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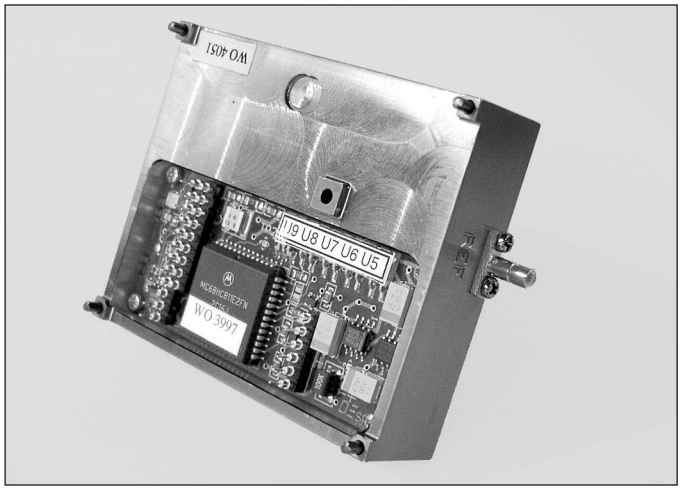

ENHANCED FM SYNTHESIZER INSTRUCTION MANUAL

Covers Models:
OSR-3H061
OST-3H035
OST-3H045

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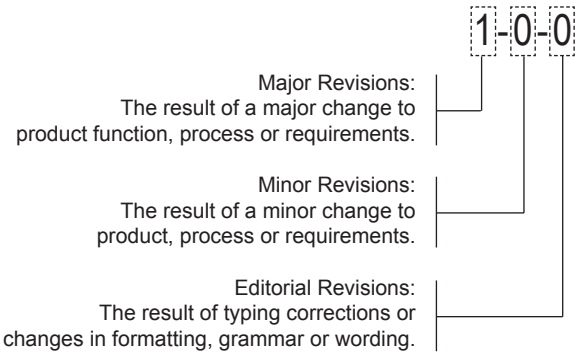
DOCUMENT REVISION DEFINITION

Daniels Electronics Ltd. utilizes a three-level revision system. This system enables Daniels to identify the significance of a revision. Each element of the revision number signifies the scope of change as described in the diagram below.



Three-level revision numbers start at 1-0-0 for the first release. The appropriate element of the revision number is incremented by 1 for each subsequent revision, causing any digits to the right to be reset to 0.

For example:
If the current revision = 2-1-1 Then the next major revision = 3-0-0
If the current revision = 4-3-1 Then the next minor revision = 4-4-0
If the current revision = 3-2-2 Then the next editorial revision = 3-2-3

The complete revision history is provided at the back of the document.

NOTE

The user's authority to operate this equipment could be revoked through any changes or modifications not expressly approved by Daniels Electronics Ltd.

The design of this equipment is subject to change due to continuous development. This equipment may incorporate minor changes in detail from the information contained in this manual.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF Exposure Warning

Exposure to radio frequency (RF) energy has been identified as a potential environmental factor that must be considered before a radio transmitter can be authorized or licensed. The FCC and IC have therefore developed maximum permissible exposure (MPE) limits for field strength and power density, listed in FCC 47 CFR § 1.1310 and IC RSS-102 Issue 2 Sect 4. The FCC has furthermore determined that determination of compliance with these exposure limits, and preparation of an Environmental Assessment (EA) if the limits are exceeded, is necessary only for facilities, operations and transmitters that fall into certain risk categories, listed in FCC 47 CFR § 1.1307 (b), Table 1. All other facilities, operations and transmitters are categorically excluded from making such studies or preparing an EA, except as indicated in FCC 47 CFR §§ 1.1307 (c) and (d).

Revised FCC OET Bulletin 65 (Edition 97-01) and IC RSS-102 Issue 2 provide assistance in determining whether a proposed or existing transmitting facility, operation or device complies with RF exposure limits. In accordance with OET Bulletin 65, FCC 47 CFR § 1.1307 (b) and RSS-102 Issue Sect 2.5, this Daniels Electronics Ltd. transmitter is categorically excluded from routine evaluation or preparing an EA for RF emissions and this exclusion is sufficient basis for assuming compliance with FCC/IC MPE limits. This exclusion is subject to the limits specified in FCC 47 CFR §§ 1.1307 (b), 1.1310 and IC RSS-102 Issue 2 Sect 4. Daniels Electronics Ltd. has no reason to believe that this excluded transmitter encompasses exceptional characteristics that could cause non-compliance.

Notes:

- The FCC and IC's exposure guidelines constitute exposure limits, not emission limits. They are relevant to locations that are accessible to workers or members of the public. Such access can be restricted or controlled by appropriate means (i.e. fences, warning signs, etc.).
- The FCC and IC's limits apply cumulatively to all sources of RF emissions affecting a given site. Sites exceeding these limits are subject to an EA and must provide test reports indicating compliance.

RF Safety Guidelines and Information

Base and Repeater radio transmitters are designed to generate and radiate RF energy by means of an external antenna, typically mounted at a significant height above ground to provide adequate signal coverage. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication. The following antenna installation guidelines are extracted from Appendix A from OET Bulletin 65 and must be adhered to in order to ensure RF exposure compliance:

Non-building-mounted Antennas:

Height above ground level to lowest point of antenna ≥ 10 m or
Power ≤ 1000 W ERP (1640 W EIRP)

Building-mounted Antennas:

Power ≤ 1000 W ERP (1640 W EIRP)

The following RF Safety Guidelines should be observed when working in or around transmitter sites:

- Do not work on or around any transmitting antenna while RF power is applied.
- Before working on an antenna, disable the appropriate transmitter and ensure a "DO NOT USE" or similar sign is placed on or near the PTT or key-up control.
- Assume all antennas are active unless specifically indicated otherwise.
- Never operate a transmitter with the cover removed.
- Ensure all personnel entering a transmitter site have electromagnetic energy awareness training.

For more information on RF energy exposure and compliance, please refer to the following:

1. FCC Code of Regulations; 47 CFR §§ 1.1307 and 1.1310.
2. FCC OET Bulletin 65, Edition 97-01, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields".
3. http://www.fcc.gov/oet/rfsafety/
4. IC RSS-102 Issue 2, "Radio Frequency Exposure Compliance of Radio Communication Apparatus"

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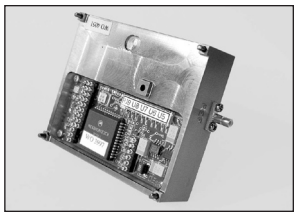


GENERAL INFORMATION

INTRODUCTION

The OS(R/T)-3H Synthesizer is a compact, fully shielded and environmentally rugged frequency synthesis module that is the nucleus of every MT-3 synthesized Receiver and Transmitter radio module.

The OS(R/T)-3H generates a stable, low-distortion radio frequency signal in one of several frequency bands. The OS(R/T)-3H uses an internal temperature compensated 10.0 MHz reference to produce a signal stable to ±5 ppm within the temperature range of -40°C to +60°C. Alternately, the OS(R/T)-3H can be disciplined by an external 9.6 MHz or 10 MHz reference of higher stability. All synthesizer modules are designed to be easily removed for programming, calibration and / or repair.

The synthesizer circuitry is distributed between two printed circuit boards (PCBs) which are isolated yet interconnected via photologic optical transceivers that effectively eliminate residual electrical noise between digital and analog circuitry. Further shielding of the synthesizer's RF filter circuitry is provided by an internal shielded enclosure.

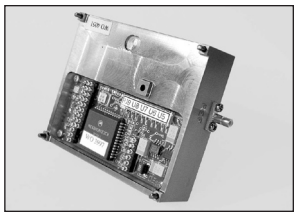
OS(R/T)-3H ENHANCED SYNTHESIZER FAMILY MODELS

The OS(R/T)-3H Synthesizer Module is used in both the MT-3 Receiver and Transmitter product lines. In MT-3 Transmitters, theOS(R/T)-3H synthesizer provides a modulated, low-level RF signal to the Power Amplifier module. In MT-3 Receivers, the OS(R/T)-3H synthesizer provides a low-noise local oscillator (LO) signal that either directly drives the mixer circuitry or first drives a buffer amplifier which precedes the mixer circuitry (if a higher LO drive signal is required for enhanced intermodulation capability).

All OS(R/T)-3H FM Enhanced Synthesizer Modules, regardless of the frequency band, use the same digital PCB and mechanical construction. There are, however, significant differences between the various models when it comes to the analog PCB. Each model's specific sub-band of operation within a given frequency band is determined through SELECT components on the corresponding analog board.

PERFORMANCE SPECIFICATIONS

Type:	Narrow band FM, Single loop synthesizer module using low noise VCO and PLL technology. Compatible with Daniels' MT-3 Series Transmitter and Receiver modules.
Frequency Range: (Tuning range with no adjustment is shown in [ ] brackets.)	• 29 MHz–38 MHz [±0.5 MHz] (OST-3H035) • 38 MHz–50 MHz [±1.0 MHz] (OST-3H045) • 50.4 MHz–71.4 MHz [±1.0 MHz] (OSR-3H061)
Output Power:	+5 dBm ±2 dBm into 50 Ω
Harmonics:	<-30 dBc
Spurious:	<-90 dBc
Hum and Noise:	>55 dB
Modulation Sensitivity:	3.0 kHz peak deviation (400 mV rms input)
External Reference Input:	• External reference input signal via SMB connector J1 • Input level 0 dBm ±3 dB • Input impedance 50 • Input frequency 10.0 MHz or 9.6 MHz • Selectable through digital board jumper JU1
Power Requirements:	• Normal Configuration: +9.5 VDC @ 160 mA • Low Current Standby Mode (TCXO enabled): +9.5 VDC @ 14 mA



THEORY OF OPERATION

INTERNAL POWER AND CONTROL – DIGITAL BOARD

The synthesizer operates from a +9.5 VDC power source applied to connector pin P1-2. Total current draw is approximately 160 mA. POWER DOWN control line P2-4 controls the +5.0 VDC microcontroller regulator U2 through power MOSFET switch U1. For receiver applications the synthesizer is always ON, with the enable line P2-4 directly connected to +9.5 VDC. For transmitter applications, pin P2-4 is controlled by the MT-3 Transmitter Board jumper J18 which selects the synthesizer standby mode.

In Low Current Standby Mode, less than 14 mA is drawn, however, a delay of approximately 50 ms from PTT activation to transmitter turn on is then required to allow for the synthesizer to lock. In Normal Mode, with the synthesizer ON continuously, less than 10 ms delay is encountered. This capability comes at the expense of additional standby current (160 mA).

SYNTHESIZER ANALOG CIRCUITRY

The Analog Board uses four optical receivers (U1–U4) and one optical transmitter (U5) to provide an isolated data interface to the digital board. The regulator IC U8 provides a continuous +5.0 VDC to the internal TCXO and power control optical receiver U1 whenever +9.5 VDC is applied to the synthesizer's voltage terminals. The analog board's main power is turned on and off by driving the optical receiver U1. U1 is driven by U4 on the digital board, which is controlled by the microcontroller. The main power regulators are provided by U6 and U7. Regulator U6 provides switched +8.0 VDC and regulator U7 provides switched +5.0 VDC. The power MOSFET IC U9 works as a clamping circuit to quickly discharge the VCO filter capacitors C32 and C33; when U9 is powered down, the RF output from the VCO is suppressed almost immediately.

At the heart of the OS(R/T)-3H Enhanced Synthesizer is U10 a low power, single chip PLL synthesizer IC. U10 is setup to use a 9.6 or 10.0 MHz reference signal provided either from the internal TCXO (with JU1-B selected) or from the external SMB connector J1 (with JU1-A selected). The reference signal's frequency is selected by jumper JU2 on the digital board; 9.6 MHz (external only) is selected if JU2 is not installed and 10 MHz if JU2 is installed.

If an external reference signal is used it must be sinusoidal, low phase noise and highly stable with an output power of 0 dBm ±3 dBm. A poor quality reference source will degrade the receiver or transmitter performance to unacceptable levels. The external reference is buffered by transistor Q2 on the analog board, which has 50 Ω input impedance at 10.0 MHz. The internal TCXO reference of 10.0 MHz provides better than ±5 ppm frequency stability from -30°C to +60°C (-40°C to +60°C optional). The TCXO fine frequency adjustment is made through potentiometer RV1, which is accessible through the synthesizer's top cover.

The 9.6 or 10.0 MHz reference source is divided down to establish a channel selection step size of 5.0 or 6.25 kHz. A third order passive loop filter comprised of C37, C38, C39, C45, C49, R36 and R32 are employed to achieve the required noise performance, modulation and worst case switching time of 50 ms. A small sample of RF energy is coupled from the VCO output buffer U16 to the synthesizer IC U10 prescaler input Pin 11. FM modulation of the VCO from approximately 100 Hz to 3 kHz is achieved through the baseband input pin P1-1 on the Digital Board. A 1 kHz sine wave with a level of approximately 400 mV rms at P1-1 provides FM deviation of 3.0 kHz. SMB connector J2 provides an RF output level of approximately +5 dBm into a 50 Ω load.

