

USER MANUAL



Features

Operating Bands 160m – 6m (Ham Bands)
RF Auto Band Decoding
Band Data (CAT) For Many Brands
7-inch Color Touch Screen
Remote Connection To PC
2 x ART1K6 LDMOS with KoolPlus™
1500 Watts SSB/CW
800 Watts DIGI Mode
Input Power 30-50 Watts
FWD/REF/SWR Meter
DI Voltage/DI Current Meter
All Protections
Cortex-M7 at 600 MHz Processor
Selection for 3 Antennas w/Memory
120-240 VAC Internal Power Supply
W 11 x L 13.5 x H 5.5 Inch / Weight 29 pounds
FCC Approved

Designed and Manufactured in the USA
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OVERVIEW

Hello Fellow Ham Radio Operators:

Thank you for being part of the mercury family, I am so grateful that when KM3KM Electronics started to manufacture amplifiers as kits over four years ago most of you saw the potential. The early struggles were real as no one knew who we were; the original mercury was designed and built with the idea of providing close friends an innovative solution to a need that was not being met by the larger companies.

Then came the mercuryI, followed by the mercuryII and the version the made our reputation in the business -- the mercuryIIIS.

I am now humbled and proud to introduce you to the Mercury LUX, incorporating not only the next technology evolution but requests as well from operators all over the world. Your petitions have been heard . . . The Mercury LUX boasts full legal limit, CAT Control, Remote operation with PC Control software, and an expanded user interface, all in the smallest 1500 watts package in the industry including the internal power supply.

I would like to take this time to clarify several points about high power that is good practice with all power amplifiers, that all of us already know but it's always good to have as a reminder. We use an amplifier because of the convenience of achieving better range in long-distance communications and the ease of solid, clean operation at close range. Even though we should only use the needed power to maintain communications, it's easy to overlook the fact that our shack may not be suitably prepared with a good grounding and antenna system.

Below I will give you some tips that I have found to be very useful to operate with any high-power amplifier:

- It's best not to use antennas with SWR greater than 3 even if you are using an antenna tuner.
- Antennas must be located at a minimum distance of 25 feet from the radio shack.
- Do not use chokes or ferrite clamps on the interconnect coax in your shack, or on the antenna output of the amplifier.
- Placing an RF choke at the feed point of the antenna avoids the local interference that comes with using long wire antennas.
- Have a good ground for the amplifier.
- Place ferrite clamps on data or DC cables in your shack if there is interference.
- Operating the amplifier at full power may not be necessary, as there is no perceptible difference in the signal while the difference in power consumption and heating of the amplifier will be noticeable. For example, the difference between 1500 Watts and 1300 Watts is only 0.63 dBm. However, the power dissipation increases by 14 percent.

Hopefully recapping these points and others you may think of will help you to have many hours of worry-free operation, avoiding those problems that arise by improper grounds and antennas that may not be well matched to your system. These suggestions may not be pointed out by other manufacturers because of marketing issues.

Words cannot express how grateful I am to the growing mercury family and my wish is that you all have many happy DX's.

Kenny (KM3KM)

FEATURES & SPECIFICATIONS

FEATURES

- Low harmonic content (below -43dBc on HF & -65dBc on VHF bands) thanks to an efficient Chebyshev filter.
- Fast and effective protection systems maintain the amplifier's safety from operational damage.
- Compact linear amplifier design with Full Legal (1500 Watts) SSB/CW Mode & 800 Watts DIGI-MODE. See gain test on page 16.
- Auto sensing power supply from 120VAC to 240VAC, allowing your choice of voltage in the shack. Note that 1200 Watts in any mode is available at (120VAC 20-Amp), but that **1500 Watts (any mode) will require (240VAC 10-Amp).**
- Generous power and great dynamics with the proven paired BLF188XRA by Ampleon Inc.
- Easy to read 7", 165x100mm, high-resolution touch screen color display w/800x480 pixels and 24-bit colors.
- Compatible with all transceiver models available on the market; ground on transmit (PTT) and 50W of RF drive power is sufficient.
- The amplifier monitors the frequency of the input signal and automatically switches bands accordingly.
- Monitors itself during operation with full-time protection circuits in all modes so the operator does not need to monitor. Quick and easy reset after any unexpected protection circuit issue.
- Convenient for expeditions and field operation due to an extremely compact and light construction, wide mains voltage range (100V÷240V), protection from unstable mains, generators etc. These features are achieved thanks to the built-in switching mode power supply (SMPS).
- Exceeds electromagnetic compatibility (EMC) both for the highly-sensitive as well as with other powerful appliances in the radio station.
- Logger program continuously monitors operation and allows for later debugging of issues.
- TX delay 9 milliseconds, RX delay 3 milliseconds relay switch. **This amp doesn't support full-BREAKIN; for CW use semi-BREAK IN.**
- Introducing **KoolPlus™** the Mercury LUX implements better cooling features and will keep cooler than any of our previous amplifiers.

SPECIFICATIONS

- Intermodulation products (IMD3): tested better than -30dB below the rated PEP output (this all depends on the input signal) GARBAGE IN GARBAGE OUT...
- Input and output impedances: nominal value: 50 Ohm unbalanced, UHF (SO239) type connectors.
- Input circuit: broadband, SWR below 1.2:1 (1.1:1 typically); 1.8 – 54 MHz continuous range without retuning or switching.
- Duty cycle in digital mode: Maximum 1 minute of TX, minimum 15 seconds of RX. Note that the output power may gradually decrease due to heating of components in the amplifier and transceiver. Cycle for FT8 has been tested by more than 5 hours of QSO.
- Temperature range: 14 F to 167 F (-10 C to +75 C). Do not install the device in environments with temperatures above +40 C (+104 F).
- Dimensions (projections not included) and weight, operating: (W x H x D) 11 x 5.5 x 13.5 In (305 x 140 x 343 mm); 29 lbs. (12.7 kg).

