

# MERCURY LITE USER MANUAL



## Features

Operating Range 3.5 Mhz – 54 Mhz (Ham Bands)

Internal Automatic Tuner

RF Auto Band Decoding

5-inch Color Touch Screen

2 x MRF300 LDMOS

600 Watts all Modes

Input Power 5-40 Watts

FWD/REF/SWR Meter

Supply Voltage / DI Current Meter

All Protections

W 7 x L 11.5 x H 4.5 Inch / Weight 14 Pounds

FCC Approved

*Designed and Manufactured in the USA*  
*Copyright 2024 KM3KM Electronics LLC.*

## *INDEX*

- Overview.....Page 3
- Features & Specs..... Page 4
- Quick Start Guide.....Page 5
- Main Screen .....Page 6,7
- Settings .....Page 8
- Rear Panel.....Page 9
- Band Test Report.....Page 11

This manual is subject to updates. Check for updated versions at  
[WWW.KM3KM.COM/DOWNLOAD](http://WWW.KM3KM.COM/DOWNLOAD)

# **OVERVIEW**

Hello Fellow Ham Radio Operators:

At KM3KM we have reached a significant milestone, celebrating five years of dedication to creating high-quality amplifiers. This achievement is a testament to our commitment to innovation and customer satisfaction.

By actively listening to customer feedback, at KM3KM we have successfully developed amplifiers that are not only more affordable and robust but also incorporate numerous customer-driven design enhancements. Our focus on addressing the specific needs and desires of our users has culminated in the creation of the Mercury LITE, an HF amplifier that stands out in its category.

- Smallest in its Class – POTA and Remote Expedition Friendly.
- Reduced space shacks friendly with a very small footprint.
- QRP Radio friendly for full power as well as full power radios with overdrive protection.
- New protection Software Algorithm.
- 600 Watts Super Cool operation.
- Battery operated 8+ Hrs of constant operation (Battery not included).
- Internal antenna tuner.
- Fully operational on 80 to 6 Meters.
- Should the need arise user friendly LDMOS replacement.

The Mercury LITE is poised to revolutionize the industry with its compact size and comprehensive features that have been neglected by larger manufacturers. Here at KM3KM we take pride in this groundbreaking development, which represents a significant leap forward in meeting the evolving demands of the market.

The introduction of the Mercury LITE shows our unwavering pursuit of excellence and our ability to anticipate and fulfill the unmet needs of the industry. With this latest offering, KM3KM will continue to solidify our reputation as a forward-thinking and customer-centric company, ready to set new standards and lead the way in amplifier technology.

*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 (600 Watts) all mode.
- Generous 600 Watts and great dynamics with the proven paired MRF 300 by NXP.
- Easy to read 5", high-resolution touch screen 24-bit colors.
- Compatible with all transceiver models available on the market; ground on transmit (PTT) and 40W 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 (40V÷55V) suitable for 48V batteries,. Exceeds electromagnetic compatibility (EMC) both for the highly-sensitive as well as with other powerful appliances in the radio station.
- TX delay 9 milliseconds, RX delay 3 milliseconds relay switch (Better than industry standard). **This amp doesn't support full-BREAKIN, for CW use semi-BREAK IN.**

## **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); 3.5 – 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 4 hours of QSO.
- Temperature range: 14 F to 140 F (-10 C to +60 C)
- Dimensions (projections not included) and weight, operating: (W x H x D) 7 x 4.5 x 11.5 Inch, 14 lbs.

