EXPERT LINEARS America

EXPERT 1.3K-FA

1.3KW SOLID STATE FULLY AUTOMATIC LINEAR AMPLIFIER

QUICK – START Guide (June 2017)

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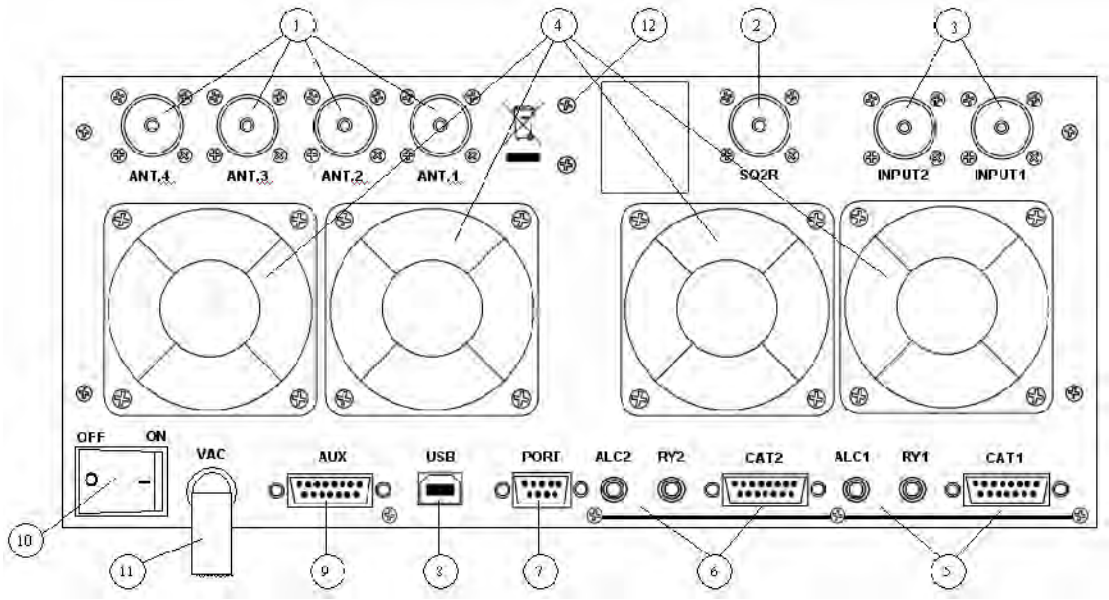
For