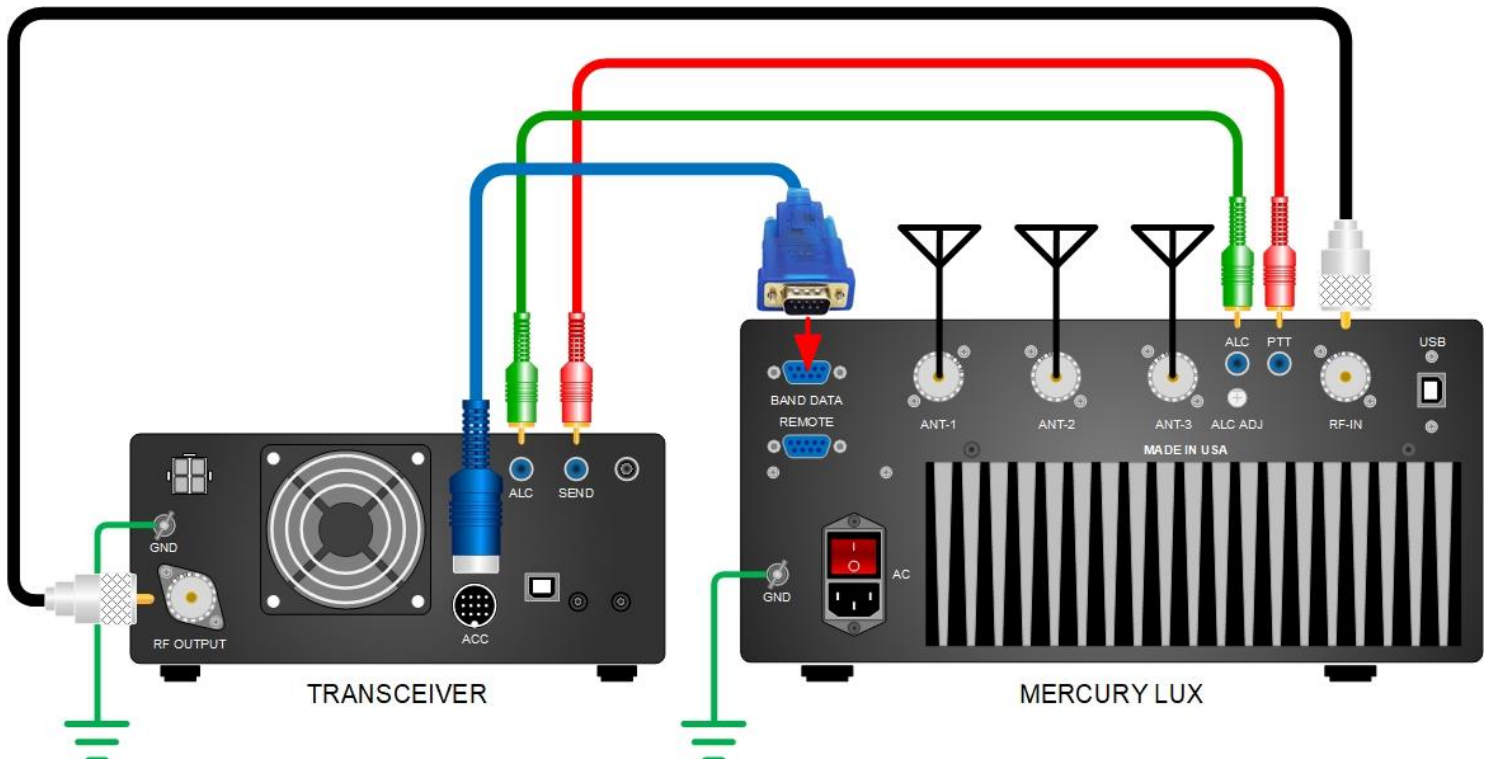
This unit complies with the FCC RF Exposure limits for an uncontrolled environment. To comply with FCC RF exposure limit requirements, antennas must be operated at a minimum distance of 740.25 cm or 24.29' between the radiator and any person's body.

QUICK START GUIDE

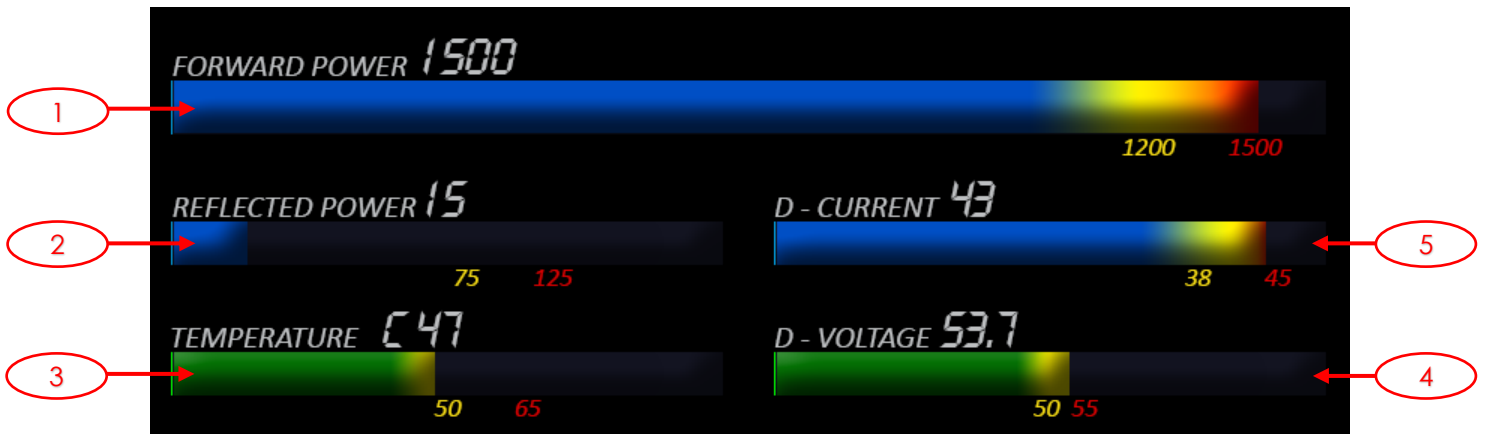
1. Connect the Amplifier to a (120VAC 20-Amp) or (240VAC 10-Amp) outlet as the power supply is AUTO sensing. We recommend using the Amplifier at 240VAC, although at 120VAC your Mercury LUX's power supply will perform well. At 240VAC the power supply fan runs at a lower RPM and are quieter, any high frequency sounds that the power supply may produce is inaudible and is more efficient.
2. Connect the output of the amplifier ANT-1 to a 50-ohm load or to the corresponding antenna. Connect the RF-IN of the amplifier to the RF-OUT of the transceiver.
3. Connect the RCA PTT terminals from amplifier and to transceiver. *Never connect a Soft-Key Keying Interface Box, this may affect the sequencing of the RF Band Decoder*
4. DO NOT connect ALC unless it has been adjusted...(not needed for quick startup). Set the transceiver to a minimum power output, 1-5 watts.
5. Gradually increase power by SSB modulation, while checking for output power.