An optional low frequency modulation input is provided through connector P1-18 on the digital board and routed to the analog board via connector P3. This modulation input is coupled to a low impedance DC coupled source. The input provides a phase modulated bandwidth from 0 Hz (DC) to the PLL loop filter bandwidth. This allows for specialized applications such as paging or trunking where a separate low frequency digital / analog modulation channel is required. The phase modulation input on the digital board, connector P1-18, is routed to the transmitter's audio processor pin P4-2 via JA4-2 on the MT-3 Transmitter's mainboard.

NOTE: Any application that uses the direct TCXO modulation port transfers control of the synthesizer's steady state frequency setting to the external modulation source. The internal TCXO frequency control potentiometer RV1 is then effectively removed from the circuitry.

A lock detect LED on the synthesizer's analog board (LED1) indicates an unlocked PLL condition. An unlocked PLL condition normally indicates that the VCO is not tuned within the lock in range of the desired channel frequency. In a transmitter, the loss of lock will prevent a PTT from keying the power amplifier module, thus preventing the transmission of a spurious output signal. Adjusting capacitor C24 will normally re-establish a frequency lock within the synthesizer's frequency range. The optical transmitter U5 on the analog board is also activated in an unlocked condition and enables the microcontroller on the digital board to respond to the unlocked PLL condition.

The field effect transistor Q5 forms part of the negative resistance VHF amplifier oscillator that is tuned on-frequency by the combination of the resonator L5 and the total capacitive reactance presented across L5 through capacitors C62, C63, C64, C23 (Select), variable capacitor C24, and varactor diodes D1 and D2. Fine frequency adjustment is obtained via the multi-turn trimmer capacitor C24 in conjunction with the coarse frequency jumper selections JU2, JU3 and JU4. Select capacitor values are chosen to position the operating frequency in one of three bands: 29-38 MHz, 38-50 MHz or 50.4-71.4 MHz. Varactor diodes D1 and D2 provide oscillator frequency control.

The PLL control voltage, at the output of the low pass loop filter TP4 controls the VCO frequency through the reverse biasing of varactor diodes D1 and D2. The PLL control voltage can range between ≈ +0.5 VDC and +4.5 VDC and is nominally set to ≈ +2.3 VDC (RX) and +3.5 VDC (TX) at the synthesizer centre frequency. Setting of the PLL control voltage test point TP4 is achieved by adjusting fine frequency variable capacitor C24 combined with binary weighted lumped capacitor coarse frequency jumpers JU2, JU3 and JU4. External baseband frequency modulation is provided through connection P1 and a voltage divider network formed by R21 and R22. A large signal division ratio, established by the resistive dividers R21 and R22, allows low deviation (less than 5 kHz) direct frequency modulation of the VCO output signal.

The PLL low pass filter is formed by SELECT components C37, C38, C39, C45, R32 and R36. The loop filter response is optimized for switching time, noise and modulation requirements specific to each sub-band within the 29-71.4 MHz frequency range. The SELECT components (including the loop filter) can be found in tabular format on the VHF OS(R/T)-3H 29-71.4 MHz Analog Board schematic diagram.

RF output power is taken from the source of Q5 and amplified / buffered by U11. U15 provides further amplification and isolation while delivering approximately +10 dBm into a six-pole low-pass notch formed by C53, C57, C58,

C59, L11 and L13. The six-pole output filter, with a cutoff frequency of 50 MHz for models OST-3H035 and OST-3H045 or 80 MHz for the OSR-3H061 effectively eliminates output harmonics. SMB connector J2 provides interconnection to the companion transmitter or receiver with an output level of +5 dBm ±2 dBm.

SYNTHESIZER DIGITAL CIRCUITRY

The synthesizer's digital board circuitry generates control signals used within the synthesizer. The microcontroller U4 on the digital board:

- communicates with the synthesizer's PLL IC U10 on the analog board
- monitors the synthesizer lock detect
- manages the PTT input and output
- determines the operating frequency by reading the channel code number information from either the four rotary binary coded decimal (BCD) switches mounted on the transmitter or receiver's mainboard, or by reading the four externally driven channel select lines.

The microcontroller U4 is also designed to communicate with Daniels' Synthesizer Channel Programmer (CP-SC-3) through I/O lines TX Data (P1-17), RX Data (P1-9) and Bootstrap (P2-2). This external programmer places the operating program in non-volatile microprocessor memory and programs up to 15 user-defined channel code numbers. An internal "watchdog" timer provides robust software protection in all operating modes.

Data communication between the digital and analog circuit boards is achieved through four optical transmitters U5 through U8 and one optical receiver U9. The optical interface provides a fully isolated inter-board data communications link designed to prevent digital noise from interfering with the sensitive PLL circuitry.

BCD SWITCH FREQUENCY CONTROL

Selection of the desired synthesizer output frequency is straightforward. If all four of the CHANNEL SELECT lines (CHAN SEL3–CHAN SEL0) are pulled low (to GND), the synthesizer will scan the four BCD switches FSW1-FSW4 located on the receiver or transmitter mainboards via connections SW1 COM–SW4 COM and PC4–PC7 and establish the operating frequency from these switches. The four CHANNEL SELECT lines, are connected via the MT-3 Transmitter or Receiver mainboard module connector to the MT3 motherboard subrack. These lines are by default normally pulled low (to GND) via jumpers located on the MT3 motherboard subrack.

If any one of the CHANNEL SELECT lines are pulled high (to +9.5 VDC), then the synthesizer's frequency of operation will be determined by the CHANNEL SELECT lines and not the BCD switches. Up to 15 separate channel frequencies can be pre-programmed into a table in non-volatile microprocessor memory and accessed through binary interpretation of the CHANNEL SELECT lines.

The most significant bit (MSB) in the CHANNEL SELECT binary code is represented by CHAN SEL3 and the least significant bit (LSB) is represented by CHAN SEL0. For example, if all CHANNEL SELECT lines are pulled high, (i.e., binary 1111) then the 15th frequency entry in the internal channel table will be selected. The channel table is normally pre-programmed at the factory to user specifications, but may be programmed in the field using Daniels' Synthesizer Channel Programmer (CP-SC-3).

In transmitters, the synthesizer operating frequency is the transmitter operating frequency. For receivers, the synthesizer's operating frequency is 21.4 MHz above the receiver frequency. Refer to the Channel Designation Table Manual for a channel code number versus frequency table.

SYNTHESIZER BASE AND FREQUENCY INCREMENTS

The OS(R/T)-3H Synthesizer operates in frequency increments of 5.0/6.25kHz. The Base Frequency for any given synthesizer model is the lowest frequency generated.

Model Number	Freq. Range	Base Freq.	Freq. Increment
OST-3H035	29–38 MHz	29 MHz	5.0 / 6.25 kHz
OST-3H045	38–50 MHz	29 MHz	5.0 / 6.25 kHz
OSR-3H061	50.4–71.4 MHz	50.4 MHz	5.0 / 6.25 kHz

5.0 / 6.25 kHz Channelization

The OS(R/T)-3H synthesizers have been designed to generate frequencies in both 5.0 kHz and 6.25 kHz channel increments. The frequency increments are determined by the channel code number range. The channel code numbers from 0000 to 4999 increment the frequency in 5.0 kHz increments and channel code numbers from 5000 to 9999 increment the frequency by 6.25 kHz increments. The channel code number is either stored in the synthesizer's memory or by the BCD switches on the transmitter or receiver's mainboard. The channel number determines where the channel code number is retrieved from; Channel 1 is stored by the BCD switches and Channels 2 through 16 are stored in the synthesizer's memory.

To calculate the operating frequency for the OS(R/T)-3H from the channel code numbers refer to the Channel Table Instruction Manual or the calculations below.

BCD Switch Settings from 0000 to 4999:

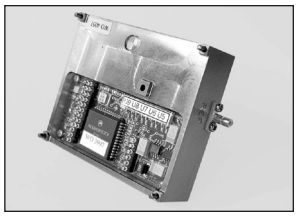
Multiply the switch setting by 5.0 kHz and add the result to the synthesizer base frequency.

Example: An OST-3H045 synthesizer has a base frequency of 29 MHz. The selected channel number is 0988. The *synthesizer* output frequency is: ((988 x 5 kHz) +29 MHz) = 33.940 MHz

BCD switch settings from 5000 to 9999:

Subtract 5000 from the switch setting. Multiply the result by 6.25 kHz
and add the result to the synthesizer base frequency.

Example: An OST-3H035 synthesizer has a base frequency of 29 MHz. The selected channel number is 7205. The *synthesizer* output frequency is: (((7205-5000) x 6.25 kHz) +29 MHz) = 42.78125 MHz



SYNTHESIZER ALIGNMENT

GENERAL

OS(R/T)-3H enhanced synthesizer alignment is simplified by using a Type-84 subrack and RF extender card / cable for providing receiver or transmitter power and signal interconnection. Alternately, a +9.5 VDC may be directly connected to a receiver or transmitter module with the positive connection on pins B6 / Z6 and the negative connection on pins B30 / Z30 / B32 / Z32. The receiver's balanced audio output (600 Ω) is available at pins B26 and Z26. The transmitter's balanced audio output (600 Ω) is available at pins B18 and Z18.

REPAIR NOTE

The OS(R/T)-3H synthesizer employs a large number of surface mount components. Removal and / or replacement of surface mount components should never be performed using an ordinary soldering iron, but should only be performed at surface mount rework and repair stations equipped with Electrostatic Discharge (ESD) protection.

When removing Surface Mount Solder Jumpers, it is recommended that a solder wick braid be used in lieu of vacuum type de-soldering tools to help prevent damage to the printed circuit boards.

RECOMMENDED TEST EQUIPMENT

Synthesizer alignment requires the following test equipment or its equivalent:

- Power supply regulated +9.5 VDC at 2 A – Phillips PM 2811
- Oscilloscope / Multimeter-Fluke 97 Scopemeter
- Radio communications test set – Marconi Instruments 2965A

It is recommended that the radio communications test set be referenced to an external high stability frequency source (WWVH, GPS, Loran C) so that the OS(R/T)-3H internal high stability local oscillator may be accurately set to within its ±1 ppm frequency tolerance.

OS(R/T)-3H SYNTHESIZER FACTORY CONFIGURATION

The OS(R/T)-3H Synthesizer is factory configured as follows:

- Internal 10.0 MHz reference selected
- VCO modulation (via audio processor) enabled – OST transmitter versions only

The corresponding synthesizer jumper settings are:

Digital Board

Jumper JU2	installed 10.0 MHz reference frequency selected
Jumper JU2	not installed 9.6 MHz reference frequency selected (default)
Jumper JU1	not installed AM Multichannel mode selected (default)

Analog Board

Jumper JU1	'B' position Internal TCXO reference frequency selected (default)

OS(R/T)-3H SYNTHESIZER ALIGNMENT PROCEDURE

General

Synthesizer alignment is normally accomplished with the synthesizer installed in the MT-3 Receiver IF / Audio Board or the MT-3 Transmitter Mainboard. The alignment procedure involves setting the internal TCXO reference frequency; the internal reference option is enabled. This step is described in 'Reference Frequency Alignment' in this section.

A change in operating frequency from the initial factory setting that exceeds the synthesizer's maximum tuning range (see Performance Specifications section) requires a more involved alignment procedure as described below. The conversion of a synthesizer from an internal reference to an external reference or vice-versa is accomplished through jumper selection. See OS(R/T)-3H Synthesizer Factory Configuration.

Synthesizer Test Points

Analog Board Component Layout (Top)

TP1	+8.0 ±0.3 VDC U6 positive regulator output
TP2	+5.0 ±0.1 VDC U7 positive regulator output
TP3	+5.0 ±0.1 VDC U8 positive regulator output (always on)
TP4	PLL error voltage Normal range is +0.5 to +4.5 VDC (depending on frequency) Nominally adjusted via C24 for +2.3 VDC (RX) and +3.5 VDC (TX) for centre channel

Digital Board Component Layout (Bottom)

TP1	+5.0 ±0.1 VDC. U2 positive regulator output (controlled via pin P2-4)
TP2	Microcontroller E clock. 2 MHz logic level square wave

Synthesizer Removal and Installation

NOTE: Complete synthesizer alignment can be performed without removing the synthesizer from the radio.

The synthesizer module is secured to the mainboard (MT-3 Receiver IF / Audio Board or MT-3 Transmitter Mainboard) with a single countersunk Phillips machine screw accessible from the top cover. Remove this screw to remove the synthesizer module. Using a plastic coated lifting tool, such as a small screwdriver with the tip covered in heat shrink material, gently lift the synthesizer module from the main circuit board by applying pressure in a rotating fashion about the four corners of the synthesizer module.

It is important to gently remove the synthesizer module “straight out” in order to prevent damage to the connector pins. Installation of the synthesizer is performed by:

- ensuring complete connector pin alignment
- applying reinsertion force
- securing the synthesizer to the mainboard with the single countersunk Phillips machine screw.