Expert Linears America LLC

Setting Up the SPE 1.3K-FA Amplifier

Rear Panel Connections

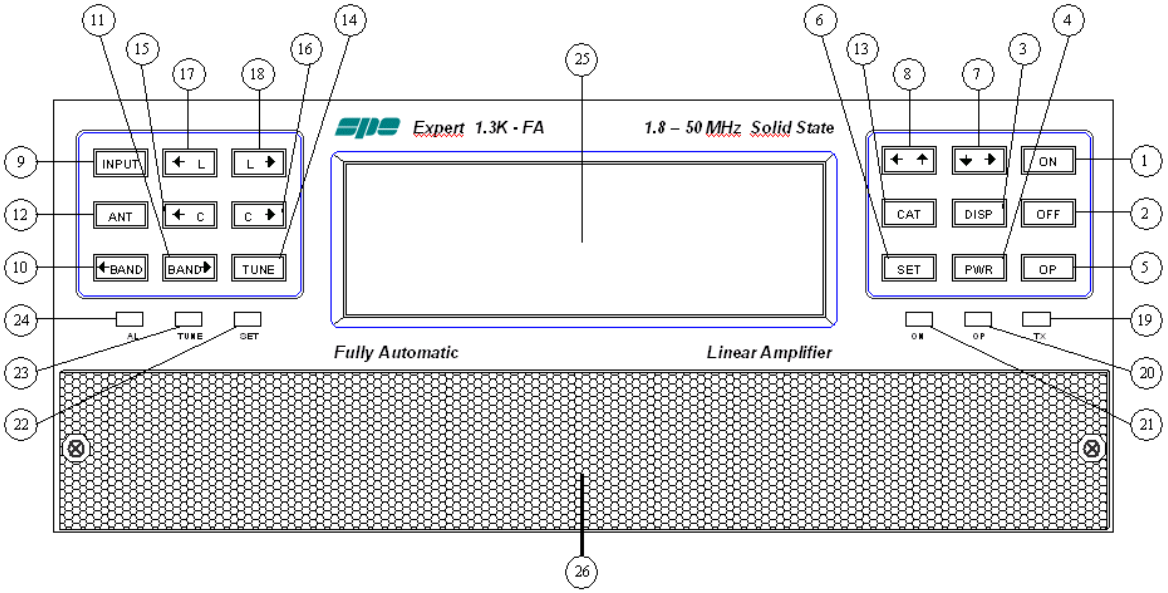


✓ Connections to Get Started

- Connect your antenna(s) to one or more of the four SO-239 ANT connectors (# 1 on the Rear Panel).
- There is also a dedicated SO-239 available for SO2R (Single OP, 2 Rx's) operating (#2).
- You may connect either one or two transceivers to the amplifier at INPUT 1 & 2 (#3 above).
- The SPE 1.3K-FA has four cooling fans on the rear. (#4). Another fan is inside.
- ALC, Relay and CAT control is provided for either 1 or 2 transceivers at #5 & #6 above.
  - A dual RCA phono cable (provided) between the transceiver and the amplifier for relay must be connected at a minimum; and an ALC connection is also highly recommended.
  - CAT cable configuration for most transceivers is described in the SPE 1.3K-FA manual. Wiring from the CAT connectors can include the ALC and RELAY control, can eliminate the need for the RCA phono cables.
- A good ground connection must be secured (#12 above). Braid or copper straps are best. Read other literature about obtaining good grounds for RF, lightning and electrical safety. Lightning and RF grounds are important. Removing Antennas from your amp when not is use can help. Also, using Coaxial Switches to route antennas to ground.

- The main power switch is located at position #10 above. It must be turned on first, prior to the Front Panel ON switch.
- Additional remote control and software updating can be done via the AUX, PORT and USB connections which are discussed in the SPE 1.3K-FA Manual.

Front Panel Controls



- Pressing the ON button (#1 above) turns the unit on. However, note that the main ON/OFF switch, #11 on the Rear Panel must first be set to ON.

- Pressing the OFF button (#2 above) and *holding it down for at least three seconds* turns the unit off. This is the only button requiring to be held for over three seconds.

  Note the following:

  - When OFF, only two direct connections are actuated:
    - between INPUT 1 and ANT 1
    - between INPUT 2 and SO2R

- Pressing the POWER button (#4 on Front Panel FP) switches the output power control level between “MAX/MID/ and LOW.“

- Pressing the OP button (#5 on FP) toggles back and forth between Standby and Operate.

Note the following:

- In STANDBY, all of the functions are activated (band change, antenna change, tuner control); but the transmission is from the transceiver only (Barefoot).

- In OPERATE, all the functions are activated and the transmission is using the linear amplifier (QRO).

- Regulation of the exciter’s (transmitter) power can be automatically achieved through the ALC link. With the ALC connected, the amplifier input power in OPERATE mode is automatically adjusted to the correct driving level for the amplifier.

- In STANDBY, the exciter’s output will pass the output through the amplifier to the antenna that was selected. The exciter’s power is set by its power output control. The exciter’s power output will be controlled by the ampllifier’s ALC when the amplifier is in Operate. However, without the ALC connection, you have to manually adjust the exciter power to correctly drive the amplifier in order to avoid damage. This is important as over driving needs to be avoided at all times.

- Pressing the SET button, only while in STANDBY, (#6 on FP) will activate the SET mode to program the amplifier. This is described in this guide on page 8, and in detail on page 12, “Let’s Program the 1.3K-FA” section of the SPE 1.3K-FA Operator Manual.

- Pushing the INPUT button (#9 on the FP) allows selection of one of the two exciter inputs (SO-239) to the amplifier. See Rear Panel diagram for Input 1 & Input 2. The CAT connectors will also control INPUT selection. Keying on CAT 1 will activate INPUT 1. Keying on CAT 2 will switch the amplifier to INPUT 2.

- Pushing the BAND buttons switches bands manually (◄BAND (#10 on FP) downward in frequency/ BAND► (#11 on FP) upward in frequency). The CAT interface setting, IN THE CAT MENU, MUST be set to "none" for this button to actuate.

