute logic circuitry to mute the receiver.

The output frequency of the 2nd LO is set by the values of switches SW0-SW3. The output frequency is determined by adding the resultant frequency values set by each switch. SW0 is a one bit switch that sets 64 MHz. SW1, SW2, and SW3 are four-bit switches set to a hex value (0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F), where A - F corresponds to 10 - 15. A simple example illustrates the math:

Receiver 2nd LO frequency example:

1st LO =	1020.000 MHz
Carrier freq.=	- 950.000
1st IF freq.=	70.000 MHz

1st IF freq.=	70.000 MHz
2nd IF freq.=	+ 10.700 MHz
2nd LO/Synth=	80.700 MHz

Switch settings:

SW0	1	X	64	=	64.000	MHz
SW1	4	X	4	=	16.000	
SW2	2	X	.25	=	.500	
SW3	8	X	.025	=	0.200	
					80.700	MHz

(Note: See section 5.3.9 for changing the STL frequency in the field)

4.2.2.2 2nd LO/Synthesizer (Multichannel Option)

The 2nd LO/Synthesizer consists of three main subgroups: the RF group, the digital group, and the loop filter. The RF group includes the voltage controlled oscillator (VCO), buffer, reference oscillator, and low-pass filter. The digital group includes a dual modulus prescaler and an integrated PLL IC that provides multiple functions to be described later.

These three groups provide an RF signal source that has good short-term stability, low noise, and is tunable over a wide frequency range. Selecting the appropriate divide ratio synthesizes the crystal-controlled reference oscillator and ensures long-term stability.

The VCO consists of low-noise field effect transistor Q4 in an RF grounded base configuration. The drain of Q4 is connected to the resonant circuit inductor and capacitors. The capacitance for this circuit is provided by C35, C40 and C41, as well as the three switching networks that control the capacitors C26, C30, and C34. The inductance consists of a stripline inductor on the PC board. Feedback to cause oscillation is from the drain to the source consisting of C40 and C41. The normal frequency range of the oscillator is 70.7 to 90.7 MHz.

The signal is buffered by U4 which drives the seven section elliptical low-pass filter comprised of C55, L6, C56 ,C57, L7, C58, C59, L8, C60, and C61. This sharp cut-off filter attenuates the harmonics of the 2nd LO. The output is buffered by the resistive attenuator (R78, R79, R80) to provide a level at the mixer of -6 dBm.

R48 is used to sample the VCO output as feedback for the high speed dual-modulus prescaler (U2). The prescaler divides the 80.7 MHz signal by 10 or 11, depending on the divide ratio selected by the integrated PLL chip (U1). This technique enables one divider IC to be used for small step sizes. The PLL chip contains programmable dividers (/N, /A, /R), a digital phase detector, modulus control logic and lock detect circuitry to reduce chip count and increase reliability in synthesizer designs.

OSC1 is a temperature compensated crystal oscillator (TCXO) that provides a stable, low phase noise reference oscillator for the phase lock loop. The internal phase detector compares the VCO and reference oscillator inputs and delivers a series of pulses to the integrating loop filter.

Loop filter U3 is an integrating low-pass filter that removes most of the reference frequency component of the phase comparator output. It also provides DC gain to decrease the very low frequency noise of the 2nd LO. Further filtering of the AFC voltage is then delivered to CR10 and CR11 through R30, closing the AFC loop. The frequency stability of the 2nd LO is maintained by CR10 and CR11, which is attached to the stripline inductor through C62. A voltage generated by the AFC circuitry changes the capacitance of CR10 and CR11, which is also part of the tuning of the VCO resonant circuit. Depending upon which capacitors are switched into the resonant circuit; F1 (C34), F2 (C30), or FIX (C26), the AFC level adjustment is used to place the phase-locked loop in the center of its operating control range. This is indicated by a nominal +7 VDC AFC level.

For Multichannel operation, different capacitors are switched in to maintain an AFC range between 5 - 9 VDC for different channel frequencies. These switching networks are labeled F1, F2, and FIX. A logic level of +5 VDC at the input of the buffers (Q3, Q2, Q1) will connect that corresponding capacitor into the resonant circuit. If the Multichannel option is being utilized in the system, these settings come from the Channel Control board's programmed inputs at J11-5, -18, -6, and switch S4 must be disabled (open circuit). If the RF module is being used as a stand-alone, switch S4 is used to switch in the required capacitors. In either case, green LED indicators CR6 (F1) and CR5 (F2) will light to indicate which setting is active. The FIX capacitor is normally used to band-switch to a frequency far removed from the initial setting.

The lock detect signal at U1-28 is a series of pulses at the step size rate (25 kHz) when the loop is locked. The low pass filter (R19 and C13) provide an average voltage at U3-5 of +5 VDC when the loop

is locked. If the loop becomes unlocked, the average voltage drops to 2.5 VDC. This causes the output of comparator U3 to change state which lights the red LOSS OF LOCK LED on the module. Also, the voltage at FL2 drops from +5 to 0 VDC, causing the radiate control circuitry to put the transmitter in STANDBY.

The output frequency of the 2nd LO is determined by the divider values programmed into the PLL chip U1. If the Multichannel option is being utilized in the system, these settings come from the Channel Control board's parallel inputs at J11 and the internal switches S1, S2, S3, and S4 must be disabled (S4: open circuit and S1,2,3: set to "F"). If the RF module is being used as a stand-alone, the frequency is set by the values of switches S1, S2, S3, and S4. The output frequency is determined by adding the resultant frequency values set by each switch. S4-1 is a one bit switch that sets 64 MHz. S1, S2, and S3 are four-bit switches set to a hex value (0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F), where A - F corresponds to 10 - 15. The transmitter frequency example below illustrates the math.

Receiver 2nd LO frequency example:

1st LO =	1020.000 MHz
Carrier freq.=	- 950.000
1st IF freq.=	70.000 MHz

1st IF freq.=	70.000 MHz
2nd IF freq.=	+ 10.700 MHz
2nd LO/Synth=	80.700 MHz

Switch settings:

S4-1	1	X	64	=	64.000	MHz
S1	4	X	4	=	16.000	
S2	2	X	.25	=	.500	
S3	8	X	.025	=	0.200	
					80.700	MHz

(Note: See section 5.3.9 for changing the STL frequency in the field)

4.3.2.3 1st Local Oscillator (950 MHz)

The receiver 1st LO is identical to the transmitter 1st LO circuit. See section 4.2.2.2 (TX RF Module) for a detailed circuit description.

4.3.2.4 1st Local Oscillator (330/450 MHz)

The receiver 1st LO is identical to the transmitter 1st LO circuit. See section 4.2.2.3 (TX RF Module) for a detailed circuit description.

4.3.2.5 1st Local Oscillator (220 MHz)

The receiver 1st LO is identical to the transmitter 1st LO circuit. See section 4.2.2.4 (TX RF Module) for a detailed circuit description.

4.3.2.6 1st Local Oscillator (1.7 GHz)

The 1st LO signal is derived from crystal-controlled oscillator Q6. The fifth overtone crystal (Y2, 110 MHz) is temperature stabilized by a 65°C proportionally controlled oven (HR1). The output frequency is not adjustable. Oscillator buffers Q8 and AR3 isolate the oscillator and amplify the signal, preventing frequency pulling when adjusting the multipliers.

The output of the buffer is doubled in an active push-push doubler. The single-ended input from the buffer is split into two out-of-phase voltages in T1 and applied to the bases of Q9 and Q10. The output of these two transistors is summed at their collectors.

The output of the doubler is tuned by C101 and L8 and is impedance matched to the step-recovery diode multiplier by C64 and C109. The diode self-bias current is determined by RT1. The step-recovery diode (CR9) forms the heart of an X8 multiplier (C63, C100, and the 12 nH printed inductor). The multiplier converts the input sinusoidal signal to a stream of impulses. These impulses are fed to an LC output circuit (L9 and C56) which is tuned to the desired output frequency. The external five-pole interdigital coupled-resonator filter is tuned to the LO output frequency (1760 MHz nominal). The output is terminated into a 3 dB attenuator, reducing the output power to that required by the 1st mixer and providing a wideband match for the filter. The undesired harmonics are suppressed at least 40 dB. The output power is between +5 and +9 dBm.

4.3.2.7 1st Local Oscillator (950 MHz, Multichannel Option)

The receiver 1st LO is identical to the transmitter 1st LO circuit. See section 4.2.2.2 (TX RF Module) for a detailed circuit description.

4.3.2.8 1st Local Oscillator (330/450 MHz, Multichannel Option)

The receiver 1st LO is identical to the transmitter 1st LO circuit. See section 4.2.2.3 (TX RF Module) for a detailed circuit description.

4.3.2.9 Preselector/Preamplifier/1st Mixer (950 MHz, 6020/6030)

The receiver RF input passes through a two-pole helical filter (FL12) to protect the succeeding low-noise preamp from high level carriers. The preamp (AR5) is a monolithic gain block with a gain of 14 dB (NF = 2.8 dB). The three-pole helical filter (FL11) provides image frequency rejection the front-end selectivity characteristics (BW = 20 MHz). Mixer HY2 performs the first down-conversion, in conjunction with the 1st LO, to the 1st IF (60-80 MHz).

4.3.2.10 Preselector/Preamplifier/1st Mixer (950 MHz, 6060)

In order to accomodate the 6060 receiver, the RF module is configured differently. The Preselector, Preamplifier, 1st Mixer and 1st IF amplifier are not installed and the 1st LO is routed to the IF output connector (J2). See the description of the Preamp/1st Mixer module below.

4.3.2.11 Preselector/Preamplifier/1st Mixer (150-450 MHz)

The receiver RF input passes through an external three-pole helical filter to protect the succeeding low-noise preamp from high level carriers and provide the front-end selectivity characteristic (BW = 8 MHz). The preamp (AR5) is a monolithic gain block with a gain of 20 dB (NF = 2.8 dB). Mixer HY2 performs the first down-conversion to the 60-80 MHz IF.

4.3.2.12 Preselector/Preamplifier/1st Mixer (1.7 GHz)

The receiver RF input passes through an external five-pole interdigital coupled resonator filter to protect the succeeding low-noise preamp from high level carriers and provide the front-end selectivity characteristic (BW = 20 MHz). The preamp (AR5) is a monolithic gain block with a gain of 20 dB (NF = 2.8 dB). Mixer HY2 performs the first down-conversion to the 60-80 MHz IF.

4.3.2.13 Preselector/Preamplifier/1st Mixer (950 MHz, 6020/6030, Multichannel Option)

The receiver RF input passes through a two-pole helical filter (FL12) to protect the succeeding low-noise preamp from high level carriers. The preamp (AR2) is a monolithic gain block with a gain of 14 dB (NF = 2.8 dB). The three-pole helical filter (FL11) provides image frequency rejection the front-end selectivity characteristics (BW = 20 MHz). Mixer HY1 performs the first down-conversion, in conjunction with the 1st LO, to the 1st IF (60-80 MHz).

4.3.2.14 Preselector/Preamplifier/1st Mixer (150-450 MHz, Multichannel Option)

The receiver RF input passes through an external three-pole helical filter to protect the succeeding low-noise preamp from high level carriers and provide the front-end selectivity characteristic (BW = 8 MHz). The preamp (AR2) is a monolithic gain block with a gain of 20 dB (NF = 2.8 dB). Mixer HY1 performs the first down-conversion to the 60-80 MHz IF.

4.3.2.15 1st IF Amplifier (6020/6030)

The IF output of the mixer (HY1) is terminated with a constant-impedance diplexer network (C80, L16, R75, C81) and tuned amplifier Q11 that has a high intercept point to prevent interference intermodulation. The 1st IF amp also buffers the mixer output and provides gain to overcome conversion losses. C86 and L17 tune the output of the amp to provide filtering (BW = 4 MHz).

4.3.2.16 1st IF Amplifier (6020/6030: Multichannel Option)

The IF output of the mixer (HY1) is terminated with a constant-impedance diplexer network (C108, L18, R79, C109, L19) and wideband amplifier AR3 that has a high intercept point to prevent interference intermodulation. The 1st IF amp also buffers the mixer output and provides gain to overcome conversion losses.

4.3.3 Preamp/1st Mixer (950 MHz, 6060)

Drawings:
Schematic: 91D7274-2 Assembly: 20D2827

The Preamp/1st Mixer module has been designed to provide optimum service in the most hostile RF environments. The active attenuator, low-noise preamplifier, 1st mixer, and 1st IF amplifier are integrated in this module.

The input signal is applied to a PIN diode attenuator normally set to minimum loss (0.5 dB). By adjusting the diode bias via R13 (RF ATTEN ADJ), the attenuator can be set to approximately 15 dB to prevent preamp overload in very high level RF environments.

The signal is split by a 3 dB hybrid coupler (microstrip design). The outputs are each applied to low-noise amplifiers Q3 and Q4. Each amplifier employs active bias (Q2, Q5) to stabilize the best low-noise bias conditions. The outputs are recombined by another hybrid coupler. This configuration increases the third intercept point by 3 dB, providing an extremely robust front-end preamp.

The signal passes through a microstrip image noise filter to be applied to the 1st mixer (U1). At this point, the carrier signal is down-converted to the 1st IF (60-80 MHz) by mixing with the 1st LO (1020 MHz).

The IF output is terminated with a constant-impedance diplexer network (C8, L4, R4, C7) and tuned amplifier Q1 that has a high intercept point to prevent interference intermodulation. The 1st IF amp also buffers the mixer output and provides gain to overcome conversion losses. C4 and L3 tune the output of the amp to provide filtering.

4.3.4 IF Demod (6020)

Drawings:
Schematic: 91D7375 Assembly: 20D2941

The IF Demod module incorporates several functions including the 1st IF bandpass filter, 2nd mixer, 2nd IF filters, and FM demodulator.

The input signal at the 1st IF (60-80 MHz) enters at J2 and is amplified by Q3 to overcome the succeeding filter losses. The nominal 70 MHz BPF is a 3-pole lumped element, synchronously-tuned, capacitively coupled design whose primary purpose is to reduce undesired signals to levels that will not

cause intermodulation in the 2nd mixer and IF amplifier. The 10 dB bandwidth is 4 MHz. Jumper E1 can be used to access this filter for testing.

The 2nd mixer performs down conversion of the carrier to 10.7 MHz. The output is diplexed (L1-L3, C1-C3, R4) to provide a constant impedance filter function and is amplified by Q1, Q2, and associated circuitry.

The FM demodulator is comprised mainly of U2, a high performance integrated circuit designed for wideband FM demodulation at 10.7 MHz and provides a low noise, low distortion output in addition to providing a variety of internal functions. The input (pin 1) is preceded by the 1st IF Filter (FL7) which is a linear phase, monolithic ceramic resonator. The signal is buffered and the output (pin 2) is applied to the 2nd IF Filter (FL8). These filters set the selectivity of the receiver and are adjusted for minimum distortion by C13 and C18. The signal is then fed to the IF limiter amplifier input (pin 5) and the quadrature detector circuit (pins 10 and 11). The quadrature tank circuit (C26, C68, R16, L8 and L9) is singly tuned and U2 provides a distortion compensation circuit internally to achieve this simpler approach to quadrature detection. The demodulated baseband output (pin 15) is applied to amplifier U4 and the output is adjusted by R19. Baseband level (TP2) may be used for monitoring. The IF limiter also provides a logarithmic meter output (pin 8) which is proportional to signal strength. This output is fed to buffer amp U3 and is available on the Audio/Power Supply board for metering. R18 (MUTE THRESHOLD ADJUST) provides feedback to the mute circuit (pin 13) and sets the signal mute level. The mute output (pin 16) is sent to the mute logic circuit located on the Audio/Power Supply board. The current in R17 is zero when the quad tank is tuned to center frequency, therefore a demod balance voltage is available (TP1) that should be 0 ± 0.5 volt when tuned properly. The test point is available on the Audio/Power Supply board for metering.

4.3.5 Double Converter/LO3 (6030/6060)

Drawings:	
Schematic:	91D7451
Assembly:	20D3039

System selectivity of the receiver is provided by the Double Converter/LO3 module. The following discussion will describe the signal flow.

The input signal is amplified by Q1 to overcome the insertion loss of the 70 MHz bandpass filter. This amplifier also acts as an impedance transformer from the 50 ohm input impedance to the 3000 ohm impedance of the filter.

The primary purpose of the 70 MHz bandpass filter is to reduce undesired signals to levels that will not cause intermodulation in the 2nd mixer and 2nd IF amplifiers. The 10 dB bandwidth of this filter is 4 MHz. The output of the filter is impedance transformed down to 50 ohms to match the mixer. The output of the filter is applied to mixer U1 through test point E1 and the optional attenuator at E6. This attenuator compensates for differing system gains of the 6030 and 6060 receivers.

The signal input to mixer U1 is mixed with the 2nd LO signal to produce the 2nd IF signal at 10.7 MHz. The 2nd LO signal is provided by the synthesizer in the RF module. The mixer is double balanced, and its IF port (10.7 MHz) is diplexed (L1, C1, C2, R1) and fed through a filter (L2, C3, L3) to amplifier Q1. The output of the 1st 10.7 MHz amplifier (Q1) is buffered by emitter follower Q2. The source impedance required by filter FL1 is set by R9.

The 1st 10.7 MHz IF filters FL1, FL2, and FL3 are linear phase monolithic ceramic filters that are jumper-programmed for particular receiver configurations (MONO, WIDEBAND COMPOSITE, or NARROW-

BAND COMPOSITE). C13, C14, and C15 allow a null adjustment of the filter distortion. Amplifier U2 compensates for filter losses and buffers the impedance match between the 1st and 2nd IF filters.

In a similar fashion, the 2nd 10.7 MHz IF filters FL4, and FL5 are jumper-programmed for receiver configurations (MONO or COMPOSITE). C21 and C22 allow a null adjustment of the filter distortion. Amplifier U3 compensates for filter losses and buffers the impedance matching. L11 and C28 form a harmonic and noise filter for the 3rd mixer (U4).

The input to 3rd mixer is mixed with the 13.7 MHz 3rd LO signal to produce the 3rd IF signal at 3 MHz. The 3rd LO is comprised of crystal oscillator Q4 and buffer Q5. The 3rd mixer is also double balanced and diplexed. The output signal is sent to the FM Demodulator module.

4.3.6 FM Demod (6030/6060)

Drawings:
Schematic: 91D7387 Assembly: 20D2949

The FM Demod module performs three major functions:

1. Extraction of baseband information from the frequency modulated input signal;
2. Generation of DC metering signal proportional to the logarithm of the input RF carrier over a three-decade range;
3. Generation of a mute signal to squelch the receiver when the RF input signal is too low for reliable operation.

4.3.6.1 FM Demodulator

The 3 MHz RF signal at J3 is fed to a low-noise amplifier, U4, and its associated circuitry, where it receives approximately 30 dB of voltage amplification. This signal passes through a 3 MHz phase linear bandpass filter (L8 through L10 with C83 and C84). The output of this filter drives a high-gain (60 dB) non-saturating symmetrical limiting amplifier U6. The amplitude-limited signal is then fed to a precision charge count FM detector to extract the baseband information.

The FM detector operates as follows: Q15, Q16 and Q18 form a differential amplifier with Q13 and Q14 serving as constant-current collector loads. This amplifier has a gain in excess of 30 dB. Q10 and Q17 in conjunction with diodes CR15 through CR17 form low-noise voltage clamps to ensure non-saturating action of the differential amplifier transistors. The current outputs of the differential amplifier alternately charge C62 and C63 through diodes CR12 and CR13. These capacitors are then alternately discharged through Q11 and Q12, the total current being proportional to the signal frequency. Q11 and Q12 serve as current-to-voltage converters whose outputs are combined and integrated in a 500 kHz low-pass filter (L4 and L5 and associated circuitry). The output from this filter contains the baseband information.

A two-stage low-noise amplifier (U5 and U1) then amplifies the baseband signal to a useful system level. Jumper E1 sets the baseband gain to compensate for the differences in wideband and narrowband transmitter deviation. Baseband Level Adjust R10 is set to deliver a 3.5 V p-p signal at J2 for an FM signal with 50 kHz (35 kHz in narrowband mode) deviation. This FM detector is inherently wideband, linear, and adjustment free.

4.3.6.2 RF Signal Strength Detector

The RF signal from U4 is also sent to a four-stage successive limiting differential amplifier (Q2 through Q9) through a simple bandpass filter (L3 and C42). Each stage of this amplifier drives an amplitude detector (CR7 through CR10), which in conjunction with the summing amplifier U3, produces a dc metering signal at J1-9 that is proportional to the logarithm of the RF input level over three decades of amplitude. This voltage is used to indicate RF signal strength over the range of 3 microvolts to 3000 microvolts on the front-panel meter. LOG GAIN control R67 is used to establish the linearity of the signal sent to the Metering and Status module.

4.3.6.3 Mute Logic

The RF signal strength voltage from the log amplifier is also sent to comparator U2, which compares this level to a preset reference voltage established by MUTE THRESHOLD ADJUST (R22). Decreasing this reference voltage decreases the signal strength required to initiate the mute condition. Whenever the logic circuitry is in the mute condition, MUTE threshold indicator CR6 will glow red. A 2 dB hysteresis is built into the mute logic to eliminate "chattering" near the mute threshold. Also network CR3, CR4, R16, R17, and C10 provide a fast-attack, slow-release (1 ms and 1.5 seconds, respectively) to and from the mute mode to eliminate "thumps". The mute signal is brought out on J1-10 and J1-11.

4.3.7 Adjacent Channel Filter (6060)

Drawings:	
Schematic:	91D7502
Assembly:	20D3089

The Adjacent Channel Filter is an elliptical low-pass baseband filter that attenuates any high frequency signals that could be demodulated by the FM Demod due to adjacent channel interference. These signals can cause slew-rate limiting in successive baseband processing circuits. The filter module is jumper-programmable (E1 and E2) for composite or mono operation.

4.3.8 Channel Control Board (Multichannel Option)

Drawings:	
Schematic:	91A7515
Assembly:	20C3104-2

The Channel Control Board is used to control the RF module frequency selection, provide front panel display, and implement the remote control facilities for channel selection. The transmitter version (-1) provides gain compensation for the FMO modulation sensitivity variation with frequency change.

Mux IC (U4) selects either the front panel CHANNEL SELECT switch (S1) or the CHANNEL REMOTE INPUT (P1-1, -2, -3, -4), providing a BCD output to the address lines of the EPROMs (U1, U2, U3) for channels 0 - 15. The remote input is toggled active by the REM ENABLE line (P1-5) which also controls the RMT LED on the display (DP). Board mounted INTERNAL MODE switch (S6) emulates the remote input function for internal security lockout of the front panel channel selection.

Logic IC (U5) decodes and detects channel address number 0 to toggle between EPROM control (PROM ENABLE) and on-board manual programming control (CHNL 0 ENABLE) via switches S2, S3, S4 and S5. The EPROM outputs (PROM PROGRAM) are buffered by bus drivers U7, U8, U9. The switch outputs are buffered by bus drivers U10, U11, U12. The driver outputs are parallel connected (PROGRAM OUTPUT BUS) and enable bank switching of the outputs. When channel number 0 is selected, the switches take control and the RF module may be programmed for a user-specified frequency. The programming bits are assigned as follows:

Bit Name	Assignment	Comments
N8	64 MHz	
N7	32 MHz	
N6	16 MHz	
N5	8 MHz	
N4	4 MHz	
N3	2 MHz	
N2	1 MHz	
N1	500 kHz	
N0	250 kHz	
A3	200 kHz	
A2	100 kHz	
A1	50 kHz	
A3	200 kHz	
C5	"FIX" CAP ACTIVE	(RF MODULE CKT)
C4	"F2" CAP ACTIVE	(RF MODULE CKT)
C3	"F1" CAP ACTIVE	(RF MODULE CKT)
C2	"MOD1" ADJ ACTIVE	(TX ONLY)
C1	"MOD2" ADJ ACTIVE	(TX ONLY)
C0	"MOD3" ADJ ACTIVE	(TX ONLY)

The two digit display (DGT1, DGT2) is controlled by the EPROM outputs D0 - D4. D0 controls the 10's digit and D1-D4 (BCD DISPLAY) are decoded by U13 to provide the 1's display. For systems with less than 16 channels, the display will blank and no programming is available. DGT1 may be tested by shorting jumper E1 (DGT1 TEST).

Analog switch IC (U6) is used to compensate for modulation gain variations with frequency in the FMO. Each pot adjustment (R12, R13, R14) is independent of each other and is factory set for each system configuration. This circuit is not installed for receiver applications.

Section Five

Alignment

Contents

5.1 Introduction

This section presents the alignment procedures for the PCL 6000 and a list of recommended test equipment. Also included are descriptions of all module adjustments, general troubleshooting information, and test fixture diagrams. Relevant troubleshooting information is included at the end of each alignment procedure.

5.2 Test Equipment

Table 5-1 lists the test equipment recommended for use in the alignment procedures. Equivalent items of test equipment may also be used. Any test equipment that is used for RF measurements must be rated for the frequency of operation and power levels that may be encountered.

5.3 Alignment Procedures

The PCL 6000 alignment procedures include the following:

1. STL Frequency Alignment
2. Receiver Sensitivity
3. Receiver Selectivity
4. Transmitter Deviation and Receiver Output Level Calibration
5. Ultimate Signal-to-Noise Ratio
6. Distortion Alignment
7. Stereo Separation and Signal-to-Noise Ratio
8. Stereo Crosstalk
9. STL frequency Change
10. FMO Adjustment
11. Transmitter Troubleshooting Procedure

Table 5-1
Recommended Test Equipment

Instrument Type	Suggested Model	Critical Specifications
Counter *(Note: For dual links on the same frequency, include Option 01.)*	Tektronix DC-508A 1.3 GHz	Single Link ± 5 ppm Dual Link ± 0.2 ppm
Directional Coupler	Microlab/FXR CB-49B	30 dB; 1-2 GHz 50 Ohms
Attenuator, Fixed	Philco 662A-30 Sierra 661A-30	30 dB; 1 GHz 50 Ohms, 20 Watts
Attenuator, Adjustable	Kay Elemetrics Model 432D	1,2,3,5,10,20 dB steps 50 ohm; 1 GHz
RF Signal Generator	Hewlett-Packard Model 8640B with Option 01 & 02	**Freq Range:** 0.5-1024 MHz **Residual FM:** 30 Hz, 20 Hz-15 kHz >10 Hz, 300 Hz-3 kHz **RF Level Accuracy:** +3.5 dB,-7 to -47 dBm +4.0 dB,-74 to-137 dBm **Output Impedance:** 50 ohm **FM Deviation BW:** dc to 250 kHz
Distortion Analyzer	Hewlett-Packard 339A Tektronix AA501 w/SG5050 and TM503 Main Frame	**Residual Noise:** -92 dB (80 kHz) **Input Impedance:** 100 ohm shunted by less than 100 pF **Accuracy:** 20 Hz to 20 kHz ±2% 10 Hz to 110 kHz ±4% **Oscillator Freq. Range:** 10 Hz-110 kHz **Output Level:** 3VRMS into 600 ohm **Distortion:** 10 Hz-20 kHz: -95 dB (0.00187%) THD
Audio Oscillator	Hewlett-Packard 204C	**Frequency Range:** 100 Hz to 200 kHz **Output Impedance:** 600 Ohm

Table 5-1 (*continued*)
Recommended Test Equipment

Instrument Type	Suggested Model	Critical Specifications
RF Spectrum Analyzer	Hewlett-Packard Model 8559A with 18IT Display	**Frequency Band:** 0.01-3 GHz **Dynamic Range:** 0.01 to <70 dB **Display Range:** Log 10 dB and 1 dB/div **Display Accuracy:** Log > 2 dB (full range) **Input Impedance:** 50 ohm **SWR:** 1.3:1 10 dB input attenuation
Audio Spectrum Analyzer	Tektronix 7L5 with Option 25 L3 Plug in 7603 Main Frame	**Input Impedance:** 1M ohm/29pF **Input Frequency:** 10 Hz to >500 kHz **Display Range:** 80 dB, log 10 dB/div
Power Meter and Sensor	Hewlett-Packard 435A with 8481A Power Head	**Accuracy:** ± 1% of full scale **Power Range:** -25 dBm (3 microwatt) to +20 dBm (100 mW) full scale
Stereo Generator	Moseley SCG-9A or equivalent	**Stereo SNR:** 75dB **Separation:** 55 dB **THD:** 0.1% or less
Stereo Demodulator	Belar Stereo Modulation Monitor or equivalent	**Stereo SNR:** 75 dB **Separation:** 55 dB **THD:** 0.5% or less
Oscilloscope	Tektronix T932A or equivalent	**Bandwidth:** 35 MHz
Multimeter	Fluke Model 77 or equivalent	

5.3.1 STL Frequency Alignment

Description

The STL frequency is aligned by using a counter to measure the transmitter output frequency and the receiver 1st LO frequency. A high-precision counter (+/-0.2 ppm) is recommended to align STL links that are used in a redundant installation. If such a counter is not available, we recommend that both STL systems be aligned at the same time using the same counter. A difference greater than 2 kHz between the transmitter center frequency and receiver center frequency will result in degradation of the distortion, separation, and crosstalk performance.

Test Equipment

Counter	Tektronix	DC-508A with option 01
Directional Coupler	Microlab/FXR	CB-49N
Attenuator, Load	Philco	662A-30

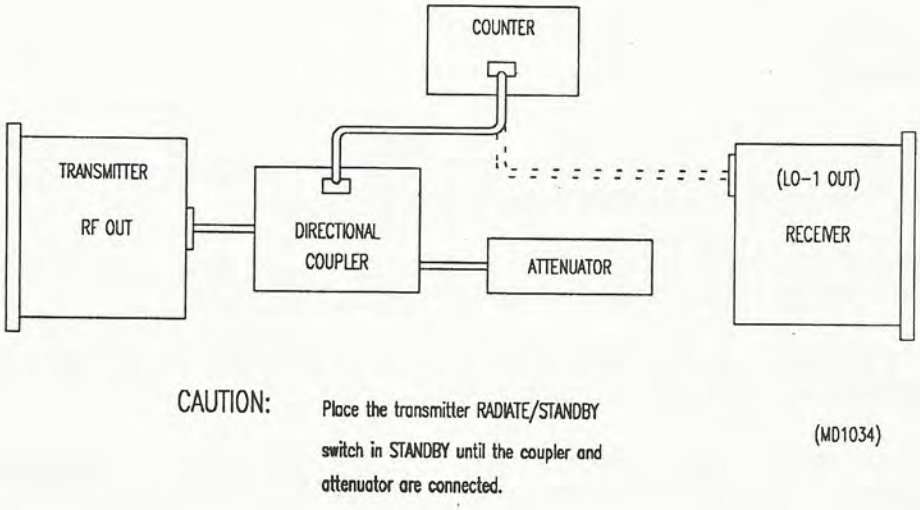


Figure 5-1
Test Setup for Frequency Alignment

Procedure

1. Connect the equipment as shown in Figure 5-1.

2. Position the transmitter OPERATE/STANDBY switch to the OPERATE position. Verify that the RADIATE, and AFC LOCK status LEDs are green.

   Using the METER FUNCTION switch, select the FWD PWR position. Verify that the front panel meter reads between -3 and +2 dB on the top scale.

3. Check the serial number label on the back of the transmitter for its operating center frequency. The counter should indicate the frequency within 8 kHz of the specified center frequency. If it does not, proceed to the troubleshooting portion of this procedure and verify that the 1st LO and FMO are operating at their specified frequencies (refer to system data sheet supplied with the unit).

4. While monitoring the counter, adjust the transmitter FMO frequency trim adjustment for a reading of the specified transmitter frequency ±200 Hz.*

5. The receiver 1st LO frequency for the 950 MHz band is 1020.000 MHz ± 8KHz (refer to system data sheet to determine exact frequency of your unit).

6. Calculate the receiver 2nd LO frequency by adding 10.700 to the 1st LO frequency and subtracting the operating frequency (i.e., for a transmitter at 950.000 MHz, the 2nd LO is (1020.000 + 10.700) - 950.000 = 80.700 MHz).

7. Using the counter, adjust the receiver 2nd LO frequency adjustment for a reading within ± 200 Hz of the frequency calculated in Step 6.*

(Note: If two STL systems are installed for redundant operation, both should be aligned for frequency at the same time.)

Troubleshooting

1. The crystal in the transmitter 1st LO should be to 102.000 MHz for the 950 MHz band (refer to system data sheet to determine exact frequency of your unit).

2. The crystal frequency of the receiver 1st LO should be the same as the PCL 6010 transmitter 1st LO (except in the 1.7 GHz band, check the system specs)

3. If the 1st LO fails to meet the ± 8 kHz specified in this procedure, the crystal oven should be checked to ensure that it is operating at 65°C ± 5°C.*

4. If the transmitter frequency fails to meet the ± 8 kHz specified in this procedure and the 1st LO appears to be operating to specification, the FMO should be checked to ensure that it is operating at its designed frequency. The FMO frequency may be calculated as follows:

   For a High-Side LO (LO > CARRIER)

   FMO frequency = (LO freq.) - (CARRIER freq)

   For a Low-Side LO (LO < CARRIER)

   FMO frequency = (CARRIER freq) - (LO freq.)

   *The FMO frequency should be within ± 1 kHz of the value calculated.**

5. A red AFC LOCK status will cause the RADIATE status indicator to remain red.

***Multichannel Option:** The FMO and 2nd LO are aligned for exact frequency operation (within ±200 Hz of the indicated synthesizer switch settings). To align the STL to the exact carrier frequency of the channel, adjust the 1st LO XTAL tuning capacitor C84.*

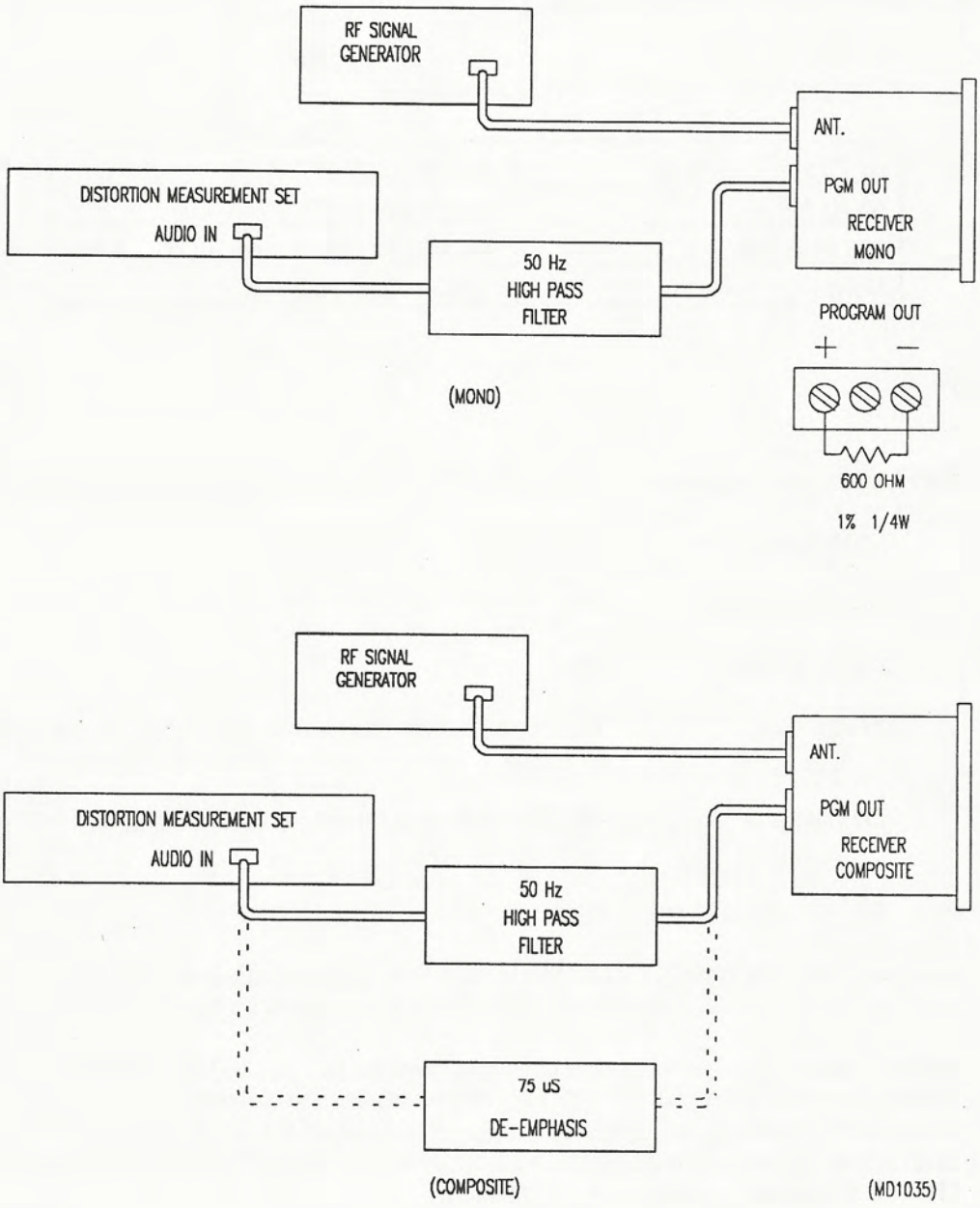


Figure 5-2
Sensitivity Test Setup

5.3.2 Receiver Sensitivity

Description

The sensitivity of the PCL 6000 receiver is verified using a signal generator and either a de-emphasis network or a de-emphasized stereo demodulator.

Test Equipment

RF Signal Generator	Hewlett-Packard 8640B
50 Hz Filter	(see Figure 5-15)
600 ohm Resistor	RN55D6000F 600 ohm 1% 1/4 W
Distortion Analyzer	Hewlett-Packard 339A

Procedure

1. Connect equipment as shown in Figure 5-2. Set the controls on the signal generator as follows:

Meter Level	Volts
AM Modulation	Off
FM Deviation	Off
Frequency	Tuned to center frequency (indicated on label on rear of receiver)
Output Level	-40 dBm (adjust output level for a reading of 3 mV on the signal generator meter)
RF	On

2. Using the METER FUNCTION switch on the PCL 6000 Receiver, select the RF LEVEL meter position. Verify that the meter reads within the 3 K range of the middle scale.

3. While monitoring the center scale of the receiver meter, switch the OUTPUT LVL ADJ on the signal generator from -40 to -110 and verify that the signal strength reads within the meter range for each setting. If it does not, proceed to Section 5.4.10 , FM Demod (6030/6060), Log Gain Adjust, prior to continuing the test, and perform the calibration adjustments given there. (The 6020 system log gain is not adjustable.)

4. Using the METER FUNCTION switch on the receiver, select the PGM LVL position.

   Set FM Deviation on the RF Signal generator to ON.

   Set the modulation frequency on the signal generator to 400 Hz.

   Adjust the deviation control on the signal generator so that the meter on the receiver reads 0 dB on the top scale. Verify that the deviation on the signal generator reads 50 ± 1 kHz.

5. Set the controls on the distortion measurement equipment for a 0 dB reference.

   Set the FM Deviation on the RF signal generator to OFF.

   Position the controls on the distortion measurement equipment for a reading of 60 dB SNR.

   Reduce the RF LVL adjustment on the RF signal generator until the distortion measurement equipment reads 60 dB.

   Observe the RF level output of the signal generator; it should indicate less than 20 microvolts.

6. Set the controls on the distortion measurement equipment for a signal-to-noise ratio of 40 dB.

   Reduce the RF level on the signal generator until the mute threshold LED on the IF Demod (6020) or FM Demod (6030/6060) module indicates red. Observe the RF level output of the signal generator; it should indicate between 18 and 22 microvolts. If not, the MUTE THRESHOLD ADJ on the IF Demod (6020) or FM Demod (6030/6060) module should be rotated fully counterclockwise. Then set the RF level output of the signal generator to 20 microvolts and adjust the MUTE THRESHOLD ADJ until the mute threshold LED changes from off to red.

Troubleshooting Notes:

The cable between the RF signal generator and the receiver should be kept at a minimum to reduce insertion loss. As an example, a 3-foot cable (RG-58) will cause a 1 dB or 10% loss in signal at 950 MHz.

5.3.3 Receiver Selectivity

Description

The receiver selectivity is verified using an RF signal generator.

Test Equipment

RF Signal Generator	Hewlett-Packard 8640B

Procedure

1. Connect the equipment as shown in Figure 5-3. Set the controls on the signal generator as follows:

Meter Level	Volts
AM Modulation	Off
FM Deviation	Off

Frequency	Tuned to the center frequency (indicated on the serial number label on the rear panel). ***Multichannel Option:*** *Tune to the channel frequency indicated on the "Channel Assignments" label on the rear panel.*
Output Level	-40 dBm (adjust the output level for a reading of 3 mV on the signal generator meter)
RF	On

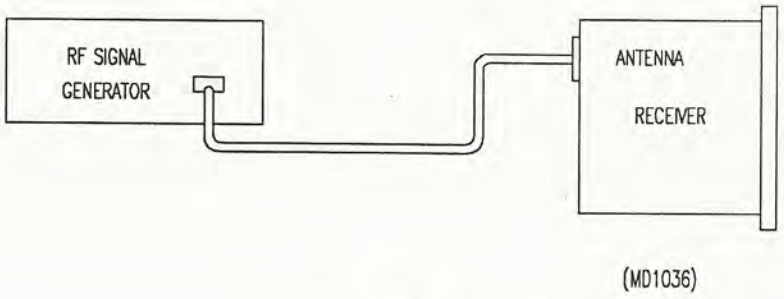


Figure 5-3
Selectivity Test Setup

2. Using the receiver METER FUNCTION switch, select the RF LVL meter position. Verify that the meter reads within the 3 K range of the middle scale.

3. Position the OUTPUT LEVEL switch on the signal generator to -100. Verify that the receiver meter reads within the 3 microvolt range on the center scale. Note the position of the meter reading as a reference for the -60 dB point.

4. Position OUTPUT LEVEL on the signal generator to -40. Increase the frequency on the signal generator until the meter reading on the receiver front panel is the same as the value noted in paragraph 3. Subtract the carrier frequency from the value indicated on the signal generator. The value calculated indicates the positive -60 dB point.

5. Decrease the frequency on the signal generator until the meter reads the same as the value noted in paragraph 3. Subtract the frequency indicated on the signal generator from the center frequency. This value indicates the negative -60 dB bandwidth point.

6. The bandwidth calculated in steps 3 and 4 should be no greater than ± 400 kHz.

Specification (6020)

Bandwidth	1st 10.7 MHz IF	2nd 10.7 MHz IF
± 90 KHz	1.5 dB	3 dB
±400 KHz	30 dB	60 dB
± 1 MHz	70 dB	80 dB

Specification (6030/6060)

Bandwidth	Wideband	Narrowband
3 dB	±100 kHz	+75 kHz
60 dB	±450 kHz	±350 kHz
80 dB	±1 MHz	±1 MHz

(Note: The Wideband/Narrowband filter bandwidth can be selected in the 6030/6060 system by properly positioning jumpers E2 and E3 in the Double Converter/LO3 module)

Troubleshooting Notes

The cable between the RF signal generator and the receiver should be kept at a minimum to reduce insertion loss. As an example, a 3-foot cable (RG-58) will cause a 1 dB or 10% loss in signal at 950 MHz.

5.3.4 Transmitter Deviation, and Receiver Output Level Calibration

Description

The deviation and modulation sensitivity of the composite information is aligned using a Bessel null function as a reference. The MUX channel is aligned using an RF generator as a reference.

Test Equipment

Frequency Counter	Tektronix DC-508A
Directional Coupler	Microlab FXR CB49N
Attenuator, 50 ohm Load	Philco 662A-30
Attenuator, Adjustable	Kay Elemetrics 432D
RF Signal Generator	Hewlett Packard 8640B
Distortion Analyzer	Hewlett Packard 339A
Audio Oscillator	Hewlett Packard 204C
Spectrum Analyzer	Hewlett Packard 8559A
50 Hz Filter	(See Figure 5-15)
Oscilloscope	BW = 50 MHz (minimum)

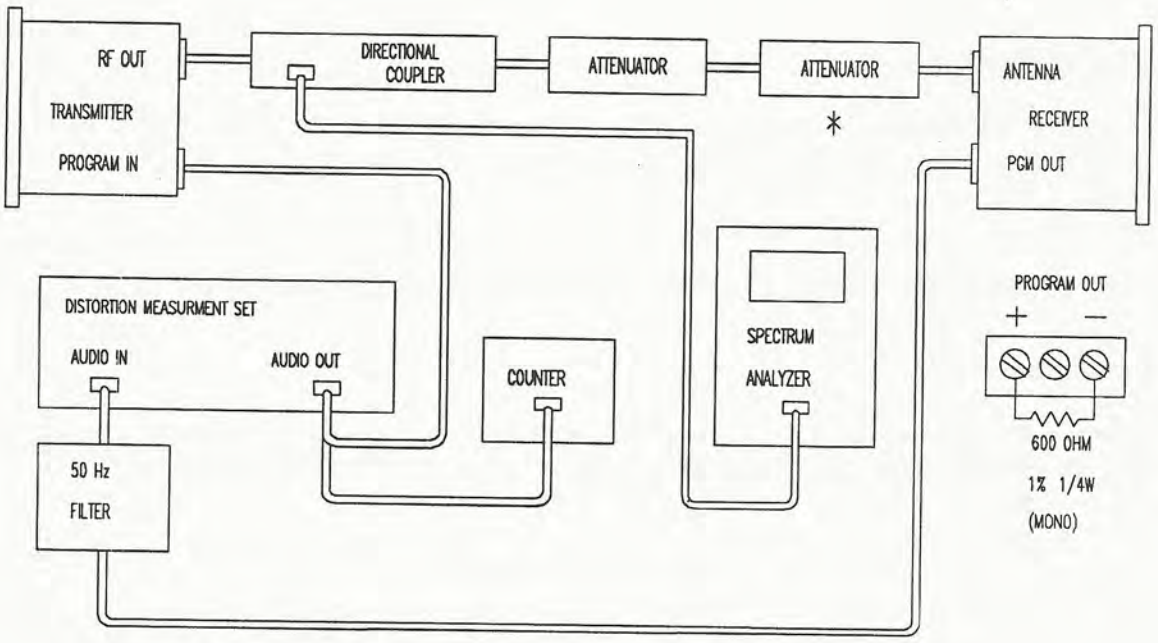
Procedure

1. Connect the equipment as shown in Figure 5-4.

2. Adjust the audio oscillator of the distortion analyzer as follows:

   a. Position the meter function switch to the oscillator level position and adjust the oscillator level controls for an output voltage of 1.25 VRMS (composite), 1.00 VRMS (mono).

   b. Using the counter to monitor the oscillator frequency, position the frequency controls for 20.79 kHz (composite), 16.62 kHz (mono).



CAUTION: **Place the transmitter RADIATE/STANDBY switch in STANDBY until the coupler and attenuator are connected.**

* **CAUTION:** **To avoid receiver damage, initally set attenuator for maximum attenuation.**

(MD1037)

Figure 5-4
Test Setup For Deviation Alignment

3. Position the transmitter OPERATE/STANDBY switch to the OPERATE position.

   Using the METER FUNCTION switch, select the FWD PWR position and verify that the meter reads between -3 dB and +2 dB on the top scale.

4. Using the spectrum analyzer, monitor the modulated RF output of the transmitter. The controls of the spectrum analyzer should be in the following positions:

Frequency Band GHz	.01-3
Time/DIV	Auto
Trigger	Free run
FREQ/SPAN/DIV	50 kHz/DIV with 3 kHz bandwidth
Input ATTEN	30
REF Level	-20
10 dB/DIV	Depress
Tuning	Transmitter center frequency

5. Disconnect the program input to the transmitter and adjust display on the spectrum analyzer so that the waveform is at the top graticule (see Figure 5-5A).

   Reconnect the program input of the transmitter. The display on the spectrum analyzer should be similar to Figure 5-5A.

   Adjust COMP PGM LVL (R28) or MONO PGM LVL (R199) on the Audio/Power Supply board for a Bessel null of at least -50 dB on the spectrum analyzer.

   Using the METER FUNCTION switch on the transmitter, select the PGM LVL position. Adjust COMP PGM MTRG (R201) or MONO PGM MTRG (R202) as is necessary on the Audio/Power Supply board for a reading of 0 dB on the top scale of the meter.

6. Using the METER FUNCTION switch on the receiver, select the RF LVL position.

   Position the switches on the adjustable attenuator for an RF level reading between 1 K and 3 K on the receiver meter.

   Set the controls on the distortion analyzer as follows:

Meter Function	Reference level
Frequency	1.0 kHz
Meter Input Range	+10 dB

   With the oscillator output connected to the transmitter, connect the meter input in parallel with the oscillator output and adjust the Relative Adjust control for a 0 dB reference on the distortion analyzer.

   Reconnect the distortion analyzer input to the program output of the receiver.

   PCL 6020: On the receiver IF Demod module, adjust BASEBAND LVL ADJUST (R19) for a reading of 0 dB on the distortion measurement test set.

   PCL 6030, 6060: On the receiver FM Demod module, adjust BASEBAND LVL ADJUST (R10) for a reading of 0 dB on the distortion measurement test set.

   Using the receiver METER FUNCTION switch, select the PGM LVL position and adjust PGM LVL (R171) on the RX Audio/Power Supply board for a reading of 0 dB on the top scale.

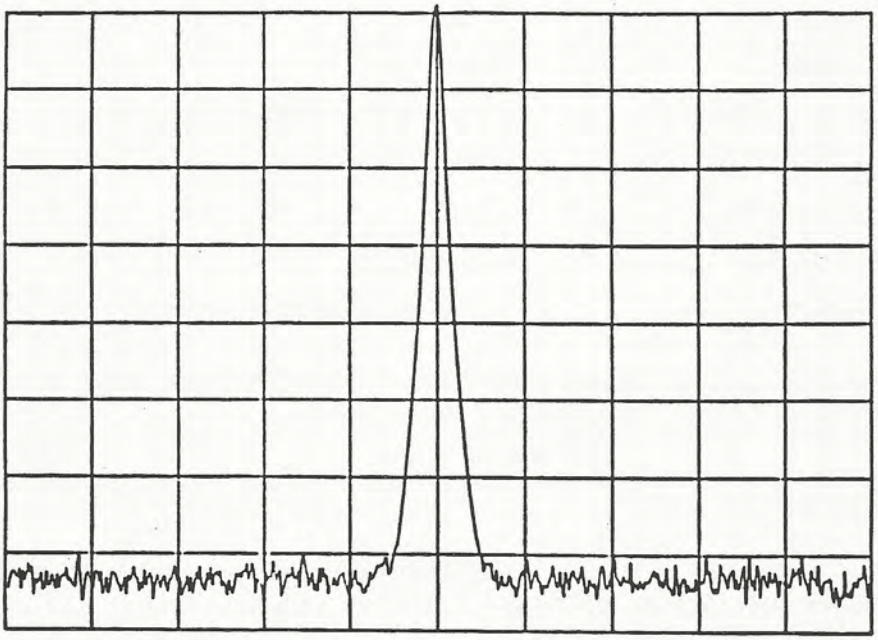


Figure 5-5A
Bessel Null Function Waveforms

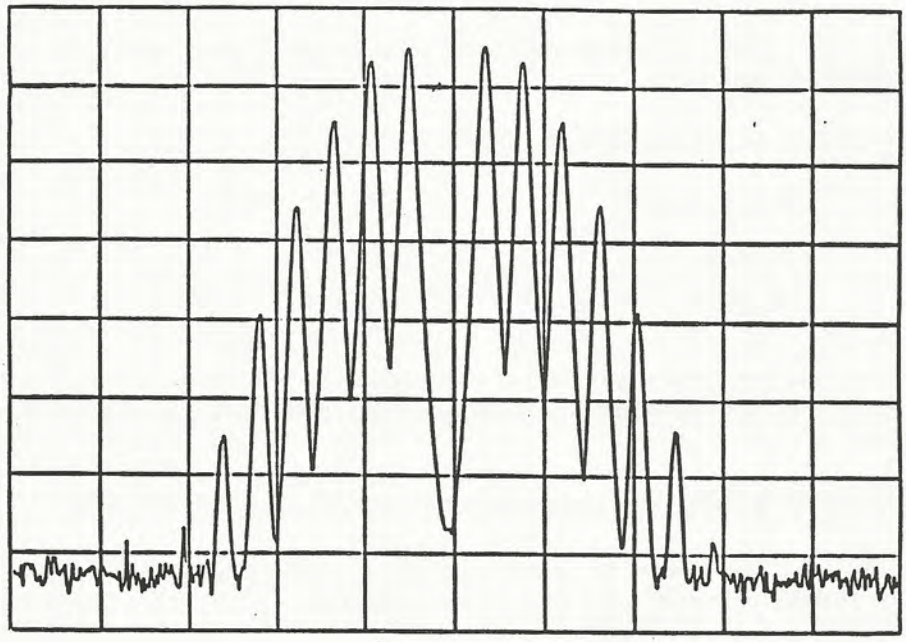


Figure 5-5B
Bessel Null Function Waveforms

7. Position the transmitter OPERATE/STANDBY switch to the STANDBY position.

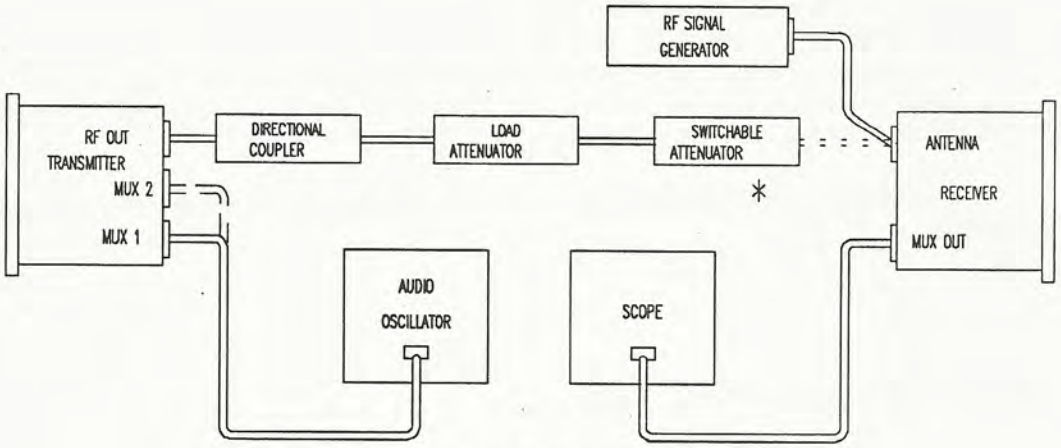
   Connect the equipment as shown in Figure 5-6 and adjust the controls on the RF signal generator as follows:

Meter Function	FM
AM	OFF
Modulation Freq.	110 kHz
FM	10 kHz
Output Level	-40
Frequency Tune	Tune to the center frequency (specified on serial number label of receiver).
Peak Deviation	Adjust FM control for a meter reading of 5 kHz.

While monitoring the oscilloscope, adjust MUX Level. Adjust R31 on the receiver Audio and Power Supply board for a reading of 1.5 Vp-p.

Using the receiver METER FUNCTION switch, select the MUX LVL position.

Adjust R12 on the RX Audio/Power Supply board for a reading of 5 on the lower scale of the receiver meter.



