Yaesu fl-2000b manual

Page 2Page 3 Fox Tango International presents the evolution of the FL Amplifier A look at what's going on in FL-1000~2100Z Most amateur radio operators of the 21st century are well acquainted with the world famous FT-101 and the matching line of accessories, including the FL-2100B compact 1200W linear PEP amplifier. The FL-2100B is known for its reliability, using robust 572B amplifier tubes, high quality construction and it is a reasonable selling price on the second hand market. But the evolution of a large amplifier like the FL-2100 series did not happen overnight, let's take a tour of the various amplifiers. By the time Yaesu (Wireless) Musen introduced its original F line in 1964 it was quickly followed by a sophisticated F series in 1965 with transceiver power and a matching 1200w PEP input linear amplifier. Yaesu FL-1000 Starting with the Yaesu FL-1000, the corresponding amplifier for the Yaesu F line. The FL-1000 uses four 6JS6C power amplifier tubes in the bottom grey configuration with capacitor coupling input at the cathode and no tune input circuits. Rated at 1200 watts PEP INPUT typically power will run 450 watts or slightly more with good strong tubes. (webmaster's FL-1000 W4CLM) Type: All-mode HF linear amplifier Class AB2. Frequency range: 3.5 ~28 MHz voltage: 100/110/200/220 A.C. 50/60 Hz Power Drain: xxxx Drive Power: 30 to 100 watts generator Maximum input power: 960 watts pep maximum dimensions (W*H*D): 13 X 7 -1/8 X 11-3/4 Weight: 20 kg Ca. Manufactured: Japan, 1965 Other: 4X 6JS6A Plate Voltage 850Vdc Output Impedance 50~75 Ohms Take a look at the original 1965 FL-1000 ad Schematic, Top and bottom of the FL-1000 It's interesting to look at the FL amplifiers that follow in progression things of interest to note are the overall layout of the power supply, RF deck, cooling fans and similarities from one amplifier to the next. The four 6JS6A tubes are vertical and a single fan is attached to the back of the cabinet. A look inside the FL-1000 PA Cage A look below the FL-1000 FL-1000 Power Supply Bottom of the FL-1000 RF deck FL-1000 TR Relay As we continue our tour of the various FL Amplifiers we will notice many similarities in circuits layout, and components used. The TR Relay you see in the above picture had to be replaced, not surprising for an amplifier manufactured in 1965. The TR relay I chose as a replacement for my early FL-1000 is the same antenna relay used in the FL-2100B and still currently available through Yaesu parts. (RL-1 P/N M1090001) Yaesu FLdx2000 October 1967 the FLdx-2000 used four 6KD6 sweeping tubes in the ground grid configuration. Like the previous FL-1000, this amplifier had no tuned input circuits. The input signal was fed from the input SO-239 to RL-1 and was used capacitor coupled 6KD6 cathode. This method worked very well with the transceiver of the same era. The last amp phase of the transceiver was tuned to transfer to the linear amplifier. Not unlike the modern solid state transceivers that see 50 Ohm load and minimum standing wave ratio for maximum power transfer in the amplifier. Type: All-mode HF linear amplifier AB2 Frequency range: 3.5 ~28 MHz Voltage: 100/110/117/220 A.C. 50/60 Hz Power Drain: xxxx Drive Power: 30 to 100 watts PEP Maximum input power: 1,200 watts PEP Dimensions (W*H*D): 14-9/16 X 6-5/16 X 11-7/16 Weight: 20 kg produced: Japan, 1967 Other: 4X 6KD6 Plate Voltage 1200 Vdc Output Impedance 50~75 Ohms FL2000 Above and Below View The four 6KD6 amplifier tubes laid horizontally in the PA cage and uses a single fan for forced air cooling under the PA compartment. Yaesu FL2000B FL2000B September 1969 with the introduction of the FL200B Yaesu made an important step forward by moving away from using sweeping tubes in its linear amplifiers and using two parallel Cetron triode 572B power amplifier tubes in ground grid configuration. Type: All-mode HF linear amplifier Frequency range: 3.5 ~28 MHz Voltage: 100/110/117/220 A.C. 50/60 Hz Power Drain: 117V=17 Ampère 234V=9 Amp drive power: 100W Maximum input power: SSB: 1500 PEP; CW 1000W Dimensions (W*H*D): Weight: 55 Lbs Manufactured: Japan, 1969 Other: 2X Cetron 572B Triode in Parallel Output Impedance 50~75 Ohms Other improvements included individual tuned input coils and dual cooling fans one for each of the PA tubes just like the later FL-2100B. Yaesu FL2500 Yaesu's Grand Linear Amplifier with an input of 1500 watts with a power of 100 watts. Unlike previous amplifiers manufactured by Yaesu, this amplifier can be operated from 1.9 MHz to 28 MHz amateur bands. With dual fans for cooling the five horizontally mounted 6KD6 output tubes. February 1971 used FL2500 FIVE Horizontally mounted 6KD6 tubes. 