



EXPERT LINEARS

America

EXPERT SPE 1.5K-FA

(Second Series)

**1.5KW SOLID STATE FULLY AUTOMATIC
LINEAR AMPLIFIER**

QUICK – START Guide

(March 2019 Edition One)

This manual reflects the Series II modifications and improvements.

However, most of this guide can apply to Series I if specifications differences are taken into consideration.

This Guide written by:

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For

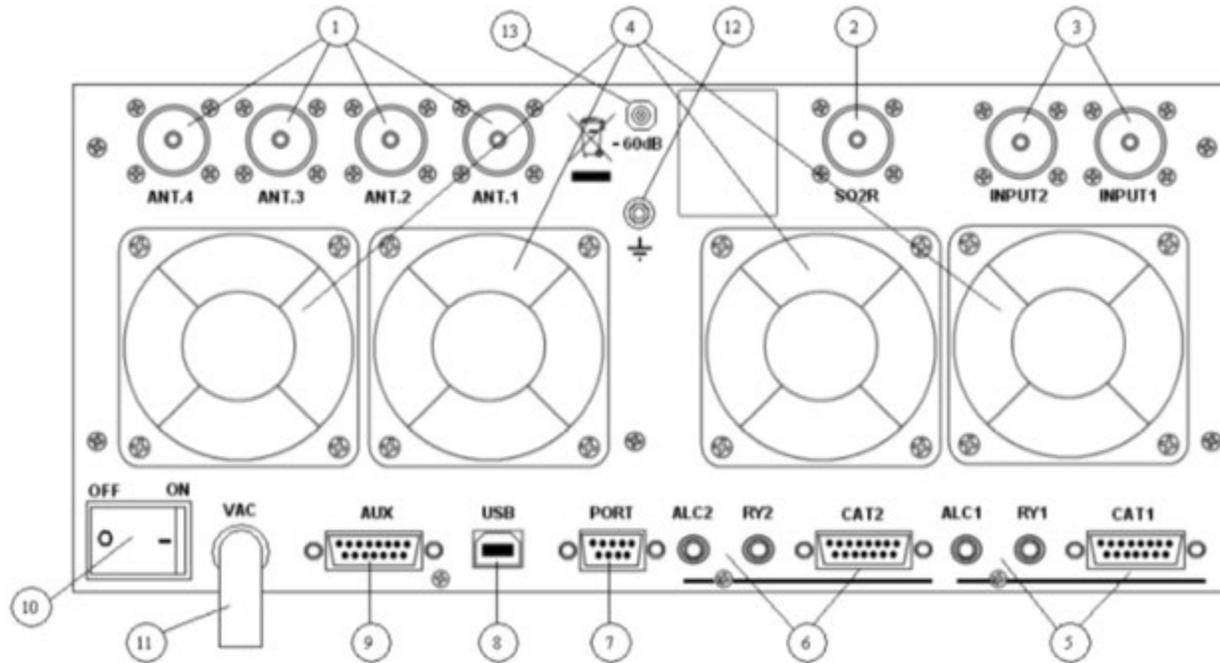
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(Edited by Robert G. Hardie, W5UQ)