CAUTION: **Place the transmitter RADIATE/STANDBY switch in STANDBY until the coupler and attenuator are connected.**

(MD1038)

* **CAUTION:** **To avoid receiver damage, initially set attenuator for maximum attenuation.**

Figure 5-6
Test Setup for MUX Channel Alignment

8. On the RF signal generator, adjust the modulation frequency to 67 kHz and the FM deviation for 6.0 kHz.

   Note the reading on the receiver meter. It should be between 6 and 8 on the lower scale. This reading will be used as a reference to align the transmitter MUX 2 deviation. Connect the output of the adjustable attenuator to the RF input of the receiver.

9. Position the transmitter OPERATE/STANDBY switch to the OPERATE position.

   Using the scope, adjust the output of the audio oscillator for a voltage of 1.5 Vp-p and a frequency of 110 kHz (26 kHz mono). Connect the audio oscillator output to the MUX 1 input of the transmitter.

   Adjust the MUX 1 Level Adjust R29 on the Audio/Power Supply board for a reading of 5 on the lower scale of the receiver meter.

   Using the transmitter METER FUNCTION switch, select the MUX LVL position.

   Adjust R159 on the TX Audio/Power Supply board for a reading of 5 on the meter lower scale.

   Connect the audio oscillator to the transmitter MUX 2 input and adjust the oscillator to a frequency of 185 kHz (composite only).

   Using the receiver meter as a reference, on the Audio/Power Supply board, adjust MUX 2 Level Adjust R40 for the reading noted in paragraph 8. The meter reading on the transmitter front panel should be between 6 and 8 on the lower scale.

Troubleshooting

1. When aligning systems as a dual or redundant installation, one transmitter should be used as a reference. In this case, the second transmitter would be aligned using the first receiver as a reference. The second receiver would be aligned using the first transmitter as a reference. As a final verification, the second transmitter would be checked using the second receiver. Using any combination of transmitter and receiver, the composite band should be flat within ±0.1 dB. The results from the MUX band measurements should be within 10%.

2. The MUX output is lowest when the carrier center frequency of the transmitter and receiver are identical.

5.3.5 Ultimate Signal-to-Noise Ratio

Description

The STL ultimate wideband (50 Hz to 15 kHz) SNR, is verified using a distortion analyzer. The receiver SNR (quieting) is verified during the receiver sensitivity test (see Section 5.3.2).

Test Equipment

Directional Coupler	Microlab/FXR CB-49N
Attenuator, 50 ohm Load	Philco 662A-30
Attenuator, Adjustable	Kay Elemetrics Corp. 432D
Distortion Measurement test set	Hewlett-Packard 339A
50 Hz High Pass Filter	(See Figure 5-11)
600 ohm Resistor 1% 1/4W	RN55D6000F

Procedure

1. Connect the equipment as shown in Figure 5-7 and set the controls on the distortion measurement test set as follows:

Meter Function	REF Level
Meter Input	+10 dBm
Frequency	400 Hz

2. Set the controls on the transmitter as follows:

OPERATE/STANDBY	OPERATE (Radiate LED green)
METER FUNCTION	PGM LVL

3. Using the METER FUNCTION switch on the receiver, select the PGM LVL position.

4. Adjust the oscillator output level on the distortion measurement test set for a reading of 0 dB on the top scale of the transmitter meter.

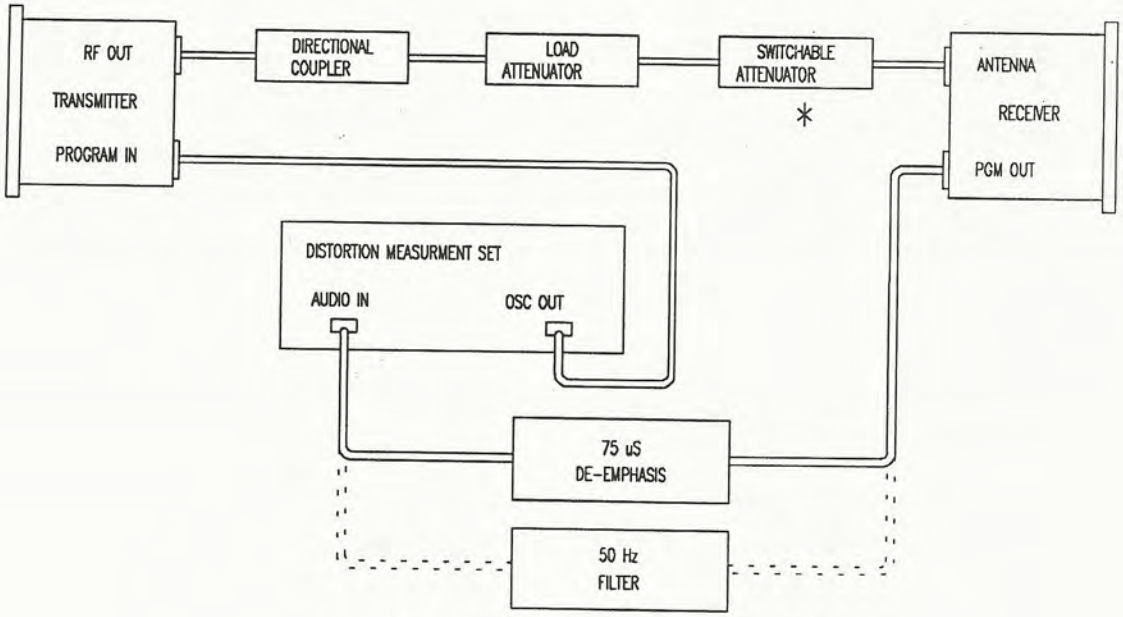
   Rotate the REFERENCE ADJUST on the distortion measurement test set for a 10 dB reference on its front-panel meter. Disconnect the composite input at the transmitter rear panel.

   Using the INPUT RANGE switch on the distortion measurement test set, measure the ultimate wideband SNR. (Note: The reference is +10 dB; hence, a meter input range indicating -60 and a meter reading of -6 would indicate an SNR of -76 dB.)

5. Position the INPUT RANGE switch to +10 dB and reconnect the program input to the transmitter composite BNC connector.

Troubleshooting

1. If the STL link fails to meet the ultimate SNR specification, the sensitivity test (paragraph 5.3.2) should be performed on the receiver prior to troubleshooting the transmitter.



CAUTION: **Place the transmitter RADIATE/STANDBY switch in STANDBY until the coupler and attenuator are connected.**

(MD1039)

* **CAUTION:** **To avoid receiver damage, initially set attenuator for maximum attenuation.**

Figure 5-7
Test Setup For Signal-To-Noise Ratio Measurement

2. If the STL link fails to meet the SNR specification, and the transmitter is suspected, the following method may be used to help isolate the problem:

   a. Using the 80 kHz filter on the distortion measurement test set, measure the baseband output of the TX Audio/Power Supply board for a reading at least 5 dB greater than specified for the ultimate SNR.

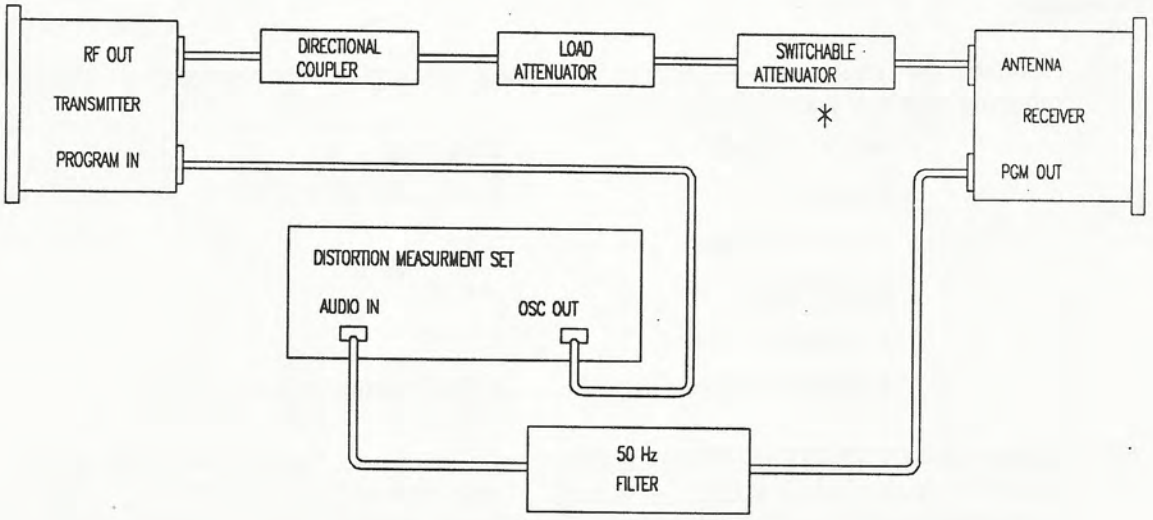
   b. Substitute the 1st LO signal (1020 MHz for the 950 MHz band) using an RF signal generator such as the HP 8640B at an output level of +10 dBm.

   c. Substitute the FMO signal using the RF signal generator at an RF level of 0 dBm.

5.3.6 Distortion Alignment

Description

A distortion analyzer is used to align the receiver 10.7 MHz IF filters for minimum distortion. This method assumes the FMO will contribute a negligible amount of distortion to the overall reading. The FMO distortion can be verified independently of the receiver by referring to Section 5.3.10 (FMO Adjustment).



CAUTION: **Place the transmitter RADIATE/STANDBY switch in STANDBY until the coupler and attenuator are connected.**

(MD1040)

* **CAUTION:** **To avoid receiver damage, initially set attenuator for maximum attenuation.**

Figure 5-8
STL Distortion Alignment

Test Equipment

Directional Coupler	Microlab/FXR CB-49B
Attenuator, 50 Ohm Load	Philco 662A-30
Attenuator, Adjustable	Kay Elemetrics Corp. 432A
600 ohm Resistor 1% 1/4 W	RN55D6000F
50 Hz Filter	Figure 5-14

Procedure

1. Connect the equipment as shown in Figure 5-8 and adjust controls on the distortion measurement test set as follows:

Meter Function	Input level
Filters	400 Hz - In; 80 kHz - In
Distortion Range	0.3%
Input Range	+10 dB
Frequency	1.0 kHz
Oscillator Level	+10 dBm from 600 ohm source

2. Position the OPERATE/STANDBY switch on the transmitter to the OPERATE position. The RADIATE status LED should be green. Using the METER FUNCTION switch on the transmitter, select the FWD PWR position and verify that the meter reads between -3 and +2 dB on the top scale.

   Using the METER FUNCTION switch on the transmitter, select the PGM LVL function and verify that the meter reads between -1 and +1 dB on the top scale.

3. Using the METER FUNCTION switch on the receiver, select the RF LVL function.

   Position the switches on the adjustable attenuator for a reading between 1 k and 3 k microvolts on the middle scale of the receiver meter.

   Using the METER FUNCTION switch on the receiver, select the PGM LVL function. The meter should read between -1 and +1 dB on the top scale.

   Set the frequency to 15 kHz and verify that the meter of the distortion measurement test set reads between .9 and 1.1 VRMS.

   Adjust the METER FUNCTION switch on the distortion measurement test set to the DISTORTION position.

4. Using the distortion measurement test set, adjust the following controls on the IF Demod (6020) or Double Converter/LO3 (6030, 6060) for minimum distortion:

   PCL 6020:
   a. 1ST 10.7 MHz IF ADJ
   b. 2ND 10.7 MHz IF ADJ

PCL 6030/6060:

a. 1ST 10.7 MHz IF ADJ (MONO, WB COMP, NB COMP)

b. 2ND 10.7 MHz IF ADJ (MONO, COMP)

Check the receiver configuration to verify which filter adjustments; MONO (monaural), WB COMP (wideband composite), or NB COMP (narrowband composite) pertain to your system.

5. The distortion reading should now be less than 0.2%. Switch the frequency on the distortion measurement test set to 1.0 kHz. Verify that the distortion reading meets specifications.

Troubleshooting

1. The following procedure may be used to determine if the 10.7 MHz filters are a source of high distortion.

   a. **PCL 6020:** Remove FL1 and FL2 from the IF Demod module and replace it with a 1.0 K ohm resistor. The resistor leads should first be cut between 0.3 and 0.4 inch from the body. The ends of the resistor leads should then be flattened using a pair of needle-nose pliers so they can be inserted in the filter sockets. The cover should then be replaced.

   PCL 6030/6060: Remove the appropriate ceramic filters FL1 and FL4 (Monaural), FL2 and FL5 (Wideband Composite), or FL3 and FL5 (Narrowband Composite) from the Double Converter/LO3 module and replace it with a 1.0 K ohm resistor. The resistor leads should first be cut between 0.3 and 0.4 inch from the body. The ends of the resistor leads should then be flattened using a pair of needle-nose pliers so they can be inserted in the filter sockets. The cover should then be replaced.

   b. Using the distortion measurement test set, the distortion reading should now be less than 0.05% at 15 kHz. If it is not, additional troubleshooting will be required prior to determining the performance of the 10.7 MHz IF filters.

2. An RF input to the receiver exceeding 6 mV may cause an indication of high distortion.

3. The distortion of the Audio/Power Supply board in the receiver can be tested independently by applying the output of the distortion analyzer's audio oscillator to the baseband input of the Audio/Power Supply board.

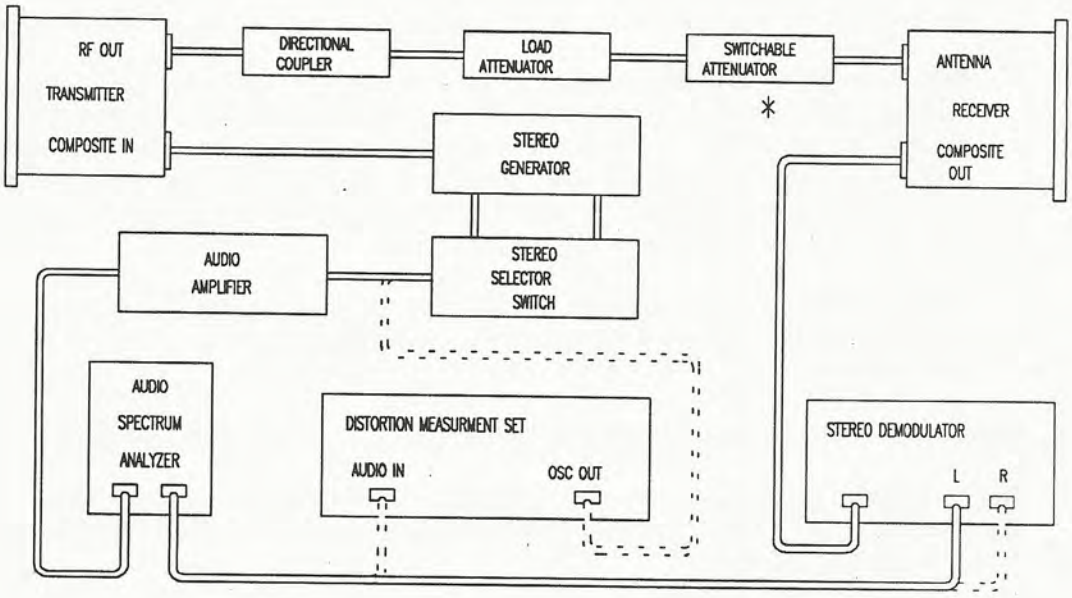
5.3.7 Stereo Separation and Stereo Signal-to-Noise Ratio

Description

The stereo separation alignment is accomplished using a stereo generator and demodulator of known quality and an audio spectrum analyzer with tracking generator.

Test Equipment

Directional Coupler	Microlab/FXR CB-49N
Attenuator, 50 Ohm Load	Philco 662A-30
Attenuator, Adjustable	Kay Elemetrics Corp. 432D
Distortion Analyzer	Hewlett-Packard 330A
Spectrum Analyzer	Tektronics 7L5 w/ Option 01
Audio Amplifier	
Stereo Generator	Moseley SCG-9A or equivalent
Stereo Demodulator	Belar Stereo Modulation Monitor or eqivalent
Stereo Source Selector	Moseley custom test equipment



CAUTION: **Place the transmitter RADIATE/STANDBY switch in STANDBY until the coupler and attenuator are connected.**

(MD1041)

* **CAUTION:** **To avoid receiver damage, initially set attenuator for maximum attenuation.**

Figure 5-9
Stereo Separation Test Setup

Procedure

1. Connect the equipment as shown in Figure 5-9. This test should be run flat; i.e., the stereo generator pre-emphasis and the stereo demodulator de-emphasis should be switched out. If this cannot be accomplished, the system modulation reference level should be reduced to -20 dB at 400 Hz. Adjust the controls on the audio spectrum analyzer as follows:

Frequency	Far left graticule
Dot Frequency	Zero Hz
LOG	10 dB/DIV
Source	FREE RUN
Mode	NORM
Termination	1 Megohm
REF	dBV
Resolution	Coupled
SPAN/DIV	2 kHz
Time/DIV	Auto
Tracking GEN	ON

2. Set the OPERATE/STANDBY switch on the transmitter to the OPERATE position. Verify that the RADIATE LED is green.

   Using the METER FUNCTION switch on the transmitter, select the FWD PWR position. Verify that the meter reads between -3 and +2 dB on the top scale.

   Using the METER FUNCTION switch on the transmitter, select the PGM LVL position.

   Adjust the dot frequency on the audio spectrum analyzer to 1.0 kHz and the SPAN/DIV to zero.

   Adjust the level control on the audio spectrum analyzer for a reading of zero dB on the top scale of the transmitter meter.

   Set the dot frequency on the audio spectrum analyzer to zero and the SPAN/DIV to 2 kHz.

   Using the METER FUNCTION switch on the receiver, select the RF LVL position.

   Position the switches on the adjustable attenuator for a reading between 1 K and 3 K on the receiver meter middle scale.

   Using the METER FUNCTION switch on the receiver, select the PGM LVL position. Verify that the meter reads within •1 dB of the transmitter meter.

3. Select the LEFT ONLY position on the stereo source selector.

   Adjust the step and variable attenuators on the audio spectrum analyzer so that the waveform is at the top graticule. (See Figure 5-10.)

   Select the RIGHT ONLY position on the stereo source selector.

Adjust COMP HF TILT (R7) on the RX Audio/Power Supply board for maximum separation between 1 and 5 kHz.

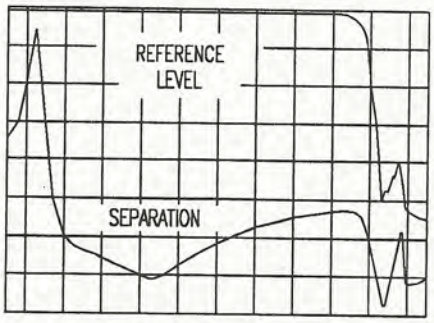
Adjust DELAY EQ (R111) on the RX Audio/Power Supply board for maximum separation between 10 and 15 kHz. (See Figure 5-10.)

Using the SAVE A function on the audio analyzer, store this waveform.

Verify that the separation meets specification between 1 kHz and 15 kHz.

Stereo separation: Measurement of the worst case ratio in dB of residual signal in the stereo demodulated right channel referred to the demodulated left channel with a left-only driving signal for frequencies between 30 Hz and 15 kHz; the procedure is repeated for right to left channel separation.

Vert = 10 dB/div **Horz = 2 KHz/div**



(MD1042)

Figure 5-10
Swept Separation Waveform

4. Connect the spectrum analyzer to the right output of the stereo demodulator.

   Select the RIGHT ONLY position on the stereo source selector. Adjust the step and variable attenuators on the audio spectrum analyzer so that the waveform is at the top graticule. (See Figure 5-10.)

   Select the LEFT ONLY position on the stereo source selector. Verify that the separation meets specification between 1 kHz and 15 kHz.

   (Note: The COMP HF TILT and DELAY EQ module affect both the left and right channel separation. Paragraphs 3 and 4 may be repeated to assure optimum performance on both channels.)

5. Connect the audio output of the distortion analyzer to the stereo source selector. Connect the left output of the stereo demodulator to the input of the distortion analyzer.

   Set the frequency on the distortion measurement test set to 1 kHz. Select the LEFT + RIGHT position on the stereo source selector.

   Adjust the output level on the distortion measurement test set for a reading of zero dB on the top scale of the transmitter. Using the METER FUNCTION switch on the receiver, select the

PGM LVL position and verify that the meter reads within ± 1 dB of the transmitter program level.

Adjust the input controls on the distortion measurement test set for a zero dB reference.

Set the frequency on the distortion measurement test set to 30 Hz.

Verify that the reference on the distortion measurement test set is ± 0.5 dB.

Select the RIGHT ONLY position on the stereo source selector. Using the input attenuator on the distortion measurement test set, measure the separation.

Adjust COMP LF TILT (R61) on the RX Audio/Power Supply board for maximum separation.

Verify the separation at 50, 100 and 500 Hz.

6. Connect the input of the distortion analyzer to the right channel of the stereo demodulator.

   Position the input range and relative ADJ controls on the distortion analyzer for a zero dB reference.

   Select the RIGHT ONLY position on the stereo source selector and, if required, adjust the zero dB reference on the distortion analyzer.

   Select the LEFT ONLY position on the stereo source selector.

   Using the input range controls on the distortion analyzer, measure the right channel separation.

   (Note: The COMP LF TILT adjustment affects both channels.Paragraphs 5 and 6 may be repeated several times to optimize this setting.)

7. Stereo signal-to-noise ratio. This test should be run using the normal 75 microsecond de-emphasis characteristics of the stereo demodulator.

   Connect the audio output of the distortion analyzer to the stereo source selector.

   Set the stereo source selector to the LEFT + RIGHT position.

   Using the 50 Hz high-pass filter, connect the left channel of the stereo demodulator to the distortion analyzer input.

   Using the METER FUNCTION switch on the STL transmitter, select the PGM LVL position.

   Adjust the output of the audio oscillator on the distortion analyzer for a frequency of 400 Hz.

   Adjust the output level on the distortion analyzer so that the transmitter meter reads zero dB on the top scale.

   Using the METER FUNCTION switch on the receiver, select the PGM LVL position, and verify that the meter reads within •1 dB of the transmitter meter.

   Adjust the input range and relative ADJ controls on the distortion analyzer for a zero dB reference on its meter.

   Position the stereo source selector to the OFF position.

Measure the stereo demodulated signal-to-noise ratio for the left channel using the input range control on the distortion analyzer.

Using the 50 Hz high-pass filter, connect the input of the distortion analyzer to the right channel and repeat the test.

Troubleshooting

The performance of the stereo generator and stereo demodulator can be verified by connecting the output of the stereo generator directly to the input of the stereo demodulator.

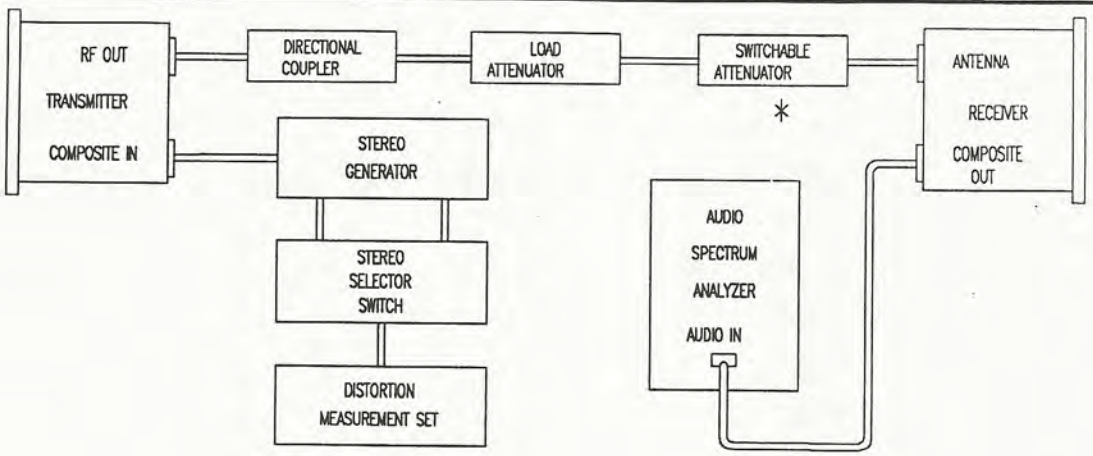
5.3.8 Stereo Crosstalk

Description

The crosstalk measurements are made using a stereo generator of known quality, a low-distortion audio oscillator, and an audio spectrum analyzer.

Test Equipment

Directional Coupler	Microlab/FXR CB-49N
Attenuator, 50 Ohm Load	Philco 662A-30
Attenuator, Adjustable	Kay Elemetrics Corp. 432D
Distortion Measurement test set	Hewlett-Packard HP-339A
Audio Spectrum Analyzer	Tektronix 7L5
Stereo Source Selector	Moseley custom test equipment
Stereo Generator	Moseley SCG-9A or equivalent



CAUTION: **Place the transmitter RADIATE/STANDBY switch in STANDBY until the coupler and attenuator are connected.**

(MD1043)

* **CAUTION:** **To avoid receiver damage, initially set attenuator for maximum attenuation.**

Figure 5-11
Stereo Crosstalk Setup

Procedure

1. Connect the equipment as shown in Figure 5-11. This test should be run with the stereo generator pre-emphasis switched out.

2. Set the OPERATE/STANDBY switch on the transmitter to the OPERATE position. The RADIATE status LED should be green.

   Using the METER FUNCTION switch, select the FWD PWR position, and verify that the meter of the transmitter reads between -3 and +2 dB on the top scale.

   Using the METER FUNCTION switch on the transmitter, select the PGM LVL position.

   Adjust frequency controls on the distortion analyzer for a value of 15 kHz.

   Adjust the oscillator output level on the distortion analyzer so that the transmitter meter reads zero dB on the top scale.

3. Using the METER FUNCTION switch on the receiver, select the RF LVL position.

   Position the switches of the adjustable attenuator so that the receiver meter reads between 1K and 3K on the middle scale.

   Using the METER FUNCTION switch on the receiver, select the PGM LEVEL position. Verify that the receiver meter reads between -1 and +1 dB on the top scale.

4. Position the controls on the audio spectrum analyzer as follows:

DOT MARKER	Dot on far left graticule
DOT FREQUENCY	Zero Hz
LOG	10 dB/DIV
SOURCE	Free run
MODE	NORM
RESOLUTION	Coupled
SPAN/DIV	5 kHz
TIME/DIV	AUTO
TERMINATION	1 Megohm
REF	dBV

5. Measure the stereo crosstalk as follows:

   a. Using the attenuator on the audio spectrum analyzer, adjust the 15 kHz waveform to the top graticule. (See Figure 5-12A.)

   b. Calculate the main channel to subchannel crosstalk by measuring the indicated waveforms and using the formula shown in Figure 5-12A.

   c. Adjust the frequency of the distortion measurement test set to 7.5 kHz.

   d. Position the stereo source selector to the left minus right position.

   e. Calculate the subchannel to main channel crosstalk by measuring the indicated waveforms and using the formula shown in Figure 5-12.

Troubleshooting

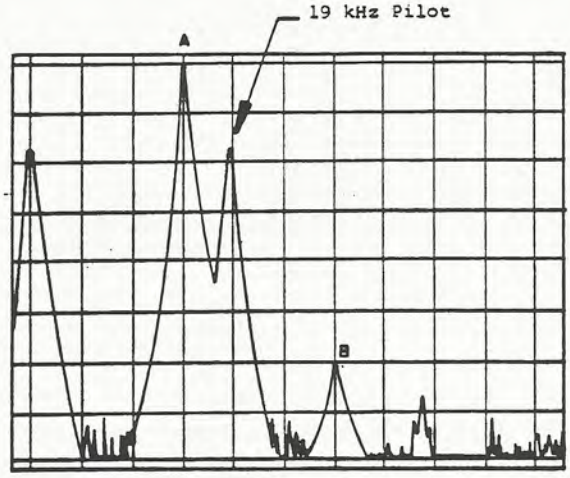
1. The stereo generator's performance can be verified by connecting output to the input of the audio spectrum analyzer and performing the tests specified in step 5 above.

2. If the STL link is identified as the source of excessive stereo crosstalk, the following steps should be taken:

   a. Verify that the cover is on the RF amplifier and install the covers on the transmitter and receiver using at least two screws.

   b. Ensure that the transmitter and receiver are more than 2 feet apart.

   c. Verify that distortion meets specification, using the procedure shown in paragraph 5.3.6.

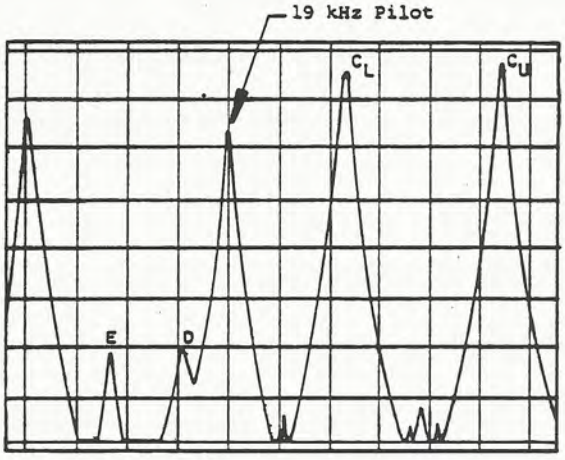


A = 15 kHz L+R Ref. level.
B = 2nd harmonic distortion level at 30 kHz.

Nonlinear crosstalk main to sub = the difference in dB between level A and level B (60 dB in this example).

Vert = 10 dB/div Hor = 5 kHz/div

(A) Nonlinear crosstalk, main to sub.



C_L and C_u = lower and upper L-R sideband level at 30.5 kHz and 45.5 kHz.

D = intermodulation product at 15 kHz.

E = linear (vector) crosstalk at 7.5 kHz. This signal is a product of the stereo generator.

Nonlinear crosstalk sub to main = the difference in dB between level C_L or C_u and level D + 6 dB (60 dB in this example).

Vert = 10 dB/div Hor = 5 kHz/div

(B) Nonlinear crosstalk, sub to main.

Figure 5-12
Nonlinear Crosstalk

Nonlinear crosstalk: Measurement of the ratio in dB of harmonic products in the subchannel referred to 15 kHz L+R at 100% modulation in the main channel (M&S); measurement of the ratio in dB of intermodulation products in the main channel referred to 7.5 kHz L-R at 100% modulation in the subchannel (S&M).

5.3.9 STL Frequency Change

Test Equipment

Attenuator, Adjustable	Kay Elemetrics Corp. 432D
Frequency Counter	Tektronix DC-508A with option 01
Audio Generator	(less than 0.5% Distortion)
Distortion Measurement test set	Hewlett-Packard HP-339A
Audio Spectrum Analyzer	Tektronix 7L5
Attenuator, 50 Ohm Load	Philco 662A-30
High Frequency Scope Probe	Tektronix 100 MHz or equivalent

5.3.9.1 Transmitter Procedure

*(**Note:** Check the schematics of the RF module pertaining to the frequency range of the system being modified. If the frequency change falls outside of the original range listed, the 1st LO crystal frequency must be changed. Consult the factory if this is the case.)*

*(**Multichannel Option:** If this is a multichannel system, refer to Section 5.3.9.4)*

1. Connect 50 ohm high power dummy load to transmitter RF output.
2. Remove RF Module from transmitter. Remove the cover from component side of module.
3. a. Calculate the FMO frequency as follows (check the system data sheet for the exact frequency):

   For a High-Side LO (LO > CARRIER)

   FMO frequency = (LO freq.) - (CARRIER freq)

   For a Low-Side LO (LO < CARRIER)

   FMO frequency = (CARRIER freq) - (LO freq.)

   b. Program the synthesizer switches (SW0 - SW3) in the RF module for the correct frequency.

Please refer to Figure 5-13 for the Synthesizer Frequency Calculation example.

4. Put meter switch in AFC LVL position and adjust AFC LVL ADJUST (C30) for centerscale on front panel meter. The test point/feedthrough marked " AFC LVL" on the RF Module should read +7 Vdc.

5. Count FMO frequency (with probe on R50) and adjust FMO FREQ TRIM (C11) for proper frequency.

6. a. 950 MHz band: If the new frequency is within the 940-960 MHz range, there is no need to adjust the IPA and RFA filters. If the new frequency is outside of this range, peak the internal pc board mounted filters FL-12 and FL-11 for maximum IPA LVL meter reading. Peak the external filter FL2 (mounted underneath the Audio/Power Supply board) for maximum FWD PWR meter reading.

   b. 220-450 MHz band: Peak the external helical filter FL4 for maximum IPA LVL meter reading. Peak the external filter FL2 for maximum FWD PWR meter reading. Check the transmitter assembly drawing to verify the proper filter before tuning.

   c. 1.7 GHz band: The TX RF module operates at one-half the carrier frequency (i.e. 850 MHz for 1.7 GHz carrier). Peak the internal pc board mounted filters FL-12 and FL-11 for maximum IPA LVL meter reading. Peak the external filter FL2 (mounted in front of the RFA and part of the doubler assembly) for maximum FWD PWR meter reading.

7. Connect the transmitter dummy load output to the frequency counter. Allow 15 minutes for the crystal oven to stabilize. Adjust FMO FREQ TRIM (C11) in the RF module to set the new output carrier frequency.

8. Put the cover back on the RF module (it's a tight fit) and reinstall the module in the transmitter.

5.3.9.2 Receiver Procedure

*(**Note:** Check the schematics of the RF module pertaining to the frequency range of the system being modified. If the frequency change falls outside of the original range listed, the 1st LO crystal frequency must be changed. Consult the factory if this is the case.)*

*(**Multichannel Option:** If this is a multichannel system, refer to Section 5.3.9.4)*

1. Attenuate the carrier to 1500 microvolts and feed to the receiver antenna input.

2. Remove RF module from RX.

3. Remove cover from component side of module.

4. a. Calculate the 2nd LO frequency as follows (check the system data sheet for the exact frequency):

   <u>For a High-Side LO (LO > CARRIER)</u>

   2nd LO frequency = [(LO freq.) - (CARRIER freq)] + 10.7 MHz

   <u>For a Low-Side LO (LO < CARRIER)</u>

   2nd LO frequency = [(CARRIER freq) - (LO freq.)] + 10.7 MHz

   b. Program the synthesizer switches (SW0 - SW3) in the RF module for the correct frequency.

Please refer to Figure 5-13 for the Synthesizer Frequency Calculation example.

5. Reinstall RF Module.

6. Put meter switch in AFC LVL position and adjust AFC LEVEL ADJUST (C30) for centerscale on front panel meter. The test point/feedthrough marked " AFC LVL" on the RF Module should read +7 Vdc.

7. Adjust FMO frequency trim (C11) for exact frequency calculated in step 4.

8. a. Preselector Filter (950 MHz, 6020/6030) : Filters FL-12 and FL-11 (in the RF module) are two- and three-pole helical filters with a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five adjustments should be set for a flat passband greater than 5 MHz wide.

   b. Preselector Filter (950 MHz, 6060): The filter is located under the Audio/Power Supply board of the receiver (see system assembly drawing). The filter has a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five screw adjustments should be set for a flat passband greater than 5 MHz wide.

   c. Preselector Filter (220-450 MHz): The filter is located at the rear of the receiver (see system assembly drawing) and has a passband of approximately 8 MHz. This can be tuned by observing the RF LVL on the meter and peaking the three adjustment capacitors of the filter. Take care not to adjust the LO filter which is located on the same bracket. The preselector filter is the one that is connected directly to the ANTENNA port.

   d. Preselector Filter (1.7GHz): The filter is located at the rear of the receiver (see system assembly drawing) and has a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five screw adjustments should be set for a flat passband greater than 5 MHz wide. Take care not to adjust the LO filter which is located on the same bracket. The preselector filter is the one that is connected directly to the ANTENNA port.

9. Adjust IF amplifier (C86) in RF module for a peak reading on the RF LVL meter position.

10. Adjust 70 MHz bandpass filter capacitors C41, C44, and C47 (IF Demod module, 6020) or C40, C43, C46, and C49 (Double Converter/LO3 module, 6030/6060) for a peak reading on the RF LVL meter position. These adjustments are found through access holes at the top of the module.

5.3.9.3 System Check

1. Using MOD ADJ in the RF module, set deviation to ±50 kHz (±40 kHz mono).

2. Using a 15 kHz tone, verify distortion to be within specification. (If adjustment is needed, use 10.7 MHz IF adjustments.)

5.3.9.4 Multichannel Option

The Multichannel System has been aligned to operate within the programmed channel frequency bandwidth specified for your system. To operate at another non-programmed frequency, be sure it is within the existing bandwidth of your system. The system data sheets supplied with your unit contain valuable information for alignment and frequency changes in the field. Be sure to have these at hand when contacting Moseley.

Note: Any user adjustments to the AFC level in the RF module and/or the IF filters in the IF strip will change the factory presets for the existing programmed channels. Re-adjustment can be very difficult to achieve. Consult the factory for best results.

---

*(**Multichannel Option:** If this is a multichannel system, refer to Section 5.3.9.4)*

Step 1. If larger than 64 MHz, put S0 in 1 position and go to step 3.

Step 2. Subtract 64 MHz from synthesizer frequency:

95.600 MHz (example frequency)= f

95.600
-64.000
31.600 MHz = **result "A"**

Step 3. See Table 1 below, S1 column. Find largest entry which is less than or equal to result "A":

28.0 ≤ 31.6, therefore S1 = 7

Step 4. Subtract S1 frequency from result "A":

31.00 MHz
-28.00
3.600 MHz = **result "B"**

Step 5. See Table 1 below, S2 column. Find largest entry which is less than or equal to result "B":

3.50 ≤ 3.60, therefore S2 = E

Step 6. Subtract S2 frequency from result "B":

3.600 MHz
-3.500
.100 MHz = **result "C"**

Step 7. See Table 1 below, S3 column. Find largest entry which is less than or equal to result "C".

.100 ≤ .100, therefore S3 = 4

Step 8. Any remainder is obtained by offsetting the reference oscillator.

Figure 5-13
Synthesizer Frequency Calculation Example

Table 5-1
Synthesizer Frequency Selection Switch Settings

S1	MHz	S2	MHz	S3	MHz
0	0.0	0	0.0	0	0.0
1	4.0	1	.25	1	.025
2	8.0	2	.50	2	.050
3	12.0	3	.75	3	.075
4	16.0	4	1.00	4	.100
5	20.0	5	1.25	5	.125
6	24.0	6	1.50	6	.150
7	28.0	7	1.75	7	.175
8	32.0	8	2.00	8	.200
9	36.0	9	2.25	9	.225
A	40.0	A	2.50	A	.250
B	44.0	B	2.75	B	.275
C	48.0	C	3.00	C	.300
D	52.0	D	3.25	D	.325
E	56.0	E	3.50	E	.350
F	60.0	F	3.75	F	.375

5.3.10 FMO Adjustment

Test Equipment

RF Signal Generator	HP-8640B
Mixer	Mini-Circuit 2AD-1
Adjustable Attenuator	Kay Elemetrics Corp., 432B
RF Spectrum Analyzer	HP-8559A
Distortion Measurement test set	HP-339A
50 Hz Filter	Figure 6-11
Counter	Tektronix DC-508A
Multimeter	Data Precision 935
Power Meter	HP-435A w/ 8481A Power Sensor

Procedure

1. a. Connect the equipment as shown in Figure 5-14.

   b. Using the counter, measure the output frequency of the FMO.

   c. <u>For a High-Side LO (LO > CARRIER)</u>

   FMO frequency = (LO freq.) - (CARRIER freq)

   <u>For a Low-Side LO (LO < CARRIER)</u>

   FMO frequency = (CARRIER freq) - (LO freq.)

*(**Note:** If the frequency is greater than 10 kHz away from the desired frequency, remove the top cover and position frequency selector switches S1 through S4 for the desired frequency.)**

** **Multichannel Option:** The FMO and 2nd LO are aligned for exact frequency operation (within ±200 Hz of the indicated synthesizer switch settings). To align the STL to the exact carrier frequency of the channel, adjust the 1st LO XTAL tuning capacitor C84.*

2. Adjust the frequency trim on the FMO (C11) so that the counter reads the desired frequency.

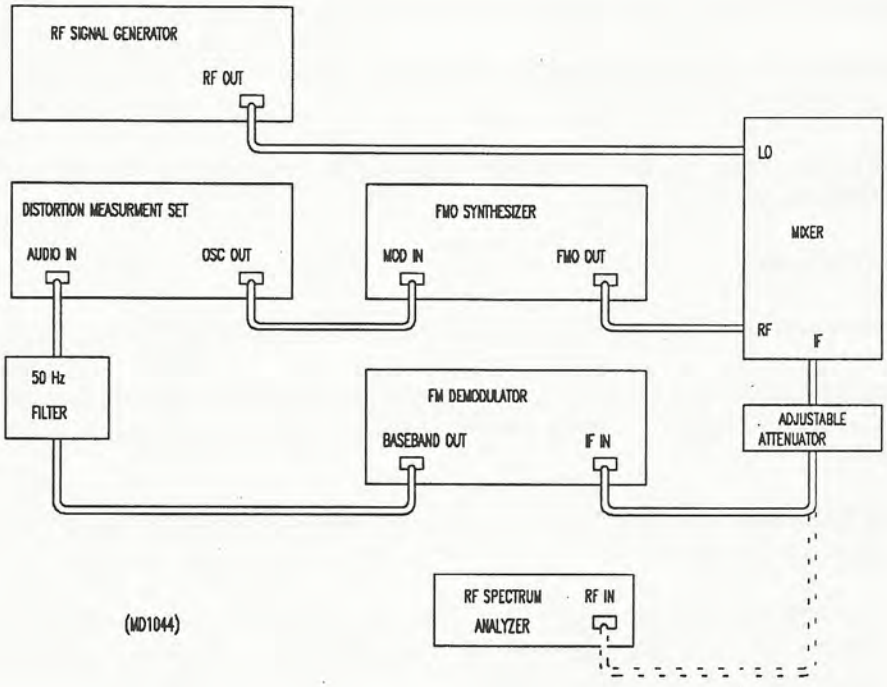


Figure 5-14
Test Setup for FMO Adjustment

*(**Note:** If the FMO LOSS OF LOCK is red, it will be necessary to first adjust the AFC level to accomplish this step. See Step 4 below.)*

3. Reconnect the FMO output to the RF input of the mixer.

4. Adjust the controls on the RF signal generator for a frequency that is 70 MHz (6020) or 3 MHz (6030/6060) above the FMO frequency and for an output of +10 dBm.

   Using the RF spectrum analyzer, position the switches on the adjustable attenuator for an output level of between -20 and -25 dBM at 70 MHz.

   Reconnect the adjustable attenuator to the IF Demod.

5. Adjust the oscillator output on the distortion measurement test set for a frequency of 1 kHz and a level of 1.25 VRMS (3.5 Vp-p).

6. Distortion and AFC Level Alignment.

   Using the multimeter, monitor FL1 (AFC Level) and adjust the AFC LVL ADJ so that the voltmeter reads +7 Vdc.

   Using the distortion measurement test set, verify that the baseband output of the IF Demod is between 1.0 and 1.5 VRMS.

   Measure the distortion of the output of the IF Demod, and adjust the Varicap Bias adjustment on the FMO (R37) for a minimum distortion reading.

*(**Note**: Normally there are two setting of the Varicap Bias adjustment that will produce minimum distortion. Varicap bias should be adjusted to the setting that produces the lowest distortion.)*

   Readjust the AFC LVL ADJ so that the voltmeter reads 7 volts.

   Repeat this procedure until the varicap bias is set for minimum distortion and the AFC level adjustment is between 6.9 and 7.1 Vdc.

   Set the frequency on the distortion measurement test set for 15 kHz and verify that the distortion meets specifications.

7. Modulation Level.

   The deviation select jumper E7 should be in the wideband composite position.

   Using the counter, set the output frequency of the distortion measurement test set oscillator to 20.78 kHz (16.62 mono). Verify that the oscillator output voltage is 1.25 VRMS (1.00 VRMS mono).

   Adjust FMO deviation for ± 50 kHz (± 40 kHz mono) as follows, using the Bessel null function waveforms in Figure 5-5:

   a. Connect the output of the adjustable attenuator to the RF spectrum analyzer and disconnect the audio input from the FMO. Establish the reference level shown in Figure 5-5A on the RF spectrum analyzer.

   b. Reconnect the audio from the distortion measurement test set to the FMO and adjust the MODULATION ADJ on the FMO from minimum to the first Bessel null function (Figure 5-5B).

8. Reconnect the adjustable attenuator to the IF Demod.

   Verify the AFC level at FL1 is between 6.9 and 7.1 VDC.

Verify the distortion at 15 kHz meets specifications.

Repeat Steps 6 through 8 of this procedure as required to achieve the above results.

9. Using the Power Meter, verify that the output of the FMO is -2 ± 2 dBm.

5.3.11 Transmitter Troubleshooting Procedure

Test Equipment

Attenuator 50-Ohm Load	Philco 662A-30
Counter	Tektronix DC-508A
Directional Coupler	Microlab/FXR Model CB-49B
Distortion Measurement	Hewlett-Packard Model 339A Set
Power Meter and Sensor	Hewlett-Packard 435A w/8481A Power Sensor
RF Signal Generator	Hewlett-Packard Model 8640B
RF Spectrum Analyzer	Hewlett-Packard Model 8559A
Stereo Demodulator	Belar Stereo Modulation Monitor, or equivalent
Multimeter	Data Precision Model 935
600 ohm Resistor 1% 1/4W	RN55D6000F

Procedure:

1. Connect the equipment, as shown in Figure 5-1, and position the OPERATE/STANDBY switch to the OPERATE position.

2. Check the +5 VDC, +15 VDC, -15 VDC, -12 VDC and +12.5 VDC test points on the Audio/Power Supply board.

3. Verify that the RADIATE, and AFC LOCK status indicators are green. The AFC LOCK indicator is controlled by the FMO. The RADIATE status indicator is determined by the Radiate Control circuitry.

4. The following test points on the Audio/Power Supply board should be checked:

   a. AFC LVL: The AFC Level should be between 6.9 VDC and 7.1 VDC. If not, the FMO AFC Level should be aligned before proceeding (see Section 5.3.10).

   b. IPA: The IPA Level should be greater than 1 VDC. If not, the following steps should be taken:

      Verify that the +12 VDC is between 12.25 and +12.75 VDC.

Using the power meter, verify that the input to the IPA amplifier is at least -10 dBm. If it is, the problem is located in the IPA amplifier.

Measure the output of the 1st LO and module for a value of between +5 and +10 dBm.

Using the power meter, measure the output of the FMO for a value of -2±2 dBm.

5.4 Module Adjustments Information

This section is intended to provide additional technical information, assist during alignment troubleshooting and module replacement.

Included are adjustment instructions to be used during troubleshooting, module repair, or module replacement for the following modules:

5.4.1 Transmitter Audio/Power Supply

Audio Processor

COMP PGM LVL (R28) — Composite program level adjustment. Sets the transmitter deviation of the composite signal. Normal input is 3.5 Vp-p. The normal deviation of the transmitter is ±50 kHz.

MONO PGM LVL (R199) — Monaural program level adjustment. Sets the transmitter deviation of the mono signal. Normal input is +10 dBm. The normal deviation of the transmitter is ±40 kHz.

DIG PGM LVL (R200)	Digital modulation program level adjustment. Sets the transmitter deviation of the digital signal in DSP-6000 applications. Consult the DSP-6000 manual for further information.
MUX1 LVL (R29)	MUX (ch. 1) level adjustment. Sets the transmitter deviation for the MUX (ch. 1) deviation. The normal input is 1.5 Vp-p at 110 kHz. Main carrier deviation normally is ±5 kHz.
MUX2 LVL (R40)	MUX (ch. 2) level adjustment. Sets the transmitter deviation for the MUX (ch. 2) input. The normal input is 1.5 Vp-p at 185kHz. Main carrier deviation normally is ±7.5 kHz.
PHASE SELECT (E2)	Jumper used to select the phase of the modulation. Position A is in-phase and position B is 180 degrees out-of-phase.
MONO LVL SELECT(E6)	Hard-wire jumper used to select various input levels and impedances. See the table referenced in the schematic.
75 µS PRE-EMPHASIS (E5)	Jumper to enable (IN) or disable (OUT) the pre-emphasis network (E5) (mono only).
F1 (R77)	Adjustment for lower break frequency of pre-emphasis (factory set).
F2 (R78)	Adjustment for upper break frequency of pre-emphasis (factory set).
15 kHz LPF (E4)	Jumper select for monaural low-pass filter (IN/OUT).
FA (R76)	Monaural 15 kHz low-pass filter adjustments (factory set).
FB (R75)	Monaural 15 kHz low-pass filter adjustments (factory set).
FC (R49)	Monaural 15 kHz low-pass filter adjustments (factory set).
LF TILT (R47)	Compensates for low frequency roll-off of mono filter (factory set).
LPF GAIN (R45)	Sets unity gain of mono filter.
MONO/COMP SELECT (E3)	Selects the input program signal to be processed.

Metering

COMP PGM MTRG(R201)	Composite PGM LVL meter function. 0 dB = 50 kHz deviation.
MONO PGM MTRG(R202)	Monaural PGM LVL meter function. 0 dB = 40 kHz deviation.
DIG PGM MTRG (R203)	Digtial modulation PGM LVL meter function.
REFL-PWR (R161)	REFL PWR meter function. 0 dB = 100% reflected power.
FWD-PWR (R162)	FWD PWR meter function. 0 dB = 100% output power (5 to 7 watts).
PA-CURR (R163)	RF Power Amp current meter function. Scale is AMPS X 10.

IPA-LVL (R164)	Intermediate power amplifier relative output level meter function.
AFC-LVL (R165)	Relative AFC level from FMO/synthesizer meter function.
LO1 (R166)	Relative output level of 1st LO meter function.
MUX (R159)	MUX LVL meter function. 5 on the lower scale equals 5 kHz deviation of the main carrier by the subcarrier.
+5V (R157) +12V (R155) +15V (R151) -15V (R153)	Power supply metering adjustments.
METER BALLISTICS (R286)	Adjust the meter ballistics. The meter is normally adjusted for a 0.25 dB overshoot by switching between the REFL POWER meter function and the PGM LEVEL meter function with a 0 dB input (program input = 3.5 Vp-p or 1.25 VRMS).
METER ZERO (R131)	Used to electrically zero the meter.

Power Supply

+12 V ADJ (R6)	Used to adjust the +12.5 VDC (+22 VDC for 1.7GHz) power supply output voltage when the transmitter is in the OPERATE position.

Control

TPT THRESHOLD (R138)	Sets the point at which the standby transmitter will switch in conjunction with the Moseley TPT-2 transfer panel.

5.4.2 Transmitter RF Module

FMO Synthesizer

FMO FREQ ADJ (C11)	Frequency Trim Adjustment. Used to tune the reference oscillator. The frequency switching described below adjusts the frequency in 25 kHz increments. This adjustment is used as a vernier between those increments.
LOSS OF LOCK (CR1)	This LED gives a red indication when the AFC loses lock.
AFC LVL (FL1)	AFC level test point. Monitors the DC level of the AFC loop. It is normally set to +7 VDC.
VARICAP BIAS (R37)	Varicap bias adjustment. Used to adjust the FMO for minimum distortion.

VARICAP BIAS (TP2)	Varicap bias level test point. A DC level (-5.5 VDC) to set a nominal minimum distortion point.
MOD ADJ (R34)	Modulation adjustment. Used to set the FMO deviation. It is normally set to ± 40 kHz with 2.8 Vp-p input.
AFC LVL ADJ (C30)	AFC Level Adjustment. Sets the free run oscillator frequency. Rotating it clockwise causes the frequency to decrease. The final adjustment is made by monitoring the AFC level (FL1) for a value of +7 VDC.
FMO LVL (TP4)	FMO level test point. A DC level (+0.9 VDC) that represents the detected relative output of the FMO oscillator.

Frequency Selector Switches

*(**Note:** See section 5.3.9 for detailed explanation of these switch functions.)*

SW0	Programs the 64 MHz step size of the synthesizer.
SW1	Programs the 4 MHz step size of the synthesizer.
SW2	Programs the 250 kHz step size of the synthesizer.
SW3	Programs the 25 kHz step size of the synthesizer.

Intermediate Power Amplifier (950 MHz, 1.7GHz)

The only adjustments to the IPA are the filters (FL11, FL12). These can be adjusted by injecting a sweep signal at J3 with P2 in the "test-out" position. The filter response may be tuned by observing the output on a spectrum analyzer. If a quick alignment is needed, put the meter switch in IPA position and peak the reading by adjusting the filter screws. P2 should be in the operate position for this.

Intermediate Power Amplifier (220-450 MHz)

The only adjustments to the IPA are the external filters (FL4, FL2). These can be adjusted by tuning the filter screws for a peak reading of the FWD PWR meter while in the OPERATE mode .

1st Local Oscillator (950 MHz)

XTAL OSC TUNE (C60)	Crystal oscillator tune. Sets peak oscillator output and operating point.
DRIVER TUNE (C76)	Sets input level to the doubler for maximum odd harmonic rejection.
SRD INPUT MATCH1 (C64)	Diode drive adjustment. Used to tune for maximum power output.
SRD INPUT MATCH2 (C63)	Diode drive adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH1(C110)	Diode match adjustment. Used to tune for maximum power output.

SRD OUTPUT MATCH2(C56)	Diode match adjustment. Used to tune for maximum power output.
LO FILTER (FL10)	Factory set for 20 MHz bandwidth. DO NOT ADJUST.
LO LVL (FL3)	Detected DC level (+1.5 Vdc) representing power output of LO.

*(**Note:** When installed in the PCL 6010 transmitter, set for the 950 MHz band, the frequency output of this module should be 1020 MHz with a power output between +5 and +9 dBm. This measurement should be made on a low-power wattmeter.)*

1st Local Oscillator (330/450 MHz)

XTAL OSC TUNE (C60)	Crystal oscillator tune. Sets peak oscillator output and operating point.
DRIVER TUNE (C76)	Sets input level to the doubler for maximum odd harmonic rejection.
SRD INPUT MATCH1 (C64)	Diode drive adjustment. Used to tune for maximum power output.
SRD INPUT MATCH2 (C63)	Diode drive adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH (C56)	Diode match adjustment. Used to tune for maximum power output.
LO FILTER (EXT)	External LO filter. Tune for maximum power output.
LO LVL (FL3)	Detected DC level (+1.5 Vdc) representing power output of LO.

1st Local Oscillator (220 MHz)

XTAL OSC TUNE (C60)	Crystal oscillator tune. Sets peak oscillator output and operating point.
DRIVER TUNE 1 (C76)	Sets input level to the driver for maximum power to the SRD multiplier.
DRIVER TUNE 2 (C87)	Sets input level to the driver for maximum power to the SRD multiplier.
SRD INPUT MATCH (C64)	Diode drive adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH (C56)	Diode match adjustment. Used to tune for maximum power output.
LO FILTER (EXT)	External LO filter. Tune for maximum power output.
LO LVL (FL3)	Detected DC level (+1.5 Vdc) representing power output of LO.