- The ANT button (#12 on FP) switches the antennas that are programmed for a given band if multiple antennas are programmed in the SET/ANTENNA menu.

- Pushing the CAT button (#13 on FP) shows the current CAT interface setting. Pushing it twice shows the current Software version. Updating the SW is not recommended unless recommended by your dealer or the factory.

- Pushing TUNE button (#14 on FP) activates the automatic tuning process when the optional ATU is installed. The YELLOW TUNE LED will come on, only in the STANDBY position and as long at there is NOT a "b" or "t" next to the ANT number in the ANT box. EG: 1b or 1t will either "automatically bypass' the ATU and not allow it to be TUNED. Removal of the "b" or "t" is necessary in order for the ATU TUNE to function.

- Pushing buttons (#15 – 18 on FP) (◄C C► ◄L L►) can be used for manual tuning when the optional ATU is installed.

A Word about Antennas

✓ High-power amplifiers require properly rated antennas, isolators, baluns, connectors, and feed line cables.

- A unique feature of this linear is that, it not only measures the SWR after the band pass filter matching, but also the SWR of the system antenna and cable. This allows you to always evaluate your antenna system despite the matching and the power applied, however:

- Without the ATU (option), always use antennas having SWR of 1.5:1 or less.

- With the ATU, the amplifier is able to overcome some mismatches of 3:1 SWR or more. As long as the ATU matches the antenna to give a reading below 1.99:1 in the SWR box, the amplifier will operate. Between 1.7 and 1.99 the output of the amplifier is slightly lowered. At 2:1 the amplifier will switch out of Operate and exhibit an alarm of High SWR.

- While tuning matches the antenna to the PA, with a high VSWR there can be consequent loss of power, with heating and possibly higher than acceptable voltages present. Decreasing the output power of the amplifier to lower these “higher voltages” is recommended.

- For amplifiers without the ATU with a mismatch from 1.7:1 to 1.99:1, there is an alarm. At 2:1 and above the amplifier is automatically switched to STANDBY.

  - Always operate with the best possible matching. Despite the amplifier’s protection against high SWR, continuous use into a mismatched load (a bit lower than the protection threshold) may lead to damage.

  - It is suggested that suitable static protection be given to antenna coax cables.

  - The software allows you to select any two of the four antennas for each band.

A Word about the Internal TUNER where installed

- ✓ The SPE 1.3K-FA amplifier can be equipped with an automatic tuner that handles load mismatches up to 3:1 VSWR (A little lower for 6 meters).

  - Antenna tuning and other working data are stored for tuner management and recalled by the CPU when returning to that stored data.

  - The amplifier Op Manual contains a chart with all the permitted bands. With operator programmed stored data, the tuner and the antenna are automatically set correctly. (Note: Using the RS232 information from the transceiver”, will allow your amp to know, to the kHz, the frequency of your transceiver. Then the ATU memories are recalled and preset before transmitting.)

- Every ham band has a sub-band set, and for each of those, data related to the antenna and ATU tuning is also stored. A “Sub-band chart” is on page 56 in the manual. If you so chose, using the frequencies on this chart for TUNING, will pre-tune your amplifier to that frequency, with the ANTENNA that you have selected. EG: If ANT 1 and ANT 3 are programmed for 80 meters, when you “select the sub-bands that you feel ANT 1 will work efficiently with, TUNING to those sub-bands using ANT1 will be “stored” in the ATU. Then when using ANT 2 and the sub-bands you chose for TUNING, those settings will be “stored” in the ATU. And those settings will be remembered when your frequency and ANT choice matches those sub-bands. Be sure to make notations on your Sub-band chart which antenna has “stored memories on particular sub-bands”.

- With a proper cable, the CAT connections the amplifier will know to the kHz the transceiver’s frequency.

- The 1.3K-FA amplifier has two different memory banks, A and B. It is possible to use the two different presets when the amplifier operates at two different locations.

✓ Before starting a matching process, the tuner measures the SWR of the system antenna system. If it is greater than 5:1, the procedure does not begin and an alarm is displayed.

✓ 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.
- When “b” is selected in ANTENNA programming.
- On 70 MHz band.

