



ELECRRAFT® KPA1500

1500-WATT AMPLIFIER

OWNER'S MANUAL

Revision A1 (Draft), August 9, 2017

E740301

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WARNING

Dangerous Voltages Inside the KPA1500

Before opening the KPA1500 RF Deck or Power Supply enclosures:

1. Turn off the KPA1500 by tapping the front panel ON switch and wait until the fan stops. (The fan drains the power supply to a safe voltage.)
2. Disconnect the Power Supply at RF Deck rear panel before opening the RF Deck enclosure.
3. Disconnect the Power Supply from the mains before opening the cover.

Key to Symbols Abbreviations and Text Styles



Important – read carefully



Operating tip

TEMP

Tap switch function (labeled *above* a switch; press for less than 1/2 second)

PK HOLD

Hold switch function (labeled *below* a switch; press for at least 1/2 sec. to activate)

LED

Light Emitting Diode

LCD

Liquid Crystal Display

CAUTION

Follow the instructions under a Caution to avoid damage to the equipment.

WARNING

Follow the instructions under a Warning to avoid serious personal injury.

Introduction

On behalf of our entire design team, we'd like to thank you for choosing the Elecraft KPA1500 amplifier.

The KPA1500 offers a unique combination of features. It's one of the smallest 1500-W amplifiers available. The power supply is in a separate enclosure for ease of station layout.

The KPA1500 is capable of fully automatic operation, yet has an alphanumeric display and a full complement of front panel switches for precise manual control. A comprehensive remote-control command set is also included.

The KPA1500 can be used with nearly any transceiver, thanks to its instantaneous RF-based band switching, advanced protection circuitry, adjustable ALC, and extensive parametric monitoring. It also has inputs that allow direct band switching from many popular transceivers. T/R is completely noise-free thanks to the use of PIN-diode switching.

The KPA1500 comes with a built-in Automatic Antenna Tuner (ATU) that can handle a load SWR up to 3:1 at full 1500 watt output in any mode.

Of course the KPA1500 is an ideal companion for the Elecraft K3 transceiver, both physically and electrically. The K3 can sense whether the amp is in standby or operate mode, then select the appropriate per-band power settings. This allows you to set up the K3 for "barefoot" operation at one power level on each band, and then switch the amp to operate and set up optimal drive levels for full 1500-W output. The K3/KPA1500 combination is also capable of extremely fast break-in, especially when the K3 is placed in QRQ (high-speed CW) mode. The two are so well-integrated that you can use the per-band switches on the amplifier to change bands at the transceiver.

If you use the KPA1500 with both the K3 transceiver and P3 panadapter – our new "K-Line" – you'll enjoy a high degree of operating convenience, along with world-class performance *and* the power to get the job done.

73,

Wayne, N6KR

Eric, WA6HHQ

FCC-Mandated Part 15 Notice:

This equipment has been tested and found to comply with the limits for a **Class B digital device**, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against **harmful interference** in a residential installation. This equipment generates, uses and can radiate **radio frequency energy** and, if not installed and used in accordance with the instructions, may cause **harmful interference** to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause **harmful interference** to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Regarding the computer interface: changes or modifications not expressly approved by Elecraft could void the user's authority to operate this equipment.

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Installation

Installation consists of the following:

- Positioning the KPA1500 RF Deck and Power Supply to provide for proper cooling (pg 6).
- Connecting the KPA1500 RF Deck and Power Supply (pg 6)
- Cabling the KPA1500 RF Deck to your other station equipment (pg 6).

The KPA1500 rear panel is shown in Figure 1. The connectors and controls are described following the figure.

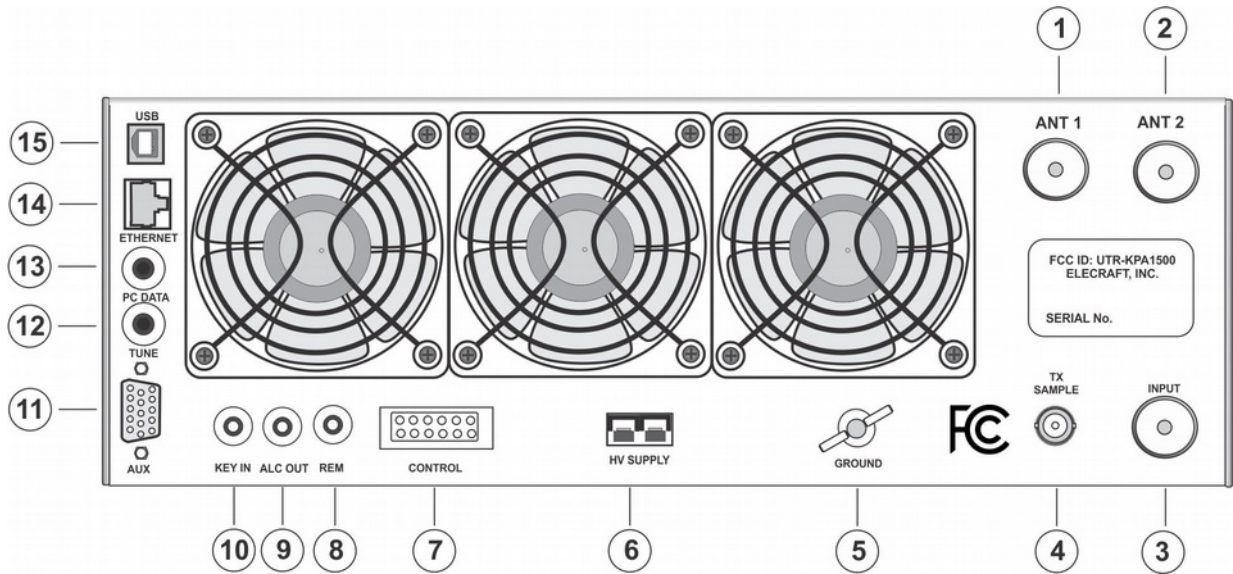


Figure 1. KPA1500 Rear Panel

- ① and ② SO-239 RF connectors to antenna system or dummy load.
- ③ SO-239 connector for RF input from the driving transceiver.
- ④ Low level KPA1500 transmit signal output.
- ⑤ Station ground attachment.
- ⑥ High voltage connection to the KPA1500 power supply.
- ⑦ Control circuit connection to the KPA1500 power supply.
- ⑧ Accepts a 12V input for remote control applications to power the KPA1500 on or off.
- ⑨ Negative-going voltage for transceivers that require ALC. (Elecraft transceivers do not require this connection.
- ⑩ Enables the KPA1500 by a short to ground. 5 Vdc open circuit inhibits the KPA1500 . When grounded the source must sink 1mA to enable the KPA1500.
- ⑪ For interconnecting cable to fully integrate the KPA1500 with an Elecraft K3 or K3s for enhance mode operation.
- ⑫ Input signal to the internal KPA1500 automatic antenna tuner (ATU) that emulates an Icom remote ATU when the KPA1500 is used with Icom transceivers.
- ⑬ RS232 level serial data connection for use with the KPA1500 Utility program and other computer-based applications
- ⑭ Ethernet connection for local or remote operation applications.
- ⑮ USB connection to virtual COM port for use with the KPA1500 Utility and other computer-based programs.

