



# ***UHF AMP-2 30 W POWER AMPLIFIER INSTRUCTION MANUAL 406 - 470 MHz***

Covers Models:  
AMP-2/450-30

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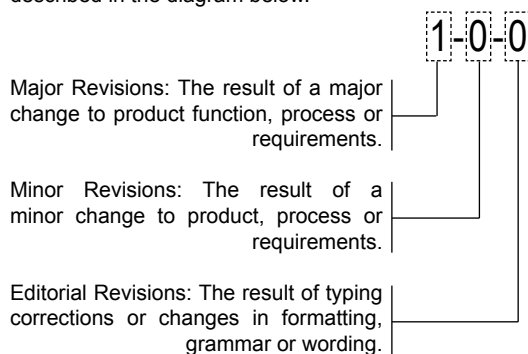
## DOCUMENT CONTROL

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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.

## 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  $\geq 10$  m or  
Power  $\leq 1000$ W ERP (1640 W EIRP)

### Building-mounted Antennas:

Power  $\leq 1000$  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/>



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## GENERAL INFORMATION

“This equipment is not be operated within the frequency band 406 - 406.1 MHz, unless specifically authorized by the Federal Communications Commission or Industry Canada in conjunction with COSPAS/SARSAT”

## INTRODUCTION

The MT 3/MT 4 repeater system is a VHF/UHF radio system which is characterized by high performance and reliability under the most severe environmental conditions. The total system is designed to provide dependable, low maintenance performance, even in the most difficult circumstances.

The MT 3/MT 4 series of modules are packaged in the compact Eurostandard (5”h x 2.8”w x 7.5”d) housing, and are robustly designed for mountain top or transportable applications. All of the modules use high reliability components and each module is accompanied with a complete operational test report on delivery.

The MT 3/MT 4 radio system is specifically designed to deliver high performance under adverse conditions and comply with the design specifications and the Industry Canada (IC) Radio Standards Specification (RSS 119). In addition, voltage stress testing is done over the range of +11 to +16 Volts DC which is followed by 24 hours of continuous operation at maximum rated power output.

The UHF AMP-2 (AMP-2/450-30) power amplifier module is engineered to provide an adjustable 20 to 30 watts RF output over the 406 to 470 MHz UHF frequency range. The UHF AMP-2 power amplifier module mates with either of the MT 3/MT 4 UHF transmitter exciter modules. The combination may be mated with either the MT 3 or MT 4 series radio systems subrack.

## PERFORMANCE SPECIFICATIONS

Frequency:	406 to 430 MHz and 450 to 470 MHz.
Models	AMP-2/450-30
Output Power:	20 to 30 Watts (set by exciter).
Output Impedance:	50 $\Omega$
Spurious & Harmonics:	More than 75 dB below carrier.
Operating Voltage:	+13.8 Vdc nominal, range +11 to +16 Vdc
Transmit Current:	4.5 to 6 A at 30 W.
Standby Current:	Less than 2 mA.
Thermal Protection:	Thermal interlock disables at +80°C (+175°F).
Duty Cycle:	Continuous -40°C to +60°C operation.
Options:	• 13.8 Vdc Power indicator;
Exciter	MT 3 and MT 4; 2W Max. output for 30W PA
IC Number:	142A - AMP2450
FCC ID:	H4JAMP-2-450
Emission Designators:	F1D, F1E, F3D, F3E

## PHYSICAL SPECIFICATIONS

Operating Temperature:	-40°C to +60°C
Operating Humidity:	Up to 95% RH at 25°C.
Corrosion Prevention:	Anodized aluminum construction. Stainless steel hardware.
Connectors:	Type N standard.
Physical Dimensions:	Width: Height: Depth: 14.2 cm (5.6") 12.8 cm (5.05") 19 cm (7.5")
Weight:	1.6 kg (3.5 lb).
Features:	<ul style="list-style-type: none"> <li>• Heavy Duty Aluminum Heatsink;</li> <li>• Over Temperature Indicator;</li> <li>• Thermal switched (+40°C) Fan.</li> <li>• Forward Power Sensing Indicator/Output;</li> <li>• Reflected Power Sensing Indicator/Output.</li> </ul>





## INSTALLATION AND SITE OPERATION

### GENERAL

The UHF AMP-2 RF power amplifier module is approved for operation with the MT 3 or MT 4 exciter. Complete MT 3 subrack systems shipped directly from the factory are normally set to the appropriate options and output power calibration as requested by the customer. These units require no recalibration.

For UHF AMP-2 RF power amplifiers shipped separately from the MT 3 subracks, install as outlined:

- 1 Confirm exciter and power amplifier are aligned for the same frequency. (See Alignment Procedure).
- 2 Remove the blank cover plates or TX-RX pair in the "B" System subrack slot.
- 3 Install the UHF AMP-2 in slot 39 (visible via the marker hole on the upper left UHF AMP-2 front panel).

**NOTE:** If the unit is being adjusted with the extender card, a voltage drop of +1.0 to +1.5 Vdc will occur when the power amplifier is transmitting. This voltage drop must be compensated to permit a valid power output measurement.

- 4 Connect the output of the exciter to the input of the UHF AMP-2 power amplifier with the cable provided.
- 5 Connect the antenna system and key the transmitter. The LED indicators are defined as follows:

Power Indicator - indicates +13.8 Vdc is applied to the transmitter when the ON-OFF switch is activated. An internal connector on the RF Sensor PCB disables the power indicator LED in the event that standby LED current drain must be eliminated.

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TX Indicator - indicates that a preset forward RF power level is present at the transmitter output. The threshold level is internally adjustable for various RF output levels over the 20-30 watt range.

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Over Temperature Indicator - (O/T) a thermostat control switch interrupts the input supply voltage (nominally +13.8 Vdc) to the power amplifier when the heat sink temperature exceeds 175°F (80°C). The over temp thermostat will reset at 145°F (63°C), thus providing hysteresis. The Over Temperature indicator is only operational when exciter drive is present.

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VSWR Indicator - Normally set up at the factory. This indicator is internally set on the RF Sensor PCB for a 50 ohm resistive match. When appreciable reverse power is sensed (high VSWR), the VSWR indicator LED turns on. The reverse power threshold for this indicator is internally adjustable as required.

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The fan is activated when the UHF power amplifier output heat sink temperature reaches +40°C. The fan's operating temperature range is -20°C to +60°C. The fan sensor will not activate the fan when the ambient temperature is below -20°C.