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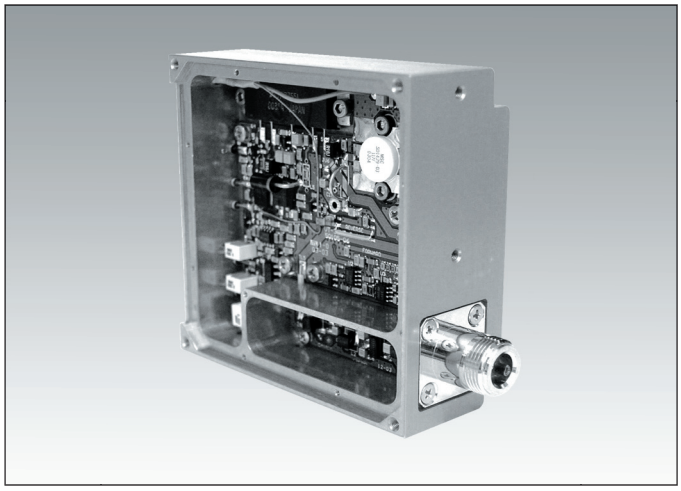

# *UHF AMPLIFIER INSTRUCTION MANUAL*

## *UT-3 / UT-4 406-470 MHZ*

| Covers Models: |
| --- |
| A23-UPA420-02 A23-UPA420-08 |
| A23-UPA460-02 A23-UPA460-08 |



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Daniels Electronics Ltd.
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DOCUMENT CONTROL

This document has been produced, verified and controlled in accordance with Daniels Electronics' Quality Management System requirements.

Please report any errors or problems to Daniels Electronics' Customer Service Department.

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.

# 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 has therefore developed maximum permissible exposure (MPE) limits for field strength and power density, listed in FCC 47 CFR § 1.1310. 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) provides assistance in determining whether a proposed or existing transmitting facility, operation or device complies with RF exposure limits. In accordance with OET Bulletin 65 and FCC 47 CFR § 1.1307 (b), 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 MPE limits. This exclusion is subject to the limits specified in FCC 47 CFR §§ 1.1307 (b) and 1.1310. Daniels Electronics Ltd. has no reason to believe that this excluded transmitter encompasses exceptional characteristics that could cause non-compliance.

**Notes:**
- The FCC'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'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. The following antenna installation guidelines are extracted from Appendix A to 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 ≤ 1000W ERP (1640 W EIRP)

Building-mounted Antennas:

Power ≤ 1000 W ERP (1640 W EIRP)

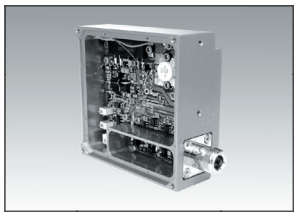
***The following RF Safety Guidelines should be observed when working in or around transmitter sites***:

- 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/

# Contents



# GENERAL INFORMATION

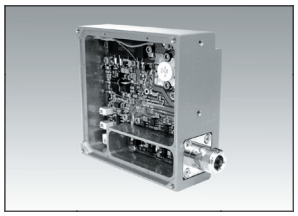
## INTRODUCTION

The UT-3/400 Amplifier provides the final stage of RF amplification and filtering for the entire UHF Transmitter UT-3 and UT-4 406 -470 MHz family. The amplifier has two distinct frequency ranges: 406 to 430 MHz and 450 to 470 MHz as well as two distinct output power ranges: 0.5 to 2.0 Watts and 2.0 to 8.0 Watts. The UT-3/400 Amplifier is housed in a machined aluminum case that ensures optimum RF shielding, provides a good ground, and also acts as a heatsink.

Additionally, the UT-3/400 Amplifier is equipped with output power and VSWR sensing lines that can be individually configured as open collector or linear outputs. The internal VSWR sensor protects the amplifier from high antenna VSWR by approximately halving the amplifier's RF gain when a VSWR overload condition is present.

The UT-3/400 Lowpass Filter Board provides output filtering for the UT-3/400 Amplifier. The lowpass filter assembly is mounted in a separate compartment of the amplifier case in order to provided maximum attenuation of harmonic and other spurious signals.

| Performance Specifications | |
|---|---|
| Type: | MT-3 series UHF Amplifier module |
| Compatibility: | MT-3 series Transmitter Main Board<br>MT-4 series Digital Transmitter Main Board |
| Frequency Range: | 406 to 430 MHz, 450 to 470 MHz, |
| RF Power Output: | adjustable 0.5 to 2.0 Watts or 2.0 to 8.0 Watts |
| RF power Input: | nominal level adjustable from 0 dBm to +5 dBm,<br>held within +/- 2 dB of nominal. |
| Ouput Impedance and VSWR: | 50 Ω, Type N connector; 3:1 max. VSWR. |
| Input /Output Isolation: | > 60 dB |
| Duty Cycle: | 100%: Continuous operation from -40˚ C to +60˚C. |
| Harmonic Emissions: | Less than -90 $dB_C$ . |
| Transmitter Mismatch Protection: | 20:1 VSWR at all phase angles. |
| Transmitter Alarm: | Forward power sense and reverse VSWR;<br>- open collector output (separate or 'OR'ed configuration);<br>- linear output (separate lines only). |
| Operating Temperature Range: | -30˚ C to +60˚ C, optional -40˚ C temperature test. |
| Operating Humidity: | 95% RH (non-condensing) at +25˚ C. |
| Operating Voltage: | +13.8 Vdc Nominal (range +11 to +16 Vdc),<br>+9.5 Vdc Regulated. |
| Amplifier Standby Current: | less than 1.0 mA. |
| Amplifier Enable: | Active to ground. |
| Amplifier Enable Response: | typically overdamped, rising to within 90% of full power within 5 msec; maximum (underdamped) overshoot of 30%. |



# THEORY OF OPERATION

## AMPLIFIER OPERATION

The operation of the UT-3/400 Amplifier varies slightly according to whether the amplifier is a low power (0.5-2.0 W) or a high power (2.0-8.0 W) version. In both versions the power control circuitry monitors the RF output power of amplifier and keeps the power constant.

Power for the UT-3/400 Amplifier is provided from the Transmitter Main Board. The +13.8 Vdc supply is continuously connected to the amplifier; whereas, the +9.5 Vdc supply is always switched by the transmitter's PTT circuitry. The UT-3/400 Amplifier will not consume any power from the +13.8 Vdc supply until +9.5 Vdc is switched on for the amplifier's circuitry and an RF input signal is present. The synthesizer or crystal control module controls the +9.5 Vdc to the amplifier's circuitry; switching it on by grounding the amplifier's input enable line. The synthesizer will ground the input enable line only when the synthesizer's RF signal is phase locked. This prevents unwanted spurious emissions during transmitter start-up. A typical start-up sequence is listed below:

| | |
|---|---|
| 1) | +13.8 Vdc is always present |
| 2) | the transmitter is keyed on |
| 3) | +9.5 Vdc is switched on by the PTT circuitry and the synthesizer or crystal control module PTT line is pulled low |
| 4) | an RF signal is output to the amplifier |
| 5) | the amplifier's input enable line is activated |
| 6) | the amplifier outputs RF power |

# POWER REQUIREMENTS

Typical current requirements for the UT-3/400 Amplifier at different power levels are given below. The total current drawn should not exceed 2.5 Amps.