The four corner locating pins on the synthesizer housing assist in connector pin alignment during the installation.

Circuit Board Removal

NOTE: Circuit board removal is not required for tuning purposes.

The analog and digital boards can be removed using a vacuum de-soldering station.

To remove the analog board:

1. De-solder connections P1, P2 and P3.
2. Remove the SMB connectors J1 and J2 by de-soldering the center pins and removing the four (two per connector) M2 machine screws.
3. Remove the seven M2 machine screws (that secure the analog board) and carefully remove the analog circuit board.
   Removal of the analog circuit board will expose three inter-board wire connections.
4. Carefully remove three ferrite beads and six Teflon washers from the inter-board connection wires.
   Attempt to maintain the position of the three inter-board wires in order to simplify re-assembly.
5. Remove four M2 machine screws to extract the digital board
6. Follow a reverse procedure to re-assemble.

Frequency Adjustment and Channel Selection

Connect a radio communications test set through a short section of low loss 50 Ω coaxial cable to the synthesizer’s SMB RF output jack J2. Select the desired channel code number via the BCD frequency selection switches on the mainboard, or reprogram the synthesizer memory with a Channel Synthesizer Programer (CP-SC-3). Turn the power off and back on and wait a few minutes for the oscillator to completely stabilize.

NOTE: The internal synthesizer TCXO, if installed, operates continuously (regardless of the transmitter PTT state) when installed in a transmitter.

The measured RF output signal should be within ±1.0 ppm of the specified oscillator frequency at an output level of +5 dBm ±2 dBm @ 25°C.

An unlocked synthesizer operation will also be indicated by an unstable or spurious RF output signal. The “Unlocked” red LED will be illuminated if the PLL is unlocked. If a VCO alignment does not resolve the unlocked condition, check that the requested channel code number is within the frequency range of the particular synthesizer model. An unlocked condition will probably be rectified by adjusting the VCO tuning elements as described in the following procedures.

VCO Alignment

See also the Analog Board Component Layout diagrams in the Illustrations and Schematics section.

1. Measure the PLL DC control voltage at TP4 located on the synthesizer module analog board (top) using a high impedence (10 MΩ) voltmeter. Access to TP4 is available through the synthesizer top cover.
2. Carefully adjust the VCO fine frequency "TUNE" trimmer capacitor C24, using a small standard blade screwdriver, until a test point TP4 voltage of approximately +2.3 VDC (RX) and +3.5 VDC (TX) is obtained.

   PLL loop control voltages below approximately +0.5 VDC and above approximately +4.5 VDC will indicate an "out of lock" synthesizer condition.

If a TP4 reading of approximately within the above range is unattainable through adjustment of C24, then the coarse frequency jumpers JU2–JU4 require modification in order to pull the VCO tune range within the adjustment range of fine tuning capacitor C24.

The top synthesizer cover must be removed in order to gain access to the coarse frequency jumpers. The coarse frequency jumpers JU2–JU4 may be considered a selectable binary weighted capacitor element with JU2 being the most significant bit (MSB) and JU4 being the least significant bit (LSB). The tuning resolution size is approximately 12pF (JU4).

If the tuning voltage remains higher than +2.3 VDC (RX) and +3.5 VDC (TX), decrease the tuning jumper setting by 1 "bit" position and re-adjust C24 in an attempt to achieve +2.3 VDC (RX) and +3.5 VDC (TX) at TP4. For example, if coarse frequency jumpers JU2-JU4 are all installed and represented by 111 then a decrease by 1 "bit" position (12 pF) is represented by a binary jumper selection of 110; jumper JU4 is not installed and jumpers JU2, JU3 are installed. Continue to decrease the jumper position one "bit" at a time until the synthesizer regains lock with TP4 adjusted (C24) for +2.3 VDC (RX) and +3.5 VDC (TX). If the tuning voltage remains lower than +2.3 VDC (RX) and +3.5 VDC (TX), increase the jumper setting by 1 "bit" position and re-adjust C24 in an attempt to achieve +2.3 VDC (RX) and +3.5 VDC (TX) at TP4. Repeat this procedure until +2.3 VDC (RX) and +3.5 VDC (TX) is achieved at TP4.

It is important to check the loop control voltage at TP4 when multiple synthesizer channels have been programmed. All channel selections should result in a TP4 voltage within a +0.5 to +4.5 VDC range. Adjust the fine-tuning capacitor C24 to center multiple channel voltages symmetrically about +2.3 VDC (RX) and +3.5 VDC (TX). Channel selections beyond the tuning range capability of the synthesizer will result in unlocked operation. The tuning range capability of this synthesizer model is listed in the Theory of Operation section.

Reference Frequency Alignment

NOTE: This frequency alignment is only valid when the internal reference is selected (JU1 in the B position on the analog board).

To adjust the internal TCXO reference frequency, adjust the synthesizer TCXO fine frequency potentiometer RV1 until the correct output frequency is achieved. Access to this potentiometer is through an opening in the synthesizer top cover. An RF power level of approximately +5 dBm ±2 dBm should be measured at the synthesizer's SMB output connector J2. The frequency should be within ±5 ppm of the desired operating frequency.

Reference frequency adjustments should be made at room temperature (+25°C) after a ten minute stabilization period.

JUMPER CONFIGURATION

The synthesizer's surface mount solder jumpers are clearly marked on both of its digital and analog circuit boards. For jumper locations, see the Analog Board Component Layout (Top) and the Digital Board Component Layout (Bottom) diagrams in the Illustrations and Schematics section. The following list details the required jumper configuration for the two synthesizer operating modes:

Internal reference.
Install jumper JU1 in the B position on the Analog Board (Standard). The internal temperature compensated crystal oscillator (TCXO) provides the reference signal with a stability of ±5 ppm from -30°C (Optional -40°C) to +60°C.

External reference input.
Install jumper JU1 in the A position on the Analog Board. This mode is used in applications requiring better than ±5 ppm frequency stability.

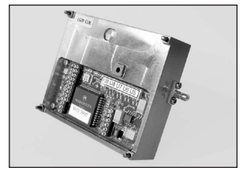
An external reference signal must be provided at the synthesizer's SMB connector J1. An optional front panel external reference connector is available as an option for transmitters and receivers.

Reference Frequency Select.
Install jumper JU2 on the Digital Board to select a 10.0 MHz reference frequency. When not installed, the reference frequency is 9.6 MHz.

JU2 is used by the microcontroller to establish the correct reference frequency division ratio. The synthesizer module must be removed to change jumper JU2 on the digital board.

NOTE: Care must be exercised when reinstalling the synthesizer module on the transmitter mainboard or the IF / Audio board.

Pay careful attention to pin alignment before pressing the synthesizer module into its mating sockets.



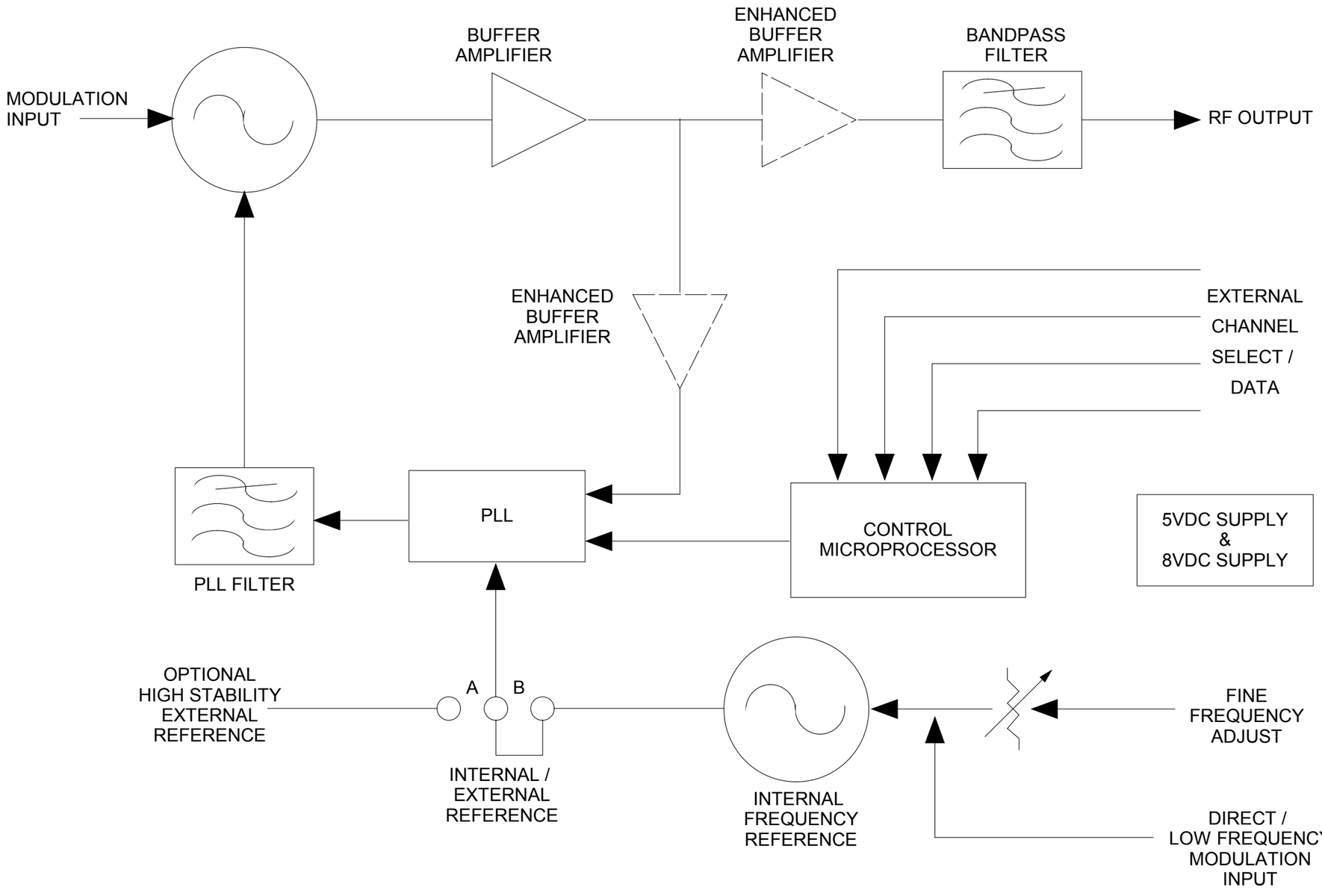
ILLUSTRATIONS AND SCHEMATICS

PRINTED CIRCUIT BOARD NUMBERING CONVENTION

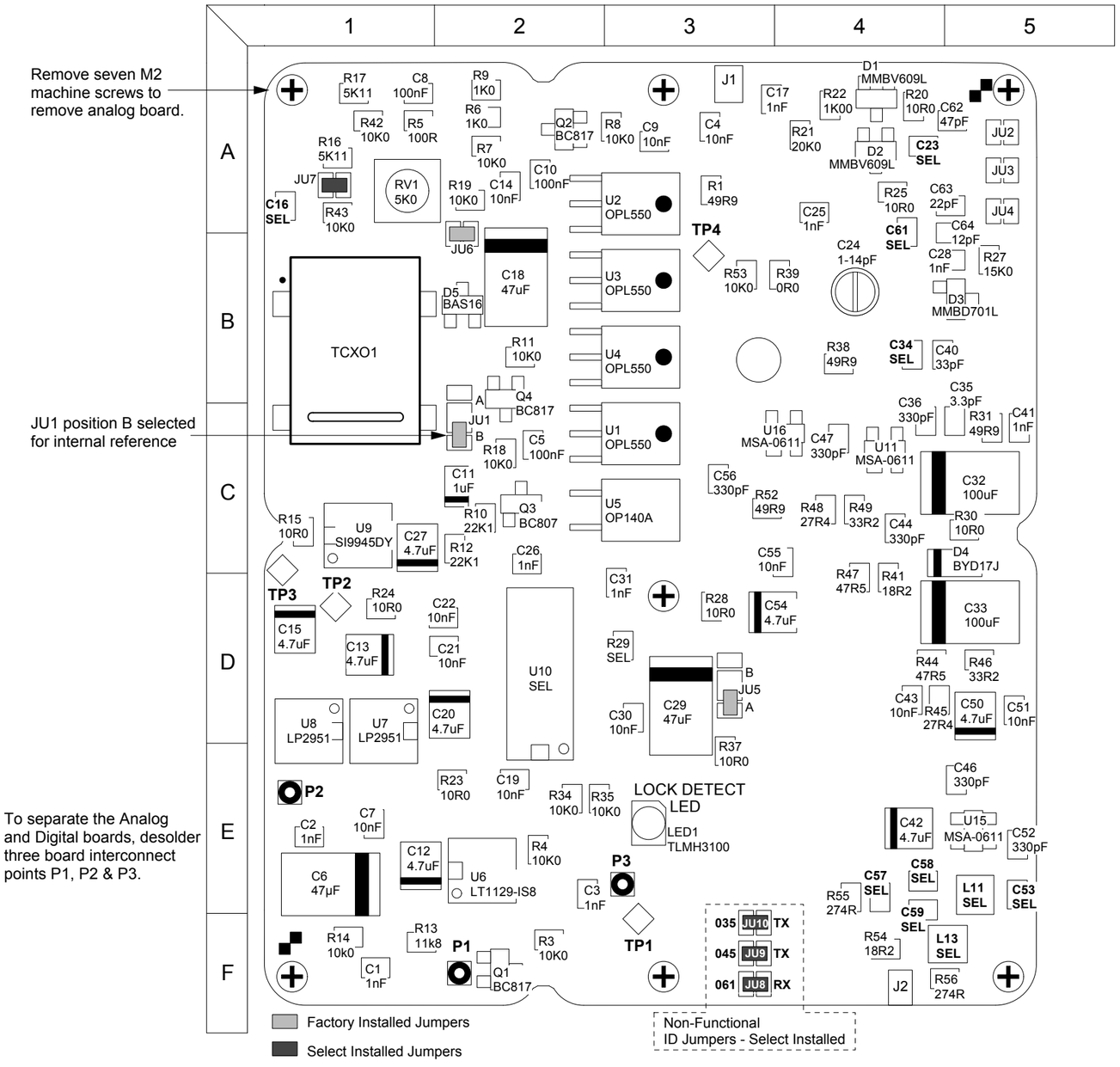
Daniels Electronics Ltd. has adopted a printed circuit board (PCB) numbering convention in which the last two digits of the circuit board number represent the circuit board version. All PCBs manufactured by Daniels Electronics Ltd. are identified by one of the following numbering conventions:

PCB number	43-91201<u>0</u> Indicates circuit board version 1.0
PCB number	50002-<u>02</u> Indicates circuit board version 2 (no decimal version)

SYNTHESIZER MODULE BLOCK DIAGRAM



OS(R/T)-3H 29–71.4 MHZ ANALOG BOARD COMPONENT LAYOUT – TOP



	TRANSMITTER		RECEIVER
DESIG.	A64-OT3H035-ANA TX 29 - 40 MHz	A64-OT3H045-ANA TX 39 - 50 MHz	A64-OR3H061-ANA RX 50.4 - 71.4 MHz
C16	Not Installed	Not Installed	1 nF
C23	150 pF	68 pF	27 pF
C34	56 pF	47 pF	33 pF
C48	short	short	Not Installed
C53	56 pF	56 pF	Not Installed
C57	15 pF	15 pF	68 pF
C58	33 pF	33 pF	68 pF
C59	33 pF	33 pF	100 pF
C61	150 pF	100 pF	56 pF
JU7	Installed	Installed	Installed
L5	260 nH *	197 nH *	138 nH *
L11	100 nH	100 nH	120 nH
L13	100 nH	100 nH	120 nH
R29	See U10 Sel Table	See U10 Sel Table	See U10 Sel Table
U10	MC145191F or MC145192F	MC145191F, MC145192F or MC145193F	MC145191F, MC145192F or MC145193F

U10 SELECT TABLE		
	MC145191F or MC145192F	MC145193F
R29	18k2	3k92

* Through Hole Component

COMPONENT LOCATION TABLE

DES	LC	SD	DES	LC	SD	DES	LC	SD	DES	LC	SD	DES	LC	SD
C1	F1	T	C41	C5	T	L1	F2	B	R19	A2	T	TCXO1	C1	T
C2	E1	T	C42	E4	T	L2	E2	B	R20	A4	T			
C3	E2	T	C43	D4	T	L3	E2	B	R21	A4	T	TP1	F3	T
C4	A3	T	C44	C4	T	L4	A4	B	R22	A4	T	TP2	D1	T
C5	C2	T	C45	D4	B	L5	A5	B	R23	E2	T	TP3	C1	T
C6	E1	T	C46	E5	T	L6	A4	B	R24	D1	T	TP4	B3	T
C7	E1	T	C47	C4	T	L7	B5	B	R25	A4	T	U1	C3	T
C8	A1	T	C48	A3	B	L8	C4	B	R26	A3	B	U2	A3	T
C9	A3	T	C49	D3	B	L9	E5	B	R27	B5	T	U3	B3	T
C10	A2	T	C50	D5	T	L10	C3	B	R28	D3	T	U4	B3	T
C11	C2	T	C51	D5	T	L11	E5	T	R29	D3	T	U5	C3	T
C12	E1	T	C52	E5	T	L12	B5	B	R30	C5	T	U6	E2	T
C13	D1	T	C53	E5	T	L13	F4	T	R31	C5	T	U7	D1	T
C14	A2	T	C54	D3	T				R32	E3	B	U8	D1	T
C15	D1	T	C55	C4	T	LED1	E3	T	R33	E3	B	U9	C1	T
C16	A1	T	C56	C3	T				R34	E2	T	U10	E2	T
C17	A3	T	C57	E4	T	Q1	F2	T	R35	E2	T	U11	C4	T
C18	B2	T	C58	E4	T	Q2	A2	T	R36	E3	B	U15	E5	T
C19	E2	T	C59	E4	T	Q3	C2	T	R37	E3	T	U16	C4	T
C20	D2	T	C61	A4	T	Q4	B2	T	R38	B4	T			
C21	D2	T	C62	A5	T	Q5	B5	B	R39	B4	T			
C22	D2	T	C63	A5	T				R40	D4	B			
C23	A4	T	C64	B5	T	R1	A3	T	R41	D4	T			
C24	B4	B				R2	C2	B	R42	A1	T			
C25	A4	T	D1	A4	T	R3	F2	T	R43	A1	T			
C26	C2	T	D2	A4	T	R4	E2	T	R44	D4	T			
C27	C1	T	D3	B4	T	R5	A1	T	R45	D4	T			
C28	B5	T	D4	C5	T	R6	A2	T	R46	D5	T			
C29	D3	T	D5	B2	T	R7	A2	T	R47	D4	T			
C30	D3	T				R8	A3	T	R48	C4	T			
C31	D3	T	JU1	B2	T	R9	A2	T	R49	C4	T			
C32	C5	T	JU2	A5	T	R10	C2	T	R50	E5	B			
C33	D5	T	JU3	A5	T	R11	B2	T	R51	C3	B			
C34	B4	T	JU4	A5	T	R12	C2	T	R52	C3	T			
C35	C5	T	JU5	D3	T	R13	F1	T	R53	B3	T			
C36	C4	T	JU6	B2	T	R14	F1	T	R54	F4	T			
C37	E4	B	JU7	A1	T	R15	C1	T	R55	E4	T			
C38	E4	B	JU8	F3	T	R16	A1	T	R56	F4	T			
C39	E4	B	JU9	F3	T	R17	A1	T						
C40	B4	T	JU10	F3	T	R18	C2	T	RV1	A1	T			