5.4.3 Transmitter RF Module (Multichannel Option)

FMO Synthesizer

REF FREQ ADJ (OSC1)	Frequency Trim Adjustment. Used to tune the reference oscillator.
LOSS OF LOCK (CR1)	This LED gives a red indication when the AFC loses lock.
AFC LVL (FL1)	AFC level test point. Monitors the DC level of the AFC loop. It is normally set to +7 VDC.
VARICAP BIAS (R37)	Varicap bias adjustment. Used to adjust the FMO for minimum distortion.
VARICAP BIAS (TP4)	Varicap bias level test point. A DC level (-5.5 VDC) to set a nominal minimum distortion point.
MOD ADJ (R33)	Modulation adjustment. Used to set the FMO deviation. It is normally set to ± 40 kHz with 2.8 Vp-p input.
F1 AFC ADJ (C34)	F1 AFC Level Adjustment. Adjusted for a nominal 5 - 9 VDC depending on the channel assignment. Check the test data sheet.
F1 "ON" (S4-2)	Switches on the F1 AFC adjustment capacitor (active).
F1 LED (CR6)	Indicates the F1 AFC adjustment capacitor is active.
F2 AFC ADJ (C30)	F2 AFC Level Adjustment. Adjusted for a nominal 5 - 9 VDC depending on the channel assignment. Check the test data sheet.
F2 "ON" (S4-3)	Switches on the F2 AFC adjustment capacitor (active).
F2 LED (CR5)	Indicates the F2 AFC adjustment capacitor is active.
FIX "ON" (S4-4)	Switches on the FIX AFC adjustment capacitor (active).
FMO LVL (TP2)	FMO level test point. A DC level (+0.9 VDC) that represents the detected relative output of the FMO oscillator.

Frequency Selector Switches

S4-1	Programs the 64 MHz step size of the synthesizer.
S1	Programs the 4 MHz step size of the synthesizer.
S2	Programs the 250 kHz step size of the synthesizer.
S3	Programs the 25 kHz step size of the synthesizer.

Intermediate Power Amplifier (950 MHz)

The only adjustments to the IPA are the filters (FL11, FL12). These can be adjusted by injecting a sweep signal at J3 with P2 in the "test-out" position. The filter response may be tuned by observing the output on a spectrum analyzer. If a quick alignment is needed, put the meter switch in IPA position and peak the reading by adjusting the filter screws. P2 should be in the operate position for this.

Intermediate Power Amplifier (220-450 MHz)

The only adjustments to the IPA are the external filters (FL4, FL2). These can be adjusted by tuning the filter screws for a peak reading of the FWD PWR meter while in the OPERATE mode .

1st Local Oscillator (950 MHz)

XTAL OSC TUNE (C84)	Crystal oscillator tune. Sets peak oscillator output and operating point.
DRIVER TUNE (C88)	Sets input level to the doubler for maximum odd harmonic rejection.
SRD INPUT MATCH1 (C95)	Diode drive adjustment. Used to tune for maximum power output.
SRD INPUT MATCH2 (C98)	Diode drive adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH1(C65)	Diode match adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH2(C101)	Diode match adjustment. Used to tune for maximum power output.
LO FILTER (FL10)	Factory set for 20 MHz bandwidth. DO NOT ADJUST.
LO LVL (FL3)	Detected DC level (+1.5 Vdc) representing power output of LO.

*(**Note:** When installed in the PCL 6010 transmitter, set for the 950 MHz band, the frequency output of this module should be 1020 MHz with a power output between +5 and +9 dBm. This measurement should be made on a low-power wattmeter.)*

1st Local Oscillator (330/450 MHz)

XTAL OSC TUNE (C84)	Crystal oscillator tune. Sets peak oscillator output and operating point.
DRIVER TUNE (C88)	Sets input level to the doubler for maximum odd harmonic rejection.
SRD INPUT MATCH1 (C95)	Diode drive adjustment. Used to tune for maximum power output.
SRD INPUT MATCH2 (C98)	Diode drive adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH (C101)	Diode match adjustment. Used to tune for maximum power output.
LO FILTER (EXT)	External LO filter. Tune for maximum power output.
LO LVL (FL3)	Detected DC level (+1.5 Vdc) representing power output of LO.

5.4.4 Doubler Assembly (1.7GHz)

The only adjustments to the Doubler Assembly are in the filter (FL2). The filter can be adjusted by injecting a sweep signal into FL2. The filter response may be tuned by observing the output on a spectrum analyzer. If a quick alignment is needed, put the meter switch in the FWD PWR position and peak the reading by adjusting the filter screws.

5.4.5 RF Amplifier

5.4.5.1 Alignment Procedure (950 MHz)

1. Measure input level at the RFA. IT should be greater than +13 dBm and less than +19 dBm (damage level). If power level is low, peak the external RFA filter.
2. Connect RFA output to power meter and spectrum analyzer using an appropriate high power attenuator/dummy load.
3. Connect input and adjust R1 (1st stage bias) through access hole in RFA for 6 watts (+38 dBm).
4. Monitor PA final current sample voltage across C701 and C702. Calculate (final current = Vsample divided by 0.16). Current should be less than 1.7 amp.
5. Check harmonic and spurious signal content for level ≤-65 dBc.

5.4.5.2 Alignment Procedure (450 MHz)

1. Measure input level at the RFA. IT should be greater than +18 dBm and less than +23 dBm (damage level). If power level is low, peak the external RFA filter.
2. Connect RFA output to power meter and spectrum analyzer. Using appropriate high power attenuator/dummy load.
3. Connect input and adjust RFA power supply +12.5 ADJ for 10 watts (+40 dBm).
4. Monitor final current for reading less than 2.0 amp.
5. Check harmonic and spurious signal content for level ≥ 65 dBc.

5.4.5.3 Alignment Procedure (330 MHz)

1. Measure input level at the RFA. It should be 20 dBm (100 mW nominal). If power level is low, peak the external RFA filter.
2. Connect RFA output to power meter and spectrum analyzer using appropriate high power attenuator/dummy load.
3. Connect input and adjust C701, C703 and C707 for max output power.

4. Adjust C712 and C713 for maximum output power, minimum final stage current and harmonic/spurious content ≥ 65 dBc.

5. Maximum final current must be < 1.7 amp.

5.4.5.4 Alignment Procedure (220 MHz)

1. Measure input level at the RFA. It should be 20 dBm (100 mW nominal). If power level is low, peak the external RFA filter.

2. Connect RFA output to power meter and spectrum analyzer using appropriate high power attenuator/dummy load.

3. Connect input and adjust C701, C703 and C707 for max output power.

4. Adjust C712 and C713 for maximum output power, minimum final stage current and harmonic/spurious content ≥ 65 dBc.

5. Maximum final current must be < 1.7 amp.

5.4.5.5 Alignment Procedure (1.7 GHz)

DO NOT ATTEMPT TO ADJUST THIS RFA. CALL THE FACTORY FOR ANY TECHNICAL PROBLEMS ENCOUNTERED WITH THIS MODULE.

5.4.6 Receiver Audio/Power Supply

Audio Processor

COMP/MONO SELECT	Jumpers (E1, E4, E5, E6, E7, E8, E10) select proper audio processing and MUX filter bands for either composite or monaural operation.
COMP FILTER (E9)	Jumper E9 bypasses the composite low pass filter and delay equalizer (OUT position) for digital STL applications (see DSP 6000 manual for further details.
COMP HF TILT (R7)	High frequency tilt adjustment (composite). Compensates for the high frequency roll-off caused by the IF filtering.
MONO HF TILT (R208)	High frequency tilt adjustment (monaural). Compensates for the high frequency roll-off caused by the IF filtering.
COMP LF TILT (R61)	Composite low frequency tilt adjustment. Adjusts the stereo separation between 30 and 100 Hz.
DELAY EQ (R111)	Delay Equalizer Adjustment. Adjusts the stereo separation between 10 and 15 kHz.

*(**Note**: The COMP HF TILT, COMP LF TILT, and DELAY EQ adjustments are used primarily to optimize stereo separation performance. In other applications, such as communications, HF TILT and LF TILT would be used to adjust the audio frequency response within ± 1 dB from 30 Hz to 53 kHz. The DELAY EQ adjustment would have no effect on the frequency response performance.)*

75 µS DE-EMPHASIS	Jumper selects the de-emphasis network to be enabled SELECT (E2) (IN) or disabled (OUT).
F1 (R23)	Adjustment for lower break frequency of de-emphasis (factory set).
F2 (R22)	Adjustment for upper break frequency of de-emphasis (factory set).
15 kHz LPF (E3)	Jumper select for monaural low-pass filter.
FA (R30)	Monaural 15 kHz low-pass filter adjustments (factory set).
FB (R78)	Monaural 15 kHz low-pass filter adjustments (factory set).
FC (R82)	Monaural 15 kHz low-pass filter adjustments (factory set).
MONO LF TILT (R88)	Compensates for low frequency roll-off of mono filter (factory set).
FILTER GAIN (R89)	Sets unity gain of mono filter.
MONO PGM LVL (R98)	Sets output program level of the receiver.
MONO PGM MTRG (R90)	Sets the meter program level for mono operation.
MUX LVL (R12)	MUX level adjustment. Adjusts the MUX level output of the audio processor. Normally adjusted so that ± 5 kHz (± 4 kHz mono) deviation equals 1.5 Vp-p at 110 kHz.

Metering and Status

PGM LVL (R171)	Adjusts the PGM LEVEL meter function. 100% = 0 dB.
AFC LVL (R166)	AFC level metering adjust. Center arc.
LO1 (R169)	1st LO relative level. Center arc.
LO2 (R168)	2nd LO/synthesizer relative level. Center arc.
LO3 (R167)	3rd LO relative level (6030). Center arc.
MUX LVL (R170)	Adjusts the MUX LVL function of the meter. A reading of 5 on the lower scale equals 5 kHz of the main carrier by the subcarrier.
SIG LVL (R172)	Used to adjust the RF LEVEL function. A reading of 3 K on the center scale of the meter equals 3000 microvolt of input signal.
+5V (R213) +15V (R210) -15V (R212)	Power supply metering adjustments.

METER BALLISTICS (R196) Adjusts the meter ballistics.

METER ZERO (R186) Adjusts meter zero.

Mute and Transfer

The Mute and Transfer section requires no adjustment. If a failure is suspected in the Mute and Transfer circuitry, the following information may be useful in isolating the problem:

1. A mute signal from the IF Demod (Mute Threshold Adjust LED red) will de-energize the mute relay and disconnect the composite and MUX audio outputs.

2. This module may be externally muted, either by a remote mute input or a transfer input from a receiver transfer panel (TPR).

5.4.7 Receiver RF Module

Preselector Filter (950 MHz, 6020/6030)

Filters FL-12 and FL-11 (in the RF module) are two- and three-pole helical filters with a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five adjustments should be set for a flat passband greater than 5 MHz wide.

Preselector Filter (950 MHz, 6060)

The filter is located under the Audio/Power Supply board of the receiver (see system assembly drawing). The filter has a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five screw adjustments should be set for a flat passband greater than 5 MHz wide.

Preselector Filter (220-450 MHz)

The filter is located at the rear of the receiver (see system assembly drawing) and has a passband of approximately 8 MHz. This can be tuned by observing the RF LVL on the meter and peaking the three adjustment capacitors of the filter. Take care not to adjust the LO filter which is located on the same bracket. The preselector filter is the one that is connected directly to the ANTENNA port.

Preselector Filter (1.7GHz)

The filter is located at the rear of the receiver (see system assembly drawing) and has a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five screw adjustments should be set for a flat passband greater than 5 MHz wide. Take care not to adjust the LO filter which is located on the same bracket. The preselector filter is the one that is connected directly to the ANTENNA port.

1st Local Oscillator (950 MHz)

The adjustments for the receiver 1st LO are identical to those specified for the transmitter 1st LO (see section 5.4.2).

1st Local Oscillator (330/450 MHz)

The adjustments for the receiver 1st LO are identical to those specified for the transmitter 1st LO (see section 5.4.2).

1st Local Oscillator (220 MHz)

The adjustments for the receiver 1st LO are identical to those specified for the transmitter 1st LO (see section 5.4.2).

1st Local Oscillator (1.7 GHz)

XTAL OSC TUNE (C60)	Crystal oscillator tune. Sets peak oscillator output and operating point.
DRIVER TUNE (C76)	Sets input level to the doubler for maximum odd harmonic rejection.
SRD INPUT MATCH1 (C64)	Diode drive adjustment. Used to tune for maximum power output.
SRD INPUT MATCH2 (C63)	Diode drive adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH1(C110)	Diode match adjustment. Used to tune for maximum power output.
SRD OUTPUT MATCH2(C56)	Diode match adjustment. Used to tune for maximum power output.
LO FILTER (EXT)	External, factory set for 20 MHz bandwidth. DO NOT ADJUST.
LO LVL (FL3)	Detected DC level (+0.6 Vdc) representing power output of LO.

LO2 Synthesizer

LO2 FREQ ADJ (C11)	Frequency Trim Adjustment. Used to tune the reference oscillator. The frequency switching described below adjusts the frequency in 25 kHz increments. This adjustment is used as a venire between those increments.
LOSS OF LOCK (CR1)	This LED gives a red indication when the AFC loses lock.
AFC LVL (FL1)	AFC level test point. Monitors the DC level of the AFC loop. It is normally set to +7 VDC.
AFC LVL ADJ (C30)	AFC Level Adjustment. Sets the free run oscillator frequency. Rotating it clockwise causes the frequency to decrease. The final adjustment is made by monitoring the AFC level (FL1) for a value of +7 VDC.
FMO LVL (TP4)	FMO level test point. A DC level (+0.9 VDC) that represents the detected relative output of the FMO oscillator.

Frequency Selector Switches

*(**Note:** See section 5.3.9 for detailed explanation of these switch functions.)*

SW0	Programs the 64 MHz step size of the synthesizer.
SW1	Programs the 4 MHz step size of the synthesizer.
SW2	Programs the 250 kHz step size of the synthesizer.
SW3	Programs the 25 kHz step size of the synthesizer.

5.4.8 Receiver RF Module (Multichannel Option)

Preselector Filter (950 MHz, 6020/6030)

Filters FL-12 and FL-11 (in the RF module) are two- and three-pole helical filters with a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five adjustments should be set for a flat passband greater than 5 MHz wide.

Preselector Filter (950 MHz, 6060)

The filter is located under the Audio/Power Supply board of the receiver (see system assembly drawing). The filter has a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five screw adjustments should be set for a flat passband greater than 5 MHz wide.

Preselector Filter (220-450 MHz)

The filter is located at the rear of the receiver (see system assembly drawing) and has a passband of approximately 8 MHz. This can be tuned by observing the RF LVL on the meter and peaking the three adjustment capacitors of the filter. Take care not to adjust the LO filter which is located on the same bracket. The preselector filter is the one that is connected directly to the ANTENNA port.

Preselector Filter (1.7GHz)

The filter is located at the rear of the receiver (see system assembly drawing) and has a passband of approximately 20 MHz. Under normal circumstances, no alignment is required. To check alignment, a sweep oscillator, whose frequency is centered in the middle of the RF band used, is injected into RF IN and the signal is monitored at IF OUT. The five screw adjustments should be set for a flat passband greater than 5 MHz wide. Take care not to adjust the LO filter which is located on the same bracket. The preselector filter is the one that is connected directly to the ANTENNA port.

1st Local Oscillator (950 MHz)

The adjustments for the receiver 1st LO are identical to those specified for the transmitter 1st LO (see section 5.4.3, Multichannel Option).

1st Local Oscillator (330/450 MHz)

The adjustments for the receiver 1st LO are identical to those specified for the transmitter 1st LO (see section 5.4.3, Multichannel Option).

LO2 Synthesizer

REF FREQ ADJ (OSC1)	Frequency Trim Adjustment. Used to tune the reference oscillator.
LOSS OF LOCK (CR1)	This LED gives a red indication when the AFC loses lock.
AFC LVL (FL1)	AFC level test point. Monitors the DC level of the AFC loop. It is normally set to +7 VDC.
F1 AFC ADJ (C34)	F1 AFC Level Adjustment. Adjusted for a nominal 5 - 9 VDC depending on the channel assignment. Check the test data sheet.
F1 "ON" (S4-2)	Switches on the F1 AFC adjustment capacitor (active).
F1 LED (CR6)	Indicates the F1 AFC adjustment capacitor is active.
F2 AFC ADJ (C30)	F2 AFC Level Adjustment. Adjusted for a nominal 5 - 9 VDC depending on the channel assignment. Check the test data sheet.
F2 "ON" (S4-3)	Switches on the F2 AFC adjustment capacitor (active).
F2 LED (CR5)	Indicates the F2 AFC adjustment capacitor is active.
FIX "ON" (S4-4)	Switches on the FIX AFC adjustment capacitor (active).
LO2 LVL (TP2)	LO2 level test point. A DC level (+0.9 VDC) that represents the detected relative output of the FMO oscillator.

Frequency Selector Switches

S4-1	Programs the 64 MHz step size of the synthesizer.
S1	Programs the 4 MHz step size of the synthesizer.
S2	Programs the 250 kHz step size of the synthesizer.
S3	Programs the 25 kHz step size of the synthesizer.

5.4.9 IF Demod (6020)

1ST 10.7 MHz IF ADJ (C13)	IF Adjustment. Adjust for minimum distortion.
2ND 10.7 MHz IF ADJ (C18)	IF Adjustment. Adjust for minimum distortion.

(Note: The L02 FREQ ADJ and the 1st 10.7 MHZ IF ADJ and 2nd 10.7 MHz IF ADJ interact. See paragraph 5.3.6, Distortion Alignment, for additional information.)

70 MHz BPF ADJ (C41,C44,C47)	Bandpass Filter Adjustments. The alignment of the 70 MHz bandpass filter can be checked indirectly by verifying the receiver noise performance to within 20 microvolt of the value specified on the final test data sheet included in this manual. (See paragraph 5.3.2, Receiver Sensitivity).
MUTE THRESHOLD (R18)	Mute Threshold Adjust. Adjusts the mute logic threshold; threshold = 20 microvolt input signal.
BB LVL ADJ (R19)	Baseband Level Adjust. Adjust the output of the baseband including the composite and MUX levels. ±50 kHz deviation = 3.5 Vp-p.
BB LVL (TP2)	Baseband Level Test Point. An ac test point used to monitor the output level of the baseband processor. ±50 kHz deviation = 3.5 Vp-p.
DEMOD BALANCE (TP1)	Demod Balance Level. Is an indication of quadrature coil balance (minimum distortion) and/or demodulator free drift (0 ± 1 VDC).

5.4.10 Double Converter/LO3 (6030/6060)

70 MHz BPF ADJ (C40,C43,C46,C49)	Bandpass Filter Adjustments. The alignment of the 70 MHz bandpass filter can be checked indirectly by verifying the receiver noise performance to within 20 microvolt of the value specified on the final test data sheet included in this manual. (See paragraph 5.3.2, STL Receiver Sensitivity.
1ST IF FLTR SELECT (E2,E3)	Selects proper filter for intended system application.
1ST 10.7 MHz IF ADJ WB (C14)	Wideband IF Filter Adjust. Determines selectivity and distortion specifications.
1ST 10.7 MHz IF ADJ NB (C15)	Narrowband IF Filter Adjust. Determines selectivity and distortion specifications.
1ST 10.7 MHz IF ADJ MONO (C13)	Mono IF Filter Adjust Determines selectivity and distortion specifications.
2ND IF FLTR SELECT (E4,E5)	Selects proper filter for intended system application.
2ND 10.7 MHz IF ADJ COMP (C21)	Composite IF Filter Adjust. Determines selectivity and distortion specifications.
2ND 10.7 MHz IF ADJ MONO (C22)	Mono IF Filter Adjust. Determines selectivity and distortion specifications.
LO3 OUT LVL (FL6)	LO3 Output Level. DC voltage sample of 3rd LO at 13.7 MHz (0.3 - 1.2 VDC).

5.4.11 Preamp/1st Mixer (950 MHz, 6060)

RF ATTEN ADJ (R13)	Sets the value of front end attenuation (up to 15 dB).
RF ATTEN LVL (TP1)	Indication of relative attenuation (0 VDC = max atten.).
70 MHZ OUTPUT ADJ (L3)	Set for peak level of 1st IF output in this module.

5.4.12 FM Demod (6030/6060)

LOG GAIN ADJ (R67)	Log Gain Adjustment. Calibrates the RF LVL meter function. With 10 mV of signal applied to the RF input, SIG LVL on the Audio/Power Supply board should be adjusted for a reading of 3K on the middle scale. The input should then be reduced to 100 mV, and the LOG GAIN ADJ on the FM Demod should be adjusted for 100 on the middle scale. The 3, 10, 30, 100, 300, 1 K, and 3 K levels should be checked to ensure that the meter reads between the upper and lower line on the meter for each range. As a general rule, SIG LVL is used to adjust the full scale or 3 K reading, and the LOG GAIN ADJ on the FM Demod module is used to adjust the linearity in the 100 to 300 mV range.
LOG LVL (TP3)	Log Level Test Point. A DC test point used to monitor the first stage of the meter log amplifier.
DEMOD LVL (TP2)	Demod Level Test Point. A dc test point with a voltage proportional to the frequency of the 3 MHz IF. Normally, this voltage is between +4 and +6 VDC.
MUTE INDICATOR (CR6)	Mute Threshold Indicator (LED). Indicates status of mute logic (red = mute).
MUTE THRESHOLD ADJ (R22)	Mute Threshold Adjust. Adjusts the mute logic threshold; threshold = 20 mV input signal with RF gain at 15 on receiver meter.
BB LVL ADJ (R10)	Baseband Level Adjust. Adjust the output of the baseband including the composite and MUX levels. ±50 kHz deviation wideband or ±35 kHz deviation narrowband = 3.5 Vp-p.
BB LVL (TP1)	Baseband Level Test Point. An ac test point used to monitor the output level of the baseband processor. ±50 kHz deviation wideband or ±35 kHz deviation narrowband = 3.5 Vp-p.

5.4.13 Adjacent Channel Filter (6060)

COMP/MONO SELECT (E1,E2)	Selects proper filter for intended system application (Composite or Mono).

5.4.14 Channel Control Board (Multichannel Option)

CHNL SELECT (S1)	Front panel select control. Selects channels 0 - 15.
FIX LED (CR1)	LED indicates EPROM output bit C5 (FIX capacitor in RF Module) is active.
F2 LED (CR2)	LED indicates EPROM output bit C4 (F2 capacitor in RF Module) is active.
F1 LED (CR3)	LED indicates EPROM output bit C3 (F1 capacitor in RF Module) is active.
MOD1 LED (CR4)	LED indicates EPROM output bit C2 (MOD1 adjustment) is active.
MOD2 LED (CR5)	LED indicates EPROM output bit C1 (MOD2 adjustment) is active.
MOD3 LED (CR6)	LED indicates EPROM output bit C0 (MOD3 adjustment) is active.
DGT1 TEST (E1)	Short circuit this test point to turn on all segments (display 8) of DGT1.
MOD IN (TP1)	Modulation input to control board (3.5 Vp-p nominal).
MOD1 LVL ADJ (R12)	Modulation adjustment (1) set active by EPROM or CHNL ZERO programming.
MOD2 LVL ADJ (R13)	Modulation adjustment (2) set active by EPROM or CHNL ZERO programming.
MOD3 LVL ADJ (R14)	Modulation adjustment (3) set active by EPROM or CHNL ZERO programming.
MOD OUTPUT (TP2)	Modulation output to transmitter RF Module (3.5 Vp-p nominal).

INTERNAL REMOTE:

ENABLE	(S6-1)	When set to ON, provides internal **front panel lockout** of the channel select function.
CHNL SELECT	(S6-2)	BCD 8's bit to set channel number when INT RMT ENABLE is ON. 1=8
	(S6-3)	BCD 4's bit to set channel number when INT RMT ENABLE is ON. 1=4
	(S6-4)	BCD 2's bit to set channel number when INT RMT ENABLE is ON. 1=2
	(S6-5)	BCD 1's bit to set channel number when INT RMT ENABLE is ON. 1=1

CHANNEL ZERO PROGRAMMING:

FIX	(S2-1)	Sets FIX capacitor in RF Module active. 1=ON
F2	(S2-2)	Sets F2 capacitor in RF Module active. 1=ON
F1	(S2-3)	Sets F1capacitor in RF Module active. 1=ON
MOD1	(S2-4)	Sets modulation adjust (MOD1) active. 1=ON

MOD2	(S2-5)	Sets modulation adjust (MOD2) active. 1=ON
MOD3	(S2-6)	Sets modulation adjust (MOD3) active. 1=ON
N/A	(S2-7)	not used
64 MHz	(S2-8)	Sets 64 MHz bit on for frequency selection. 1=ON
4 MHz	(S3)	Sets 4 MHz step. HEX switch functions as follows: 0=0 MHz, 1=4MHz, 2=8 MHZ,..., E=56 MHz, F=60 MHz
250 kHz	(S4)	Sets 250 kHz step. HEX switch functions as follows: 0=0 kHz, 1=250 kHz, 2=500 kHZ,..., E=3.5 MHz, F=3.75 MHz
25 kHz	(S5)	Sets 25 kHz step. HEX switch functions as follows: 0=0 kHz, 1=25 kHz, 2=50 kHZ,..., E=350 kHz, F=375 kHz

5.5 Test Fixture Diagrams

The test fixtures shown in Figures 5-15 and 5-16 have been designed to interface with the equipment specified in Table 5-1.

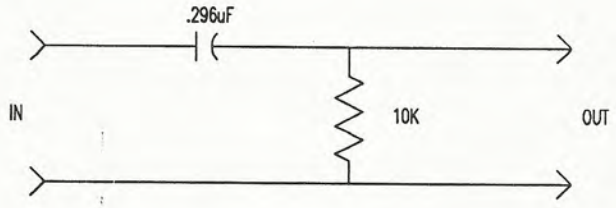


Figure 5-14
50 Hz High-Pass Filter

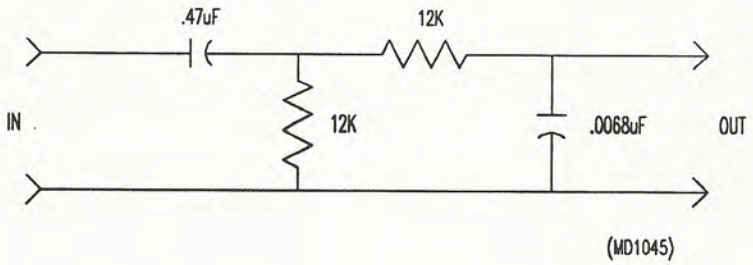


Figure 5-15
75 microsecond De-Emphasis with 30 Hz High-Pass Filter

Section Six

Customer Service Information

Contents		Page
6.1	Introduction	6-2
6.2	Telephone Consultation	6-2
6.3	Factory Service	6-3
6.4	General	6-4

6.1 Introduction

Moseley Associates, Inc. has a Technical Services Department to assist Moseley product users who experience difficulties. Our service is available at two levels: telephone consultation, and factory service. Different circumstances apply depending on whether product(s) are under Warranty/Service Agreement or outside Warranty/Service Agreement status.

Please read the manual; a large portion of telephone calls to Moseley request information which is needed due to non-familiarity with the equipment. The majority of those questions are already answered by the Installation/Operation sections of each manual. If these do not help your problem, the first step in any factory service transaction should always be telephone consultation.

6.2 Telephone Consultation

If telephone assistance is necessary, please have the following information available prior to calling the factory:

A. Model Number and Serial Number of unit;

B. Shipment date or date of purchase of an Extended Service Agreement;

C. Suspected module identification markings;

D. Be prepared to accurately describe the problems with the unit: Constant or intermittent? Precise symptoms? Meter readings? Operational frequency of unit?

E. Factory test data, if applicable.

Once you are prepared with the above-requested information, contact our Technical Services Department for assistance. A Technical Services Representative who knows your product(s) is available during normal work hours (8:00 a.m. to 5:00 p.m., Pacific time, Monday through Friday). Please have patience if the particular representative you should talk to is busy. Leave your name, call letters, equipment type, and telephone number(s) where you can be reached in the next few hours. Someone will get back to you as soon as possible.

Please be prepared to keep telephone consultations as short as possible in order to free up the Technical Service Representative to help someone else in trouble. Usually, the Technical Service Representative will make suggestions and recommendations for your next step. After trying these, you may call back if you continue to experience problems.

For telephone assistance, call (805) 968-9621.

After Hours Emergency Only Telephone Consultation

Emergency service is provided from 5:00 p.m. to 10:00 p.m., Pacific time, Monday to Friday, and from 8:00 a.m. to 10:00 p.m., Pacific time, on weekends and holidays. For telephone assistance, call (805) 968-9621.

This after-hours service is for **emergencies only**. Please do not expect our representative to know the status of your order, to take parts orders or to be equipped to help with installation problems.

6.3 Factory Service

Arrangements for factory service can be made after consultation with the factory Technical Service Representative and his assignment to you of a Return Authorization (R.A.) number. This number expedites your equipment's routing from the Receiving Department to Technical Services.

The following suggestions are offered to assist you when returning your equipment to Moseley Associates, Inc. If you are returning a module, ensure that the module is carefully packed to withstand the rigors of the journey. Make sure the shipping carton is packed evenly and fully, with packing material filling all voids so that the module cannot shift inside the shipping carton. The package also should be marked in red with the words "Electronic Equipment" or "Fragile". Remember, the condition of the module is totally dependent on the care taken in the packing. Reference the return order number, previously obtained from the factory, on the outside of the carton or on the shipping label. Make sure that the name of your company is listed on the shipping label, and insure your module appropriately.

If you are shipping a complete chassis, all modules should be tied down as they were originally received. On some Moseley Associates equipment, shipping screws are required on the underside or topside of the chassis. In this case, printing on the chassis will indicate where such screws should be installed and secured.

Include any and all descriptions of the difficulties encountered with your equipment in the field. This will greatly assist us in processing your equipment and returning it as expeditiously as possible.

Use the original shipping carton in which your equipment was supplied, if possible. Ensure that the carton is packed evenly and fully, with packing material filling any voids so that the chassis cannot shift inside the carton. Make sure the carton is sealed properly with either nylon-reinforced tape or shipping sealing tape. Mark the outside of the carton "Electronic Equipment - Fragile" in big, red letters. This will assist in the survival of the equipment during the shipping process. Again, bear in mind that the survival of the unit depends almost solely on the preparation taken in shipping it.

When returning your equipment to our factory, please address it as follows:

MOSELEY ASSOCIATES, INC.
Attn: Technical Services Department
111 Castilian Drive
Santa Barbara, CA 93117

Display your return authorization number clearly on the shipping label, and insure the equipment for the appropriate amount.

All equipment must be shipped prepaid; Moseley Associates, Inc. will return the equipment prepaid under Warranty and Service Agreement conditions, and either freight collect or billed for equipment not covered by Warranty or a Service Agreement.

6.4 GENERAL

Replacement Modules

Moseley Associates encourages the purchase of spare parts kits to allow the customer to be totally self sufficient with regard to parts. We recognize that there are extenuating circumstances when troubleshooting to the component level is neither practical nor possible. If this is the case, replacement module exchange may be the most expedient way of correcting the problem.

Replacement modules are normally available for immediate shipment. If you require a replacement module from Moseley Associates, please give your shipping address to our Technical Services Engineer. If the module or equipment to be supplied to your company is to be held at the airport with a telephone number to call, provide at least two telephone numbers. This will often expedite the delivery or pickup of the replacement module or equipment.

Field Repair

Always try to isolate the problem to a specific area or module, if possible. By comparing actual wave shapes and levels with those referenced on the block and level diagrams or schematics, the problem often can be localized to the component level.

If an integrated circuit is suspect, carefully remove the original and install the new one in the same direction. These devices are installed one way only. Installing a new device backward may damage the newly-installed component or the surrounding circuitry. ICs occasionally exhibit temperature-sensitive characteristics. If a suspicious device operates intermittently, or appears to drift, Freeze Mist may aid in diagnosing the problem.

If a soldered component has to be removed from a printed circuit board, do the following:

- Use a 40W soldering iron with a 1/8-inch tip. Do not use a soldering gun. Excessive heat may cause damage.

- Remove all solder contacting the lead or leads from the component and from the associated printed circuit pad. To assist in the removal of the solder, solder-sipping braid, such as solder wick, is very useful. Once the solder has been removed, remove the component from the board.

When installing the new component, pre-bend the leads of the replacement component so they will easily fit into the appropriate PC board holes. Solder each lead of the component to the bottom side of the board with a 40W soldering iron with a 1/8-inch tip. Always use a good brand of rosin-core solder. The solder joint should be smooth and shiny. Also, be sure that excessive heat is not used in this soldering operation. Excessive heat will damage the printed circuit pad that comes in contact with the new component. Finally, cut each lead of the replacement component close to the solder on the pad side of the printed circuit board with a pair of diagonal cutters. Then, remove all residual flux with either flux cleaner or a cotton swab moistened with flux cleaner.

PCL-6000-950 STD MANUAL DOC #602-10299-01 REV A
Revision Configuration:

Section	Description	Eng. Dwg. #	Rev Level	Rev Date
7	Schematic/Assembly Dwgs	602-10299-71	A	08-94
8	Assembly Parts Lists	602-10299-81	A	08-94
Appendix App A: App B: App C:	 Path Evaluation Conversion Chart Spare Parts Kits	602-10299-A1	A	08-94

Note to our customers:

This documentation package contains drawings and parts lists in sections that pertain to the following systems:

PCL 6020 Standard System (950 MHz)

PCL 6030 Standard System (950 MHz)

PCL 6060 Standard System (950 MHz)

Please insert this package into the Operation Manual binder directly behind sections 1 through 6. If you have received the incorrect package for your system, call Moseley Associates at (805) 968-9621.

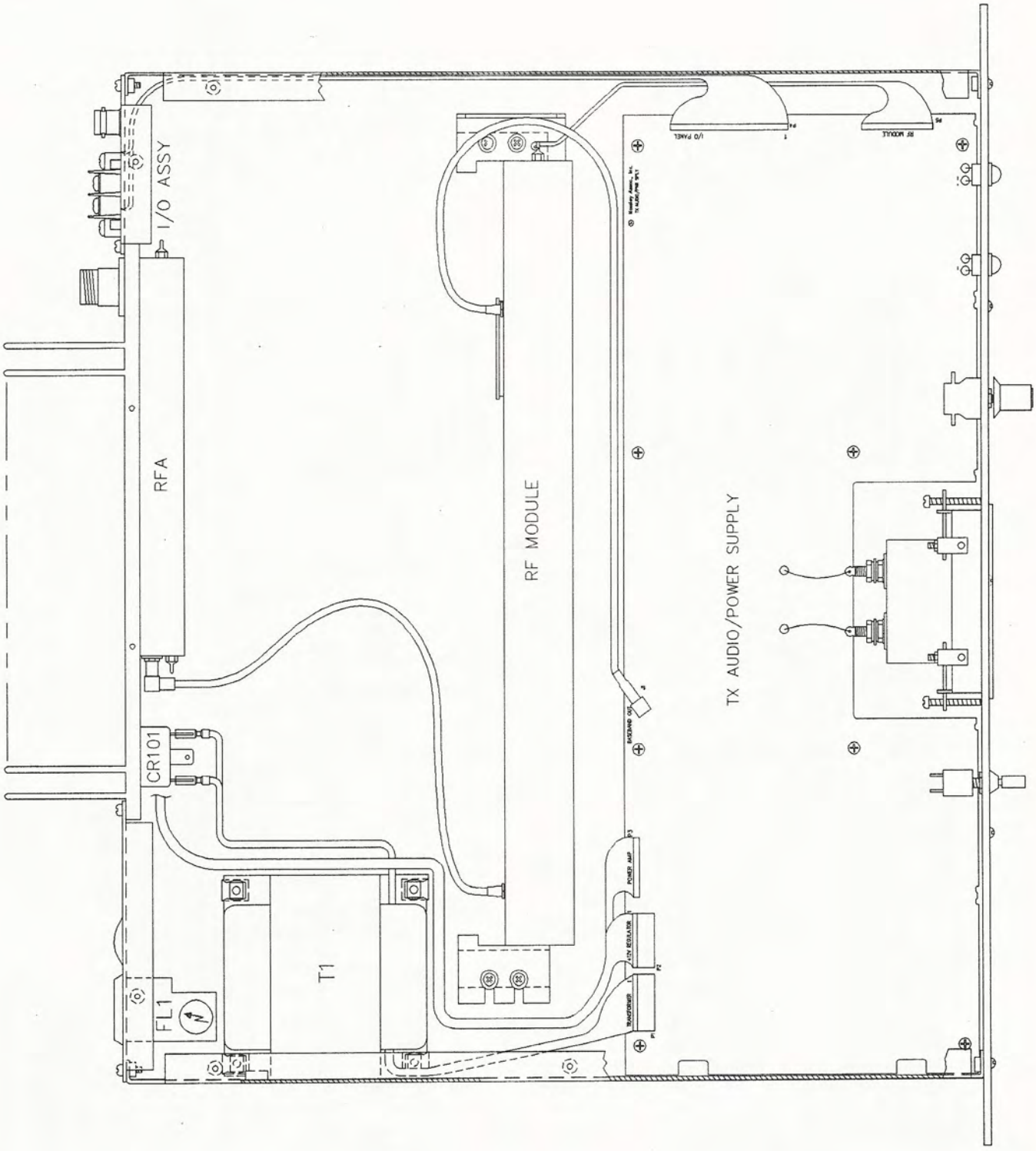
Section 7

Schematic and Assembly Drawings

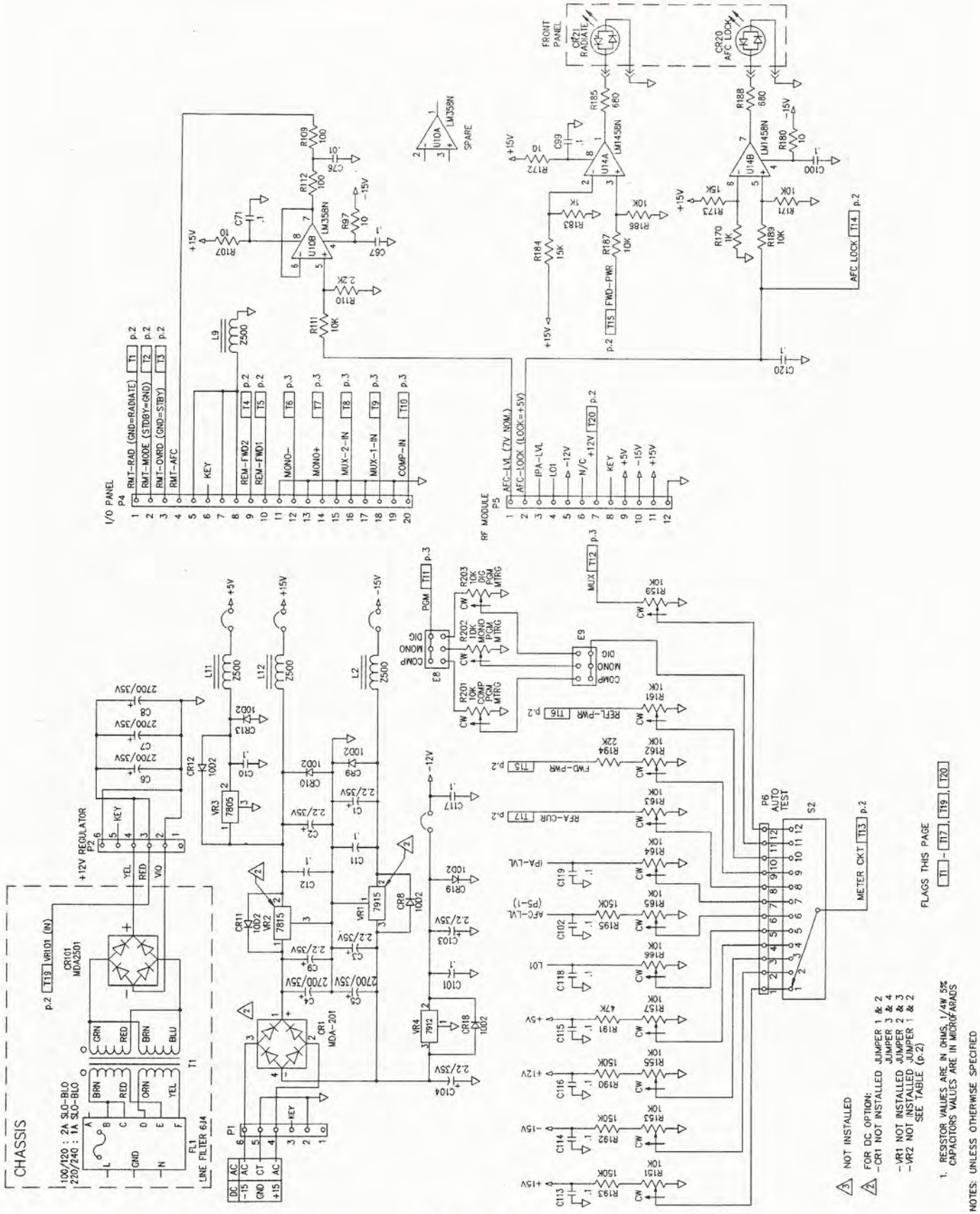
(950 MHz STANDARD SYSTEM)

NOTICE:

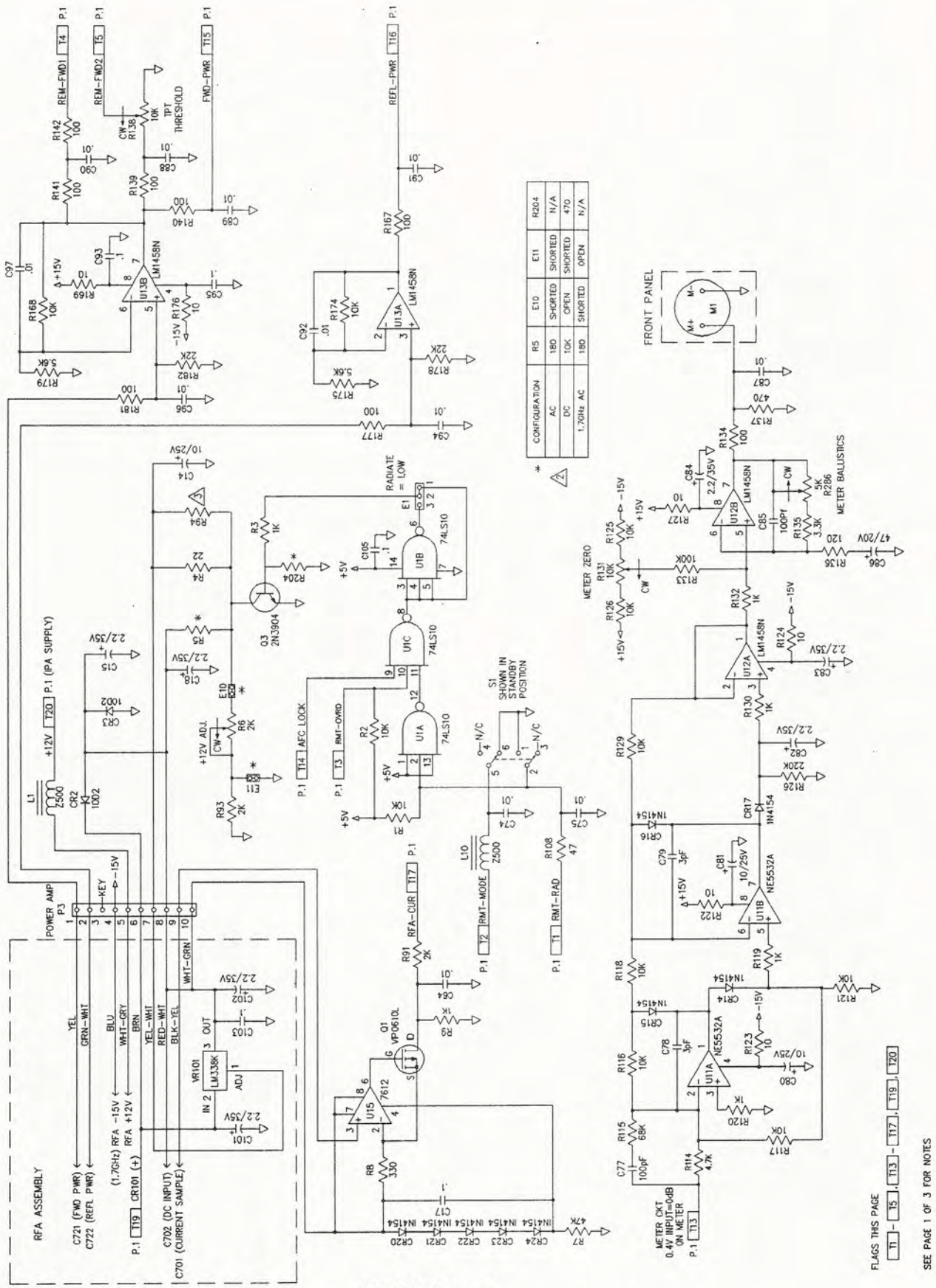
This section contains schematic and assembly drawings referred to in Sections 1 and 4. For information on individual drawings refer to Section 1 under "System Description" and/or Section 4 under "Module Description".



21D2690-1 Rev E
6010 Transmitter Final Assembly (950 MHz)

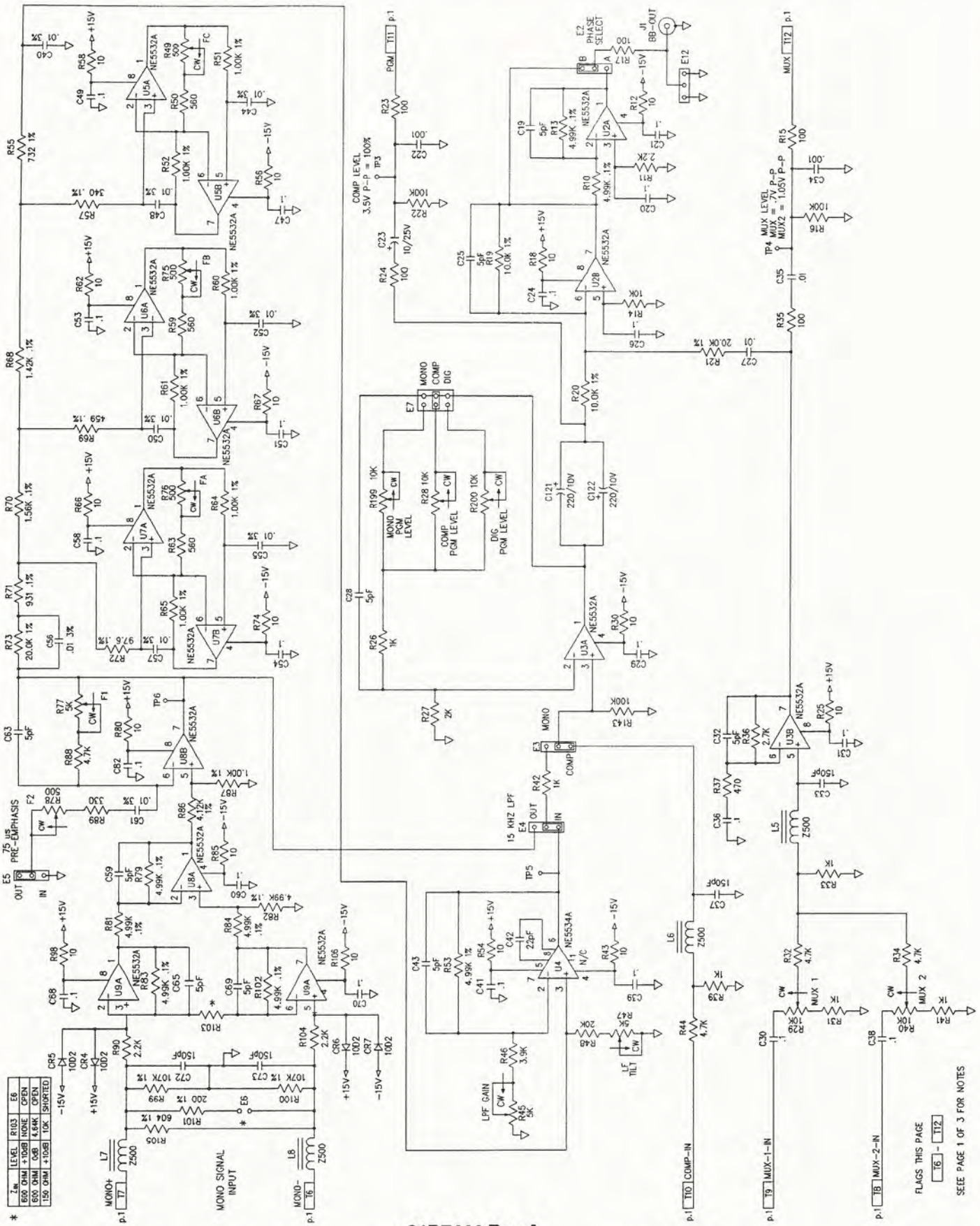


91D7444 Rev A
Transmitter Audio/Power Supply Schematic, p. 1 of 3

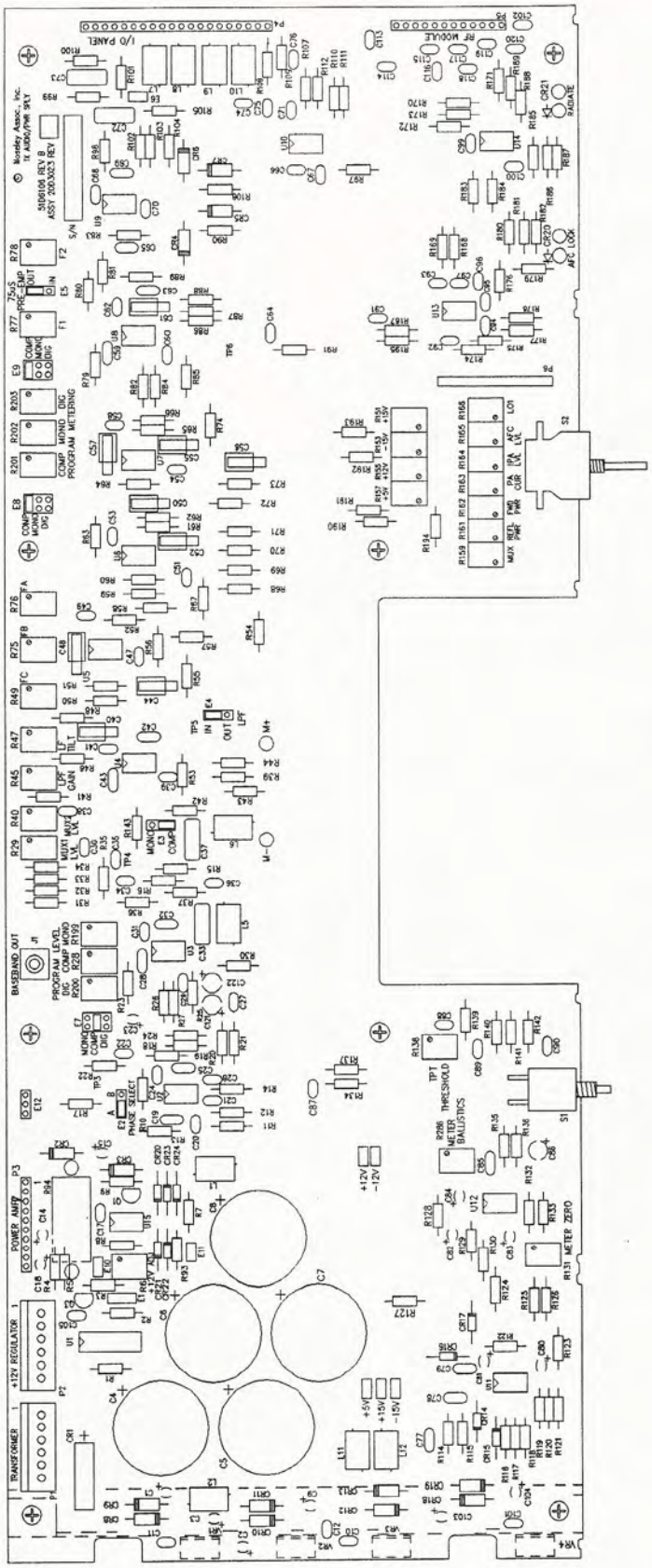


91D7444 Rev A

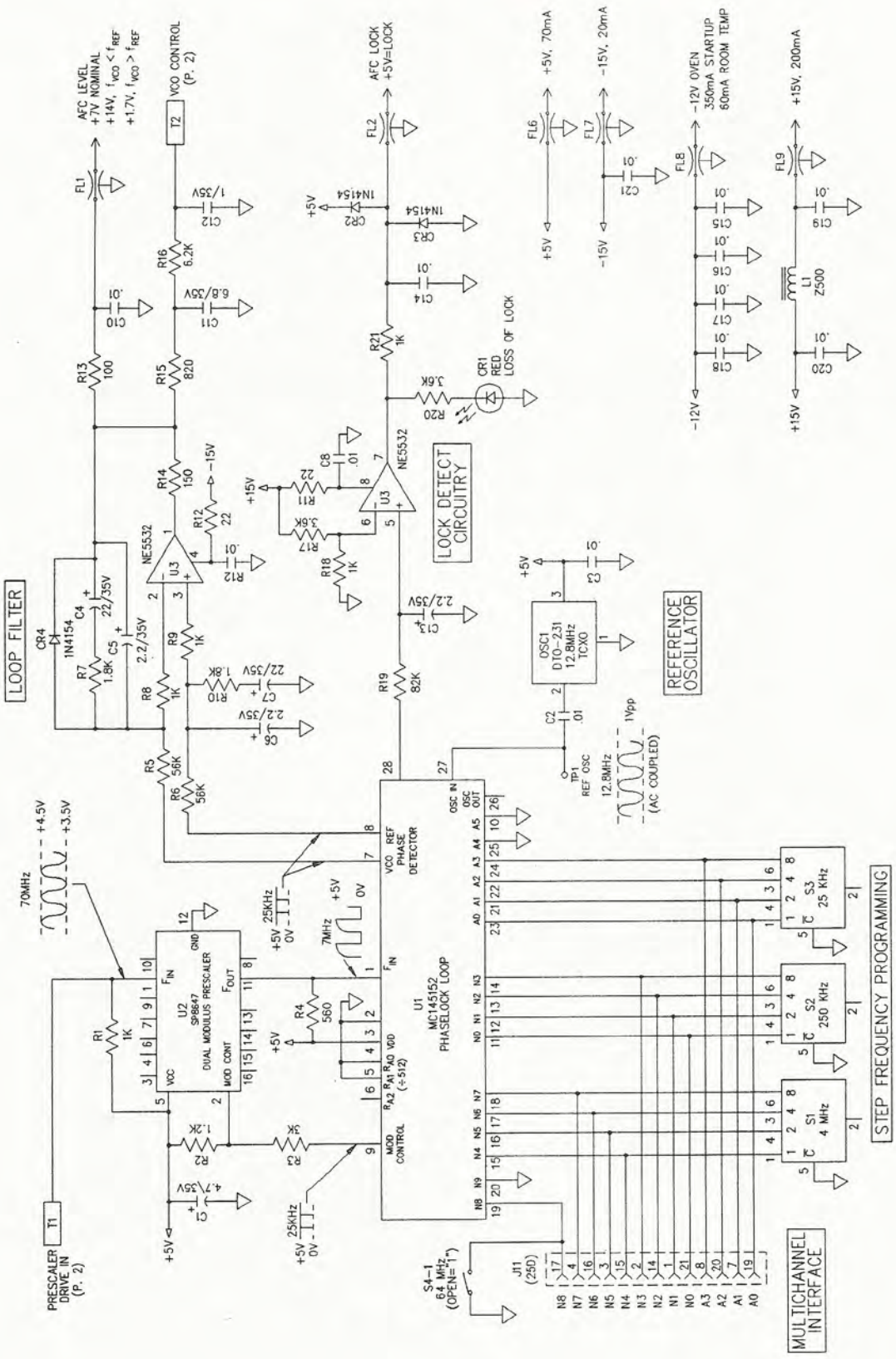
Transmitter Audio/Power Supply Schematic, p. 2 of 3