Positioning the KPA1500 RF Deck and Power Supply

Provide at least 4 inches (10 cm) clearance behind the fans and at least 1 inch (2.5 cm) clearance around the top, bottom and sides for normal cooling air flow.

The supplied cables allow the power supply and RF deck to be placed up to 66 inches (167 cm) apart. The Power Supply can be operated remotely and so need not be positioned within reach of the operator. The fans operate whenever the KPA1500 is on, so you can place the power supply under the operating desk or elsewhere to minimize the sound of the fans.

Cabling – Power Supply

A mains power cable is provided that plugs into the Power Supply. The other end has bare wires for you to add the 240 VAC connector needed to match your mains outlet.

Connect the Power Supply to the RF deck with the supplied 66-inch (167 cm) cable that has an Anderson PowerPole® connector and a 12-pin connector at each end.

Plug the PowerPole connector into the HV Supply connector (⑥) on the RF Deck rear panel (see Figure 1) and the corresponding connector on the Power Supply. Observe the polarity; match the colors on the plug with the connectors

Connect the 15-pin connector to the Power Supply and the Control connector (⑦) on the RF Deck rear panel.

Cabling – RF Deck

⚠ Always turn the KPA1500 off before attaching or removing cables.

The KPA1500 may be used with the Elecraft K3, K2 or any HF/6 meter transmitter and that has a KEY IN output meeting the requirements shown under note 4 below. Interconnections with the transceiver are shown in Figure 2. The driving transceiver must provide up to TBD watts of RF drive for full output and the output power must be adjustable as described under *Transmitting* on pg 11.

The optional KPAK3AUX cable provides closer integration with the K3 by sharing band information between the KPA1500 and the transceiver (see Figure 3). The KPAK3AUX cable provides all the operational features described under Operation, including coordinated band-switching (pg 11). The KPAK3AUX cable includes the KEY IN line. If you need access to this line so that other equipment can control the amplifier, you can install the Key Line interrupter supplied with your KPAK3AUX cable set and use a separate key line as shown in Figure 4.

⚠ You must use the Key Line Interrupter when using a separate key line with the KPAK3AUX cable set. Otherwise any external equipment inserted into the key line will not be able to inhibit the amplifier.

You can make cables for use with Yaesu and Icom transceivers that also provide closer integration with the KPA1. For details of those cables and the KPAK3AUX cable set see AUX Connector Interface on page 22.

NOTE

1. Connect your station ground to the GND wing-nut ⑩. A good station ground is important for safety and to minimize local radio frequency interference (RFI).

- Attach the RF INPUT (11) to the output of your driving transceiver or transmitter using a 50 ohm coaxial cable with a PL-259 male connector on the KPA1500 end.
- Attach the RF OUTPUT (1) to a suitable load with an SWR of less than 1.5:1. A dummy load is strongly recommended for initial testing.
- The driving transmitter must ground the KEY IN line circuit during transmit while sinking up to 1 mA. If the transmitter Key Output is not a contact closure or equivalent, it must be at a level between +4 and +16 VDC during receive. (Compatible with all known transmitters. No key line buffer required.)

