



Via di Monteverde, 33  
00152 Rome – Italy

Tel. (39-6) 58209429  
Fax (39-6) 58209647

Website [www.linear-amplifier.com](http://www.linear-amplifier.com)  
e-mail [info@linear-amplifier.com](mailto:info@linear-amplifier.com)

---

## **Exhibit 8: Operational Description**

**External Radio Frequency  
Linear Amplifier  
Model Expert 1K-FA**



Via di Monteverde, 33  
00152 Rome – Italy

Tel. (39-6) 58209429  
Fax (39-6) 58209647

Website [www.linear-amplifier.com](http://www.linear-amplifier.com)  
e-mail [info@linear-amplifier.com](mailto:info@linear-amplifier.com)

## Operational Description

The SPE EXPERT 1K-FA solid state linear amplifier is small, powerful and completely automatic, it covers the radio amateur band range from 1.8 MHz to 50 MHz, it provides 900W (700W in 50 Mhz) output power with 60W input typically. All operating conditions (frequency, antenna and tuner) may be controlled from the transceiver.

The linear amplifier has two inputs (INPUT 1, INPUT 2) to which it is possible to connect two transceivers of any brand or type. These inputs are selected with the [INPUT] key.

It can manage up to four antennas (ANT 1, ANT 2, ANT 3, ANT 4).

The amplifier selects antennas automatically when they have been programmed.

The amplifier is composed of three push-pull of MRF150 (mosfets) in class AB paralleled with a passive combiner.

The modern transceivers have CAT control, thanks to this link the linear amplifier detects the operating frequency of the transceiver and then automatically changes band, antenna and automatic tuner.

The power supply unit of the SPE Expert 1K-FA has two blocks with two separate power transformers.

The first block has regulated and protected voltages, and powers all the electronic circuits for command and control.

The second block powers only the PA. It has a toroidal transformer with a low magnetic field to avoid disturbances to nearby equipment. The output voltages are 44 Vdc (on Full-power mode) and 30 Vdc (on Half-power mode), regulated with SCRs that also provide 'soft start' on switch-on.

The amplifier has an automatic tuner that handles load mismatches up to 3:1 VSWR (2,5:1 for 50 MHz).

The circuit used is a PI – L network with excellent harmonic suppression.

The amplifier contains a look-up table with the permitted amateur bands only (the continuous coverage is inhibited).

For tuner management, antenna data and other working data are stored.

Every band has a sub-band set, and for each of those, data related to the antenna and auto-ATU tuning is stored.

The CAT and the frequency counter detect the operating frequency and the correct sub-band. Thanks to the stored data, the tuner and the antenna are automatically set correctly.

In the US version, operation on the 12 m and 10 m bands has been inhibited following FCC regulations.

Setting of the match data to write in the tables is performed automatically by pressing the [TUNE] key. The system will then find the correct match for minimum SWR.

The SPE 1K-FA has a sophisticated protection system that constantly controls the amplifier's most important parameters.

These parameters are:

Temperature of the heatsink; max. / min. voltage on the PA; max. PA current; SWR; reflected power; max voltage RF on the tuner; input power; power combiner balance.



Via di Monteverde, 33  
00152 Rome – Italy

Tel. (39-6) 58209429  
Fax (39-6) 58209647

Website [www.linear-amplifier.com](http://www.linear-amplifier.com)  
e-mail [info@linear-amplifier.com](mailto:info@linear-amplifier.com)

The protection system is effected in two different ways:

- 1) Through hardware circuits to guarantee minimum intervention time.
- 2) Through software, with one of the two CPU's, to guarantee the maximum precision.

The two results are always compared, every difference produces a protection trip and consequent alarm.