U10	JU5
MC-145190F	B
MC-145191F	A
MC-145192F	A
MC-145193F	A

DES - Designation
LC - Location
SD - Side
B - Bottom
T - Top

DANIELS™ ELECTRONICS LTD

TITLE: 29-71.4 MHz ANALOG BOARD BOARD LAYOUT - TOP

DATE: 18 SEPT 2002	BOARD NO: 50038-03
DWG No: 01-T-05-01	REV DATE: 15 MAR 2010

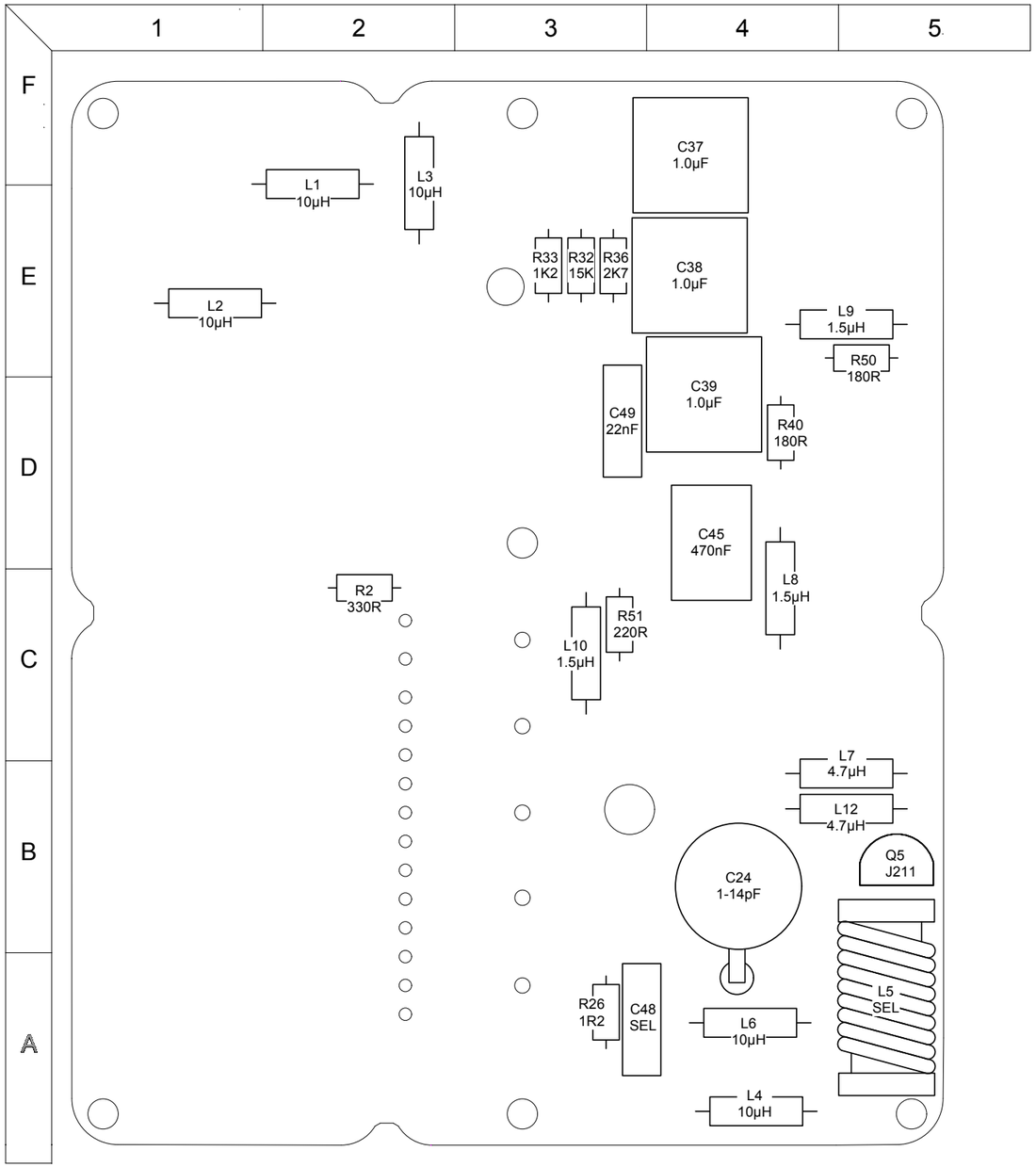
OS(R/T)-3H 29–71.4 MHZ ANALOG BOARD COMPONENT LAYOUT – BOTTOM

COMPONENT LOCATION TABLE

DES	LC	SD	DES	LC	SD	DES	LC	SD	DES	LC	SD	DES	LC	SD
C1	F1	T	C41	C5	T	L1	F2	B	R19	A2	T	TCXO1	C1	T
C2	E1	T	C42	E4	T	L2	E2	B	R20	A4	T			
C3	E2	T	C43	D4	T	L3	E2	B	R21	A4	T	TP1	F3	T
C4	A3	T	C44	C4	T	L4	A4	B	R22	A4	T	TP2	D1	T
C5	C2	T	C45	D4	B	L5	A5	B	R23	E2	T	TP3	C1	T
C6	E1	T	C46	E5	T	L6	A4	B	R24	D1	T	TP4	B3	T
C7	E1	T	C47	C4	T	L7	B5	B	R25	A4	T	U1	C3	T
C8	A1	T	C48	A3	B	L8	C4	B	R26	A3	B	U2	A3	T
C9	A3	T	C49	D3	B	L9	E5	B	R27	B5	T	U3	B3	T
C10	A2	T	C50	D5	T	L10	C3	B	R28	D3	T	U4	B3	T
C11	C2	T	C51	D5	T	L11	E5	T	R29	D3	T	U5	C3	T
C12	E1	T	C52	E5	T	L12	B5	B	R30	C5	T	U6	E2	T
C13	D1	T	C53	E5	T	L13	F4	T	R31	C5	T	U7	D1	T
C14	A2	T	C54	D3	T				R32	E3	B	U8	D1	T
C15	D1	T	C55	C4	T	LED1	E3	T	R33	E3	B	U9	C1	T
C16	A1	T	C56	C3	T				R34	E2	T	U10	E2	T
C17	A3	T	C57	E4	T	Q1	F2	T	R35	E2	T	U11	C4	T
C18	B2	T	C58	E4	T	Q2	A2	T	R36	E3	B	U15	E5	T
C19	E2	T	C59	E4	T	Q3	C2	T	R37	E3	T	U16	C4	T
C20	D2	T	C61	A4	T	Q4	B2	T	R38	B4	T			
C21	D2	T	C62	A5	T	Q5	B5	B	R39	B4	T			
C22	D2	T	C63	A5	T				R40	D4	B			
C23	A4	T	C64	B5	T	R1	A3	T	R41	D4	T			
C24	B4	B				R2	C2	B	R42	A1	T			
C25	A4	T	D1	A4	T	R3	F2	T	R43	A1	T			
C26	C2	T	D2	A4	T	R4	E2	T	R44	D4	T			
C27	C1	T	D3	B4	T	R5	A1	T	R45	D4	T			
C28	B5	T	D4	C5	T	R6	A2	T	R46	D5	T			
C29	D3	T	D5	B2	T	R7	A2	T	R47	D4	T			
C30	D3	T				R8	A3	T	R48	C4	T			
C31	D3	T	JU1	B2	T	R9	A2	T	R49	C4	T			
C32	C5	T	JU2	A5	T	R10	C2	T	R50	E5	B			
C33	D5	T	JU3	A5	T	R11	B2	T	R51	C3	B			
C34	B4	T	JU4	A5	T	R12	C2	T	R52	C3	T			
C35	C5	T	JU5	D3	T	R13	F1	T	R53	B3	T			
C36	C4	T	JU6	B2	T	R14	F1	T	R54	F4	T			
C37	E4	B	JU7	A1	T	R15	C1	T	R55	E4	T			
C38	E4	B	JU8	F3	T	R16	A1	T	R56	F4	T			
C39	E4	B	JU9	F3	T	R17	A1	T						
C40	B4	T	JU10	F3	T	R18	C2	T	RV1	A1	T			

DES - Designation
LC - Location
SD - Side
B - Bottom
T - Top

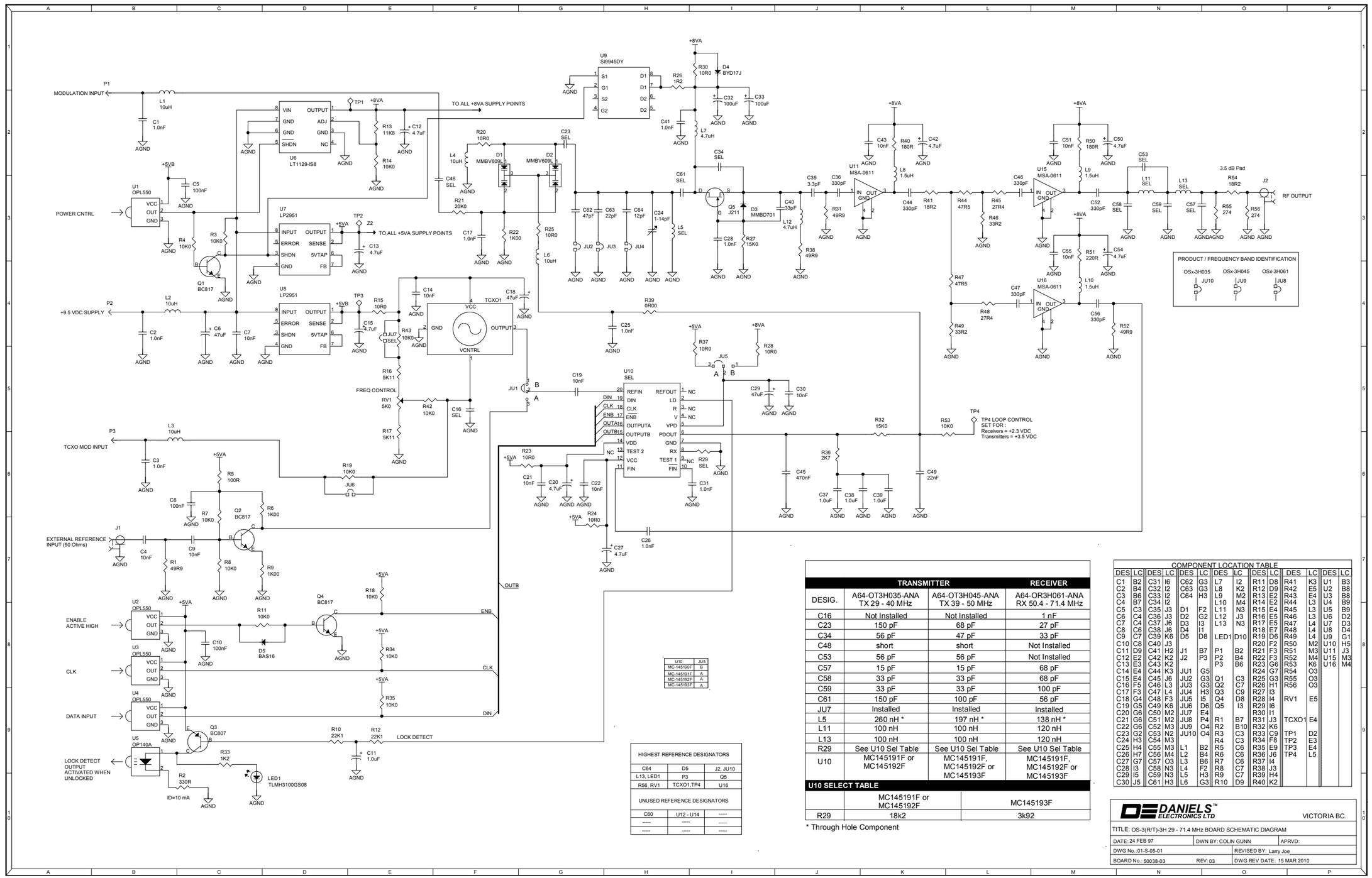
	TRANSMITTER		RECEIVER
DESIG.	A64-OT3H035-ANA TX 29 - 40 MHz	A64-OT3H045-ANA TX 39 - 50 MHz	A64-OR3H061-ANA RX 50.4 - 71.4 MHz
C48	SHORT 22 AWG Buss	SHORT 22 AWG Buss	Not Installed
L5	260 nH (1253-A1352603)	197 nH (1253-A1151971)	138 nH (1253-A0951389)



DANIELS™ ELECTRONICS LTD

TITLE: 29-71.4 MHz ANALOG BOARD BOARD LAYOUT - BOTTOM	
DATE: 18 SEPT 02	BOARD NO: 50038-03
DWG No: 01-B-05-01	REV DATE: 12 MAR 10

OS(R/T)-3H 29–71.4 MHZ ANALOG BOARD SCHEMATIC DIAGRAM



U10	JU5
MC-145190F	B
MC-145191F	A
MC-145192F	A
MC-145193F	A

HIGHEST REFERENCE DESIGNATORS		
C64	D5	J2, JU10
L13, LED1	P3	Q5
R56, RV1	TCXO1,TP4	U16
UNUSED REFERENCE DESIGNATORS		
C60	U12 - U14	------
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DESIG.	TRANSMITTER A64-OT3H035-ANA TX 29 - 40 MHz	TRANSMITTER A64-OT3H045-ANA TX 39 - 50 MHz	RECEIVER A64-OR3H061-ANA RX 50.4 - 71.4 MHz
C16	Not Installed	Not Installed	1 nF
C23	150 pF	68 pF	27 pF
C34	56 pF	47 pF	33 pF
C48	short	short	Not Installed
C53	56 pF	56 pF	Not Installed
C57	15 pF	15 pF	68 pF
C58	33 pF	33 pF	68 pF
C59	33 pF	33 pF	100 pF
C61	150 pF	100 pF	56 pF
JU7	Installed	Installed	Installed
L5	260 nH *	197 nH *	138 nH *
L11	100 nH	100 nH	120 nH
L13	100 nH	100 nH	120 nH
R29	See U10 Sel Table	See U10 Sel Table	See U10 Sel Table
U10	MC145191F or MC145192F	MC145191F, MC145192F or MC145193F	MC145191F, MC145192F or MC145193F

U10 SELECT TABLE		
	MC145191F or MC145192F	MC145193F
R29	18k2	3k92

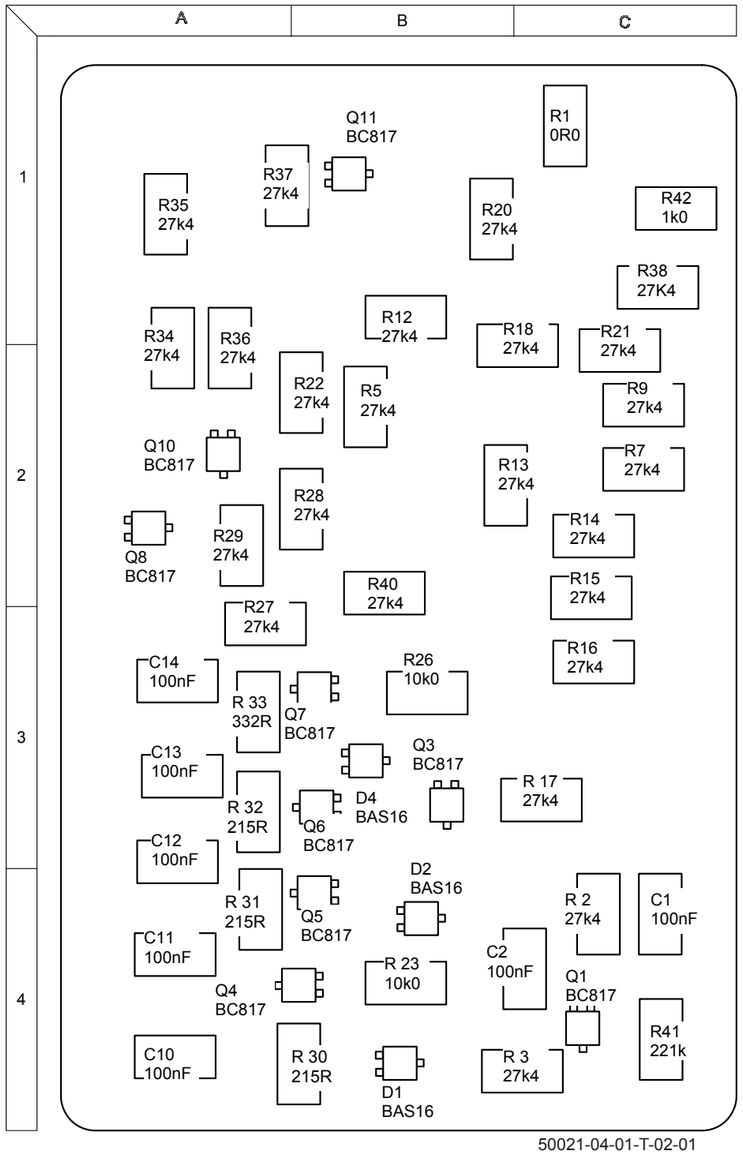
* Through Hole Component

COMPONENT LOCATION TABLE																			
DES	LC	DES	LC	DES	LC	DES	LC	DES	LC	DES	LC	DES	LC	DES	LC	DES	LC	DES	LC
C1	B2	C31	I6	C62	G3	L7	I2	R11	D8	R41	K3	U1	B3						
C2	B4	C32	I2	C63	G3	L8	K2	R12	D9	R42	E5	U2	B8						
C3	B6	C33	I2	C64	H3	L9	M2	R13	E2	R43	E4	U3	B8						
C4	B7	C34	I2			L10	M4	R14	E2	R44	L3	U4	B9						
C5	C3	C35	J3	D1	F2	L11	N3	R15	E4	R45	L3	U5	B9						
C6	C4	C36	J3	D2	G2	L12	J3	R16	E5	R46	L3	U6	D2						
C7	C4	C37	J6	D3	I3	L13	N3	R17	E5	R47	L4	U7	D3						
C8	C6	C38	J6	D4	I1			R18	E7	R48	L4	U8	D4						
C9	C7	C39	K6	D5	D8	LED1	D10	R19	D6	R49	L4	U9	G1						
C10	C8	C40	J3					R20	F2	R50	M2	U10	H5						
C11	D9	C41	H2	J1	B7	P1	B2	R21	F3	R51	M3	U11	J3						
C12	E2	C42	K2	J2	P3	P2	B4	R22	F3	R52	M4	U15	M3						
C13	E3	C43	K2			P3	B6	R23	G6	R53	K6	U16	M4						
C14	E4	C44	K3	JU1	G5			R24	G7	R54	O3								
C15	E4	C45	J6	JU2	G3	Q1	C3	R25	G3	R55	O3								
C16	F5	C46	L3	JU3	G3	Q2	C7	R26	H1	R56	O3								
C17	F3	C47	L4	JU4	H3	Q3	C9	R27	I3										
C18	G4	C48	F3	JU5	I5	Q4	D8	R28	I4	RV1	E5								
C19	G5	C49	K6	JU6	D6	Q5	I3	R29	I6										
C20	G6	C50	M2	JU7	E4			R30	I1										
C21	G6	C51	M2	JU8	P4	R1	B7	R31	J3	TCXO1	E4								
C22	G6	C52	M3	JU9	O4	R2	B10	R32	K6										
C23	G2	C53	N2	JU10	O4	R3	C3	R33	C9	TP1	D2								
C24	H3	C54	M3			R4	C3	R34	F8	TP2	E3								
C25	H4	C55	M3	L1	B2	R5	C6	R35	E9	TP3	E4								
C26	H7	C56	M4	L2	B4	R6	C6	R36	J6	TP4	L5								
C27	G7	C57	O3	L3	B6	R7	C6	R37	I4										
C28	I3	C58	N3	L4	F2	R8	C7	R38	J3										
C29	I5	C59	N3	L5	H3	R9	C7	R39	H4										
C30	J5	C61	H3	L6	G3	R10	D9	R40	K2										

DANIELS™ ELECTRONICS LTD — VICTORIA BC.