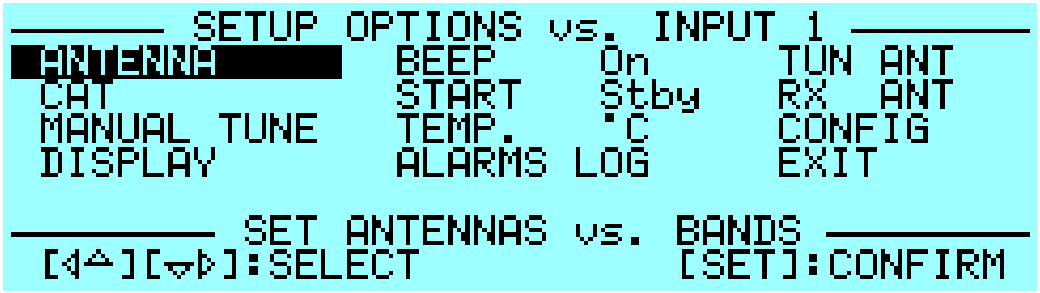
✓ Never use the internal tuner and an external tuner simultaneously as damage can be sustained by the internal tuner. If you intend to use an external tuner, then disable the internal tuner.

Let's Program the 1.3K-FA

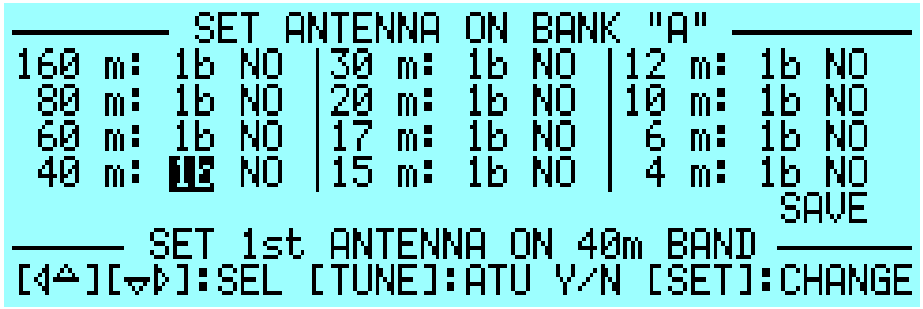
- ✓ Programming operations are only possible in STANDBY.
- ✓ The three keys: [SET], [◄▲] and [▼►], allow programming of the amplifier. They can be used in the following way:
  - o Press [SET] to open a menu page, also to validate choices, as well as to exit from a menu page.
  - o Press the [◄▲], [▼►] keys to select options in the menu.
  - o The green SET LED illuminates during the programming process.
  - o Programming changes take effect only after exiting from a menu page (the green SET led turns off).
  - o You will find your programming choices confirmed by the items shown at the lower part of the display.

Antenna Choices

- ✓ Programming Antenna Choices:
  - o Turn power ON.
  - o Ensure amplifier is in STANDBY.
  - o Press [SET] to open the menu page.
  - o The SET LED (green) will light and you will see this page:



  - o The menu default will be on ANTENNA option. (The [◄▲] and [▼►] keys will advance or step to menu choices, eg. “antenna” “CAT”, “MANUAL TUNE”, “DISPLAY”, ETC.).
  - o When ANTENNA is highlighted, press SET again to enter the ANTENNA sub-menu.



- You may assign antennas to each band by selecting one or two of the amplifier's ANT 1, ANT 2, ANT 3, ANT 4 connector for each band. Or "NO" for "NONE". EG: "1 NO" would be antenna 1 and NONE are selected for the two choices.

- This setup allows you to preset up to 2 antennas per band. Or one antenna or none.

- Then when out of SET/Programming you will press the [ANT] button to switch between ANT 1 and ANT 2 on a particular band to toggle between the programmed antennas.

- If you don't have an antenna assignment for a particular band, select "NO NO" for NO antennas.

- You may bypass the ATU on any band and antenna by pressing the [TUNE] Key. You will see a "b" next to the ANT number in the box. To remove the "b" (for Bypass) just press [TUNE] again. The [TUNE] key "toggles" the "b" on or off.

- Bypassing the ATU can be programmed one band and one antenna position at a time. Allowing operator to bypass the ATU selectively per band and antenna.

- Programming takes effect when you exit from the menu page. You will see the green SET LED turn off.