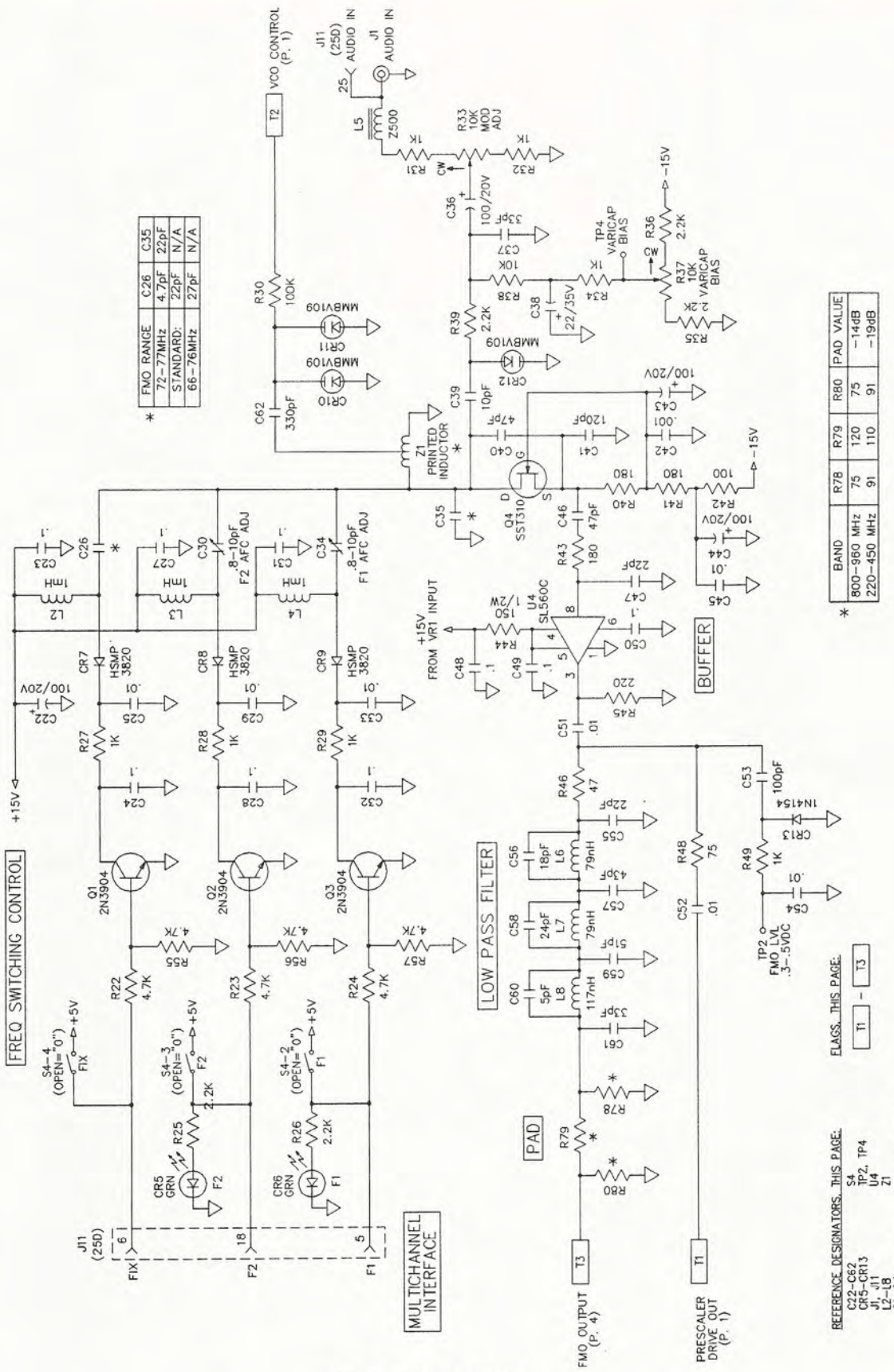
91D7444 Rev A
Transmitter Audio/Power Supply Schematic, p. 3 of 3



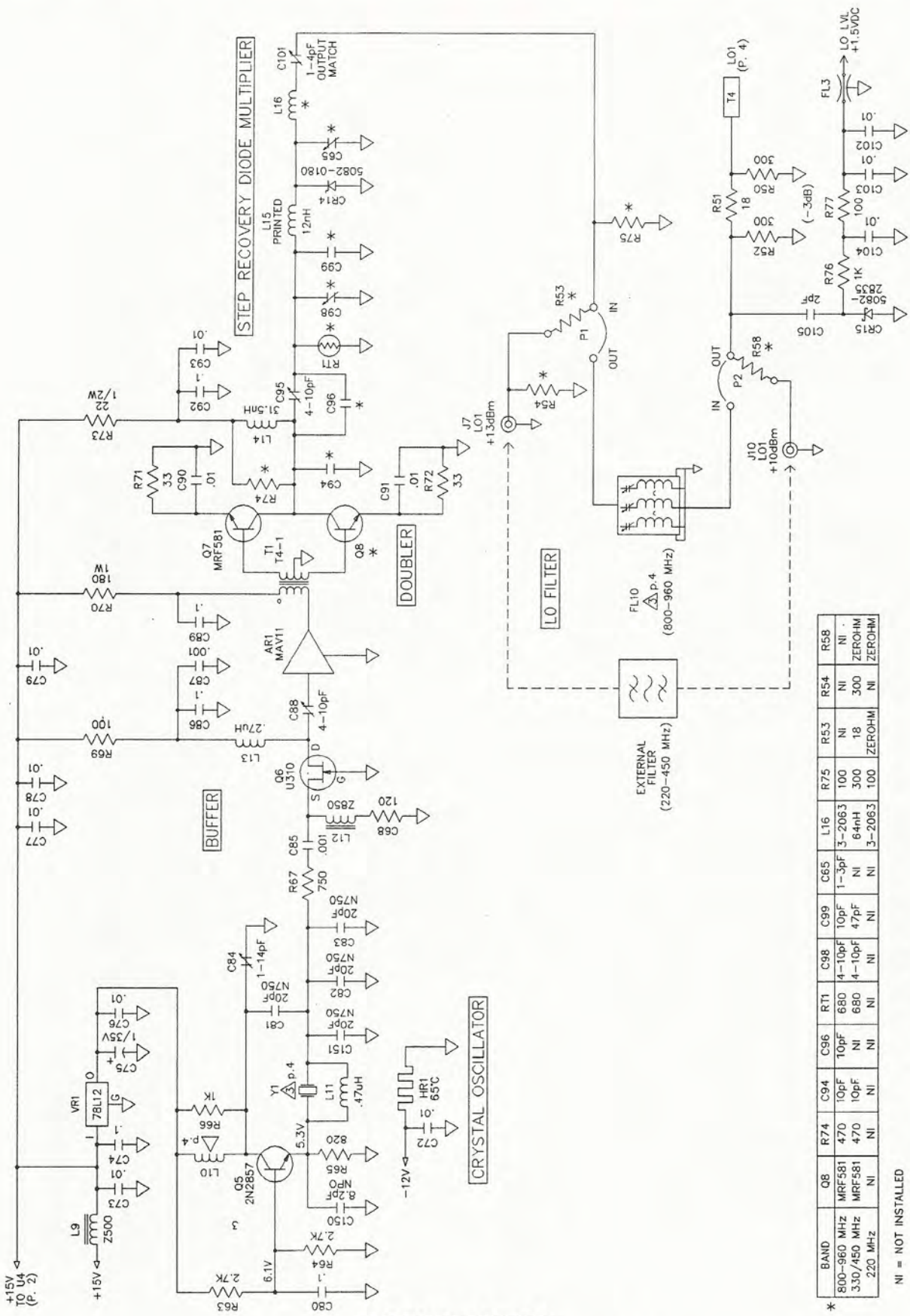
20D3023 Rev A
Transmitter Audio/Power Supply Assembly



600-10227-01 REV A
Transmitter RF Module Schematic, p. 1 of 4



600-10227-01 REV A
Transmitter RF Module Schematic, p. 2 of 4



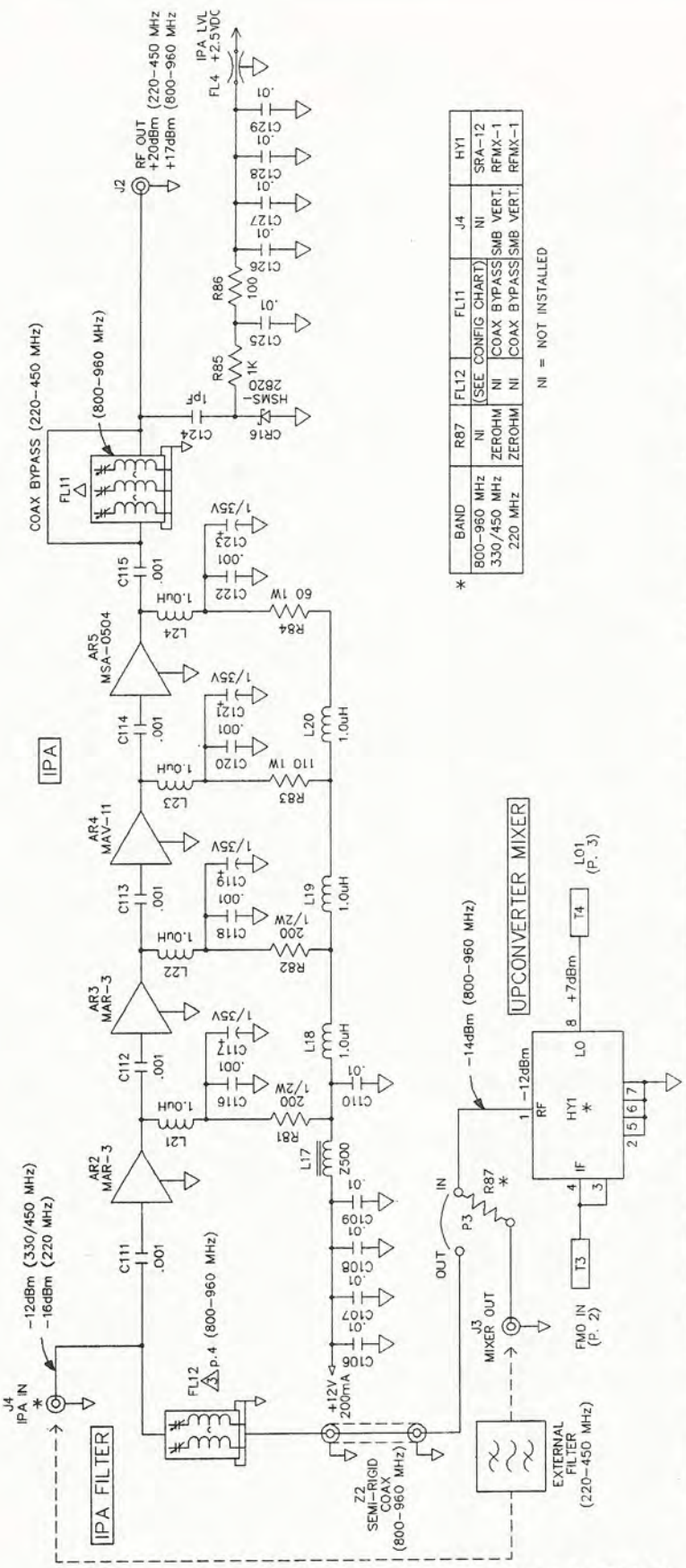
BAND	Q8	R74	C94	C96	RT1	C98	C99	C65	L16	R75	R53	R54	R58
800–960 MHz	MRF581	470	10pF	10pF	680	4–10pF	10pF	1–3pF	3–2063	100	NI	NI	NI
330/450 MHz	MRF581	470	10pF	NI	680	4–10pF	47pF	NI	64nH	300	18	300	ZEROHM
220 MHz	NI	NI	NI	NI	NI	NI	NI	NI	3–2063	100	ZEROHM	NI	ZEROHM

* NI = NOT INSTALLED

REFERENCE DESIGNATORS THIS PAGE:
AR1
C72–C95, C98, C99, C101–C105, C150, C151
CR14, CR15
FL3
HR1
J7, J10
L9–L16
T1, P2

FLAGS THIS PAGE:
T4
Q5–Q8
R50–R54, R63–R77
RT1
T1
VR1
Y1

600-10227-01 REV A
Transmitter RF Module Schematic, p. 3 of 4



* NI = NOT INSTALLED

BAND	R87	FL12	FL11		J4	HY1
800–960 MHz	NI	(SEE CHART)	CONFIG CHART		NI	SRA–12
330/450 MHz	ZEROHM	NI	COAX BYPASS	SMB VERT.		RFMX–1
220 MHz	ZEROHM	NI	COAX BYPASS	SMB VERT.		RFMX–1

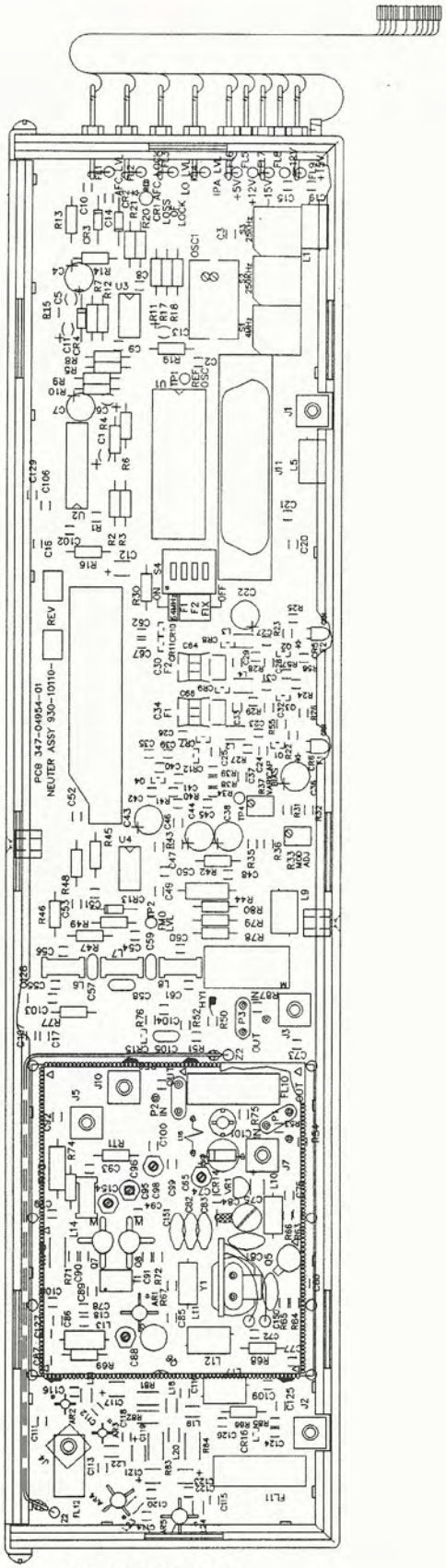
CONFIGURATION	CARRIER MHz	LO MHz	Y1 MHz	FMO MHz	L10	FL10	FL11	FL12
950 MHz BAND STANDARD:	940–960	1020	102.000	60–80	.10uH	1271	1259	2737
	920–940	1000	100.000	60–80	.10uH	1271	1259	2737
	910–920	980	98.000	60–80	.10uH	1259	1259	2737
	900–910	980	98.000	60–80	.10uH	1259	1278	2737
	880–900	960	96.000	60–80	.15uH	1259	1278	2737
	860–880	940	94.000	60–80	.15uH	1259	1278	2737
	840–860	920	92.000	60–80	.15uH	1259	1328	2774
1.7 GHz BAND STANDARD:	840–860	920	92.000	60–80	.15uH	1259	1328	2774
	820–840	900	90.000	60–80	.15uH	1278	1328	2774
	800–820	880	88.000	60–80	.15uH	1278	1328	2774
	780–800	860	86.000	60–80	.15uH	—	—	—
	760–780	840	84.000	60–80	.15uH	—	—	—
	740–760	820	82.000	60–80	.15uH	—	—	—

CONFIGURATION	CARRIER MHz	LO MHz	Y1 MHz	FMO MHz	L10
220 MHz BAND STANDARD:	215–222	282	94.000	60–67	.15uH
	222–230	291	97.000	61–69	.10uH
	230–237	300	100.000	63–70	.10uH
	237–247	311	103.667	63–74	.10uH
330 MHz BAND STANDARD:	300–310	372	93.000	62–72	.15uH
	310–320	385	96.250	65–75	.10uH
	320–330	392	98.000	62–72	.10uH
450 MHz BAND STANDARD:	440–450	372	93.000	68–78	.15uH
	450–460	385	96.250	65–75	.10uH
	460–470	392	98.000	68–78	.10uH

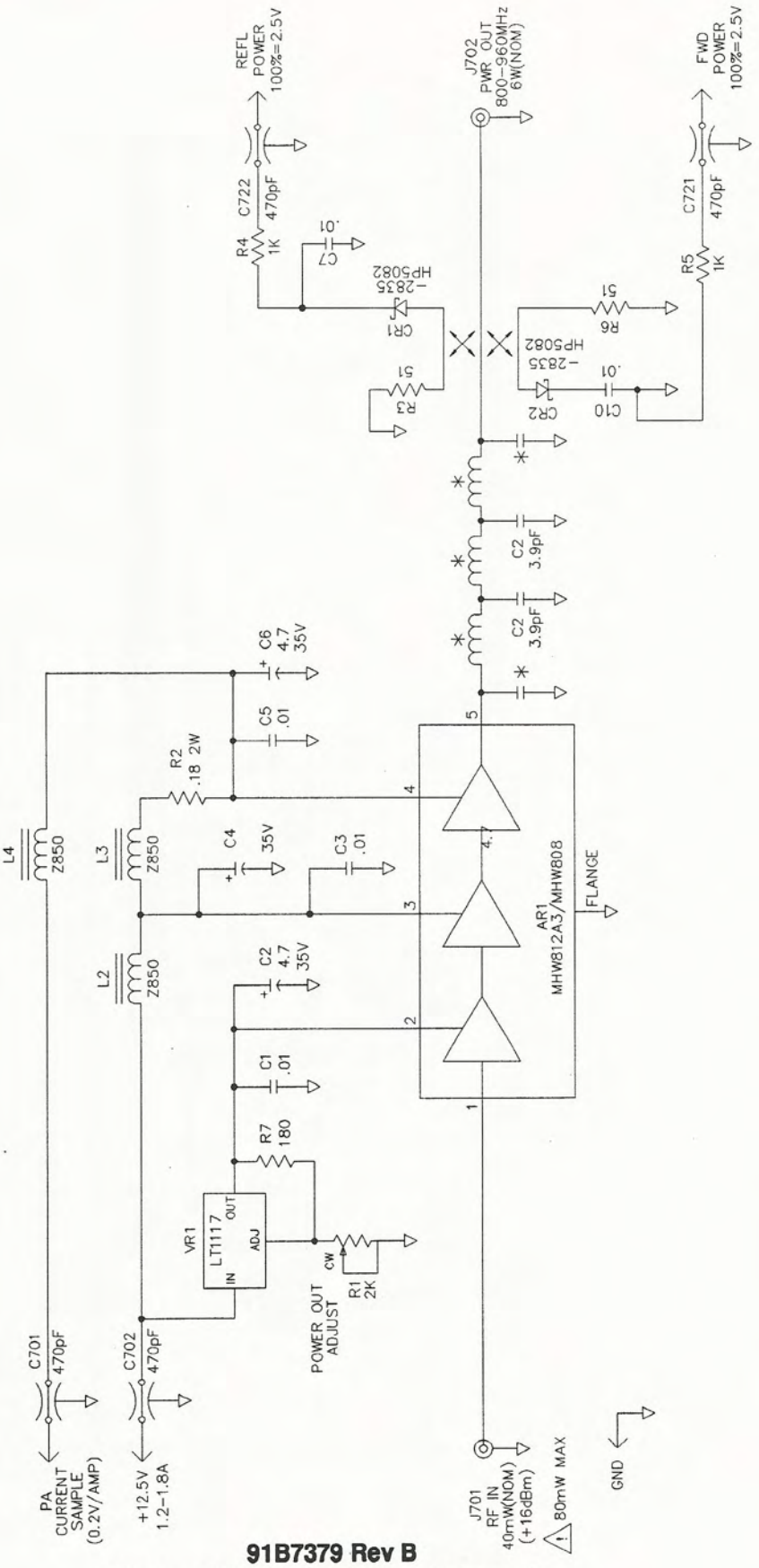
FLAGS THIS PAGE: T3, T4

REFERENCE DESIGNATORS THIS PAGE:
AR2–AR5
C106–C129
CR16
FL4, FL11, FL12
HY1
J2–J4
L17–24
P3
R81–R87
Z2

600-10227-01 REV A
Transmitter RF Module Schematic, p. 4 of 4



20B3106 Rev B
Transmitter RF Module Assembly

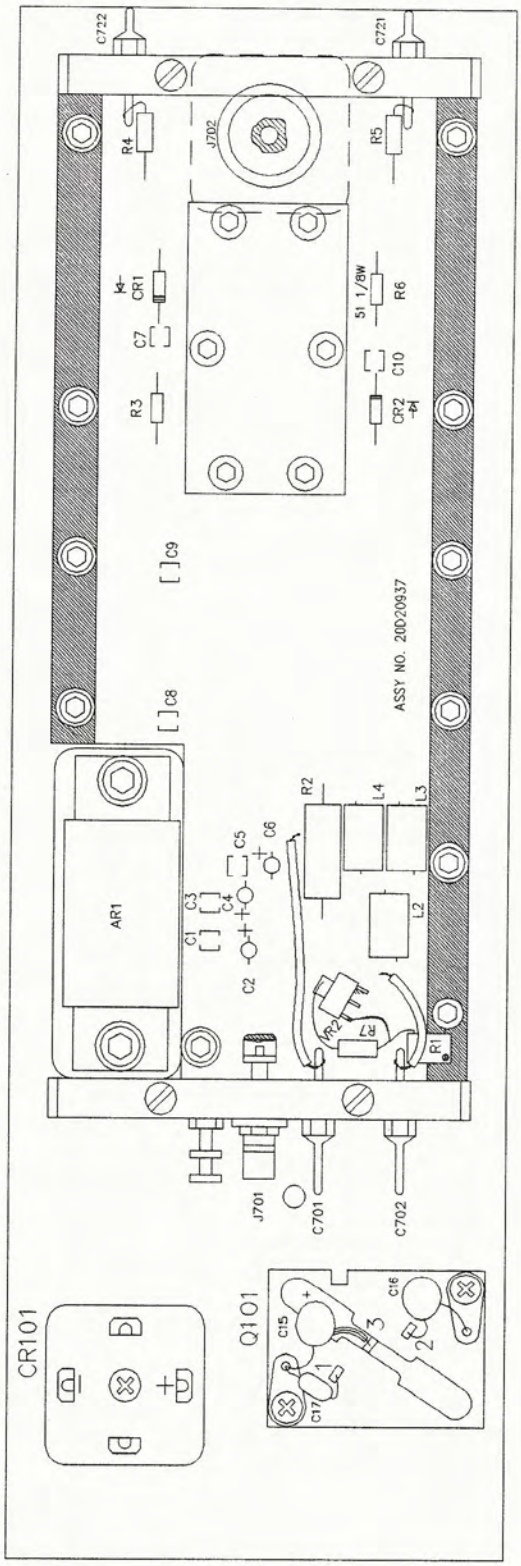


91B7379 Rev B

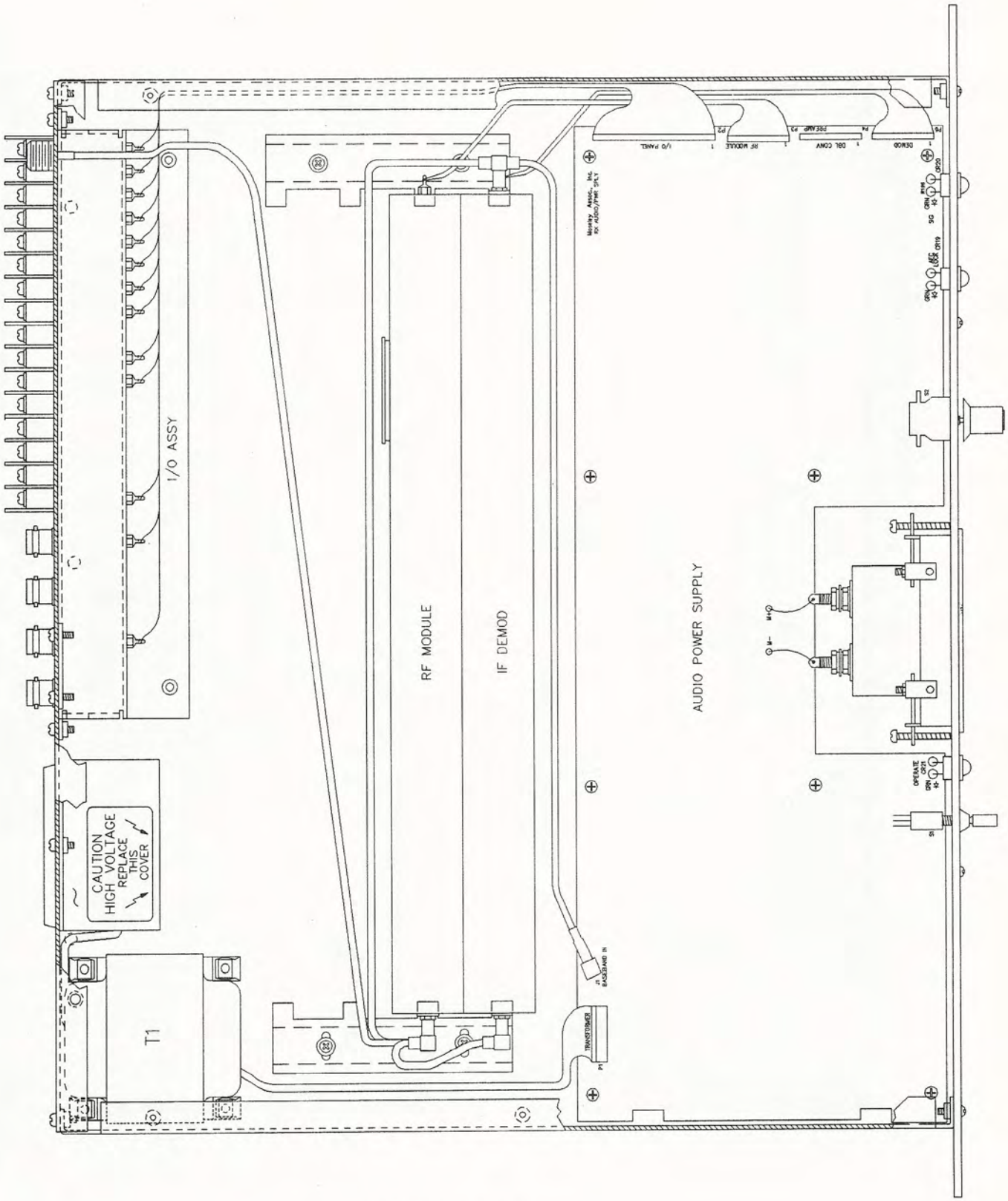
RF Amplifier (950 MHz, 6w) Schematic

NOTES: UNLESS OTHERWISE SPECIFIED

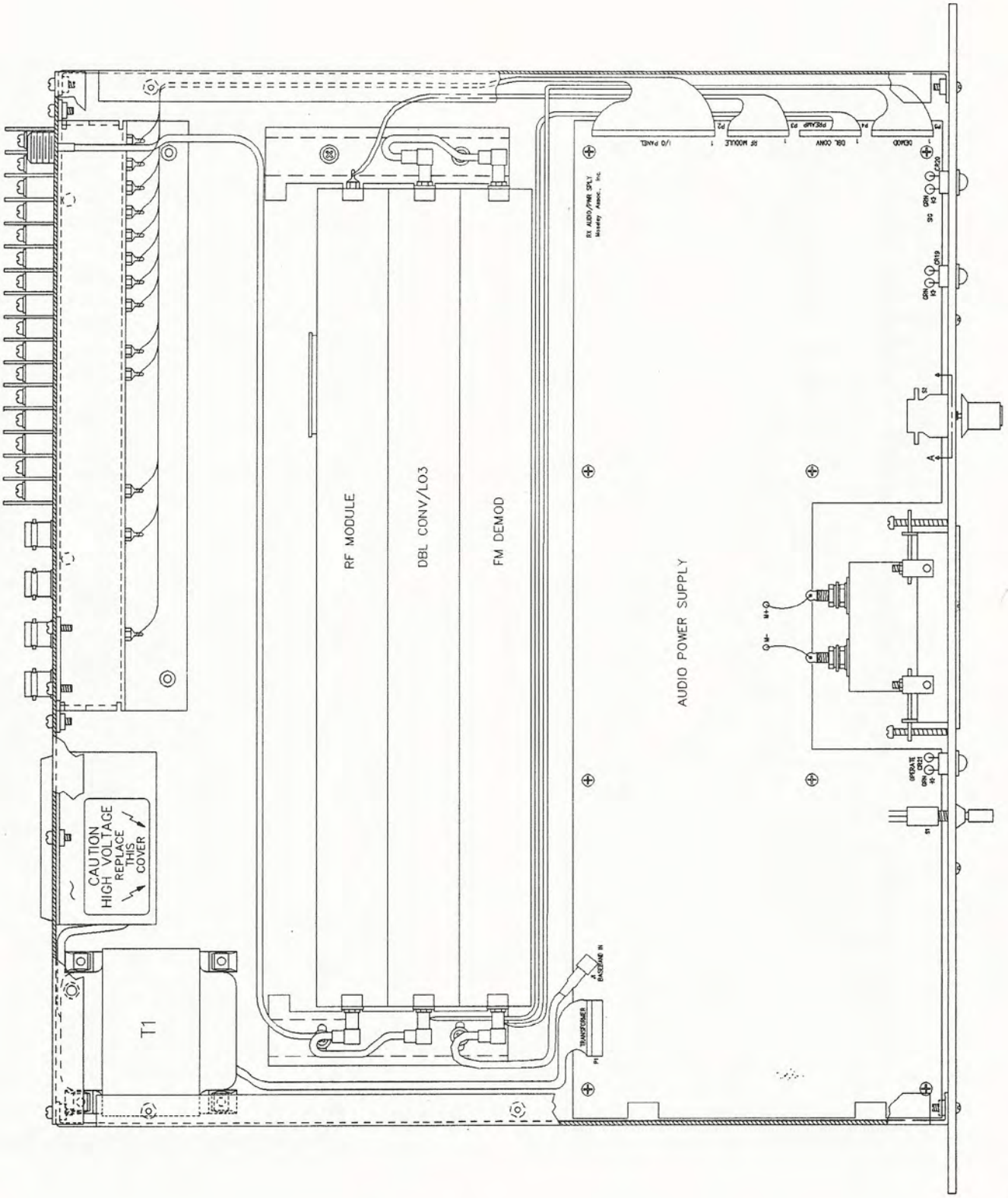
1. RESISTOR VALUES ARE IN OHMS, 1/4W, 5%. CAPACITORS VALUES ARE IN MICROFARADS.
2. * INDICATES PRINTED CIRCUIT ELEMENTS.



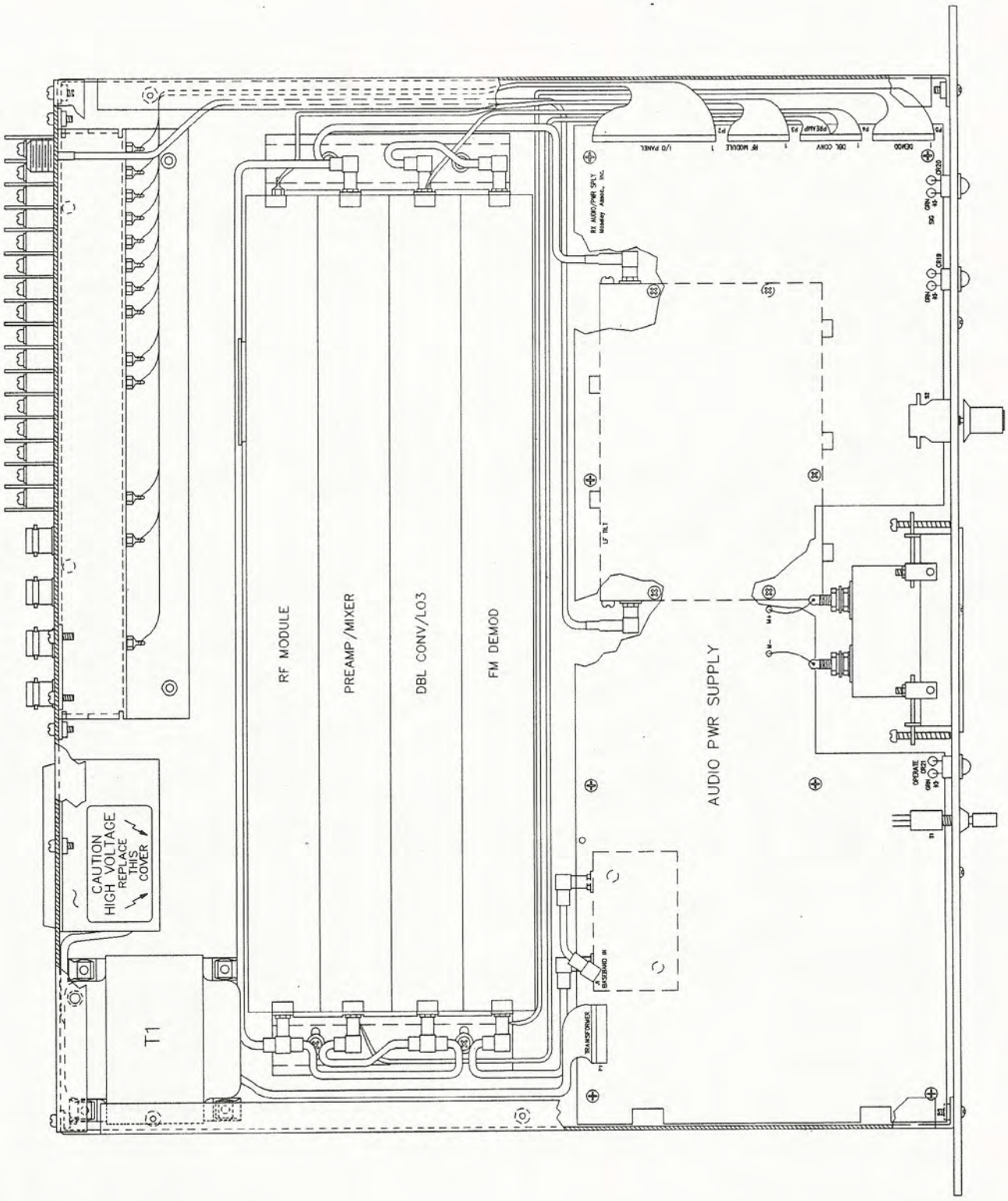
20D2937-3 Rev L
RF Amplifier (950 MHz,6w) Assembly



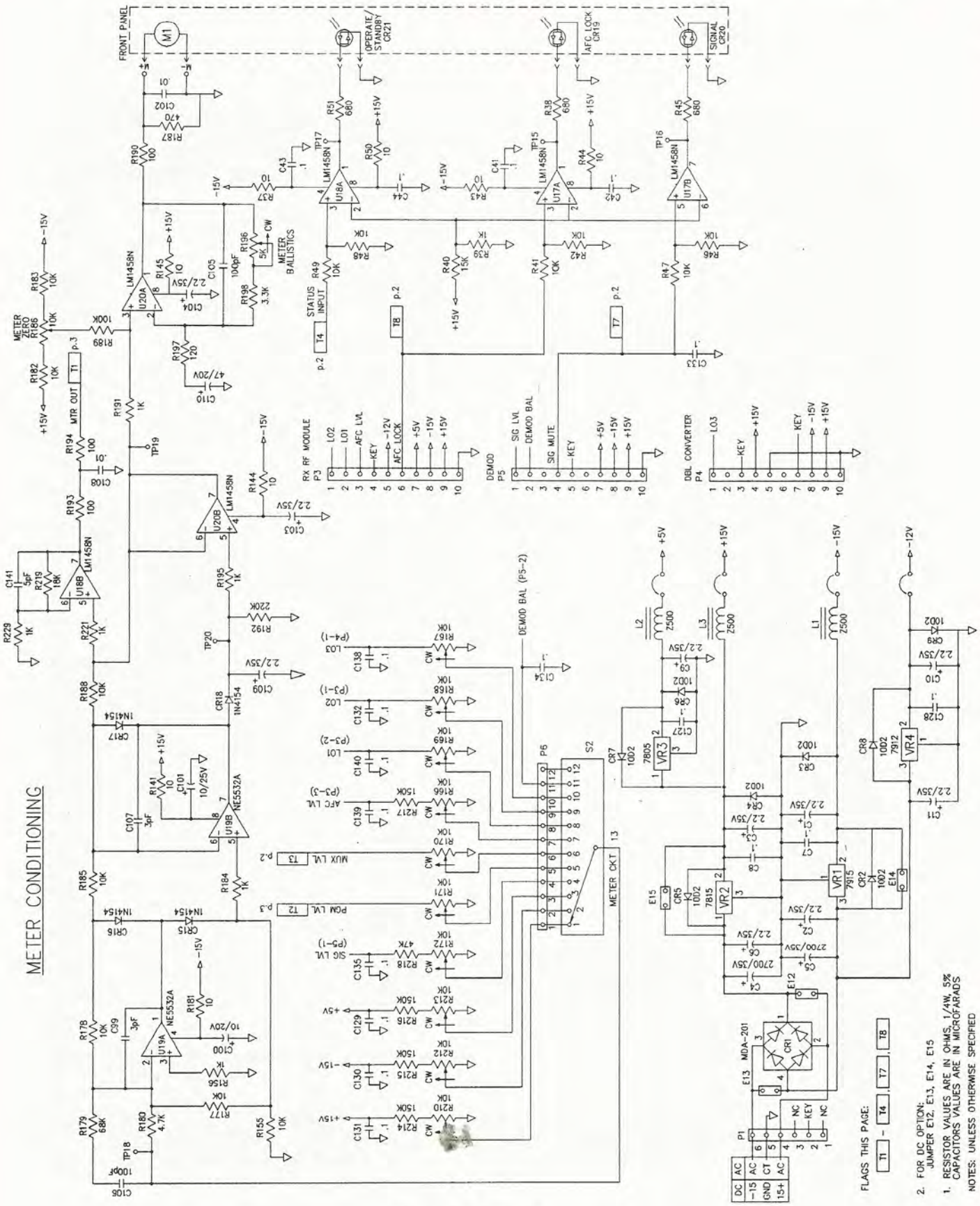
21D2891-1 Rev D
6020 Receiver Final Assembly



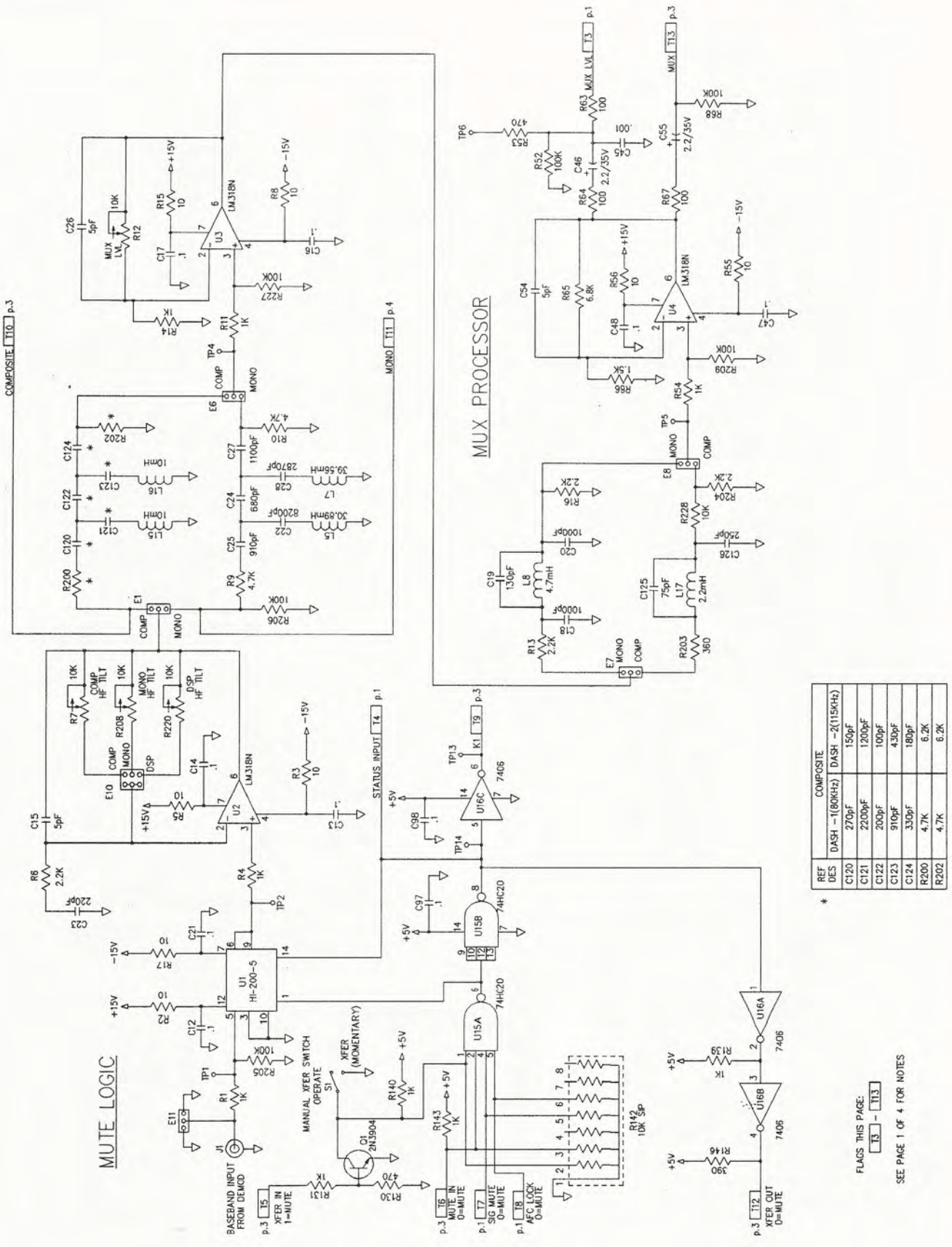
21D2692-1 Rev D
6030 Receiver Final Assembly



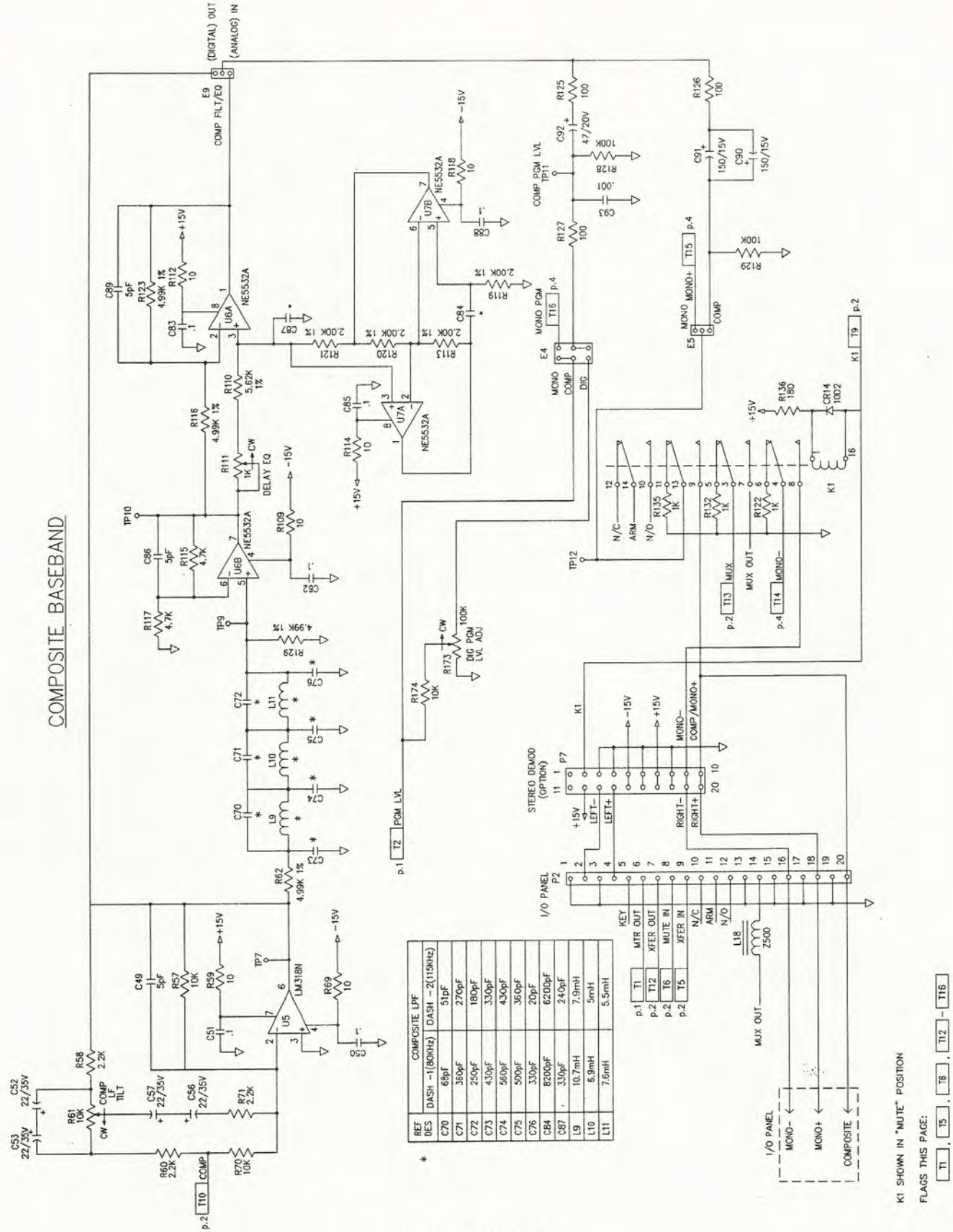
21D2915 Rev D
6060 Receiver Final Assembly



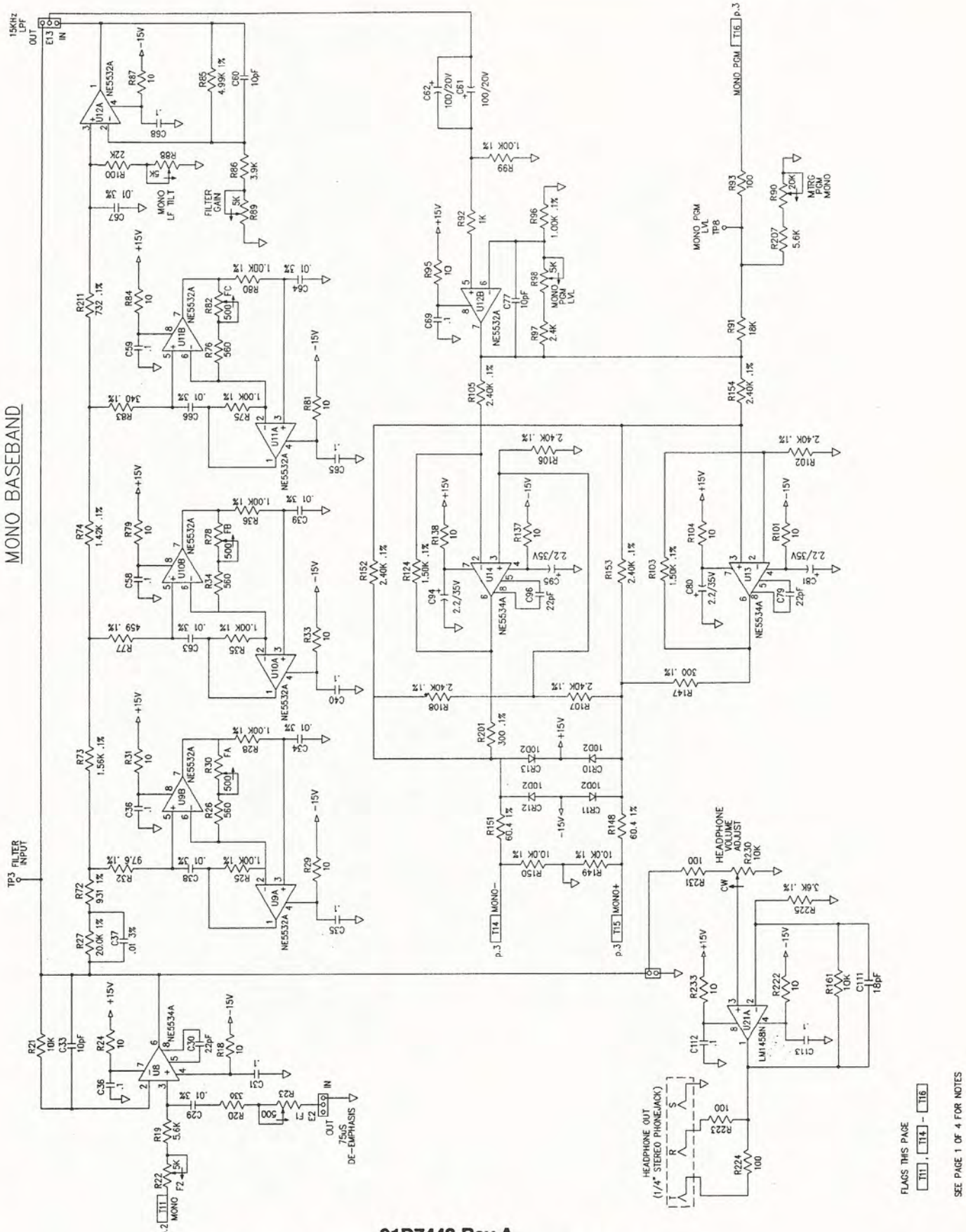
91D7443 Rev A
Receiver Audio/Power Supply Schematic, p. 1 of 4