TITLE: OS-3(R/T)-3H 29 - 71.4 MHz BOARD SCHEMATIC DIAGRAM		
DATE: 24 FEB 97	DWN BY: COLIN GUNN	APRVD:
DWG No.:01-S-05-01	REVISED BY: Larry Joe	
BOARD No.: 50038-03 REV:03	DWG REV DATE: 15 MAR 2010	

OS(R/T)-3H 29–71.4 MHZ DIGITAL BOARD COMPONENT LAYOUT – TOP

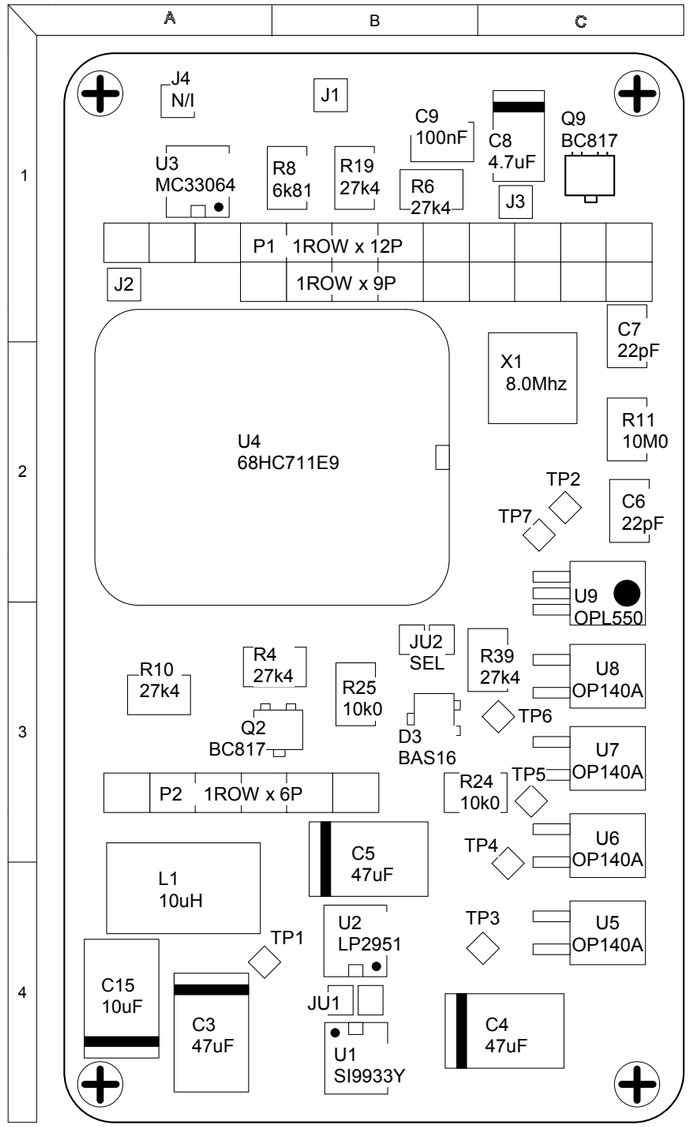


50021-04-01-T-02-01

COMPONENT LOCATION TABLE

DES	LC	SD	DES	LC	SD	DES	LC	SD
C1	C4	T	Q6	B3	T	R33	A3	T
C2	C4	T	Q7	B3	T	R34	A2	T
C3	A4	B	Q8	A2	T	R35	A1	T
C4	C4	B	Q9	C1	B	R36	A2	T
C5	B4	B	Q10	A2	T	R37	A1	T
C6	C2	B	Q11	B1	T	R38	C1	T
C7	C1	B				R39	C3	B
C8	C1	B	R1	C1	T	R40	B2	T
C9	B1	B	R2	C4	T	R41	C4	T
C10	A4	T	R3	C4	T	R42	C1	T
C11	A4	T	R4	B3	B			
C12	A3	T	R5	B2	T	TP1	A4	B
C13	A3	T	R6	B1	B	TP2	C2	B
C14	A3	T	R7	C2	T	TP3	C4	B
C15	A4	B	R8	B1	B	TP4	C3	B
			R9	C2	T	TP5	C3	B
D1	B4	T	R10	A3	B	TP6	C3	B
D2	B4	T	R11	C2	B	TP7	C2	B
D3	B3	B	R12	B1	T			
D4	B3	T	R13	B2	T	U1	B4	B
			R14	C2	T	U2	B4	B
J1	B1	B	R15	C2	T	U3	A1	B
J2	A1	B	R16	C3	T	U4	A2	B
J3	C1	B	R17	C3	T	U5	C4	B
J4	A1	B	R18	C1	T	U6	C3	B
			R19	B1	B	U7	C3	B
JU1	B4	B	R20	B1	T	U8	C3	B
JU2	B3	B	R21	C2	T	U9	C2	B
			R22	B2	T			
L1	A4	B	R23	B4	T	X1	C2	B
			R24	B3	B			
P1	B1	B	R25	B3	B			
P2	A3	B	R26	B3	T			
			R27	A3	T			
Q1	C4	T	R28	B2	T			
Q2	B3	B	R29	A2	T			
Q3	B3	T	R30	B4	T			
Q4	B4	T	R31	A4	T			
Q5	B4	T	R32	A3	T			

OS(R/T)-3H 29–71.4 MHZ DIGITAL BOARD COMPONENT LAYOUT – BOTTOM



COMPONENT LOCATION TABLE

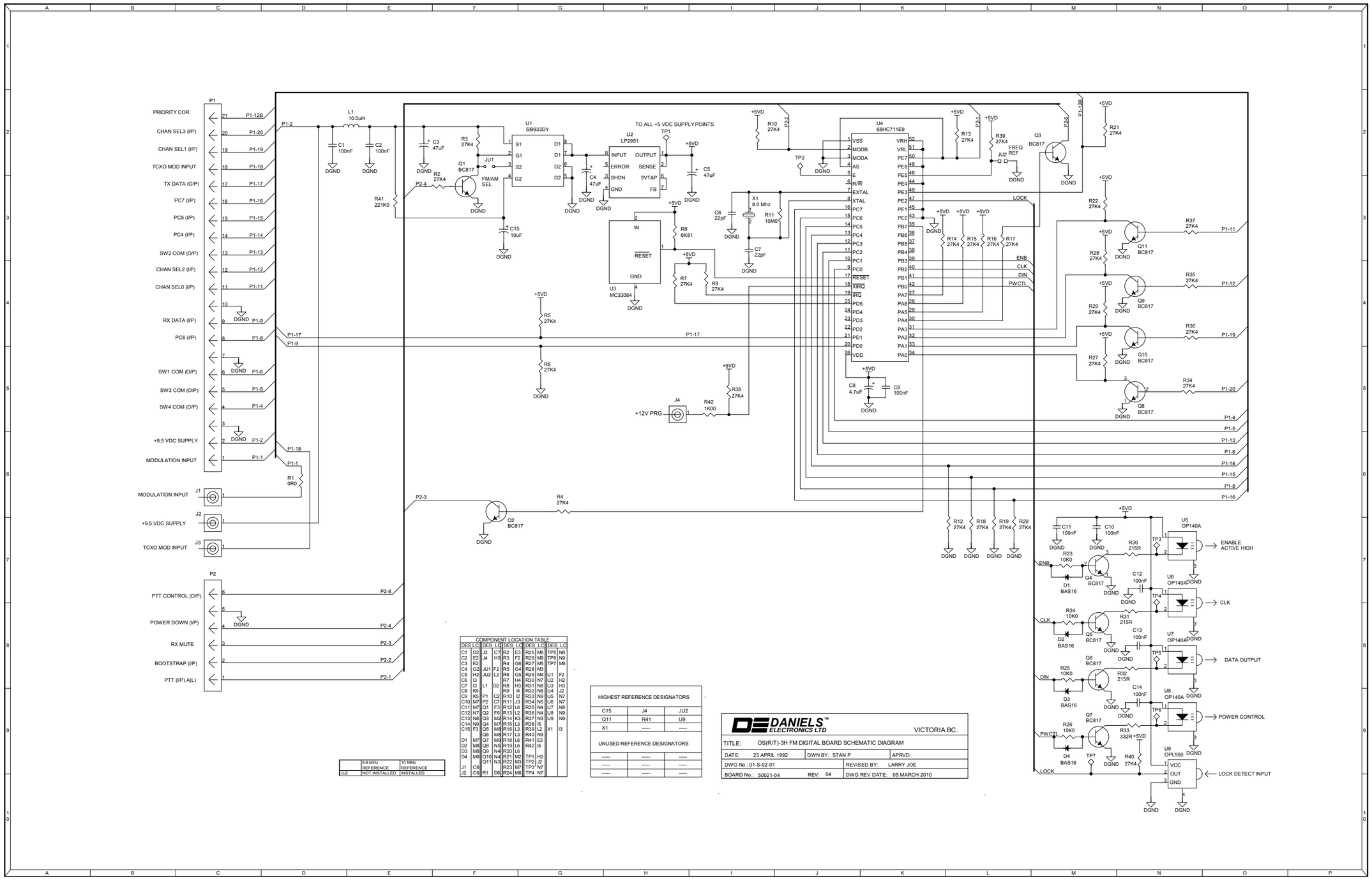
DES	LC	SD	DES	LC	SD	DES	LC	SD
C1	C4	T	Q6	B3	T	R33	A3	T
C2	C4	T	Q7	B3	T	R34	A2	T
C3	A4	B	Q8	A2	T	R35	A1	T
C4	C4	B	Q9	C1	B	R36	A2	T
C5	B4	B	Q10	A2	T	R37	A1	T
C6	C2	B	Q11	B1	T	R38	C1	T
C7	C1	B				R39	C3	B
C8	C1	B	R1	C1	T	R40	B2	T
C9	B1	B	R2	C4	T	R41	C4	T
C10	A4	T	R3	C4	T	R42	C1	T
C11	A4	T	R4	B3	B			
C12	A3	T	R5	B2	T	TP1	A4	B
C13	A3	T	R6	B1	B	TP2	C2	B
C14	A3	T	R7	C2	T	TP3	C4	B
C15	A4	B	R8	B1	B	TP4	C3	B
			R9	C2	T	TP5	C3	B
D1	B4	T	R10	A3	B	TP6	C3	B
D2	B4	T	R11	C2	B	TP7	C2	B
D3	B3	B	R12	B1	T			
D4	B3	T	R13	B2	T	U1	B4	B
			R14	C2	T	U2	B4	B
J1	B1	B	R15	C2	T	U3	A1	B
J2	A1	B	R16	C3	T	U4	A2	B
J3	C1	B	R17	C3	T	U5	C4	B
J4	A1	B	R18	C1	T	U6	C3	B
			R19	B1	B	U7	C3	B
JU1	B4	B	R20	B1	T	U8	C3	B
JU2	B3	B	R21	C2	T	U9	C2	B
			R22	B2	T			
L1	A4	B	R23	B4	T	X1	C2	B
			R24	B3	B			
P1	B1	B	R25	B3	B			
P2	A3	B	R26	B3	T			
			R27	A3	T			
Q1	C4	T	R28	B2	T			
Q2	B3	B	R29	A2	T			
Q3	B3	T	R30	B4	T			
Q4	B4	T	R31	A4	T			
Q5	B4	T	R32	A3	T			