UT-3/400 Amplifier Typical Current Consumption

**0.5 to 2.0 Watt Amplifier**

| Output Power | +9.5 Vdc Supply Current | +13.8 Vdc Supply Current |
|---|---|---|
| 0.5 W | 0.15 A | 0.38 A |
| 1.0 W | 0.16 A | 0.54 A |
| 1.5 W | 0.17A | 0.69 A |
| 2.0 W | 0.17 A | 0.81 A |

**2.0 to 8.0 Watt Amplifier**

| Output Power | +9.5 Vdc Supply Current | +13.8 Vdc Supply Current |
|---|---|---|
| 2.0 W | 0.17 A | 0.81 A |
| 4.0 W | 0.18 A | 1.14 A |
| 6.0 W | 0.20 A | 1.42 A |
| 8.0 W | 0.21 A | 1.71 A |

**Note:** Current consumption measured at 470 MHz

# RF CIRCUITRY

The RF circuitry consists of several blocks: a 0 dB input pad (R1, R2, and R3), an RF amplifier module (U4), an output power boosting transistor (Q1), two directional couplers (TL3 and TL4), and the UT-3/400 Lowpass Filter. RF amplifier modules U4 and U5 amplify a 1 mW signal up to a maximum of 2.0 W, at the antenna connector, for a low power unit. In high power units, the output of U4 is further amplified by Q1 to a maximum of 8.0 Watts at the antenna connector. Inductor L10 provides tuning for the output match of transistor Q1. The input match and the output match networks for Q1 have been made broadband so the high power amplifier will operate over the same frequency range as the low power amplifier.

The frequency band of the UT-3/400 Amplifier is determined by the operating frequency range of the RF amplifier module U4.

For the 450-470 MHz band, U4 is connected directly to the Low Pass Filter, bypassing Q1. Also for this band, R57 is not installed and pin 4 of U4 is connected to +13.8 Vdc.

Directional couplers (TL3 and TL4) are used to sample forward and reverse power. The sampled power is used by the sensing and power control circuits to control the amplifier's gain to maintain a constant RF output level.

Finally the RF signal is filtered by the UT-3/400 Lowpass Filter

## UT-3/400 Lowpass Filter

The UT-3/400 Lowpass Filter is a 50 ohm, 9 pole, reciprocal filter with a 3 dB cutoff frequency of approximately 512 MHz. The lowpass filter assembly attenuates the desired signal's harmonics as well as any other out-of-band emissions so that a 'clean' RF signal is output to the antenna connector.

## Power Control Circuitry

The UT-3/400 Amplifier employs a closed loop power control, which uses a sample of the forward RF power to control the gain of RF amplifier U4. Op-amp U1b compares the sampled RF voltage to the output power setpoint and generates an error signal that Q3 uses to control the voltage on U4's gain control pin. The output power setpoint is determined by R7, the Output Power Adjust potentiometer.

Forward power is sampled by TL3, D6, C27, R18, R19, and C28. In both high power and low power amplifiers, the power control circuitry keeps the output power constant.

## Power Sensing Circuitry

The UT-3/400 Amplifier is equipped with output power and VSWR sensing lines which can be individually configured as open collector or linear outputs. In open collector configuration, the output is active low, that is, when a fail condition is detected (not enough output power or too high antenna VSWR) the open collector transistor is turned on.

In linear configuration, a voltage proportional to the sensed output power or antenna VSWR is output.

Both the Output Power Alarm setpoint and the VSWR Alarm setpoint are individually adjustable; however, the Output Power Alarm setpoint must always be adjusted before the VSWR Alarm setpoint. This is because the Output Power Alarm setpoint is used as a reference by the VSWR Alarm circuitry.

## Output Power Sense

The output power sense circuitry uses directional coupler TL3 to sample some of the forward power. The sampled power is rectified by diode D6 and capacitor C27 and then amplified by op-amp U3b. Op-amp U3b's amplification is controlled by R21, the output power alarm adjust potentiometer. The amplified voltage is then output directly in linear operation (JU1 installed, JU2 not installed) or compared to +4.2 Vdc by op-amp U1a that then drives transistors Q5 and Q6 for open collector operation (JU1 not installed, JU2 installed).

In open collector configuration, Q6 (the open collector output transistor) is turned on when an alarm condition occurs. The adjustment range for the output power alarm can vary depending on the setting of R21 (the Output Power Alarm Adjust potentiometer).

## VSWR Sense

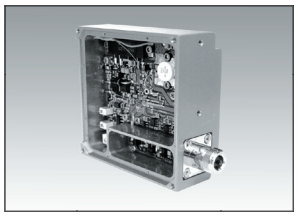
The VSWR sense circuitry uses directional coupler TL4 to sample some of the power reflected from the antenna terminal. The reflected power is rectified by diode D7 and capacitor C33 and then amplified by op-amp U2b. Op-amp U2b's amplification is controlled by R36, the VSWR Alarm Adjust potentiometer. The amplified voltage is then output directly in linear operation (JU4 installed, JU3 not installed) or compared to the output power alarm setpoint by op-amp U3a that then drives transistor Q7 for open collector operation (JU4 not installed, JU3 installed).

In open collector configuration, Q7 (the open collector output transistor) is turned on when an alarm condition occurs. The adjustment range for the VSWR Alarm can depending on the setting of R36 (the VSWR Alarm Adjust potentiometer).

## VSWR Overload

The VSWR overload circuit protects the UT-3/400 Amplifier from excessive antenna VSWR by reducing the amplifier's gain (output power) when an overload condition occurs. The VSWR overload circuit (R38 to R41, R8, U2a, and Q4) is an extension of the VSWR sense circuit and operates the same as the VSWR sense open collector circuit. The VSWR Overload Adjust potentiometer (R38) reduces the voltage level of the VSWR Alarm Setpoint. The voltage set by R38 is then compared to the output power alarm setpoint by op-amp U2a that then drives transistor Q4. When transistor Q4 turns on, signaling an overload condition, resistor R8 is grounded which reduces the output power setpoint. Reducing the output power setpoint lowers the UT-3/400 Amplifier's gain and protects the amplifiers from excessive current draw resulting from high antenna VSWR.

The VSWR overload circuit's range of adjustment depends on the setting of the VSWR Alarm Adjust potentiometer (R36). The VSWR overload transistor Q4 can be activated at the same point at which the VSWR alarm becomes active or the VSWR overload circuit can be disabled by turning R38 completely counterclockwise.



# UT-3/400 AMPLIFIER ALIGNMENT

## GENERAL

Connections to the power supply, alarm and transmit enable lines (ENA), are clearly marked on the amplifier case. The amplifier is enabled when the enable line (ENA) is grounded.
If the amplifier is installed in the transmitter, alignment is simplified by using an SR-3 Subrack, SM-3 System Monitor, and RF extender cable to provide transmitter power and signal interconnection (see the Transmitter Main Board Manual for details). For complete transmitter alignment, the Transmitter Main Board, Synthesizer, Amplifier, and Audio Processor should be tuned in this order. Please refer to the corresponding manuals for each module.

If the input RF level is not changed, adjustments to the output power and alarm thresholds may be made without removing the amplifier cover. However, in the case of a complete amplifier alignment, the amplifier should be separated from the Transmitter Main Board and the amplifier cover removed to expose all amplifier circuitry. All jumpers and test points are clearly marked.

## REPAIR NOTE

The UT-3/400 Transmitter is mainly made up of surface mount devices which should not be removed or replaced using an ordinary soldering iron. Removal and replacement of surface mount components should be performed only with specifically designed surface mount rework and repair stations complete with Electrostatic Dissipative (ESD) protection.

When removing Surface Mount Solder Jumpers, it is recommended to use solder braid in place of manual vacuum type desoldering tools when removing jumpers. This will help prevent damage to the circuit boards.

# RECOMMENDED TEST EQUIPMENT LIST

Alignment of the transmitter requires the following test equipment or its equivalent.

| | |
|---|---|
| Dual Power Supply: | Regulated +9.5 Vdc at 1 A<br>Regulated +13.8 Vdc at 2 A - Topward TPS-4000 |
| Oscilloscope / Multimeter: | Fluke 97 Scopemeter |
| Current Meter: | Fluke 75 multimeter |
| Radio communications test set : | Marconi Instruments 2955R |
| VSWR 3:1 mismatch load: | JFW 50T-035-3.0:1 |
| coaxial test cable set | three 50 Ω cables of incremental length 20 to 40 cm |
| Alignment Tool: | Johanson 4192 |

It is recommended that the radio communications test set be frequency locked to an external reference (WWVH, GPS, Loran C) so that the high stability oscillator may be accurately set to within its ±1 ppm frequency tolerance.