Setting Up the SPE 1.5K-FA Amplifier

✓ Connections to Get Started

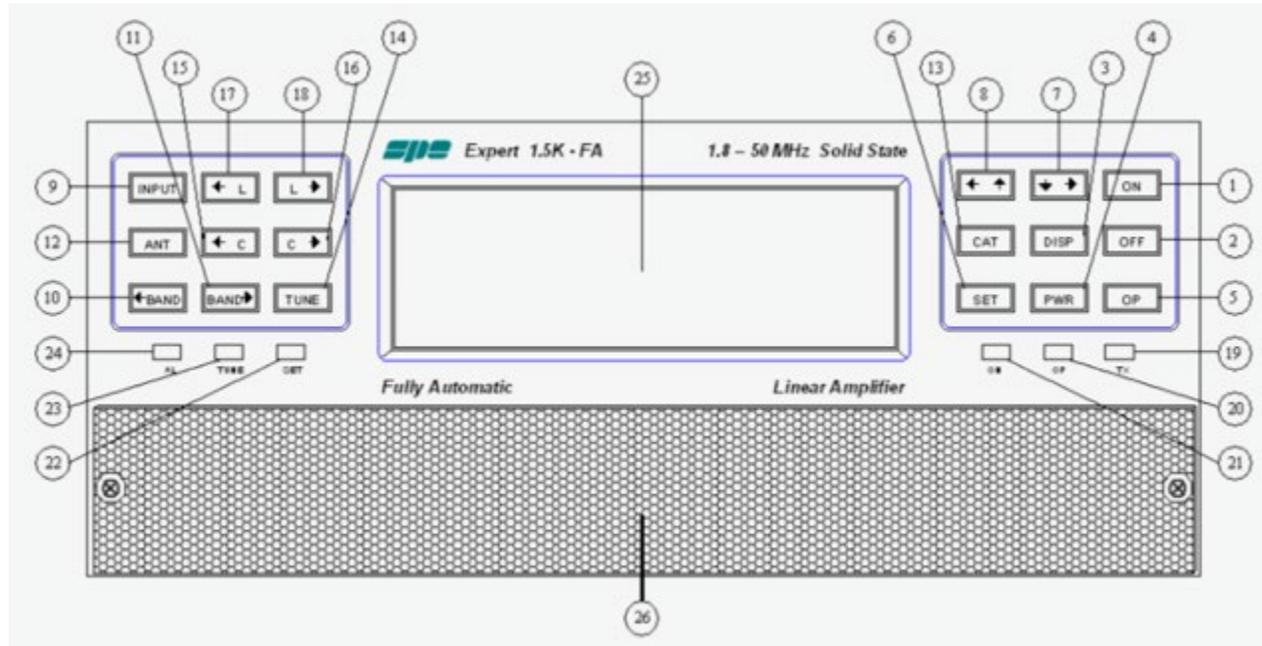


Rear Panel Connections

- Connect your antenna(s) to one or more of the four (4) SO-239 ANT PORT connectors (# 1 on the Rear Panel).
- There is also a dedicated SO-239 PORT available for operating SO2R (Single OP, 2 Rx's) (#2).
- You may connect either one or two transceivers to the amplifier at INPUTs 1 & 2 (#3 above).

- The SPE 1.5K-FA has four cooling fans on the rear (#4). Another smaller 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 1.5K-FA USER Manual. Wiring from the CAT connectors can include the ALC and RELAY controls, and can eliminate the need for the RCA phono cables.
 - (Dan Tassell, (KC5PCB) builds & supplies custom CAT cables for almost all transceivers. Contact Dan at: KC5PCB2@ATT.NET).
- Lightning and RF grounds are important. A good ground connection should be secured (#12 above). Braid or copper straps are best. Consult the literature about obtaining good grounds for RF, lightning and electrical safety. Removing Antennas from your amp when not in use can help. Also, route your antenna coaxial switches 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. The AC main power cable is shown on #11 above.
- Additional remote control can be done via the AUX, PORT and USB connections (#7, #8, & #9) which are discussed in the SPE 1.5K-FA USER Manual. Also, updating of the software can be accomplished by using the Term 1.5K program uploaded via the USB and PORT connections.
- The SPE 1.5KFA has a "60 dB down pre-distortion tap" (#13 above) for SDA transceivers like the Anon Apache. This will allow the IMD to increase to 60dB down.

Front Panel Controls



- Pressing the ON button (#1 above) turns the unit on. However, note that the main ON/OFF switch, #10 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) switches the output power control levels between “MAX,” “MID,” and “LOW” power levels.
- Please note:
 - MAX limit is 1500W
 - MID limit is 1,000W
 - Low limit is 500W
 - Exciter drive must be lowered when switching from MAX to MID and again to LOW settings, (i.e., if drive on MAX for 20 meters is about 40 watts, other bands can differ, possibly nearer to 30 watts. And for MID level, the drive can be about half, or about 20 watts, and LOW level may be about 10 watts or so). Of course, these are approximations as antenna type and SWR plays an important part in the system. Each amplifier has its own personality for drive levels. Over-driving can cause damage to the MOSFET, if repeatedly occurring.
 - Watch temperature display – typical range is about 25 degrees C to 60 degrees C.
- 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 to the programmed antenna 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. This DC voltage begins at zero volts and adjust automatically to one's transceiver ALC voltage range, never exceeding that range. It works with all transceivers' ALC system just fine. With the ALC connected, the amplifier input power in OPERATE mode is automatically adjusted to the correct driving level for the amplifier. (Note that most transceivers work automatically with SPE's ALC. However, Elecraft does not, and some early model Flex

transceivers will need to have the output drive manually set. The Flex 6000 series can be used with ALC. Both Elecraft and Flex do have programmable drive settings that are saved.)

