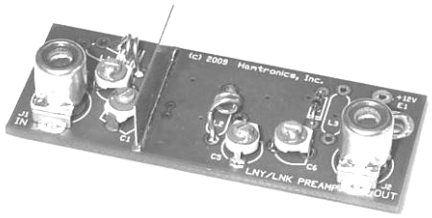
HAMTRONICS® LNY-( ) RECEIVER PREAMP: INSTALLATION, OPERATION, & MAINTENANCE



DESCRIPTION.

The LNY-( ) series of low-noise preamps employs one of the new generation diode-protected dual-gate MOS FET devices which are designed exclusively for use in the vhf & uhf bands. The 1 dB compression point for these preamps is approximately +5dBm. Surface mount technology is used to obtain minimum noise figure and best stability.

The preamp is 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 LNY series was designed for operation in 50 ohm systems; however, they will operate satisfactorily on 75 ohms as well.

INSTALLATION.

MOUNTING. The preamp can be mounted to any flat surface with standoffs and 4-40 screws through the two mounting holes. The ideal location is in the chassis with the receiver.

Complete shielding of the preamp is not required. However, some care should be given to selection of the mounting location with regard to feedback from adjacent receiver circuits or rf pickup if mounted very close to a transmitter circuit. Because the unit is small, make sure that it isn't installed tight against the rf amplifier or first mixer of the receiver to minimize feedback effects.

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

RF CONNECTIONS. Antenna and receiver connections are made with special rf type RCA plugs to the input and output jacks on the preamp. The RF INPUT must be connected to the antenna, and the RF OUTPUT must be connected to the receiver input.

CAUTION: The preamp cannot be used on a transceiver unless you have a way to connect it only in the receive rf path.

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.

Note that special rf type RCA plugs with good cable clamps are available from us (model A5) as an accessory. It is very important to use the proper plugs and make sure the coax pigtails soldered to the plugs are as short as possible. Attempts to use a different type of connector or to solder coax directly to the board should be avoided because it would degrade performance.

POWER CONNECTIONS. Power for the unit must be filtered +10 to 15 Vdc. Current drain is about 10 mA. Solder positive supply wire to solder pad E1 on the board. Many times, the power supply ground connection can be made through the coax shield. Otherwise, connect a separate power supply ground wire to the ground plane on the pc board.

If you have a receiver which feeds +12Vdc up the antenna cable to a preamp, rf choke L3 can be added to the LNY-( ) Preamp to allow power to be taken from the coax. (This choke is not supplied.) Note that such an arrangement can affect the rf performance of a preamp; so we recommend you use a separate piece of hookup wire to provide power whenever possible.

☹ 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. Special care should be taken to install reverse transient absorbing diodes across any inductive devices, such as relays. 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 that the coax relay has sufficient isolation to avoid coupling large amounts of rf to the preamp.

WHEN DOES A PREAMP HELP?

It is tempting to hope that a preamp can make any receiver more sensitive in any situation. It is important to understand what happens when you add a preamp before a receiver.

A preamp can help overcome a deficiency in receiver sensitivity *only* if the noise figure is poor, either due to the design or because a lossy filter or cable adds to the noise figure. For instance, a preamp up at the antenna can overcome the effects of coax cable loss.

However, adding gain in the front end raises all signal levels; so, in effect, every dB of gain added overrides 1 dB of i-f selectivity. Therefore, adding a preamp can result in intermod or desense. The only way to know is to try it!

MODEL	TUNES RANGE	TYPICAL NOISE FIG.	GAIN	MIN. 3DB BANDWIDTH
LNY-50	35-63 MHz	0.6 dB	24 dB	±3 MHz
LNY-100	88-108 MHz	0.6 dB	22 dB	±5 MHz
LNY-120	108-140 MHz	0.6dB	22 dB	±4 MHz
LNY-137	130-160 MHz	0.6 dB	18 dB	±4 MHz
LNY-146	130-160 MHz	0.6 dB	18 dB	±4 MHz
LNY-166	150-180 MHz	0.6 dB	16 dB	±5 MHz
LNY-220	195-240 MHz	0.7 dB	18 dB	±5 MHz
LNY-400	360-440 MHz	0.8 dB	19 dB	±5 MHz
LNY-450	400-470 MHz	0.8 dB	18 dB	±5 MHz
Note: Units are aligned to frequency indicated by model number.				

OPERATION.

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

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.

ALIGNMENT.

