

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



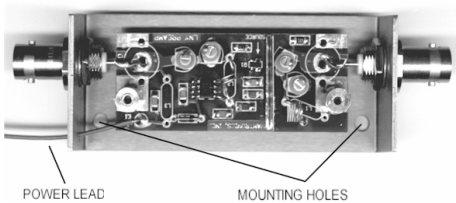
## DESCRIPTION.

The LNK-( ) 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 LNK 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 screws through the two mounting holes inside the chassis, as shown below. When replacing the cover screws, be careful not to make them so tight that the cover is bowed. It is



not necessary that the cover screws be

very tight. It also is not necessary to make the mounting screws overly tight. Because of the thickness of the screw heads under the chassis, if you do want to make the mounting screws really tight, you should add flat washers under the chassis on the mounting screws.

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 on a flat aluminum panel U-bolted to the antenna mast. Then, caulk around base of preamp and around B+ and coax cables to weatherproof unit. Silicone sealant is good for this purpose.

**RF CONNECTIONS.** Antenna and receiver connections are made with BNC 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.

**POWER CONNECTIONS.** Power for the unit must be filtered +10 to 15 Vdc. Current drain is about 10 mA. Connect positive supply to wire extending from case. If you need a longer wire, you can either splice onto the existing wire or replace it by soldering a long wire to the power pad on the pc board inside the unit. Most times, the power supply ground connection can be made through the coax

## 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 or dynamic range. Therefore, adding a preamp can result in intermod or desense. The only way to know is to try it!

shield. Otherwise, connect a separate power supply ground wire to one mounting screw at the chassis.

If you have a receiver which feeds +12Vdc up the antenna cable to a preamp, rf choke L3 can be added to the LNK-( ) Preamp to allow power to be taken from the coax. (This choke is not supplied, but we sell a PF-1 Power Feed Kit, which has parts you can use at both ends of the cable.) 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 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.

## OPERATION.

The LNK series preamps operate in linear mode; so they may be used to

MODEL	TUNES RANGE	TYPICAL NOISE FIG.	GAIN	MIN. 3DB BANDWIDTH
LNK-50	35-63 MHz	0.6 dB	24 dB	±3 MHz
LNK-100	88-108 MHz	0.6 dB	22 dB	±5 MHz
LNK-120	108-140 MHz	0.6dB	22 dB	±4 MHz
LNK-137	130-160 MHz	0.6 dB	18 dB	±4 MHz
LNK-146	130-160 MHz	0.6 dB	18 dB	±4 MHz
LNK-166	150-180 MHz	0.6 dB	16 dB	±5 MHz
LNK-220	195-240 MHz	0.7 dB	18 dB	±5 MHz
LNK-400	360-440 MHz	0.8 dB	19 dB	±5 MHz
LNK-450	400-470 MHz	0.8 dB	18 dB	±5 MHz

**Note: Units are aligned to center of band.**

## Parts List, Parts which change with Frequency Band.

Model	C1	C2	L1	L2	C3, C4, C7, C8	C5	C6
LNK-50	10pF disc	50pF var.	0.33μH	0.33μH	390pF smt	n/u	68pF, 1206
LNK-100	6pF disc	11pF var.	0.22μH	0.22μH	390pF smt	n/u	68pF, 1206
LNK-120	4.5pF var.	11pF var.	6T #20 bus on 1/4-20 screw form	0.33μH	390pF smt	n/u	470pF, 1206
LNK-137	4.5pF var.	11pF var.	5T #20 bus on 1/4-20 screw form	0.33μH	390pF smt	n/u	470pF, 1206
LNK-146	4.5pF var.	11pF var.	5T #20 bus on 1/4-20 screw form	0.33μH	390pF smt	n/u	470pF, 1206
LNK-166	4.5pF var.	11pF var.	4T #20 bus on 1/4-20 screw form	0.33μH	390pF smt	n/u	470pF, 1206
LNK-220	4.5pF var.	11pF var.	5T #20 bus on 8-18 screw form	0.33μH	390pF smt	n/u	470pF, 1206
LNK-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.
LNK-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.

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 in the rf stage or mixer of your receiver after being amplified an additional amount by the preamp. Preamps are never recommended for repeaters because desense can result.

### ALIGNMENT.

Units 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 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 capacitor 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 trans-

sistor, 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)
D1	1N4148 diode
J1,J2	RCA jack (rf type)
Q1	Philips BF-998 MES FET
R1	620Ω chip resistor
R2, R3	68K chip resistor
R4	47Ω chip resistor
U1	78L08ACD voltage regul.
Z1	ferrite bead on power lead

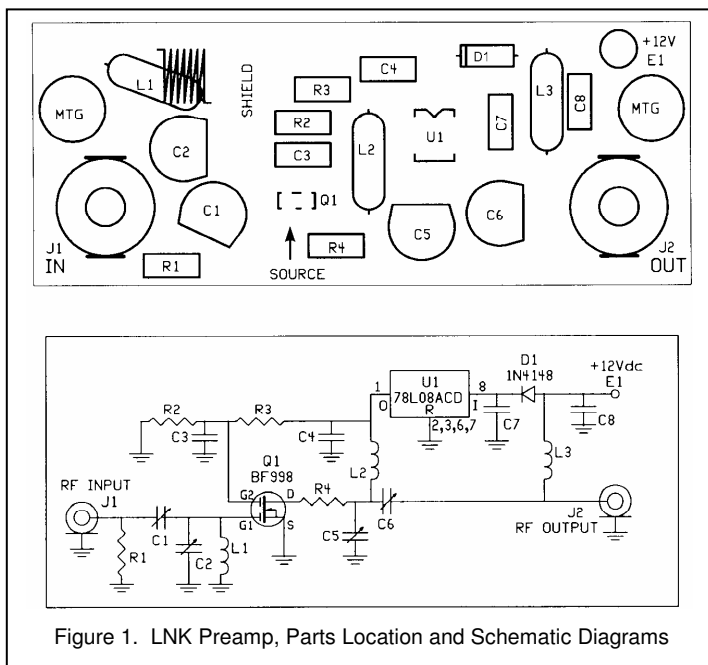


Figure 1. LNK Preamp, Parts Location and Schematic Diagrams