Exhibit 8: Operational Description

External Radio Frequency
Linear Amplifier
Model Expert 1.5K-FA

Exhibit 8

Operational Description

The SPE Expert 1.5K-FA solid state linear amplifier is small, powerful and completely automatic, covers all the amateurs bands from 1.8 to 54 MHz.

Being very light it is perfect for use in the shack and superior for DXpeditions.

All operating conditions (frequency, antenna, tuner etc.) are controlled from the transceiver.

The operator has to only move the frequency-tuning knob, it is extremely user-friendly and offers a product which is the best in its class.

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 or automatically.
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 constituted by a class AB single push-pull performed by a just one dual mosfet device.
This simplifies the design and increases the reliability of the amplifier.

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 moves the ATU.

The power supply of the SPE Expert 1.5K-FA is switching with a PFC (Power Factor Correction) that allows a drastic reduction of the harmonic components in the mains in accordance with IEC555-2.
The power supply meets also the followings rules: UL60950-1, TUV EN60950-1, EN55022, EN61000-3-2,-3, EN61000-4-2,3,4,5,6,8,11; ENV50204, EN5502.

It consists of two separate elements:
The first powers all the electronic circuits for command and control.
The second powers only the PA, its output voltages are 48 Vdc (MAX Pout), 36 Vdc (MID Pout), and 32 Vdc (LOW Pout).

The amplifier has an automatic tuner that handles load mismatches up to 3:1 VSWR (2,5:1 for 50 MHz).
A unique feature of this linear is that it not only measures the SWR after the matching, but also the SWR of the system antenna / cable, this allows to always evaluate the antenna system despite the matching and the power applied.

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

Exhibit 8

The CAT information and the frequency counter inside the linear detect the operating frequency and set the correct sub-band.

Thanks to the stored data, the tuner and the antenna are automatically set correctly.

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 internal tuner may be bypassed as follows:
 - Totally.
 - For single band.
 - For single band and specific antenna.
 It is always automatically bypassed:
 - With the only receiving antenna set.
 - With tunable antenna set.

The SPE Expert 1.5K-FA has a sophisticated protection system that constantly controls the amplifier's most important parameters.

These main parameters are:

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

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.

Exhibit 8