1.9 MHz to 28 MHz Type: All-mode HF linear amplifier Frequency range: 1.9 ~28 MHz Voltage: 100/110/117/220 A.C. 50/60 Hz Power Drain: xxxx Drive Power: 100W Maximum input power: 1500 W DC Dimensions (W*H*D): 370mm X 160mm X 290mm Weight: 22 Kg Manufactured: Japan, 1971 Other: 5X 6KD6 Output Impedance 50~75 Ohms Also sold in Europe by importers Sommerkamp, as the Sommerkamp FL2500 FL2500 Schematic diagram The meter is double purpose. It will read plate flow & also acts as a Forward/SWR meter. There is a switch next to the meter for CW/Tune (top position), SSB (bottom position). Yaesu FL-2100 /B/F Probably the most famous and seen amplifier in this series is the FL-2100B. The FL-2100B is designed as a conservatively rated matching amplifier for use with the FT-101E and matching accessories. There were three variations that looked and for all practical purposes worked the same The original FL2100, The FL2100B and the (Less 10 meters operation) From CQ Ham Radio Japan December 1971 See here the original FL2100 FL-2100 Type: All-mode HF linear amplifier Frequency range: 3.5 ~28 MHz Voltage: 100/110/117/220 A.C. 50/60 Hz Hz drain: xxxx Drive power: 30~100W Maximum input power: 1200 W (SSB) 800 W(CW). Dimensions (W*H*D): 340 x 153mm x 285mm weight: 18.5kg manufactured: Japan, 1971 Other: 2X Cetron 572B Triode Output Impedance 50~75 Ohms FL-2100 Schematic Diagram FL2100B One of the nice features of the 2100 Linear Amplifier compared to that of the previous models was the use of dual front panel meters that offered continuous monitoring of plate flow and voltage. The FL-2100 features two robust 572B carbon plate tubes in Class B ground-grid circuit with individually tuned input coils for each tire. SOMMERKAMP FL2277 (Same as FL2100) One can hardly see any difference from an FT-101E sold in Europe by Swiss importers like the Sommerkamp FT-277E, along with the Yaesu FL-2100 amplifier sold as the Sommerkamp FT2277 linear amplifier. Sommerkamp was a Swiss company that sold all kinds of communication equipment on the European market, mainly to Germany and Italy. Sommerkamp produced nothing themselves, they bought a lot of equipment directly from Yaesu and other manufacturers, and sold them under their own brand, not unlike Radio Shack does in the US. It already started with the FR-50 and FL-50 series. Normally they bought standard equipment, but occasionally they had produced something on their own specifications, (FTDX series) or CB stuff, that sold true in large numbers. So: every Sommerkamp is basically a Yaesu (or other brand). The only thing, original Sommerkamp, is the name tag. Wim Penders PA0PGA FL2100F 10 Meter add to your FL-2100F The FL-2100F ready for surgery and the addition of 10 meters In the photo above you look at the rear input band selector switch. If you look closely, just below the 33 Ohm resistance in the middle of the entrance and from left the third Mica capacitor over. You can see the white part of the switch, this would normally have had a 10m contact, but it's missing. To complete the 10m input circuit (S2b), it must be replaced. What you look at here S2b removed and you see the tuned circuit entrance of the FL-2100F, the coil to the right is not connected yet. This is new for 10 meters. Also, you need to work two more ceramic doorknob capacitors along with your new front and rear tire switches for 10 feet. C211 200pf (same as FL-2100B) C215 100pf (Same as FL-2100B) L206 10 meter input coil P/N L0020710 Add at 10 meters for the FL-2100F model amplifier. New input circuit coil, two new ceramic doorknob capacitors and front and rear tire switches were needed to do the job. While you're at it, you might as well clean up the inside of the amplifier! Close the position of the tyre switch on the FT-101F with the new 10-meter position. On the -F model to do the work, you need to replace both front and back, input and output band switches. IT'S A JOB!! I this from a real super person on Fox Tango. My good friend Rick KA4ZSG. This is the finished amplifier after installing rear tire switches 10 meters. The FL-2100F did not come with the 10m band, thanks to FCC rulings on linear amplifier operation that could possibly be used on Citizens Band in the United States. Parts required for 10m add at 10 meters to add on kit for the ** FL-2100F ** Yaesu P/N D3000037 (Sold out) The kit consisted of C211 20 0pf K24356201 (same as FL-2100B) $9.20 C215 100pf K24356101 (Same as FL-2100B) $ 9.20 L206 10 meter input coil P/N L0020710 $9.92 Front Band SW N0050008 With 10 meters contact (No longer available) was $3 5 .25 USD Front Band SW Replaced by front Band Switch N0050034B $68.35 Rear Band SW N0050009 With 10 meters contact $25.65 Total for caps, coil and switches was $122.32. Pix A Pix B Pix C Thinking of buying a used FL2100B or just doing an overhaul on your FL2100B? Check that tire switch! FL-2100B (S1a) See: Pix A & Pix B band switch closest to the front of the amplifier. You can see that the contacts for the 75 meter capacitors that turned on this tire were literally burned down in both photos. I can't give you a better example of this as in photo B it