	OSx-3H 29-71.4 MHz
JU1	NOT INSTALLED

	9.6 MHz REFERENCE	10 MHz REFERENCE
JU2	NOT INSTALLED	INSTALLED

50021-04-01-B-02-01

OS(R/T)-3H 29–71.4 MHZ DIGITAL BOARD SCHEMATIC DIAGRAM



	9.6 MHz REFERENCE	10 MHz REFERENCE
JU2	NOT INSTALLED	INSTALLED

COMPONENT LOCATION TABLE

DES	LC	DES	LC	DES	LC	DES	LC	DES	LC	DES	LC
C1	D2	J3		C7	R2	E3	R25	M8	TP5	N8
C2	E2	J4		H5	R3	F2	R26	M9	TP6	N9
C3	E3				R4	G6	R27	M5	TP7	M9
C4	G2	JU1	F2		R5	G4	R28	M3		
C5	H2	JU2	L2		R6	G5	R29	M4	U1	F2
C6	I3				R7	H4	R30	N7	U2	H2
C7	I3	L1	D2		R8	H3	R31	N8	U3	H3
C8	K5				R9	I4	R32	N8	U4	J2
C9	K5	P1	C2		R10	I2	R33	N9	U5	N7
C10	M7	P2	C7		R11	J3	R34	N5	U6	N7
C11	M7	Q1	F3		R12	L6	R35	N4	U7	N8
C12	N7	Q2	F6		R13	L2	R36	N4	U8	N9
C13	N8	Q3	M2		R14	K3	R37	N3	U9	N9
C14	N9	Q4	M7		R15	L3	R38	I5		
C15	F3	Q5	M8		R16	L3	R39	L2	X1	I3
		Q6	M8		R17	L3	R40	N9		
D1	M7	Q7	M9		R18	L6	R41	E3		
D2	M8	Q8	N5		R19	L6	R42	I5		
D3	M8	Q9	N4		R20	L6				
D4	M9	Q10	N4		R21	M2	TP1	H2		
		Q11	N3		R22	M3	TP2	J2		
J1	C6				R23	M7	TP3	N7		
J2	C6	R1	D6		R24	M8	TP4	N7		

HIGHEST REFERENCE DESIGNATORS		
C15	J4	JU2
Q11	R41	U9
X1	-----	-----

UNUSED REFERENCE DESIGNATORS		
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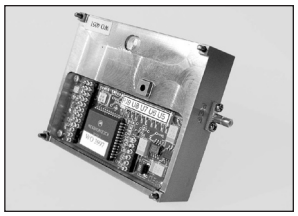
DANIELS™ ELECTRONICS LTD VICTORIA BC.

TITLE:	OS(R/T)-3H FM DIGITAL BOARD SCHEMATIC DIAGRAM		
DATE:	23 APRIL 1992	DWN BY: STAN P	APRVD:
DWG No.:	01-S-02-01	REVISED BY:	LARRY JOE
BOARD No.:	50021-04 REV: 04	DWG REV DATE:	05 MARCH 2010



PARTS LIST

OS (R/T) 29–71.4 MHZ ANALOG BOARD ELECTRICAL PARTS LIST

Designator	Description	Part Number	OSR-3H061	OST-3H035	OST-3H045
C1	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C2	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C3	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C4	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C5	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R	•	•	•
C6	CAP., SM, 47uF TANT., 20%, 16V	1055-6D476M16	•	•	•
C7	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C8	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R	•	•	•
C9	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C10	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R	•	•	•
C11	CAP., SM, 1uF TANT., 20%, 16V	1055-5A105M16	•	•	•
C12	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C13	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C14	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C15	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C16	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•		
C17	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C18	CAP., SM, 47uF TANT., 20%, 16V	1055-6D476M16	•	•	•
C19	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C20	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C21	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C22	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C23	CAP, 27pF CER,0805,5%,100V,C0G	1008-1A270J1G	•		
C23	CAP,150pF CER,0805,5%,100V,C0G	1008-2A151J1G		•	
C23	CAP, 68pF CER,0805,5%,100V,C0G	1008-1A680J1G			•
C24	CAP/TRIM., 1-14pF, STAND. >6T	1082-A1R0014J	•		

OS (R/T) 29–71.4 MHz Analog Board Electrical Parts List (Continued)

Designator	Description	Part Number	OSR-3H061	OST-3H035	OST-3H045
C25	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•		
C26	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C27	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C28	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C29	CAP., SM, 47uF TANT., 20%, 16V	1055-6D476M16	•	•	•
C30	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C31	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C32	CAP., SM, 100uF TANT., 20%,16V	1055-7D107M16	•	•	•
C33	CAP., SM, 100uF TANT., 20%,16V	1055-7D107M16	•	•	•
C34	CAP, 33pF CER,0805,5%,100V,C0G	1008-1A330J1G	•		
C34	CAP, 56pF CER,0805,5%,100V,C0G	1008-1A560J1G		•	
C34	CAP, 47pF CER,0805,5%,100V,C0G	1008-1A470J1G			•
C35	CAP, 3p3 CER, 0805,5%,100V,C0G	1008-0A339J1G	•	•	•
C36	CAP,330pF CER,0805,5%,100V,C0G	1008-2A331J1G	•	•	•
C37	CAP., 1uF FILM, MMK5, 10%, 50V	1016-6D105K50	•	•	•
C38	CAP., 1uF FILM, MMK5, 10%, 50V	1016-6D105K50	•	•	•
C39	CAP., 1uF FILM, MMK5, 10%, 50V	1016-6D105K50	•	•	•
C40	CAP, 33pF CER,0805,5%,100V,C0G	1008-1A330J1G	•	•	•
C41	CAP, 1nF CER, 0805,10%,50V,X7R	1008-3A102K5R	•	•	•
C42	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C43	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C44	CAP,330pF CER,0805,5%,100V,C0G	1008-2A331J1G	•	•	•
C45	CAP., 470nF FILM, MMK5,10%,63V	1016-5D474K63	•	•	•
C46	CAP,330pF CER,0805,5%,100V,C0G	1008-2A331J1G	•	•	•
C47	CAP,330pF CER,0805,5%,100V,C0G	1008-2A331J1G	•	•	•
C48	SELECT (see Table on Analog CLD – Bottom)				
C49	CAP., 22nF FILM, MMK5, 10%,63V	1016-4A223K63	•	•	•
C50	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C51	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C52	CAP,330pF CER,0805,5%,100V,C0G	1008-2A331J1G	•	•	•
C53	CAP, 56pF CER,0805,5%,100V,C0G	1008-1A560J1G		•	•
C54	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16	•	•	•
C55	CAP, 10nF CER,0805,10%,50V,X7R	1008-4A103K5R	•	•	•
C56	CAP,330pF CER,0805,5%,100V,C0G	1008-2A331J1G	•	•	•
C57	CAP, 68pF CER,0805,5%,100V,C0G	1008-1A680J1G	•		
C57	CAP, 15pF CER,0805,5%,100V,C0G	1008-1A150J1G		•	•
C58	CAP., SM, 33pF CER., 0805, C0G	1008-1A330J1G	•		
C58	CAP, 33pF CER,0805,5%,100V,C0G	1008-1A330J1G		•	•
C59	CAP,100pF CER,0805,5%,100V,C0G	1008-2A101J1G	•		
C59	CAP, 33pF CER,0805,5%,100V,C0G	1008-1A330J1G		•	•

OS (R/T) 29–71.4 MHz Analog Board
Electrical Parts List (Continued)

Designator	Description	Part Number	OSR-3H061	OST-3H035	OST-3H045
C61	CAP, 56pF CER,0805,5%,100V,C0G	1008-1A560J1G	•		
C61	CAP,150pF CER,0805,5%,100V,C0G	1008-2A151J1G		•	
C61	CAP,100pF CER,0805,5%,100V,C0G	1008-2A101J1G			•
C62	CAP, 47pF CER,0805,5%,100V,C0G	1008-1A470J1G	•	•	•
C63	CAP, 22pF CER,0805,5%,100V,C0G	1008-1A220J1G	•	•	•
C64	CAP, 12pF CER,0805,5%,100V,C0G	1008-1A120J1G	•	•	•
D1	DIODE, MMBV609L,VARICAP,SOT-23	2106-MMBV609L	•	•	•
D2	DIODE, MMBV609L,VARICAP,SOT-23	2106-MMBV609L	•	•	•
D3	DIODE, MMBD701,HOT CARR.,SOT23	2105-MMBD7010	•	•	•
D4	DIODE, BYD17J, RECTIFIER,SOD87	2101-BYD17J00	•	•	•
D5	DIODE, BAS16, SWITCHING, SOT23	2100-BAS16000	•	•	•
L1	CHOKE, RF/MOLDED,10uH,10%,.25”	1251-4A00100K	•	•	•
L2	CHOKE, RF/MOLDED,10uH,10%,.25”	1251-4A00100K	•	•	•
L3	CHOKE, RF/MOLDED,10uH,10%,.25”	1251-4A00100K	•	•	•
L4	CHOKE, RF/MOLDED,10uH,10%,.25”	1251-4A00100K	•	•	•
L5	INDUCTOR, 9.5T/138nH,MOLD.,WHT	1253-A0951389	•		
L5	INDUCTOR,13.5T/260nH,MOLD.,ORG	1253-A1352603		•	
L5	INDUCTOR,11.5T/197nH,MOLD.,BRN	1253-A1151971			•
L6	CHOKE, RF/MOLDED,10uH,10%,.25"	1251-4A00100K	•	•	•
L7	CHOKE, RF/MOLDED,4.7uH,10%,.25	1251-3A004R7K	•	•	•
L8	CHOKE, RF/MOLDED,1.5uH,10%,.25	1251-3A001R5K	•	•	•
L9	CHOKE, RF/MOLDED,1.5uH,10%,.25	1251-3A001R5K	•	•	•
L10	CHOKE, RF/MOLDED,1.5uH,10%,.25	1251-3A001R5K	•	•	•
L11	INDUCTOR/1008, 120nH CER, 5%	1256-2BR1200K	•		
L11	INDUCTOR/1008, 100nH CER, 5%	1256-2BR1000K		•	•
L12	CHOKE, RF/MOLDED,4.7uH,10%,.25	1251-3A004R7K	•	•	•
L13	INDUCTOR/1008, 120nH CER, 5%	1256-2BR1200K	•		
L13	INDUCTOR/1008, 100nH CER, 5%	1256-2BR1000K		•	•
LED1	LED/SM,PLCC-3.2X2.8,TOP,CL/RED	2111-T3228CRD	•	•	•
PCB	PCB, ANALOG,OS-3H VHF 30-50MHz	4309-26500383	•	•	•
Q1	TRANSISTOR, BC817-25,NPN,SOT23	2120-BC817025	•	•	•
Q2	TRANSISTOR, BC817-25,NPN,SOT23	2120-BC817025	•	•	•
Q3	TRANSISTOR, BC807-25,PNP,SOT23	2120-BC807025	•	•	•
Q4	TRANSISTOR, BC817-25,NPN,SOT23	2120-BC817025	•	•	•
Q5	JFET, J211, RF, N-CHAN., TO-92	2041-J2110000	•	•	•

OS (R/T) 29–71.4 MHz Analog Board Electrical Parts List (Continued)

Designator	Description	Part Number	OSR-3H061	OST-3H035	OST-3H045
R1	RES., SM, 49R9 0805, 1%,100ppm	1150-1A49R9FP	•	•	•
R2	RES., 330R METAL FILM, 5%,0.5W	1101-2A0331JP	•	•	•
R3	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R4	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R5	RES., SM, 100R 0805, 1%,100ppm	1150-2A1000FP	•	•	•
R6	RES., SM, 1K00 0805, 1%,100ppm	1150-3A1001FP	•	•	•
R7	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R8	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R9	RES., SM, 1K00 0805, 1%,100ppm	1150-3A1001FP	•	•	•
R10	RES., SM, 22K1 0805, 1%,100ppm	1150-4A2212FP	•	•	•
R11	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R12	RES., SM, 22K1 0805, 1%,100ppm	1150-4A2212FP	•	•	•
R13	RES., SM, 11K8 0805, 1%,100ppm	1150-4A1182FP	•	•	•
R14	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R15	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R16	RES., SM, 5K11 0805, 1%,100ppm	1150-3A5111FP	•	•	•
R17	RES., SM, 5K11 0805, 1%,100ppm	1150-3A5111FP	•	•	•
R18	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R19	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R20	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R21	RES., SM, 20K0 0805, 1%,100ppm	1150-4A2002FP	•	•	•
R22	RES., SM, 1K00 0805, 1%,100ppm	1150-3A1001FP	•	•	•
R23	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R24	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R25	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R26	RES., 1R2 METAL FILM, 5%, 0.5W	1101-0A01R2JI	•	•	•
R27	RES., SM, 15K0 0805, 1%,100ppm	1150-4A1502FP	•	•	•
R28	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R29	SELECT (see Table on Analog CLD – Top)				
R30	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R31	RES., SM, 49R9 0805, 1%,100ppm	1150-1A49R9FP	•	•	•
R32	RES., 15K METAL FILM, 5%, 0.5W	1101-4A0153JP	•	•	•
R33	RES., 1K2 METAL FILM, 5%, 0.5W	1101-3A0122JP	•	•	•
R34	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R35	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R36	RES., 2K7 METAL FILM, 5%, 0.5W	1101-3A0272JP	•	•	•
R37	RES., SM, 10R0 0805, 1%,100ppm	1150-1A10R0FP	•	•	•
R38	RES., SM, 49R9 0805, 1%,100ppm	1150-1A49R9FP	•	•	•
R39	RES., SM, ZERO OHM JUMPER,0805	1150-0A0R0000	•	•	•
R40	RES., 180R METAL FILM, 5%,0.5W	1101-2A0181JP	•	•	•
R41	RES., SM, 18R2 0805, 1%,100ppm	1150-1A18R2FP	•	•	•