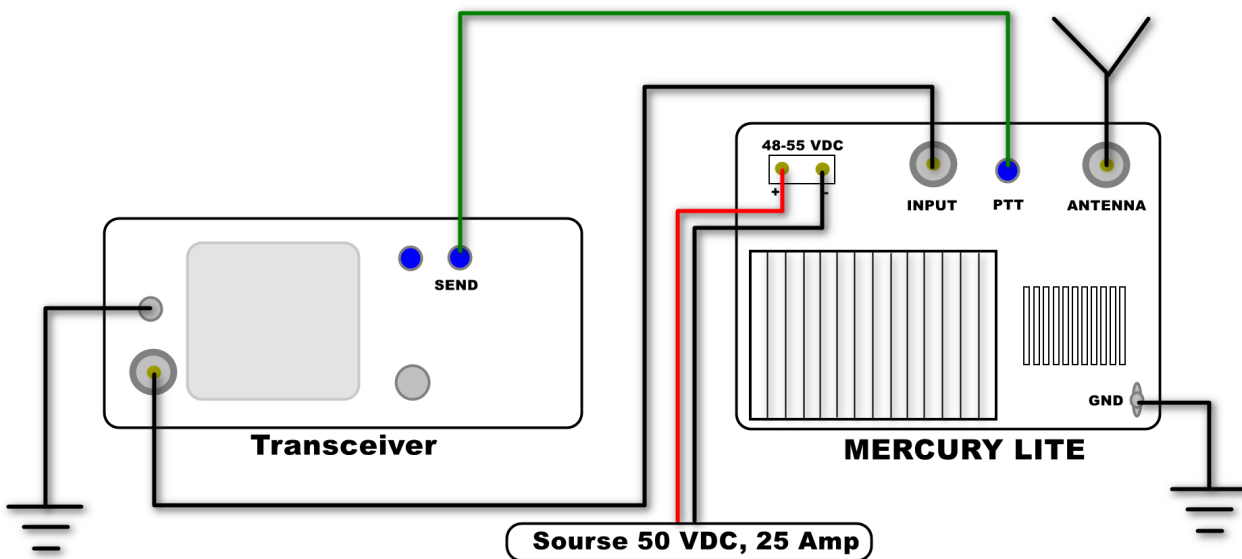
**This unit complies with the FCC RF Exposure limits for an uncontrolled environment. To comply with FCC RF exposure limit requirements, antennas must be operated at a minimum distance of 488.52 cm or 16.03' between the radiator and any person's body.**

# QUICK START GUIDE

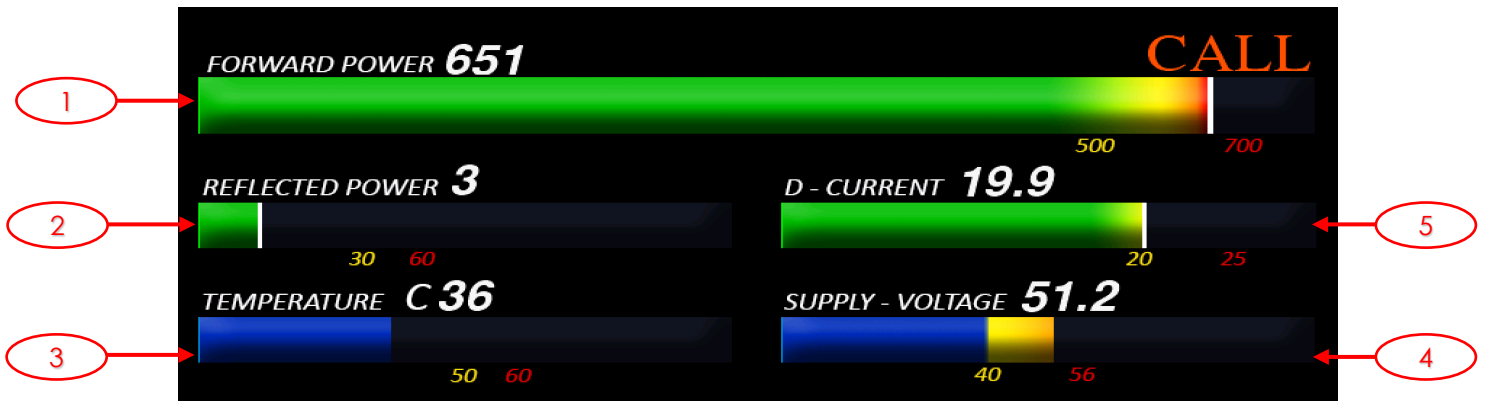
1. Connect the Amplifier to a (48-53 VDC 25-A Source)
2. Connect the output of the Amplifier to a 50-ohm load or to the corresponding antenna.  
Connect the RF-IN of the amplifier to the RF-OUT of the transceiver.
3. Connect the RCA PTT terminals from amplifier and to transceiver. *Never connect a Soft-Key Keying Interface Box, this may affect the sequencing of the RF Band Decoder*
4. Gradually increase power by SSB modulation, while checking for output power.

**WARNING:** Keep input power less than 40-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 tune if REF is greater than 30 Watts.