- In STANDBY, the exciter's output will pass through the amplifier to the antenna that was selected in programming. The exciter's power is set by its power output control; however, most exciter power output will be controlled by the amplifier's ALC, when the amplifier is in Operate. Without the ALC connection, you have to manually adjust the exciter power to correctly drive the amplifier in each amplifier power level, in order to avoid damage. This is important as over-driving needs to be avoided at all times.
- Pressing the SET button when in STANDBY (#6 on FP) will activate the SET mode to program the amplifier. This is described in the "Let's Program the SPE 1.5K-FA" section of the SPE 1.5K-FA USER 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 automatically 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 function.
- 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. Any two of the four antennas can be programmed per band.
- Pushing the CAT button (#13 on FP) shows the current CAT interface setting. Pushing it twice shows the current software version. Updating the software is recommended when new SW is posted on SPE website. You can go to Expertlinears.com and click on the PRODUCT page to find the "Link for Updating SW".
- Pushing TUNE button (#14 on FP) activates the automatic tuning process of the ATU. The YELLOW TUNE LED will come on, but only in the STANDBY position. A continuous carrier must be provided from the transceiver during the tuning process and must be present until the YELLOW TUNE LED goes out. If there is a "b" or "t" next to the ANT number in the ANT box, i.e., 1"b" or 1"t", then the ATU is "automatically bypassed. Removal of the "b" or "t" is necessary in order for the ATU TUNE process to function.
- Pushing buttons (#15 – 18 on FP) (◀C C▶ ◀L L▶) can be used for manual tuning for lower SWR reached thru the "automatic range" of the ATU. This new setting can be SAVED for returning to that "sub-band" frequency (See Sub-bands on page 15).

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

A Word about Antennas

- Again, high-power amplifiers mandate properly rated antennas, isolators, baluns, connectors and feed line cables. When damaged, including by over-heating, they can cause the SWR to increase when power is applied. The SWR can rise to a point that deems the antenna system unusable until the damaged part or parts are replaced.
 - With the SPE 1.5K-FA ATU, the amplifier is able to automatically tune mismatches up to 5:1 SWR (2.5:1 on 6M). As long as the ATU matches the antenna to indicate a reading below 1.99:1 on the SWR meter, the amplifier will operate. Between 1.7 and 1.99, the output of the amplifier is slightly lowered. For a mismatch from 1.7:1 to 1.99:1 there is a beeping alarm. At 2:1 the amplifier will switch out of **Operate** and send a high SWR alarm.
 - While the antenna tuner matches a high VSWR antenna to the PA, a consequent loss of power occurs. This is normal. However, with heating and possibly higher than acceptable voltages present, damage can occur to the ATU, so decreasing the output power of the amplifier to lower these “higher voltages” is recommended.
 - Always operate with the best possible matching. Despite the amplifier’s protection against high SWR, continuous operation into a mismatched load (a bit lower than the protection threshold) could possibly lead to damage.
 - It is suggested that suitable static protection be given to antenna coax cables.

A Word about the Internal Tuner

- The SPE1.5K-FA amplifier is equipped with an automatic tuner that can automatically tune load mismatches up to 5:1 VSWR (2.5:1 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. Sub-bands are used to facilitate programmed ATU tuning. See page 57 in the USER Manual.
 - The amplifier USER Manual contains a chart with all the sub-bands and the recommended “center frequency” of that Sub-band. With operator programmed stored data, the tuner and the antenna are automatically set correctly when the transceiver’s frequency is in that sub-band. (Note: Using the RS232 information from the transceiver will allow your amp to

know, to the kHz, the frequency of your transceiver. This frequency information allows ATU memories to be recalled and preset before transmitting).

- Every ham band has several sub-bands, and for each of these, data related to the ATU tuning is also stored. A “Sub-band chart” is on page 57 in the USER Manual. If you so choose, using the frequencies on this chart for TUNING, will pre-tune your amplifier to that center frequency, for the ANTENNA that you have selected. For example, 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 3 in the sub-bands that you chose for TUNING, those settings will be stored in the ATU. And those settings will be remembered when your frequency and ANTENNA choice matches those sub-bands. Be sure to make notations on your sub-band chart of which antenna has stored memories on particular sub-bands.
 - 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.
 - With a proper cable, the CAT connections the amplifier will know to the KHz the transceiver’s frequency. See SPE 1.5K-FA USER Manual for the schematics for the cables.
 - The SPE 1.5K-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. Memories in Bank A are independent to Bank B.
- ✓ The internal tuner may be bypassed as follows:
- On each band, one, both, or none of the antenna ports may be set to ‘b.’ Therefore, an antenna PORT can be bypassed on one band, and not bypassed on other bands.
 - Use the “b” for typical bypassing, or “t” for bypassing tuneable antennas. The “b” is added when in SET PROGRAMMING ANTENNA mode by pushing the TUNE button. Pushing the TUNE button again will remove the “b.” Saving the programming will save your settings.
 - It is always automatically bypassed:
 - When a Port is set for receive antenna, or “r.”
 - With tunable antenna set, “t.”
 - When “b” is selected in ANTENNA programming for bypassing the ATU.
 - 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 SPE 1.5K-FA

