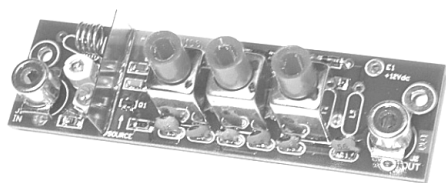


HAMTRONICS® LNP-() RECEIVER PRESELECTOR: INSTALLATION, OPERATION, & MAINTENANCE



DESCRIPTION.

The LNP-() series of preselectors is designed to reduce out of band interference in vhf receivers from broadcast and paging transmitters and other strong signals in nearby bands. It consists of a low-noise preamp driving a sharp, three stage L-C filter. The preamp stage has just enough gain to prevent degradation of noise figure due to the insertion loss of the filter and provides a minimal amount of net gain to avoid overloading the receiver.

The low-noise preamp stage employs one of the new generation diode-protected dual-gate MOS FET devices which are designed exclusively for use in the vhf & uhf bands. Surface mount technology is used in the preamp stage to obtain minimum noise figure and best stability.

The LNP Preselector is connected in series between the antenna and the receiver. They were designed for operation in 50 ohm systems; however, they will operate satisfactorily on 75 ohms as well.

INSTALLATION.

MOUNTING. The preselector 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 preselector 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, preselector can be mounted right at the antenna. Install the preselector in a project box and mount the box on a flat aluminum panel U-bolted to the antenna mast. Then, caulk around base of preselector 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 rf type RCA plugs to the input and output jacks on the preselector. The RF INPUT must be connected to the antenna, and the RF OUTPUT must be connected to the receiver input.

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 preselector; 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 pigtailed 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.

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

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 preselector, rf choke L5 can be added to the LNP-() Preselector 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 preselector; 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 preselector, 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 preselector 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 preselector.

OPERATION.

The LNP series preselectors 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 retune the variable capacitors and coils 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 or S-meter.

Low-noise preamps are effective in improving sensitivity of receivers in weak signal areas. However, it is

MODEL	TUNES RANGE	TYPICAL NOISE FIG.	NOM. GAIN	TYP. 3DB BANDWIDTH	TYP. 20DB BANDWIDTH	TYP. 30DB BANDWIDTH	TYP. 40DB BANDWIDTH
LNP-121	120-132 MHz	0.6 dB	18 dB	±1 MHz	±3.5 MHz	±4.6 MHz	±7 MHz
LNP-137	132-144 MHz	0.6 dB	18 dB	±1 MHz	±3.5 MHz	±4.6 MHz	±7 MHz
LNP-146	140-155 MHz	0.6 dB	18 dB	±1 MHz	±3.8 MHz	±4.8 MHz	±7 MHz
LNP-160	150-170 MHz	0.6 dB	16 dB	±1 MHz	±4 MHz	±5 MHz	±7.5 MHz
LNP-220	216-230 MHz	0.6 dB	10 dB	±2 MHz	±8 MHz	±13 MHz	±18 MHz

Note: Unless otherwise requested, units are factory aligned to the nominal frequency of 121.5, 137, 146, 160, or 223 MHz.

Parts List, Parts which change with Frequency Band.

Model	L1	C5	C6	C7	C8	C9	C10
LNP-121	6T #20 bus on 1/4-20 screw form	24 pf*	0.5 pf	26 pf*	0.5 pf	33 pf	100 pf
LNP-137	5T #20 bus on 1/4-20 screw form	20 pf	0.3 pf	20 pf	0.3 pf	27 pf	68 pf
LNP-146	5T #20 bus on 1/4-20 screw form	15 pf	0.3 pf	18 pf	0.3 pf	22 pf	62 pf
LNP-160	4T #20 bus on 1/4-20 screw form	12 pf	0.3 pf	15 pf	0.3 pf	18 pf	56 pf
LNP-220	5T #20 bus on 8-18 screw form	5 pf	n/u	7 pf	0.3 pf	10 pf	27 pf

* Note: Some values are a combination of two chip capacitors.

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 preselector.

If you use a preselector 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 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)
C1	4.5pf variable cap.
C2	11pf variable cap.
C3, C4	390pf chip cap.
C11, C12	390pf chip cap.
D1	1N4148 diode
J1, J2	RCA jack (rf type)
L2 - L4	2½ turn slug-tuned coil
L5 (option)	0.33µH rf choke
Q1	Philips BF-998 MES FET
R1	680Ω chip resistor
R2, R3	68K chip resistor
R4	47Ω chip resistor
R5	not used
U1	78L08ACD voltage regul.

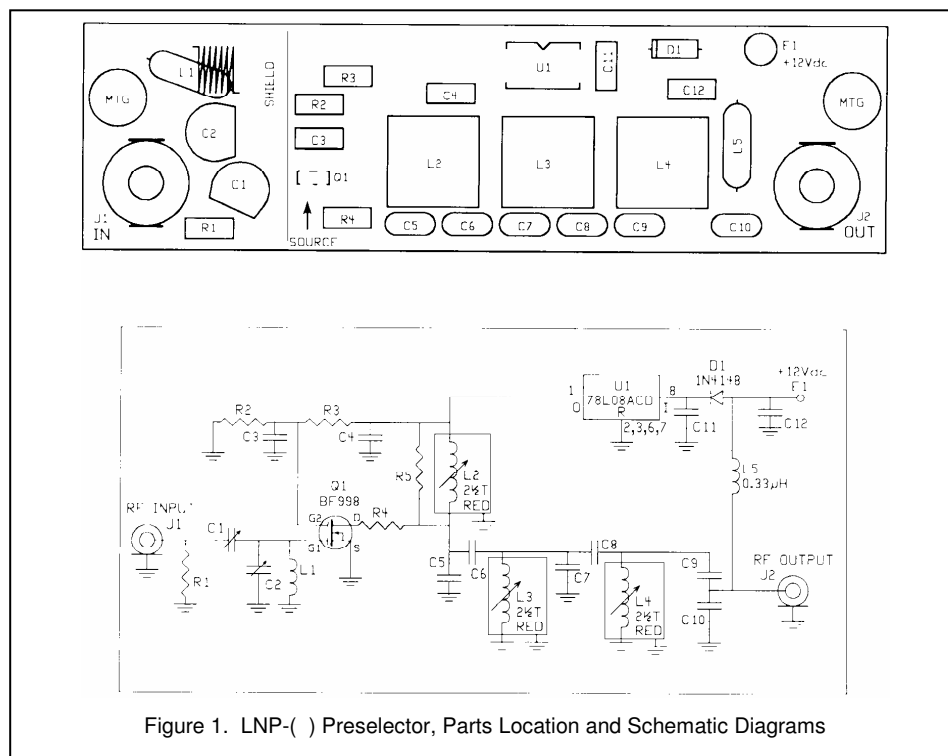


Figure 1. LNP-() Preselector, Parts Location and Schematic Diagrams