91D7443 Rev A
Receiver Audio/Power Supply Schematic, p. 2 of 4

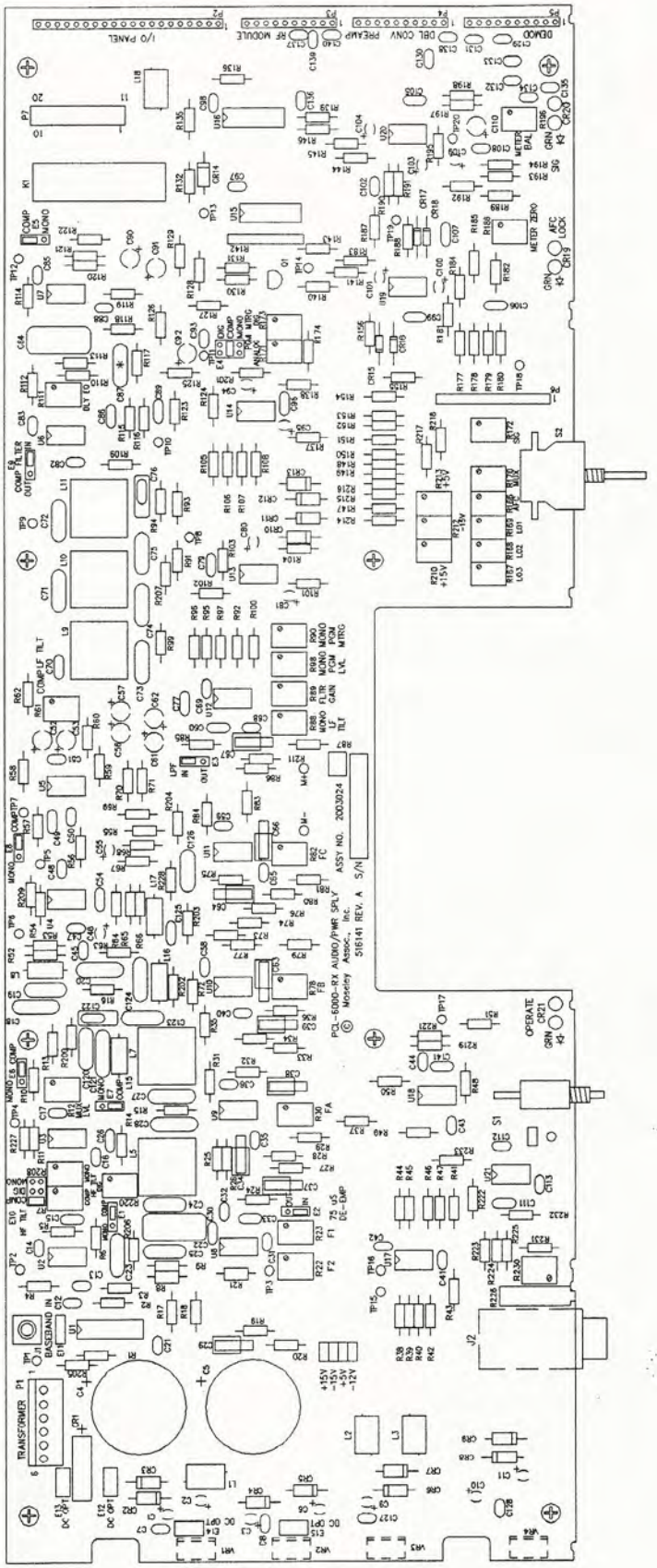


91D7443 Rev A
Receiver Audio/Power Supply Schematic, p. 3 of 4

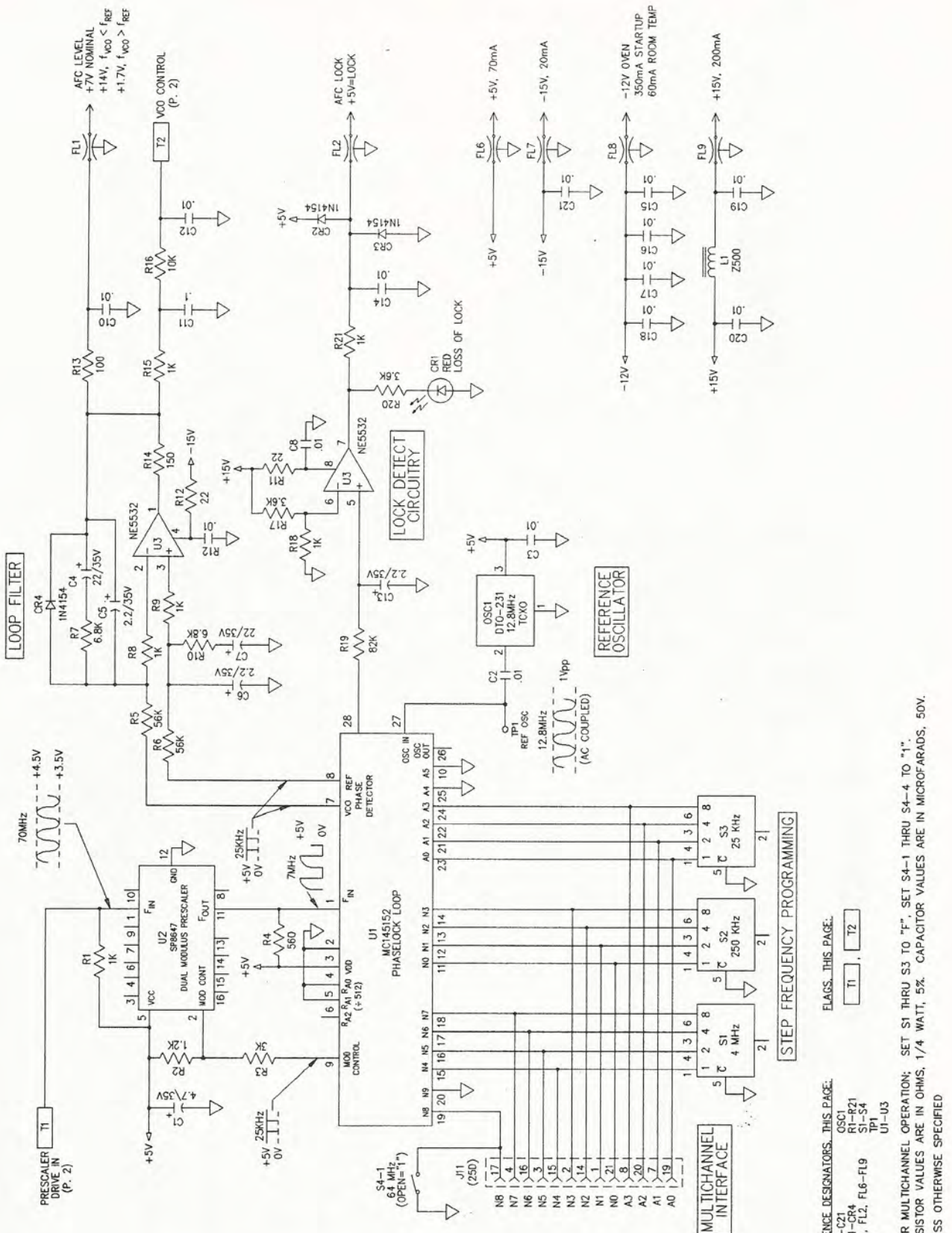


91D7443 Rev A

Receiver Audio/Power Supply Schematic, p. 4 of 4



20D3024 Rev A
Receiver Audio/Power Supply Assembly



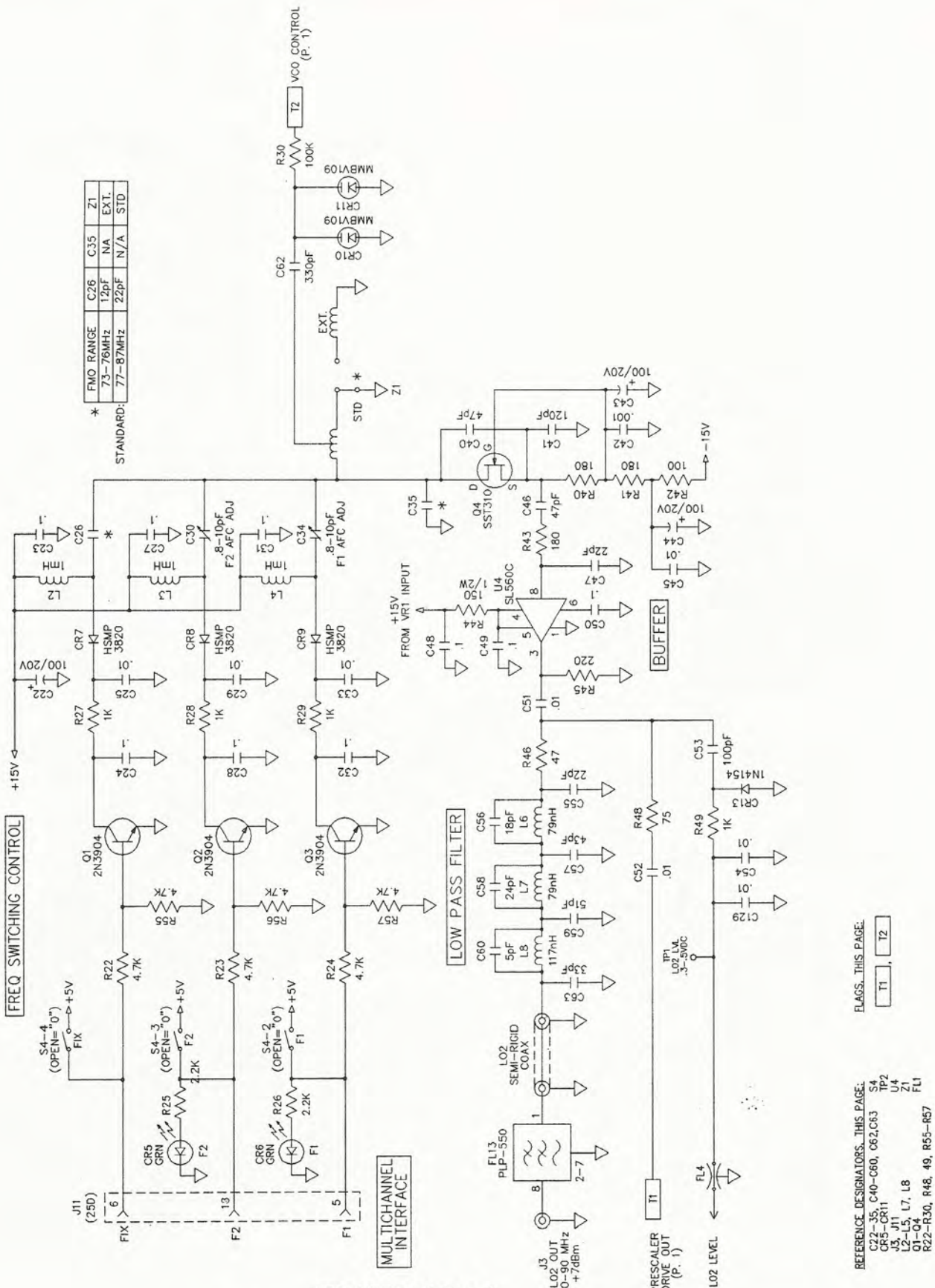
REFERENCE DESIGNATORS, THIS PAGE:
C1–C21, CR1–CR4, FL1, FL2, FL6–FL9, J11, L1, OSC1, R1–R21, S1–S4, TP1, U1–U3

FLAGS, THIS PAGE: T1, T2

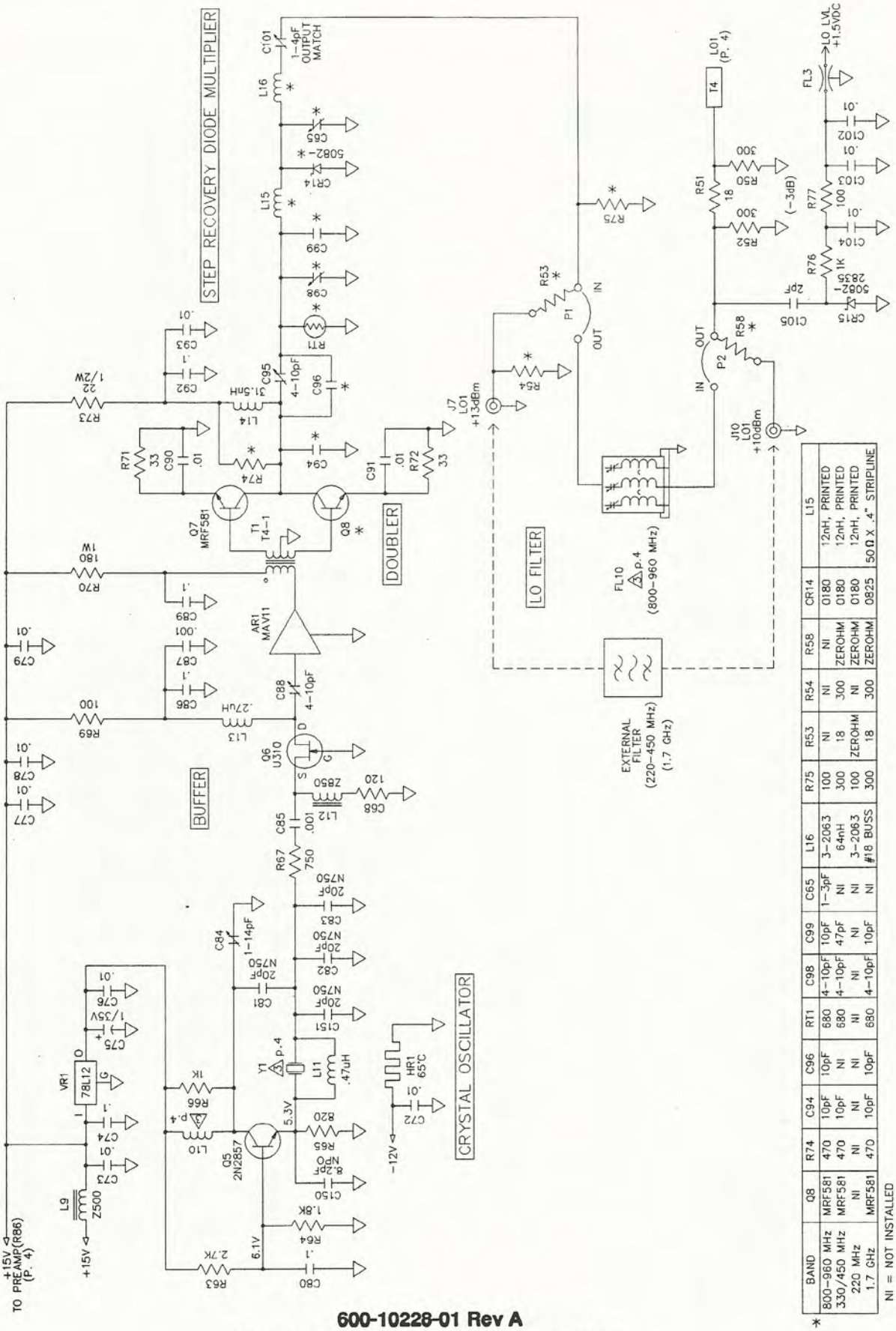
2. FOR MULTICHANNEL OPERATION; SET S1 THRU S3 TO "F", SET S4–1 THRU S4–4 TO "1".
1. RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%. CAPACITOR VALUES ARE IN MICROFARADS, 50V.

NOTES: UNLESS OTHERWISE SPECIFIED

600-10228-01 Rev A
Receiver RF Module Schematic, p. 1 of 4



600-10228-01 Rev A
Receiver RF Module Schematic, p. 2 of 4



BAND	Q8	R74	C94	C96	RT1	C98	C99	C65	L16	R75	R53	R54	R58	CR14	L15
800–960 MHz	MRF581	470	10pF	10pF	680	4–10pF	10pF	1–3pF	3–2063	100	NI	NI	NI	0180	12nH, PRINTED
330/450 MHz	MRF581	470	10pF	NI	680	4–10pF	47pF	NI	64nH	300	18	300	ZEROHM	0180	12nH, PRINTED
220 MHz	NI	NI	NI	NI	NI	NI	NI	NI	3–2063	100	ZEROHM	NI	ZEROHM	0180	12nH, PRINTED
1.7 GHz	MRF581	470	10pF	10pF	680	4–10pF	10pF	NI	#18 BUSS	300	18	300	ZEROHM	0825	50Ω X .4" STRIPLINE

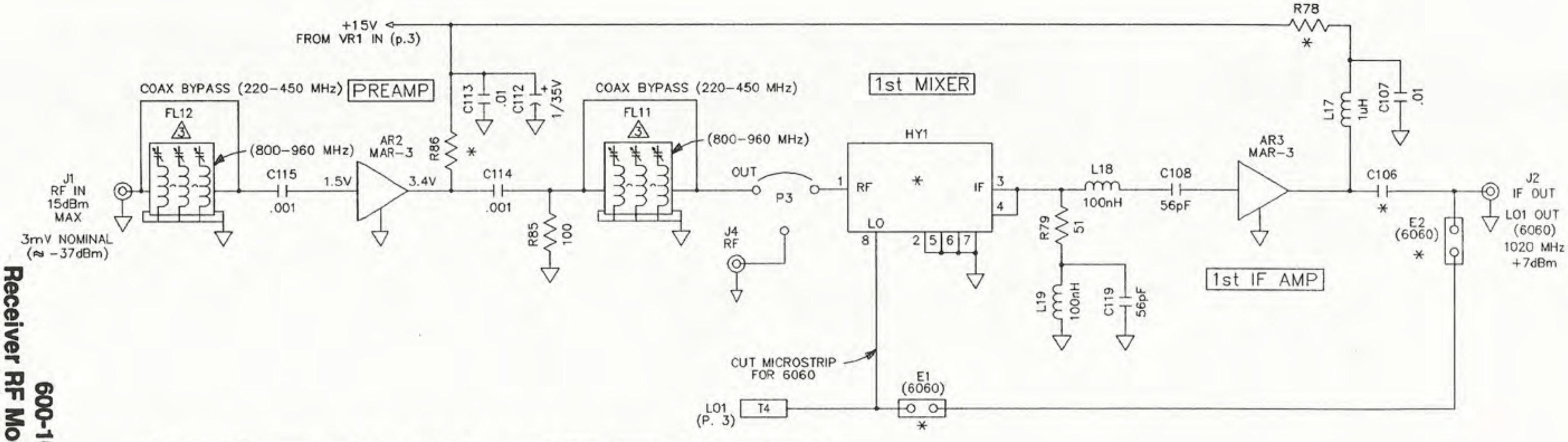
NI = NOT INSTALLED

*

REFERENCE DESIGNATORS, THIS PAGE:
AR1
C72–C95, C98, C99, C101–C105, C150, C151
CR14, CR15
FL3
HR1
J7, J10
L9–L16
P1, P2
Q5–Q8
R50–R54, R63–R77
RT1
T1
VR1
Y1

FLAGS, THIS PAGE: T4

600-10228-01 Rev A
Receiver RF Module Schematic, p. 3 of 4



*

BAND	HY1	R86	R78	C106	FL12	FL11	E1	E2
6020/6030 950 MHz	SRA12	470	360	.01	(SEE CONFIG CHART)		NI	NI
6060 950 MHz	N/A	NI	NI	NI	NA		JUMPER	JUMPER
330/450 MHz	RFMX1	470	360	.01	COAX BYPASS		NI	NI
220 MHz	RFMX1	470	360	.01	COAX BYPASS		NI	NI
1.7GHz	RFMX1	470	360	.01	COAX BYPASS		NI	NI

NI = NOT INSTALLED

△3

CONFIGURATION		CARRIER MHz	LO MHz	Y1 MHz	L10	FL10	FL11	FL12
950 MHz BAND	STANDARD:	940–960	1020	102.000	.10uH	1271	1259	2737
		920–940	1000	100.000	.10uH	1271	1259	2737
		910–920	980	98.000	.10uH	1259	1259	2737
		900–910	980	98.000	.10uH	1259	1278	2737
		880–900	960	96.000	.15uH	1259	1278	2737
		860–880	940	94.000	.15uH	1259	1278	2737
		840–860	920	92.000	.15uH	1259	1328	2774
1.7 GHz BAND	STANDARD:	840–860	920	92.000	.15uH	1259	1328	2774
		820–840	900	90.000	.15uH	1278	1328	2774
		800–820	880	88.000	.15uH	1278	1328	2774
		780–800	860	86.000	.15uH	—	—	—
		760–780	840	84.000	.15uH	—	—	—
		740–760	820	82.000	.15uH	—	—	—

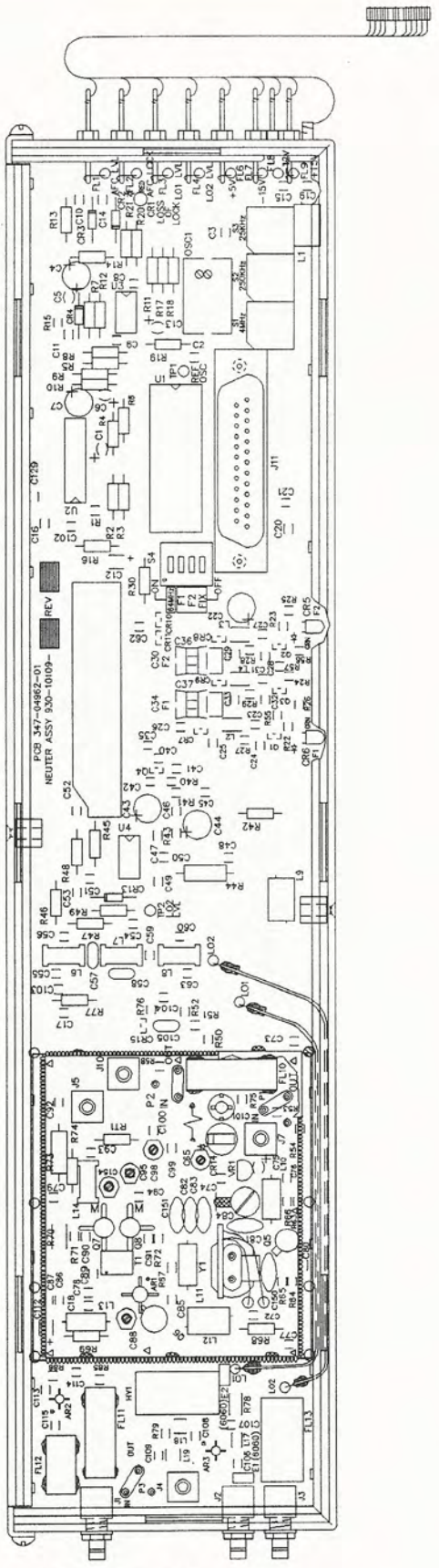
△3

CONFIGURATION		CARRIER MHz	LO MHz	Y1 MHz	L10
220 MHz BAND	STANDARD:	215–222	282	94.000	.15uH
		222–230	291	97.000	.10uH
		230–237	300	100.000	.10uH
		237–247	311	103.667	.10uH
330 MHz BAND	STANDARD:	300–310	372	93.000	.15uH
		310–320	385	96.250	.10uH
		320–330	392	98.000	.10uH
450 MHz BAND	STANDARD:	440–450	372	93.000	.15uH
		450–460	385	96.250	.10uH
		460–470	392	98.000	.10uH

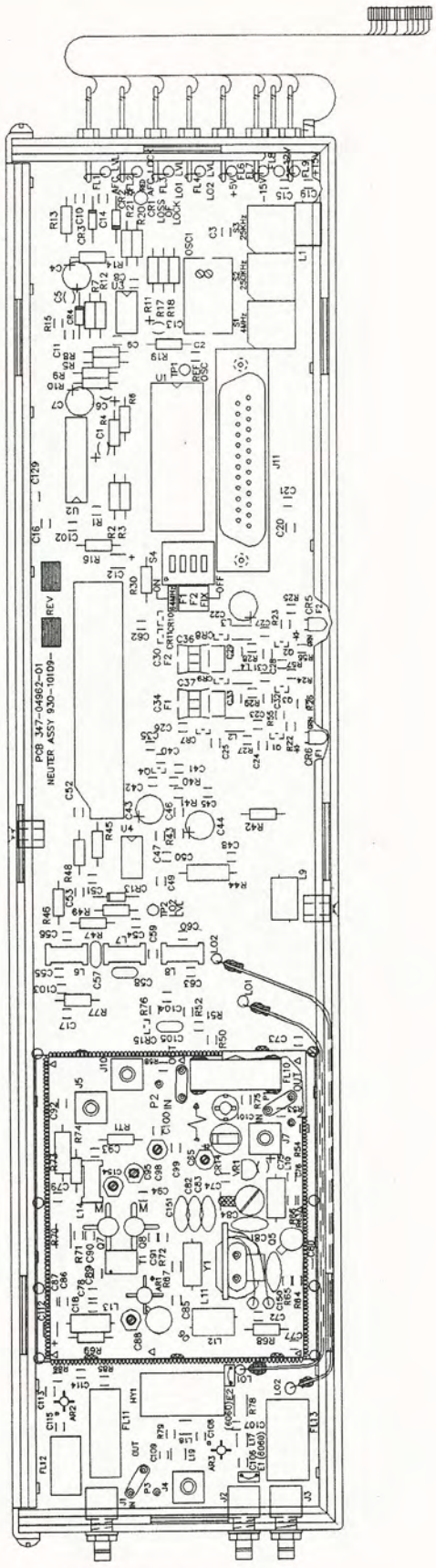
REFERENCE DESIGNATORS, THIS PAGE:
AR2, AR3
C106–C109, C112–C115
E1, E2
FL11, FL12
HY1
J1, J2, J4
L17–L19
P3
R78, R79, R85, R86
Z2

FLAGS, THIS PAGE:
T4

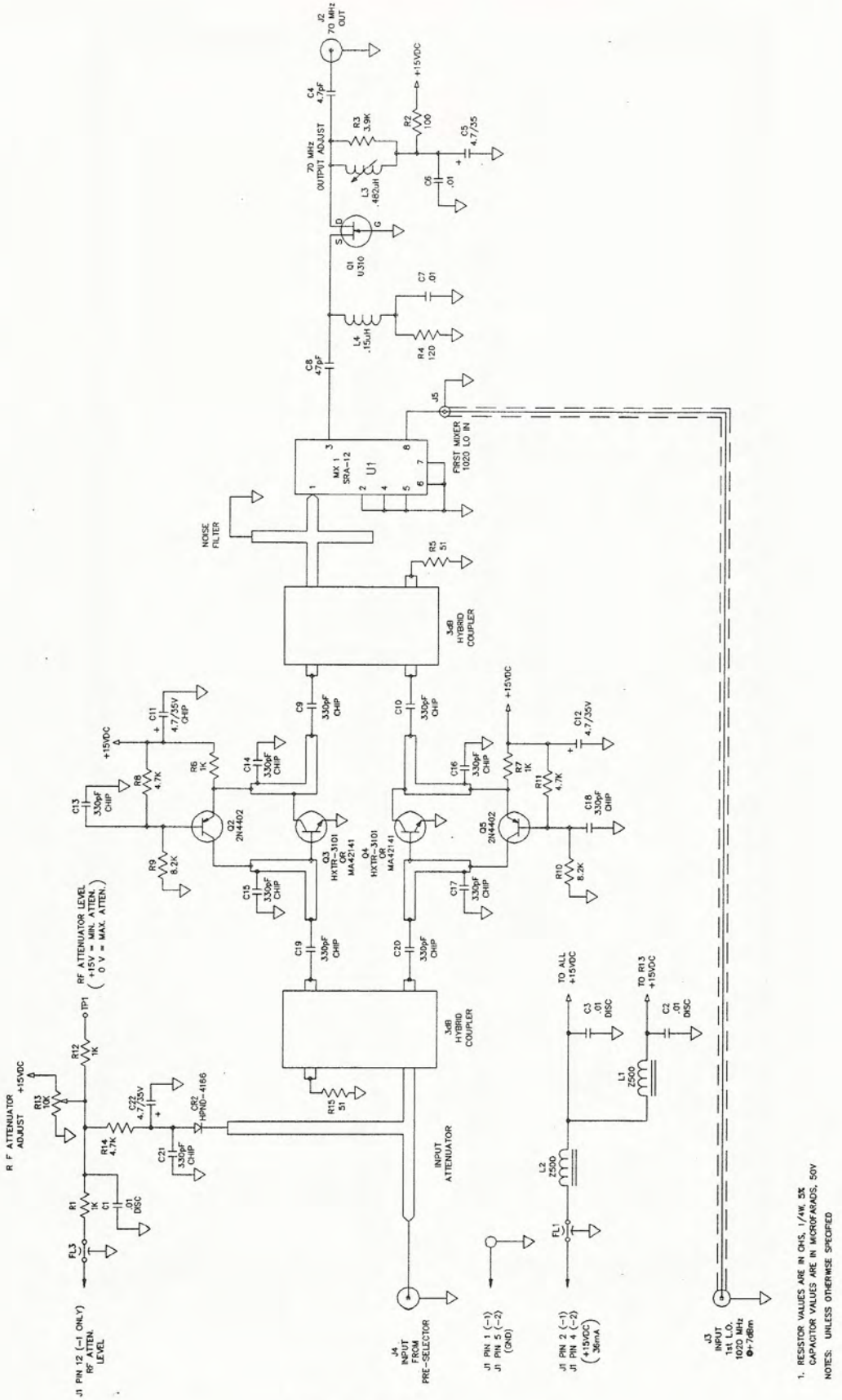
600-10228-01 Rev A
Receiver RF Module Schematic, p. 4 of 4



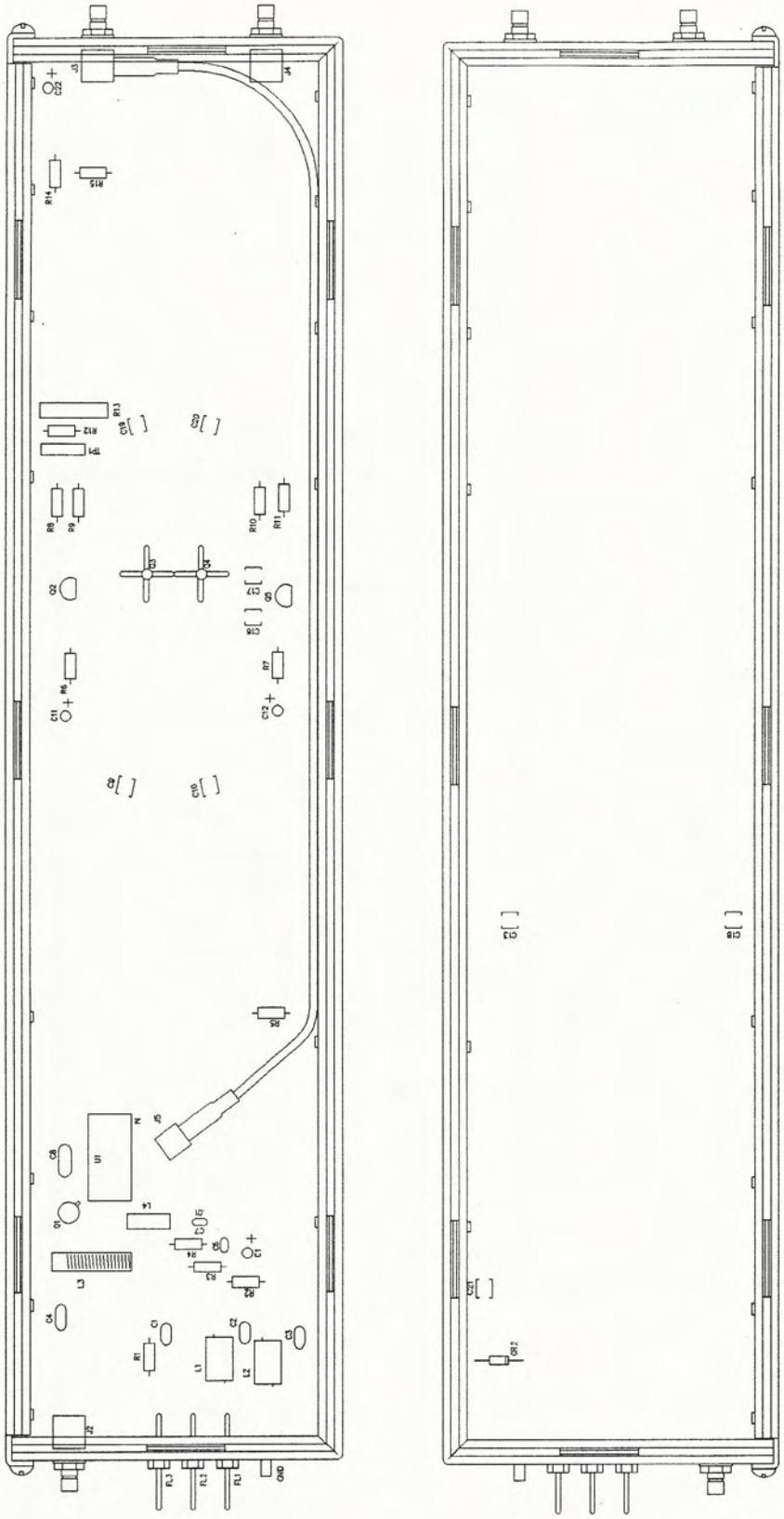
20B3107-1 Rev B
Receiver RF Module (6020/6030) Assembly



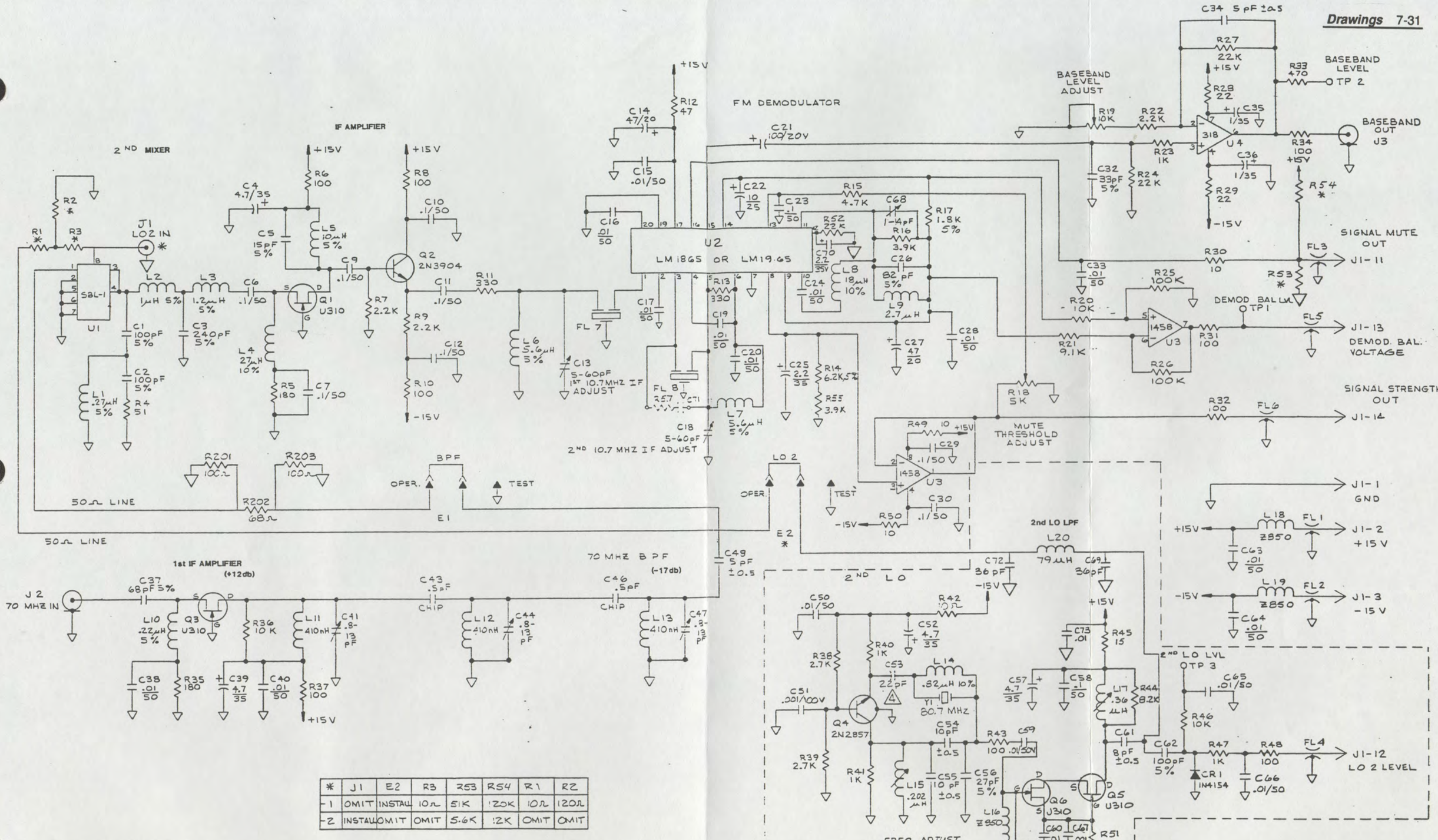
20B3107-5 Rev B
Receiver RF Module (6060) Assembly



91D7274-2 Rev J
Preamp/1st Mixer (6060) Schematic



20D2827 Rev P
Preamp/1st Mixer (6060) Assembly

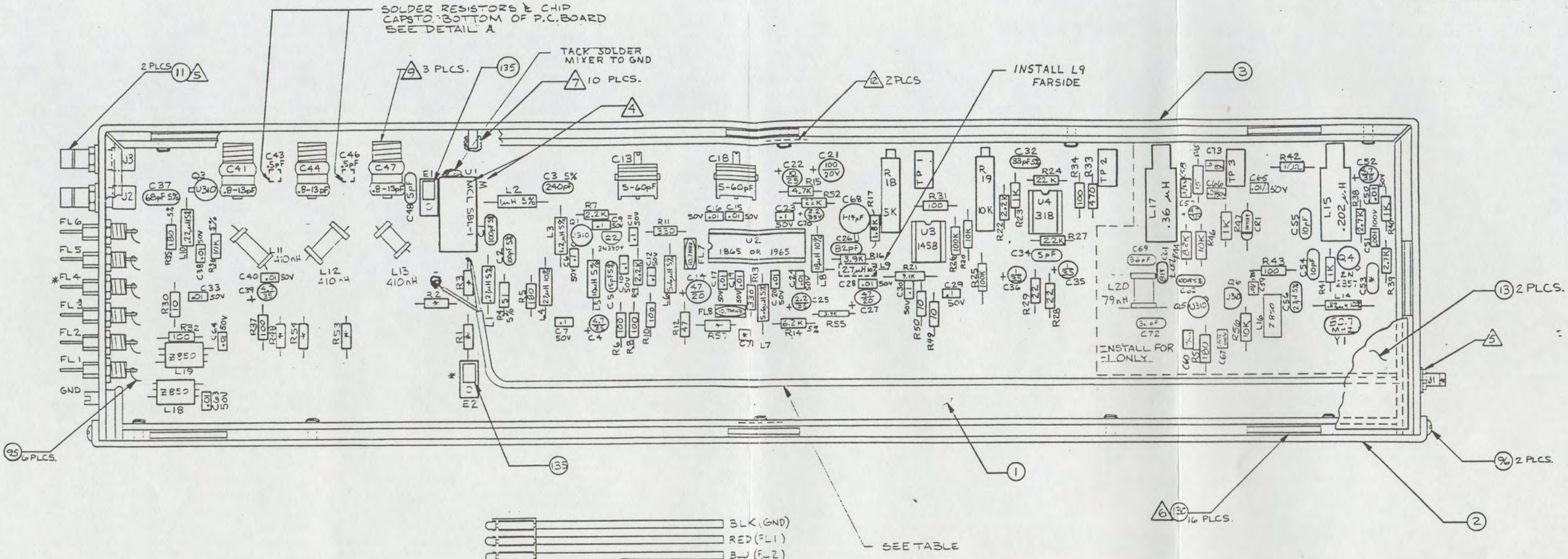


*	J1	E2	R3	R53	R54	R1	R2
-1	OMIT	INSTALL	10Ω	51K	120K	10Ω	120Ω
-2	INSTALL	OMIT	OMIT	5.6K	12K	OMIT	OMIT

4. C53, R57 & C71 SELECT IN TEST IF NECESSARY
3. COMPONENT LAYOUT: 20D2941
2. P.C. BOAD: 51D6045
1. RESISTOR VALUES ARE IN OHMS, 1/4W, 5 %
   CAPACITOR VALUES ARE IN MICROFARADS

NOTES: UNLESS OTHERWISE SPECIFIED.

91D7375-Rev 7
IF Demod (6020)
Schematic



DETAIL A

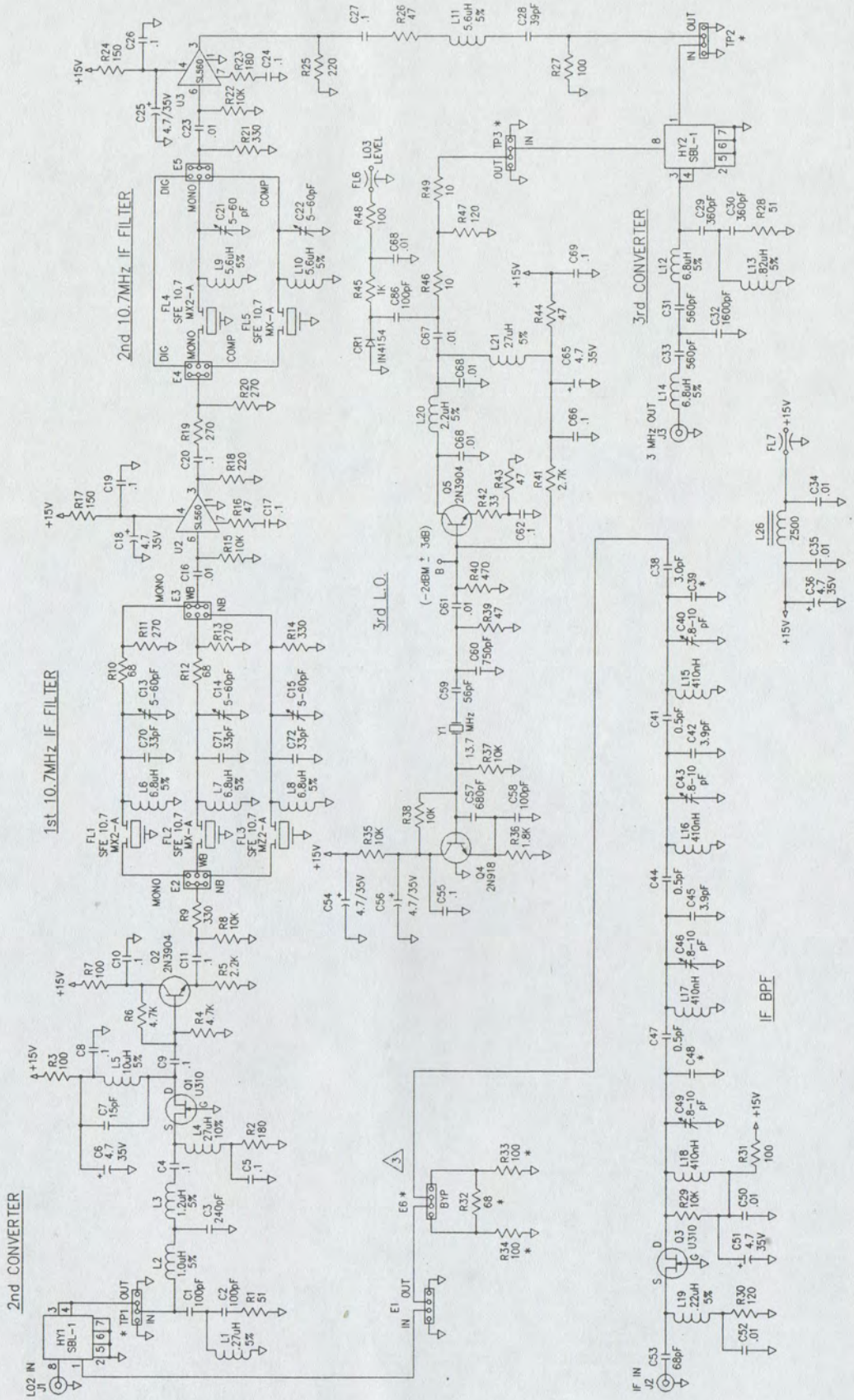
9. REMOVE CAPACITOR COVER, 3 PLACES.
8. FOR HARNESS (PCL-6020) REFERENCE MATRING., 20D2874 SHT 3 OF 3
7. SOLDER PINS TO TOP SIDE OF PC BD, 10 PLACES.
6. INSTALL CLIP (ITEM130) AS SHOWN, 8 PLACES (TOP & BOTTOM).
5. MOUNTING NUTS FOR J1, J2 & J3 MUST BE INSTALLED WITH A TORQUE WRENCH SET AT 3 IN-LBS.
4. "M" ON SILKSCREEN AND COMPONENT INDICATES POLARITY OF PART.
3. PC BD: 51D6045
2. SCHEMATIC: 91D7375
1. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE IN OHMS, 1/4 W, 5 %
   CAPACITOR VALUES ARE IN MICROFARADS

NOTES:

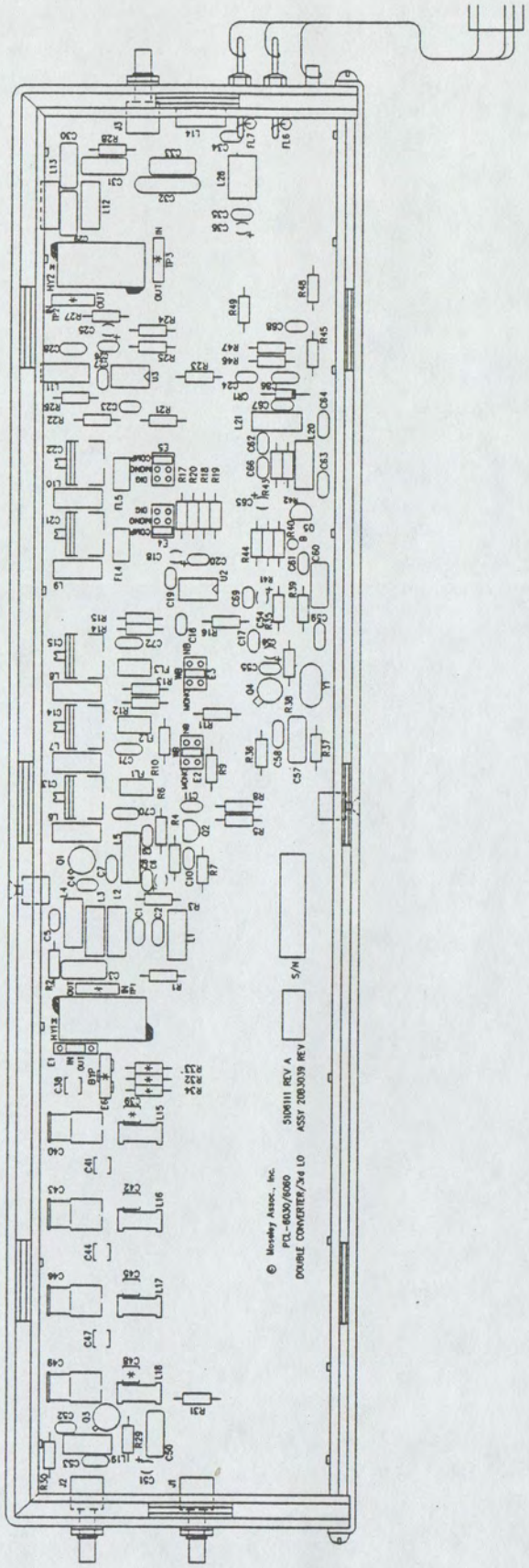
2. WRAP #22 BUSS WIRE OVER PINS AND THROUGH HOLES IN P.C. BOARD BEFORE SOLDERING. 2 PLCS

DASH LEVEL	ITEM #	DESCRIPTION *	J1	E2	R3	R48	R54	R53	R57	C1	C53	R1	R2	FL4
-1	9302563	IF DEMOD PCL-6020-1	OMIT	INSTALL	10Ω	100Ω	120K	51K	OMIT	OMIT	OMIT	10Ω	120Ω	INSTALL
-2	9302704	IF DEMOD PCL-6020-2	INSTALL	OMIT	OMIT	OMIT	12K	5.6K	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT

20D2941 Rev 11
IF Demod (6020) Assembly



91D7451 Rev A
Double Converter/LO3 (6030/6060) Schematic



20D3039 Rev A
Double Converter/LO3 (6030/6060) Assembly

3.5 V p-p

PREAMPLIFIER

LIMITER

F M DETECTOR

BASEBAND AMPLIFIER

BASEBAND SIGNAL LEVEL

BASEBAND LEVEL SET

BASEBAND OUT

DEMOD IDLE LEVEL +4V TO +6V

4V p-p ± 20% @ -15 dBm IN (40mv @ 50Ω)

3.0 MHz B.P.F.

1.2 V p-p ± 20%

+10V ± 10%

-5V ± 10%

0.33µs

1.1 V p-p ± 20% @ 50 KHz DEVIATION OR 0.77Vp-p ± 20% @ 35 KHz DEVIATION

LOG AMPLIFIER

LOG GAIN

MUTE LOGIC

MUTE THRESHOLD

MUTE THRESHOLD INDICATOR

6V p-p ± 20% 3.0MHz

-1.2V ± 20% @ 3 mV IN

TP3 LOG SIGNAL LEVEL -6.8V ± 20% @ 3 mV IN @ ANTENNA

+7.5V ± 20% @ 3 mV IN

-14V = ON +14V = MUTE

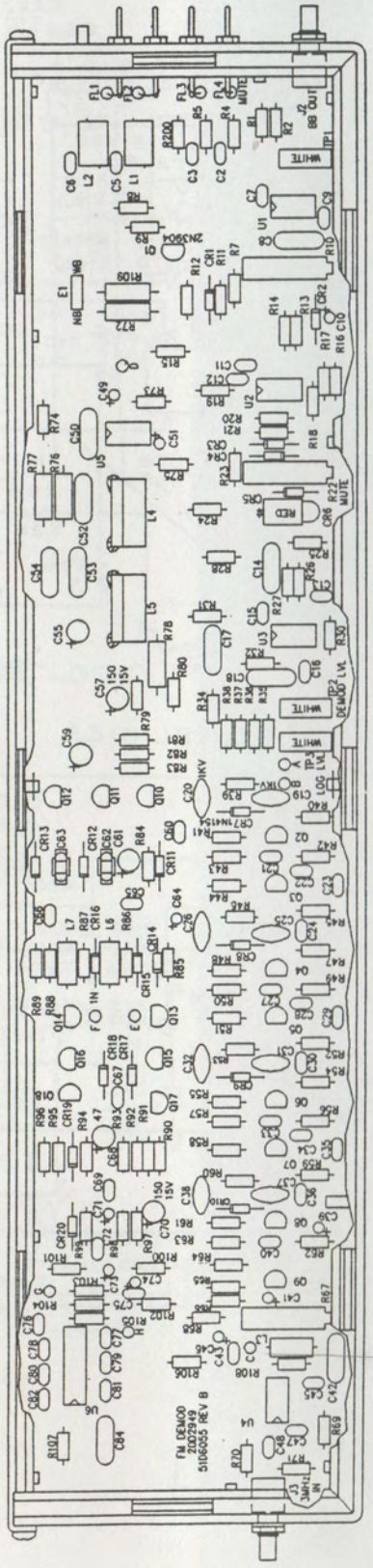
SIGNAL MUTE OUT

RF SIGNAL STRENGTH OUT

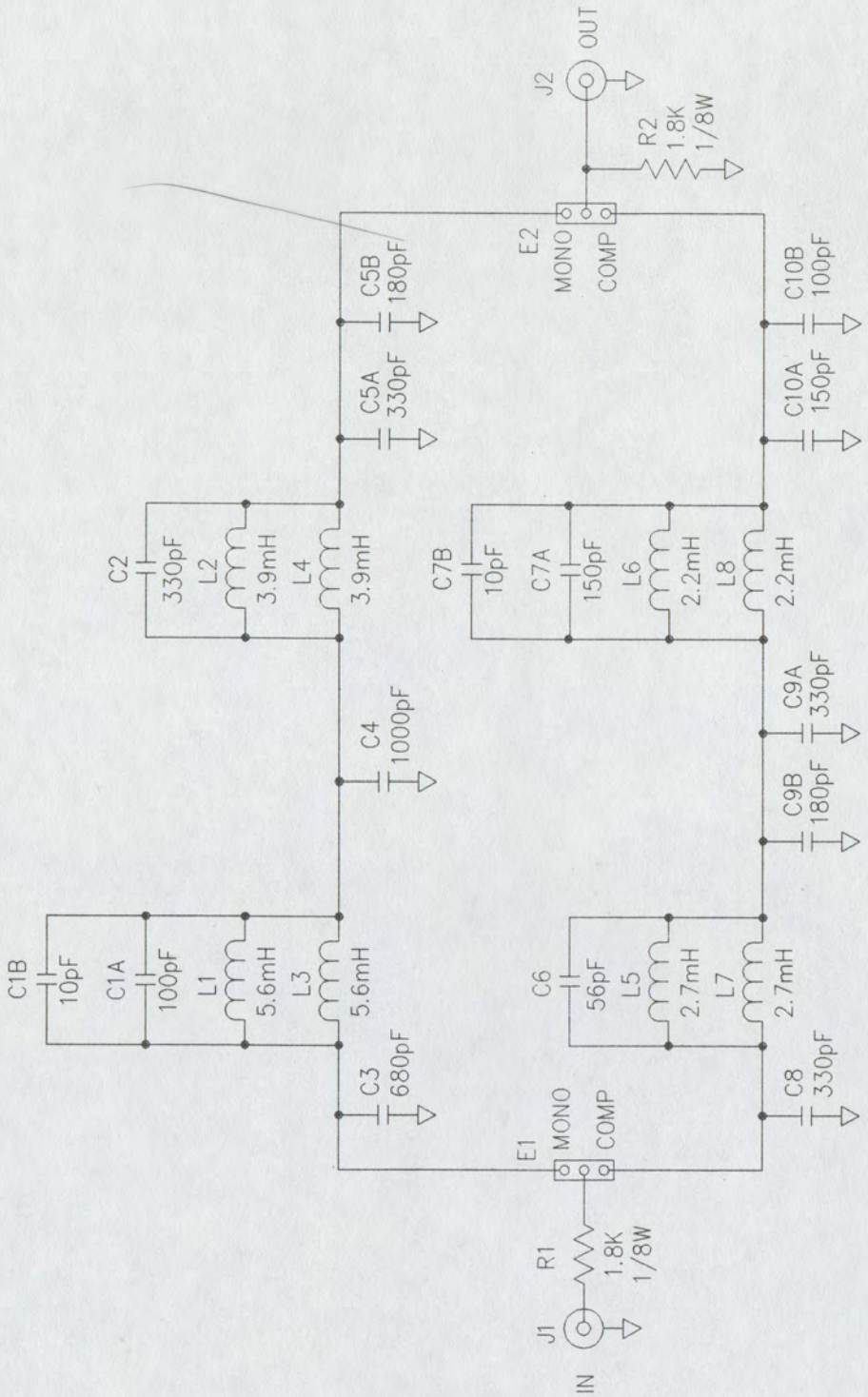
4. POINTS "A" THRU "H" ARE DIAGNOSTIC TEST POINTS.
3. COMPONENT LAYOUT 20D2949.
2. P.C. BOARD 51D6055.
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS, ¼ W., 5 % CAPACITORS ARE IN MICROFARADS DIODES ARE IN4154.

NOTES:

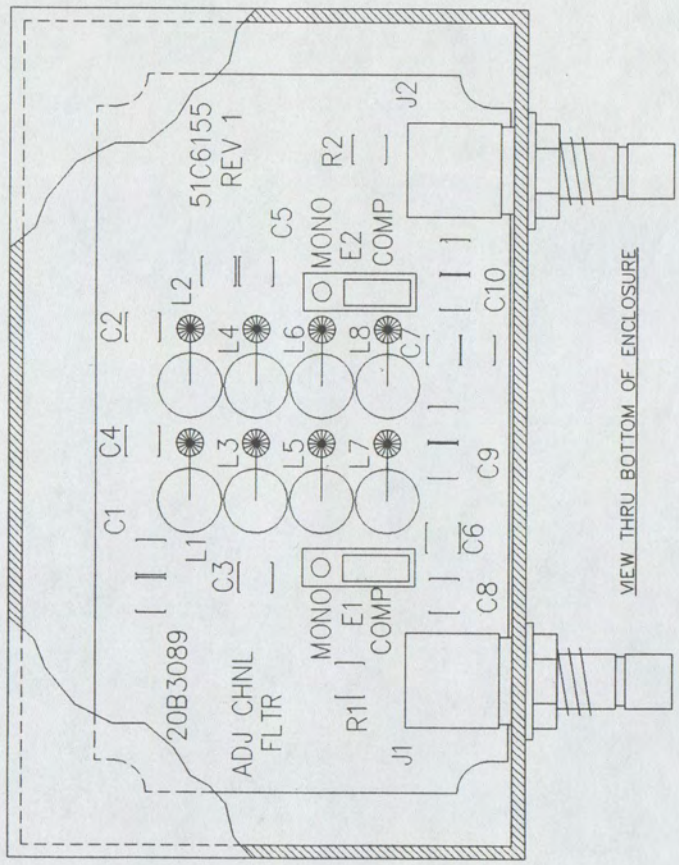
91D7387 Rev C
FM Demod(6030/6060)
Schematic



20D2949 Rev D
FM Demodulator (6030/6060) Assembly



91B7502 Rev 1
Adjacent Channel Filter (6060) Schematic



20B3089 Rev 1
Adjacent Channel Filter Assembly

Section 8

Parts Lists

(950 MHz STANDARD SYSTEM)

This section contains parts lists for the assemblies outlined in Section 5.

