

2M 1kW Larcan amplifier

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The Larcan 144MHz amplifier is \$960US shipped within the lower 48 US states. This is taken care of by Paul, N1RJX in Massachusetts. I can ship within Canada. Email for total shipped elsewhere.

These are commercial television broadcast transmitter modules which have been converted to 144MHz operation based on the initial work done by [Brian WA1ZMS](#). The procedure was further refined to produce a consistent 1kW module. The amplifier module is ideal for today's punishing digital modes as well as SSB and CW. The amps have been modified with the serious 2M DXer in mind. Typical drive power is 20-25W input for 1kW output power. DC current requirement is roughly 40A @ 50VDC. For those interested in do-it-yourself, the details are supplied below.

These are serious commercial amplifiers, designed for 24/7 operation. It is not typical amateur radio equipment. Many of the hams on [Ping Jockey](#) run Larcan amplifiers for EME and terrestrial digital modes.

The SSPA uses four MRF151G FETs installed on a large heatsink. It has a bias/VSWR board on the rear. The amps have breezed through a 1 hour smoke test producing a steady 1kW carrier into a dummy load. This is a considerably higher duty cycle than any typical amateur use. The time limit was caused by the IC706 transmitter getting uncomfortably warm. The 222MHz version has operated for over 20 hours in a single FSK441 sked as well as many hours of JT65 EME skeds.

The amps and PSUs are very easy to set up. Treat each part as a separate block. Amplifier, relays, switching, PSU, cooling.

Input and output connectors are usually changed out to BNC or Type-N at input and Type-N or SO239 for output.

All that remains is to connect all the pieces together, much like assembling your shack station. The HP 3kW PSU (HP 253232 001 - available on eBay for around \$40) needs three small pins soldered together, a cable for AC, and a cable for DC. These are the standard PSU used by most hams running 48v SSPAs.

The K6VHF sequencer / timing board is a good addition for T/R switching. Four solder joints to the board will take care of all of the switching. Two for 12v DC and Two for your relays. For more information contact Alex at alex_nersesyan@yahoo.com

Many transmitters will create a RF spike at key up despite being set for lower power output. These high power spikes can damage the FETs. The 2M amplifiers should not be driven with higher than about 25 watts. For a transmitter that produces 100W maximum output power, a 6dB pad can be permanently installed on the module. Doing this allows a full 100W drive and eliminates any potential of spikes causing damage. For a 50W transmitter use a 3dB pad. For 50MHz amplifiers, 10W is the maximum recommended drive power. Choose the appropriate attenuator for your station. Here is a picture of a [250W 6dB input attenuator](#) installed on a converted 2M amplifier. With proper notice, I could install something like this on a module during conversion.

All transmitters, amplifiers, and so on will create spurious and harmonics at the RF output. These amplifiers are no different. A low pass filter or at least a second harmonic trap is highly

recommended. A shorted quarter wavelength line with a Tee connector will reduce the second (and even order) harmonics considerably. The second harmonic from 50MHz is at 100MHz, right in the middle of the FM broadcast band. It is a sure way to get in trouble.

Visit my [Larcan amplifier page](#) for schematic diagrams, installation ideas, and much more.

2M Conversion improvements

James WA3LBI suggested a few improvements to Brian's original documentation. I made a few more changes to get a reliable (and repeatable) 1kW output from the modules.

To begin, adjust bias to 500mA per side of each FET.
On the bias board, adjust R21 for 1.25V at pin 6 of U2.

Follow the Brian's instructions with additions and changes as shown in the photos below. These are working pictures. Cleanup of excess solder flux and solder tidy up is needed on some of the boards shown.

Click thumbnails to enlarge.



Starting point. Unmodified lo/lo 1kW amplifier.



My work bench.



Input board stripped of components showing where original trace gets cut for new 43uH inductors for L3 and L4.

Input board components showing new 43uH inductors for L3 and L4.



Remove two screws holding board to heat sink. Raise the board with flat blade screwdriver. Use solder filled wick and soldering iron to clean and tin underside of the board.



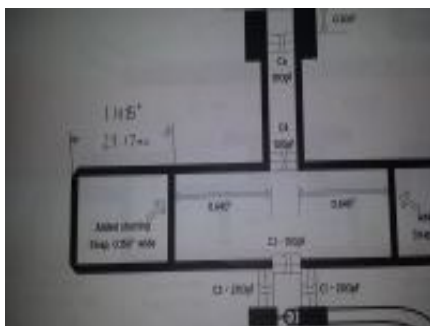
Clean and tin copper strap. Hook it under the board and heat with the soldering iron. After cooling it should be bonded well and not come off when tugged firmly.



Trim end of strap to be flush with the circuit board trace. Clean and tin both parts. Hold in place while soldering. The strap should remain flush with the circuit board.



Completed input strap. It is positioned directly to the left of Larcan lettering.



Original drawing showing position of the new PA input board stripline shorting straps. Measurement is from the outside of each piece as shown. This is different than the original document.



PA input board stripline shorting straps are stick-on copper foil, 1/4 inch wide x 3/8 inch long. Make sure to clean and tin the board prior to installing the straps. Notice the position of the straps as compared to the documentation.

100pF Ca mounts flush with the lower part of the wide strap coming from the FET as shown.



Original drawing showing position of the new PA output board stripline shorting straps. Measurement is from the outside of each piece as shown between the lines. This is different from the original document.



PA output board stripline shorting straps are stick-on copper foil, 1/4 inch wide x 3/8 inch long. Make sure to clean and tin the board prior to installing the straps. Notice the position of the straps as compared to the documentation.

All 68pF capacitors in the original have been replaced with dual 33pF capacitors. Both capacitors for C13 are positioned away from C14 and C15 towards the FET as shown.



PA output 4-way combiner. For the Io/Io module, the original 24pF capacitors for C2 and C3 can be removed and positioned on either side of the 100nH output coil as C4 and C5. Cut the traces as with the input section for new 43nH inductors. On some modules, the original 43nH inductors as specified in the writeup overheat and smoke at 1kW output power. As a precaution I opted to change to a different coil on all

amplifiers. See the parts list below for suggested replacements.



Install the output strap in the same manner as the input strap. Clean and tin both the strap and circuit board. It gets placed as shown.

Here is a [full parts list](#) that I've compiled.

For those looking to convert their own Lo/Lo Larcan amplifiers a kit of parts has been made available by Jimm WA3LBI. For more information please contact Paul at g6yzc@msn.com

I can also convert your lo/lo or lo/hi amplifier. Cost of parts and shipping both ways extra of course.



I can supply a full set of [Larcan adapters](#) to anyone interested.

If you have any other improvements or suggestions please pass them along to be shared with others. Please send pictures of your amplifier to show how it has been installed.

73
Warren
VO1KS

For purposes of disclosure and so on, some background is in order. I work in broadcasting and have installed, maintained, and repaired Larcan and other TV and FM transmitters for many years. The module pictured were obtained legitimately through other sources. The use of this equipment for amateur radio purposes should not in any way be interpreted as an endorsement by either my employer or Larcan, nor in any other way related to my regular work duties.