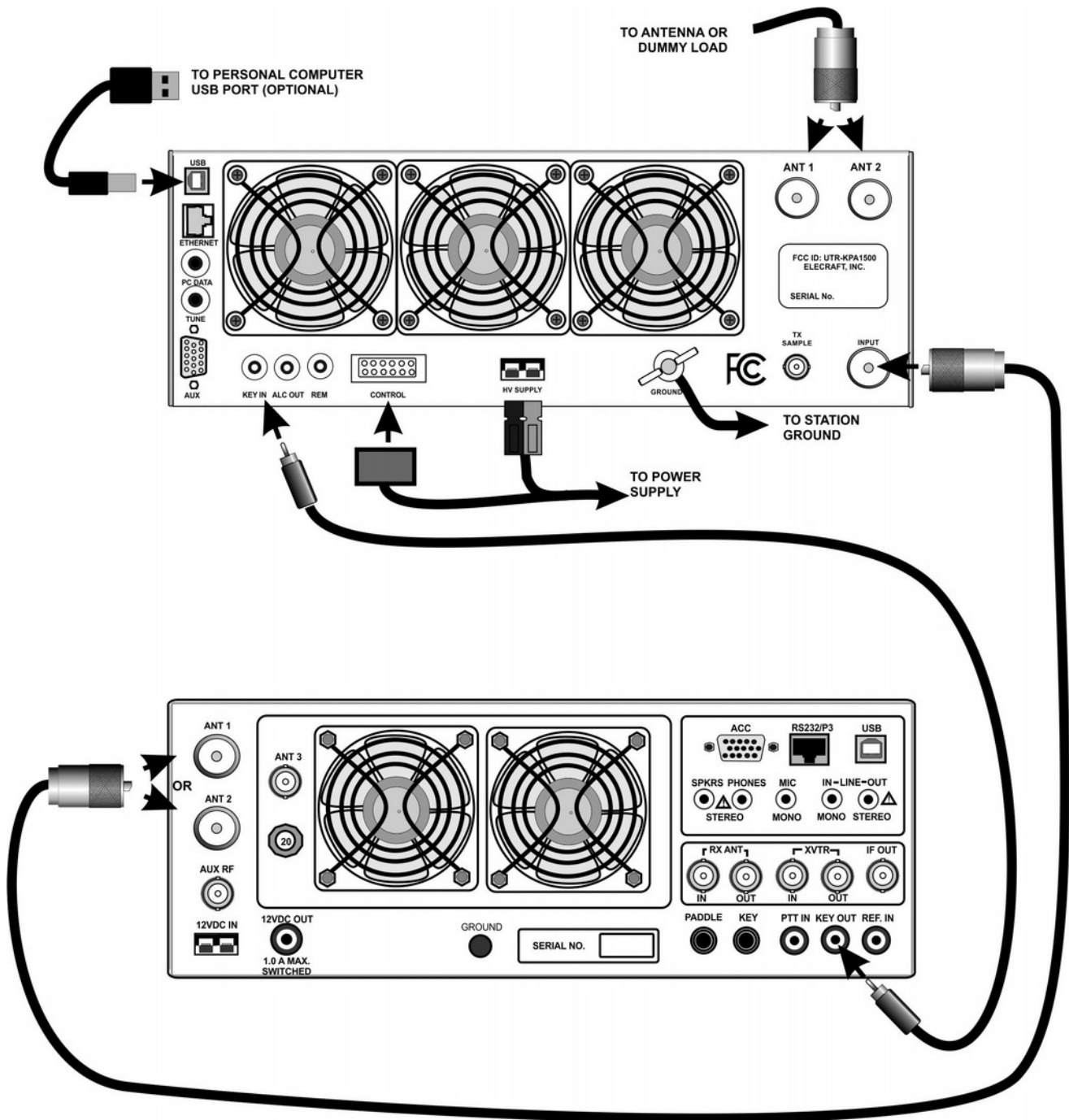


Figure 2. Basic Cabling Diagram for Any Transceiver.

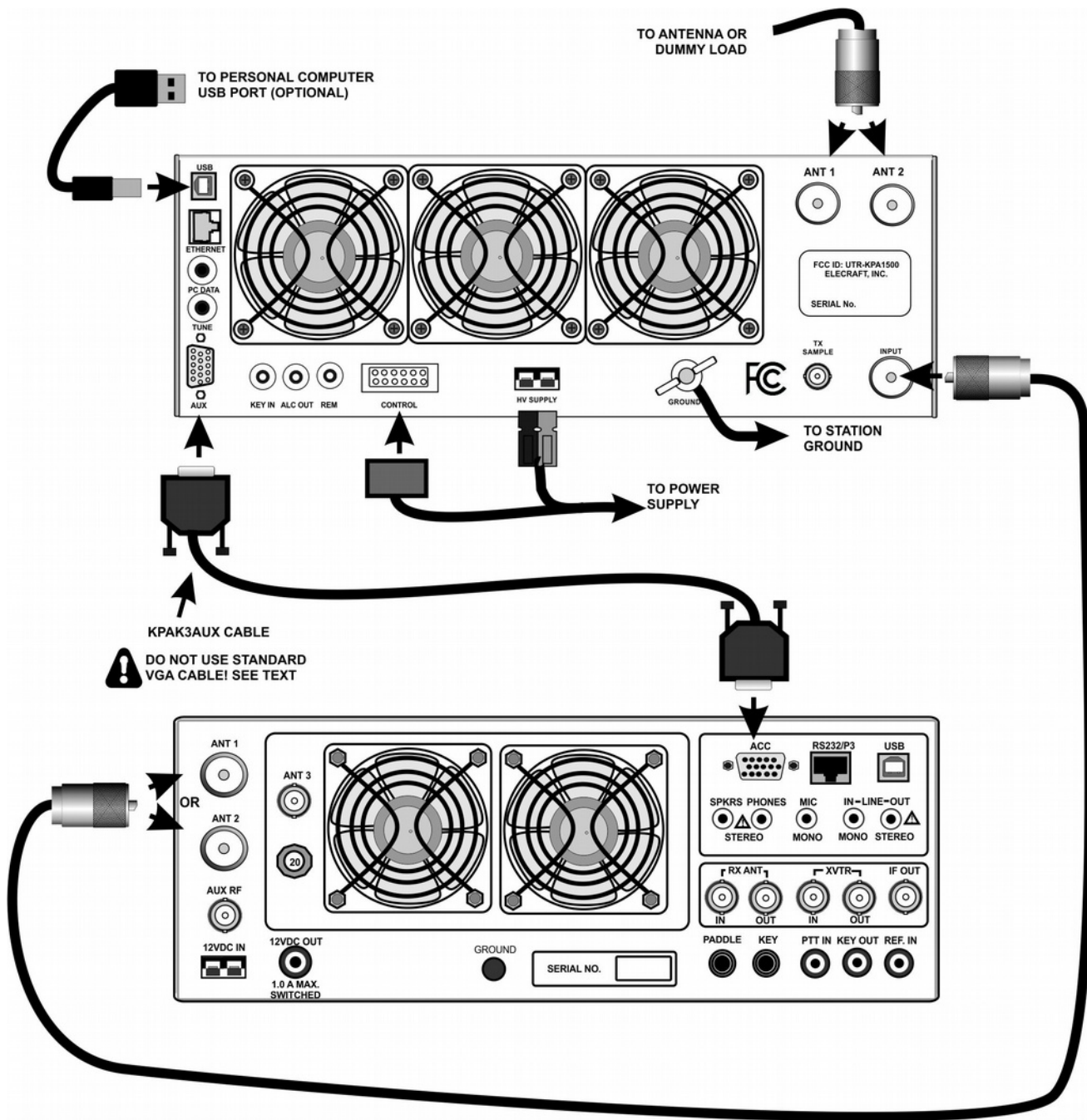


Figure 3. K3S Enhanced Cabling Using KPAK3AUX Cable.