had to be just about one of the worst cases of band switch destruction I've seen in a long time! This is not an uncommon problem seen in the FL-2100 series amplifiers and band switches are expensive if you even find one. I can provide you with example after example of tire switches that have been burned either due to poor operator habits or parasitic oscillations in FL-2100 amplifiers. One thing that can help in this situation is Richard Measures parasitic kit as mentioned below which should help stabilize the amplifier at 10 meters. See:Pix C as the 10 meter section of S1B burned down in this photo. See below: 1977 Yaesu bulletin CA:128 Referencing band switch problems Fire in the Hole Boys! 1977 Yaesu bulletin CA:128 Referencing band switch problems FL-2100B band switch repair. The entire front panel will need to be removed from the amplifier to do this work. Tire switches if they can be found are very expensive. When buying an amplifier check that all bands work to avoid doing this work. While you're overhauling any amp with High Voltage and high power RF, make an extra effort to control everything. As you can see with a flashlight behind these ceramic capacitors, you can literally see light coming through the capacitors. When you use High Voltage & High power RF in an amplifier, you have to look for these kinds of problems and you need to replace them. Note: C222 takes a lot of heat from the 572B finals, if it cracked or shows signs of failure, replace it. C222 is the output clutch capacitor that feeds the tank circuit, it can be seen in the picture above on the right. This ceramic capacitor was removed from a amplifier, but it's a time bomb lurking for a small disaster, the. cracks were due to heat in the PA compartment. Below you can see GOOD YAESU PART NUMBERS FOR THE FL-2100 Series Ceramic Capacitors, Capacitors, note them. When ordering replacements someone change two number when ordering C222 K24356102, I became a K31356102 Mica Cap cap Axial leading 1000PF @ 16.82 ea. Using Yaesu part numbers all ceramics start K24 ..... and the MICAS are K313..... Something. So always check your part numbers when ordering and make sure the parts dept send you the right part. C222 center ceramic capacitors for your FL-2100/FL-2100B/**FL-2100F** Schematic # Description Yaesu# 215, 224 100pf K24356101 $9.20 2212, 217 250 K24356251 211, 216 200pf K24356201 $9.20 226 300pf K24356301 $9.20 221, 222 1000pf K24356102 $9.15 (RDA30 3Kv) 223 500pf K24356501 $9.15 This amp was a real mess when I got it. Unfortunately I didn't take any pictures before I started. But what you see here is Nicotine gravy on the main RFC and a new RFC on the right, which goes into the amplifier along with the new band switch. This amp was full of nicotine and a real mess, even the double cooling fans under the RF deck would barely turn form solidified nicotine. Plate RFC Inductor Yaesu P/n L102220655 $21.45 USD The FL-2100B was full of nicotine gravy when I started and the tire switch was burned at 75 feet. This is how it looked after I cleaned inside and a new tire switch was installed. This is the way your amplifier will look like if you change a tire switch, you need to check for other things like cracked parasitic resistors, cracked ceramic doorknobs capacitors, and make sure the fans are clean and running quickly. See more about fans below Several photos with the tank circuit removed and PA cage ready for cleanup. This is the front panel of a FL-2100B removed. Cleaned, touched with paint where necessary with new plastic on the panel. It looked like it was factory new when finished. Yaesu Technical Bulletin: Fl-2100B Amplifier Bias Modification For Svetlana and Taylor 572B Tubes Thinking of Buying a Used FL2100B ? When buying a FL-2100 series amplifier some of the things you want to look for in this amp are burned parasitic resistors, 22 ohm (2 watt resistors) on the plates of the 572B tubes. Burned band switch contacts as mentioned in Pix A, B&C above. Burn 33 ohm (1 watt resistors) in the net circuit under the tailgate in the back of the amplifier. Fans don't turn slowly or run (Clean them & Reference the Fan Photos.) High Voltage should be up to 2.4 KV and slightly higher about 2.6 Kv when running the amplifier at 220 VAC input. A word of caution, be very careful when working with the covers off and power on the amp, if you have to do this. Also note that there is a safety lock under the cover of the PA cage cover. This switch will put a ground directly on your high voltage power supply when the RF tank circuit top is deleted. I've seen it numerous times where the 47K ohm R207 in series with the switch is burned open, indicating that someone turned on the amplifier with the lid off of the upper shield out of the tank circuit and the the was not defeated. If you need to maintain your amplifier with the high voltage and power on while removing the top shield from the PA