**3. Temperature Meter:** Indicates the internal temperature, measured on the copper heat spreader

**4. Supply Voltage Meter:** Indicates the voltage applied to the unit. **Note:** The optimum voltage is 52V and minimum is 40V. Output power is affected if the supply voltage is below 48V

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



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

**7. Band LPF Select:** Indicates the RF detected band. Press this tab to select the band manually, recommended for CW.

**8. Alarm & Messages Zone:** It shows the protection messages when the software algorithm activates the alarm:

**VOLTAGE ERROR** If the Supply voltage is not between 40 and 55V. **NOT OPERABLE** If the detected frequency is not compatible with the Amp specifications. **OVER DRIVER** if input power is high. **HIGH D-CURRENT** if >25A. **HI TEMPERATURE** if >60 °C **HIGH REFLECTED** if >60 Watts .

**9. On Air TAB:** The indicator turns green when the amplifier is keying from the PTT port.

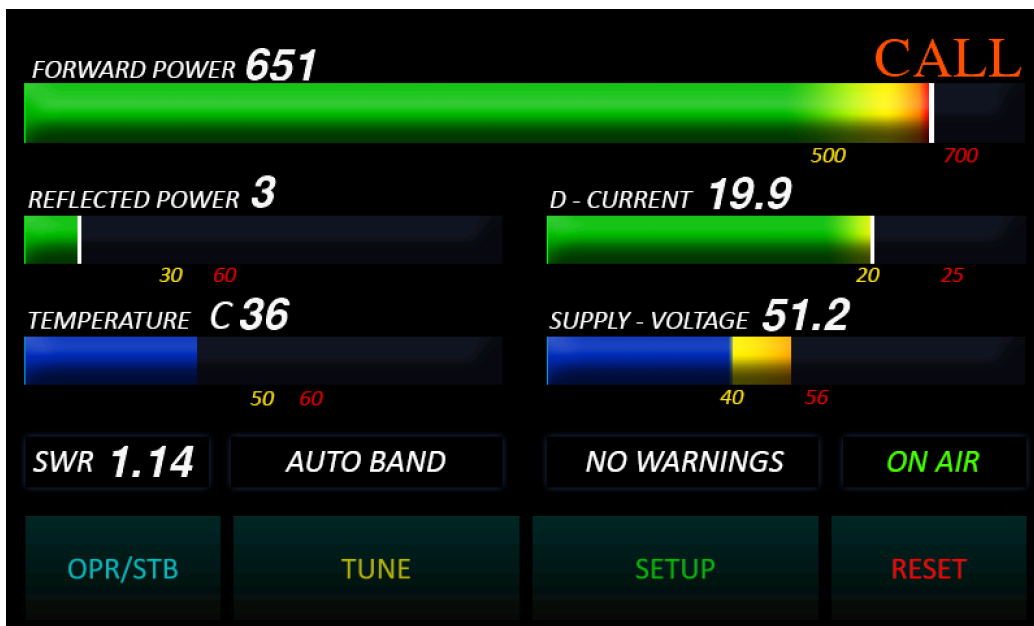


**10. OPR/STB:** Disables/Enables the amp. The transceiver signal goes directly to the selected antenna when the button is in standby. Standby pass-through power max 100 Watts.

**11. Tune Call:** Internal Tuner will be ready to receive a 10-30 watts continuous carrier to start the auto adjustment. More about Internal Tuner on page 10.