OS (R/T) 29–71.4 MHz Analog Board
Electrical Parts List (Continued)

Designator	Description	Part Number	OSR-3H061	OST-3H035	OST-3H045
R42	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R43	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R44	RES., SM, 47R5 0805, 1%,100ppm	1150-1A47R5FP	•	•	•
R45	RES., SM, 27R4 0805, 1%,100ppm	1150-1A27R4FP	•	•	•
R46	RES., SM, 33R2 0805, 1%,100ppm	1150-1A33R2FP	•	•	•
R47	RES., SM, 47R5 0805, 1%,100ppm	1150-1A47R5FP	•	•	•
R48	RES., SM, 27R4 0805, 1%,100ppm	1150-1A27R4FP	•	•	•
R49	RES., SM, 33R2 0805, 1%,100ppm	1150-1A33R2FP	•	•	•
R50	RES., 180R METAL FILM, 5%,0.5W	1101-2A0181JP	•	•	•
R51	RES., 220R METAL FILM, 5%,0.5W	1101-2A0221JP	•	•	•
R52	RES., SM, 49R9 0805, 1%,100ppm	1150-1A49R9FP	•	•	•
R53	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP	•	•	•
R54	RES., SM, 18R2 0805, 1%,100ppm	1150-1A18R2FP	•	•	•
R55	RES., SM, 274R 0805, 1%,100ppm	1150-2A2740FP	•	•	•
R56	RES., SM, 274R 0805, 1%,100ppm	1150-2A2740FP	•	•	•
RV1	POT., SM/4mm SQ,5K,SINGLE TURN	1174-AS2502J1	•	•	•
TCXO1	VCTCXO/SMT,10MHz,5ppm,0.5-4.5V	2641-10000DM7	•	•	•
U1	DIODE, I/R SENSOR,TTL O/P,PLST	2014-1L18230T	•	•	•
U2	DIODE, I/R SENSOR,TTL O/P,PLST	2014-1L18230T	•	•	•
U3	DIODE, I/R SENSOR,TTL O/P,PLST	2014-1L18230T	•	•	•
U4	DIODE, I/R SENSOR,TTL O/P,PLST	2014-1L18230T	•	•	•
U5	LED, I/R,GaAs,.81 x .23,PLAST.	2013-1G18230A	•	•	•
U6	IC, LT1129I,PROG. VOLT REG,SO8	2305-11290N08	•	•	•
U7	IC, LP2951,PROG. VOLT REG,SO-8	2305-29510N08	•	•	•
U8	IC, LP2951,PROG. VOLT REG,SO-8	2305-29510N08	•	•	•
U9	MOSFET, SI9945AEY,N CHAN.,SO-8	2142-SI9945DY	•	•	•
U10	SELECT (see Table on Analog Schematic)	2355-45191N20	•	•	•
U11	IC,msA-0611, MMIC AMP,SOT-143	2354-MSA06110	•	•	•
U15	IC,msA-0611, MMIC AMP,SOT-143	2354-MSA06110	•	•	•
U16	IC,msA-0611, MMIC AMP,SOT-143	2354-MSA06110	•	•	•

DIGITAL BOARD ELECTRICAL PARTS LIST

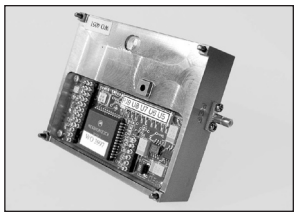
Designator	Description	Part Number
C1	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C2	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C3	CAP., SM, 47uF TANT., 20%, 16V	1055-6D476M16
C4	CAP., SM, 47uF TANT., 20%, 16V	1055-6D476M16
C5	CAP., SM, 47uF TANT., 20%, 16V	1055-6D476M16
C6	CAP, 22pF CER,0805,5%,100V,C0G	1008-1A220J1G
C7	CAP, 22pF CER,0805,5%,100V,C0G	1008-1A220J1G
C8	CAP., SM, 4.7uF TANT., 10%,16V	1055-5B475K16
C9	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C10	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C11	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C12	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C13	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C14	CAP,100nF CER,0805,10%,50V,X7R	1008-5A104K5R
C15	CAP., SM, 10uF TANT., 20%, 16V	1055-6C106M16
D1	DIODE, BAS16, SWITCHING, SOT23	2100-BAS16000
D2	DIODE, BAS16, SWITCHING, SOT23	2100-BAS16000
D3	DIODE, BAS16, SWITCHING, SOT23	2100-BAS16000
D4	DIODE, BAS16, SWITCHING, SOT23	2100-BAS16000
L1	INDUCTOR, SM, 10uH, 10%, 1812	1255-4G10000K
P1	INTERCONNECT/STD,1ROW x 12P,Au	5015-IS112G21
P1	INTERCONNECT/STD,1ROW x9PIN,Au	5015-IS109G21
P2	INTERCONNECT/STD,1ROW x6PIN,Au	5015-IS106G21
PCB	PCB, DIGITAL, OS-3H H/P SYNTH.	4309-26002104
Q1 – Q11	TRANSISTOR, BC817-25,NPN,SOT23	2120-BC817025
R1	RES., SM, ZERO OHM JUMPER,0805	1150-0A0R0000
R2	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R3	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R4	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R5	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R6	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R7	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R8	RES., SM, 6K81 0805, 1%,100ppm	1150-3A6811FP
R9	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R10	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R11	RES., SM, 10M0 1206, 5%,400ppm	1151-7B0106JG
R12	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R13	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R14	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R15	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R16	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP

Digital Board Electrical Parts List (Continued)

Designator	Description	Part Number
R17	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R18	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R19	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R20	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R21	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R22	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R23	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP
R24	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP
R25	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP
R26	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP
R27	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R28	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R29	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R30	RES., SM, 215R 0805, 1%,100ppm	1150-2A2150FP
R31	RES., SM, 215R 0805, 1%,100ppm	1150-2A2150FP
R32	RES., SM, 215R 0805, 1%,100ppm	1150-2A2150FP
R33	RES., SM, 332R 0805, 1%,100ppm	1150-2A3320FP
R34	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R35	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R36	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R37	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R38	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R39	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R40	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R41	RES., SM, 221K 0805, 1%,100ppm	1150-5A2213FP
R42	RES., SM, 1K00 0805, 1%,100ppm	1150-3A1001FP
U1	MOSFET, SI9933BDY,P CHAN.,SO-8	2142-SI9933DY
U2	IC, LP2951,PROG. VOLT REG,SO-8	2305-29510N08
U3	IC, MC33064,UNDR/VOLT SEN.SO-8	2308-33064N08
U4	IC, 68HC711E9, MIC/CTR, PLCC52	2380-68711P52
U5	LED, I/R,GaAs,.81 x .23,PLAST.	2013-1G18230A
U6	LED, I/R,GaAs,.81 x .23,PLAST.	2013-1G18230A
U7	LED, I/R,GaAs,.81 x .23,PLAST.	2013-1G18230A
U8	LED, I/R,GaAs,.81 x .23,PLAST.	2013-1G18230A
U9	DIODE, I/R SENSOR,TTL O/P,PLST	2014-1L18230T
X1	RESONATOR, SM, 8.0MHz, CERAMIC	1575-8001816A

OS(R/T) 29–71.4 MHZ MECHANICAL PARTS LIST

Description	Part Number	Qty.
CASE, OS-3H SYNTH. MODULE,ALUM	3702-66100920	1
CONN., SMB, JACK,2 HOLE FLANGE	5120-J2SC01BG	2
FERRITE BEAD, 43MIX,3x3.5mm OD	1210-43030350	3
LID, CASE,OS-3H SYNTH/MODL.,AL	3702-66100921	1
PIN, 2 x 10mm, GROOVED W/PILOT	5876-D1470210	4
SCREW, M2 X 4, PAN/PHILLIPS,A2	5812-2M0PP04S	15
SCREW, M2 x 4, FLAT/PHIL, A2	5812-2M0FP04S	8
SCREW,M2.5x24.5mm,FLAT/PHIL,A2	5812-2M5FP24S	1
WASHER, TFE,0.036ID,1/8 OD,.02T	5805-T3612F20	6



REVISION HISTORY

Revision	Date	Action #	Description
5-0-0	Aug 03	n/a	• Converted to new manual format. Seperated models into discrete manual sections. Included appendixes into main body of manual. Removed AM Enhanced Synthesizer as it is now part of a product specific manual and is no longer required in this modual manual.
		699	• Changes applied to Low Band only-Unfiltered audio is coupling with the low level signal close to the output of the audio processor (not included in this manual). R10 and R12 were 1150-4A1002FP, 10K0 SM 0805 Now 1150-4A2212FP, 22K1 0805
		759	• New Digital PCB to allow for new Microprocessor PCB was 4309-26500213, PCB 50021 Rev 3 Now 4309-26002104, PCB 50021 Rev 4 Added R42 10150-3A1001FP, 1K00 0805
5-0-1	Aug 03	n/a	• Corrected header and footer to match sections. • Corrected VHF band reference in manual locator section.Revision
5-1-1	Feb 05	812	• Ferrite Bead was: 1210-73030350 FERRITE BEAD, 73MIX,3x3.5mm OD now: 1210-43030350 FERRITE, BEAD,43MIX,3x3.5mm OD • Synthesizer Block Diagram now included. • Top frequency corrected from 512 to 470MHz
		829	To allow for an additional channel step size of 2.5 kHz in the VHF 150MHz Enhanced Receivers and Transmitters.
5-2-1	May 05	846	Affects OSR-3H141, OSR-3H162, OST-3H141, and OST-3H162 with PCB 50025-04; • R19 was 1150-5A2213FP RES., SM, 221K 0805, 1%,100ppm now 1150-5A2743FP RES., SM, 274K 0805, 1%,100ppm • R59 was 1150-4A1002FP RES., SM, 10K0 0805, 1%,100ppm now 1150-5A2213FP RES., SM, 221K 0805, 1%,100ppm • C16 was 1008-3A102K5R CAP., SM, 1nF CER, 0805,X7R,50V now Not Installed All associated drawings, schematics, and parts lists updated.
			Affects OSR-3H440 AND OST-3H440 with PCB 50028-05 • R19 was 1150-4A7502FP RES., SM, 75K0 0805, 1%,100ppm now 1150-5A2743FP RES., SM, 274K 0805, 1%,100ppm • R42 was 1150-4A1002FP RES., SM, 10K0 0805, 1%,100ppm now 1150-5A2213FP RES., SM, 221K 0805, 1%,100ppm All associated drawings, schematics, and parts lists updated.

Revision	Date	Action #	Description
5-3-0	Dec 05	6113	Affects OSR-3H141 and OST-3H141 with PCB 50025-04; • C23 was 1008-1A120J1G CAP., SM, 12pF CER., 0805, C0G now 1008-1A100J1G CAP., SM, 10pF CER., 0805, C0G • D1 was not installed now 2106-MMBV609L DIODE, MMBV609L,VARICAP,SOT-23 • R47 was 1150-1A47R5FP RES., SM, 47R5 0805, 1%,100ppm now 1150-1A27R4FP RES., SM, 27R4 0805, 1%,100ppm • R48 was 1150-1A47R5FP RES., SM, 47R5 0805, 1%,100ppm now 1150-1A27R4FP RES., SM, 27R4 0805, 1%,100ppm • R49 was 1150-1A10R0FP RES., SM, 10R0 0805, 1%,100ppm now 1150-1A39R2FP RES., SM, 39R2 0805, 1%,100ppm • R52 was not installed now 1150-2A1500FP RES., SM, 150R 0805, 1%,100ppm • JU3 was generic not installed now band specific installed
5-4-0	Apr 06	6138	Affects OSR-3H141, OSR-3H162, OST-3H141, and OST-3H162 with PCB 50025-04; • C17 was 1008-3A102K5R CAP., SM, 1nF CER 0805, X7R, 50V now 1008-4A333K5R CAP., SM, 33nF CER 0805, X7R, 50V
6-0-0	Mar 2010	---	Revision history older than seven years has been removed.
		6127	Low Band Transmitter Synthesizer TCXO Replacement with Rakon +/- 5 ppm VCTCXO
		6347	Discontinue MT-3 Radios and Modules • Removed all information on discontinued models OSR-3H141, OSR-3H162, OSR-3H440, OST-3H141, OST-3H162 and OST-3H440
		6459	New Rakon VCTCXO for use in Low-Band Receiver Analog Board. • Receiver low band frequency stability is changing from +/-1.0 ppm to +/- 5.0 ppm. • Updated all CLDs and schematics
		---	Updated company logos and applied Daniels' Style Guide