WARNING: Keep input power less than 20-Watts for (RTTY, AM, FM, DATA) Modes.

Typical connection example:



MAIN SCREEN



1. FWD Power Meter: Indicates the output power in operation mode with high accuracy. **Note:** The measurement sometimes will not match with an external instrument due to loss from coax cables loss or other devices connected to the transmission line. This loss can be up to 0.2 dBm.

2. REF Power Meter: Indicates the reflected power in Operation mode. **Note:** The measurement will sometimes not match with external instruments due to the matching point of the transmission line. The Amp will go into protection mode if REF is greater than 125 Watts.

3. Temperature Meter: Indicates the internal temperature, measured on the copper heat spreader to which the LDMOS pair is soldered. Select °C/°F in the settings section.

4. Drain Voltage Meter: Indicates the voltage applied to the LDMOS pair in transmission. **Note:** This voltage can sometimes vary slightly.

5. Drain Current Meter: Indicates the LDMOS pair drain current. This meter is not a reference for LDMOS pair bias current.

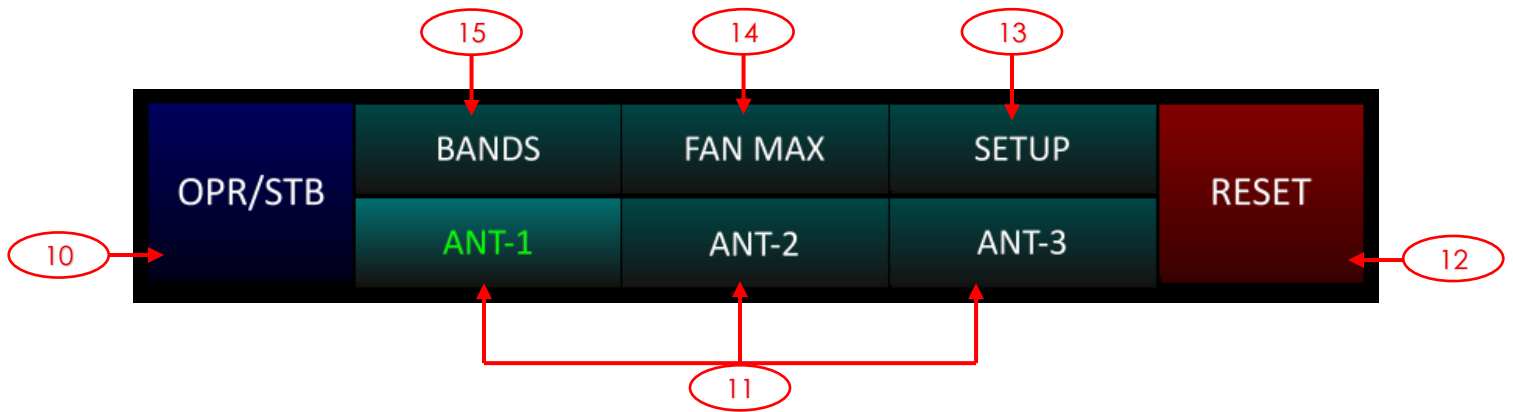


6. SWR Indicator: SWR does not determine the mercury Amp Protection feature, but it does influence the output power.

7. Band Data Select: Indicates the Band Selector selected in the configuration section and the detected band. **Note:** This is what is selected in the setup menu and may not be what is connected in the band data port.

8. Alarm Messages Zone: It shows the protection messages when the software algorithm activates the alarm: **CONTINUOUS CARRIER** if >800 Watts. **VOLTAGE ERROR** if >55V. **NOT OPERABLE 26-27 mhz.** **OVER DRIVER** if input power is high. **HIGH D-CURRENT** if >51A. **HI TEMPERATURE** if >75 °C/ 185 °F. **HIGH REFLECTED** >125 Watts.

9. On Air TAB: The indicator turns green when the amplifier is keying from the PTT port, the blue underscore line appears when the RF level for RF Decoder is good.



10. OPR/STB: Disables/Enables the amp. The transceiver signal goes directly to the selected antenna when the button is in standby.

11. Antenna Switch Zone: Manually select antenna 1, 2 or 3. The button illuminates the selected antenna manually or automatically.

12 Alarm Reset Button. Quickly restore operation after an alarm shutdown. *Before resetting read the error message and find the cause of the problem.*

13. Setup Button: Open the general settings screen.

14. Fan Max Button: Sets the fan speed to maximum or automatic (default). If the temperature is greater than 45°C/113°F, the fan will run in maximum speed. **Note:** For prolonged operation or DIGI MODE keep the fan at maximum speed.

15. Bands Button: Opens the manual band selection tab. **Note:** The amplifier is not operable if the bands tab is showing, as a selection must be made.



FULL MAIN SCREEN VIEW.



QR CODE SCREEN VIEW.

Note: Use your smartphone camera to scan the QR codes on the amp's screen to access Troubleshooting, Manual and Mercury LUX Forum.

Through the Forum on our platform, you will be able to share experiences and exchange questions with other MERCURY LUX users.

SETTING SCREEN

Main screen / Setup button



Display Settings.

Bar Graph: Select 2 types of bar graph, continuous bar or dashed bar.

Celsius / Fahrenheit: Select the unit of measure that will be displayed on the temperature indicator.

Sound: Enables or disables the alarm sound. **Note:** The protections are not disabled.

Call Sign: Displays the keyboard to put Call Sign on the main screen.

Sleep: If the button is activated, the screen will turn off after 15 minutes of inactivity. Restart the screen by pressing PTT or touching the screen..

Brightness: Slide the bar to adjust the brightness.

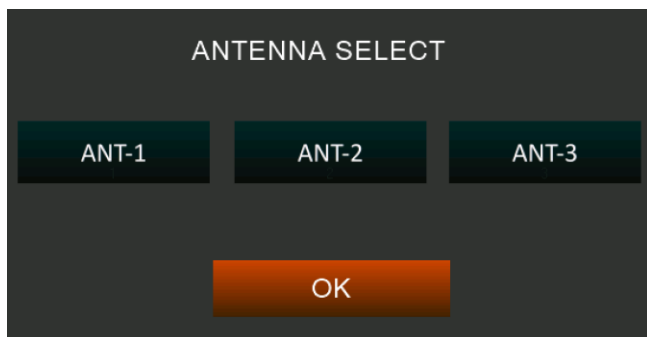
Antenna Memory.

Configure the three antenna outputs for each band segment.

