



The Drake L-4 Linear Amplifier

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The new Drake L-4 linear amplifier has just about all the features you look for in a high power rf amplifier. Since this compact unit is rated for continuous duty, it will loaf along at 2000 watts PEP on single sideband, or a full gallon on CW, AM and RTTY in amateur service. The complete L-4 amplifier consists of an rf power unit and a solid state high voltage supply. There is a long connecting cable provided so the amplifier may be conveniently located at the operating position with the power supply tucked underneath out of the way.

The Drake L-4 may be driven to its full rated input on single sideband by any transmitter that has an output of 100 watts PEP. For full input on CW, AM and RTTY, the exciter must have an output power of 75 watts. For maximum efficiency, the 50 ohm input impedance of the amplifier is matched to the grounded grid power amplifier tubes

through a factory adjusted, broadband pi network. There is a separate network provided for each band and when peaked up it will cover the entire amateur band. To cover other frequencies in the 3.5–30 MHz spectrum, these circuits may be adjusted by the operator. This is especially helpful for those hams who handle a lot of traffic on the MARS frequencies. The necessary adjustment is very easy to make and requires only an SWR bridge; the instruction manual gives complete details and the entire procedure shouldn't take more than four or five minutes.

To ensure that the odd order distortion products are suppressed more than 35 dB, a slight amount of negative feedback is obtained in the L-4 by raising the grids above ground with 200 pF grid bypass capacitors. In addition, a very effective ALC circuit is included to prevent overdrive and

Drake L-4 Specifications

Frequency coverage:	All amateur bands from 80 through 10 meters.
Power input:	2000 watts PEP SSB, 1000 watts dc on CW, AM and RTTY
Drive requirements:	100 watts PEP SSB, 75 watts CW, AM and RTTY.
Input impedance:	50 ohms unbalanced.
Output impedance:	Adjustable pi network designed to load into 25 to 100 ohm unbalanced loads (50 ohm coaxial lines with SWR less than 2:1).
Tube lineup:	Two 8163 or 3-400Z triodes operated in class B grounded grid.
Features:	Broadband input tuned circuit on each band for high efficiency with minimum distortion; transmitting ALC; rapid heating filament tubes—3 seconds from initial turn on to full rated input; internal antenna switching.
Power requirements:	230 volts ac, 50/60 Hz at 15 amperes, or 115 volts ac, 50/60 Hz at 30 amperes.
Size and weight:	Amplifier: 13-15/16" X 7-7/8" X 14-15/16"; weight 32 pounds. Power supply: 6-3/4" X 7-7/8" X 11"; weight 43 pounds.
Price:	\$695.00

further reduce distortion. A small amount of rf energy is picked off the input and applied to a semiconductor diode which is normally reverse biased. The amount of reverse bias is controlled by the *transmitting AGC threshold* control, so the point where the rf is rectified may be precisely controlled by the operator. When the rf exceeds this reverse bias, the diode conducts and a negative voltage proportional to the rf signal applied to the grid appears at the ALC output connector. This signal may be used with the exciter through its external ALC input to control audio gain.

The power tubes are matched to the 50 ohm output by a conventional pi network. To maintain high Q and high efficiency, the tank coil is constructed of very large diameter tubing and completely silver plated. A portion of the rf output voltage is rectified and applied to the output meter through a *sensitivity* potentiometer. This little convenience is very helpful in obtaining maximum output from the amplifier since maximum output does not correspond

exactly with plate current dip.

An internal antenna changeover relay is included in the amplifier to feed the antenna through to the receiver when receiving or when the power is turned off. To eliminate any diode noise which might be generated by the final tubes during receiving, they are completely cut off by applying 120 volts to their cathodes during receive. Since the tubes used in the final heat up to operating temperature in about three seconds, it only takes this amount of time from the completely off condition to the full rated input. This permits the L-4 and its power supply to remain off until it is required for communications (such as rare DX!). The fan used to cool the final is amazingly quiet and it's nearly impossible to tell that it's on without looking.

The two meters used to indicate plate current, grid current, plate voltage and relative output are of the taut-band type for maximum reliability and long life. This type of meter movement has virtually no friction, so the operator is assured of accuracy and repeatability. The upper meter always indicates final plate current, while the lower one may be switched to read grid current, plate voltage or relative output.

Tuning up the Drake L-4 is a real snap and only takes a couple of seconds. Since the input stages are broadbanded and present an essentially flat 50 ohm load to the exciter, if the exciter is properly loaded into a 50 ohm transmission line with low SWR, turning on the L-4 has no effect on exciter tuning. After waiting three seconds for filament warmup, you can hit the switch, load the antenna, tune for a dip and call CQ. By checking your plate current and plate voltage, your final dc input may be easily calculated from the chart that the Drake Company provides in the instruction manual. This chart takes into account any fluctuations in line voltage (and therefore plate voltage) so that the full legal limit under various conditions may be easily calculated.

Although the high voltage power supply may be operated from either a 115 or 230 volt line, the 230 volt system is recommended for best supply regulation. In fact, when the L-4 arrives from the factory, it is connected for 230 volt operation. For 115 volt operation, it is only necessary to move a couple of the jumpers on terminal strips in the power supply and rf power unit. However, if a 115 volt circuit is all that is available, it must be fused for 30 amperes,

the circuit conductors should not be less than number 10 and no other equipment should be operated from the circuit. Do not operate the L-4 from a standard 115 volt light circuit because the circuit conductors are not large enough to safely carry this load.

Most homes are equipped with 230 volt service for either an electric stove or a clothes dryer, so it's a relatively easy matter to have an electrician run a 230 volt line into your shack. Another solution, and one that I have used is to make a 230 volt extension cord using three conductor, number 14 house wire. When 230 volts is required, all you have to do is unplug the clothes dryer and plug in your extension. This is not the most convenient method in the world, but it does work temporarily until you can get an electrician to put another line in. Be sure to use large 230 volt plugs and sockets on the extension cord so no one can plug a 115 volt appliance into this line.

The proof of the pudding of any amplifier of course is in the operating, and this is where the Drake L-4 really shines. In amateur operation, probably the toughest conditions are those when a rare dx station is on and dozens of fellows are calling him. Obviously, the strongest signals will consistently work the rare ones first. Another good test is over difficult paths; from the east coast for example, propagation into the south Pacific area is usually open less than an hour each evening. Assuming a good location and a good antenna, the station that can consistently work into Tahiti, Samoa and Fiji from New England has a power amplifier that is really putting out. The L-4 performed magnificently in a recent dx test and added several new ones to the WIDTY countries list, including several from the elusive south Pacific. Running phone patches is another test where the Drake L-4 comes away with flying colors. On 20 meters in the evening it is difficult to find many spots that are void of QRM. Therefore, to run a phone patch, even locally, you have to have an outstanding signal. Here again the Drake does a very nice job, providing strong readable signals where lower power and lesser amplifiers just wouldn't do the job. For the amateur who works dx or otherwise must work over difficult paths, the Drake L-4 linear amplifier may be just the answer. It certainly has done an outstanding job for me.

... WIDTY

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