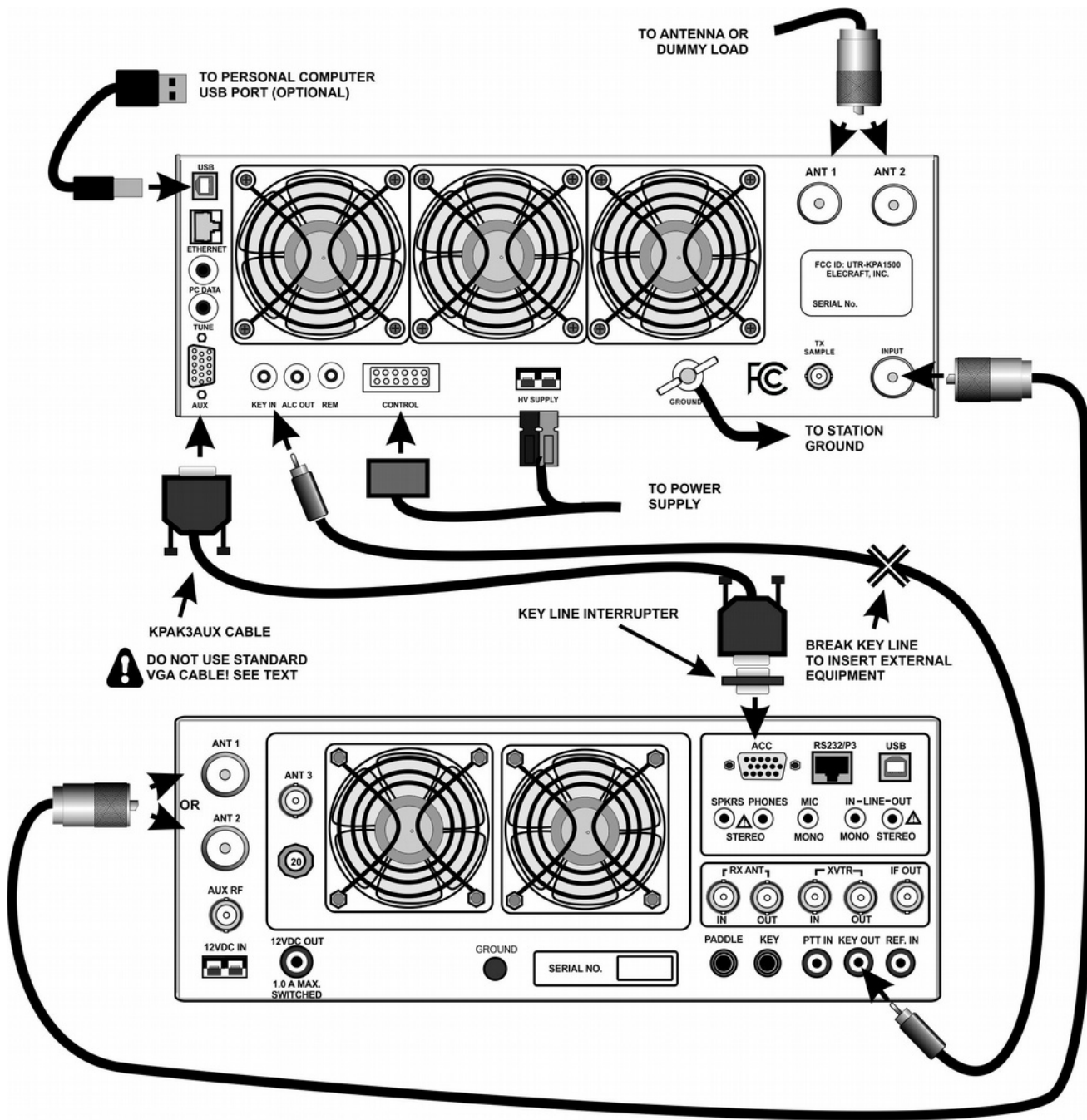


Figure 4. K3S Enhanced Cabling Using KPAK3AUX Cable and Separate Key Line.


Operation

IMPORTANT

When the KPA1500 is turned off using the front-panel switch, part of the control circuitry remains on as long as mains power is applied to the Power Supply. Keeping the control circuitry energized allows the KPA1500 to be turned on and off remotely as well as from the front-panel switch.. If you do not need to control the KPA1500 remotely and would prefer to save the small amount of power required to power the control circuitry, either switch the Power Supply completely off or provide an external mains power switch.

Power On

1. Ensure a suitable 50 ohm load is attached to the ANT 1 or ANT 2 connector on the rear panel . Tap the front panel ANTENNA switch to select the antenna connector used. The associated LED will be illuminated. A dummy load is recommended for initial tests.
2. Enable the power supply by pressing the rear panel rocker switch (Figure 1, ③) to the On (I) position.

 **Switches with a legend above and below the pushbutton have two functions. Tap (press briefly) to activate the function labeled above a switch. Hold to activate the function labeled below the switch. In the text, tap functions are shown like this: STATUS. An example of a hold function is **EDIT**.**

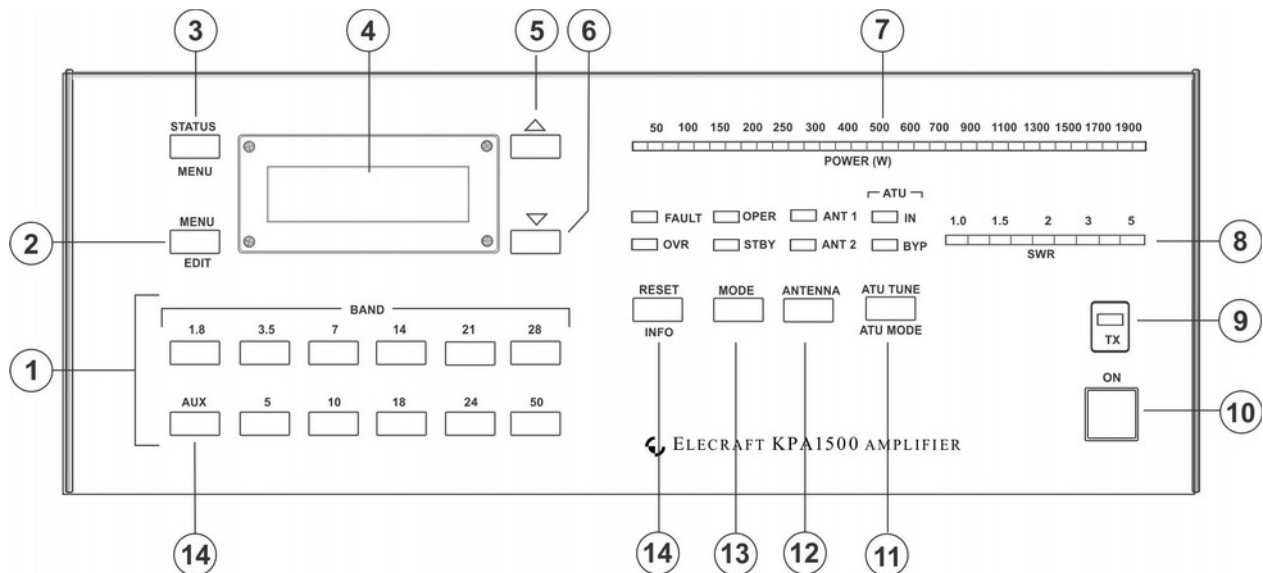


Figure 5. KPA1500 Front Panel.