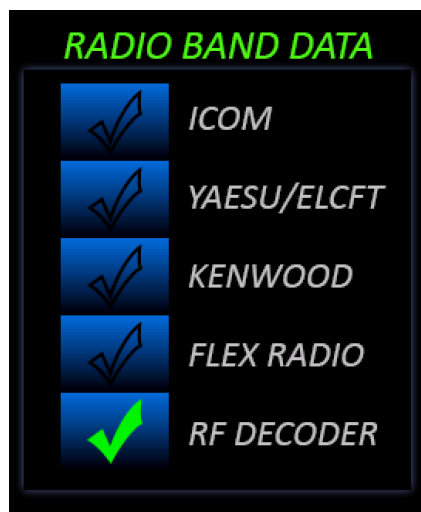
The configuration remains in memory.

ALL TO ANT-1 button restores all bands to Antenna -1.

WARNING: Even though the power amp's protection will trigger a REF POWER alarm, it is always recommended to have an antenna, or 50-ohm load connected to the programmed output in order to avoid probable severe damage to components.



BAND SELECTORS



RF Decoder: If the RF Decoder is selected on Radio Band Data section it will be in AUTO Mode which selects the 6-meter band when the amplifier starts up.

A signal emitted by the transceiver selects the appropriate Low Pass Filter. **Note:** In SSB mode the radio will not emit RF until modulated; 200 milliwatts are needed to detect the current frequency. Some transceivers make a small click when you press PTT, which is enough to quickly detect the appropriate segment. If there is not enough signal level or the mic gain is too low, it may cause a delay in the decoder.

Band Data (CAT): MERCURY LUX will detect the band while in receive mode, then automatically control the Low Pass Filter (LPF).

Connect the Band Data Interface cable (sold separately). Select the appropriate transceiver in the configuration page (Band Data section).

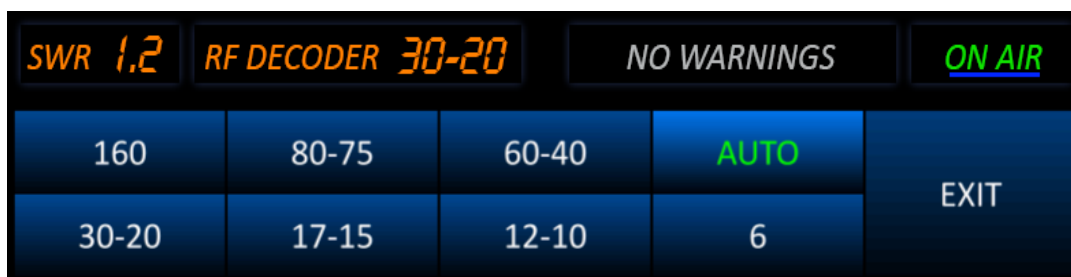
Select your manufacturer: Yaesu, Kenwood, Icom, Flex Radio. The selected transceiver will be displayed on the main screen.

Make sure the Band Data function works correctly the first time. Change the band segments on your transceiver and watch to see that the MERCURY LUX auto-switching follows the selected band.

For Kenwood and Flex Radio, please set 9600 baud on the Transceiver (9600 baud default in most Kenwood transceivers.)

If the interface is disconnected or not working properly, RF Decoder will automatically select the segment to avoid damage to the amplifier. The Band Data selector option is recommended. See the Band Data connection details starting on page 13.

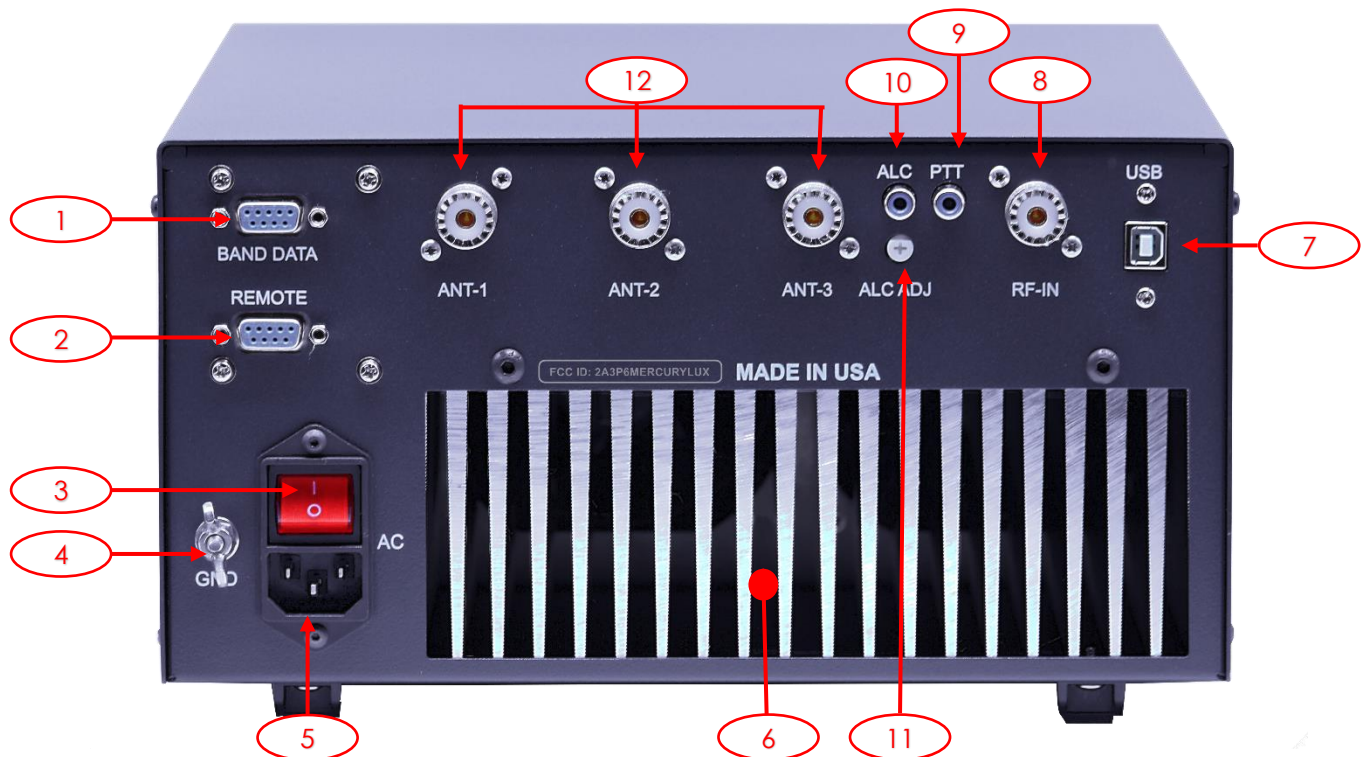
Note: If the Band Data Interface is not used for some reason, the RF Decoder will detect the frequency from the transmitted signal.