Antenna Tuning

Antenna Tuning: The amplifier MUST be in STANDBY for the AUTO TUNING feature to function. (Note: Definition of Auto Tuning is: you push the TUNE button on the front panel when the 1.3K is in “STANDBY”. THEN you KEY/Push To Talk your transceiver, which in turn KEYS the Amplifier. As long as there is a “carrier”, the ATU with then TUNE. The ATU will then automatically go through a complete “TUNING CYCLE” and memorize its settings.
IMPORTANT: As long as the YELLOW TUNE LED is on, you MUST keep the carrier to the 1.3K input and the 1.3K keyed. Otherwise erroneous tuning readings may be saved.

✓

- Your transceiver should be connected to the 1.3K FA via CAT cable to communicate to the amplifier all band and frequency data from the transceiver. If not connected using RS232 information, then the amplifier will switch to the band and frequency after it receives RF from the transceiver.

- When the amplifier is on the correct band, as evidenced by the BAND window on the DISPLAY and the amp is in STANDBY, then the TUNE key can be pushed and the TUNE LED should light. Then immediately you must key or push to talk, your transceiver. If the ALC is hooked up and functioning properly, then the ATU will drop your transceiver power too about 20 watts or so. If not, then set your drive to about 20 watts of RF carrier. As long as the YELLOW TUNE LED is on, you MUST keep a carrier into your amplifier for the ATU to properly AUTO TUNE the ATU. Removing the RF carrier before the YELLOW TUNE LED extinguishes, can result in an erroneous setting and will be remembered until the next time the ATU is tuned in this sub-band.

- You can use the SUB-BAND chart from the operator's manual to TUNE to a suggested centred frequency, or just TUNE to any frequency you select. Note: If you do not use the SUB-BAND frequency chart suggested frequencies, the frequency you choose may not be near the "centred frequency" of that sub-band.

- Using the SUB-BAND chart should help you "TUNE" less. Otherwise, your selection may not be a frequency near a centred frequency of a sub-band. This is okay, however you may find that you may not be satisfied with some 'near frequencies SWR readings".

- Or select the frequency you desire to begin AUTO TUNING. Repeat this method on each antenna for each band, etc.

- If you notice that the SWR seems high and you want to try to improve the SWR tuning, go to the next paragraph, "Another way to use TUNE:"

- Another way to use TUNE: Adjust your transceiver's drive (power level) to about 20 to 30W unless you have the ALC link established. If ALC is connected, the ALC should drop the transceiver power to about 20 to 30 watts to use for tuning.

- Now set your transceiver to transmit a continuous RF signal (either RTTY or FM).

- Press the amplifier's [TUNE] key followed by your transceiver's PTT (Push To Talk). The procedure for automatic tuning will start. The TUNE (yellow) LED light will come on and you will hear the ATU relays operate.

- Watch the SWR indication on the screen. When tuning stops, (as indicated by the YELLOW TUNE LED going out) the SWR will be at a minimum for that antenna. Sometimes it is possible to improve tuning by repeating this step.

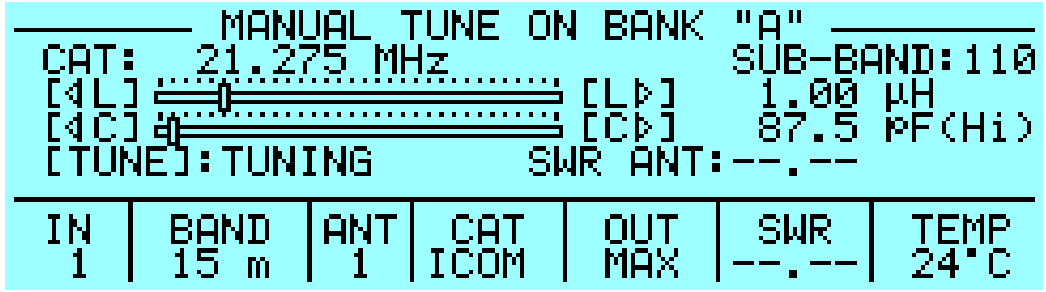
- Repeat these steps for other antennas assigned to the same band after having selected it using the [ANT] key to toggle to the second antenna for that band.

- Repeat the previous steps for all bands and antennas that you wish to use.

Manual Tuning

✓ Manual Tuning

- To achieve a better match than that achieved with the automatic tune procedure which is rather unlikely) it is possible to set the tuning manually by using the keys [◄C], [C►], [◄L], [L►].