3. Tap the **ON** switch ⑩. The LCD ④ and STBY LED should light.

If at any time the **FAULT LED** ⑦ lights, refer to *Fault Conditions*, pg 14.

Band Switching


Automatic Band Switching: The KPA1500 automatically measures the frequency of the RF drive and selects the proper band. The KEY IN input must be connected to the driving transmitter.

Manual Band Switching: Tap any of the front-panel BAND switches to select that band.


Coordinated K3 and KPA1500 Band Switching: When the optional AUX cable (pg 6) is connected between the KPA1500 and the K3 or K3S:

- The KPA1500 will follow the band selected on a K3 or K3S transceiver.
- Tapping a BAND switch on the KPA1500 will cause the K3 or K3S to change bands accordingly.

Band switching control in which the KPA1500 follows the transceiver band selection without transmitting is available with other popular transceivers such as Icom and Yaesu with the appropriate interconnection cable. See AUX Connector Interface on pg 22. However, the control is one-way. The KPA1500 cannot command the transceiver to change bands.

 The automatic band selection function is active whenever the KEY IN is low (transmit mode) and the transmitter is delivering RF drive to the KPA1500. The automatic band selection function overrides band selection made by any other means to protect the KPA1500 from damage by wrong-band operation.

Antenna Selection

Tap **ANTENNA**  to select the desired rear panel antenna indicated by a lighted ANT 1 or ANT 2 LED above the switch. **Do not attempt to change the antenna selection while transmitting.**

Transmitting

The POWER (W) and standing wave ratio (SWR) bargraphs are functional when the amplifier is in standby (STBY). Twenty-five watts from the driving transceiver will illuminate the first POWER LED. You may run up to 200 watts through the KPA1500 in STBY.

1. Be sure you have an antenna or dummy load connected to the active antenna output (see *Antenna Selection* on page 11)
2. Tap the MODE switch (13) and confirm that the STBY LED goes out and the OPER LED lights.
3. Apply a few watts of RF drive and note that the POWER (W) (7) bargraph illuminates to indicate the RF output power. Never exceed 100 watts of drive to the KPA1500 in OPER mode. Normal drive levels will be about 50 watts. The KPA1500 will not amplify without the KEY IN signal. Note that the TX LED (9) lights when the key signal is present. If the KEY IN signal is not present, *INHIBIT* will appear on the LCD (See the *INHIBIT* menu entry on page 15)

NOTE

If you apply RF drive at a frequency below 1.6 MHz, between 26 MHz and 28 MHz, or above 54 MHz, *INVALID* will appear on the LCD and the KPA1500 will not amplify.

4. Increase the drive power and confirm that the SWR bargraph (8) indicates less than 1.5 while the output indicated by the POWER (W) LEDs increases. For ease in reading the critical SWR levels, the SWR LEDs are green from 1 to 1.5. The 1.5 to 2.1 SWR LEDs are yellow and the LEDs for SWRs above 2.1 are red. Up to TBD watts of drive may be required to produce the full 1500 watts output from the KPA1500. During heavy use, you may hear audible clicking sounds, particularly as amplifier components cool after transmitting. This is normal. It does not indicate that the amplifier is being overly stressed.
5. When driving the KPA1500 with an Elecraft K3 or K3S, use the K3 or K3S per-band power control to set the amplifier output just below the desired peak output on each band. Do not rely on ALC to control the power output (see *Using ALC*, pg 12). At the K3 or K3S, set *CONFIG:POWER SET* to Per Band. See *Per-Band Power Control* in your K3 or K3S Owner's manual for further details.

⚠ If you use the AUX cable interface between the K3 or K3S and KPA1500 (pg 22), the KPA1500 will send the OPER/STBY status to the K3 or K3S. You can then set two per-band power levels at the K3 or K3S: one to drive the KPA1500 when it is in OPER mode and another for pass-through transmitting when the KPA1500 is in STBY. The K3 or K3S will automatically furnish your preset power levels as you switch the KPA1500 between OPER and STBY.

Using ALC

Automatic Level Control (ALC) is a useful safety mechanism, but never use ALC as the principle power control. Doing so causes many of the unwanted transmit dynamics you often hear on the air including excessive intermodulation distortion (IMD) and clicks. Instead, set your transmitter power output correctly as described under *Transmitting* and adjust the ALC so it does not affect output power in normal operation. To do this, drive the KPA1500 to the desired output. Adjust *ALC THR* in the menu (pg 15) until power just starts to drop and then set *ALC THR* above this setting so it does not affect the output power in normal operation.

The Elecraft K3 or K3S ALC intentionally has a slow attack and much slower decay to avoid adding more distortion or dynamics problems than necessary. However, not all of the negative effects of ALC action can be avoided. It is still best to set the ALC threshold and then adjust the drive to avoid ALC action in normal operation.

Automatic Antenna Tuner (ATU)

Hold **ATU MODE** to select whether the ATU is active (IN) or bypassed. The corresponding LED above the switch will light.

Tap **ATU TUNE** to initiate an ATU tune cycle.

Monitoring

KPA1500 operation is monitored by the LEDs ⑦, ⑧ and ⑨ and reported in text on the LCD.

LEDs

The SWR of the load and the output power are displayed on LED bar graphs. The bar graphs are color-coded: green for normal operating range, yellow for marginal levels and red for excessive levels. Excessive levels may trigger a fault and shut the KPA1500 off (see *Fault Conditions* below). The FAULT LED lights if a fault condition occurs. Also two LEDs indicate whether the amplifier is in standby (STBY) or operating (OPER) mode.

LCD

Normally the LCD displays the band currently selected. The four switches around the LCD select other information to be displayed on the screen and the behavior of the LEDs. Note that these switches have both tap and hold functions (pg 2). Repeat the tap or hold action to return the LCD to the band display.