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9551987 DESCRIPTION: ASSY SHPG TX PCL-6010 940-960
ENG. 21D2890-1 REV E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			10.000	EA
100	2032415	COVER PCL-600/6000	05D3272	A	1.000	EA
	3050424	SHELL CONN RFI/EMI 09P/GROMMET (SHIP WITH UNIT)	DCH-E-001		1.000	EA
	3050473	CONN D 09P W/SLDRPOT (SHIP WITH UNIT)	4007-9		1.000	EA
	3050721	COVER CONN CAPLUG 25PIND(F)BLK (ECO 5341)	DCC-03-BLACK		1.000	EA
101	3370038	CORD LINE 10A 8' USA-IEC BLK (SHIP WITH UNIT)	C3120008BL		1.000	EA
107	3430121	LBL MODEL/SERIAL/FREQUENCY	04-1013-2	A	1.000	EA
103	3431269	LBL FCC PART 94 PCL-6010 TX -	10A1093	PLT 1	.000	EA
105	9504549	ASSY XMTR PCL-6010 940-960 MHZ	21D2890-1 REV E		1.000	EA
	9999897				.000	EA

REV	ECO#	DATE	COMMENTS
B	5293	09/10/93	NO CHANGE
C	5341	05/20/94	CHANGE TO MC RF MOD. SPLIT 21D2890-1 FROM -3,-4,-5
	5341A1	07/13/94	NO CHANGE
	5341A2	07/29/94	NO CHANGE
D	5360	04/18/94	NO CHANGE
E	5366	06/01/94	NO CHANGE

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504549 DESCRIPTION: ASSY XMTR PCL-6010 940-960 MHZ
ENG. 21D2890-1 REV E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST (ECO 5341)			20.000	EA
5	1090109	CLIP NUT 6-32	SL-210-06-2		4.000	EA
53	1090182	SCR PNH PHPS 6-32 X 1/4 SST (ECO 5341)			8.000	EA
6	1090208	SCR PNH PHPS 6-32 X 3/8 SST			4.000	EA
7	1090604	WSHR FL #6 CD PL (ECO 5341)	AN960-6 CAD 1		8.000	EA
8	1090901	SCR BTH SKT CAP 6-32 X 3/8 BLK	6-32 X 3/8		7.000	EA
9	1150226	LUG #10 LKG PREFORMED	T-250		2.000	EA
28	1250158	PLUG HOLE 1/2"	653		1.000	EA
12	1251131	KNOB PANEL BLK 1/8 DIA W/SKIRT	KAS500B-1/8		1.000	EA
14	1560010	TUBING SHRINK BLACK 3/32"	MIL-I-23053/5		.300	FT
13	1560028	TUBING SHRINK BLACK 1/8"	MIL-I-23053/5		.300	FT
	1640630	W STRD 22GA WHITE-BLACK	UL 1061*90		.167	FT
	1640655	W STRD 22GA WHITE-RED	UL 1061*92		.167	FT
	1641554	W STRD 18GA BLACK 16/30	MIL-W76B TYPEMW		.167	FT
	1641604	W STRD 18GA GREEN 16/30	MIL-W76B TYPEMW		.333	FT
	1641646	W STRD 18GA WHITE 16/30	MIL-W76B TYPEMW		.167	FT
16	2011294	PANEL FRONT TX PCL-6010	05D3321	A	1.000	EA
17	2031920	CHASSIS TX PCL-606/6010 CHASSIS REV R OBSOLETES TRP215(4090627)	05B2794	T	1.000	EA
61	2060036	BRKT ANGLE PCL-6000,RPL-4000	05A3441	A	2.000	EA
55	2062743	SPACER LOCKING BAR 606 (ECO 5341)	05A2857	C	2.000	EA
58	2062768	BAR LOCKING (ECO 5341)	05B2862	A0	1.000	EA
59	2062776	BAR ANGLE LKG 2 TABS 606 (ECO 5341)	05B2864	B	1.000	EA
19	2064657	PANEL REAR TX PCL-6010	05C3350	B	1.000	EA
52	2202026	ASSY CA SMB/RT-SMB/S 13" (ECO 5341)	24B1075-3	F	1.000	EA
57	2202646	ASSY CA SMB/RT-SMB/S 18.5" (ECO 5341)	24B1075-6	F	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504549 DESCRIPTION: ASSY XMTR PCL-6010 940-960 MHZ
ENG. 21D2890-1 REV E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	2351203	ASSY HARN I/O TX PCL-6010 MC A4	29C1103 PLT1	1.000	EA
22	3010121	METER BEZEL FOR HOYT 2025	2025-B BEZEL	1.000	EA
	3011327	METER 0-25 W/HDWR & 50A5122 M1	2025B W/50A5122	1.000	EA
30	3091196	CONN IDC .156 06POS 22AWG RED	CE156F22-6-X-B	1.000	EA
32	3110004	CONN FASTON F .250 22-18 AWG	2-520184-2	2.000	EA
35	3110962	CONN FASTON F .110 22-18 AWG	2-520084-2	1.000	EA
36	3111028	CONN FASTON F .250 22-18 AWG	2-520129-2	1.000	EA
38	3111267	KEY CONN IDC .156	PK156-C	1.000	EA
39	3190873	NUT DRESS SWITCH BLACK	7099-02-231	1.000	EA
2	3190899	PIN STOP RTRY SW 71ADF30011AJN	71J1071	1.000	EA
15	3190907	LABEL PIN RETAINER FOR 3150174	71-SS1073-1	1.000	EA
37	3291150	TERM CRIMP FEM FOR .045 SQ PIN	75187-006	5.000	EA
	3370046	CONN PWR W/FUSE FILTER FL1	06LE4	1.000	EA
42	3370251	FUSE .25X1.25 SLOW 1. A (FOR 220 VOLTS)	MDL 1	.000	EA
42	3370277	FUSE .25X1.25 SLOW 2. A (FOR 110 VOLTS)	MDL 2	2.000	EA
43	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A	2.000	EA
33	3430055	LBL FUSE "1AMP-2AMP"	JA413	1.000	EA
44	3430071	LBL HIGH VOLTAGE SYMBOL	10A1058-2 A0	1.000	EA
	4090627	XFMR 8-P-114 PCL-6010 10W T1	3A1119 PLT 1	1.000	EA
	9206582	ASSY TX AUDIO/PS PCL-6010 AC A1	20D3023 A	1.000	EA
	930-02936-A1	ASSY RFA 960 MHZ PCL-6010 A3 (ECO 5360)	20B2937-3 L	1.000	EA
	930-03462-A1	ASSY RF MOD 6010 MC 940-960MHZ A2 (ECO 5366)	20D3106-1 REV B	1.000	EA
	9999897	REV ECO# DATE COMMENTS		.000	EA

B 5293 09/10/93 NO CHANGE
C 5341 05/20/94 CHG TO MC RF MOD, NO SHK-MT
SPLIT 21D2890-1 FROM -3,4,5
5341A1 07/13/94 MOVE T1 TO CHASSIS BOTTOM.
5341A2 07/29/94 DEL FL2 AND CABLE.
D 5360 05/20/94 CHG RFA 9302936 > 930-02936-01
(MHW808 TO MHW812 WITH MODS)

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206582 DESCRIPTION: ASSY TX AUDIO/PS PCL-6010 AC
ENG. 20D3023 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
4	1050129	SCR PNH PHPS 4-40 X 1/4 SST		12.000	EA
7	1050665	WSHR SHLDR #4 NYL	5607-15219	4.000	EA
3	1231547	STDF 1/4 HEX 4-40 X 1-5/8 BRSS	8230-B-0440-28	6.000	EA
8	1290188	SIL PAD TO-220	7403-09-FR-51	4.000	EA
10	1560234	TBG TEFLON 22AWG NAT	TT-22	.040	FT
11	1590702	SEALANT THREAD REMOVABLE ANER.	SUPER LOCK S360	.000	EA
2	2064525	BRKT RGLTR HEATSINK PCL-6000	05B3323 A	1.000	EA
	3150174	SW RTRY SP 12POS PCMT ADJ STOP S2	71ADF30-01-1AJN	1.000	EA
	3160223	SW TGL DPDT ON-NONE-ON S1	7201L41H3AV2QE	1.000	EA
	3250917	JUMPER MINI FOR 2 PINS=.025/.1 E2,E3,E4,E5,E7,E8,E9	929952-10	7.000	EA
	3650173	RGLTR MC7805CT 05V 1.0A TO220 VR3	MC7805CT	1.000	EA
	3650207	RGLTR MC7815CT 15V 1.5A TO220 VR2	MC7815CT	1.000	EA
	3650215	RGLTR MC7912CT 12V 1.5A TO220 VR4	MC7912CT	1.000	EA
	3650223	RGLTR MC7915CT 15V 1.5A TO220 VR1	MC7915CT	1.000	EA
	4260287	CAP ALLYTIC 2700/35V SNAP 105C C4,C5,C6,C7,C8	LP272M035C1P3	5.000	EA
	8000085	ASSY PCB TX AUDIO/PS -OUT VNDR	20D3023 A	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206608 DESCRIPTION: KIT PREP PART TX AUDIO 6000 AC
ENG. 20D3023 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	3091139	CONN 6PIN HDR BRKAWAY LKG .156 P1,P2	MLSS156-6-X-B		2.000	EA
	3091147	HDR .025X.100 STRT 20P 1ROW P3,P4,P5,E2,E3,E4,E5,E12	MFSS100-20-X-B		2.850	EA
	3091220	CONN SMB PC MT VERT MALE RECPT J1	2009-7511-000		1.000	EA
	3091253	HDR .025X.100 STRT 72P 2ROW E7,E8,E9	CA-D72-24C-44		.250	EA
	3250016	SKT IC DIP 08 PIN .3 U2,U3,U4,U5,U6,U7,U8,U9,U10,U11,U12,U13,U14,U15	ICO-083-S8-T		14.000	EA
	3250024	SKT IC DIP 14 PIN .3 U1	ICO-143-S8-T		1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035 CR14,CR15,CR16,CR17,CR20,CR21,CR22,CR23,CR24 (AFTER DEPLETION OF 3600053)	1N4154		9.000	EA
	3610003	DIO RECT 200V 1A SI D041 CR2,CR3,CR4,CR5,CR6,CR7, CR8,CR9,CR10,CR11,CR12, CR13,CR18,CR19	1N4003		14.000	EA
	3610078	DIO BRIDGE 100V 2A CR1	MDA201		1.000	EA
	3630456	XT 2N3904 Q3	2N3904		1.000	EA
	3640588	XT MOSFET P-CHANNEL TD-92 Q1	VP0610L		1.000	EA
	3660701	IC 74LS10 TR 3IN NAND 14PDIP U1	74LS10	PS	1.000	EA
	3730215	IC LM1458N OPAMP DUAL U12,U13,U14	LM1458N		3.000	EA
	3730728	IC 5534 OPAMP U4	NE5534P		1.000	EA
	3730967	IC DUAL OP AMP U2,U3,U5,U6,U7,U8,U9,U11	NE5532P		8.000	EA
	3730983	IC LM358N U10	LM358N		1.000	EA
	3731981	IC OPAMP LP EXTND CMVR DIP8 U15	ICL7612BCPA		1.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L1,L2,L5,L6,L7,L8,L9,L10,L11,L12	VK200 10/3B		10.000	EA
	4200002	CAP MICA DIP 5PF +/- 0.5PF C19,C25,C28,C32,C43,C59,C63,C65,C69	DM-5-050D		9.000	EA
	4200069	CAP MICA DIP 100PF 5% C77,C85	DM-5-101J		2.000	EA
	4200085	CAP MICA DIP 3PF +/- 0.5PF C78,C79	DM-5-030D		2.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206608 DESCRIPTION: KIT PREP PART TX AUDIO 6000 AC
ENG. 20D3023 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4200192	CAP MICA DIP 22PF 5% C42	DM-5-220J	1.000	EA
	4210308	CAP MICA DIP 150PF 5% C33,C37,C72,C73	DM-15-151J	4.000	EA
	4250825	CAP PCARB .01UF/100V/2.5% .2 C40,C44,C48,C50,C52,C55,C56,C57,C61	FKC2 .01/100/2	9.000	EA
	4280541	CAP TANT 10/20V 20% .100 LS C14,C23,C80,C81	TAP106M020SRW	4.000	EA
	4280574	CAP TANT 2.2/35V 20% .100 LS C1,C2,C3,C9,C15,C18,C82,C83,C84,C103,C104	TAP225M035SRW	11.000	EA
	4280590	CAP TANT 220/10V 10% .200 LS C121,C122	TAP227K010CCS	2.000	EA
	4280624	CAP TANT 47/20V 20% .200 LS C86	TAP476M020CRW	1.000	EA
	4310264	CAP CER .1/50V Z5U 20% T&R C10,C11,C12,C17,C20,C21,C24,C26,C29,C30,C31,C36, C38,C39,C41,C47,C49,C51,C53,C54,C58,C60,C62,C67, C68,C70,C71,C93,C95,C99,C100,C101,C102,C105,C113, C114,C115,C116,C117,C118,C119,C120	SR205E104MAA	42.000	EA
	4310272	CAP CER .01/50V X7R 10% T&R C27,C35,C64,C74,C75,C76,C87,C88,C89,C90,C91,C92, C94,C96,C97	SR155C103KAA	15.000	F
	4310280	CAP CER .001/100V X7R 10% C22,C34	SR151C102KAA	2.000	EA
	4500005	RES 1/8W .1% MF 97.6 OHM AXL R72	RN55D97R6B	1.000	EA
	4500013	RES 1/8W .1% MF 931 OHM AXL R71	RN55D9310B	1.000	EA
	4500021	RES 1/8W .1% MF 459 OHM AXL R69	RN55D4590B	1.000	EA
	4500039	RES 1/8W .1% MF 340 OHM AXL R57	RN55D3400B	1.000	EA
	4500047	RES 1/8W .1% MF 732 OHM AXL R55	RN55D7320B	1.000	EA
	4500054	RES 1/8W .1% MF 1.42K OHM AXL R68	RN55D1421B	1.000	EA
	4500062	RES 1/8W .1% MF 1.56K OHM AXL R70	RN55D1561B	1.000	EA
	4510004	RES 1/4W 1% MF 200 OHM AXL R101	5043ED200R0F	1.000	EA
	4510087	RES 1/4W 1% MF 4.12K OHM AXL R86	5043ED4K120F	1.000	EA
	4510103	RES 1/4W 1% MF 4.99K OHM AXL R10,R13,R79,R81,R82,R83,R84,R102	5043ED4K990F	8.000	EA
	4510145	RES 1/4W 1% MF 10.0K OHM AXL R19,R20	5043ED10K00F	2.000	EA

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DATE: 8/24/94

PARENT ITEM: 9206608 DESCRIPTION: KIT PREP PART TX AUDIO 6000 AC
ENG. 20D3023 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4510160	RES 1/4W 1% MF 20.0K OHM AXL R21,R73	5043ED20K00F	2.000	EA
	4510269	RES 1/4W 1% MF 107K OHM AXL R99,R100	5043ED107K0F	2.000	EA
	4510301	RES 1/4W 1% MF 1.00K OHM AXL R51,R52,R60,R61,R64,R65,R87	5043ED1K000F	7.000	EA
	4510640	RES 1/4W 1% MF 604 OHM AXL R105	5043ED604R0F	1.000	EA
	4570008	RES 1/4W 5% CF 10 OHM AXL R12,R18,R25,R30,R43,R54,R56,R58,R62,R66,R67,R74, R80,R85,R97,R98,R106,R107,R122,R123,R124,R127, R169,R172,R176,R180	06A1016	26.000	EA
	4570040	RES 1/4W 5% CF 22 OHM AXL R4	06A1016	1.000	EA
	4570080	RES 1/4W 5% CF 47 OHM AXL R108	06A1016	1.000	EA
	4570144	RES 1/4W 5% CF 100 OHM AXL R15,R17,R23,R24,R35,R109,R112,R134,R139,R140,R141, R142,R167,R177,R181	06A1016	15.000	EA
	4570160	RES 1/4W 5% CF 120 OHM AXL R136	06A1016	1.000	EA
	4570184	RES 1/4W 5% CF 180 OHM AXL R5	06A1016	1.000	EA
	4570232	RES 1/4W 5% CF 330 OHM AXL R8,R89	06A1016	2.000	EA
	4570256	RES 1/4W 5% CF 470 OHM AXL R37,R137	06A1016	2.000	EA
	4570272	RES 1/4W 5% CF 560 OHM AXL R50,R59,R63	06A1016	3.000	EA
	4570288	RES 1/4W 5% CF 680 OHM AXL R185,R188	06A1016	2.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R3,R9,R26,R31,R33,R39,R41,R42,R119,R120,R130,R132, R170,R183	06A1016	14.000	EA
	4570368	RES 1/4W 5% CF 2.0K OHM AXL R27,R93	06A1016	2.000	EA
	4570376	RES 1/4W 5% CF 2.2K OHM AXL R11,R90,R104,R110	06A1016	4.000	EA
	4570392	RES 1/4W 5% CF 2.7K OHM AXL R36	06A1016	1.000	EA
	4570408	RES 1/4W 5% CF 3.3K OHM AXL R135	06A1016	1.000	EA
	4570424	RES 1/4W 5% CF 3.9K OHM AXL R46	06A1016	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206608 DESCRIPTION: KIT PREP PART TX AUDIO 6000 AC
ENG. 20D3023 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4570440	RES 1/4W 5% CF 4.7K OHM AXL R32,R34,R44,R53,R88,R114	06A1016	6.000	EA
	4570456	RES 1/4W 5% CF 5.6K OHM AXL R175,R179	06A1016	2.000	EA
	4570504	RES 1/4W 5% CF 10K OHM AXL R1,R2,R14,R91,R111,R116,R117,R118, R121,R125,R126,R129,R168,R171, R174,R186,R187,R189	06A1016	18.000	EA
	4570528	RES 1/4W 5% CF 15K OHM AXL R173,R184	06A1016	2.000	EA
	4570540	RES 1/4W 5% CF 20K OHM AXL R48	06A1016	1.000	EA
	4570548	RES 1/4W 5% CF 22K OHM AXL R178,R182,R194	06A1016	3.000	EA
	4570612	RES 1/4W 5% CF 47K OHM AXL R7,R191	06A1016	2.000	EA
	4570636	RES 1/4W 5% CF 68K OHM AXL R115	06A1016	1.000	EA
	4570668	RES 1/4W 5% CF 100K OHM AXL R16,R22,R133,R143	06A1016	4.000	EA
	4570684	RES 1/4W 5% CF 150K OHM AXL R190,R192,R193,R195	06A1016	4.000	E.
	4570708	RES 1/4W 5% CF 220K OHM AXL R128	06A1016	1.000	EA
	4630166	POT CER PC PIN 5K OHM .5W 25T R45,R47,R77,R286	3296W-1-502	4.000	EA
	4630273	POT CER PC PIN 10K OHM .5W 25T R28,R29,R40,R131,R138,R151,R153,R155,R157,R159, R161,R162,R163,R164,R165,R166,R199,R200,R201, R202,R203	3296W-1-103	21.000	EA
	4630745	POT CER PC PIN 2K OHM .5W 25T R6	3296W-1-202	1.000	EA
	4631008	POT CER PC PIN 500 OHM .5W 25T R49,R75,R76,R78	3296W-1-501	4.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-02936-01 DESCRIPTION: ASSY RFA 960 MHZ PCL-6010
ENG. 20B2937-3 L

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
41	1050129	SCR PNH PHPS 4-40 X 1/4 SST			16.000	EA
43	1050525	SCR FLH SLTD 4-40 X 1 SST			4.000	EA
39	1050574	SCR SCH 4-40 X 3/8 SST			6.000	EA
40	1050632	WSHR LK #4 SR CD PL			21.000	EA
38	1050640	WSHR FL #4 CD PL	MW-401		10.000	EA
31	1050798	LUG LKG #4 PREFORMED	T-233		2.000	EA
33	1050905	SCR SCH CAP 4-40 X 1/4 SST			11.000	EA
29	1090471	SCR PNH PHPS #6 X 1/2 TYP B			2.000	EA
34	1090539	SCR SCH 6-32 X 3/8 SST			2.000	EA
36	1090851	WSHR BELLEVILLE CONICAL #6	5808-87-25		2.000	EA
45	1130129	SCR PNH PHPS 8-32 X 3/4 SST			1.000	EA
14	1250190	COVER INSULATING TO-3 VR1	A22-2003		1.000	EA
13	1290162	SIL PAD VR1	7403-09-FR-05		1.000	EA
46	1560234	TBG TEFLON 22AWG NAT	TT-22		.080	FT
42	1640416	W STRD 22GA YELLOW	UL 1061*4		.250	FT
48	1641935	W BUSS 24GA	299		.042	FT
44	2063675	BRKT MTG	610		1.000	EA
2	2091957	COVER ENCL RFA 150/960 MHZ	05B3118	REV C	1.000	EA
4	2091965	PLATE INPUT ENCL RFA 960 MHZ	05B3119	C	1.000	EA
7	2091973	PLATE COVER DIR COUPLER	05B3121	B	1.000	EA
5	2091981	PLATE OUTPUT ENCL RFA	05B3149	B	1.000	EA
3	2110385	HEATSINK RFA PCL-6010 960 MHZ	05D3120	E	1.000	EA
6	2350981	ASSY HARN RFA PCL-6010 960 MHZ	29C1085	A	1.000	EA

MOSELEY ASSOCIATES, INC.
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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-02936-01 DESCRIPTION: ASSY RFA 960 MHZ PCL-6010
ENG. 20B2937-3 L

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
10	3030178	CONN TYPE N RCPT 1/8 DIA HOLES J702	82-97(UG-58A/U)		1.000	EA
11	3030400	CONN SMB BLKHD STR ML SLDR POT J701	2019-7511-000		1.000	EA
27	3251170	SKT PWR XSTR TO-3	8116LB603		1.000	EA
32	3290582	TERMINAL PCB SOLDER	1300T-4.5		1.000	EA
1	3473824	PCB RFA 960 MHZ	51C6042	C	1.000	EA
8	3473832	PCB DIRECTIONAL COUPLER	51B6049	B	1.000	EA
17	3610045	DIO SCH .340V 10MA 1.0PF (15) CR1,CR2	5082-2835		2.000	EA
15	3610284	DIO BRIDGE 100V (MIN) 25A CR101	MDA2502		1.000	EA
	365-10139-RG	LTR LT1117CST ADJ .8A SOT223 VR1	LT1117CST		1.000	EA
12	3650363	RGLTR VARV 5.0A TO3 VR1	LM338K-STEEL		1.000	EA
	3731999	IC RF PWR AMP 870-950 MHZ 12W AR1	MHW812A3		1.000	EA
18	4020368	IDCTR FERRITE BEAD 850 OHM L2,L3,L4	VK200 20/4B		3.000	EA
19	4280574	CAP TANT 2.2/35V 20% .100 LS C15,C16	TAP225M035SRW		2.000	EA
20	4280616	CAP TANT 4.7/35V 10% .100 LS C2,C4,C6	TAP475K035SRW		3.000	EA
47	4310264	CAP CER .1/50V Z5U 20% T&R C17	SR205E104MAA		1.000	EA
9	4350070	CAP FD THRU 470PF 20% C701,C702,C721,C722	54-804-002-471M		4.000	EA
22	4350823	CAP MLCC 1206 X7R .01 UF 10% C1,C3,C5,C7,C10	06A1014		5.000	EA
21	4350898	CAP MLPC 1212 P90 3.9 PF +-.25 C8,C9	100B3R9CP500X		2.000	EA
26	4450037	RES 1/8W 5% CC 51 OHM AXL R3,R6	RC05GF510J		2.000	EA
	4570184	RES 1/4W 5% CF 180 OHM AXL R7	06A1016		1.000	EA
25	4570320	RES 1/4W 5% CF 1.0K OHM AXL R4,R5	06A1016		2.000	EA
24	4590022	RES 2W 5% 0.18 OHM AXL R2	SPH-0.18L-5%		1.000	EA
	4631081	POT CER SMT 2K 12T TOP 0.25W R1	3269W-1-202		1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9551995 DESCRIPTION: ASSY SHPG RX PCL-6020 940-960 ENG. 21D2891-1 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			9.000	EA
100	2032415	COVER PCL-600/6000	05D3272	A	1.000	EA
104	2202273	ASSY CA BNC FT MT-SMB/RT 13.25 -3	24B1090-1	E	1.000	EA
	3050721	COVER CONN CAPLUG 25PIND(F)BLK (ECO 5341)	DCC-03-BLACK		1.000	EA
101	3370038	CORD LINE 10A 8' USA-IEC BLK	C3120008BL		1.000	EA
107	3430121	LBL MODEL/SERIAL/FREQUENCY	04-1013-2	A	1.000	EA
102	9504531	ASSY RCVR PCL-6020 940-960 MHZ	21D2891-1 REV D		1.000	EA
	9999897				.000	EA

REV	ECO#	DATE	COMMENTS
B	5293	09/10/93	NO CHANGE.
C	5341	05/20/94	CHANGE TO MC RF MOD. SPLIT 21D2891-1 FROM -3,-4.
D	5365	07/15/94	NO CHANGE

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504531 DESCRIPTION: ASSY RCVR PCL-6020 940-960 MHz
ENG. 21D2891-1 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			22.000	EA
5	1090109	CLIP NUT 6-32	SL-210-06-2		4.000	EA
6	1090182	SCR PNH PHPS 6-32 X 1/4 SST			8.000	EA
7	1090208	SCR PNH PHPS 6-32 X 3/8 SST			4.000	EA
8	1090604	WSHR FL #6 CD PL	AN960-6 CAD 1		4.000	EA
9	1090901	SCR BTH SKT CAP 6-32 X 3/8 BLK	6-32 X 3/8		7.000	EA
10	1150226	LUG #10 LKG PREFORMED	T-250		2.000	EA
12	1190214	NUT SPEED FOR.310 BARSTP TURRT	L97		2.000	EA
13	1251131	KNOB PANEL BLK 1/8 DIA W/SKIRT	KAS500B-1/8		1.000	EA
16	1560010	TUBING SHRINK BLACK 3/32"	MIL-I-23053/5		.300	FT
14	1560028	TUBING SHRINK BLACK 1/8"	MIL-I-23053/5		.160	F.
15	1560234	TBG TEFLON 22AWG NAT	TT-22		.200	FT
56	1590702	SEALANT THREAD REMOVABLE ANER.	SUPER LOCK S360		.000	EA
	1640630	W STRD 22GA WHITE-BLACK	UL 1061*90		.167	FT
	1640655	W STRD 22GA WHITE-RED	UL 1061*92		.167	FT
	1641554	W STRD 18GA BLACK 16/30	MIL-W76B TYPEMW		.167	FT
	1641604	W STRD 18GA GREEN 16/30	MIL-W76B TYPEMW		.125	FT
	1641646	W STRD 18GA WHITE 16/30	MIL-W76B TYPEMW		.167	FT
51	1641927	W BUSS 22GA	298		.400	FT
18	2011302	PANEL FRONT RX PCL-6020	05D3322	A	1.000	EA
19	2031847	CHASSIS RX PCL-606/6000	05B2778	M	1.000	EA
60	2031896	COVER CORCOM	05B2815	B	1.000	EA
63	2060036	BRKT ANGLE PCL-6000,RPL-4000	05A3441	A	2.000	EA
21	2064533	SPACER LOCKING BAR 6000	05A3326	A	2.000	EA
22	2064541	LOCKING BAR SLIDING PCL-6000	05A3325	A	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504531 DESCRIPTION: ASSY RCVR PCL-6020 940-960 MHZ ENG. 21D2891-1 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.			QUANTITY PER	UM
23	2064558	LOCKING BAR 4 TABS 6000	05A3324		A	1.000	EA
24	2064566	SHIELD I/O PANEL PCL-6000	05C3327		A	1.000	EA
69	2065001	PLATE BLANK PCL-6000 MC 9PIN D	05A3447	PLT	1	1.000	EA
20	2065027	PANEL REAR RX PCL-6000MC	05D3455	PLT	2	1.000	EA
26	2202422	ASSY CA SMB/RT-SMB/RT 21"	24B1074-5		C	2.000	EA
27	2202638	ASSY CA SMB/RT-SMB/RT 5"	24B1074-6		C	1.000	EA
25	2202687	ASSY CA N FT-SMB/RT 21.5"	24B1094-2		D	1.000	EA
57	2351005	ASSY HARN I/O RX PCL-6020/6030	29C1087	REV	2	1.000	EA
28	3010121	METER BEZEL FOR HOYT 2025	2025-B BEZEL			1.000	EA
29	3011335	METER 0-25 W/HDWR & 50A5123	2025B W/50A5123			1.000	EA
30	3030244	M1 CONN BNC BULKHD UG-1094/U	227754-1			4.000	EA
35	3091196	CONN IDC .156 06POS 22AWG RED	CE156F22-6-X-B			1.000	EA
3	3110004	CONN FASTON F .250 22-18 AWG	2-520184-2			1.000	EA
61	3110962	CONN FASTON F .110 22-18 AWG	2-520084-2			1.000	EA
38	3111267	KEY CONN IDC .156	PK156-C			1.000	EA
39	3190873	NUT DRESS SWITCH BLACK	7099-02-231			1.000	EA
2	3190899	PIN STOP RTRY SW 71ADF30011AJN	71J1071			2.000	EA
11	3190907	LABEL PIN RETAINER FOR 3150174	71-SS1073-1			1.000	EA
40	3291069	FILTER FD-THRU TYPE20 NO/HDWR	859619-1			13.000	EA
62	3291150	TERM CRIMP FEM FOR .045 SQ PIN	75187-006			5.000	EA
41	3291192	BARR STP 16 POS BLK W/TURRET	SSB6TP-16-07-04			1.000	EA
	3370046	CONN PWR W/FUSE FILTER	06LE4			1.000	EA
43	3370236	FL1 FUSE .25X1.25 SLOW 0.5 A (FOR 220 VOLTS)	MDL 1/2			.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504531 DESCRIPTION: ASSY RCVR PCL-6020 940-960 MHZ
ENG. 21D2891-1 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
43	3370251	FUSE .25X1.25 SLOW 1. A (FOR 110 VOLTS)	MDL 1		2.000	EA
44	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A		3.000	EA
59	3430048	LBL FUSE "1/2AMP-1AMP"	JA412		1.000	EA
45	3430063	LBL "CAUTION-HIGH VOLTAGE"	10A1058-1	A0	1.000	EA
46	4020467	IDCTR FERRITE BEAD 500 OHM	VK200 10/3B		2.000	EA
	4090437	XFMR 8-P-98 RX 606/6000 T1	3-1108	D	1.000	EA
	9206624	ASSY RX AUDIO/PS 80KHZ 6000 A1	20D3024	A	1.000	EA
	930-03470-01	ASSY RF MOD 6020/30 MC 950 MHZ A2 (ECO 5365)	20D3107-1 REV B		1.000	EA
	9302704	ASSY IF DEMOD RX PCL-6020 A3	20D2941-2 PLT11		1.000	EA
	9999897				.000	EA

REV ECO# DATE COMMENTS
B 5293 09/10/93 NO CHANGE.
C 5341 07/15/94 CHANGE TO MC RF MOD.
SPLIT 21D2891-1 FROM -3,-4,-5.
D 5365 07/27/94 CHANGE RFM TO 930-03470-01

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
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DATE: 8/24/94

PARENT ITEM: 9552027 DESCRIPTION: ASSY SHPG RX PCL-6030 940-960 ENG. 21D2892-1 REV*C

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			9.000	EA
100	2032415	COVER PCL-600/6000	05D3272	A	1.000	EA
104	2202273	ASSY CA BNC FT MT-SMB/RT 13.25 -	24B1090-1	E	1.000	EA
	3050721	COVER CONN CAPLUG 25PIND(F)BLK (ECO 5341)	DCC-03-BLACK		1.000	EA
101	3370038	CORD LINE 10A 8' USA-IEC BLK	C3120008BL		1.000	EA
107	3430121	LBL MODEL/SERIAL/FREQUENCY	04-1013-2	A	1.000	EA
102	9504556	ASSY RCVR PCL-6030 940-960 MHZ	21D2892-1 REV*C		1.000	EA
	9999897				.000	EA

REV	ECO#	DATE	COMMENTS
B	5293	09/10/93	NO CHANGE.
C	5341	05/20/94	CHANGE TO MC RF MOD. SPLIT 21D2892-1 FROM -3,-4.
D	5365	06/28/94	NO CHANGE

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504556 DESCRIPTION: ASSY RCVR PCL-6030 940-960 MHZ
ENG. 21D2892-1 REV*C

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			22.000	EA
5	1090109	CLIP NUT 6-32	SL-210-06-2		4.000	EA
6	1090182	SCR PNH PHPS 6-32 X 1/4 SST			8.000	EA
7	1090208	SCR PNH PHPS 6-32 X 3/8 SST			4.000	EA
8	1090604	WSHR FL #6 CD PL	AN960-6 CAD 1		4.000	EA
9	1090901	SCR BTH SKT CAP 6-32 X 3/8 BLK	6-32 X 3/8		7.000	EA
10	1150226	LUG #10 LKG PREFORMED	T-250		2.000	EA
12	1190214	NUT SPEED FOR.310 BARSTP TURRT	L97		2.000	EA
13	1251131	KNOB PANEL BLK 1/8 DIA W/SKIRT	KAS500B-1/8		1.000	EA
16	1560010	TUBING SHRINK BLACK 3/32"	MIL-I-23053/5		.300	FT
14	1560028	TUBING SHRINK BLACK 1/8"	MIL-I-23053/5		.160	FT
15	1560234	TBG TEFLON 22AWG NAT	TT-22		.200	FT
60	1590702	SEALANT THREAD REMOVABLE ANER.	SUPER LOCK S360		.000	EA
	1640630	W STRD 22GA WHITE-BLACK	UL 1061*90		.167	FT
	1640655	W STRD 22GA WHITE-RED	UL 1061*92		.167	FT
	1641554	W STRD 18GA BLACK 16/30	MIL-W76B TYPEMW		.167	FT
	1641604	W STRD 18GA GREEN 16/30	MIL-W76B TYPEMW		.125	FT
	1641646	W STRD 18GA WHITE 16/30	MIL-W76B TYPEMW		.167	FT
53	1641927	W BUSS 22GA	298		.400	FT
18	2011310	PANEL FRONT RX PCL-6030	05D3336	A	1.000	EA
19	2031847	CHASSIS RX PCL-606/6000	05B2778	M	1.000	EA
63	2031896	COVER CORCOM	05B2815	B	1.000	EA
67	2060036	BRKT ANGLE PCL-6000,RPL-4000	05A3441	A	2.000	EA
21	2064533	SPACER LOCKING BAR 6000	05A3326	A	2.000	EA
22	2064541	LOCKING BAR SLIDING PCL-6000	05A3325	A	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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DATE: 8/24/94

PARENT ITEM: 9504556 DESCRIPTION: ASSY RCVR PCL-6030 940-960 MHZ
ENG. 21D2892-1 REV*C

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
23	2064558	LOCKING BAR 4 TABS 6000	05A3324	A	1.000	EA
24	2064566	SHIELD I/O PANEL PCL-6000	05C3327	A	1.000	EA
69	2065001	PLATE BLANK PCL-6000 MC 9PIN D	05A3447 PLT	1	1.000	EA
20	2065027	PANEL REAR RX PCL-6000MC	05D3455 PLT	2	1.000	EA
62	2202372	ASSY CA SMB/RT-SMB/RT 9"	24B1074-4	C	1.000	EA
27	2202638	ASSY CA SMB/RT-SMB/RT 5"	24B1074-6	C	3.000	EA
25	2202687	ASSY CA N FT-SMB/RT 21.5"	24B1094-2	D	1.000	EA
61	2351005	ASSY HARN I/O RX PCL-6020/6030	29C1087 REV	2	1.000	EA
28	3010121	METER BEZEL FOR HOYT 2025	2025-B BEZEL		1.000	EA
29	3011335	METER 0-25 W/HDWR & 50A5123 M1	2025B W/50A5123		1.000	EA
30	3030244	CONN BNC BULKHD UG-1094/U	227754-1		4.000	EA
35	3091196	CONN IDC .156 06POS 22AWG RED	CE156F22-6-X-B		1.000	EA
3	3110004	CONN FASTON F .250 22-18 AWG	2-520184-2		1.000	EA
64	3110962	CONN FASTON F .110 22-18 AWG	2-520084-2		1.000	EA
38	3111267	KEY CONN IDC .156	PK156-C		1.000	EA
39	3190873	NUT DRESS SWITCH BLACK	7099-02-231		1.000	EA
2	3190899	PIN STOP RTRY SW 71ADF30011AJN	71J1071		2.000	EA
11	3190907	LABEL PIN RETAINER FOR 3150174	71-SS1073-1		1.000	EA
40	3291069	FILTER FD-THRU TYPE20 NO/HDWR	859619-1		13.000	EA
65	3291150	TERM CRIMP FEM FOR .045 SQ PIN	75187-006		5.000	EA
41	3291192	BARR STP 16 POS BLK W/TURRET	SSB6TP-16-07-04		1.000	EA
	3370046	CONN PWR W/FUSE FILTER FL1	06LE4		1.000	EA
43	3370236	FUSE .25X1.25 SLOW 0.5 A (FOR 220 VOLTS)	MDL 1/2		.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
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PARENT ITEM: 9504556 DESCRIPTION: ASSY RCVR PCL-6030 940-960 MHZ
ENG. 21D2892-1 REV*C

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
43	3370251	FUSE .25X1.25 SLOW 1. A (FOR 110 VOLTS)	MDL 1		2.000	EA
44	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A		3.000	EA
66	3430048	LBL FUSE "1/2AMP-1AMP"	JA412		1.000	EA
45	3430063	LBL "CAUTION-HIGH VOLTAGE"	10A1058-1	A0	1.000	EA
46	4020467	IDCTR FERRITE BEAD 500 OHM	VK200 10/3B		2.000	EA
	4090437	XFMR 8-P-98 RX 606/6000 T1	3-1108	D	1.000	EA
	9206624	ASSY RX AUDIO/PS 80KHZ 6000 A1	20D3024	A	1.000	EA
	930-03470-01	ASSY RF MOD 6020/30 MC 950 MHZ A2 (ECO 5365)	20D3107-1	REV B	1.000	EA
	9302100	ASSY FM DEMOD SEC A3	20D2949	E	1.000	EA
	9302944	ASSY DBL CONV/3RD LO 6030/6060 A4	20B3039	REV B	1.000	EA
	9999897	REV ECO# DATE COMMENTS B 5293 09/10/93 NO CHANGE. C 5341 06/28/94 CHANGE TO MC RF MOD. SPLIT 21D2892-1 FROM -3,-4,-5. D 5365 06/29/94 CHANGE RFM TO 930-03470-01			.000	EA

MOSELEY ASSOCIATES, INC.
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SANTA BARBARA, CA 93117-3093
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DATE: 8/24/94

PARENT ITEM: 9552290 DESCRIPTION: ASSY SHPG RX PCL-6060 940-960 ENG. 21D2915 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			9.000	EA
100	2032415	COVER PCL-600/6000	05D3272	A	1.000	EA
104	2202273	ASSY CA BNC FT MT-SMB/RT 13.25 -	24B1090-1	E	1.000	EA
	3050721	COVER CONN CAPLUG 25PIND(F)BLK (ECO 5341)	DCC-03-BLACK		1.000	EA
101	3370038	CORD LINE 10A 8' USA-IEC BLK	C3120008BL		1.000	EA
107	3430121	LBL MODEL/SERIAL/FREQUENCY	04-1013-2	A	1.000	EA
102	9504838	ASSY RCVR PCL-6060 940-960 MHZ	21D2915	REV D	1.000	EA
	9999897	REV ECO# DATE COMMENTS C 5341 05/20/94 CHANGE TO MC RF MOD. D 5365 06/24/94 NO CHANGE			.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9504838 DESCRIPTION: ASSY RCVR PCL-6060 940-960 MHZ
ENG. 21D2915 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
1	1050129	SCR PNH PHPS 4-40 X 1/4 SST			27.000	EA
5	1090109	CLIP NUT 6-32	SL-210-06-2		4.000	EA
6	1090182	SCR PNH PHPS 6-32 X 1/4 SST			8.000	EA
7	1090208	SCR PNH PHPS 6-32 X 3/8 SST			4.000	EA
8	1090604	WSHR FL #6 CD PL	AN960-6 CAD 1		4.000	EA
9	1090901	SCR BTH SKT CAP 6-32 X 3/8 BLK	6-32 X 3/8		7.000	EA
10	1150226	LUG #10 LKG PREFORMED	T-250		2.000	EA
12	1190214	NUT SPEED FOR.310 BARSTP TURRT	L97		2.000	EA
2	1230358	STDF 1/4 HEX 4-40 X 3/8 BRS	9738-B-0440		4.000	EA
3	1230366	STUD 1/4 HEX 4-40 X 1/2 BRS	9739-B-0440-28		1.000	EA
13	1251131	KNOB PANEL BLK 1/8 DIA W/SKIRT	KAS500B-1/8		1.000	EA
16	1560010	TUBING SHRINK BLACK 3/32"	MIL-I-23053/5		.300	FT
14	1560028	TUBING SHRINK BLACK 1/8"	MIL-I-23053/5		.160	FT
15	1560234	TBG TEFLON 22AWG NAT	TT-22		.200	FT
	1640630	W STRD 22GA WHITE-BLACK	UL 1061*90		.167	FT
	1640655	W STRD 22GA WHITE-RED	UL 1061*92		.167	FT
	1641554	W STRD 18GA BLACK 16/30	MIL-W76B TYPEMW		.167	FT
	1641604	W STRD 18GA GREEN 16/30	MIL-W76B TYPEMW		.125	FT
	1641646	W STRD 18GA WHITE 16/30	MIL-W76B TYPEMW		.167	FT
53	1641927	W BUSS 22GA	298		.400	FT
18	2011393	PANEL FRONT RX PCL-6060	05D3420	A	1.000	EA
19	2031847	CHASSIS RX PCL-606/6000	05B2778	M	1.000	EA
63	2031896	COVER CORCOM	05B2815	B	1.000	EA
67	2060036	BRKT ANGLE PCL-6000,RPL-4000	05A3441	A	2.000	EA
21	2064533	SPACER LOCKING BAR 6000	05A3326	A	2.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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DATE: 8/24/94

PARENT ITEM: 9504838 DESCRIPTION: ASSY RCVR PCL-6060 940-960 MHZ
ENG. 21D2915 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
22	2064541	LOCKING BAR SLIDING PCL-6000	05A3325	A	1.000	EA
23	2064558	LOCKING BAR 4 TABS 6000	05A3324	A	1.000	EA
24	2064566	SHIELD I/O PANEL PCL-6000	05C3327	A	1.000	EA
69	2065001	PLATE BLANK PCL-6000 MC 9PIN D	05A3447 PLT 1		1.000	EA
20	2065027	PANEL REAR RX PCL-6000MC	05D3455 PLT 2		1.000	EA
31	2202000	ASSY CA SMB/RT-SMB/RT 16"	24B1074-2	C	1.000	EA
	2202372	ASSY CA SMB/RT-SMB/RT 9"	24B1074-4	C	1.000	EA
26	2202422	ASSY CA SMB/RT-SMB/RT 21"	24B1074-5	C	1.000	EA
27	2202638	ASSY CA SMB/RT-SMB/RT 5"	24B1074-6	C	4.000	EA
25	2202687	ASSY CA N FT-SMB/RT 21.5"	24B1094-2	D	1.000	EA
61	2351005	ASSY HARN I/O RX PCL-6020/6030	29C1087 REV 2		1.000	EA
28	3010121	METER BEZEL FOR HOYT 2025	2025-B BEZEL		1.000	EA
29	3011335	METER 0-25 W/HDWR & 50A5123 M1	2025B W/50A5123		1.000	EA
30	3030244	CONN BNC BULKHD UG-1094/U	227754-1		4.000	EA
35	3091196	CONN IDC .156 06POS 22AWG RED	CE156F22-6-X-B		1.000	EA
36	3110004	CONN FASTON F .250 22-18 AWG	2-520184-2		1.000	EA
64	3110962	CONN FASTON F .110 22-18 AWG	2-520084-2		1.000	EA
38	3111267	KEY CONN IDC .156	PK156-C		1.000	EA
39	3190873	NUT DRESS SWITCH BLACK	7099-02-231		1.000	EA
68	3190899	PIN STOP RTRY SW 71ADF30011AJN	71J1071		2.000	EA
11	3190907	LABEL PIN RETAINER FOR 3150174	71-SS1073-1		1.000	EA
40	3291069	FILTER FD-THRU TYPE20 NO/HDWR	859619-1		13.000	EA
65	3291150	TERM CRIMP FEM FOR .045 SQ PIN	75187-006		5.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
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DATE: 8/24/94

PARENT ITEM: 9504838 DESCRIPTION: ASSY RCVR PCL-6060 940-960 MHZ
ENG. 21D2915 REV D

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
41	3291192	BARR STP 16 POS BLK W/TURRET	SSB6TP-16-07-04	1.000	EA
	3370046	CONN PWR W/FUSE FILTER FL1	06LE4	1.000	EA
43	3370236	FUSE .25X1.25 SLOW 0.5 A (FOR 220 VOLTS)	MDL 1/2	.000	EA
43	3370251	FUSE .25X1.25 SLOW 1. A (FOR 110 VOLTS)	MDL 1	2.000	EA
44	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A	3.000	EA
66	3430048	LBL FUSE "1/2AMP-1AMP"	JA412	1.000	EA
45	3430063	LBL "CAUTION-HIGH VOLTAGE"	10A1058-1 A0	1.000	EA
46	4020467	IDCTR FERRITE BEAD 500 OHM	VK200 10/3B	2.000	EA
	4090437	XFMR 8-P-98 RX 606/6000 T1	3-1108 D	1.000	EA
	9206624	ASSY RX AUDIO/PS 80KHZ 6000 A1	20D3024 A	1.000	EA
	930-03595-01	ASSY RF MOD 6060 MC 950 MHZ A2 (ECO 5365)	20D3107-5 REV B	1.000	EA
	9302092	ASSY PRESEL 960MHZ PCL606/6060 FL2	20C2947 A	1.000	EA
	9302100	ASSY FM DEMOD SEC A3	20D2949 E	1.000	EA
	9302944	ASSY DBL CONV/3RD LO 6030/6060 A4	20B3039 REV B	1.000	EA
	9303249	ASSY PREAMP/1ST MXR 6060 950 A5	20D2827-2 P1	1.000	EA
	9303298	ASSY MOD ADJ CHN FLTR PCL-6060 FL3	20B3089 PLT 1	1.000	EA
	9999897	REV ECO# DATE COMMENTS C 5341 08/22/94 CHANGE TO MC RF MOD. D 5365 08/24/94 CHANGE RFM TO 930-03595-01		.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206624 DESCRIPTION: ASSY RX AUDIO/PS 80KHZ 6000
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
4	1050129	SCR PNH PHPS 4-40 X 1/4 SST			12.000	EA
7	1050665	WSHR SHLDR #4 NYL	5607-15219		4.000	EA
3	1231547	STDF 1/4 HEX 4-40 X 1-5/8 BRSS	8230-B-0440-28		6.000	EA
8	1290188	SIL PAD TO-220	7403-09-FR-51		4.000	EA
10	1590702	SEALANT THREAD REMOVABLE ANER.	SUPER LOCK S360		.000	EA
2	2064525	BRKT RGLTR HEATSINK PCL-6000	05B3323	A	1.000	EA
	3150174	SW RTRY SP 12POS PCMT ADJ STOP S2	71ADF30-01-1AJN		1.000	EA
	3160231	SW TGL SPST ON-NONE-MOM PC MT S1	7108L41H3AV2QE		1.000	EA
	3250917	JUMPER MINI FOR 2 PINS=.025/.1 E1,E2,E3,E4,E5,E6,E7,E8,E9,E10	929952-10		10.000	EA
	3650173	RGLTR MC7805CT 05V 1.0A TO220 VR3	MC7805CT		1.000	EA
	3650207	RGLTR MC7815CT 15V 1.5A TO220 VR2	MC7815CT		1.000	EA
	3650215	RGLTR MC7912CT 12V 1.5A TO220 VR4	MC7912CT		1.000	EA
	3650223	RGLTR MC7915CT 15V 1.5A TO220 VR1	MC7915CT		1.000	EA
	4041059	ASSY 30.89MH CUP CORE COIL L5	02C1400-124	F	1.000	EA
	4041067	ASSY 39.56MH CUP CORE COIL L7	02C1400-125	F	1.000	EA
	4041109	ASSY 10.71MH CUP CORE COIL L9	02C1400-129	F	1.000	EA
	4041422	ASSY 7.510MH CUP CORE COIL L11	02C1400-165	F	1.000	EA
	4041984	ASSY 6.9MH CUP CORE COIL L10	02C1400-097	F	1.000	EA
	4200143	CAP MICA DIP 68PF 5% C70	DM-5-680J		1.000	EA
	4210340	CAP MICA DIP 200PF 5% C122	DM-15-201J		1.000	EA
	4210381	CAP MICA DIP 250PF 5% C72	DM-15-251J		1.000	EA
	4210399	CAP MICA DIP 270PF 5% C120	DM-15-271J		1.000	EA
	4210415	CAP MICA DIP 330PF 5% C76,C87,C124	DM-15-331J		3.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206624 DESCRIPTION: ASSY RX AUDIO/PS 80KHZ 6000 ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	4210423	CAP MICA DIP 360PF 5% C71	DM-15-361J		1.000	EA
	4210449	CAP MICA DIP 430PF 5% C73	DM-15-431J		1.000	EA
	4210464	CAP MICA DIP 500PF 5% C75	DM-15-501J		1.000	EA
	4210480	CAP MICA DIP 560PF 5% C74	DM-15-561J		1.000	EA
	4210548	CAP MICA DIP 910PF 5% C123	DM-15-911J		1.000	EA
	4220133	CAP MICA DIP 2200PF 1% C121	DM-19-222F		1.000	EA
	4220232	CAP MICA DIP 8200PF 5% C84	DM-19-822J		1.000	EA
	4260287	CAP ALLYTIC 2700/35V SNAP 105C C4,C5	LP272M035C1P3		2.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R229(BOTTOM OF PCB)	06A1016		1.000	EA
	4570440	RES 1/4W 5% CF 4.7K OHM AXL R200,R202	06A1016		2.000	EA
	8000093	ASSY PCB RX AUDIO/PS -OUT VNDR	20D3024	A	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
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DATE: 8/24/94

PARENT ITEM: 9108770 DESCRIPTION: KIT UPGR 6000 RX APS 115KHZ
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	4042115	ASSY 7.90MH CUP CORE COIL L9	02C1400-170	F	1.000	EA
	4042123	ASSY 5.50MH CUP CORE COIL L11	02C1400-171	F	1.000	EA
	4042131	ASSY 5.00MH CUP CORE COIL L10	02C1400-172	F	1.000	EA
	4200069	CAP MICA DIP 100PF 5% C122	DM-5-101J		1.000	EA
	4200176	CAP MICA DIP 20PF 5% C76	DM-5-200J		1.000	EA
	4200226	CAP MICA DIP 51PF 5% C70	DM-5-510J		1.000	EA
	4210308	CAP MICA DIP 150PF 5% C120	DM-15-151J		1.000	EA
	4210324	CAP MICA DIP 180PF 5% C72,C124	DM-15-181J		2.000	EA
	4210373	CAP MICA DIP 240PF 5% C87	DM-15-241J		1.000	EA
	4210399	CAP MICA DIP 270PF 5% C71	DM-15-271J		1.000	EA
	4210415	CAP MICA DIP 330PF 5% C73	DM-15-331J		1.000	EA
	4210423	CAP MICA DIP 360PF 5% C75	DM-15-361J		1.000	EA
	4210449	CAP MICA DIP 430PF 5% C74,C123	DM-15-431J		2.000	EA
	4220042	CAP MICA DIP 1200PF 5% C121	DM-19-122J		1.000	EA
	4220257	CAP MICA DIP 6200PF 5% C84	DM-19-622J		1.000	EA
	4570464	RES 1/4W 5% CF 6.2K OHM AXL R200,R202	06A1016		2.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206616 DESCRIPTION: KIT PREP PART RX AUDIO 6000 AC
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3091139	CONN 6PIN HDR BRKAWAY LKG .156 P1	MLSS156-6-X-B	1.000	EA
	3091147	HDR .025X.100 STRT 20P 1ROW P2,P3,P4,P5,E1,E2,E3,E5,E6,E7,E8,E9,E11	MFSS100-20-X-B	3.850	EA
	3091220	CONN SMB PC MT VERT MALE RECPT J1	2009-7511-000	1.000	EA
	3091253	HDR .025X.100 STRT 72P 2ROW E4,E10	CA-D72-24C-44	.167	EA
	3250016	SKT IC DIP 08 PIN .3 U2,U3,U4,U5,U6,U7,U8,U9,U10,U11,U12,U13,U14,U17, U18,U19,U20,U21	ICO-083-S8-T	18.000	EA
	3250024	SKT IC DIP 14 PIN .3 U1,U15,U16	ICO-143-S8-T	3.000	EA
	3270394	RELAY 4PDT 2A 12V PC MT NORMAL K1	DS4E-S-DC12V	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035 CR15,CR16,CR17,CR18	1N4154	4.000	EA
	3610003	DIO RECT 200V 1A SI D041 CR2,CR3,CR4,CR5,CR6,CR7,CR8,CR9,CR10,CR11,CR12, CR13,CR14	1N4003	13.000	EA
	3610078	DIO BRIDGE 100V 2A CR1	MDA201	1.000	EA
	3630456	XT 2N3904 Q1	2N3904	1.000	EA
	3661147	IC SN7406 HEX INV/BUF 30V OC U16	SN7406N	1.000	EA
	3661766	IC 74HC20 DUAL 4INP POS-NAND U15	MM74HC20N	1.000	EA
	3730173	IC LM318N OPAMP HISPEED U3,U4,U5	LM318N	3.000	EA
	3730215	IC LM1458N OPAMP DUAL U17,U18,U20	LM1458N	3.000	EA
	3730728	IC 5534 OPAMP U2,U8,U13,U14	NE5534P	4.000	EA
	3730934	IC HI-200-5 DUAL SPST CMOS SW U1	HI3-0200-5	1.000	EA
	3730967	IC DUAL OP AMP U6,U7,U9,U10,U11,U12,U19	NE5532P	7.000	EA
	4020038	IDCTR MINI-RED 2.2 MH 5% L17	MR 2200 5%	1.000	EA
	4020053	IDCTR MINI-RED 4.7 MH 10% L8	MR 4700 10%	1.000	EA
	4020061	IDCTR MINI-RED 10 MH 10% L15,L16	MR 10,000 10%	2.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L1,L2,L3,L18	VK200 10/3B	4.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9206616 DESCRIPTION: KIT PREP PART RX AUDIO 6000 AC
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4200002	CAP MICA DIP 5PF +/- 0.5PF C15,C26,C49,C54,C86,C89,C141	DM-5-050D	7.000	EA
	4200069	CAP MICA DIP 100PF 5% C105,C106	DM-5-101J	2.000	EA
	4200077	CAP MICA DIP 10PF +/- 0.5PF C33,C60,C77	DM-5-100D	3.000	EA
	4200085	CAP MICA DIP 3PF +/- 0.5PF C99,C107	DM-5-030D	2.000	EA
	4200127	CAP MICA DIP 18PF 5% C111	DM-5-180J	1.000	EA
	4200192	CAP MICA DIP 22PF 5% C30,C79,C96	DM-5-220J	3.000	EA
	4200242	CAP MICA DIP 75PF 5% C125	DM-5-750J	1.000	EA
	4210290	CAP MICA DIP 130PF 5% C19	DM-15-131J	1.000	EA
	4210357	CAP MICA DIP 220PF 5% C23	DM-15-221J	1.000	EA
	4210381	CAP MICA DIP 250PF 5% C126	DM-15-251J	1.000	EA
	4210506	CAP MICA DIP 680PF 5% C24	DM-15-681J	1.000	EA
	4210548	CAP MICA DIP 910PF 5% C25	DM-15-911J	1.000	EA
	4220018	CAP MICA DIP 1000PF 5% C18,C20	DM-19-102J	2.000	EA
	4220026	CAP MICA DIP 1100PF 5% C27	DM-19-112J	1.000	EA
	4220174	CAP MICA DIP 2870PF 2% C28	DM-19-F2871G	1.000	EA
	4220232	CAP MICA DIP 8200PF 5% C22	DM-19-822J	1.000	EA
	4250825	CAP PCARB .01UF/100V/2.5% .2 C29,C34,C37,C38,C39,C63,C64,C66,C67	FKC2 .01/100/2	9.000	EA
	4280541	CAP TANT 10/20V 20% .100 LS C100,C101	TAP106M020SRW	2.000	EA
	4280558	CAP TANT 100/20V 10% .200 LS C61,C62	TAP107K020CCS	2.000	EA
	4280566	CAP TANT 150/16V 20% .200 LS C90,C91	TAP157M016CCS	2.000	EA
	4280574	CAP TANT 2.2/35V 20% .100 LS C1,C2,C3,C6,C9,C10,C11,C46,C55,C80,C81,C94,C95, C103,C104,C109	TAP225M035SRW	16.000	EA
	4280582	CAP TANT 22/35V 10% .200 LS C52,C53,C56,C57	TAP226K035CRW	4.000	EA