Band Manual Selector: It is not necessary to use the manual selector. However, if you do not have the Band Data interface connected and different antennas were configured in the band segments, it will be very convenient to manually select the band to connect the appropriate antenna in RX mode since you need to transmit first for RF Decoder to select the segment and appropriate antenna.

Note: If the manual selector tab is displayed the amplifier will not work, press exit to operate.

REAR PANEL



1. Band Data Port: Connect Band Data of the transceiver through Band Data Interface Cable (Sold separately). See Band Data connection details starting on page 13.

2. Remote Port: This port provides low power high/low voltages from the controller to connect accessories. For details see page 13.

3. Main Switch: Main power supply interrupter. Recommended for total power shutdown when not in use.

5. IEC 320 C14 AC Outlet: Connect to either a (120VAC 20-Amp) or a (240VAC 10-Amp) line.

4. Ground Screw: Connect directly to physical ground. Do not make ground loops. Do not connect Ferrite Clamps or RF Chokes to this ground screw.

6. Air Flow Area: Do not block this area and space it at least 6 inches from any obstruction for proper airflow.

7. USB Port: Remotely operate amp from a PC via a USB Type B (Printer) cable. For details see page 12.

8. SO239 RF Input: Do not exceed an input level of more than 60 Watts.

9. RCA PTT Plug: This triggers the amplifier from your transceiver. *Never connect a Soft-Key Keying Interface Box, this may affect the sequencing of the RF Band Decoder.*

10. ALC Input: Voltage (-2 to -7V) automatically controls the power level of the transceiver (Optional).

11. ALC Adjustment: An ALC adjustment can be performed with a Philips screwdriver, see page 11.

12. SO239 RF Outputs (3): **WARNING:** NEVER disconnect any antenna during transmission, as there may be a possibility of radio frequency burns or fire.

ADJUST THE ALC

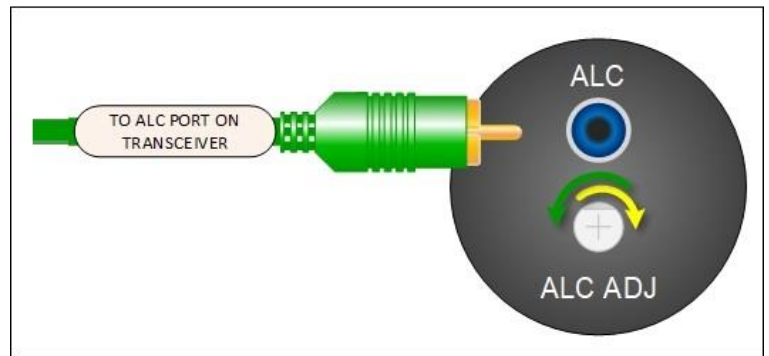
ALC is a negative voltage generated by the amplifier to limit power from the radio, which allows you to enjoy a broadcast signal of relatively the same strength across the bands on which you operate. If you use this feature, you must adjust it as described below. This adjustment will be different for every radio. The MERCURY LUX does not need ALC to function as you can easily control your final output by adjusting your transceiver's power level.

The amplifier provides a full output power of 1300 - 1500 Watts in HF bands. For 50 MHz, the output power does not exceed 900 Watts. The input level is different in each band segment; **the use of ALC is only for constant output power in all bands without regulating the input power.**

How to adjust ALC:

1. Connect Amplifier to a dummy load.
2. Connect an RCA-type cable from the ALC port on the amplifier to the ALC port on the transceiver.
Note: Some Transceivers do not have an RCA-type for ALC.

3. Turn the regulator completely to the left, counter-clockwise. (Green Arrow)
4. Set the transceiver output to 50 Watts. The 20-meter band is recommended for this adjustment.
5. Begin to modulate and turn the regulator to the right, clockwise, (Yellow Arrow) noting that the power will be low and will begin to rise (2).



6. Stop when you see the level bar in approximate peaks of 1300 Watts for linear gain on all bands.

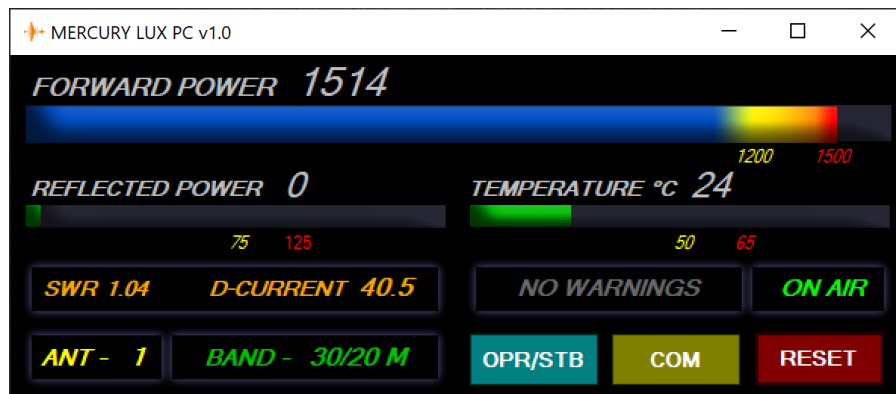
Note: Some Transceivers have a narrow adjustment and may not be compatible with the ALC voltage range of the amplifier. ALC Voltage -2 to -7V.

WARNING: Do not exceed input drive more than 20-Watts for (RTTY, AM, FM, DATA) Modes.

PC REMOTE CONTROL

The integration of MERCURY LUX PC Software allows the user to operate the amplifier from a PC. The Software has essential commands and visualization for a comfortable and safe operation and gives you access to Reset Alarm, Alarm Message Operate/Standby, and *FWD. REF. SWR. D-CURRENT Meters*. It also shows selected antenna and operating band.

