

HAMTRONICS® LNG-137, LNG-144, LNG-160, LNG-220 RECEIVER PREAMP: INSTALLATION, OPERATION, & MAINTENANCE

FUNCTIONAL DESCRIPTION.

The LNG-() series of low-noise preamps employs one of the new generation diode-protected dual-gate GaAs FET devices which are designed exclusively for use in the vhf & uhf bands. The 1 dB compression point for these preamps is approximately +5dBm. They are connected in series between the antenna and the receiver to effectively lower the noise figure of the receiver front end, allowing weaker signals to be received. The LNG series was designed for operation in 50 ohm systems; however, they will operate satisfactorily on 75 ohms as well.

The LNG-144 is designed to be tunable over a range of 137-152 MHz. It is factory tuned at 146 MHz. The LNG-160 covers a range of 152-172 MHz and comes peaked at 160 MHz. The LNG-220 covers 210-230 MHz and comes peaked at 223 MHz. The 3 dB bandwidth of these units is about ± 5 MHz. The gain is about 20-22 dB. The nominal noise figure is 0.7 dB.

INSTALLATION.

The preamp can be mounted to any flat surface with screws through the two mounting tabs. If complete shielding is desired (not normally required), mount unit against a metal surface or mount with a metal plate behind the unit a little larger than the case. Simply drill two holes in the plate to match the mounting tabs.

For best results, in a receiving system when antenna is not also used for transmit, preamp can be mounted right at the antenna. Mount preamp against a flat aluminum panel U-bolted to antenna boom. Then, caulk around base of preamp and around B+ and coax connectors to weatherproof unit. Silicone sealant is good for this purpose.

Antenna and receiver connections are made with BNC plugs to the input and output jacks on the preamp. Use good quality low-loss coax to maintain low noise operation. Remember that any loss in coax from antenna cannot be made up later in the preamp; it adds directly to system noise figure.

B+ for the unit must be filtered +10 to 15Vdc. Current drain is about 10 mA. Solder B+ supply wire to feedthrough capacitor on front of preamp. Unless a good ground connection is made through the coax shield, connect a separate power supply ground wire under a screw used to mount the unit at one of the mounting tabs.

CAUTION: Solid state amplifiers can be damaged by large voltage transients and reverse polarity. Although protection is provided in the preamp, avoid such conditions as a matter of principle. Care should be taken especially to install reverse diodes across any inductive devices, such as relays, on the same B+ line to absorb transients. If the preamp is connected to an antenna used for transmit as well as receive, be sure that the unit is connected only in the receive path, and be sure the coax relay has sufficient isolation to avoid coupling large amounts of rf to the preamp.

OPERATION.

The LNG series preamps operate in linear mode; so they may be used to receive any mode of transmission, including ssb and atv.

They are factory aligned at the center of the band, and they are easily readjusted if your operating frequency is near one end of the band or the other instead of being near the center. If retuning is necessary, simply repeak for maximum response at your receiver. The loading has been preset at the center of the band for best noise figure, and it is close enough that it need not be considered if a small retuning is necessary.

Low-noise preamps are effective in improving sensitivity of receivers in weak signal areas. However, it is normally considered inadvisable to use a preamp, even with a well designed receiver, in very strong signal areas, such as the center of a large city or other locations with high powered transmitters on all sorts of frequencies. Adding gain ahead of a receiver degrades the selectivity of a receiver by an equivalent amount by boosting undesirable signals as well as desirable ones. In severe cases, strong signals which do not cause intermod by themselves will create intermod in the rf stage or mixer of your receiver after being amplified an additional amount by the preamp. If you use a preamp with a repeater receiver, you will need to have additional rejection in your duplexer to attenuate your transmit signal that much more to prevent desense.

TROUBLESHOOTING.

Since the unit is fairly simple, troubleshooting usually is limited to checking the dc voltages on the transistor. These will vary somewhat; but, in general, the source voltage should be about 1.5 to 2Vdc, gate-2 should be about 3.5 to 4Vdc, and the drain should be 8Vdc. The two common failure modes, caused by excessive rf or dc voltage transients, usually cause one or more of these voltages to be quite low or the same as one of the other terminals of the transistor, indicating an internal short. Note: The pc board is designed to allow the FET to be replaced without removing the board from the case.