# STANDARD FACTORY SETTINGS AND JUMPER CONFIGURATION

The UT-3/400 Amplifier is factory configured as follows:

- Open collector configuration for Output Power Alarm (3 dB drop).
- Open collector configuration for Antenna VSWR Alarm (VSWR ≥ 3:1).
- Output power of 2 Watts or 8 Watts for low and high power amplifiers respectively.

The corresponding jumper settings are:

| | | |
|---|---|---|
| Jumper JU1: | not installed | Output power alarm - linear output |
| Jumper JU2: | installed | Output power alarm - open collector output |
| Jumper JU3: | installed | Antenna VSWR alarm - open collector output |
| Jumper JU4: | not installed | Antenna VSWR alarm - linear output |

# UT-3/400 AMPLIFIER ALIGNMENT

The UT-3/400 Amplifier is a frequency sensitive module that is factory assembled to operate in one of two frequency bands: 406 to 430 MHz or 450 to 470 MHz. The UT-3/400 amplifier is available in two versions, a low power version, 0.5 to 2.0 Watts output power, and a high power version, 2.0 to 8.0 Watts output power.
The UT-3/400 amplifier requires 0 dBm of input power and the amplifier's output power is continuously adjustable over its respective power range. The UT-3/400 Amplifier provides Output Power and Antenna VSWR Alarm outputs which can be configured for open collector output or linear operation.

The amplifier's output power level, alarm levels, and tuning for the transistor matching circuit in the high power version can be set without detaching the amplifier from the transmitter board. However, if the output power alarm or the Antenna VSWR alarm output configuration requires changing, the UT-3/400 Amplifier must be detached from the Transmitter Main Board. Refer to "UT-3/400 Amplifier Component Layout" for the location of solder jumpers JU1 to JU4.

## UT-3/400 Amplifier Adjustment

The Amplifier alignment consists of two adjustment procedures; (i) a general set up procedure that sets up the proper bias conditions for the RF transistors and (ii) the RF threshold adjustments which set up the desired alarm threshold levels as well as the RF output power. The general alignment procedure is required following major repair operations, changes in RF input levels or large changes in operating frequency (greater than ± 1.0 MHz).

The RF output and alarm threshold level adjustments are more easily accessible so that fine adjustments can be made in the field. Depending on user requirements, the RF alarm threshold levels should be checked whenever a significant change in operating frequency (± 0.5 MHz) is made.

The adjustment procedures for the high power and the low power version amplifiers are identical after the matching for transistor Q1 is tuned in the high power version. As the antenna VSWR alarm is dependent on the output power alarm, the output power alarm should always be set first. The order of adjustment should be:

| | |
|---|---|
| 1) | High Power Amplifiers Only - Tune the transistor matching circuit at the desired frequency and power. |
| 2) | Set the desired output power alarm level |
| 3) | Set the desired output power level |
| 4) | Set the desired Antenna VSWR alarm level |
| 5) | Set the desired overload condition level |

Details for the preceding steps are outlined below.

## General Set-Up

| | |
|---|---|
| 1 | Connect the transmitter's antenna output connector to the type N input of the radio communications test set through a short section of low loss 50 Ω coaxial cable. |
| 2 | Turn all four (4) of the adjustment potentiometers (R7, R21, R36, and R38) fully counterclockwise. |
| 3 | Turn on the power to the transmitter. |
| 4 | For high power amplifier units, follow steps 5 to 9 below. For low power amplifiers, skip to the Output Power Alarm procedure. |
| 5 | For 406-430 MHz amplifiers set input RF signal to 430 MHz and 0 dBm level. Set R7 for maximum output power. Adjust L10 for 8.5 W by changing the distance to the case wall. |
| 6 | Set RF input signal to 420 MHz and adjust R7 for 8 W of output RF power. |
| 7 | Test RF output power at 406 and 430 MHz. It should be 8 W +/- 0.5 W with current consumption at 13.8 V line ≤ 1.5 A and 9.5 V ≤ 0.7 A. |
| 8 | For 450-470 MHz amplifiers set input RF signal to 460 MHz, 0 dBm. Set R7 for 8 W of output RF power. |
| 9 | Test RF output power at 450 and 470 MHz. It should be 8 W +/- 0.5 W with current consumption at 13.8 V line ≤ 1.7 A and 9.5 V ≤ 0.3 A. |

## Output Power Alarm (Forward Power)

Open Collector Output

Note: The output power alarm output is factory configured as an open collector output so a pull-up resistor may be required on transmitter pin B26 if one is not already present

1 Adjust R7, the output power adjustment, to the output power at which the Output Power Alarm is to be activated.

2 Monitor transmitter pin B26, the Output Power Alarm line, and slowly turn R21, the output power alarm adjustment, clockwise until pin B26 goes low. The alarm is now set for the current output power of the transmitter.

Linear Output

1 Open the amplifier case to disable (open circuit) jumper JU2 and enable (short) jumper JU1.

2 Monitor transmitter pin B26 with a voltmeter.

3 Adjust R7, the output power adjustment, for full transmitter output power.

4 Adjust R21, the output power alarm adjustment, so that the voltmeter indicates +7.5 Vdc for full transmitter output power.

5 Turn R7, the output power adjustment, fully counterclockwise. The voltmeter should read approximately +3 Vdc.

6 Disconnect the voltmeter.

## Output Power

1 Turn R7, the output power adjustment, clockwise to the desired transmitter output power.

## Antenna VSWR Alarm (Reverse Power)

Open Collector Output

Note: The antenna VSWR alarm output is factory configured as an open collector output so a pull-up resistor may be required on transmitter pin Z26 if one is not already present. The output power alarm must be set first before the antenna VSWR alarm can be set.

1 Disconnect the radio communications test and terminate the transmitter with the 3:1 mismatch load.

2 Monitor pin Z26, the Antenna VSWR Alarm line, and turn R36 fully counterclockwise. Pin Z26 should be high. Slowly turn R36 clockwise until pin Z26 is pulled low. Put the 50 ohm load back on again, Pin Z26 should go high. The reverse power trip point is now set for a VSWR of 3:1.

Linear Output

1 Open the amplifier case to disable (open circuit) jumper JU3 and enable (short) jumper JU4.

2 Monitor transmitter pin Z26 with a voltmeter.

3 Disconnect the radio communications test set and terminate the transmitter with the 3:1 mismatch load.

4 Adjust R36, the VSWR alarm adjustment, so that the voltmeter indicates +5 Vdc for a 3:1 mismatch.

5 Put the 50 ohm load back on again. The voltmeter should read approximately 0 Vdc.

6 Disconnect the voltmeter.

Antenna VSWR Overload

1 Disconnect the radio communications test set and so that the amplifier is terminated with an open circuit.

2 Monitor the current from the +13.8 Vdc supply.

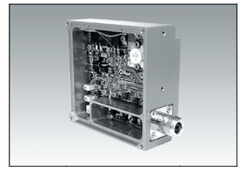
3 Adjust R38, the VSWR overload adjustment, clockwise until a noticeable drop in the +13.8 Vdc current occurs.

4 Reconnect the radio communications test set and, the +13.8 Vdc current should return to the previous level.

## Procedure Verification

1 Verify that the current drawn from the +13.8 Vdc supply is less than 1.5 A and from the +9.5 Vdc supply is less than 1.2 A when transmitting full 8 W RF output power.