- **HV** ③ displays the PA voltage on the LCD. Must be TBD when the KPA1500 is in STBY.
- **CURRENT** ② displays the PA current on the LCD. Must never exceed TBD.
- **TEMP** ⑤ displays the heat sink temperature on the LCD. Must be less than 90C.
- **PWR** ⑥ displays the output power numerically on the LCD. Must not exceed TBD W.
- **MENU** ③ displays the menu system (see pg. 15).
- **EDIT** ② enables editing menu parameters (see pg. 15).
- **PK HOLD** ⑤ toggles the peak power output display on the bar graph. When enabled, the LED corresponding to the peak power output remains lighted for one second.
- **SWR** ⑥ displays the load SWR numerically on the LCD.

Remote Operation

The KPA1500 can be controlled remotely using a personal computer connected to the RJ45 Ethernet port or to the USB port. A basic remote operating capability is built into the KPA1500 Utility program (see pg 17). For those who may wish to develop their own software, a Command Reference Manual is available on the Elecraft web site. (www.elecraft.com).

Fault Conditions

The FAULT indicator lights and the speaker sounds to indicate a fault condition has occurred. To avoid unnecessarily interrupting amplification because of moderately abnormal conditions, there are two levels of faults that may occur, attenuator faults and hard faults.

Attenuator Faults

Relatively minor faults such as excessive reflected power cause an internal 3dB attenuator to be switched into the RF path that reduces the output to protect the KPA1500. When an attenuator fault occurs, the FAULT LED blinks and the cause is displayed on the LCD for about 1 second. The KPA500 tests the condition at intervals and will return to normal operation automatically after the cause of the fault is removed. The interval between tests is set with the *ATTEN REL* menu (pg 15). If the fault persists over time or if it is severe enough, a hard fault will occur.

Unauthorized Frequency (INVALID) Fault

If you try to transmit on an unauthorized frequency the KPA1500 will automatically switch to STBY and *INVALID* will be displayed on the LCD until RF drive is removed.

Hard Faults

Hard faults are those that require switching the KPA1500 to STBY to protect it, such as conditions of extremely high reflected power or high drive power, or because a critical component such as a power supply has failed. When a Hard Fault occurs, the cause of the fault is displayed on the LCD. When the condition has been corrected, tap the OP/STBY switch to return the KPA1500 to normal operation, or tap the **INFO** switch to return the KPA1500 to STBY mode.

LCD Display	Fault	Fault Type	Fault No. ¹
<i>GAIN ERR</i>	Excessive overall amplifier gain.	Hard	15
<i>HI CURR</i>	Excessive power amplifier current. ²	Attenuator→Hard	2
<i>HI TEMP</i>	Power amplifier temperature over limit. ²	Hard	4
<i>PWRIN HI</i>	Excessive driving power.	Attenuator→Hard	6
<i>PA DISS</i>	Power amplifiers are dissipating excessive power. ²	Hard	11
<i>POUT HI</i>	Excessive power output.	Attenuator→Hard	12
<i>REFL HI</i>	Excessive reflected power (high SWR).	Attenuator→Hard	9
<i>60V HIGH</i>	50 volt supply over limit	Hard	8
<i>60V FAIL</i>	500 volt supply failure. Requires cycling KPA1500 mains power after it is corrected. ³ TBD	Hard	13
<i>270V ERR</i>	HV volt supply failure. Requires cycling KPA1500 mains power after it is corrected. ³	Hard	14
N/A	Communication failure between KPA1500 and K3 or K3S.	N/A	0

NOTES:

1. When the KPA1500 is used with the Elecraft K3 or K3S transceiver, and the optional K3 interface cable (see Elecraft KPAK3AUX Interface Cable , pg 23) is used to connect the K3 or K3S to the KPA1500, these numbers will be displayed on the K3's LCD briefly if a **hard** fault occurs.
2. These faults are commonly caused by excessive power output or excessive reflected power.

Menu

Holding **MENU** ② enables the menu function to allow the following parameters to be set. With the menu function enabled, the MENU, EDIT and switches next to the Δ and ∇ symbols all respond to a simple tap. Use them to scroll through the menu items. Tap **EDIT** and then the Δ and ∇ switches to select the parameter and tap **MENU** again to save the parameter. Tap **MENU** to exit the menu.

To reset all the parameters to the default value, press and hold the **EDIT** switch while tapping the **ON** switch to turn the KPA1500 on.

Menu Entry	Default	Description
<i>ALC THR</i>	210	ALC Threshold Adjustment: 0 to 210 . See Using ALC on pg 12.
<i>ATTN REL</i>	3	Attenuator Release Time: 1.4 – 5 seconds.
<i>BAND CHG</i>	NOR	NOR : OPER/STBY status the same after band change. STBY : Switches amp to standby after band change.
<i>DEMO</i>	NOR	Factory Use Only.
<i>FAN CTL</i>	NOR	Sets minimum fan speed. NOR : fan is off when not needed. 1 to 6 : selects various minimum speeds. Fan speed increases automatically as needed for cooling.
<i>FW REV</i>		Displays firmware revision.
<i>INHIB IN</i>	DISABLE	ENABLE allows the amplifier operation to be inhibited (won't amplify) when a logic low is applied to pin 11 of the AUX Connector (see pg 22). When amplification is inhibited, INHIBIT appears on the LCD display.
<i>LCD ADJ</i>	30	LCD Contrast Adjustment.
<i>LCD BRT</i>	6	LCD Backlight Brightness. Use DAY in bright sunlight and 2 to 8 for indoor lighting.
<i>LED BRT</i>	6	LED Brightness.
<i>PWR ADJ</i>	100	Per-Band Wattmeter Calibration, range 80 to 120 . These are percentages of the measured value. See Wattmeter Calibration Procedure on page 18.
<i>PWR ON</i>	STBY	STBY : Amp is in standby mode when first turned on. OPER : Amp is in operate mode when first turned on.
<i>RADIO</i>	K3	Specifies driving transceiver interface: K3 : Allows use of Auxbus interface which allows the KPA1500 band switches to change bands on the K3 or K3S; sends KPA1500 mode to the K3 or K3S so the K3 can automatically select correct drive power when the KPA1500 is in OPER (see 11); reports KPA1500 faults to K3. BCD : Signals provided by Yaesu transceivers. ANALOG : Signals provided by Icom transceivers. Note that Icom transceivers do not identify WARC bands, but KPA1500 frequency sensing will switch the KPA1500 to the correct band upon transmit. SERIAL : Kenwood/Elecraft compatible interface using TBD? RS232X port. If transceiver is in split mode, the transmit frequency will select proper band at KPA1500.
<i>RS232 P</i>	38400	PC Serial Port Speed: 4800, 9600, 19200, 38400 bps
<i>RS232 X</i>	4800	Transceiver Serial Port Speed: 4800, 9600, 19200, 38400 bps. Set <i>RADIO</i> to SERIAL.