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

Antenna Choices

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

```

----- SETUP OPTIONS vs. INPUT 1 -----
CONFIG  DISPLAY  ALARMS LOG
ANTENNA  BEEP    On    TUN ANT
CAT      START  Stby  RX ANT
MANUAL TUNE  TEMP/FANS  EXIT
-----
OTHER SETTINGS
[◀▲][▼▶]:SELECT      [SET]:CONFIRM

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- The menu default will be on CONFIG option. (The [◀▲] and [▼▶] keys will advance or step to menu choices, (e.g. “ANTENNA” “CAT,” “MANUAL TUNE,” “DISPLAY,” etc.).
 - When ANTENNA is highlighted, press SET again to enter the ANTENNA sub-menu.

```

----- SET ANTENNA ON BANK "A" -----
160 m: 1b NO | 30 m: 1b NO | 12 m: 1b NO
 80 m: 1b NO | 20 m: 1b NO | 10 m: 1b NO
 60 m: 1b NO | 17 m: 1b NO |  6 m: 1b NO
 40 m: 1b NO | 15 m: 1b NO |  4 m: 1b NO
                                     SAVE
----- SET 1st ANTENNA ON 40m BAND -----
[◀▲][▼▶]:SEL [TUNE]:ATU Y/N [SET]:CHANGE

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- You may assign antennas to each band by selecting one or two of the amplifier’s ANT PORT 1, ANT PORT 2, ANT PORT 3, ANT PORT 4 connectors for each band, or “NO” for “NONE” (i.e., “1 NO” would be antenna port 1 and NONE are selected for the two choices).
- This setup allows you to preset up to 2 antennas per band.

- 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 selected programmed antennas.
- If you don't have an antenna assignment for a particular band, select "NO NO" for NO antenna to be assigned to that band.
- 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, thus allowing the 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

- o The amplifier must be in STANDBY for the AUTO TUNING feature to function. To function, you will push the TUNE button on the front panel when the SPE 1.5K 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 will then TUNE. The ATU will then automatically go through a complete TUNING CYCLE and memorize its settings.
- o IMPORTANT: When the YELLOW TUNE LED is on, you must maintain the carrier to the SPE 1.5K input and the SPE 1.5K keyed. Otherwise the original tuning readings remain. To replace that memory, one must continue holding the PTT with carrier until the YELLOW TUNE LED goes out.
 - For maximum use of the full capabilities of your amplifier, your transceiver should be connected to the SPE 1.5K FA via a CAT cable to communicate all band and frequency data from the transceiver to the amplifier. If not connected using RS232 information, then the amplifier will switch to the band and frequency after it receives RF from the transceiver. This feature is meant to be used as a "failsafe feature," not for daily operation. Of course, it can be used without the CAT RS232, CIV or Band Data feature. However, it is best that the amplifier is used with a CAT cable that utilizes this "think ahead" to pre-set the amplifier's settings.
 - If the ALC is hooked up and functioning properly when the amplifier is in the TUNE mode, then the amplifier's unique ALC system will drop your transceiver power to about 20 watts or so. If not, then set your drive to about 20 watts of RF carrier. This 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 USER 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 often. 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 connected. If ALC is connected, the ALC should drop the transceiver power to about 20 to 30 watts for 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.

- AUTO TUNING has a range of 5:1 SWR in the SPE 1.5KFA. To accomplish tuning of higher SWR than 5:1, use Manual Tuning as explained in next.

Manual Tuning

- o To achieve a better match than that achieved with the automatic tune procedure, it is possible to set the tuning manually by using the keys [◀C], [C▶], [◀L], [L▶].