2 Turn off the power to the transmitter.



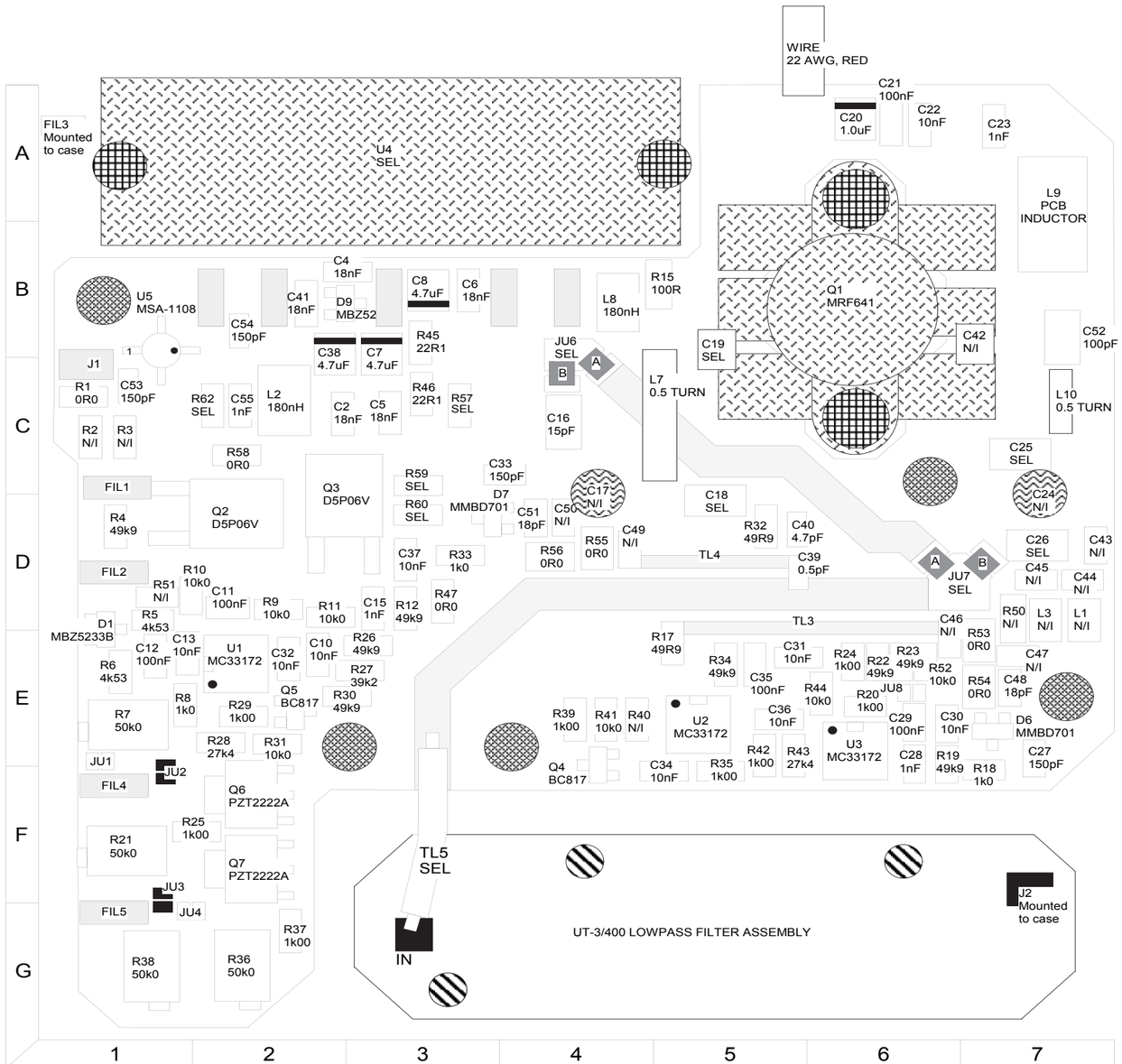
# ILLUSTRATIONS AND SCHEMATICS

## 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 PCB's manufactured by Daniels Electronics Ltd. are identified by one of the following numbering conventions:

| | |
|---|---|
| PCB number | 43-912010 |
| | Indicates circuit board version 1.0 |
| PCB number | 50002-02 |
| | Indicates circuit board version 2 (no decimal version) |

# UT-3/400 UHF AMPLIFIER COMPONENT LAYOUT




COMPONENT LOCATION TABLE

| DES | LC | DES | LC | DES | LC | DES | LC | DES | LC | DES | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C2 | C3 | C35 | E5 | FIL3 | A1 | Q7 | F2 | R32 | D5 | U1 | E2 |
| C4 | B3 | C36 | E5 | FIL4 | F1 | | | R33 | D3 | U2 | E5 |
| C5 | C3 | C37 | D3 | FIL5 | G1 | R1 | C1 | R34 | E5 | U3 | E6 |
| C6 | B3 | C38 | B2 | | | R2 | C1 | R35 | F5 | U4 | A3 |
| C7 | F3 | C39 | D5 | J1 | C1 | R3 | C1 | R36 | G2 | U5 | B1 |
| C8 | B3 | C40 | D5 | J2 | F7 | R4 | D1 | R37 | G2 | | |
| C10 | E2 | C41 | B2 | | | R5 | D1 | R38 | G1 | | |
| C11 | D2 | C42 | B7 | JU1 | E1 | R6 | E1 | R39 | E4 | | |
| C12 | E1 | C43 | D7 | JU2 | F1 | R7 | E1 | R40 | E4 | | |
| C13 | E1 | C44 | D7 | JU3 | G1 | R8 | E1 | R41 | E4 | | |
| C15 | D3 | C45 | D7 | JU4 | G1 | R9 | E5 | R42 | E5 | | |
| C16 | C4 | C46 | E6 | JU6 | B4 | R10 | D1 | R43 | E5 | | |
| C17 | C4 | C47 | E7 | JU7 | D7 | R11 | D2 | R44 | E6 | | |
| C18 | D5 | C48 | E7 | JU8 | E6 | R12 | D3 | R45 | B3 | | |
| C19 | B5 | C49 | D4 | | | R15 | B5 | R46 | C3 | | |
| C20 | A6 | C50 | D4 | L1 | D7 | R17 | E5 | R47 | D3 | | |
| C21 | A6 | C51 | D4 | L2 | C2 | R18 | E7 | R50 | D7 | | |
| C22 | A6 | C52 | B7 | L3 | D7 | R19 | E6 | R51 | D1 | | |
| C23 | A6 | C53 | C1 | L5 | F3 | R20 | E6 | R52 | E6 | | |
| C24 | D7 | C54 | B2 | L7 | C6 | R21 | F1 | R53 | E7 | | |
| C25 | C7 | C55 | C2 | L8 | B4 | R22 | E6 | R54 | E7 | | |
| C26 | D7 | | | L9 | A7 | R23 | E6 | R55 | D4 | | |
| C27 | E7 | D1 | D1 | L10 | C7 | R24 | E6 | R56 | D4 | | |
| C28 | E6 | D2 | D3 | | | R25 | F2 | R57 | C3 | | |
| C29 | E6 | D6 | E7 | Q1 | B6 | R26 | E3 | R58 | C2 | | |
| C30 | E6 | D7 | D3 | Q2 | D2 | R27 | E3 | R59 | C3 | | |
| C31 | E5 | D9 | B3 | Q3 | D3 | R28 | E2 | R60 | D3 | | |
| C32 | E2 | | | Q4 | E4 | R29 | E2 | R61 | C3 | | |
| C33 | C4 | FIL1 | C1 | Q5 | E2 | R30 | E3 | R62 | C2 | | |
| C34 | F5 | FIL2 | D1 | Q6 | F2 | R31 | E2 | | | | |

| FREQUENCY SELECT PARTS | | |
|---|---|---|
| | 406 - 430 MHz | 450 - 470 MHz |
| U4 | M57721M | M57721 |

| POWER SELECT PARTS | | | |
|---|---|---|---|
| | 2W POWER | 8W 406-430MHz | 8W 450-470MHz |
| JU6 | 'A' INSTALLED | 'B' INSTALLED | 'A' INSTALLED |
| JU7 | 'A' INSTALLED | 'B' INSTALLED | 'A' INSTALLED |
| JU8 | INSTALLED | NOT INSTALLED | NOT INSTALLED |

| 8W SELECT PARTS | | |
|---|---|---|
| | 406 - 430 MHz | 450 - 470 MHz |
| C18 | 4.7 pF | 3.9 pF |
| C19 | 39 pF | 33 pF |
| C25 | 7.5 pF | 4.7pF |
| C26 | 4.7 pF | 3.0 pF |
| R57 | 0R0 | Not Installed |
| R59 | 49R9 | 0R0 |
| R60 | 49R9 | 0R0 |
| R62 | 200R | 100R |