**12. Setup Button:** Open the general settings screen.

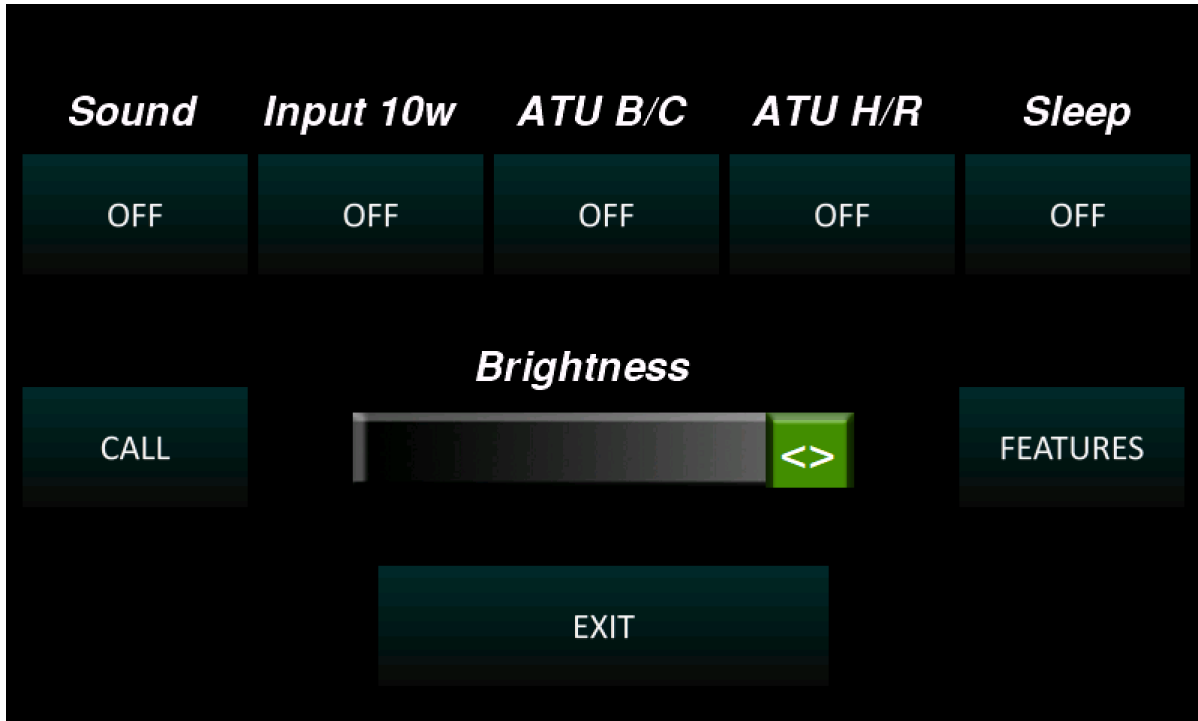
**13 Alarm Reset Button.** Quickly restore operation after an alarm shutdown. Before resetting read the error message and find the cause of the problem.  
If Reset is pressed for 3 seconds; the Internal Tuner will disconnect (Not recommended)



*FULL MAIN SCREEN VIEW.*

# SETTING SCREEN

Main screen / Setup button



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

**Input 10W:** Select ON for the lowest input attenuator for 5-10 Watts drive, ideal for QRP Radios. Select OFF for higher power radios (40 watts MAX). For Safety, when rebooted the selection (Input 10w) will default to OFF.

**ATU B/C:** Select this option to have the Internal Tuner activated when changing bands. Note that a continuous carrier is required for proper tuning when changing bands. More about Internal Tuner on page 10.

**ATU H/R:** Select this option to have the Internal Tuner activated when the reflected power is greater than 30 watts. Note that a continuous carrier is required for proper tuning when changing bands. More about Internal Tuner on page 10.

**Sleep:** Select this option to the screen turn off after 15 minutes of inactivity. Restart the screen by pressing PTT or touching the screen.

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

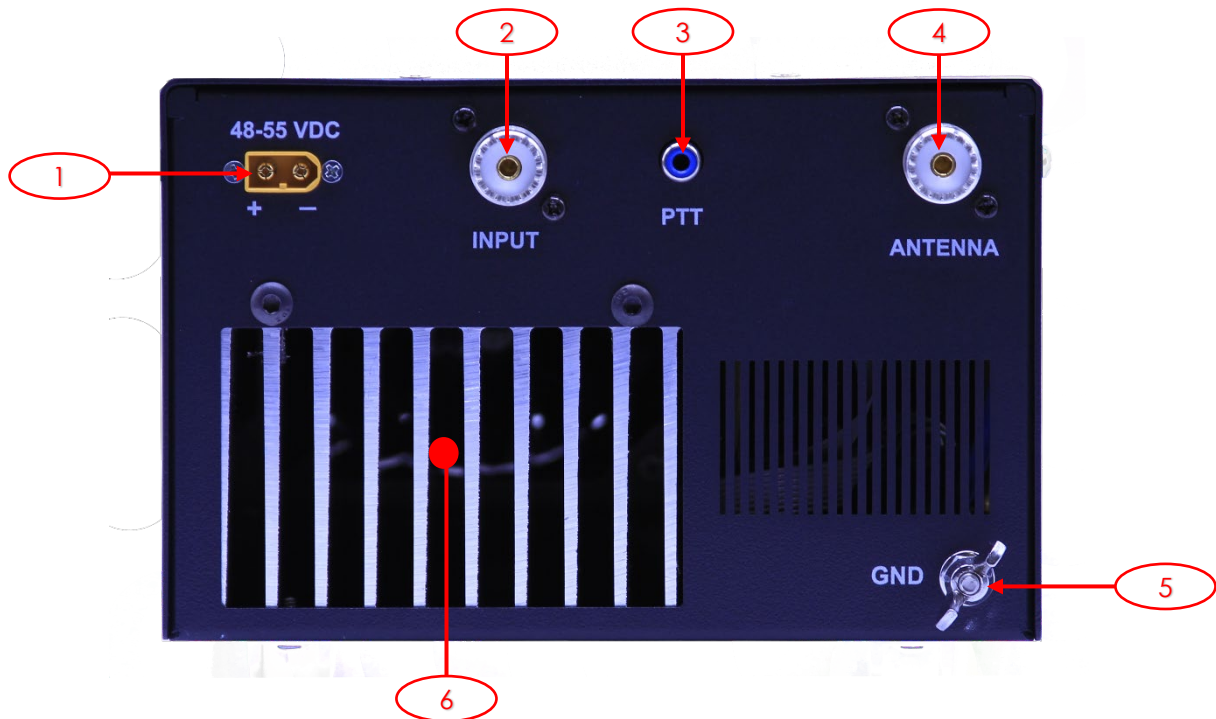
**Brightness:** Slide the bar to adjust the brightness.