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PARENT ITEM: 9206616 DESCRIPTION: KIT PREP PART RX AUDIO 6000 AC
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4280624	CAP TANT 47/20V 20% .200 LS C92,C110	TAP476M020CRW	2.000	EA
	4310264	CAP CER .1/50V Z5U 20% T&R C7,C8,C12,C13,C14,C16,C17,C21,C31,C32,C35,C36,C40, C41,C42,C43,C44,C47,C48,C50,C51,C58,C59,C65,C68, C69,C82,C83,C85,C88,C97,C98,C112,C113,C127,C128, C129,C130,C131,C132,C133,C134,C135,C136,C137,C138, C139,C140	SR205E104MAA	48.000	EA
	4310272	CAP CER .01/50V X7R 10% T&R C102,C108	SR155C103KAA	2.000	EA
	4310280	CAP CER .001/100V X7R 10% C45,C93	SR151C102KAA	2.000	EA
	4500005	RES 1/8W .1% MF 97.6 OHM AXL R32	RN55D97R6B	1.000	EA
	4500021	RES 1/8W .1% MF 459 OHM AXL R77	RN55D4590B	1.000	EA
	4500039	RES 1/8W .1% MF 340 OHM AXL R83	RN55D3400B	1.000	EA
	4500047	RES 1/8W .1% MF 732 OHM AXL R211	RN55D7320B	1.000	EA
	4500054	RES 1/8W .1% MF 1.42K OHM AXL R74	RN55D1421B	1.000	EA
	4500062	RES 1/8W .1% MF 1.56K OHM AXL R73	RN55D1561B	1.000	EA
	4500088	RES 1/8W .1% MF 2.4K OHM AXL R102,R105,R106,R107,R108, R152,R153,R154	RN55D2401B	8.000	EA
	4500096	RES 1/8W .1% MF 1.5K OHM AXL R103,R124	RN55D1501B	2.000	EA
	4500104	RES 1/8W .1% MF 300 OHM AXL R147,R201	RN55D3000B	2.000	EA
	4510103	RES 1/4W 1% MF 4.99K OHM AXL R62,R85,R94,R116,R123	5043ED4K990F	5.000	EA
	4510111	RES 1/4W 1% MF 5.62K OHM AXL R110	5043ED5K620F	1.000	EA
	4510145	RES 1/4W 1% MF 10.0K OHM AXL R149,R150	5043ED10K00F	2.000	EA
	4510160	RES 1/4W 1% MF 20.0K OHM AXL R27	5043ED20K00F	1.000	EA
	4510293	RES 1/4W 1% MF 2.00K OHM AXL R113,R119,R120,R121	5043ED2K000F	4.000	EA
	4510301	RES 1/4W 1% MF 1.00K OHM AXL R25,R28,R35,R36,R75,R80, R96,R99	5043ED1K000F	8.000	EA
	4510624	RES 1/4W 1% MF 60.4 OHM AXL R148,R151	5043ED60R40F	2.000	EA

PARENT ITEM: 9206616 DESCRIPTION: KIT PREP PART RX AUDIO 6000 AC
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4510814	RES 1/4W 1% MF 931 OHM AXL R72	5043ED931R0F	1.000	EA
	4540118	RES SIP 10K OHM 1/8W 2% 8 PIN R142	4608X-101-103	1.000	EA
	4570008	RES 1/4W 5% CF 10 OHM AXL R2,R3,R5,R8,R15,R17,R18,R24,R29,R31,R33,R37,R43, R44,R50,R55,R56,R59,R69,R79,R81,R84,R87,R95,R101, R104,R109,R112,R114,R118,R137,R138,R141,R144,R145, R181,R222,R233	06A1016	38.000	EA
	4570144	RES 1/4W 5% CF 100 OHM AXL R63,R64,R67,R93,R125,R126,R127,R190,R193,R194, R223,R224,R231	06A1016	13.000	EA
	4570160	RES 1/4W 5% CF 120 OHM AXL R197	06A1016	1.000	EA
	4570184	RES 1/4W 5% CF 180 OHM AXL R136	06A1016	1.000	EA
	4570232	RES 1/4W 5% CF 330 OHM AXL R20	06A1016	1.000	EA
	4570240	RES 1/4W 5% CF 360 OHM AXL R203	06A1016	1.000	EA
	4570248	RES 1/4W 5% CF 390 OHM AXL R146	06A1016	1.000	EA
	4570256	RES 1/4W 5% CF 470 OHM AXL R53,R130,R187	06A1016	3.000	EA
	4570272	RES 1/4W 5% CF 560 OHM AXL R26,R34,R76	06A1016	3.000	EA
	4570288	RES 1/4W 5% CF 680 OHM AXL R38,R45,R51	06A1016	3.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R1,R4,R11,R14,R39,R54,R92,R122, R131,R132,R135,R139,R140,R143, R156,R184,R191,R195,R221	06A1016	19.000	EA
	4570344	RES 1/4W 5% CF 1.5K OHM AXL R66	06A1016	1.000	EA
	4570376	RES 1/4W 5% CF 2.2K OHM AXL R6,R13,R16,R58,R60,R71,R204	06A1016	7.000	EA
	4570384	RES 1/4W 5% CF 2.4K OHM AXL R97	06A1016	1.000	EA
	4570408	RES 1/4W 5% CF 3.3K OHM AXL R198	06A1016	1.000	EA
	4570416	RES 1/4W 5% CF 3.6K OHM AXL R225	06A1016	1.000	EA
	4570424	RES 1/4W 5% CF 3.9K OHM AXL R86	06A1016	1.000	EA
	4570440	RES 1/4W 5% CF 4.7K OHM AXL R9,R10,R115,R117,R180	06A1016	5.000	EA

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DATE: 8/24/94

PARENT ITEM: 9206616 DESCRIPTION: KIT PREP PART RX AUDIO 6000 AC
ENG. 20D3024 A

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4570456	RES 1/4W 5% CF 5.6K OHM AXL R19,R207	06A1016	2.000	EA
	4570472	RES 1/4W 5% CF 6.8K OHM AXL R65	06A1016	1.000	EA
	4570504	RES 1/4W 5% CF 10K OHM AXL R21,R41,R42,R46,R47,R48,R49,R57,R70,R155,R174, R177,R178,R182,R183,R185,R188,R228,R232	06A1016	19.000	EA
	4570528	RES 1/4W 5% CF 15K OHM AXL R40	06A1016	1.000	EA
	4570532	RES 1/4W 5% CF 18K OHM AXL R91,R219	06A1016	2.000	EA
	4570548	RES 1/4W 5% CF 22K OHM AXL R100	06A1016	1.000	EA
	4570612	RES 1/4W 5% CF 47K OHM AXL R216,R218	06A1016	2.000	EA
	4570636	RES 1/4W 5% CF 68K OHM AXL R179	06A1016	1.000	EA
	4570668	RES 1/4W 5% CF 100K OHM AXL R52,R68,R128,R129,R189, R205,R206,R209,R227	06A1016	9.000	EA
	4570684	RES 1/4W 5% CF 150K OHM AXL R214,R215,R217	06A1016	3.000	EA
	4570708	RES 1/4W 5% CF 220K OHM AXL R192	06A1016	1.000	EA
	4630166	POT CER PC PIN 5K OHM .5W 25T R22,R88,R89,R98,R196	3296W-1-502	5.000	EA
	4630273	POT CER PC PIN 10K OHM .5W 25T R7,R12,R61,R166,R167,R168,R169,R170,R171,R172, R186,R208,R210,R212,R213,R220	3296W-1-103	16.000	EA
	4630331	POT CER PC PIN 20K OHM .5W 25T R90	3296W-1-203	1.000	EA
	4630778	POT CER PC PIN 100KOHM .5W 25T R173	3296W-1-104	1.000	EA
	4630786	POT CER PC PIN 1K OHM .5W 25T R111	3296W-1-102	1.000	EA
	4631008	POT CER PC PIN 500 OHM .5W 25T R23,R30,R78,R82	3296W-1-501	4.000	EA

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DATE: 8/24/94

PARENT ITEM: 930-03462-01 DESCRIPTION: ASSY RF MOD 6010 MC 940-960MHZ
ENG. 20D3106-1 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
8	1050129	SCR PNH PHPS 4-40 X 1/4 SST		2.000	EA
7	1050434	SCR FLH SKT CAP 4-40 X 5/16 SS		2.000	EA
20	1290097	FINGER STRIP 16 LI RFI/EMI	60RC-16.00-02	.687	EA
13	1310093	CLIP MODULE PCL-606/6000	05C2882 B	16.000	EA
15	1670199	CA COAX EZ-BEND .047 DIA Z2	HC10000-1	.542	FT
19	2064632	COVER SHIELD L.O. 950 MHZ 6000	05B3347 B	1.000	EA
6	2064640	SHIELD L.O. PCL-6000	05D3348 PLT 2	1.000	EA
4	209-10177-0	COVER BOT RF MODULE PCL-6000	SIZE B REV 1	1.000	EA
3	2092534	FRAME BASE PCL-6000	05B3334 B	1.000	EA
2	2092914	FRAME RF MODULE TX 6010 MC	05B3450 REV A	1.000	EA
5	2092955	COVER TOP TX RF MOD 950 MC INSTALL IN TEST	05B3456 PLT 3	1.000	EA
21	2350965	ASSY HARN RF MOD TX PCL-6010	29A1083 PLT 1	1.000	EA
	3111119	CONN SHORTING PLUG RED P1,P2,P3	09-3010-2-03-12	3.000	EA
16	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL1,FL2,FL3,FL4,FL5,FL6,FL7, FL8,FL9	859619-1	9.000	EA
	3341062	XTAL 1ST LO 102.000 MHZ Y1	30A0093-1 M	1.000	EA
	3350188	MIXER SRA-12 HY1	SRA-12	1.000	EA
	3350402	FLTR HELICAL 1015 MHZ 3 POLE FL10	302HXPK-1271B	1.000	EA
	3350410	FLTR HELICAL 910 MHZ 2 POLE FL12	252HXPK-2737F	1.000	EA
	3350428	FLTR HELICAL 948 MHZ 3 POLE FL11	302HXPK-1259B	1.000	EA
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG Y1	MC501265	1.000	EA
	3640422	XT MRF 581 Q8	MRF 581	1.000	EA
	3730967	IC DUAL OP AMP U3	NE5532P	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-03462-01 DESCRIPTION: ASSY RF MOD 6010 MC 940-960MHZ
ENG. 20D3106-1 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3731056	IC MC145152P2 FREQ SYNC CONT.	MC145152P2	1.000	EA
		U1			
	3731080	IC SP8647B DUAL MOD 10/11	SP8647B/DG	1.000	EA
		U2			
	3731536	IC SL560C/DP8 AMP 8 PIN DIP	SL560C/DP8	1.000	EA
		U4			
	4011045	COIL AIR 1T 22BUSS(18)LH	3-2063 PLT 1	1.000	EA
		L16			
	4020640	IDCTR MINI-RED .1 UH 10%	MR .10 10%	1.000	EA
		L10			
	4351276	CAP MLCC 1206 NPO 10 PF 5%	06A1013	3.000	EA
		C94,C96(BOT OF PCB),C99			
	4370201	CAP VAR PC MIN .8-10PF	5201	2.000	EA
		C30,C34			
	4370300	CAP VAR 4-10PF	9372	1.000	EA
		C98			
	4370375	CAP VAR CER 1-3PF	DV6PS3A	1.000	EA
		C65			
	4550257	RES CHIP 1206 1/8W 5% 100 OHM	06A1015	1.000	EA
		R75			
	4570120	RES 1/4W 5% CF 75 OHM AXL	06A1016	2.000	EA
		R78,R80			
	4570160	RES 1/4W 5% CF 120 OHM AXL	06A1016	1.000	EA
		R79			
	4570256	RES 1/4W 5% CF 470 OHM AXL	06A1016	1.000	EA
		R74			
	4590311	THERMISTOR 680 OHM 10%	1K681K	1.000	EA
		RT1			
	600-10227-0	SCHEM PCL-6010MC TX RF MODULES	SIZE A REV A	.000	EA
	603-10146-0	PROCESS SPEC ASSY MARKING/LBL	PS-3002 REV 1	.000	EA
	603-10149-0	PROCESS SPEC ASSEMBLY STANDARD	PS-3001 REV 1	.000	EA
	930-10110-0	ASSY TX RF MOD MC NEUTER/1ST	20D3106-0 REV B	1.000	EA
	9999897			.000	EA

REV	ECO#	DATE	COMMENTS
A	5366	05/27/94	CREATE NEUT STRUCTURE, RELEASE
B	5395	07/28/94	2ND ASSY PARTS, DWG UPDATES

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10110-01 DESCRIPTION: ASSY TX RF MOD MC NEUTER/1ST
ENG. 20D3106-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
18	1230663	FASTENER CHASSIS	7228-B-B-15	2.000	EA
	3050572	CONN D 25S FILT 820P PCST 4-40 J11	FCC17B25SK440	1.000	EA
	3091220	CONN SMB PC MT VERT MALE RECPT J1,J2,J3,J7,J10	2009-7511-000	5.000	EA
	3150182	SW 16P BCD ROT OUTPUT GREEN S1,S2,S3	DRD-16C	3.000	EA
	3190071	SW DIP 4 POSITION SEALED S4	76SB04S	1.000	EA
	3250016	SKT IC DIP 08 PIN .3 U3,U4	ICO-083-S8-T	2.000	EA
	3250032	SKT IC DIP 16 PIN .3 U2	ICO-163-S8-T	1.000	EA
	3250081	SKT IC DIP 28 PIN .6 U1	ICO-286-S8-T	1.000	EA
	3251261	SKT PIN .040 PRESSFIT ZERO GLD P1,P2,P3,Y1	8134-HC-12P2	11.000	EA
	3291259	TEST PT LOOP YEL 30POS BRKAWAY TP1,TP2,TP4	TP-104-30-04	.100	EA
	3350725	OSC XTAL 12.8 MHZ TCXO OSC1	TCO-909Z	1.000	EA
	3390820	LED RED T1 1.0 @ 2 CR1	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2 CR5,CR6	HLMP-1790	2.000	EA
1	347-04954-01	PCB TX RF MOD PCL-6010 MC	51B6169 REV A	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035 CR2,CR3,CR4,CR13	1N4154	4.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS CR14	5082-0180	1.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0 CR15,CR16	HSMS-2820-T30	2.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0" CR7,CR8,CR9	HSMP-3820	3.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A) CR10,CR11,CR12	MMBV109L	3.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF Q5	2N2857	1.000	EA
	3640307	XT U310 Q6	U310	1.000	EA
	3640422	XT MRF 581 Q7	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23 Q1,Q2,Q3	MMBT3904	3.000	EA

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DATE: 8/24/94

PARENT ITEM: 930-10110-01 DESCRIPTION: ASSY TX RF MOD MC NEUTER/1ST
ENG. 20D3106-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3640562	XT SST310 JFET SOT-23 Z10/20AB Q4	SST310	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92 VR1	MC78L12ACP	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC AR1,AR4	MAV-11	2.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN AR2,AR3	MAR-3SM	2.000	EA
	3731965	IC RF AMP 1GHZ 7DB SMT AR5	MSA-0504	1.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L1,L5,L9,L12,L17	VK200 10/3B	5.000	EA
	4020517	IDCTR MINI-RED .27 UH 10% L13	MR .27 10%	1.000	EA
	4020707	IDCTR MINI-RED .47 UH 10% L11	MR .47 10%	1.000	EA
	4020806	IDCTR 31.5NH 5% 1.5T BROWN L14	132-01	1.000	EA
	4020871	IDCTR 79NH 5% 6.5T BLUE L6,L7	132-06	2.000	EA
	4020897	IDCTR 117NH 5% 8.5T GRAY L8	132-08	1.000	EA
	4020988	IDCTR CHIP 1.0 UH 10% SMT1210 L18,L19,L20,L21,L22,L23,L24	1210-102K	7.000	EA
	4021119	IDCTR CHIP 1000 UH 10% SMT1812 L2,L3,L4	NLF1812-102K	3.000	EA
	4100038	XFMR MCL T4-1/W38 CASE T1	MCL T4-1	1.000	EA
	4200119	CAP MICA DIP 2PF +/- 0.5PF C105	DM-5-020D	1.000	EA
	4200135	CAP MICA DIP 43PF 5% C57	DM-5-430J	1.000	EA
	4200150	CAP MICA DIP 24PF 5% C58	DM-5-240J	1.000	EA
	4200226	CAP MICA DIP 51PF 5% C59	DM-5-510J	1.000	EA
	4280558	CAP TANT 100/20V 10% .200 LS C22,C36,C43,C44	TAP107K020CCS	4.000	EA
	4280574	CAP TANT 2.2/35V 20% .100 LS C5,C6,C13	TAP225M035SRW	3.000	EA
	4280582	CAP TANT 22/35V 10% .200 LS C4,C7,C38	TAP226K035CRW	3.000	EA
	4280616	CAP TANT 4.7/35V 10% .100 LS C1	TAP475K035SRW	1.000	EA
	4280632	CAP TANT 6.8/35V 20% .100 LS C11	TAP685M035SCS	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10110-01 DESCRIPTION: ASSY TX RF MOD MC NEUTER/1ST ENG. 20D3106-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4300117	CAP DISC CER N750 20PF/100V 5% C81,C82,C83,C151	DD104B10N750200	4.000	EA
	4300315	CAP DISC NPO 8.2 PF +/-0.5PF C150	TBA	1.000	EA
	4320008	CAP TANT SMT 1UF/35V 3528 10% C12,C75,C117,C119,C121,C123	06A1017	6.000	EA
	4350534	CAP MLCC 1206 X7R .1 UF 10% C23,C24,C27,C28,C31,C32,C48,C49,C50,C74,C80,C86, C89,C92	06A1014	14.000	EA
	4350823	CAP MLCC 1206 X7R .01 UF 10% C2,C3,C8,C9,C10,C14,C15,C16,C17,C18,C19,C20,C21, C25,C29,C33,C45,C51,C52,C54,C72,C73,C76,C77,C78, C79,C90,C91,C93,C102,C103,C104,C106,C107,C108, C109,C110,C125,C126,C127,C128,C129	06A1014	42.000	EA
	4351078	CAP MLCC 1206 NPO 22 PF 5% C26,C47,C55	06A1013	3.000	EA
	4351086	CAP MLCC 1206 X7R .001 UF 10% C42,C85,C87,C111,C112,C113,C114,C115,C116,C118, C120,C122	06A1014	12.000	EA
	4351144	CAP MLCC 1206 NPO 1.0 PF +-.25 C124	06A1013	1.000	EA
	4351227	CAP MLCC 1206 NPO 5.1 PF +-.25 C60	06A1013	1.000	EA
	4351276	CAP MLCC 1206 NPO 10 PF 5% C39	06A1013	1.000	EA
	4351318	CAP MLCC 1206 NPO 18 PF 5% C56	06A1013	1.000	EA
	4351342	CAP MLCC 1206 NPO 33 PF 5% C37,C61	06A1013	2.000	EA
	4351367	CAP MLCC 1206 NPO 47 PF 5% C40,C46	06A1013	2.000	EA
	4351409	CAP MLCC 1206 NPO 100 PF 5% C53	06A1013	1.000	EA
	4351417	CAP MLCC 1206 NPO 120 PF 5% C41	06A1013	1.000	EA
	4351441	CAP MLCC 1206 NPO 330 PF 5% C62	06A1013	1.000	EA
	4370219	CAP VAR 1-14PF C84	8053	1.000	EA
	4370300	CAP VAR 4-10PF C88,C95	9372	2.000	EA
	4370425	CAP VAR SURFACE MT 1-4PF C101	GKZ4R000	1.000	EA
	4470043	RES 1/2W 5% CC 150 OHM AXL R44	RC20GF151J	1.000	EA

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DATE: 8/24/94

PARENT ITEM: 930-10110-01 DESCRIPTION: ASSY TX RF MOD MC NEUTER/1ST ENG. 20D3106-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4470365	RES 1/2W 5% CC 22 OHM AXL R73	RC20GF220J	1.000	EA
	455-10147-00	RES CHIP 2512 1W 5% 60 OHM R84	CHP1-100-60RJ-B	1.000	EA
	455-10148-00	RES CHIP 2512 1W 5% 110 OHM R83	CHP1-100-110J-B	1.000	EA
	455-10173-00	RES CHIP 2512 1W 5% 180 OHM R70	CHP-100-180J-B	1.000	EA
	4550075	RES CHIP 1206 1/8W 5% 18 OHM R51	06A1015	1.000	EA
	4550133	RES CHIP 1206 1/8W 5% 33 OHM R71,R72	06A1015	2.000	EA
	4550315	RES CHIP 1206 1/8W 5% 180 OHM R40,R41,R43	06A1015	3.000	EA
	4550364	RES CHIP 1206 1/8W 5% 300 OHM R50,R52	06A1015	2.000	EA
	4550463	RES CHIP 1206 1/8W 5% 750 OHM R67	06A1015	1.000	EA
	4550471	RES CHIP 1206 1/8W 5% 820 OHM R15,R65	06A1015	2.000	EA
	4550497	RES CHIP 1206 1/8W 5% 1.0K OHM R1,R27,R28,R29,R31,R32,R34,R66,R76,R85	06A1015	10.000	EA
	4550554	RES CHIP 1206 1/8W 5% 1.8K OHM R64	06A1015	1.000	EA
	4550570	RES CHIP 1206 1/8W 5% 2.2K OHM R25,R26,R35,R36,R39	06A1015	5.000	EA
	4550596	RES CHIP 1206 1/8W 5% 2.7K OHM R63	06A1015	1.000	EA
	4550653	RES CHIP 1206 1/8W 5% 4.7K OHM R22,R23,R24,R55,R56,R57	06A1015	6.000	EA
	4550737	RES CHIP 1206 1/8W 5% 10K OHM R38	06A1015	1.000	EA
	4551321	RES CHIP 2010 1/2 W 5% 200 OHM R81,R82	CRCW2010201JB02	2.000	EA
	4570040	RES 1/4W 5% CF 22 OHM AXL R11,R12	06A1016	2.000	EA
	4570080	RES 1/4W 5% CF 47 OHM AXL R46	06A1016	1.000	EA
	4570120	RES 1/4W 5% CF 75 OHM AXL R48	06A1016	1.000	EA
	4570144	RES 1/4W 5% CF 100 OHM AXL R13,R42,R69,R77,R86	06A1016	5.000	EA
	4570160	RES 1/4W 5% CF 120 OHM AXL R68	06A1016	1.000	EA
	4570176	RES 1/4W 5% CF 150 OHM AXL R14	06A1016	1.000	EA

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DATE: 8/24/94

PARENT ITEM: 930-10110-01 DESCRIPTION: ASSY TX RF MOD MC NEUTER/1ST ENG. 20D3106-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4570200	RES 1/4W 5% CF 220 OHM AXL R45	06A1016	1.000	EA
	4570272	RES 1/4W 5% CF 560 OHM AXL R4	06A1016	1.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R8,R9,R18,R21,R49	06A1016	5.000	EA
	4570328	RES 1/4W 5% CF 1.2K OHM AXL R2	06A1016	1.000	EA
	4570360	RES 1/4W 5% CF 1.8K OHM AXL R7,R10	06A1016	2.000	EA
	4570400	RES 1/4W 5% CF 3.0K OHM AXL R3	06A1016	1.000	EA
	4570416	RES 1/4W 5% CF 3.6K OHM AXL R17,R20	06A1016	2.000	EA
	4570472	RES 1/4W 5% CF 6.8K OHM AXL R16	06A1016	1.000	EA
	4570628	RES 1/4W 5% CF 56K OHM AXL R5,R6	06A1016	2.000	EA
	4570652	RES 1/4W 5% CF 82K OHM AXL R19	06A1016	1.000	EA
	4570668	RES 1/4W 5% CF 100K OHM AXL R30	06A1016	1.000	EA
	4631073	POT CER SMT 10K 12T TOP 0.25W R33,R37	3269W-1-103	2.000	EA
	603-10146-01	PROCESS SPEC ASSY MARKING/LBL	PS-3002 REV 1	.000	EA
	603-10149-01	PROCESS SPEC ASSEMBLY STANDARD	PS-3001 REV 1	.000	EA
	9999897	REV ECO# DATE COMMENTS		.000	EA
		A 5366 05/27/94 CREATE NEUT STRUCTURE, RELEASE			
		A 5366A1 06/10/94 CHANGE R1 TO SMT			
		B 5395 07/28/94 MOVE COMPONENTS TO SECOND ASSY, UPDATE DWG			
		5365A2 08/04/94 CHG R64 FROM 4550596 TO 4550554			

MOSELEY ASSOCIATES, INC.
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DATE: 8/24/94

PARENT ITEM: 930-03470-01 DESCRIPTION: ASSY RF MOD 6020/30 MC 950 MHz
ENG. 20D3107-1 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
8	1050129	SCR PNH PHPS 4-40 X 1/4 SST		2.000	EA
7	1050434	SCR FLH SKT CAP 4-40 X 5/16 SS		2.000	EA
20	1290097	FINGER STRIP 16 LI RFI/EMI	60RC-16.00-02	.687	EA
13	1310093	CLIP MODULE PCL-606/6000	05C2882 B	16.000	EA
15	1670199	CA COAX EZ-BEND .047 DIA L01,L02	HC10000-1	.833	FT
19	2064632	COVER SHIELD L.O. 950 MHZ 6000	05B3347 B	1.000	EA
6	2064640	SHIELD L.O. PCL-6000	05D3348 PLT 2	1.000	EA
4	209-10177-00	COVER BOT RF MODULE PCL-6000	SIZE B REV 1	1.000	EA
3	2092534	FRAME BASE PCL-6000	05B3334 B	1.000	EA
2	2092922	FRAME RF MODULE RX 6000 MC	05B3451 REV A	1.000	EA
5	2092963	COVER TOP RX RF MOD 950 MC INSTALL IN TEST	05B3457 PLT 2	1.000	E
21	2350957	ASSY HARN RF MOD RX PCL-6000	29A1082 PLT 2	1.000	EA
	3111119	CONN SHORTING PLUG RED P1,P2,P3	09-3010-2-03-12	3.000	EA
16	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL1,FL2,FL3,FL4,FL6,FL7,FL8,FL9	859619-1	8.000	EA
	3341062	XTAL 1ST LO 102.000 MHZ Y1	30A0093-1 M	1.000	EA
	3350188	MIXER SRA-12 HY1	SRA-12	1.000	EA
	3350360	FLTR 550 MHZ LPF FL13	PLP-550	1.000	EA
	3350402	FLTR HELICAL 1015 MHZ 3 POLE FL10	302HXPK-1271B	1.000	EA
	3350410	FLTR HELICAL 910 MHZ 2 POLE FL12	252HXPK-2737F	1.000	EA
	3350428	FLTR HELICAL 948 MHZ 3 POLE FL11	302HXPK-1259B	1.000	EA
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG Y1	MC501265	1.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS CR14	5082-0180	1.000	EA
	3640422	XT MRF 581 Q8	MRF 581	1.000	EA

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DATE: 8/24/94

PARENT ITEM: 930-03470-01 DESCRIPTION: ASSY RF MOD 6020/30 MC 950 MHZ
ENG. 20D3107-1 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3730967	IC DUAL OP AMP	NE5532P	1.000	EA
		U3			
	3731056	IC MC145152P2 FREQ SYNC CONT.	MC145152P2	1.000	EA
		U1			
	3731080	IC SP8647B DUAL MOD 10/11	SP8647B/DG	1.000	EA
		U2			
	3731536	IC SL560C/DP8 AMP 8 PIN DIP	SL560C/DP8	1.000	EA
		U4			
	4011045	COIL AIR 1T 22BUSS(18)LH	3-2063 PLT 1	1.000	EA
		L16			
	4020640	IDCTR MINI-RED .1 UH 10%	MR .10 10%	1.000	EA
		L10			
	4350823	CAP MLCC 1206 X7R .01 UF 10%	06A1014	1.000	EA
		C106			
	4351276	CAP MLCC 1206 NPO 10 PF 5%	06A1013	3.000	EA
		C94,C96(BOT OF PCB),C99			
	4370201	CAP VAR PC MIN .8-10PF	5201	2.000	EA
		C30,C34			
	4370300	CAP VAR 4-10PF	9372	1.000	EA
		C98			
	4370375	CAP VAR CER 1-3PF	DV6PS3A	1.000	EA
		C65			
	455-10178-00	RES CHIP 2010 1/2W 5% 360 OHM	CRCW2020361JB02	1.000	EA
		R78			
	4550257	RES CHIP 1206 1/8W 5% 100 OHM	06A1015	1.000	EA
		R75			
	4550414	RES CHIP 1206 1/8W 5% 470 OHM	06A1015	1.000	EA
		R86			
	4570256	RES 1/4W 5% CF 470 OHM AXL	06A1016	1.000	EA
		R74			
	4590311	THERMISTOR 680 OHM 10%	1K681K	1.000	EA
		RT1			
	600-10228-00	SCHEM PCL-6000MC RX RF MODULES	SIZE A REV A	.000	EA
	603-10146-00	PROCESS SPEC ASSY MARKING/LBL	PS-3002 REV 1	.000	EA
	603-10149-00	PROCESS SPEC ASSEMBLY STANDARD	PS-3001 REV 1	.000	EA
	930-10109-00	ASSY RX RF MOD MC NEUTER/1ST	20D3107-0 REV B	1.000	EA
	9999897	REV ECO# DATE COMMENTS		.000	EA
		A 5365 05/27/94 CREATE NEUTER STRUCT, REL			
		B 5396 07/28/94 2ND ASSY PARTS, DWG UPDATES			

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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DATE: 8/24/94

PARENT ITEM: 930-03595-01 DESCRIPTION: ASSY RF MOD 6060 MC 950 MHZ
ENG. 20D3107-5 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
8	1050129	SCR PNH PHPS 4-40 X 1/4 SST		2.000	EA
7	1050434	SCR FLH SKT CAP 4-40 X 5/16 SS		2.000	EA
20	1290097	FINGER STRIP 16 LI RFI/EMI	60RC-16.00-02	.687	EA
13	1310093	CLIP MODULE PCL-606/6000	05C2882 B	16.000	EA
	1641927	W BUSS 22GA E1,E2	298	.083	FT
15	1670199	CA COAX EZ-BEND .047 DIA L01,L02	HC10000-1	.833	FT
19	2064632	COVER SHIELD L.O. 950 MHZ 6000	05B3347 B	1.000	EA
6	2064640	SHIELD L.O. PCL-6000	05D3348 PLT 2	1.000	EA
4	209-10177-0	COVER BOT RF MODULE PCL-6000	SIZE B REV 1	1.000	EA
3	2092534	FRAME BASE PCL-6000	05B3334 B	1.000	EA
2	2092922	FRAME RF MODULE RX 6000 MC	05B3451 REV A	1.000	EA
5	2092963	COVER TOP RX RF MOD 950 MC INSTALL IN TEST	05B3457 PLT 2	1.000	EA
21	2350957	ASSY HARN RF MOD RX PCL-6000	29A1082 PLT 2	1.000	EA
	3111119	CONN SHORTING PLUG RED P1,P2	09-3010-2-03-12	2.000	EA
16	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL1,FL2,FL3,FL4,FL6,FL7,FL8,FL9	859619-1	8.000	EA
	3341062	XTAL 1ST LO 102.000 MHZ Y1	30A0093-1 M	1.000	EA
	3350360	FLTR 550 MHZ LPF FL13	PLP-550	1.000	EA
	3350402	FLTR HELICAL 1015 MHZ 3 POLE FL10	302HXPK-1271B	1.000	EA
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG Y1	MC501265	1.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS CR14	5082-0180	1.000	EA
	3640422	XT MRF 581 Q8	MRF 581	1.000	EA
	3730967	IC DUAL OP AMP U3	NE5532P	1.000	EA
	3731056	IC MC145152P2 FREQ SYNC CONT. U1	MC145152P2	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-03595-01 DESCRIPTION: ASSY RF MOD 6060 MC 950 MHZ
ENG. 20D3107-5 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3731080	IC SP8647B DUAL MOD 10/11 U2	SP8647B/DG	1.000	EA
	3731536	IC SL560C/DP8 AMP 8 PIN DIP U4	SL560C/DP8	1.000	EA
	4011045	COIL AIR 1T 22BUSS(18)LH L16	3-2063 PLT 1	1.000	EA
	4020640	IDCTR MINI-RED .1 UH 10% L10	MR .10 10%	1.000	EA
	4351276	CAP MLCC 1206 NPO 10 PF 5% C94,C96(BOT OF PCB),C99	06A1013	3.000	EA
	4370201	CAP VAR PC MIN .8-10PF C30,C34	5201	2.000	EA
	4370300	CAP VAR 4-10PF C98	9372	1.000	EA
	4370375	CAP VAR CER 1-3PF C65	DV6PS3A	1.000	EA
	4550257	RES CHIP 1206 1/8W 5% 100 OHM R75	06A1015	1.000	EA
	4570256	RES 1/4W 5% CF 470 OHM AXL R74	06A1016	1.000	EA
	4590311	THERMISTOR 680 OHM 10% RT1	1K681K	1.000	EA
	600-10228-S	SCHEM PCL-6000MC RX RF MODULES	SIZE A REV A	.000	EA
	603-10146-P	PROCESS SPEC ASSY MARKING/LBL	PS-3002 REV 1	.000	EA
	603-10149-P	PROCESS SPEC ASSEMBLY STANDARD	PS-3001 REV 1	.000	EA
	930-10109-A	ASSY RX RF MOD MC NEUTER/1ST	20D3107-0 REV B	1.000	EA
	9999897	REV ECO# DATE COMMENTS		.000	EA
		A 5365 05/27/94 CREATE NEUTER STRUCT, REL			
		B 5396 07/28/94 2ND ASSY PARTS, DWG UPDATES			

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
18	1230663	FASTENER CHASSIS	7228-B-B-15	2.000	EA
	3050572	CONN D 25S FILT 820P PCST 4-40 J11	FCC17B25SK440	1.000	EA
	3090230	CONN SMB PC RT ANG MALE BLKHD J1,J2,J3	2110-7511-000	3.000	EA
	3091220	CONN SMB PC MT VERT MALE RECPT J4,J7,J10	2009-7511-000	3.000	EA
	3150182	SW 16P BCD ROT OUTPUT GREEN S1,S2,S3	DRD-16C	3.000	EA
	3190071	SW DIP 4 POSITION SEALED S4	76SB04S	1.000	EA
	3250016	SKT IC DIP 08 PIN .3 U3,U4	ICO-083-S8-T	2.000	EA
	3250032	SKT IC DIP 16 PIN .3 U2	ICO-163-S8-T	1.000	EA
	3250081	SKT IC DIP 28 PIN .6 U1	ICO-286-S8-T	1.000	EA
22	3251261	SKT PIN .040 PRESSFIT ZERO GLD P1,P2,P3,Y1	8134-HC-12P2	11.000	EA
	3291259	TEST PT LOOP YEL 30POS BRKAWAY TP1,TP2	TP-104-30-04	.067	E.
	3350725	OSC XTAL 12.8 MHZ TCXO OSC1	TCO-909Z	1.000	EA
	3390820	LED RED T1 1.0 @ 2 CR1	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2 CR5,CR6	HLMP-1790	2.000	EA
1	347-04962-01	PCB RX RF MOD PCL-6000 MC	51B6170 REV A	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035 CR2,CR3,CR4,CR13	1N4154	4.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0 CR15	HSMS-2820-T30	1.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0" CR7,CR8,CR9	HSMP-3820	3.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A) CR10,CR11	MMBV109L	2.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF Q5	2N2857	1.000	EA
	3640307	XT U310 Q6	U310	1.000	EA
	3640422	XT MRF 581 Q7	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23 Q1,Q2,Q3	MMBT3904	3.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3640562	XT SST310 JFET SOT-23 Z10/20AB Q4	SST310	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92 VR1	MC78L12ACP	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC AR1	MAV-11	1.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN AR3	MAR-3SM	1.000	EA
	3731932	IC RF AMP 2GHZ 16DB SMT WHT AR2	MAR-6SM	1.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L1,L9,L12	VK200 10/3B	3.000	EA
	4020517	IDCTR MINI-RED .27 UH 10% L13	MR .27 10%	1.000	EA
	4020707	IDCTR MINI-RED .47 UH 10% L11	MR .47 10%	1.000	EA
	4020806	IDCTR 31.5NH 5% 1.5T BROWN L14	132-01	1.000	EA
	4020871	IDCTR 79NH 5% 6.5T BLUE L6,L7	132-06	2.000	EA
	4020897	IDCTR 117NH 5% 8.5T GRAY L8	132-08	1.000	EA
	4020988	IDCTR CHIP 1.0 UH 10% SMT1210 L17	1210-102K	1.000	EA
	4021036	IDCTR CHIP 0.10 UH 10% SMT1210 L18,L19	1210-101K	2.000	EA
	4021119	IDCTR CHIP 1000 UH 10% SMT1812 L2,L3,L4	NLF1812-102K	3.000	EA
	4100038	XFMR MCL T4-1/W38 CASE T1	MCL T4-1	1.000	EA
	4200119	CAP MICA DIP 2PF +/- 0.5PF C105	DM-5-020D	1.000	EA
	4200135	CAP MICA DIP 43PF 5% C57	DM-5-430J	1.000	EA
	4200150	CAP MICA DIP 24PF 5% C58	DM-5-240J	1.000	EA
	4280509	CAP TANT .1/35V 20% .100 LS C75	TAP104M035SCS	1.000	EA
	4280558	CAP TANT 100/20V 10% .200 LS C22,C43,C44	TAP107K020CCS	3.000	EA
	4280574	CAP TANT 2.2/35V 20% .100 LS C5,C6,C13	TAP225M035SRW	3.000	EA
	4280582	CAP TANT 22/35V 10% .200 LS C4,C7	TAP226K035CRW	2.000	EA
	4280616	CAP TANT 4.7/35V 10% .100 LS C1	TAP475K035SRW	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
18	1230663	FASTENER CHASSIS	7228-B-B-15	2.000	EA
	3050572	CONN D 25S FILT 820P PCST 4-40 J11	FCC17B25SK440	1.000	EA
	3090230	CONN SMB PC RT ANG MALE BLKHD J1,J2,J3	2110-7511-000	3.000	EA
	3091220	CONN SMB PC MT VERT MALE RECPT J4,J7,J10	2009-7511-000	3.000	EA
	3150182	SW 16P BCD ROT OUTPUT GREEN S1,S2,S3	DRD-16C	3.000	EA
	3190071	SW DIP 4 POSITION SEALED S4	76SB04S	1.000	EA
	3250016	SKT IC DIP 08 PIN .3 U3,U4	ICO-083-S8-T	2.000	EA
	3250032	SKT IC DIP 16 PIN .3 U2	ICO-163-S8-T	1.000	EA
	3250081	SKT IC DIP 28 PIN .6 U1	ICO-286-S8-T	1.000	EA
22	3251261	SKT PIN .040 PRESSFIT ZERO GLD P1,P2,P3,Y1	8134-HC-12P2	11.000	EA
	3291259	TEST PT LOOP YEL 30POS BRKAWAY TP1,TP2	TP-104-30-04	.067	E.
	3350725	OSC XTAL 12.8 MHZ TCXO OSC1	TCO-909Z	1.000	EA
	3390820	LED RED T1 1.0 @ 2 CR1	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2 CR5,CR6	HLMP-1790	2.000	EA
1	347-04962-01	PCB RX RF MOD PCL-6000 MC	51B6170 REV A	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035 CR2,CR3,CR4,CR13	1N4154	4.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0 CR15	HSMS-2820-T30	1.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0" CR7,CR8,CR9	HSMP-3820	3.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A) CR10,CR11	MMBV109L	2.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF Q5	2N2857	1.000	EA
	3640307	XT U310 Q6	U310	1.000	EA
	3640422	XT MRF 581 Q7	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23 Q1,Q2,Q3	MMBT3904	3.000	EA

MOSELEY ASSOCIATES, INC.
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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3640562	XT SST310 JFET SOT-23 Z10/20AB Q4	SST310	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92 VR1	MC78L12ACP	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC AR1	MAV-11	1.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN AR3	MAR-3SM	1.000	EA
	3731932	IC RF AMP 2GHZ 16DB SMT WHT AR2	MAR-6SM	1.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L1,L9,L12	VK200 10/3B	3.000	EA
	4020517	IDCTR MINI-RED .27 UH 10% L13	MR .27 10%	1.000	EA
	4020707	IDCTR MINI-RED .47 UH 10% L11	MR .47 10%	1.000	EA
	4020806	IDCTR 31.5NH 5% 1.5T BROWN L14	132-01	1.000	EA
	4020871	IDCTR 79NH 5% 6.5T BLUE L6,L7	132-06	2.000	EA
	4020897	IDCTR 117NH 5% 8.5T GRAY L8	132-08	1.000	EA
	4020988	IDCTR CHIP 1.0 UH 10% SMT1210 L17	1210-102K	1.000	EA
	4021036	IDCTR CHIP 0.10 UH 10% SMT1210 L18,L19	1210-101K	2.000	EA
	4021119	IDCTR CHIP 1000 UH 10% SMT1812 L2,L3,L4	NLF1812-102K	3.000	EA
	4100038	XFMR MCL T4-1/W38 CASE T1	MCL T4-1	1.000	EA
	4200119	CAP MICA DIP 2PF +/- 0.5PF C105	DM-5-020D	1.000	EA
	4200135	CAP MICA DIP 43PF 5% C57	DM-5-430J	1.000	EA
	4200150	CAP MICA DIP 24PF 5% C58	DM-5-240J	1.000	EA
	4280509	CAP TANT .1/35V 20% .100 LS C75	TAP104M035SCS	1.000	EA
	4280558	CAP TANT 100/20V 10% .200 LS C22,C43,C44	TAP107K020CCS	3.000	EA
	4280574	CAP TANT 2.2/35V 20% .100 LS C5,C6,C13	TAP225M035SRW	3.000	EA
	4280582	CAP TANT 22/35V 10% .200 LS C4,C7	TAP226K035CRW	2.000	EA
	4280616	CAP TANT 4.7/35V 10% .100 LS C1	TAP475K035SRW	1.000	EA

MOSELEY ASSOCIATES, INC.
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SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4300117	CAP DISC CER N750 20PF/100V 5% C81,C82,C83,C151	DD104B10N750200	4.000	EA
	4300315	CAP DISC NPO 8.2 PF +/-0.5PF C150	TBA	1.000	EA
	4320008	CAP TANT SMT 1UF/35V 3528 10% C112	06A1017	1.000	EA
	4350534	CAP MLCC 1206 X7R .1 UF 10% C11,C23,C24,C27,C28,C31,C32,C48,C49,C50,C74,C80, C86,C89,C92	06A1014	15.000	EA
	4350823	CAP MLCC 1206 X7R .01 UF 10% C2,C3,C8,C9,C10,C12,C14,C15,C16,C17,C18,C19,C20, C21,C25,C29,C33,C45,C51,C52,C54,C72,C73,C76,C77, C78,C79,C90,C91,C93,C102,C103,C104,C107,C113,	06A1014	35.000	EA
	4351078	CAP MLCC 1206 NPO 22 PF 5% C26,C47,C55	06A1013	3.000	EA
	4351086	CAP MLCC 1206 X7R .001 UF 10% C42,C85,C87	06A1014	3.000	EA
	4351102	CAP MLCC 1206 NPO 56 PF 5% C108,C109,C114,C115	06A1013	4.000	EA
	4351227	CAP MLCC 1206 NPO 5.1 PF +-.25 C60	06A1013	1.000	E
	4351318	CAP MLCC 1206 NPO 18 PF 5% C56	06A1013	1.000	EA
	4351342	CAP MLCC 1206 NPO 33 PF 5% C63	06A1013	1.000	EA
	4351367	CAP MLCC 1206 NPO 47 PF 5% C40,C46	06A1013	2.000	EA
	4351375	CAP MLCC 1206 NPO 51 PF 5% C59	06A1013	1.000	EA
	4351409	CAP MLCC 1206 NPO 100 PF 5% C53,C62	06A1013	2.000	EA
	4351417	CAP MLCC 1206 NPO 120 PF 5% C41	06A1013	1.000	EA
	4370219	CAP VAR 1-14PF C84	8053	1.000	EA
	4370300	CAP VAR 4-10PF C88,C95	9372	2.000	EA
	4370425	CAP VAR SURFACE MT 1-4PF C101	GKZ4R000	1.000	EA
	4470043	RES 1/2W 5% CC 150 OHM AXL R44	RC20GF151J	1.000	EA
	4470365	RES 1/2W 5% CC 22 OHM AXL R73	RC20GF220J	1.000	EA
	455-10173-RES	CHIP 2512 1W 5% 180 OHM R70	CHP-100-180J-B	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4550075	RES CHIP 1206 1/8W 5% 18 OHM R51	06A1015	1.000	EA
	4550133	RES CHIP 1206 1/8W 5% 33 OHM R71,R72	06A1015	2.000	EA
	4550182	RES CHIP 1206 1/8W 5% 51 OHM R79	06A1015	1.000	EA
	4550257	RES CHIP 1206 1/8W 5% 100 OHM R85	06A1015	1.000	EA
	4550315	RES CHIP 1206 1/8W 5% 180 OHM R40,R41,R43	06A1015	3.000	EA
	4550364	RES CHIP 1206 1/8W 5% 300 OHM R50,R52	06A1015	2.000	EA
	4550463	RES CHIP 1206 1/8W 5% 750 OHM R67	06A1015	1.000	EA
	4550471	RES CHIP 1206 1/8W 5% 820 OHM R65	06A1015	1.000	EA
	4550497	RES CHIP 1206 1/8W 5% 1.0K OHM R1,R15,R27,R28,R29,R66,R76	06A1015	7.000	EA
	4550554	RES CHIP 1206 1/8W 5% 1.8K OHM R64	06A1015	1.000	EA
	4550570	RES CHIP 1206 1/8W 5% 2.2K OHM R25,R26	06A1015	2.000	EA
	4550596	RES CHIP 1206 1/8W 5% 2.7K OHM R63	06A1015	1.000	EA
	4550653	RES CHIP 1206 1/8W 5% 4.7K OHM R22,R23,R24,R55,R56,R57	06A1015	6.000	EA
	4570040	RES 1/4W 5% CF 22 OHM AXL R11,R12	06A1016	2.000	EA
	4570080	RES 1/4W 5% CF 47 OHM AXL R46	06A1016	1.000	EA
	4570120	RES 1/4W 5% CF 75 OHM AXL R48	06A1016	1.000	EA
	4570144	RES 1/4W 5% CF 100 OHM AXL R13,R42,R69,R77	06A1016	4.000	EA
	4570160	RES 1/4W 5% CF 120 OHM AXL R68	06A1016	1.000	EA
	4570176	RES 1/4W 5% CF 150 OHM AXL R14	06A1016	1.000	EA
	4570200	RES 1/4W 5% CF 220 OHM AXL R45	06A1016	1.000	EA
	4570272	RES 1/4W 5% CF 560 OHM AXL R4	06A1016	1.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R8,R9,R18,R21,R49	06A1016	5.000	EA
	4570328	RES 1/4W 5% CF 1.2K OHM AXL R2	06A1016	1.000	EA

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DATE: 8/24/94

PARENT ITEM: 930-10109-01 DESCRIPTION: ASSY RX RF MOD MC NEUTER/1ST ENG. 20D3107-0 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4570400	RES 1/4W 5% CF 3.0K OHM AXL R3	06A1016	1.000	EA
	4570416	RES 1/4W 5% CF 3.6K OHM AXL R17,R20	06A1016	2.000	EA
	4570472	RES 1/4W 5% CF 6.8K OHM AXL R7,R10	06A1016	2.000	EA
	4570504	RES 1/4W 5% CF 10K OHM AXL R16	06A1016	1.000	EA
	4570628	RES 1/4W 5% CF 56K OHM AXL R5,R6	06A1016	2.000	EA
	4570652	RES 1/4W 5% CF 82K OHM AXL R19	06A1016	1.000	EA
	4570668	RES 1/4W 5% CF 100K OHM AXL R30	06A1016	1.000	EA
	603-10146-01	PROCESS SPEC ASSY MARKING/LBL	PS-3002 REV 1	.000	EA
	603-10149-01	PROCESS SPEC ASSEMBLY STANDARD	PS-3001 REV 1	.000	EA
	9999897			.000	EA

REV	ECO#	DATE	COMMENTS
A	5365	05/27/94	CREATE NEUT STRUCTURE, RELEASE
A	5365A1	06/10/94	CHANGE TO SMT: C47,C55,R1 CHANGE TO THRU-HOLE: C75 CHANGE REF OF C61 TO C63
B	5396	07/28/94	MOVE PARTS TO 2ND ASSY, UPDATE DWG
	5365A2	08/04/94	CHANGE R64 FROM 4550596 TO 4550554

MOSELEY ASSOCIATES, INC.
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DATE: 8/24/94

PARENT ITEM: 9303249 DESCRIPTION: ASSY PREAMP/1ST MXR 6060 950
ENG. 20D2827-2 P1

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
28	1050129	SCR PNH PHPS 4-40 X 1/4 SST			2.000	EA
20	1130491	WSHR SST 5710-35-16	5710-35-16		2.000	EA
29	1310093	CLIP MODULE PCL-606/6000	05C2882	B	16.000	EA
32	1560226	TBG TEFLON 20AWG NAT R1,L1,L2	TT-20		.250	FT
38	2090967	FRAME BASE MODULE PCL-606/6000	05C2867	H	1.000	EA
37	2091049	FRAME PREAMP/MIXER RX PCL-6060	05D2875	F	1.000	EA
34	2091403	COVER MODULE PREAMP/1ST MIX	05C2939	A1	2.000	EA
31	2202315	ASSY CA SMB PC/RT-SMB/RT 12.25 J3-J5	24B1092-1	B	1.000	EA
4	2351146	ASSY HARN PREAMP/MXR PCL-6060 J1	29A1100	PLT 2	1.000	EA
30	3090230	CONN SMB PC RT ANG MALE BLKHD J2,J4	2110-7511-000		2.000	EA
33	3290152	JACK TEST WHITE R ANGLE TP1	430-101		1.000	EA
9	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL1,FL3	859619-1		2.000	EA
3	3350188	MIXER SRA-12 U1	SRA-12		1.000	EA
1	3473055	PCB PREAMP/1ST MIXER PCL-606	51D5943	J	1.000	EA
8	3610235	DIO HPND-4166 CR2	HPND-4166		1.000	EA
5	3630225	XT PS2N4402 .35W150M040V.6A9P Q2,Q5	2N4402		2.000	EA
7	3640307	XT U310 Q1	U310		1.000	EA
6	3650348	XT MA42141 Q3,Q4	MA42141-511		2.000	EA
12	4020467	IDCTR FERRITE BEAD 500 OHM L1,L2	VK200 10/3B		2.000	EA
11	4020632	IDCTR MINI-RED .15 UH 10% L4	MR .15 10%		1.000	EA
10	4042065	4042065482 UH 8.5T GR TYPE E L3	T7-116 8.5T3/8E		1.000	EA
17	4210183	CAP MICA DIP 47PF 5% C8	DM-15-470J		1.000	EA
16	4280053	CAP TANT LS .125 4.7/35V 10% C5,C11,C12,C22	TAP475K035GSB		4.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9303249 DESCRIPTION: ASSY PREAMP/1ST MXR 6060 950
ENG. 20D2827-2 P1

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
13	4300034	CAP DISC CER NPO 4.7PF/600V .5 C4	DTZ4R7	1.000	EA
15	4310132	CAP DISC CER Y5P .01/50V 20% C1,C2,C3	UK50103	3.000	EA
18	4310272	CAP CER .01/50V X7R 10% T&R C6,C7	SR155C103KAA	2.000	EA
14	4351441	CAP MLCC 1206 NPO 330 PF 5% C9,C10,C13,C14,C15,C16,C17,C18,C19,C20,C21	06A1013	11.000	EA
22	4460036	RES 1/4W 5% CC 51 OHM AXL R5,R15	RC07GF510J	2.000	EA
26	4570144	RES 1/4W 5% CF 100 OHM AXL R2	06A1016	1.000	EA
25	4570160	RES 1/4W 5% CF 120 OHM AXL R4	06A1016	1.000	EA
21	4570320	RES 1/4W 5% CF 1.0K OHM AXL R1,R6,R7,R12	06A1016	4.000	EA
27	4570424	RES 1/4W 5% CF 3.9K OHM AXL R3	06A1016	1.000	EA
24	4570440	RES 1/4W 5% CF 4.7K OHM AXL R8,R11,R14	06A1016	3.000	EA
23	4570488	RES 1/4W 5% CF 8.2K OHM AXL R9,R10	06A1016	2.000	EA
19	4630299	POT CER PC PIN 10K OHM .75W R13	3006P-1-103	1.000	EA

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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9302704 DESCRIPTION: ASSY IF DEMOD RX PCL-6020
ENG. 20D2941-2 PLT11

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
96	1050129	SCR PNH PHPS 4-40 X 1/4 SST			2.000	EA
5	1130491	WSHR SST 5710-35-16	5710-35-16		1.000	EA
130	1310093	CLIP MODULE PCL-606/6000	05C2882	B	16.000	EA
95	1641927	W BUSS 22GA	298		.500	FT
2	2090967	FRAME BASE MODULE PCL-606/6000	05C2867	H	1.000	EA
13	2090975	COVER MODULE PCL-606	05C2868	E	1.000	EA
3	2091858	FRAME IF DEMOD	05C3146	A	1.000	EA
4	2092567	COVER MODULE TOP IF DEMOD	05C3343	A	1.000	EA
139	2202711	ASSY CA SMB/S 11.00 J1	24B1164-1 PLT 2		1.000	EA
141	2350973	ASSY HARN IF DEMOD RX PCL-6020	29A1084 PLT 1		1.000	EA
11	3090230	CONN SMB PC RT ANG MALE BLKHD J2,J3	2110-7511-000		2.000	EA
131	3091147	HDR .025X.100 STRT 20P 1ROW E1	MFSS100-20-X-B		.150	EA
133	3250016	SKT IC DIP 08 PIN .3 U3,U4	ICO-083-S8-T		2.000	EA
134	3250057	SKT IC DIP 20 PIN .3 U2	ICO-203-S8-T		1.000	EA
135	3250917	JUMPER MINI FOR 2 PINS=.025/.1 E1	929952-10		1.000	EA
67	3250941	SKT SIP 03 PIN FL7,FL8	CA-S03SLP-TSD		2.000	EA
136	3290152	JACK TEST WHITE R ANGLE TP1,TP2	430-101		2.000	EA
12	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL1,FL2,FL3,FL5,FL6	859619-1		5.000	EA
18	3350196	MIXER BAL U1	MX-1		1.000	EA
66	3350261	FLTR E10.7MX LINE/E10.7X DOT R FL7,FL8	SFE-10.7-MX-A		2.000	EA
1	3473865	PCB IF DEMOD RX 600/6020	51D6045 PLT 6		1.000	EA
26	3630456	XT 2N3904 Q2	2N3904		1.000	EA
25	3640307	XT U310 Q1,Q3	U310		2.000	EA

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PARENT ITEM: 9302704 DESCRIPTION: ASSY IF DEMOD RX PCL-6020
ENG. 20D2941-2 PLT11

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
21	3730173	IC LM318N OPAMP HISPEED U4	LM318N	1.000	EA
20	3730215	IC LM1458N OPAMP DUAL U3	LM1458N	1.000	EA
17	3731346	IC FM DEMOD U2	LM1865	1.000	EA
65	4020368	IDCTR FERRITE BEAD 850 OHM L18,L19	VK200 20/4B	2.000	EA
74	4020459	IDCTR MINI-RED 10 UH 10% L5	MR 10 10%	1.000	EA
72	4020517	IDCTR MINI-RED .27 UH 10% L1	MR .27 10%	1.000	EA
71	4020525	IDCTR MINI-RED 1.2 UH 10% L3	MR 1.2 10%	1.000	EA
78	4020541	IDCTR MINI-RED .22 UH 10% L10	MR .22 10%	1.000	EA
75	4020566	IDCTR MINI-RED 5.6 UH 10% L6,L7	MR 5.6 10%	2.000	EA
70	4020624	IDCTR MINI-RED 1.0 UH 10% L2	MR 1.0 10%	1.000	EA
73	4020673	IDCTR MINI-RED 27 UH 10% L4	MR 27 10%	1.000	EA
76	4020822	IDCTR MINI-RED 18 UH 10% L8	MR 18 10%	1.000	EA
77	4020848	IDCTR MINI-RED 2.7 UH 10% L9(BOTTOM SIDE)	MR 2.7 10%	1.000	EA
140	4020905	IDCTR 410NH 5% 16.5T BLUE L11,L12,L13	132-16	3.000	EA
57	4210043	CAP MICA DIP 5PF +/- 0.5PF C34,C48	DM-15-050D	2.000	EA
32	4210076	CAP MICA DIP 15PF 5% C5	DM-15-150J	1.000	EA
46	4210142	CAP MICA DIP 33PF 5% C32	DM-15-330J	1.000	EA
33	4210225	CAP MICA DIP 68PF 5% C37	DM-15-680J	1.000	EA
44	4210241	CAP MICA DIP 82PF 5% C26	DM-15-820J	1.000	EA
30	4210266	CAP MICA DIP 100PF 5% C1,C2	DM-15-101J	2.000	EA
31	4210373	CAP MICA DIP 240PF 5% C3	DM-15-241J	1.000	EA
41	4280038	CAP TANT LS .125 1/35V 20% C35,C36	TAP105M035GSB	2.000	EA
35	4280046	CAP TANT LS .125 2.2/35V 20% C25,C70	TAP225M035GSB	2.000	EA