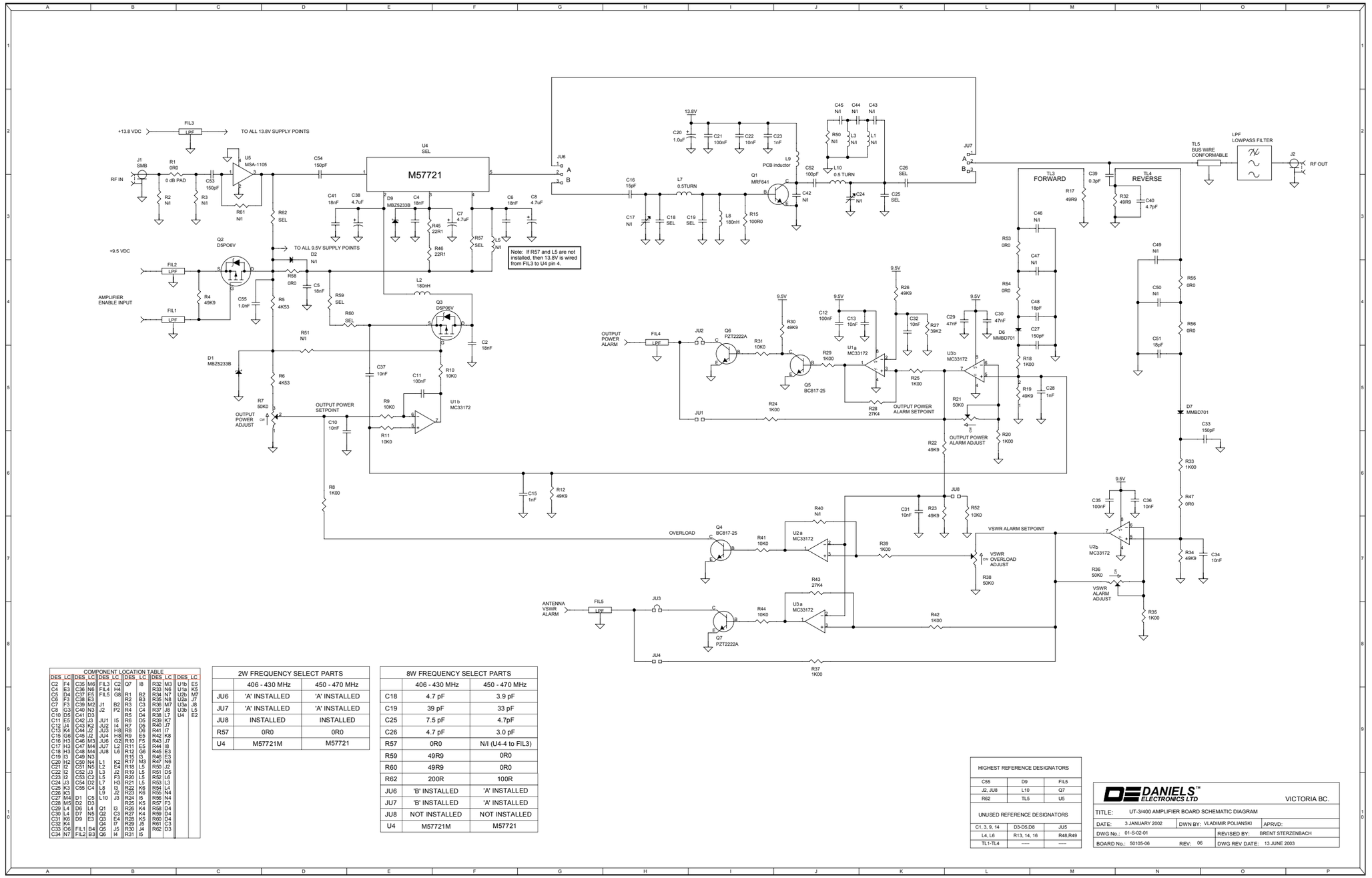
J1,J2 - MOUNTED ON CASE
FIL1-FIL5 - MOUNTED ON CASE

- Factory installed default jumpers
- Select jumpers installed
- Components installed on bottom of board
- Components mounted on case
- M3 x 8 Screws
- M2.5 x 6 Screws
- M3 x 6 - M2.5 Cap Screw

DANIELS ELECTRONICS LTD.

| | |
|---|---|
| TITLE: UHF TX AMPLIFIER BOARD | |
| DATE: 15 MAY 02 | BOARD NO: 50105-06 |
| DWG No: 02-T-01-01 | REV DATE: 17 APR 03 |

# UT-3/400 UHF AMPLIFIER SCHEMATIC DIAGRAM




COMPONENT LOCATION TABLE

| DES | LC | DES | LC | DES | LC | DES | LC | DES | LC | DES | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C2 | F4 | C35 | M6 | FIL3 | C2 | Q7 | I8 | R32 | M3 | U1b | E5 |
| C4 | E3 | C36 | N6 | FIL4 | H4 | | | R33 | N6 | U1a | K5 |
| C5 | D4 | C37 | E5 | FIL5 | G8 | R1 | B2 | R34 | N7 | U2b | M7 |
| C6 | F3 | C38 | E3 | | | R2 | B3 | R35 | N8 | U2a | J7 |
| C7 | F3 | C39 | M2 | J1 | B2 | R3 | C3 | R36 | M7 | U3a | J8 |
| C8 | G3 | C40 | N3 | J2 | P2 | R4 | C4 | R37 | J8 | U3b | L5 |
| C10 | D5 | C41 | D3 | | | R5 | D4 | R38 | L7 | U4 | E2 |
| C11 | E5 | C42 | J3 | JU1 | I5 | R6 | D5 | R39 | K7 | | |
| C12 | J4 | C43 | K2 | JU2 | I4 | R7 | D5 | R40 | J7 | | |
| C13 | K4 | C44 | J2 | JU3 | H8 | R8 | D6 | R41 | I7 | | |
| C15 | G6 | C45 | J2 | JU4 | H8 | R9 | E5 | R42 | K8 | | |
| C16 | H3 | C46 | M3 | JU6 | G2 | R10 | F5 | R43 | J7 | | |
| C17 | H3 | C47 | M4 | JU7 | L2 | R11 | E5 | R44 | I8 | | |
| C18 | H3 | C48 | M4 | JU8 | L6 | R12 | G6 | R45 | E3 | | |
| C19 | I3 | C49 | N3 | | | R15 | I3 | R46 | E3 | | |
| C20 | H2 | C50 | N4 | L1 | K2 | R17 | M3 | R47 | N6 | | |
| C21 | I2 | C51 | N5 | L2 | E4 | R18 | L5 | R50 | J2 | | |
| C22 | I2 | C52 | J3 | L3 | J2 | R19 | L5 | R51 | D5 | | |
| C23 | I2 | C53 | C2 | L5 | F3 | R20 | L5 | R52 | L6 | | |
| C24 | J3 | C54 | D2 | L7 | H3 | R21 | L5 | R53 | L3 | | |
| C25 | K3 | C55 | C4 | L8 | I3 | R22 | K6 | R54 | L4 | | |
| C26 | K3 | | | L9 | J2 | R23 | K6 | R55 | N4 | | |
| C27 | M4 | D1 | C5 | L10 | J3 | R24 | I5 | R56 | N4 | | |
| C28 | M5 | D2 | D3 | | | R25 | K5 | R57 | F3 | | |
| C29 | L4 | D6 | L4 | Q1 | I3 | R25 | K4 | R58 | D4 | | |
| C30 | L4 | D7 | N5 | Q2 | C3 | R27 | K4 | R59 | D4 | | |
| C31 | K6 | D9 | E3 | Q3 | E4 | R28 | K5 | R60 | D4 | | |
| C32 | K4 | | | Q4 | I7 | R29 | J5 | R61 | C3 | | |
| C33 | O6 | FIL1 | B4 | Q5 | J5 | R30 | J4 | R62 | D3 | | |
| C34 | N7 | FIL2 | B3 | Q6 | I4 | R31 | I5 | | | | |