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MANUAL TUNE ON BANK "A"
CAT: 21.275 MHz SUB-BAND: 110
[◀L] ..... [L▶] 1.00 µH
[◀C] ..... [C▶] 87.5 PF (Hi)
[TUNE]: TUNING SWR ANT: --.--

IN | BAND | ANT | CAT | OUT | SWR | TEMP
1 | 15 m | 1 | ICOM | MAX | --.-- | 24°C

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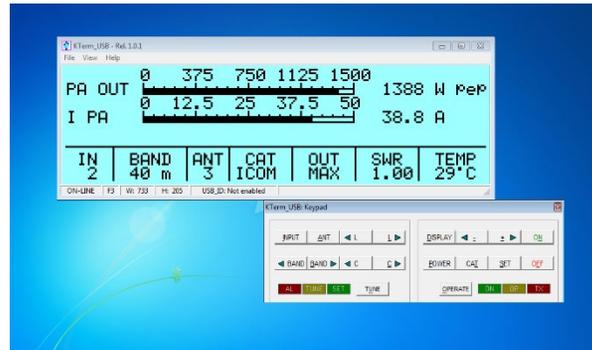
- Set your exciter to transmit a continuous RTTY or FM signal.
 - o Press the [◀L], [L▶], [◀C], [C▶] keys until you obtain the minimum SWR.
 - o The operating frequency and the sub-band are also shown on the display.
 - o When a manual tuning is performed, it is possible to read the tuning value, the working frequency and the associated sub-band on the appropriate screen page. Sometimes it is a good idea to write these settings down in case they are accidentally lost. It is easy to forget to save the settings you have spent time searching for.
- o SAVING your settings
 - o Both types of tuning are always implemented in the STANDBY state.
 - Note: to SAVE this setting you must key your transceiver. Notice that the display will now say [TUNE]: SAVE. Saving only works when the "SAVE" is displayed. You may have to key or PTT

to see SAVE appear. 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 SPE 1.5K-FA to set a dedicated receiving antenna and to control its automatic switching after a transmission starts.
 - For the selection of this antenna choose the menu item RX ANT.
 - The antenna number selected will appear followed by an "r" symbol (i.e., 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 (i.e., Beverage) is connected.
 - More details for this function are in the SPE 1.5K USER Manual.

Remote Control



- The SPE 1.5K-FA is supported by a software program, Term_1.5K, 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 1.5K-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 1.5K-FA (Alarms)

- The SPE1.5K-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; and 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 (i.e., 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 and 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 (110°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 SPE 1.5K FA is designed to operate as high as 110° 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. **Bob – is this correct temp?**
- When a “FATAL” alarm occurs, immediately contact your reseller.
- Note that more details for the temperatures are in the SPE 1.5K-FA Operating Manual.

Operating Tips

- Again, ALC and CAT links are highly recommended to achieve the maximum operating use of your amplifier.
- If you rely on the Frequency Counter in the SPE 1.5K-FA to switch bands, one of the purposes of the CAT connector to help the amplifier be at its most reliable could be compromised. Therefore, full use of 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, the drive power will reduce 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.

- NOTE: Do not use a power level incorrectly, (i.e., leaving amp on MAX power level and reducing the drive to achieve a power output level that is in the MID or LOW power ranges). Instead, switch to MID for powers above LOW and below MAX power levels and use LOW for anything below MID power levels.
 - See Flex and Elecraft for specific settings of their drive levels.
- Setting Drive Levels
 - 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, then lower the mic gain some just to be sure. 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 reduction of the output power of the amplifier is seen.
 - CW: In key down, you get the maximum output power automatically.
 - DIGITAL: RTTY, SSTV and FM modes have a very heavy-duty cycle. However, the SPE 1.5KFA can handle these modes. Even so, consider that it may be best to use the MID or LOW power settings.
 - AM: There are many combinations of transceivers that work well with the SPE 1.5KFA. And most transceivers should work well without much head scratching.
 - The following suggestions are to help you through the "AM setup process," (i.e., how to determine the CARRIER and MODULATION settings for AM).
 - ✓ SPE amplifiers are designed to work with the "most ease of operation", when using SPE's patented ALC system. The settings for using AM with ALC typically only need the MIC GAIN adjusted to not be too low or too high.
 - Here are suggested settings for AM when using ALC to control the carrier level on each power level. These settings are made when the amplifier is in OPERATE and when you have keyed your transceiver with an AM unmodulated carrier.
 - Operation of your amplifier with ALC connected should solve the problem of over-driving the amplifier. Hence, you may only have to set your MIC GAIN.