Units are factory aligned at the center of the band, and they are easily readjusted if

Parts List, Parts which change with Frequency Band							
Model	**C1**	**C2**	**L1**	**L2**	**C3, C4**	**C5**	**C6**
LNY-50	10pF disc	50pF var.	0.33µH	0.33µH	390pF smt	n/u	68pF, 1206
LNY-100	6pF disc	11pF var.	0.22µH	0.22µH	390pF smt	n/u	68pF, 1206
LNY-120	4.5pF var.	11pF var.	6T #20 bus on ¼-20 screw form	0.33µH	390pF smt	n/u	470pF, 1206
LNY-137	4.5pF var.	11pF var.	5T #20 bus on ¼-20 screw form	0.33µH	390pF smt	n/u	470pF, 1206
LNY-146	4.5pF var.	11pF var.	5T #20 bus on ¼-20 screw form	0.33µH	390pF smt	n/u	470pF, 1206
LNY-166	4.5pF var.	11pF var.	4T #20 bus on ¼-20 screw form	0.33µH	390pF smt	n/u	470pF, 1206
LNY-220	4.5pF var	11pF var.	5T #20 bus on 8-18 screw form	0.33µH	390pF smt	n/u	470pF, 1206
LNY-400	4.5pF var	4.5pF var	3T #20 bus 6-19 screw form	3T #20 bus 6-19 screw form	100pF smt	4.5pF var	4.5pF var
LNY-450	4.5pF var	4.5pF var	2T #20 bus 6-19 screw form	2T #20 bus 6-19 screw form	100pF smt	4.5pF var	4.5pF var

your operating frequency is near one end of the band or the other instead of being near the center. If retuning is necessary, simply retune the variable capacitor(s) for best reception of weak signals. No test equipment is necessary. If you happen to have access to a signal generator and sinadder, they may be used; otherwise, just do it by ear.

Note that for uhf units, it may be necessary to spread the turns of the coils to allow alignment for the high end of the band. If the variable capacitors peak with the capacitor at minimum capacitance (toward round end of cap), spread the corresponding coil turns to decrease inductance. That should allow the variable capcitor to tune within its range.

The lower frequency units have only one adjustment capacitor. The higher frequency models have multiple capacitors to tune; for those, alternately adjust pairs of capacitors seeking the best combination of settings.

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 0Vdc, gate-2 should be about 3.5 to 4Vdc, and the drain should be 8Vdc. Current drain should be no more than 20 mA (10mA typical).

The two common failure modes, caused by excessive rf or dc voltage transients, **may** cause the gate-2 voltage to be quite low or the same as the drain of the transistor, indicating an internal short. Generally, dc power line problems, such as transients cause a drain to gate-2 short and high rf fields or lightning coming in the antenna connector usually cause a gate-1 to source short. The latter usually doesn't show up as a change in dc voltage because gate-1 is connected to dc ground in the circuit. A sudden loss of sensitivity with no change in dc voltage usually indicates damage to the input gate (gate-1). Note that the two gates have built-in diode protection, but diodes will only withstand a limited surge; beyond that, the diodes will be damaged along with the FET.

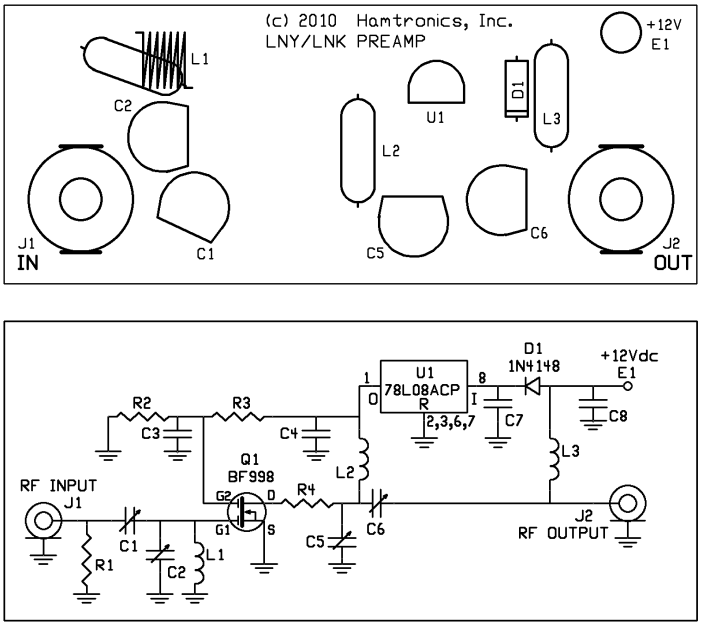
CAUTION: FET's are static sensitive. If replacement is necessary, be sure to ground your wrist before handling them. Internal diode protection will reduce, but not eliminate, risk. Devices also are heat sensitive; so don't apply soldering iron longer than necessary. If FET is replaced, be sure to orient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

Often times, the best way to remove surface mount devices from a board are to cut the part up, removing the leads individually and then unsoldering them.

PARTS LIST, COMMON PARTS FOR ALL MODELS.

Ref #	Value (marking)
C7	0.1uf
C8 *	390pf (optional)
D1	1N4148 diode
J1,J2	RCA jack (rf type)
L3 *	0.33uH (optional)
Q1	Philips BF-998 MES FET
R1	680Ω chip resistor
R2, R3	68K chip resistor
R4	47Ω chip resistor
U1	78L08ACP voltage regul.

- *Indicates optional component used only for power feed on coax cable.*



LNY Preamp, Parts Location and Schematic Diagrams

 Revised: 1/5/15