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PARENT ITEM: 9302704 DESCRIPTION: ASSY IF DEMOD RX PCL-6020
ENG. 20D2941-2 PLT11

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
34	4280053	CAP TANT LS .125 4.7/35V 10% C4,C39	TAP475K035GSB	2.000	EA
47	4280079	CAP TANT LS .125 10/20V 20% C22	TAP106M020GSB	1.000	EA
137	4280137	CAP TANT LS .250 47/20V 20% C14,C27	TAP476M020HSB	2.000	EA
	4280152	CAP TANT LS .250 100/20V 10% C21	TAP107K020HSB	1.000	EA
52	4310264	CAP CER .1/50V Z5U 20% T&R C6,C7,C9,C10,C11,C12, C23,C29,C30	SR205E104MAA	9.000	EA
53	4310272	CAP CER .01/50V X7R 10% T&R C15,C16,C17,C19,C20,C24, C28,C33,C38,C40,C63,C64	SR155C103KAA	12.000	EA
36	4350500	CAP VAR 5-60PF RT ANG ADJ PCMT C13,C18	GXD60000	2.000	EA
42	4351136	CAP MLCC 1206 NPO 0.5 PF +-.25 C43,C46	06A1013	2.000	EA
37	4370201	CAP VAR PC MIN .8-10PF C41,C44,C47	5201	3.000	EA
38	4370219	CAP VAR 1-14PF C68	8053	1.000	EA
100	4570008	RES 1/4W 5% CF 10 OHM AXL R30,R49,R50	06A1016	3.000	EA
114	4570040	RES 1/4W 5% CF 22 OHM AXL R28,R29	06A1016	2.000	EA
122	4570080	RES 1/4W 5% CF 47 OHM AXL R12	06A1016	1.000	EA
102	4570088	RES 1/4W 5% CF 51 OHM AXL R4	06A1016	1.000	EA
99	4570112	RES 1/4W 5% CF 68 OHM AXL R202	06A1016	1.000	EA
104	4570144	RES 1/4W 5% CF 100 OHM AXL R6,R8,R10,R31,R32,R34,R37,R201,R203	06A1016	9.000	EA
103	4570184	RES 1/4W 5% CF 180 OHM AXL R5,R35	06A1016	2.000	EA
106	4570232	RES 1/4W 5% CF 330 OHM AXL R11,R13	06A1016	2.000	EA
115	4570256	RES 1/4W 5% CF 470 OHM AXL R33	06A1016	1.000	EA
118	4570320	RES 1/4W 5% CF 1.0K OHM AXL R23	06A1016	1.000	EA
111	4570360	RES 1/4W 5% CF 1.8K OHM AXL R17	06A1016	1.000	EA
105	4570376	RES 1/4W 5% CF 2.2K OHM AXL R7,R9,R22	06A1016	3.000	EA

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PARENT ITEM: 9302704 DESCRIPTION: ASSY IF DEMOD RX PCL-6020
ENG. 20D2941-2 PLT11

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
112	4570424	RES 1/4W 5% CF 3.9K OHM AXL R16	06A1016	1.000	EA
110	4570440	RES 1/4W 5% CF 4.7K OHM AXL R15	06A1016	1.000	EA
107	4570456	RES 1/4W 5% CF 5.6K OHM AXL R53	06A1016	1.000	EA
120	4570464	RES 1/4W 5% CF 6.2K OHM AXL R14	06A1016	1.000	EA
116	4570496	RES 1/4W 5% CF 9.1K OHM AXL R21	06A1016	1.000	EA
108	4570504	RES 1/4W 5% CF 10K OHM AXL R20,R36	06A1016	2.000	EA
109	4570512	RES 1/4W 5% CF 12K OHM AXL R54	06A1016	1.000	EA
119	4570548	RES 1/4W 5% CF 22K OHM AXL R24,R27,R52	06A1016	3.000	EA
128	4570668	RES 1/4W 5% CF 100K OHM AXL R25,R26	06A1016	2.000	EA
129	4590360	TEMPSISTOR 3.9K 3K-392-K R55	3K-392-K	1.000	EA
60	4630695	POT CER PC PIN 10K OHM .75W20T R19	43P103	1.000	EA
61	4630729	POT CER PC PIN 5K OHM .75W 20T R18	43P502T000	1.000	EA

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PARENT ITEM: 9302944 DESCRIPTION: ASSY DBL CONV/3RD LO 6030/6060
ENG. 20B3039 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
6	1050129	SCR PNH PHPS 4-40 X 1/4 SST			2.000	EA
10	1050434	SCR FLH SKT CAP 4-40 X 5/16 SS			2.000	EA
8	1230663	FASTENER CHASSIS	7228-B-B-15		2.000	EA
5	1310093	CLIP MODULE PCL-606/6000	05C2882	B	16.000	EA
7	1641927	W BUSS 22GA	298		.250	FT
4	2090975	COVER MODULE PCL-606	05C2868	E	2.000	EA
3	2092534	FRAME BASE PCL-6000	05B3334	B	1.000	EA
2	2092633	FRAME DBL CONV/3 LO PCL6030/60	05D3358	PLT 4	1.000	EA
9	2351138	ASSY HARN DBL CONV/3LO 6030/60	29A1101	PLT 1	1.000	EA
	3090230	CONN SMB PC RT ANG MALE BLKHD J1,J2,J3	2110-7511-000		3.000	EA
	3091147	HDR .025X.100 STRT 20P 1ROW E1	MFSS100-20-X-B		.200	EA
	3091253	HDR .025X.100 STRT 72P 2ROW E2,E3,E4,E5	CA-D72-24C-44		.333	EA
	3250016	SKT IC DIP 08 PIN .3 U2,U3	ICO-083-S8-T		2.000	EA
	3250917	JUMPER MINI FOR 2 PINS=.025/.1 E1,E2,E3,E4,E5	929952-10		5.000	EA
	3250941	SKT SIP 03 PIN FL1,FL2,FL3,FL4,FL5	CA-S03SLP-TSD		5.000	EA
11	3251261	SKT PIN .040 PRESSFIT ZERO GLD Y1	8134-HC-12P2		2.000	EA
	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL6,FL7	859619-1		2.000	EA
	3340767	XTAL 13.7MHZ PCL-606 3RD LO Y1	30A0081	A0	1.000	EA
	3350196	MIXER BAL HY1,HY2	MX-1		2.000	EA
	3350261	FLTR E10.7MX LINE/E10.7X DOT R FL2,FL5	SFE-10.7-MX-A		2.000	EA
	3350279	FLTR SFE10.7MX RED DOT LEFT FL1,FL4	SFE-10.7-MX2-A		2.000	EA
	3350352	FLTR SFE10.7MZ RED DOT LEFT FL3	SFE-10.7-MZ2-A		1.000	EA
1	3474533	PCB DBL CONVERTER PCL6030/6060	51D6111	A	1.000	EA

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PARENT ITEM: 9302944 DESCRIPTION: ASSY DBL CONV/3RD LO 6030/6060
ENG. 20B3039 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3600145	DIO 1N4154 25V 4NS SI D035 CR1	1N4154	1.000	EA
	3630001	XT NS2N918 .4W600M030V50M2P Q4	2N918	1.000	EA
	3630456	XT 2N3904 Q2,Q5	2N3904	2.000	EA
	3640307	XT U310 Q1,Q3	U310	2.000	EA
	3731536	IC SL560C/DP8 AMP 8 PIN DIP U2,U3	SL560C/DP8	2.000	EA
	4020459	IDCTR MINI-RED 10 UH 10% L5	MR 10 10%	1.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L26	VK200 10/3B	1.000	EA
	4020517	IDCTR MINI-RED .27 UH 10% L1	MR .27 10%	1.000	EA
	4020525	IDCTR MINI-RED 1.2 UH 10% L3	MR 1.2 10%	1.000	EA
	4020541	IDCTR MINI-RED .22 UH 10% L19	MR .22 10%	1.000	EA
	4020566	IDCTR MINI-RED 5.6 UH 10% L9,L10,L11	MR 5.6 10%	3.000	EA
	4020574	IDCTR MINI-RED 6.8 UH 10% L6,L7,L8,L12,L14	MR 6.8 10%	5.000	EA
	4020582	IDCTR MINI-RED .82 UH 10% L13	MR .82 10%	1.000	EA
	4020624	IDCTR MINI-RED 1.0 UH 10% L2	MR 1.0 10%	1.000	EA
	4020665	IDCTR MINI-RED 2.2 UH 5% L20	MR 2.2 5%	1.000	EA
	4020673	IDCTR MINI-RED 27 UH 10% L4,L21	MR 27 10%	2.000	EA
	4020905	IDCTR 410NH 5% 16.5T BLUE L15,L16,L17,L18	132-16	4.000	EA
	4200069	CAP MICA DIP 100PF 5% C1,C2,C58,C86	DM-5-101J	4.000	EA
	4200143	CAP MICA DIP 68PF 5% C53	DM-5-680J	1.000	EA
	4200184	CAP MICA DIP 33PF 5% C70,C71,C72	DM-5-330J	3.000	EA
	4200259	CAP MICA DIP 15PF 5% C7	DM-5-150J	1.000	EA
	4200267	CAP MICA DIP 39PF 5% C28	DM-5-390J	1.000	EA
	4200275	CAP MICA DIP 56PF 5% C59,C63,C64	DM-5-560J	3.000	EA

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PARENT ITEM: 9302944 DESCRIPTION: ASSY DBL CONV/3RD LO 6030/6060
ENG. 20B3039 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4210373	CAP MICA DIP 240PF 5% C3	DM-15-241J	1.000	EA
	4210423	CAP MICA DIP 360PF 5% C29,C30	DM-15-361J	2.000	EA
	4210480	CAP MICA DIP 560PF 5% C31,C33	DM-15-561J	2.000	EA
	4210506	CAP MICA DIP 680PF 5% C57	DM-15-681J	1.000	EA
	4210514	CAP MICA DIP 750PF 5% C60	DM-15-751J	1.000	EA
	4210548	CAP MICA DIP 910PF 5% C50	DM-15-911J	1.000	EA
	4220075	CAP MICA DIP 1600PF 5% C32	DM-19-162J	1.000	EA
	4280533	CAP TANT 1/35V 20% .100 LS C54	TAP105M035SRW	1.000	EA
	4280574	CAP TANT 2.2/35V 20% .100 LS C36	TAP225M035SRW	1.000	EA
	4280616	CAP TANT 4.7/35V 10% .100 LS C6,C18,C25,C51,C56,C65	TAP475K035SRW	6.000	EA
	4310264	CAP CER .1/50V Z5U 20% T&R C4,C5,C8,C9,C10,C11,C17,C19,C20,C24,C26,C27,C55, C62,C66,C69	SR205E104MAA	16.000	EA
	4310272	CAP CER .01/50V X7R 10% T&R C16,C23,C34,C35,C52,C61,C67, C68	SR155C103KAA	8.000	EA
	4350500	CAP VAR 5-60PF RT ANG ADJ PCMT C13,C14,C15,C21,C22	GXD60000	5.000	EA
	4351037	CAP MLPC 1212 P90 3.0 PF +-0.1 C38	100B3ROBP500X	1.000	EA
	4351136	CAP MLCC 1206 NPO 0.5 PF +-.25 C41,C44,C47	06A1013	3.000	EA
	4351201	CAP MLCC 1206 NPO 3.9 PF +-.25 C42,C45	06A1013	2.000	EA
	4370201	CAP VAR PC MIN .8-10PF C40,C43,C46,C49	5201	4.000	EA
	4570008	RES 1/4W 5% CF 10 OHM AXL R46,R49	06A1016	2.000	EA
	4570064	RES 1/4W 5% CF 33 OHM AXL R42	06A1016	1.000	EA
	4570080	RES 1/4W 5% CF 47 OHM AXL R16,R26,R35,R39,R43,R44	06A1016	6.000	EA
	4570088	RES 1/4W 5% CF 51 OHM AXL R1,R28	06A1016	2.000	EA
	4570112	RES 1/4W 5% CF 68 OHM AXL R10,R12,R32	06A1016	3.000	EA

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PARENT ITEM: 9302944 DESCRIPTION: ASSY DBL CONV/3RD LO 6030/6060
ENG. 20B3039 REV B

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4570144	RES 1/4W 5% CF 100 OHM AXL R3,R7,R27,R31,R33,R34,R48	06A1016	7.000	EA
	4570160	RES 1/4W 5% CF 120 OHM AXL R30,R47	06A1016	2.000	EA
	4570176	RES 1/4W 5% CF 150 OHM AXL R17,R24	06A1016	2.000	EA
	4570184	RES 1/4W 5% CF 180 OHM AXL R2,R23	06A1016	2.000	EA
	4570200	RES 1/4W 5% CF 220 OHM AXL R18,R25	06A1016	2.000	EA
	4570216	RES 1/4W 5% CF 270 OHM AXL R11,R13,R19,R20	06A1016	4.000	EA
	4570232	RES 1/4W 5% CF 330 OHM AXL R9,R14,R21	06A1016	3.000	EA
	4570256	RES 1/4W 5% CF 470 OHM AXL R40	06A1016	1.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R45,R50	06A1016	2.000	EA
	4570360	RES 1/4W 5% CF 1.8K OHM AXL R36	06A1016	1.000	EA
	4570376	RES 1/4W 5% CF 2.2K OHM AXL R5	06A1016	1.000	EA
	4570392	RES 1/4W 5% CF 2.7K OHM AXL R41	06A1016	1.000	EA
	4570440	RES 1/4W 5% CF 4.7K OHM AXL R4,R6	06A1016	2.000	EA
	4570504	RES 1/4W 5% CF 10K OHM AXL R8,R15,R22,R29,R37,R38	06A1016	6.000	EA
	600-10194-S	SCHEM PCL-6030/60 DBL CONV/LO3	91A7451 REV A	.000	EA
	603-10146-P	PROCESS SPEC ASSY MARKING/LBL	PS-3002 REV 1	.000	EA
	603-10149-P	PROCESS SPEC ASSEMBLY STANDARD	PS-3001 REV 1	.000	EA
	9999897	REV ECO# DATE COMMENTS A 5311 012594 ADD DIGITAL BYPASS JUMPER B 5389 061394 ADD 1K R50 TO DIG BYPASS		.000	EA

MOSELEY ASSOCIATES, INC.
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DATE: 8/24/94

PARENT ITEM: 9302100 DESCRIPTION: ASSY FM DEMOD SEC
ENG. 20D2949 E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
2	1050129	SCR PNH PHPS 4-40 X 1/4 SST			2.000	EA
3	1310093	CLIP MODULE PCL-606/6000	05C2882	B	16.000	EA
4	1641927	W BUSS 22GA	298		.250	FT
5	2062412	SHIELD MAGNETIC CYLINDER L4,L5	05B2746	B	2.000	EA
6	2090967	FRAME BASE MODULE PCL-606/6000	05C2867	H	1.000	EA
	2090975	COVER MODULE PCL-606	05C2868	E	2.000	EA
7	2092062	FRAME FM DEMOD PCL606/6000 SEC	05D3160	B	1.000	EA
8	2350940	ASSY HARN FM DEMOD RX PCL-6030	29A1081	PLT 1	1.000	EA
	3090230	CONN SMB PC RT ANG MALE BLKHD J2,J3	2110-7511-000		2.000	EA
	3250016	SKT IC DIP 08 PIN .3 U1,U2,U3,U4,U5	ICO-083-S8-T		5.000	EA
	3250024	SKT IC DIP 14 PIN .3 U6	ICO-143-S8-T		1.000	EA
	3290152	JACK TEST WHITE R ANGLE TP1,TP2,TP3	430-101		3.000	EA
9	3291069	FILTER FD-THRU TYPE20 NO/HDWR FL1,FL2,FL3,FL4	859619-1		4.000	EA
	3390549	LED RED 2.0@20 WIDE RT/HOLDER CR6	550-0406		1.000	EA
1	3473923	PCB FM DEMOD SEC	51D6055	B	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035 CR1,CR2,CR3,CR4,CR6,CR7,CR8,CR9,CR10,CR11,CR12, CR13,CR14,CR15,CR16,CR17,CR18,CR19,CR20	1N4154		19.000	EA
	3630456	XT 2N3904 Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q11,Q12,Q15,Q16,Q17, Q18	2N3904		15.000	EA
	3630464	XT 2N3906 Q10,Q13,Q14	2N3906		3.000	EA
	3730173	IC LM318N OPAMP HISPEED U1	LM318N		1.000	EA
	3730215	IC LM1458N OPAMP DUAL U2,U3	LM1458N		2.000	EA
	3730348	IC MC1355P AMP FM/IF U6	MC1355P		1.000	EA
	3730728	IC 5534 OPAMP U5	NE5534P		1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9302100 DESCRIPTION: ASSY FM DEMOD SEC
ENG. 20D2949 E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3731536	IC SL560C/DP8 AMP 8 PIN DIP U4	SL560C/DP8	1.000	EA
	4020178	IDCTR RF .82 UH L6,L7	9230-18	2.000	EA
	4020467	IDCTR FERRITE BEAD 500 OHM L1,L2	VK200 10/3B	2.000	EA
	4020475	IDCTR MINI-RED 1000 UH 10% L4,L5	MR 1000 10%	2.000	EA
	4020483	IDCTR MINI-RED 150 UH 5% L3	MR 150 5%	1.000	EA
	4200135	CAP MICA DIP 43PF 5% C62,C63	DM-5-430J	2.000	EA
	4210050	CAP MICA DIP 10PF 5% C8,C14,C18,C50	DM-15-100J	4.000	EA
	4210084	CAP MICA DIP 18PF 5% C42	DM-15-180J	1.000	EA
	4210266	CAP MICA DIP 100PF 5% C17	DM-15-101J	1.000	EA
	4210308	CAP MICA DIP 150PF 5% C52,C54,C84	DM-15-151J	3.000	EA
	4210415	CAP MICA DIP 330PF 5% C53	DM-15-331J	1.000	EA
	4280038	CAP TANT LS .125 1/35V 20% C39,C41,C49,C51	TAP105M035GSB	4.000	EA
	4280053	CAP TANT LS .125 4.7/35V 10% C10	TAP475K035GSB	1.000	EA
	4280079	CAP TANT LS .125 10/20V 20% C46,C64,C71,C73,C74	TAP106M020GSB	5.000	EA
	4280137	CAP TANT LS .250 47/20V 20% C61,C68	TAP476M020HSB	2.000	EA
	4280178	CAP TANT LS .250 150/16V 20% C55,C57,C59,C70	TAP157M016HSB	4.000	EA
	4310108	CAP DISC CER Z5U .001/1KV +100 C19,C20,C25,C26,C31,C32,C37,C38	DD102G	8.000	EA
	4310264	CAP CER .1/50V Z5U 20% T&R C7,C9,C11,C12,C13,C15,C16,C21,C22,C23,C24,C27, C28,C29,C30,C33,C34,C35,C36,C40,C45,C47,C48, C60,C65,C66,C67,C69,C72,C75,C76,C77,C78,C79, C80,C81,C82	SR205E104MAA	37.000	EA
	4310272	CAP CER .01/50V X7R 10% T&R C2,C3,C5,C6,C43	SR155C103KAA	5.000	EA
	4510145	RES 1/4W 1% MF 10.0K OHM AXL R74	5043ED10K00F	1.000	EA
	4520037	RES 1/2W 1% MF 1K OHM AXL R77	5053HD1K000F	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9302100 DESCRIPTION: ASSY FM DEMOD SEC
ENG. 20D2949 E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4520052	RES 1/2W 1% MF 4.99K OHM AXL R72	5053HD4K990F	1.000	EA
	4520250	RES 1/2W 1% MF 1.91K OHM AXL R76,R78	5053HD1K910F	2.000	EA
	4570008	RES 1/4W 5% CF 10 OHM AXL R15,R19,R28,R31,R64,R66	06A1016	6.000	EA
	4570040	RES 1/4W 5% CF 22 OHM AXL R8,R9	06A1016	2.000	EA
	4570048	RES 1/4W 5% CF 27 OHM AXL R102	06A1016	1.000	EA
	4570064	RES 1/4W 5% CF 33 OHM AXL R95	06A1016	1.000	EA
	4570080	RES 1/4W 5% CF 47 OHM AXL R4	06A1016	1.000	EA
	4570088	RES 1/4W 5% CF 51 OHM AXL R61,R65	06A1016	2.000	EA
	4570096	RES 1/4W 5% CF 56 OHM AXL R71	06A1016	1.000	EA
	4570112	RES 1/4W 5% CF 68 OHM AXL R41,R44,R48,R51,R55,R58	06A1016	6.000	EA
	4570120	RES 1/4W 5% CF 75 OHM AXL R85,R88	06A1016	2.000	EA
	4570128	RES 1/4W 5% CF 82 OHM AXL R86,R87	06A1016	2.000	EA
	4570144	RES 1/4W 5% CF 100 OHM AXL R1,R5,R12,R73,R75,R83,R90,R92,R96	06A1016	9.000	EA
	4570176	RES 1/4W 5% CF 150 OHM AXL R68	06A1016	1.000	EA
	4570200	RES 1/4W 5% CF 220 OHM AXL R108	06A1016	1.000	EA
	4570248	RES 1/4W 5% CF 390 OHM AXL R106,R107	06A1016	2.000	EA
	4570256	RES 1/4W 5% CF 470 OHM AXL R2,R25,R100,R101,R103,R104	06A1016	6.000	EA
	4570320	RES 1/4W 5% CF 1.0K OHM AXL R13,R14,R17,R40,R79,R84,R98,R105	06A1016	8.000	EA
	4570328	RES 1/4W 5% CF 1.2K OHM AXL R47,R54,R62,R91	06A1016	4.000	EA
	4570336	RES 1/4W 5% CF 1.3K OHM AXL R7	06A1016	1.000	EA
	4570376	RES 1/4W 5% CF 2.2K OHM AXL R23,R43,R50,R57,R63,R81,R93,R99	06A1016	8.000	EA
	4570392	RES 1/4W 5% CF 2.7K OHM AXL R82	06A1016	1.000	EA
	4570424	RES 1/4W 5% CF 3.9K OHM AXL R97	06A1016	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9302100 DESCRIPTION: ASSY FM DEMOD SEC
ENG. 20D2949 E

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	4570440	RES 1/4W 5% CF 4.7K OHM AXL R89,R94	06A1016	2.000	EA
	4570456	RES 1/4W 5% CF 5.6K OHM AXL R24,R42,R45,R49,R52,R56,R59	06A1016	7.000	EA
	4570504	RES 1/4W 5% CF 10K OHM AXL R11,R21,R70	06A1016	3.000	EA
	4570528	RES 1/4W 5% CF 15K OHM AXL R200	06A1016	1.000	EA
	4570612	RES 1/4W 5% CF 47K OHM AXL R26	06A1016	1.000	EA
	4570668	RES 1/4W 5% CF 100K OHM AXL R34,R80	06A1016	2.000	EA
	4570684	RES 1/4W 5% CF 150K OHM AXL R18	06A1016	1.000	EA
	4570708	RES 1/4W 5% CF 220K OHM AXL R27,R35,R36,R37,R38,R39,R46,R53,R60	06A1016	9.000	EA
	4570740	RES 1/4W 5% CF 330K OHM AXL R30,R32	06A1016	2.000	EA
	4570756	RES 1/4W 5% CF 470K OHM AXL R16	06A1016	1.000	EA
	4570772	RES 1/4W 5% CF 680K OHM AXL R20	06A1016	1.000	E
	4570836	RES 1/4W 5% CF 6.8 OHM AXL R69	06A1016	1.000	EA
	4630299	POT CER PC PIN 10K OHM .75W R10,R22	3006P-1-103	2.000	EA
	4630679	POT CER PC PIN 500 OHM .75W R67	3006P-1-501	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 9303298 DESCRIPTION: ASSY MOD ADJ CHN FLTR PCL-6060
ENG. 20B3089 PLT 1

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
2	2092575	ENCL FILTER RFA PCL-6010	05C3344 A	1.000	EA
	3090230	CONN SMB PC RT ANG MALE BLKHD J1,J2	2110-7511-000	2.000	EA
	3091147	HDR .025X.100 STRT 20P 1ROW E1,E2	MFSS100-20-X-B	.300	EA
	3250917	JUMPER MINI FOR 2 PINS=.025/.1 E1,E2	929952-10	2.000	EA
1	3474848	PCB ADJ CHNL FLTR PLC-6060 RX	51D6155 PLT 1	1.000	EA
	4020038	IDCTR MINI-RED 2.2 MH 5% L6,L8	MR 2200 5%	2.000	EA
	4020046	IDCTR MINI-RED 3.9 MH 10% L2,L4	MR 3900 10%	2.000	EA
	4020491	IDCTR MINI-RED 2.7 MH 10% L5,L7	MR 2700 10%	2.000	EA
	4020699	IDCTR MINI-RED 5.6 MH 10% L1,L3	MR 5600 10%	2.000	EA
	4351102	CAP MLCC 1206 NPO 56 PF 5% C6	06A1013	1.000	EA
	4351276	CAP MLCC 1206 NPO 10 PF 5% C1,C7	06A1013	2.000	EA
	4351409	CAP MLCC 1206 NPO 100 PF 5% C1,C10	06A1013	2.000	EA
	4351441	CAP MLCC 1206 NPO 330 PF 5% C2,C5,C8,C9	06A1013	4.000	EA
	4351482	CAP MLCC 1206 NPO 680 PF 5% C3	06A1013	1.000	EA
	4351698	CAP MLCC 1206 NPO 150 PF 5% C7,C10	06A1013	2.000	EA
	4351706	CAP MLCC 1206 NPO 180 PF 5% C5,C9	06A1013	2.000	EA
	4351714	CAP MLCC 1206 NPO 1000 PF 5% C4	06A1013	1.000	EA
	4550554	RES CHIP 1206 1/8W 5% 1.8K OHM R1,R2	06A1015	2.000	EA

APP

Appendices

Contents

APPENDIX A
950 MHz MICROWAVE PATH EVALUATION INSTRUCTIONS

A.1 Introduction

The enclosed System Calculation worksheet, nomogram, tables and Fresnel zone clearance formula can be used to prepare a preliminary evaluation of a 950 MHz microwave link.

A.2 Path Profile

The proposed path should be plotted on a seven and one-half minute topographical map which can be obtained from the United States Geological Survey. Mail orders for maps west of the Mississippi River should be addressed to The Geological Survey, Distribution Section, Federal Center, Denver, Colorado, 80225, and for maps east of the Mississippi River to The Geological Survey, Distribution Section, Washington, D.C., 20242. Maps of Alaska may also be ordered from The Geological Survey, 520 Illinois Street, Fairbanks, Alaska, 99701. State indexes and a folder describing topographic maps are furnished free on request.

Using ground elevation information obtained from the topographical map, a path profile should be prepared using either true earth or 4/3 earth's radius graph paper. To obtain the necessary path clearance for a clear path, all obstacles in the path of the rays must be cleared by a distance of 0.6 of the first Fresnel zone. Be sure to include recently erected structures, such as buildings, towers, water tanks, etc., that may not appear on the map. The following formula may be used to determine 0.6 first Fresnel zone clearance:

$$H = 1368\sqrt{\frac{A \times B}{P \times F}} \qquad \text{(A-1)}$$

Where:

H = Height in feet*
A = Distance from terminal to obstruction in miles
P = Path length in miles
B = (P - A) in miles
F = Frequency in MHz

*This dimension is actually a radius and can be used to consider the clearance needed when the proposed path passes near a building, tower, storage tank, etc.

Draw a straight line on the path profile clearing any obstacle in the path by the distance determined above. This line will then indicate the required antenna and/or tower height necessary at each end. If it is impossible to provide the necessary clearance for a clear path, a minimum clearance of 30 feet should be provided. Any path with less than 0.6 first Fresnel zone clearance, but more than 30 feet can generally be considered a grazing path.

A.3 System Evaluation Instructions

The following instructions will aid you in completing the Microwave System Calculation Sheet.

A. Line One. Enter the power output of the transmitter in dBm. Examples: 5w = +37.0 dBm, 6.5w = +38.0 dBm, 7w = +38.5 dBm, 8w = +39.0 dBm.

$$dBm = 30 + 10 \log P_O \text{ (Watts)} \qquad \text{(A-2)}$$

B. Lines Two and Three. Enter on these lines the Transmitter and Receiver antenna gains over an isotropic source. Refer to the nomogram in Figure 4 which gives the power gain of a parabolic reflector at 950 MHz. Note: If the manufacturer quotes a gain in dBd (referred to a dipole), use formula A-3.

$$dBi = dBd + 1.1 \text{ dB (approx.)} \qquad \text{(A-3)}$$

Table A-1 shows some typical antenna gains for reference purposes.

Table A-1
Typical Antennas

Type	Gain (dBi)
MF-960	16.1
PR-450U	20.1
P-948-GRN (4 ft.)	18.9
P-972-GRN (6 ft.)	22.0
P-996-GRN (8 ft.)	25.0
P-9120-GRN (10 ft.)	27.0
P-9140-GRN (12 ft.)	28.5
P-9180-GRN (15 ft.)	30.0

C. Line Four. Total lines 1, 2, and 3 and enter here. This is the total gain in the proposed system.

D. Line Five. Path Loss: Use a straight-edge ruler on the free-space attenuation nomograph (Figure A-1). With the right side aligned on f_o and the left side at the path distance, read the unobstructed free-space attenuation in dB from the center scale. Enter this value on Line 5, or calculate the free-space attenuation according to formula A-4.

$$\text{Path Loss in dB} = 36.6 + 20 \log f_o + 20 \log d_m \qquad \text{(A-4)}$$

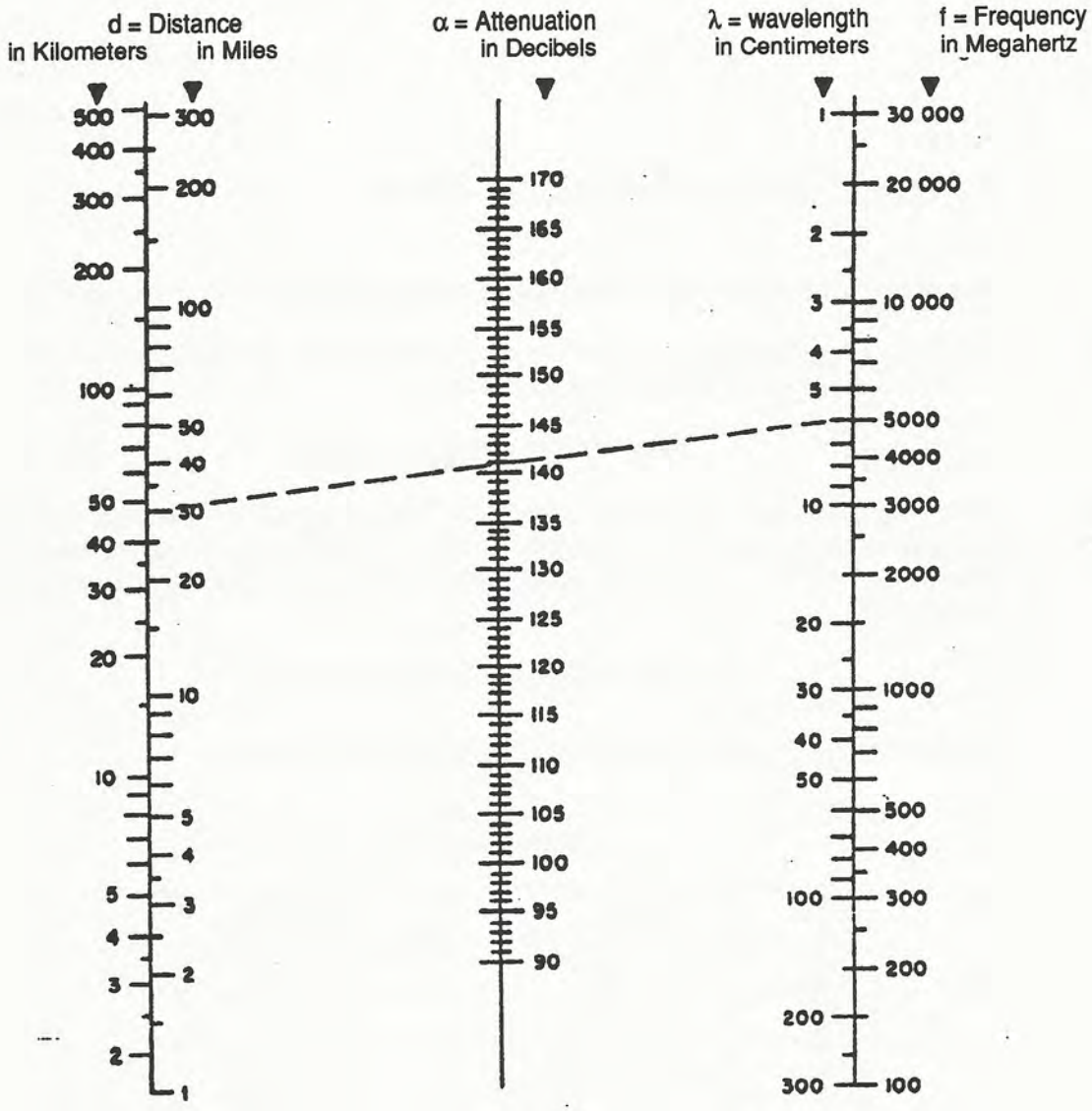

Figure A-1
Nomogram for Solution of Free-Space Path Attenuation Between Isotropic Antennas.
Example Shown: Distance = 30 miles; Frequency = 5000 MHz; Attenuation = 141 dB

E. Lines Six and Seven. Enter the total transmission line loss. Typical losses are shown in Table A-2.

Table A-2
Typical Transmission Line Loss

Frequency Band	LDF4-50 (per 100 ft.)	LDF5-50 (per 100 ft.)
330 MHz	1.4 dB	0.7 dB
450 MHz	1.6 dB	0.9 dB
470 MHz	1.7 dB	0.9 dB
950 MHz	2.4 dB	1.4 dB

F. Line Eight. Enter the total connector losses. A nominal figure of -0.5 dB is reasonable. (Based on 0.125 dB/mated pair.)

G. Line Nine. Enter all other miscellaneous branching losses here. Such losses might inlcude power dividers, duplexers, diplexers, isolators, isocouplers, etc.

H. Line Ten. Enter obstruction losses due to knife edge obstructions, etc.

I. Line Eleven. Total lines 5 - 10 and enter here. This is the total loss in the proposed system.

J. Line Twelve. Enter the total gain from line 4.

K. Line Thirteen. Enter the total loss from line 11.

L. Line Fourteen. Subtract line 13 from line 12. This is the unfaded signal level to be expected at the receiver.

M. Line Fifteen. Using the information found in Table A-3, enter the minimum signal required for 60 dB signal-to-noise ratio.

Table A-3
Typical Received Signal Strength required for 60 dB SNR

Model	dBm	microvolts
PCL-606	-84.0	14.1
PCL 606/C	-66.0	112.1
PCL 6020 M	-83	16.0
PCL 6030 M	-84	14.1
PCL 6060 M	-84	14.1
PCL 6020 C	-66	112.1
PCL 6030 C	-67	99.9
PCL 6060 C	-67	99.9
DSP 6000	-93	5.0

N. Line Sixteen. Subtract line 15 from line 14 and enter here. This is the amount of fade margin in the system. Typical fade margins that should be allowed are 25 dB for very short paths (up to 5 miles), 20 dB for median paths (5-20 miles) and increasing fade margins for longer distances (greater than 20 miles) up to a maximum of 35 dB.

SYSTEM CALCULATION WORKSHEET

PATH: **DATE:**

SYSTEM DETAILS

Frequency of operation _____MHz
Distance _____Miles

SYSTEM GAINS

1.	Transmitter Power Output	_____	dBm
2.	Transmitter Antenna Gain	_____	dBi
3.	Receiver Antenna Gain	_____	dBi
4.	Total Gain	_____	dB

SYSTEM LOSSES

5.	Path loss (___miles)	_____	dB
6.	Transmission Line Loss TX (Total Ft ____)	_____	dB
7.	Transmission Line Loss RX (Total Ft ____)	_____	dB
8.	Connector Loss (Total)	_____	dB
9.	Branching losses	_____	dB
10.	Obstruction losses	_____	dB
11.	Total loss	_____	dB

SYSTEM CALCULATIONS

12.	Total Gain (from Line 4)		_____	dBm
13.	Total Loss (from line 11)		_____	dB
14.	Effective Received Signal	_____µv	_____	dBm
15.	Minimum Signal Required	_____µv	_____	dBm
16.	Margin		_____	dB

NOTES:

APPENDIX B
CONVERSION CHART

microvolts to dBm
(impedance = 50 ohms)

Microvolts	dBm	Microvolts	dBm
0.10	-127.0	180	-61.9
0.25	-119.0	200	-61.0
0.50	-113.0	250	-59.0
0.70	-110.1	300	-57.4
1.0	-107.0	350	-56.1
1.4	-104.1	400	-54.9
2.0	-101.0	450	-53.9
2.5	-99.0	500	-53.0
3.0	-97.4	600	-51.4
3.5	-96.1	700	-50.1
4.0	-94.9	800	-48.9
4.5	-93.9	900	-47.9
5.0	-93.0	1,000	-47.0
6.0	-91.4	1,200	-45.4
7.0	-90.1	1,400	-44.1
8.0	-88.9	1,600	-42.9
9.0	-87.9	1,800	-41.9
10	-87.0	2,000	-41.0
11	-86.2	2,500	-39.0
12	-85.4	3,000	-37.4
14	-84.1	3,500	-36.1
16	-82.9	4,000	-34.9
18	-81.9	4,500	-33.9
20	-81.0	5,000	-33.0
25	-79.0	6,000	-31.4
30	-77.4	7,000	-30.1
35	-76.1	8,000	-28.9
40	-74.9	9,000	-27.9
45	-73.9	10,000	-27.0
50	-73.0	22.36 mV	-20 (10 mW)
60	-71.4	70.7 mV	-10 (100 mW)
70	-70.1	223.6 mV	0 (1 mW)
80	-68.9	707.1 mV	+10 (10 mW)
90	-67.9	2.23 V	+20 (100 mW)
100	-67.0	7.07 V	+30 (1 W)
120	-65.4	15.83 V	+37 (5 W)
140	-64.1	22.36 V	+40 (10 W)
160	-62.9		

APPENDIX C
SPARE PARTS

(950 MHz STANDARD SYSTEM)

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10278-11 DESCRIPTION: S/P SEMI PCL-6010 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3350188	MIXER SRA-12	SRA-12	1.000	EA
	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A	1.000	EA
	3390820	LED RED T1 1.0 @ 2	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2	HLMP-1790	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI DO35	1N4154	3.000	EA
	3610003	DIO RECT 200V 1A SI DO41	1N4003	3.000	EA
	3610045	DIO SCH .340V 10MA 1.0PF (15)	5082-2835	1.000	EA
	3610078	DIO BRIDGE 100V 2A	MDA201	1.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS	5082-0180	1.000	EA
	3610284	DIO BRIDGE 100V (MIN) 25A	MDA2502	1.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0	HSMS-2820-T30	1.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0"	HSMP-3820	1.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A)	MMBV109L	1.000	EA
	3630456	XT 2N3904	2N3904	1.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF	2N2857	1.000	EA
	3640307	XT U310	U310	1.000	EA
	3640422	XT MRF 581	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23	MMBT3904	1.000	EA
	3640562	XT SST310 JFET SOT-23 Z10/20AB	SST310	1.000	E
	3640588	XT MOSFET P-CHANNEL TD-92	VP0610L	1.000	E.
	365-10139-R0	RGLTR LT1117CST ADJ .8A SOT223	LT1117CST	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92	MC78L12ACP	1.000	EA
	3650173	RGLTR MC7805CT 05V 1.0A TO220	MC7805CT	1.000	EA
	3650207	RGLTR MC7815CT 15V 1.5A TO220	MC7815CT	1.000	EA
	3650215	RGLTR MC7912CT 12V 1.5A TO220	MC7912CT	1.000	EA
	3650223	RGLTR MC7915CT 15V 1.5A TO220	MC7915CT	1.000	EA
	3650363	RGLTR VARV 5.0A TO3	LM338K-STEEL	1.000	EA
	3660701	IC 74LS10 TR 3IN NAND 14PDIP	74LS10 PS	1.000	EA
	3730215	IC LM1458N OPAMP DUAL	LM1458N	1.000	EA
	3730728	IC 5534 OPAMP	NE5534P	1.000	EA
	3730967	IC DUAL OP AMP	NE5532P	2.000	EA
	3730983	IC LM358N	LM358N	1.000	EA
	3731056	IC MC145152P2 FREQ SYNC CONT.	MC145152P2	1.000	EA
	3731080	IC SP8647B DUAL MOD 10/11	SP8647B/DG	1.000	EA
	3731536	IC SL560C/DP8 AMP 8 PIN DIP	SL560C/DP8	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC	MAV-11	1.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN	MAR-3SM	1.000	EA
	3731965	IC RF AMP 1GHZ 7DB SMT	MSA-0504	1.000	EA
	3731981	IC OPAMP LP EXTND CMVR DIP8	ICL7612BCPA	1.000	EA
	3731999	IC RF PWR AMP 870-950 MHZ 12W	MHW812A3	1.000	EA
	4590311	THERMISTOR 680 OHM 10%	1K681K	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10278-21 DESCRIPTION: S/P OPT PCL-6010 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG	MC501265	1.000	EA
	3370251	FUSE .25X1.25 SLOW 1. A	MDL 1	2.000	EA
	3370277	FUSE .25X1.25 SLOW 2. A	MDL 2	2.000	EA
	4260287	CAP ALLYTIC 2700/35V SNAP 105C	LP272M035C1P3	5.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10278-31 DESCRIPTION: S/P XTAL PCL-6010 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	3341062	XTAL 1ST LO 102.000 MHZ	30A0093-1	M	1.000	EA
	3350725	OSC XTAL 12.8 MHZ TCXO	TCO-909Z		1.000	EA

MOSELEY ASSOCIATES, INC.
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SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10279-11 DESCRIPTION: S/P SEMI PCL-6020 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3350188	MIXER SRA-12	SRA-12	1.000	EA
	3350196	MIXER BAL	MX-1	1.000	EA
	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A	1.000	EA
	3390820	LED RED T1 1.0 @ 2	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2	HLMP-1790	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035	1N4154	2.000	EA
	3610003	DIO RECT 200V 1A SI D041	1N4003	3.000	EA
	3610078	DIO BRIDGE 100V 2A	MDA201	1.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS	5082-0180	1.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0	HSMS-2820-T30	1.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0"	HSMP-3820	1.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A)	MMBV109L	1.000	EA
	3630456	XT 2N3904	2N3904	1.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF	2N2857	1.000	EA
	3640307	XT U310	U310	1.000	EA
	3640422	XT MRF 581	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23	MMBT3904	1.000	EA
	3640562	XT SST310 JFET SOT-23 Z10/20AB	SST310	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92	MC78L12ACP	1.000	EA
	3650173	RGLTR MC7805CT 05V 1.0A TO220	MC7805CT	1.000	EA
	3650207	RGLTR MC7815CT 15V 1.5A TO220	MC7815CT	1.000	EA
	3650215	RGLTR MC7912CT 12V 1.5A TO220	MC7912CT	1.000	EA
	3650223	RGLTR MC7915CT 15V 1.5A TO220	MC7915CT	1.000	EA
	3661147	IC SN7406 HEX INV/BUF 30V OC	SN7406N	1.000	EA
	3661766	IC 74HC20 DUAL 4INP POS-NAND	MM74HC20N	1.000	EA
	3730173	IC LM318N OPAMP HISPEED	LM318N	1.000	EA
	3730215	IC LM1458N OPAMP DUAL	LM1458N	1.000	EA
	3730728	IC 5534 OPAMP	NE5534P	1.000	EA
	3730934	IC HI-200-5 DUAL SPST CMOS SW	HI3-0200-5	1.000	EA
	3730967	IC DUAL OP AMP	NE5532P	2.000	EA
	3731056	IC MC145152P2 FREQ SYNC CONT.	MC145152P2	1.000	EA
	3731080	IC SP8647B DUAL MOD 10/11	SP8647B/DG	1.000	EA
	3731346	IC FM DEMOD	LM1865	1.000	EA
	3731536	IC SL560C/DP8 AMP 8 PIN DIP	SL560C/DP8	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC	MAV-11	1.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN	MAR-3SM	1.000	EA
	3731932	IC RF AMP 2GHZ 16DB SMT WHT	MAR-6SM	1.000	EA
	4590311	THERMISTOR 680 OHM 10%	1K681K	1.000	EA

MOSELEY ASSOCIATES, INC.
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SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10279-21 DESCRIPTION: S/P OPT PCL-6020 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3270394	RELAY 4PDT 2A 12V PC MT NORMAL	DS4E-S-DC12V	1.000	EA
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG	MC501265	1.000	EA
	3370236	FUSE .25X1.25 SLOW 0.5 A	MDL 1/2	2.000	EA
	3370251	FUSE .25X1.25 SLOW 1. A	MDL 1	2.000	EA
	4260287	CAP ALLYTIC 2700/35V SNAP 105C	LP272M035C1P3	2.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10279-31 DESCRIPTION: S/P XTAL PCL-6020 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	3341062	XTAL 1ST LO 102.000 MHZ	30A0093-1	M	1.000	EA
	3350725	OSC XTAL 12.8 MHZ TCXO	TCO-909Z		1.000	EA

MOSELEY ASSOCIATES, INC.
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SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10280-11 DESCRIPTION: S/P SEMI PCL-6030 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3350188	MIXER SRA-12	SRA-12	1.000	EA
	3350196	MIXER BAL	MX-1	1.000	EA
	3390549	LED RED 2.0@20 WIDE RT/HOLDER	550-0406	1.000	EA
	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A	1.000	EA
	3390820	LED RED T1 1.0 @ 2	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2	HLMP-1790	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035	1N4154	6.000	EA
	3610003	DIO RECT 200V 1A SI D041	1N4003	3.000	EA
	3610078	DIO BRIDGE 100V 2A	MDA201	1.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS	5082-0180	1.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0	HSMS-2820-T30	1.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0"	HSMP-3820	1.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A)	MMBV109L	1.000	EA
	3630001	XT NS2N918 .4W600M030V50M2P	2N918	1.000	EA
	3630456	XT 2N3904	2N3904	4.000	EA
	3630464	XT 2N3906	2N3906	1.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF	2N2857	1.000	EA
	3640307	XT U310	U310	1.000	EA
	3640422	XT MRF 581	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23	MMBT3904	1.000	EA
	3640562	XT SST310 JFET SOT-23 Z10/20AB	SST310	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92	MC78L12ACP	1.000	EA
	3650173	RGLTR MC7805CT 05V 1.0A TO220	MC7805CT	1.000	EA
	3650207	RGLTR MC7815CT 15V 1.5A TO220	MC7815CT	1.000	EA
	3650215	RGLTR MC7912CT 12V 1.5A TO220	MC7912CT	1.000	EA
	3650223	RGLTR MC7915CT 15V 1.5A TO220	MC7915CT	1.000	EA
	3661147	IC SN7406 HEX INV/BUF 30V OC	SN7406N	1.000	EA
	3661766	IC 74HC20 DUAL 4INP POS-NAND	MM74HC20N	1.000	EA
	3730173	IC LM318N OPAMP HISPEED	LM318N	1.000	EA
	3730215	IC LM1458N OPAMP DUAL	LM1458N	1.000	EA
	3730348	IC MC1355P AMP FM/IF	MC1355P	1.000	EA
	3730728	IC 5534 OPAMP	NE5534P	1.000	EA
	3730934	IC HI-200-5 DUAL SPST CMOS SW	HI3-0200-5	1.000	EA
	3730967	IC DUAL OP AMP	NE5532P	2.000	EA
	3731056	IC MC145152P2 FREQ SYNC CONT.	MC145152P2	1.000	EA
	3731080	IC SP8647B DUAL MOD 10/11	SP8647B/DG	1.000	EA
	3731536	IC SL560C/DP8 AMP 8 PIN DIP	SL560C/DP8	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC	MAV-11	1.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN	MAR-3SM	1.000	EA
	3731932	IC RF AMP 2GHZ 16DB SMT WHT	MAR-6SM	1.000	EA
	4590311	THERMISTOR 680 OHM 10%	1K681K	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10280-21 DESCRIPTION: S/P OPT PCL-6030 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3270394	RELAY 4PDT 2A 12V PC MT NORMAL	DS4E-S-DC12V	1.000	EA
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG	MC501265	1.000	EA
	3370236	FUSE .25X1.25 SLOW 0.5 A	MDL 1/2	2.000	EA
	3370251	FUSE .25X1.25 SLOW 1. A	MDL 1	2.000	EA
	4260287	CAP ALLYTIC 2700/35V SNAP 105C	LP272M035C1P3	2.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10280-31 DESCRIPTION: S/P XTAL PCL-6030 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	3340767	XTAL 13.7MHZ PCL-606 3RD LO	30A0081	A0	1.000	EA
	3341062	XTAL 1ST LO 102.000 MHZ	30A0093-1	M	1.000	EA
	3350725	OSC XTAL 12.8 MHZ TCXO	TCO-909Z		1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
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(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10281-11 DESCRIPTION: S/P SEMI PCL-6060 950 ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3350188	MIXER SRA-12	SRA-12	1.000	EA
	3350196	MIXER BAL	MX-1	1.000	EA
	3390549	LED RED 2.0@20 WIDE RT/HOLDER	550-0406	1.000	EA
	3390598	LED R/G 2@10 DIFF 2-LEAD	MV5491A	1.000	EA
	3390820	LED RED T1 1.0 @ 2	HLMP-1700	1.000	EA
	3390838	LED GRN T1 1.0 @ 2	HLMP-1790	1.000	EA
	3600145	DIO 1N4154 25V 4NS SI D035	1N4154	5.000	EA
	3610003	DIO RECT 200V 1A SI D041	1N4003	3.000	EA
	3610078	DIO BRIDGE 100V 2A	MDA201	1.000	EA
	3610235	DIO HPND-4166	HPND-4166	1.000	EA
	3610243	DIO STEP REC 4.45PF 50V 225PS	5082-0180	1.000	EA
	3610383	DIO SHTKY HSMS-2820 SOT-23 C0	HSMS-2820-T30	1.000	EA
	3610425	DIO RF SWTCHNG 1PF SOT-23 "F0"	HSMP-3820	1.000	EA
	3610433	DIO VARACTOR 29PF SOT-23 (M4A)	MMBV109L	1.000	EA
	3630001	XT NS2N918 .4W600M030V50M2P	2N918	1.000	EA
	3630225	XT PS2N4402 .35W150M040V.6A9P	2N4402	1.000	EA
	3630456	XT 2N3904	2N3904	4.000	EA
	3630464	XT 2N3906	2N3906	1.000	EA
	3630597	XT 2N2857 NPN SILICON TO-72 RF	2N2857	1.000	EA
	3640281	XT HXTR-3101	HXTR-3101	1.000	EA
	3640307	XT U310	U310	1.000	EA
	3640422	XT MRF 581	MRF 581	1.000	EA
	3640539	XT MMBT3904 NPN SOT-23	MMBT3904	1.000	EA
	3640562	XT SST310 JFET SOT-23 Z10/20AB	SST310	1.000	EA
	3650124	RGLTR MC78L12 12V 0.1A TO92	MC78L12ACP	1.000	EA
	3650173	RGLTR MC7805CT 05V 1.0A TO220	MC7805CT	1.000	EA
	3650207	RGLTR MC7815CT 15V 1.5A TO220	MC7815CT	1.000	EA
	3650215	RGLTR MC7912CT 12V 1.5A TO220	MC7912CT	1.000	EA
	3650223	RGLTR MC7915CT 15V 1.5A TO220	MC7915CT	1.000	EA
	3661147	IC SN7406 HEX INV/BUF 30V OC	SN7406N	1.000	EA
	3661766	IC 74HC20 DUAL 4INP POS-NAND	MM74HC20N	1.000	EA
	3730173	IC LM318N OPAMP HISPEED	LM318N	1.000	EA
	3730215	IC LM1458N OPAMP DUAL	LM1458N	1.000	EA
	3730348	IC MC1355P AMP FM/IF	MC1355P	1.000	EA
	3730728	IC 5534 OPAMP	NE5534P	1.000	EA
	3730934	IC HI-200-5 DUAL SPST CMOS SW	HI3-0200-5	1.000	EA
	3730967	IC DUAL OP AMP	NE5532P	2.000	EA
	3731056	IC MC145152P2 FREQ SYNC CONT.	MC145152P2	1.000	EA
	3731080	IC SP8647B DUAL MOD 10/11	SP8647B/DG	1.000	EA
	3731536	IC SL560C/DP8 AMP 8 PIN DIP	SL560C/DP8	1.000	EA
	3731738	IC AMP 10MHZ-1GHZ MONOLITHIC	MAV-11	1.000	EA
	3731916	IC RF AMP 2GHZ 12DB SMT ORN	MAR-3SM	1.000	EA
	3731932	IC RF AMP 2GHZ 16DB SMT WHT	MAR-6SM	1.000	EA
	4590311	THERMISTOR 680 OHM 10%	1K681K	1.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10281-21 DESCRIPTION: S/P OPT PCL-6060 950
ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.	QUANTITY PER	UM
	3270394	RELAY 4PDT 2A 12V PC MT NORMAL	DS4E-S-DC12V	1.000	EA
	3350816	OVEN XTAL HC25/U NEG 12V 65DEG	MC501265	1.000	EA
	3370236	FUSE .25X1.25 SLOW 0.5 A	MDL 1/2	2.000	EA
	3370251	FUSE .25X1.25 SLOW 1. A	MDL 1	2.000	EA
	4260287	CAP ALLYTIC 2700/35V SNAP 105C	LP272M035C1P3	2.000	EA

MOSELEY ASSOCIATES, INC.
111 CASTILIAN DRIVE
SANTA BARBARA, CA 93117-3093
(805) 968-9621

DATE: 8/24/94

PARENT ITEM: 905-10281-31 DESCRIPTION: S/P XTAL PCL-6060 950 /ENG. REV A 9432

REF NO.	COMPONENT ITEM NO.	COMPONENT DESCRIPTION AND COMMENTS	ENG. DRAWING NO.		QUANTITY PER	UM
	3340767	XTAL 13.7MHZ PCL-606 3RD LO	30A0081	A0	1.000	EA
	3341062	XTAL 1ST LO 102.000 MHZ	30A0093-1	M	1.000	EA
	3350725	OSC XTAL 12.8 MHZ TCXO	TCO-909Z		1.000	EA