- On LOW power level, the AM PEP will be around 500 watts and the SPE 1.5KFA display may show around 500 to 600 watts, or less during modulation. Of course, the power can easily vary, especially depending on the characteristics of your voice.
 - For MID power, the AM PEP may be about 1kW and the display may show about 1.0 to 1.1 kW.
 - And for MAX power, the AM PEP may be about 1500 watts and the display may show about 1.4kW to 1.5kW.
 - It is probable, when using ALC, that during modulation pauses, the full carrier output may be seen. Using PTT to control your transmission can help. Transmissions over 5 minutes long are discouraged. At 8 minutes of continuous transmission, the amplifier should go out of OPERATE to STANDBY. This is normal for the Series II SPE 1.5KFA.
 - Failure to do make proper AM settings (especially without ALC) can easily result in over modulation distortion called "flat-topping." The result can be very wide bandwidth splatter and "downward modulation."
 - With most modern-day transceivers, the MIC GAIN setting is typically about 30% to 50% (See your transceiver manual for recommended setting). You may find your setting works good in this range. It is a good idea to ask for quality reports as you change your mic gain. Of course, proper monitoring equipment is very useful as well.
 - NOTE: If the SPE 1.5KFA goes out of Operate mode to Standby mode during any of these settings, then most likely, the carrier or modulation settings are over-driving the amplifier. However, the amp may only drop to MID power and continue operating.
 - We suggest that you monitor your transmissions closely to check that the ALC is working okay and the MIC GAIN setting is correct. These settings have been known to change and we wonder how. Most likely is that the operator made the change.
- ✓ The following suggested setting procedure is without ALC connected and is a bit more detailed than for "with ALC" settings.

- With your transceiver's "MIC GAIN" set to zero, place the amplifier in OPERATE and key your transceiver with an AM unmodulated carrier. Then advance the transceiver drive (output power) so as to drive the amplifier and not to exceed 25% of the maximum amplifier carrier output, for the power levels shown below:
 - For **LOW power**, no more than 125 watts of carrier, without modulation. With AM modulation, this should achieve about 500 watts of PEP AM power output.
 - For **MID power**, no more than 250 watts of carrier, without modulation. With AM modulation, this should achieve about 1kW watts of PEP AM power output.
 - For **MAX power**, no more than 375 watts of carrier, without modulation. With AM modulation, this should achieve about 1.5kW watts of PEP AM power output.
 - NOTE: If the SPE 1.5KFA goes out of Operate mode to Standby mode during any of these settings, then most likely, the carrier or modulation settings are over driving the amplifier. However, the amp may only drop to MID power and continue operating.
- ✓ Setting of MIC GAIN.
- As mentioned before, we have found that most modern transceivers may be designed for a MIC GAIN of about 30 to 50% setting. However, due to the different combinations of transceivers and amplifiers, a helpful hint is to have others listen to your signal and give quality reports to you. You might begin with the MIC GAIN at about 15% and increase to about 50% in 5% increments. Asking for reports.
 - It is important to know that setting the Mic gain too high on AM can easily cause splatter and distortion. We suggest that you periodically check that the CARRIER and MIC GAIN settings are correct.
 - Those of you that have equipment for monitoring AM modulation out of your amplifier will find that setting the carrier to the above recommended levels and then watching your oscilloscope monitor for setting modulation depths and peaks is much easier.
 - Note: For an unmodulated CW carrier, a good power meter, theoretically, should read the Average and PEP power as being the same reading. However, the power/SWR reading meters available for amateur use, are typically not capable of meeting this stringent standard, especially since having to cover all ham frequencies from 160m to 6m. To do so would cost quite a lot. So take those meter readings as being "relative readings" that easily may vary.

- Your SPE 1.5KFA Series II can handle key down at full power output for about 8 minutes. However, it is best to not stress the amplifier with long periods of key-down transmissions. The sophisticated SPE 1.5KFA software avoids transmitting a continuous signal in the MAX condition for more than 8 minutes by switching to MID power. In SSB, use of high compression is not encouraged as this can cause distortion at MAX power level.
- Remember that high levels of audio compression can make your SSB signal become distorted since normal audio has lots of peaks and valleys. Highly compressed audio may “in your opinion” make you sound louder; however, it may also be at the expense of over driving your amplifier. Be reasonably conservative about this. Not only can it be detrimental to your signal, 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. Typically, temperatures below 60 °C are normal. However, your SPE 1.5KFA Series II is capable of much higher temperatures. Even so, it is best to not stress your amp.
- Please note that there is a difference between the SPE 1.5KFA Series II and the Series I amplifier. The above was mainly written with the Series II in mind. However, most can also be applied to Series I, if one considers the difference in specifications of both.