- Set your exciter to transmit a continuous RTTY or FM signal.
- Press the [◄ L], [L ►], [◄ C], [C ►] keys until you obtain the minimum SWR.
  - The operating frequency and the sub-band are also shown on the Display.

- When a manual tuning is performed, it is possible to read the tuning value, the working frequency and the associated sub-band on the appropriate screen page.

- Both types of tuning are always implemented in the STANDBY state.
- Note: to SAVE this setting, you HAVE to KEY your transceiver. NOTICE that the DISPLAY will now say [TUNE]: SAVE. While the SAVE is on, push TUNE button on front of amplifier. This will SAVE your settings.

Receive Only Antennas

✓ A unique feature allows the Expert 1.3K-FA to set a dedicated receiving antenna and to control its automatic switching after a transmission starts.

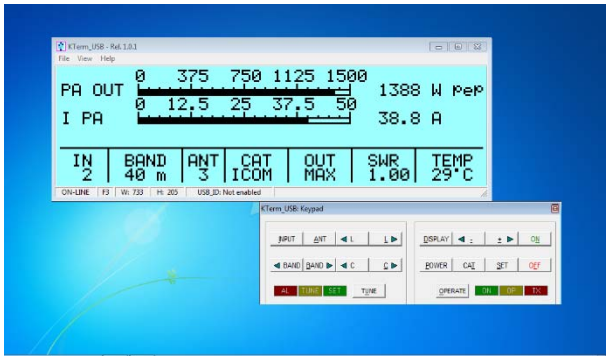
o For the selection of this antenna choose the menu item RX ANT.

- The antenna number selected will appear followed by an "r" symbol (EG: 3r).

- With the linear turned OFF the INPUT1 is directly connected to ANT1. The selection of ANT1 as “RX ANT” is not permitted in order to avoid possible damage to the transceiver or to the receiving antenna if a receiving antenna (e.g. Beverage) is connected.

- More details for this function are in the Operating Manual.

Remote Control



✓ The SPE 1.3K-FA is supported by a software program, Term_1.3K, that permits its operation remotely.

- You may download this program from the supplied CD or at the SPE web page: www.linear-amplifier.com. This site also provides access to any SPE software updates.

- The KTerm software supports both USB and RS_232, and requires a minimum of Windows XP operating systems. Most hams just use the USB function.

- The installation package is contained in a compressed .ZIP file named KTerm_Package_1_0.zip. See the SPE Expert 1.3K-FA User Manual for full details on installation and use. Please read the DRIVER installation instructions. Do not have the USB connected when installing the driver. Some OS, like Win 10 may require removing ALL USB connections (of course other than keyboard and mouse) for DRIVER install.

Protecting the SPE 1.3K-FA (Alarms)

- The 1.3K-FA protection system monitors and controls the amplifier's most important parameters, temperature of the heat-sink; maximum /minimum voltages on the PA; maximum PA current; SWR; reflected power; maximum voltage RF on the tuner; input power. The protection system is carried out in two different ways:

  - Through hardware circuits to ensure a minimum intervention time.
  - Through software, with a combined action of the two CPU's, to ensure the maximum precision.

- The two results get constantly compared**;** most every difference produces a protection trip and a consequent alarm.

✓ There are three types of protections/alarms:

- SIMPLE - This is the most common case. An acoustic warning beep sounds, but no operator intervention is required, as the control system automatically restores the correct operating conditions.

- SERIOUS - When automatic system recovery is not possible (e.g., the temperature climbs over the limits due to obstruction of the fans; SWR is too high; etc.). In this case the amplifier switches back to standby state and the alarm message gets stored. Normally transmission can continue with the exciter only.

- FATAL - If the amplifier is in the b) state, but one CPU has a fault or it can't continue operating or some fault appears in the power-supply module, then the amplifier gets turned OFF with no further warning. To restart the amplifier, the main switch in the rear panel has to be switched to [O], and then to the [I] position.

✓ It is possible to read the alarm history in the standby mode by pressing the [SET] and then [ALARMS LOG] keys. To empty the alarm stack press the [TUNE] and [OPERATE] keys together.

- If the acoustic alarm is very frequent during transmission, the possible causes should be investigated.