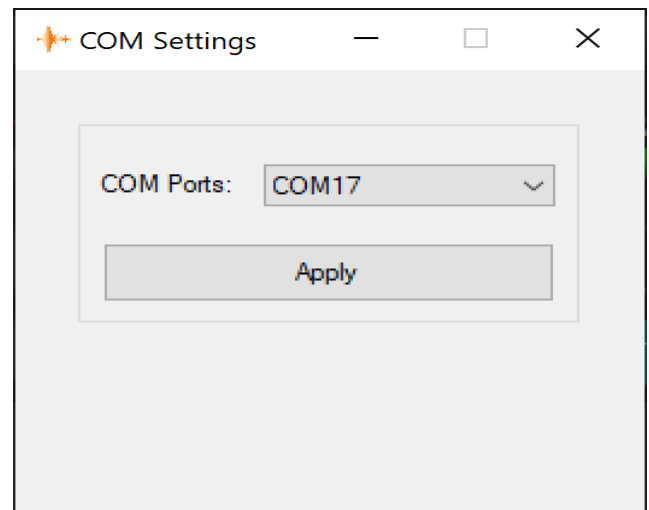
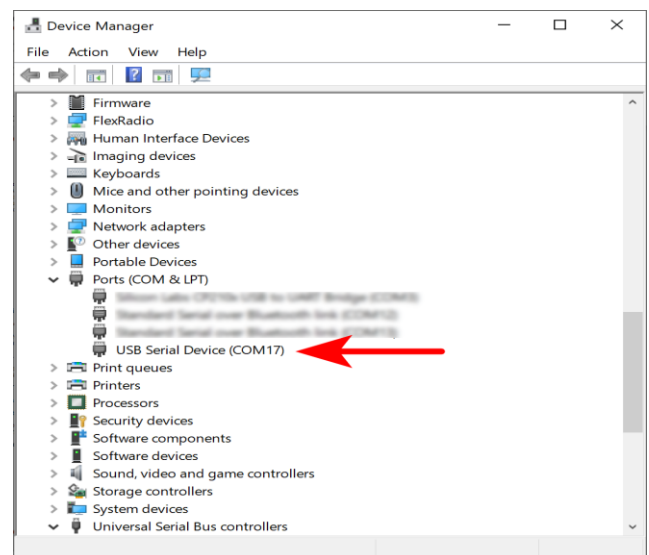
The PC Software is compatible with all versions of Microsoft Windows.



Start Guide.

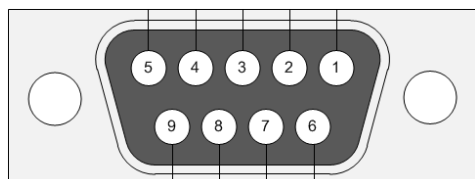
1. Make sure MERCURY LUX is powered OFF.
2. Connect a USB cable from the PC to the USB port type (B) of the Amp.
Note: Turn ON the amplifier -- the PC can already be ON.
3. Find the new port assigned by the amplifier interface. It normally appears as (Serial Device).
Note: You can see the port in the device manager section of Microsoft Windows.
4. Start MERCURY LUX PC software.
5. Click the COM button and select the corresponding port. **Note:** If the communication is successful, the temperature reading will be displayed on the main screen.

Recommended. Use shielded USB cables and place 2 ferrite clamps at the end closest to the amp and PC.



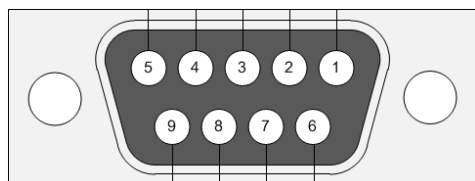
REAR PANEL PIN OUT

BAND DATA



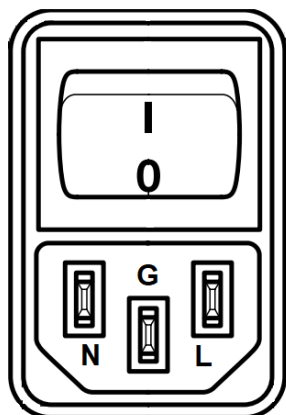
1	Serial TXD	Kenwood, Flex Radio
2	BCD (A)	Yaesu, Elecraft
3	BCD (C)	Yaesu, Elecraft
4	0...8v	Icom
5	PTT	Active Low
6	Serial RXD	Kenwood, Flex Radio
7	BCD (B)	Yaesu, Elecraft
8	BCD (D)	Yaesu, Elecraft
9	GND	To Chassis (Ground)

REMOTE



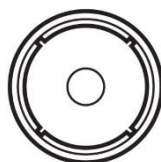
1	NC
2	TX Send, Active High (100 mA)
3	Antenna-2, Active Low (100mA)
4	NC
5	NC
6	NC
7	NC
8	Antenna-3, Active Low (100 mA)
9	GND

AC OUTLET



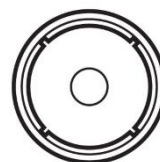
L	Line
G	Ground
N	Neutral

ALC



Center Pin, -2 to -7V

PTT

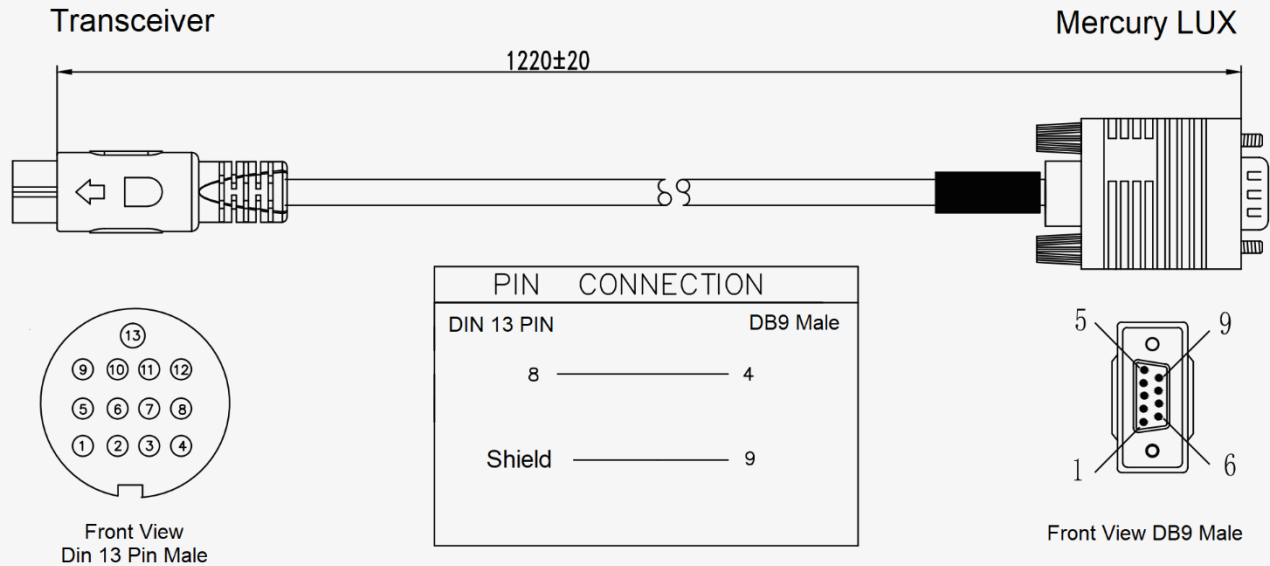


Center Pin, 3.5V 0.6 mA

BAND DATA INTERFACE CABLES

Band data interface cables are sold separately at *KM3KM.COM*. You can build your own cable depending on your transceiver. See the connector type and band data output pins described in your transceiver's manual. Use shielded cables and add ferrites clamps at each end of the interface cable.