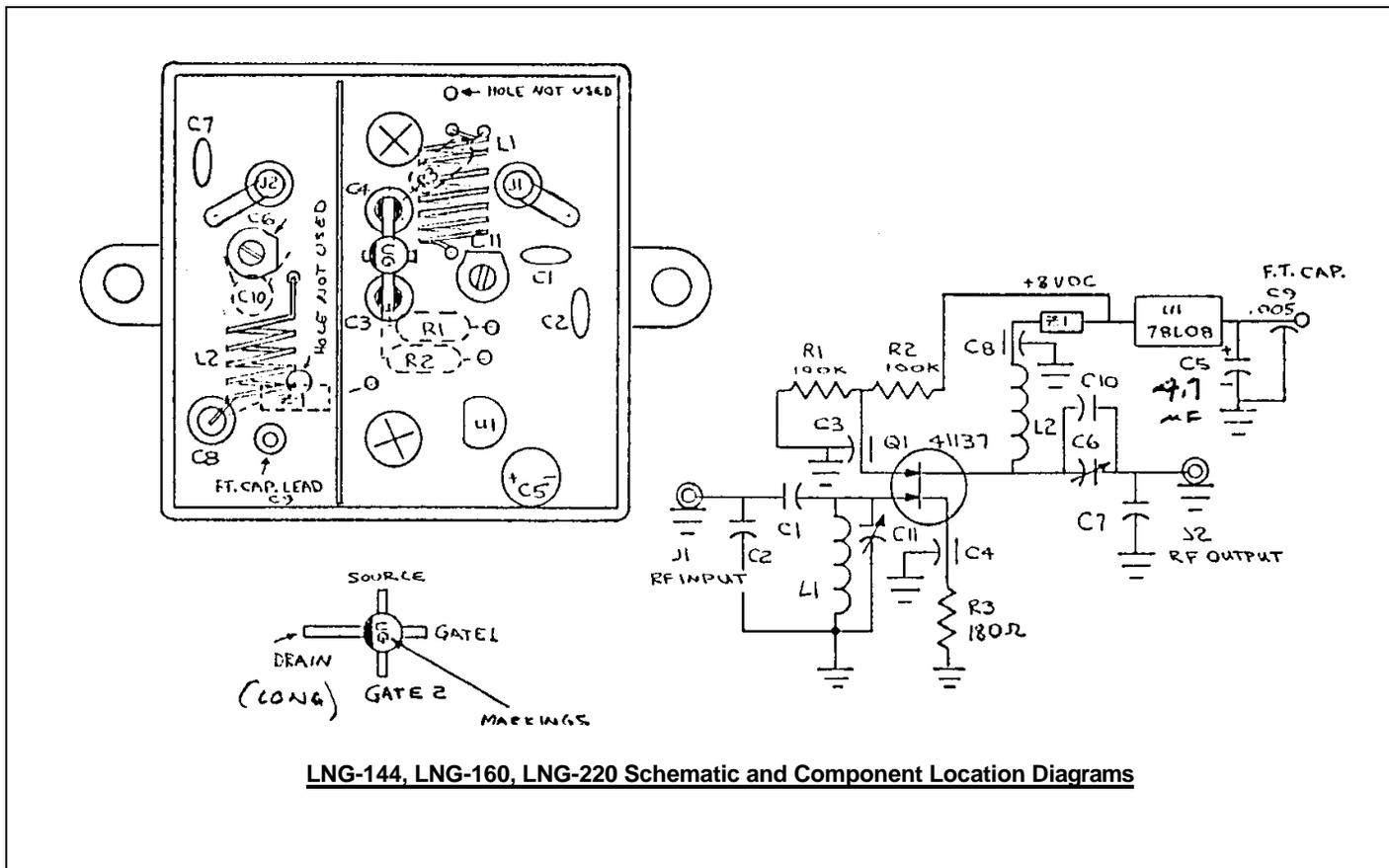
CAUTION: GaAs FET's are static sensitive. If replacement is necessary, be sure to ground your wrist before handling device. Internal diode protection will reduce, but not eliminate, risk. Devices also are heat sensitive; so don't apply soldering iron longer than necessary. If fet is replaced, be sure to orient as shown with lettering up.

PARTS LIST, FREQUENCY-SENSITIVE PARTS.

| Ref # | Value (marking) |
|-------|---|
| C1 | 5 pf |
| C2 | 20 pf |
| C6 | 4.5 pf variable |
| C7 | 20 pf |
| C10 | 2 pf (tack soldered across C6 on rear of board, oriented as shown.) |
| C11 | 4.5 pf variable |

| L1: | |
|---------|--|
| LNG-137 | 6 turns #20 bus wire on 1/4" i.d., spaced 1 wire diameter between turns. |
| LNG-144 | 6 turns #20 bus wire on 1/4" i.d., spaced 2 wire diameters between turns. (Fill space between pads.) |
| LNG-160 | Same as for LNG-137, except 5 turns. |
| LNG-220 | As for LNG-137 except 3 turns. |

| L2: | |
|---------|--|
| LNG-137 | 8 turns #20 bus wire on 1/4" i.d., spaced 1 wire diameter between turns. |
| LNG-144 | 8 turns #20 bus wire on 1/4" i.d., spaced 2 wire diameters between turns. (Fill space between pads.) |
| LNG-160 | As for LNG-137 except 6 turns. |
| LNG-220 | As for LNG-137 except 4 turns. |



LNG-144, LNG-160, LNG-220 Schematic and Component Location Diagrams