Menu Entry	Default	Description
<i>SER NUM</i>		Displays the unit serial number.
<i>SER POLL</i>	N/A	ON: Enables KPA1500 polling of the transceiver for frequency band via RS232X port (e.g. for Kenwood/Elecraft compatible interface). Note: <i>RADIO</i> menu entry must be set to SERIAL. OFF: Other device (PC, etc.) polls transceiver for frequency band. N/A: RADIO menu not set to SERIAL.
<i>SPEAKER</i>	ON	Speaker (fault annunciator) ON or OFF .
<i>TR TIME</i>	0	QSK Delay Time: 0 to 50 ms; Slows T/R release time for transceivers with poor transmit timing characteristics.

Firmware Updates

From time to time updated and improved firmware may become available for the KPA1500.

To update firmware you will need:

- The KPA Utility Program available free from Elecraft at www.elecraft.com.
- Connect the USB A to B interface cable supplied with your KPA1500 between the USB port on the KPA1500 and a USB port on your personal computer.

⚠ Your PC must be connected directly to the USB port. You cannot ‘daisy chain’ the KPA1500 with the K3 or K3S through the AUX port.

- Launch the KPA Utility program.

Updated firmware may be obtained in two ways.

1. Click on Firmware tab and then the Click on Copy Firmware Files from Elecraft to download the latest production released firmware or,
2. Download the new file from the Elecraft web site manually and place it in a local folder, then click on Browse... to locate the folder on your computer. This is the way to access the latest Beta firmware available from Elecraft.

To install new firmware in your KPA1500, click on the utility Send Firmware to the KPA1500 button to start the transfer. Follow any on-screen instructions. During download the LCD will display *MCU LOAD* and the STBY LED will flash rapidly. The KPA1500 will return to its normal power on state when the transfer is completed.

Be sure to check the notes supplied with the new firmware. They may include changes that affect the instructions in this manual.

If you don't have Internet access, you can obtain a firmware upgrade on CD. If you don't have a computer, you can send your KPA1500 to Elecraft to be upgraded. See Customer Service, pg.20.

Checking your Firmware Revision

Use the MENU entry *FW Rev* to determine your firmware revision.

Wattmeter Calibration Procedure

The KPA1500 wattmeter is factory-calibrated. However, if you have a wattmeter that you feel is more accurate, you can adjust the KPA1500 wattmeter to match its readings as follows. The calibration is done per-band so you can make adjustments for individual bands without affecting the others.

In addition to your wattmeter, you will need a good dummy load capable of handling 1500 watts.

- Connect your wattmeter to the KPA1500 one of the ANT connectors using short, direct 50 ohm coaxial cable.
- Tap **ANTENNA** on the KPA1500 to select the ANT output where you connected the wattmeter.
- Connect your dummy load to the wattmeter.
- Select the band that you wish to calibrate.
- Tap **PWR** on the KPA1500 to display the RF power output on the LCD.
- Transmit briefly at 1500 watts output into the external wattmeter and dummy load
- and compare the reading on the external wattmeter with the KPA1500 wattmeter.
- If you wish to adjust the power displayed on the KPA1500 LCD and LEDs, hold **MENU** and tap switches next to the \triangle and ∇ symbols until PWR ADJ is displayed on the LCD.
- Hold **EDIT**. A number between 80 and 120 will be displayed on the LCD.
- If the power displayed on the KPA1500 wattmeter needs to be higher, tap the \triangle switch. If the power displayed on the KPA1500 needs to be lower, tap the ∇ switch. The number displayed indicates the percentage change in the power reading. For example, changing 100 to 110 will result in a 10% increase in the power indicated.
- Tap **MENU** twice to exit the menu. The current band will be displayed on the LCD.
- Tap **PWR** on the KPA1500 to display the RF power output on the LCD.
- Transmit again and compare the readings on the KPA1500 and your external wattmeter. Repeat the procedure as needed until you are satisfied with the readings.

Specifications

Frequency Range	All Amateur Bands from 1.8 to 29.7 MHz and 50 to 54 MHz
Supply Voltage and Current	195 to 250 VAC, 50/60 Hz
Weight	26 lbs (12 kilograms)
Size	Enclosure only, 4.5 x 13.5 x 11.5 in., HWD (11.5 x 34 x 29 cm).
Power Output	1500 watts PEP CW/SSB/Data
Duty Cycle at 1500 Watts	10 minutes key down / 5 minutes standby
Drive Power	50-70 watts, typical, for 1500 watts output
Input VSWR	Less than 1.5:1
ALC Out	Negative-going, adjustable
Metering	Power Output, SWR (bargraph and on the LCD display), supply voltage and current, temperature, frequency band
Heat Sink Temperature	90°C, maximum
Key In	+5V maximum, open circuit on receive, closed to ground on transmit (1 mA max.)
Efficiency	Approximately 50%

Customer Service and Support

Technical Assistance

You can send e-mail to k3support@elecraft.com and we will respond quickly – typically the same day Monday through Friday. If you need replacement parts, send an e-mail to parts@elecraft.com. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-763-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support, so please try that route first as we can usually help you find the problem quickly.)

IMPORTANT: You must contact Elecraft before mailing your product to obtain authorization for the return, what address to ship it to and current information on repair fees and turnaround times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped without authorization will incur an additional shipping charge for reshipment to our repair depot.*

Elecraft 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from the factory, the date the product is shipped to the customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

Who is covered: This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift, or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided at time of order to ensure warranty coverage.