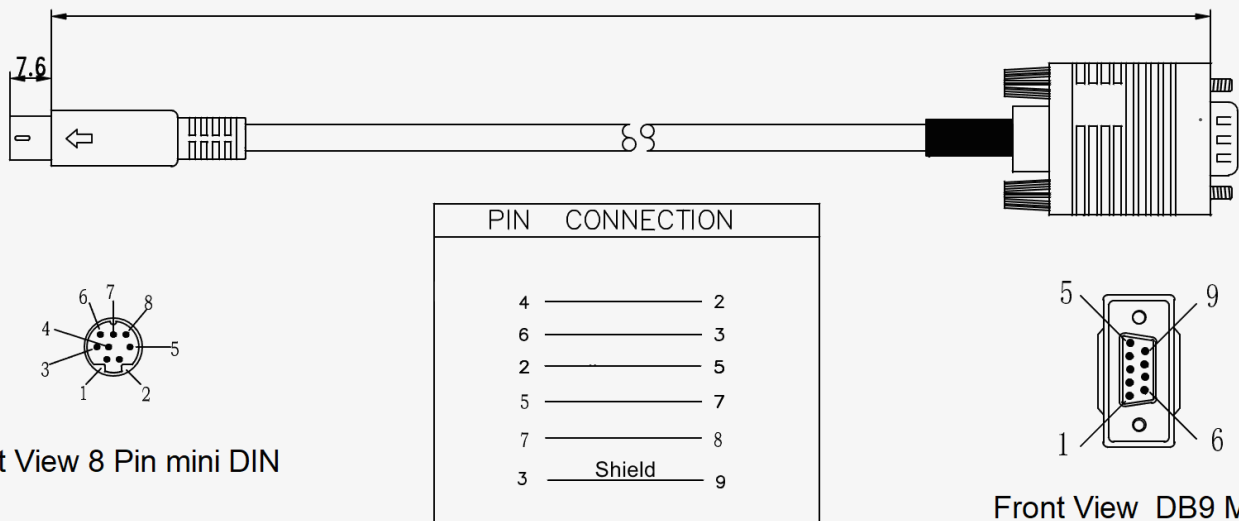
ICOM, ACC DIN 13 PIN



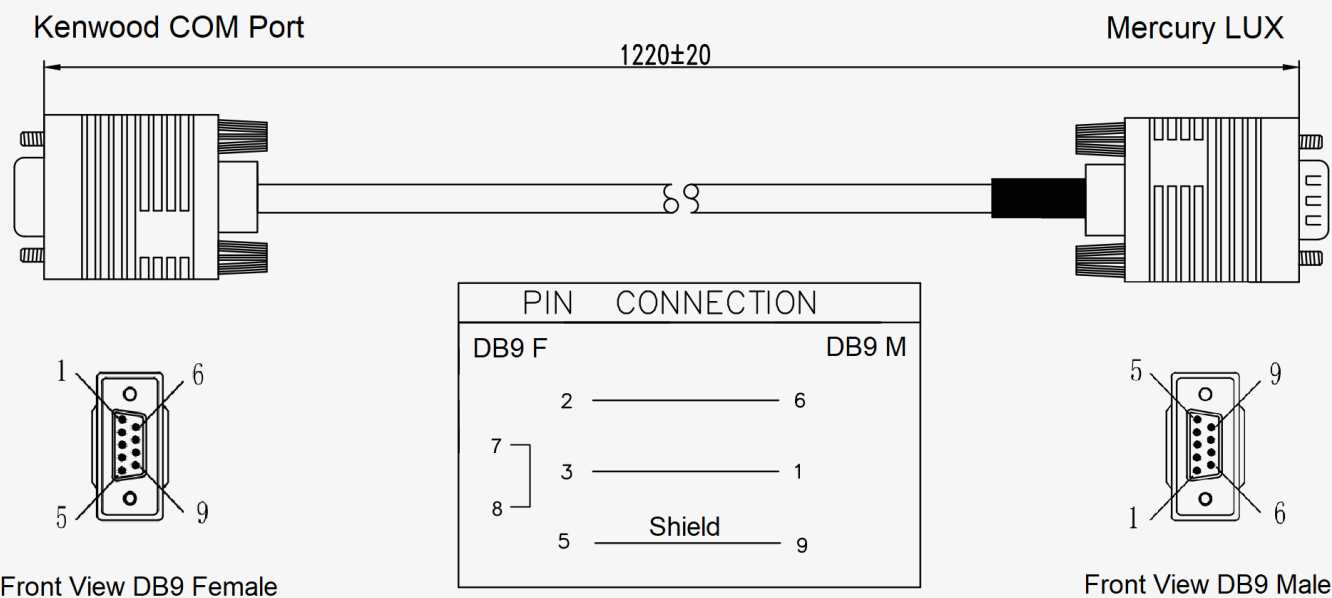
YAESU, LINEAR MINI DIN

Yaesu Mini DIN, Linear Port

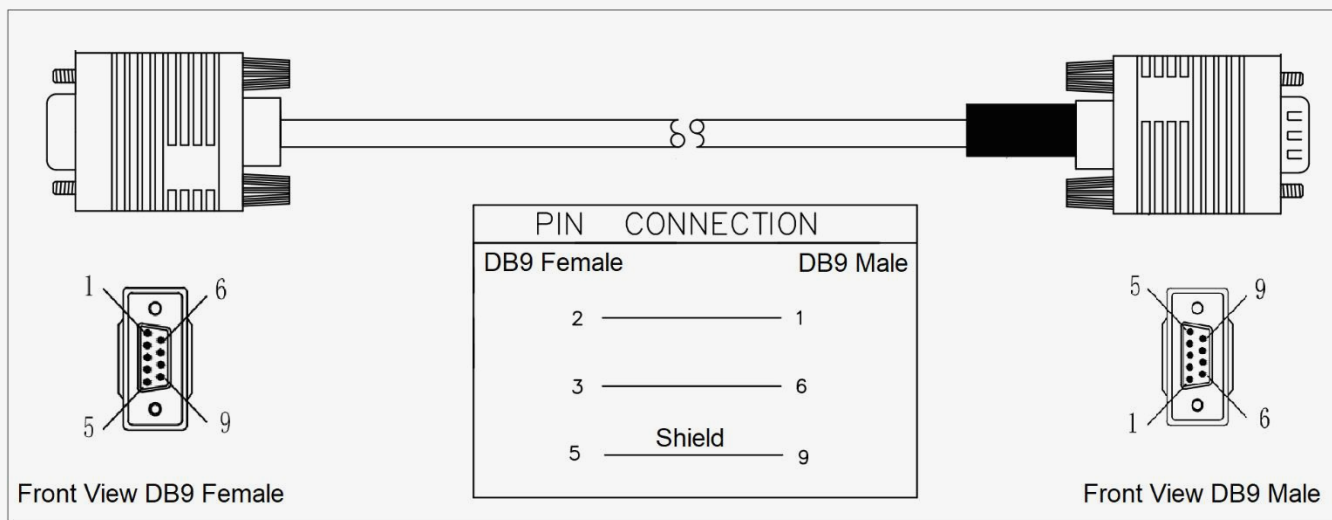
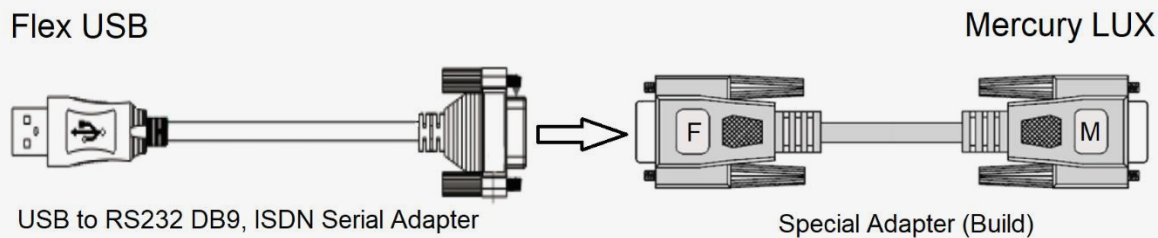
Mercury LUX



KENWOOD, COM DB9



FLEX RADIO, USB



For Interface Band Data Flex Radio, you need USB to RS232 DB9 Serial Cable Male Converter Adapter with FTDI and build a special DB9-Female to DB9-Male adapter. As displayed in the schematic above.

GAIN TEST REPORT

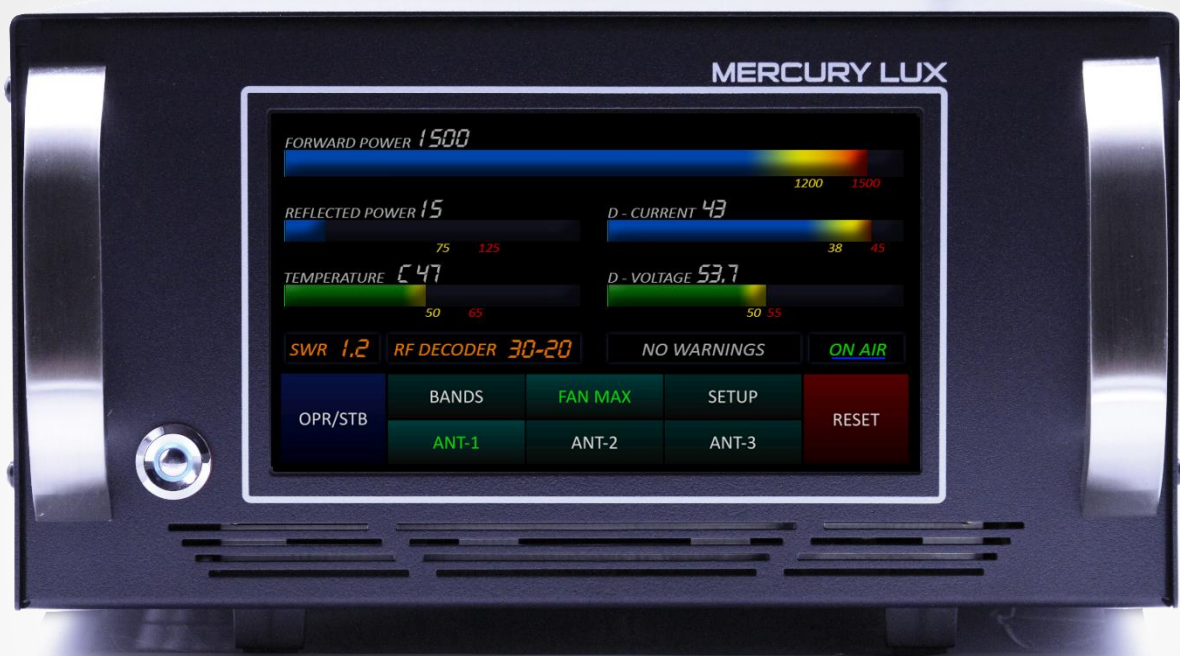
The following gain tests were run using a terminal design identical to the one currently supplied with this manual. Tolerance range error +/- 0.3 dBm.

Equipment test and Procedure.

- Driver Exciter - ICOM IC 7300.
- 8862 BIRD Coax Dummy Load.
- LP-500 - Telepost Inc Digital Station Monitor.
- Rigol DSA815 Spectrum Analyzer.
- SSB Mode.
- Room temperature 30 °C.
- SWR 1.1
- 240 VAC

BAND	POWER INPUT (WATTS)	POWER OUTPUT (WATTS)	GAIN (dBm)
160M	50	1494	14.76
80M	50	1500	14.78
40M	50	1498	14.77
30M	50	1350	14.32
20M	50	1500	14.78
17M	50	1320	14.22
15M	50	1500	14.78
12M	50	1300	14.15
10M	50	1495	14.76
6M	50	950	12.79

Note: The WARC bands 30,17,12 meters do not exceed 1350 Watts due to design.



DISCLOSURE

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.