**Features:** Show important information about the features and use of this amplifier.

**Exit:** Save changes and return to main screen.



# REAR PANEL



- 1. DC Power Input:** DC input to feed the Amplifier, the optimum source is 52 VDC 25 Amps. **Note that polarity reversal can cause severe damage to the amplifier.**
- 2. SO239 RF Input:** Do not exceed an input level of more than 40 Watts.
- 3. 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.**
- 4. SO239 RF Output):** **WARNING:** NEVER disconnect any antenna during transmission, as there may be a possibility of radio frequency burns or fire.
- 5. Ground Screw:** Connect directly to physical ground. Do not make ground loops. Do not connect Ferrite Clamps or RF Chokes to this ground screw.
- 7. . Air Flow Area:** Do not block this area and space it at least 6 inches from any obstruction for proper airflow.

# **INTERNAL TUNER**

## **Internal Tuner Specifications:**

- Optimus Range: 3.5 to 30 Mhz
- 600 Watts All modes
- Matching Range 3:1
- Tuned 1.3:1
- Inductance 3.33 uH / Capacitance 310 pF
- Minimum Tuner Level 10 Watts

**Good Practice.** An antenna tuner allows for efficient power transfer by matching the impedance of the transmission line with that of the antenna. The standard impedance for most radio transmitters is 50 Ohms, and the tuner adjusts the antenna's impedance to match this standard.

When considering an antenna for higher power output, it is essential to balance the antenna's specifications with the system's requirements to achieve optimal performance.

Caution is advised when dealing with high power transmissions; connecting an open line antenna or a long wire without proper impedance matching can lead to significant issues. These may include increased standing wave ratio (SWR), potential damage to the Amplifier, and inefficient radiation patterns.

## **Tuned Procedure:**

1- Press the TUNE Button and release. You will see the Button read "Tune CALL"

2- Press PTT in any continuous carrier mode (CW, RTTY, FM, AM). The Transceiver level should be **10-35** Watts, for best performance 35 Watts is recommended.

3- Do not release the PTT until the tuning has completed.

It is very Important not to release PTT until the sequence ends.

If the tuning is successful, the green banner "TUNED" will appear in the message area.

Note that if the SWR is more than 3:1 the tuning process will not run, and the red banner "HIGH REFLECTED" will be displayed.

**Important.** Press the Tune button every time you transmit on a new frequency more than 50 Khz from the previous tuning. **Note** that the tuning process is so fast that it is sometimes imperceptible. In the Setup you can configure the option (Band AT), if this is activated a new tuning will run every time you change bands.

If the Reflected Power is greater than 30 Watts the Tuner will start to run, **Note** that you must use a constant modulation or a continuous carrier for the best tuning performance.

To disconnect the Internal Tuner press RESET for 3 seconds (Not recommended)

For safety, the algorithm will always engage the internal tuner when the reflected power is high.

# **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.
- ATU B/C option (OFF)
- Input 10W option (OFF)
- 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
- Supply 52VDC

<b>BAND</b>	<b>POWER INPUT (WATTS)</b>	<b>POWER OUTPUT (WATTS)</b>	<b>GAIN (dBm)</b>
80M	35	620	12.48
40M	35	640	12.62
30M	35	590	12.27
20M	35	630	12.55
17M	35	603	12.36
15M	30	680	13.55
12M	40	580	11.61
10M	40	530	11.22
6M	40	450	10.51

## **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.