- Before the temperature limits are reached (75°C), the output power will change from MAX to MID automatically and then possibly from MID to LOW, so that transmission with the amplifier may continue with reduced power.

- If the temperature in LOW is allowed to rise further, a SERIOUS alarm will eventually be activated and the linear amplifier switches back to STANDBY.

- During a SERIOUS alarm, there is an acoustic alarm for 10 sec. Pressing the [DISPLAY] key, the system switches back to STANDBY state immediately and the sound stops.

- The 1.3K FA is designed to operate as high as 60° C. At 65°C one needs to monitor the temperature.

- At 75°C the amp will switch from MAX to MID power. If the temperature is not satisfied, the amp will switch to LOW power. If the temperature still will not reduce significantly, the amp will go into standby. DO NOT TURN OFF until 40 to 50 °C is achieved, for cool down.

- When a “FATAL” alarm occurs, immediately contact your reseller.

- Note that more details for the temperatures are in the Operating Manual.

Operating Tips

- Again, ALC and CAT links are highly recommended
- If one relies on the Frequency Counter in the 1.3K to “switch bands”, the purpose of the CAT connectors to help the amplifier be at its most reliability could be compromised. Therefore a CAT cable is strongly recommended.

    - If ALC is not used, it is better to lose a fraction of dB in transmitted power by slightly reducing the drive power, than to overdrive the amplifier resulting in a poor-quality transmission.

    - During transmission a good practice is to check the parameters on the display.

    - When using the ALC link to the transceiver will reduce the drive power to the optimum drive level.

- You may reduce the linear output, if required, by switching the amplifier to MID or LOW with the [POWER] key.

- You may also continuously regulate the amplifier's output power by changing the level of drive power from your transceiver, even with the ALC connected. If an output power less than 1 KW or 500 Watts is desired, for best efficiency begin reducing drive from the MID or LOW power state.

- See Flex and Elecraft for specific settings of their drive levels.

Setting Drive Levels

a) SSB: Adjust the MIC GAIN of the transceiver until while speaking normally into the microphone, the signal peaks on the display don't quite reach the maximum rated output power. Monitoring the transmission is a good way of checking your settings. If there is some distortion, decrease the mike gain or decrease the power of the transceiver until a small reduction of the output power of the amplifier is seen.

b) CW: In key down, you get the maximum output power automatically.

c) DIGITAL: RTTY, SSTV and FM modes have a very heavy duty cycles. You should not operate in MAX. It is best to use the MID or LOW power settings. The sophisticated software ensures this operation.

d) AM: This transmission mode radiates a continuous carrier which is 25% of its PEP value (e.g. 400W PEP AM = 100W carrier power). Always operate in MID or LOW mode for AM. To get an output signal without distortion, proceed as follows: Transmit an AM carrier only. With your transceiver's "MIC GAIN" set to zero, advance the transceiver drive and do not exceed 25% of the maximum carrier output from the amplifier. The speak into the microphone normally setting the MIC GAIN of the transceiver

until the peak output power, on speech peaks, is shown on the amplifier display to be no more than 0.8 KW or 400W. SPE suggests you monitor your transmission closely to check that the MIC GAIN setting is correct.

- ✓ If you choose to set the output power of the amplifier by varying the output power of the transceiver, the ALC connection may not be needed. In this case you must be careful not to overdrive the amplifier to avoid distortion and broadening of the channel (with the ALC, adjustment is automatic for maximum linearity and power out). All functionalities remain the same, as does protection. You will probably need to reset your transceiver power to full power out when returning to STANDBY.

- ✓ Never stress the amplifier with long periods in key-down transmission, as this can stress the amplifier components. However, sophisticated Soft Ware avoids transmitting a continuous signal in the MAX condition for long periods by switching to MID power. In SSB, use of high compression is not encouraged as this can cause a rapid increase in the temperature of the amplifier.
- ✓ Remember that high levels of audio compression can make your SSB signal be more like CW than SSB, meaning that normal audio has lots of peaks and valleys. Highly compressed audio may “in your opinion” make you sound louder, however it “MAY” be at the expense of over driving your amplifier. Be reasonably conservative about this. Not only can it be detrimental to your linear, it can be objectionable to others on the air. Watch the temperature when you use high compression also. It can rise higher than with normal audio.