| 2W FREQUENCY SELECT PARTS | | |
|---|---|---|
| | 406 - 430 MHz | 450 - 470 MHz |
| JU6 | 'A' INSTALLED | 'A' INSTALLED |
| JU7 | 'A' INSTALLED | 'A' INSTALLED |
| JU8 | INSTALLED | INSTALLED |
| R57 | 0R0 | 0R0 |
| U4 | M57721M | M57721 |

| 8W FREQUENCY SELECT PARTS | | |
|---|---|---|
| | 406 - 430 MHz | 450 - 470 MHz |
| C18 | 4.7 pF | 3.9 pF |
| C19 | 39 pF | 33 pF |
| C25 | 7.5 pF | 4.7pF |
| C26 | 4.7 pF | 3.0 pF |
| R57 | 0R0 | N/I (U4-4 to FIL3) |
| R59 | 49R9 | 0R0 |
| R60 | 49R9 | 0R0 |
| R62 | 200R | 100R |
| JU6 | 'B' INSTALLED | 'A' INSTALLED |
| JU7 | 'B' INSTALLED | 'A' INSTALLED |
| JU8 | NOT INSTALLED | NOT INSTALLED |
| U4 | M57721M | M57721 |

| HIGHEST REFERENCE DESIGNATORS | | |
|---|---|---|
| C55 | D9 | FIL5 |
| J2, JU8 | L10 | Q7 |
| R62 | TL5 | U5 |

| UNUSED REFERENCE DESIGNATORS | | |
|---|---|---|
| C1, 3, 9, 14 | D3-D5,D8 | JU5 |
| L4, L6 | R13, 14, 16 | R48,R49 |
| TL1-TL4 | ----- | ----- |

DANIELS™ ELECTRONICS LTD — VICTORIA BC.

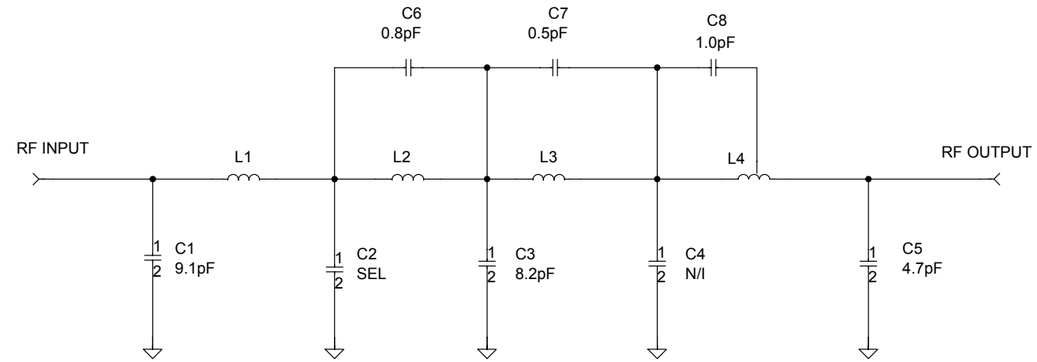
| | | | |
|---|---|---|---|
| TITLE: | UT-3/400 AMPLIFIER BOARD SCHEMATIC DIAGRAM | | |
| DATE: | 3 JANUARY 2002 | DWN BY: VLADIMIR POLIANSKI | APRVD: |
| DWG No.: | 01-S-02-01 | REVISED BY: | BRENT STERZENBACH |
| BOARD No.: | 50105-06 REV: 06 | DWG REV DATE: | 13 JUNE 2003 |

# UT-3/400 AMPLIFIER LOW PASS FILTER COMPONENT LAYOUT


| FREQUENCY BAND SELECT COMPONENTS | | |
|---|---|---|
| DESIG | 406 - 430 MHz | 450 - 470 MHz |
| C2 | 15 pF | 16 pF |

| DANIELS ™ ELECTRONICS LTD. | |
|---|---|
| TITLE: UHF TX AMPLIFIER LOW PASS FILTER BOARD | |
| DATE: 23 MAY 2002 | BOARD NO: 50112-02 |
| DWG No: 01-T-01-01 | REV DATE: 24 DECEMBER 2002 |

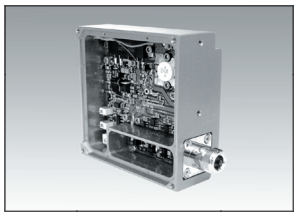
# UT-3/400 AMPLIFIER LOW PASS FILTER SCHEMATIC DIAGRAM




| FREQUENCY BAND SELECT COMPONENTS | | |
|---|---|---|
| DESIG | 406 - 430 MHz | 450 - 470 MHz |
| C2 | 15 pF | 16 pF |

| HIGHEST REFERENCE DESIGNATORS | | |
|---|---|---|
| C8 | L4 | ----- |
| ----- | ----- | ----- |
| ----- | ----- | ----- |
| UNUSED REFERENCE DESIGNATORS | | |
| ----- | ----- | ----- |
| ----- | ----- | ----- |
| ----- | ----- | ----- |

| DANIELS™ ELECTRONICS LTD | | VICTORIA BC. |
|---|---|---|
| TITLE: UT-3/400 AMPLIFIER LOW PASS FILTER BOARD SCHEMATIC DIAGRAM | | |
| DATE: 15 FEBRUARY 2002 | DWN BY: SHANE AEBISCHER | APRVD: |
| DWG No.: 01-S-01-01 | REVISED BY: SHANE AEBISCHER | |
| BOARD No.: 50112-02 REV: 02 | DWG REV DATE: 13 MARCH 2003 | |



# PARTS LISTS

## UT-3/400 AMP ELECTRICAL PARTS LIST

| Ref. Desig | Description | Part Number | ALL MODELS | A23-UPA420-02 | A23-UPA420-08 | A23-UPA460-02 | A23-UPA460-08 | |
|---|---|---|---|---|---|---|---|---|
| C2 | CAP., SM, 18nF CER., 1206, X7R | 1008-4B183K5R | • | | | | | |
| C4 | CAP., SM, 18nF CER., 1206, X7R | 1008-4B183K5R | • | | | | | |
| C5 | CAP., SM, 18nF CER., 1206, X7R | 1008-4B183K5R | • | | | | | |
| C6 | CAP., SM, 18nF CER., 1206, X7R | 1008-4B183K5R | • | | | | | |
| C7 | CAP., SM, 4.7uF TANT., 10%,16V | 1055-5B475K16 | • | | | | | |
| C8 | CAP., SM, 4.7uF TANT., 10%,16V | 1055-5B475K16 | • | | | | | |
| C10 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | | |
| C11 | CAP., SM,100nF CER,0805,X7R,50 | 1008-5A104K5R | • | | | | | |
| C12 | CAP., SM, 100nF CER., 1206,X7R | 1008-5B104K5R | • | | | | | |
| C13 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | | |
| C15 | CAP., SM, 1nF CER., 1206, C0G | 1008-3B102K1G | • | | | | | |
| C16 | CAP., SM,15pF PORCEL.,+-5%500V | 1036-1B2150J5 | • | | | | | |
| C18 | CAP., SM,3.9pF PORCEL.,+-.25pF | 1036-0B2399C5 | | | | | • | |
| | CAP., SM,4.7pF PORCEL.,+-.25pF | 1036-0B2479C5 | | | • | | | |
| C19 | CAP., SM,33pF PORCEL.,5%,500V | 1036-1B2330J5 | | | | | • | |
| | CAP., SM,39pF PORCEL.,+-5%500V | 1036-1B2390J5 | | | • | | | |
| C20 | CAP., SM, 1.0uF TANT., 20%,35V | 1055-5B105M35 | • | | | | | |
| C21 | CAP., SM,100nF CER,0805,X7R,50 | 1008-5A104K5R | • | | | | | |
| C22 | CAP., SM,10nF CER,0805,X7R,50V | 1008-4A103K5R | • | | | | | |
| C23 | CAP., SM, 1nF CER., 1206, C0G | 1008-3B102K1G | • | | | | | |
| C25 | CAP., SM,4.7pF PORCEL.,+-.25pF | 1036-0B2479C5 | | | | | • | |
| | CAP., SM,7.5pF PORCEL.,+-.25pF | 1036-0B2759C5 | | | • | | | |
| C26 | CAP., SM,3.0pF PORCEL.,+-.25pF | 1036-0B2309C5 | | | | | • | |
| | CAP., SM,4.7pF PORCEL.,+-.25pF | 1036-0B2479C5 | | | • | | | |
| C27 | CAP., SM, 150pF CER., 0805,C0G | 1008-2A151J1G | • | | | | | |
| C28 | CAP., SM, 1nF CER,0805,X7R,50V | 1008-3A102K5R | • | | | | | |
| C29 | CAP., SM,100nF CER,0805,X7R,50 | 1008-5A104K5R | • | | | | | |
| C30 | CAP., SM,10nF CER,0805,X7R,50V | 1008-4A103K5R | • | | | | | |
| C31 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | | |
| C32 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | | |
| C33 | CAP., SM, 150pF CER., 0805,C0G | 1008-2A151J1G | • | | | | | |
| C34 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | | |
| C35 | CAP., SM, 100nF CER., 1206,X7R | 1008-5B104K5R | • | | | | | |
| C36 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | | |

| Ref Desig | Description | Part Number | ALL MODELS | A23-UPA420-02 | A23-UPA420-08 | A23-UPA460-02 | A23-UPA460-08 |
|---|---|---|---|---|---|---|---|
| C37 | CAP., SM, 10nF CER., 1206, X7R | 1008-4B103K5R | • | | | | |
| C38 | CAP., SM, 4.7uF TANT., 10%,16V | 1055-5B475K16 | • | | | | |
| C39 | CAP./SM,0.5pF CER,0805,50V,C0G | 1008-0A050C5G | • | | | | |
| C40 | CAP., SM, 4.7pF CER., 0805,C0G | 1008-0A479J1G | • | | | | |
| C41 | CAP., SM, 18nF CER., 1206, X7R | 1008-4B183K5R | • | | | | |
| C48 | CAP., SM, 18pF CER., 0805, C0G | 1008-1A180J1G | • | | | | |
| C51 | CAP., SM, 18pF CER., 0805, C0G | 1008-1A180J1G | • | | | | |
| C52 | CAP., SM,100pF PORCEL.,5%,500V | 1036-2B2101J5 | • | | | | |
| C53 | CAP., SM, 150pF CER., 0805,C0G | 1008-2A151J1G | • | | | | |
| C54 | CAP., SM, 150pF CER., 0805,C0G | 1008-2A151J1G | • | | | | |
| C55 | CAP., SM, 1nF CER., 1206, C0G | 1008-3B102K1G | • | | | | |
| | | | | | | | |
| D1 | DIODE, MBZ5233B,6.0V ZEN.SOT23 | 2102-MBZ5233B | • | | | | |
| D6 | DIODE, MMBD701,HOT CARR.,SOT23 | 2105-MMBD7010 | • | | | | |
| D7 | DIODE, MMBD701,HOT CARR.,SOT23 | 2105-MMBD7010 | • | | | | |
| D9 | DIODE, MBZ5233B,6.0V ZEN.SOT23 | 2102-MBZ5233B | • | | | | |
| | | | | | | | |
| FIL1 | FILTER, EMI, Pi/5500PF,8-32UNC | 1302-P552D10D | • | | | | |
| FIL2 | FILTER, EMI, Pi/5500PF,8-32UNC | 1302-P552D10D | • | | | | |
| FIL3 | FILTER, EMI, Pi/5500PF,8-32UNC | 1302-P552D10D | • | | | | |
| FIL4 | FILTER, EMI, Pi/5500PF,8-32UNC | 1302-P552D10D | • | | | | |
| FIL5 | FILTER, EMI, Pi/5500PF,8-32UNC | 1302-P552D10D | • | | | | |
| | | | | | | | |
| L2 | INDUCTOR, SM, 180nH, 20%, 1812 | 1255-2GR1800M | • | | | | |
| L8 | INDUCTOR, SM, 180nH, 20%, 1812 | 1255-2GR1800M | • | | | | |
| | | | | | | | |
| PCB | PCB,VHF150/UHF400 TRANSMTR AMP | 4321-15010506 | • | | | | |
| | | | | | | | |
| Q1 | TRANSISTOR, MRF641, 470MHz,15W | 2025-MRF64100 | • | | | | |
| Q2 | MOSFET, D5P06V, P-CHAN., D-PAK | 2144-D5P06V00 | • | | | | |
| Q3 | MOSFET, D5P06V, P-CHAN., D-PAK | 2144-D5P06V00 | • | | | | |
| Q4 | TRANSISTOR, BC817-25,NPN,SOT23 | 2120-BC817025 | • | | | | |
| Q5 | TRANSISTOR, BC817-25,NPN,SOT23 | 2120-BC817025 | • | | | | |
| Q6 | TRANSISTOR, PZT2222A,NPN,ST223 | 2120-PZT2222A | • | | | | |
| Q7 | TRANSISTOR, PZT2222A,NPN,ST223 | 2120-PZT2222A | • | | | | |
| | | | | | | | |
| R1 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R4 | RES., SM, 49K9 1206, 1%,100ppm | 1150-4B4992FP | • | | | | |
| R5 | RES., SM, 4K53 0805, 1%,100ppm | 1150-3A4531FP | • | | | | |
| R6 | RES., SM, 4K53 1206, 1%,100ppm | 1150-3B4531FP | • | | | | |
| R7 | POT., SM, 50K, 12T, SIDE ADJ. | 1172-M30503X5 | • | | | | |
| R8 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R9 | RES., SM, 10K0 1206, 1%,100ppm | 1150-4B1002FP | • | | | | |
| R10 | RES., SM, 10K0 0805, 1%,100ppm | 1150-4A1002FP | • | | | | |
| R11 | RES., SM, 10K0 1206, 1%,100ppm | 1150-4B1002FP | • | | | | |
| R12 | RES., SM, 49K9 1206, 1%,100ppm | 1150-4B4992FP | • | | | | |
| R15 | RES., SM, 100R 1206, 1%,100ppm | 1150-2B1000FP | • | | | | |
| R17 | RES., SM, 49R9 1206, 1%,100ppm | 1150-1B49R9FP | • | | | | |
| R18 | RES., SM, 1K00 0805, 1%,100ppm | 1150-3A1001FP | • | | | | |
| R19 | RES., SM, 49K9 0805, 1%,100ppm | 1150-4A4992FP | • | | | | |
| R20 | RES., SM, 1K00 0805, 1%,100ppm | 1150-3A1001FP | • | | | | |
| R21 | POT., SM, 50K, 12T, SIDE ADJ. | 1172-M30503X5 | • | | | | |
| R22 | RES., SM, 49K9 0805, 1%,100ppm | 1150-4A4992FP | • | | | | |
| R23 | RES., SM, 49K9 0805, 1%,100ppm | 1150-4A4992FP | • | | | | |
| R24 | RES., SM, 1K00 0805, 1%,100ppm | 1150-3A1001FP | • | | | | |