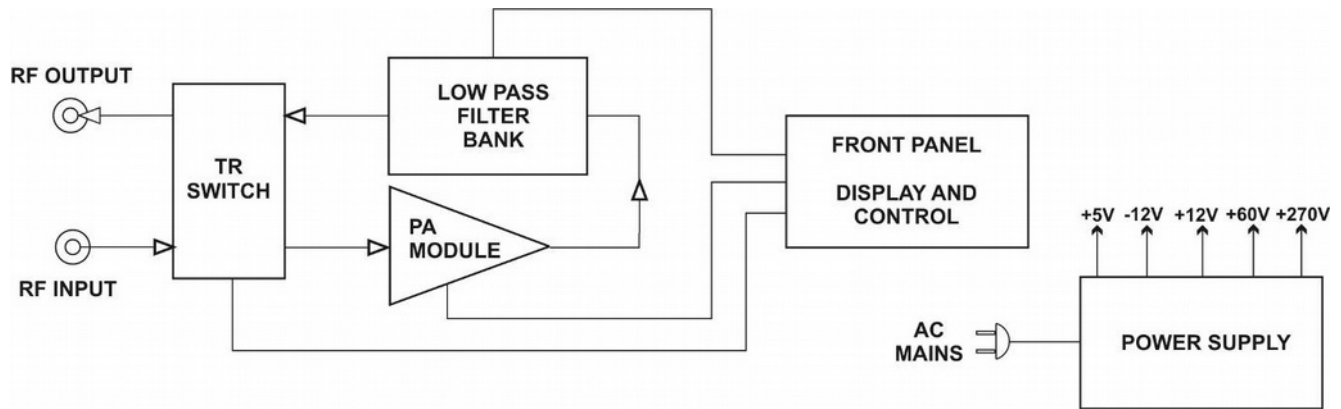
What is covered: During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to us for warranty repair; we pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. For Alaska, Hawaii, and other destinations outside the U.S. and Canada, actual return shipping cost is paid by the owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the customer. Elecraft will not be liable for an special indirect, incidental or consequential damages, including but not limited to any loss of business or profits.

Theory of Operation

TBD – Update block diagram to show 2 RF out and new power supply voltages.



When the KPA1500 is in operating (OPER) mode, RF is routed by the transmit-receive (TR) switch to the power amplifier (PA) module where it is amplified by a pair of dual power MOS FETs.

The PA module output is routed to the low pass filter (LPF) bank input. The LPF bank provides filters for each frequency band. The frequency of the incoming signal is monitored and the appropriate filter is automatically switched into the signal path. The filter also may be selected by band data provided by the transceiver or by front panel switches on the KPA1500. However, the automatic selection based on the incoming signal frequency overrides either of those inputs to ensure the correct bandpass filter is always in the signal path.

The output of the LPF bank is routed to the RF output via the TR switch.

During receive or when the KPA1500 is in Standby (STBY), the TR switch routes the RF input directly to the RF output, bypassing both the PA module and the low pass filter bank.

The MCU in the display and control module monitors and makes critical measurements of a number of operating conditions including two levels of fault conditions that automatically alter the operation of the KPA1500 (see pg 14).

AUX Connector Interface

⚠ Do not attach a common VGA cable to the AUX connector.

The AUX connector provides an optional interface that more closely integrates the KPA1500 with the driving transceiver. Below are the signals available at the AUX connector. Specific cable connections for Elecraft, Icom and Yaesu equipment follow.

Refer to the *RADIO* entry in the menu (pg 15) to enable communications via the AUX connector.

KPA1500 AUX Connector Pinout (DE-15 Male)

Signal Name	Pin	Direction	Notes
Band VRef (Icom)	1	In	Reference for Icom input – connect to 8V
AuxBus I/O	2	Out	K3/K3S
Band1 In	3	In	BCD Band Input – Bit 1*
NC	4		
GND	5		
Band V (Icom)	6	In	Uses Icom standard band voltages
Alarm Out	7	Out	Drives low for fault input Not used by K3/K3S. Must not be connected to K3/K3S.
Power On/Off	8	In	Pulse low to turn KPA on or off – do not hold low!
Band2 In	9	In	BCD Band Input – Bit 2*
Key	10	In	Low enables amplification. Internally pulled up to +5V. Sources 1 mA when pulled to ground. Diode isolated from the KEY IN RCA jack.
Inhibit#	11	In	Low inhibits amplifier operation
GND	12		
Band0 In	13	In	BCD Band Input – Bit 0*
Band3 In	14	In	BCD Band Input – Bit 3*
ALC	15	Out	ALC output to transceiver

* See pg 24 for the BCD band codes used.

Details of Aux Connector wiring cables for popular transceivers are shown on the following pages.

Elecraft KPAK3AUX Interface Cable

This is available direct from Elecraft (pg 20): order KPAK3AUX for the complete set:

- KPAK3AUX Cable, 59.5” (1.5 m) long. May be ordered separately. Order E850463.
- 15 pin Y cable that allows access to the K3 or K3S Aux port for other devices. May be ordered separately. Order E980190.
- 15 pin male-female Key Line Interrupter.

KPAK3AUX cable wiring. Pins not shown have no connection.

KPA1500 AUX CONN. PIN	K3 AUX CONN. PIN	SIGNAL
2	2	AUXBUS
3	3	BAND 1
5	5	GND
9	9	BAND 2
10	10	PTT (See Note)
11	11	Inhibit
12	12	GND
13	13	BAND0
14	14	BAND3
15	15	ALC (Optional, see pg 12)

Notes:

1. If you have devices that need access to the PTT line (e.g. some ATUs, SteppIR controllers, etc.), use the key line interrupter supplied with your KPAK3AUX cable set. The interrupter breaks the pin 10 line so you can use the separate KEY IN cable (see Figure 4 on page 9).
2. Pin 4 is not used but the wire is included in the KPAK3AUX cable.

Icom Cable

Various models of Icom radios use either a 13-pin DIN or a 8-pin DIN connector. Be sure to use the connector that is correct for your radio. Pins not shown have no connection.

KPA1500 AUX CONN. PIN	ICOM DIN13 CONN. PIN	ICOM DIN7 CONN. PIN	SIGNAL
1	1	1	8V Reference
5	2	2	Gnd
6	5	4	Band Voltage (Not CI-V)
10	3	3	HSEND
15	6	5	ALC (Optional, see pg 12)

Yaesu Cable

Although various models of Yaesu radios use either DIN8/262 or a MiniDIN8 connector, the pin connections are the same. Pins not shown have no connection.

KPA1500 AUX CONN. PIN	YAESU CONN. PIN	SIGNAL
3	5	Bit 1
5	3 & 8	GND Note: Yaesu pin 8 must be grounded or TX is inhibited.
9	6	Bit 2
10	2	Key
13	4	Bit 0
14	7	Bit 3

BCD Interface

The following are the band codes used by the KPA1500:

Band (Meters)	BCD Code
60	0x0
160	0x1
80	0x2
40	0x3
30	0x4
20	0x5
17	0x6
15	0x7
12	0x8
10	0x9
6	0xA