cage, you must disable the Safety Lock Switch S7. But be careful with the H.V. if you do this. Typically these amplifiers give you about 450 watts on the low side and up to 600 watts output with new tubes and wired for 220 VAC input. RF parts is selling TAYLOR tubes that they recommend for this in your amplifier. I've always tried to install CETRON tubes as they were original from the Yaesu factory with Cetron 572B tubes installed, but Cetron 572B tubes are no longer manufactured and the TAYLORS of RF parts work fine. In fact, I am convinced now that they work great, just as well as the Cetron tubes ever did. I do not recommend putting Sylvetlana tubes in these amplifiers, if you look closely at the Russian 572B tubes, the plate area is much smaller compared to the new Tayolor tube. It is also my understanding that Russian tubes do not hold almost as well when operated in a horizontal position. I used the Sylvetlana tubes instead of 811 tubes in amplifiers like the Ameritron 811H amplifier and they worked great in a vertical position instead of the type 811 amplifier tube, not like those of the FL-2100 series or the Heathkit SB-200 amplifiers. RF parts also recommend a bias change be made on the FL-2100/B in order for you to get their 1 year warranty on the TAYLOR tubes. This change came from a Yaesu Technical Bulletin. I did this to one of my amplifiers and the bias was adjusted for 0.03 amps on the IP meter. The manual for the FL-2100B says to adjust your bias to (90 mili amps) 0.090 amps. My gut feeling after having done this change is that at 0.030 amps it's a bit low for a few these tubes stationary and I wouldn't do the change again. I can only assume that the technical bulletin was sent by Yaesu to extend the life of the tubes. Wiring your FL-2100 amplifier for 220 VAC Europe Vs (117V VAC) or what can be almost 250 VAC USA! Much discussion has been made about the proper wiring of the FL-2100 series amplifiers for the so-called 220 VAC operation here in the states. If you want to read the whole thread you will read the comments in more detail on the club public forum: Click here to visit the thread To keep it short I will say this much on the subject. With the right wiring here in the US you really need to be using the two 117 VAC primaries of the amplifier in series Vs. using the two 110 VAC windings. Two hundred and twenty volts is not really two hundred and twenty volts here in the US and you put your amp under stress and possibly lead to premature component breakdown and eventually amplifier failure. This is important to consider due to the fact that many of the parts such as tire switches are no longer available at the manufacturer, along with high voltage doorknob type type are expensive and often hard to find. If you wire your amplifier for 220 VAC according to the owners manual your plate voltage will rise to about 2,600 VDC. When running the FL-2100 on 117 VAC you usually have 2,400 VDC on the plate voltage gauge. Now that 200 Volds DC on the plates of your tubes may not sound like much in the overall scheme of life, but is balancing with the small amount of power gained compared to the heat and stress on the components, is it really worth it? That's up to you to decide. My suggestions for what it's worth, if you live in the United States and you love your amp, it's child's play to move the taps about placing the two 117 VAC wrappers in series, I did just this and now my DC plate voltage has dropped back to where it should run at 2400 volts. (Note the links below for wiring photos) Now I can safely run my amplifier on what is almost 250 VAC coming into the shack and not having to worry about things like line loss or overloading a smaller 117 VAC circuit with high current when running the amplifier. To better portray this. I have measured my so-called 220VAC line in my house and I have more like 250 VAC! That's a lot if you take into account the Peak to Peak voltage and so on, it's probably pushing the amp pretty hard as it's wired using the two 110 VAC primaries in series while trying to use the amp here in the US. Probably outside the US, in Europe and elsewhere the use of 220 VAC really means 220 VAC and certainly it is kept much closer to the specifications. In fact if you think about it you also remember here in the United States years ago we used to call it 110 VAC, it's my understanding the tension was pushed slightly higher to make up for such things as excessive line loss getting the current all the way to those houses across the country! To clarify for you, I took some pictures of the before and after 220 VAC wiring. Let's call the side of our plate wiring diagram closest to the transformer end in the image of the TOP and the front panel bottom as it will come in my photos. If we wired our amplifier according to the manual (For 220) you need to contact one of the input leads to 110. Move it to 117 VAC at the top of the