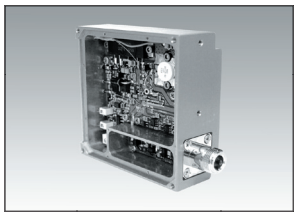
| Ref Desig | Description | Part Number | ALL MODELS | A23-UPA420-02 | A23-UPA420-08 | A23-UPA460-02 | A23-UPA460-08 |
|---|---|---|---|---|---|---|---|
| R25 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R26 | RES., SM, 49K9 1206, 1%,100ppm | 1150-4B4992FP | • | | | | |
| R27 | RES., SM, 39K2 1206, 1%,100ppm | 1150-4B3922FP | • | | | | |
| R28 | RES., SM, 27K4 1206, 1%,100ppm | 1150-4B2742FP | • | | | | |
| R29 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R30 | RES., SM, 49K9 1206, 1%,100ppm | 1150-4B4992FP | • | | | | |
| R31 | RES., SM, 10K0 1206, 1%,100ppm | 1150-4B1002FP | • | | | | |
| R32 | RES., SM, 49R9 1206, 1%,100ppm | 1150-1B49R9FP | • | | | | |
| R33 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R34 | RES., SM, 49K9 1206, 1%,100ppm | 1150-4B4992FP | • | | | | |
| R35 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R36 | POT., SM, 50K, 12T, SIDE ADJ. | 1172-M30503X5 | • | | | | |
| R37 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R38 | POT., SM, 50K, 12T, SIDE ADJ. | 1172-M30503X5 | • | | | | |
| R39 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R41 | RES., SM, 10K0 1206, 1%,100ppm | 1150-4B1002FP | • | | | | |
| R42 | RES., SM, 1K00 1206, 1%,100ppm | 1150-3B1001FP | • | | | | |
| R43 | RES., SM, 27K4 1206, 1%,100ppm | 1150-4B2742FP | • | | | | |
| R44 | RES., SM, 10K0 1206, 1%,100ppm | 1150-4B1002FP | • | | | | |
| R45 | RES., SM, 22R1 1206, 1%,100ppm | 1150-1B22R1FP | • | | | | |
| R46 | RES., SM, 22R1 1206, 1%,100ppm | 1150-1B22R1FP | • | | | | |
| R47 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R52 | RES., SM, 10K0 0805, 1%,100ppm | 1150-4A1002FP | • | | | | |
| R53 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R54 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R55 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R56 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R57 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | | • | • | • | |
| R58 | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | • | | | | |
| R59 | RES., SM, 49R9 1206, 1%,100ppm | 1150-1B49R9FP | | | • | | |
| | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | | | | | • |
| R60 | RES., SM, 49R9 1206, 1%,100ppm | 1150-1B49R9FP | | | • | | |
| | RES., SM, ZERO OHM JUMPER,1206 | 1150-0B0R0000 | | | | | • |
| R62 | RES., SM, 100R 1206, 1%,100ppm | 1150-2B1000FP | | | | | • |
| | RES., SM, 200R 1206, 1%,100ppm | 1150-2B2000FP | | | • | | |
| | | | | | | | |
| U1 | IC, MC33172, DUAL OP AMP, SO-8 | 2302-33172N08 | • | | | | |
| U2 | IC, MC33172, DUAL OP AMP, SO-8 | 2302-33172N08 | • | | | | |
| U3 | IC, MC33172, DUAL OP AMP, SO-8 | 2302-33172N08 | • | | | | |
| U4 | MODULE/RF, 400-450 MHz, 7 WATT | 2257-M57721M0 | | • | • | | |
| | MODULE/RF, 450-512 MHz, 7 WATT | 2257-M5772100 | | | | • | • |
| U5 | IC, MSA-1105, MMIC AMP, PKG-05 | 2354-MSA11050 | • | | | | |

# UT-3/400 AMP MECHANICAL PARTS LIST

| Description | Part Number | Qty |
|---|---|---|
| CAP SCREW, M3x6 HEX SOCK-M2.5 | 5816-3M0SH06S | 4 |
| CAP SCREW, M3x6 HEX SOCK-M2.5 | 5816-3M0SH06S | 4 |
| CASE, MT-3 VHF/UHF AMPLIFIER | 3702-66102130 | 1 |
| COIL,0.5TURN,18AWG,8.0mm ID,BW | 1220-0T501815 | 1 |
| COIL/SQUARE,0.5 TURN,20AWG,6mm | 1226-0T502050 | 1 |
| CONN., N JACK, PANEL MNT,C/SNK | 5184-10923011 | 1 |
| CONN., SMB, JACK,2 HOLE FLANGE | 5120-J2SC01BG | 1 |
| | | |
| LID, CASE, MT-3 AMPLIFIER,ALUM | 3702-66102151 | 1 |
| | | |
| SCREW, M2 X 4, PAN/PHILLIPS,A2 | 5812-2M0PP04S | 3 |
| SCREW, M2 X 6, PAN/PHILLIPS,A2 | 5812-2M0PP06S | 2 |
| SCREW, M2.5 X 6, PAN/PHIL., A2 | 5812-2M5PP06S | 3 |
| SCREW, M3 X 6, FLAT/PHIL., A2 | 5812-3M0FP06S | 4 |
| SCREW, M3 x 8, PAN/PHIL, A2 | 5812-3M0PP08S | 5 |
| SET SCREW, M3x3, HEX SOCKET,A2 | 5817-3M0AC03S | 1 |
| | | |
| TURRET TERMINAL, 4-40,.188L,Tn | 5053-144M188T | 1 |
| | | |
| WIRE ASSEMBLY,18AWG,30 DEG,TFE | 7816-14010625 | 1 |
| WIRE, PVC/STRAND., 22AWG, BLUE | 7110-22S07306 | 16 cm |
| WIRE, PVC/STRAND., 22AWG, ORG. | 7110-22S07303 | 15 cm |
| WIRE, PVC/STRAND., 22AWG, RED | 7110-22S07302 | 26 cm |
| WIRE, PVC/STRAND., 22AWG,BLACK | 7110-22S07300 | 14 cm |
| WIRE, PVC/STRAND., 22AWG,BROWN | 7110-22S07301 | 13 cm |
| WIRE, PVC/STRAND.,22AWG,YELLOW | 7110-22S07304 | 13 cm |

# LOW PASS FILTER PARTS LIST

| Ref Desig | Description | Part Number |
|---|---|---|
| C1 | CAP.,SM,9.1pF PORCEL.,+-5%500V | 1036-0B2919J5 |
| C2 | CAP., SM,16pF PORCEL.,+-5%500V | 1036-1B2160J5 |
| C3 | CAP., SM,8.2pF PORCEL.,+-.25pF | 1036-0B2829C5 |
| C5 | CAP., SM,4.7pF PORCEL.,+-.25pF | 1036-0B2479C5 |
| C6 | CAP., SM,0.8pF PORCEL.,+-.1pF | 1036-0B2089B5 |
| C7 | CAP., SM,0.5pF PORCEL.,+-.1pF | 1036-0B2059B5 |
| C8 | CAP., SM, 1.0pF CER., 0805,C0G | 1008-0A109J1G |
| | | |
| PCB | PCB, LPF, UT-3/400 TRMTR. AMP | 4323-16011202 |



# REVSION HISTORY

| Revision | Date | ECO | Description |
|---|---|---|---|
| 1 | Mar 2003 | | (Replaces IM23-UT3400) |
| | | 694 | • Added SCREW, M2 X 4, PAN/PHILLIPS, A2 Qty1 to parts list |
| | | 712 | • Changed Main PCB version: 50105-06, and Lowpass Filter PCB: 50112-02. |
| 1-0-1 | April 2003 | | Updated issue number to new format and corrected typing error on review page and revision page. Updated table of contents. |
| 1-0-2 | April 2003 | | Corrected error in Component Location Table on Component Layout. |
| 1-1-0 | Aug 2003 | 772 | • Updated Schematic diagram (amplifier), more descriptive select parts table<br>• New Manual Format |
| 1-1-1 | Mar 2005 | - | • Made correction to power rating in the Standard Factory section and reworded paragraph in UT-3/400 Amplifier Alignment section.<br>• Removed all references to frequency bands of 470-490 and 490 to 512 MHz. |