plate wiring diagram. In the middle according to the book count four screw contacts and you can see the Zero leave this where it is connected, but the of this jumper is connected to the next 110 contact down the line. Leave the zero contact where it is and move the lead from 110 to 117VAC contact. Finally, you need a zero contact at the bottom (Nearest the front panel) leave it where it is. In summary, a picture is worth more than a thousand words: (The way the books show it) 220VAC 234VAC USA (Beide 117VAC voorverkiezingen in serie) OH & PS: By the way way Extra jumper you wind up with when going from 117 to 220, just double it so you don't lose. Better not to have flopped around in the amp somewhere. It doesn't hurt to do this note the center contacts. Save that extra jumper lead if you have one in case you ever want to wire it back to 117VAC. Just do this. Shown for Europe 220VAC. AG6K changes for 572B amplifiers By Richard Measures AG6K After a nice conversation with Richard (AG6K) today on the phone has given me more insight into the changes he proposed for amplifiers in general, the Q of parasitic chokes and parasitic oscillations. I recommend you to look at Richards writings and give this some though before changing your amp. His kit will require you to change your parasitic chokes with Metal Oxide Film resistors to lower the Q of the parasitic chokes, lowering the grid resistances to 30 Ohm and adding in a pair by adjusting capacitors on the grounded grid circuit. And an additional interesting feature of Richard's kit is the addition of a 15 Ohm Omite current limiting resistance in the plate H.V. lead to limit the flow, must by chance see each oscillation and briefly pull high current. For more information about Richard's writings see this link: Enhanced Anode-Circuit Parasitic-Suppression For modern amplifier tubes My underbelly feel on this is using the original 22 Ohm 2w resistors if you still find them. If and when they are no longer available then you might consider looking for Richards parasitic chokes a little closer. Can we talk? Short on Fans! If you haven't noticed. All yaesu linear amplifier mentioned above used Forced Air cooling and each amplifier has used the same exact fan since day one, including the optional FT-101 transceiver fan! Each amplifier and transmitter must move as much (CFM) cubic meter per minute of air over the valve to keep it cool on its full nominal power input for the tube as designed. That being said the FL-2100 amplifier is no different and you should check if your fans haven't slowed down due to nicotine sludge building up over the years. The fans can be disassembled and cleaned, or in the least oiled. If you don't feel the air flowing from the top of the amp, you really need to check your fans, because they need to move quickly watch the pictures below. Let's see. This fan looks harmless enough to have been pulled from the back of a transceiver. Looking behind it we see caked on dirt! Pulling it apart reveals a nightmare! Your FL-2100 series amplifier has the exact same fan as used in your transceiver, except that it is not encased in an enclosure. At the remove from a revision, clean and lubricate the fans if necessary, they should quickly turn and spin down on their own once the power is removed. This is more typical of a dirty fan you probably come across. Fan Disassembly I recommend soaking the the and rear bearing in solvent overnight to remove any heavy sticky residue. Use a heavy lubricant when reassessing the fan and push the lubricant into the front and backward compositions with your thumbs. Carefully, you should test your fan to ensure that the fixture rotates freely in the field coil before tightening the hardware. Please note that the Japanese fans in your amplifier and transceiver are designed to run at 100 VAC @60 CPS. It is best if you have a VARIAC to test them at 100 VAC. If not, then you test them briefly using an interchange cord and 117 VAC, then use electrical tape on your connections and be very careful. You should retest the fan once it is installed in the transceivers fan housing. Yaesu FL-2100Z Type: All-mode HF Linear Amplifier AB Grounded Grid Frequency Range: 10-160 m + WARC Voltage: 100~117VAC 200~234 VAC Current drain: 117V @ 18 Amps / 220V @ 1 9 Amps Drive power: 100 watts PEP for full output Maximum output power: CW: 1000Watt (input) SSB: 1.2 00 Watts (PEP input) Dimensions (W*H*D): 157 X 345 X 326mm Weight: 20 Kg Manufactured: Japan, 19xx-19xx Other: 2 X 572B Related Documents: A look inside the FL-2100Z Tuned Input circuit FL-2100Z A look inside the bottom of the FL2100Z FT-902DM Station with the FL2100Z How sweet it is ! More details to follow on the 2100Z If you want to see an item of interest you want to see added to the Fox Tango Website Email to: Web Master Fox Tango International W4CLM CL. Maher Thanks for visiting Fox Tango International. International.