



ALPIN 100 MK III

- HF / 50MHz Linear Amplifier -



USER MANUAL

DECLARATION OF CONFORMITY

I hereby declare that the product:

ALPIN 100 MK III, HF/6m 1kW Linear Amplifier

satisfies all the technical regulations applicable to the product within the scope of Council Directives 73/23/EEC, 89/336/EEC and 99/5/EC:

EN 301 783-1 V1.1.1 (2000-09), EN 301 783-2 V1.1.1 (2000-09)
EN 301 489-1 V1.4.1 (2002-08), EN 301 489-15 V1.4.1 (2002-08)
EN 60215 (August 1994)

(Titles of regulations, standards, etc.)

All essential radio test suites have been carried out.

MANUFACTURER or AUTHORISED REPRESENTATIVE:

- Address:

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This declaration is issued under the sole responsibility of the manufacturer and, if applicable, his authorised representative:

- Contact:

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Bergisch Gladbach, 08.12.09



(Christian Reimesch, CEO)

TECHNICAL DATA

Frequency coverage	all Amateur Radio Bands 1.8-54 MHz
Drive power	65W
Output power	1000 Watts continuous, 1300 Watts PEP
Power Gain	11-13dB
Input Attenuator	6dB
SWR Range	1:3 (16..150Ohm)
Harmonics	1.8-29.7 MHz > 50dB / 50-54 MHz > 60dB
High Voltage	abt. 2550V under Load at 230VDC input
Intermodulation distortion	> 35dB
Tube	Single 4CX800A (GU74B) forced air cooling
supply voltage	120,200,210,220,230 & 240VAC – 50/60Hz ,one phase
Dimensions	(W x D x H) 16,9” x 14,9” x 7,4” (430mm x 383mm x 190mm)
Weight	57,5 lb (26,1 kg)
AC-Power	Fused at 20 A max. > (accordingly to be changed! > look 1.3, page 8)

GUARANTEE

This amplifier is sold with a two years guarantee except the tube. The guarantee of the tube is limited to 6 months because its life time depends strongly from type and duration of use.

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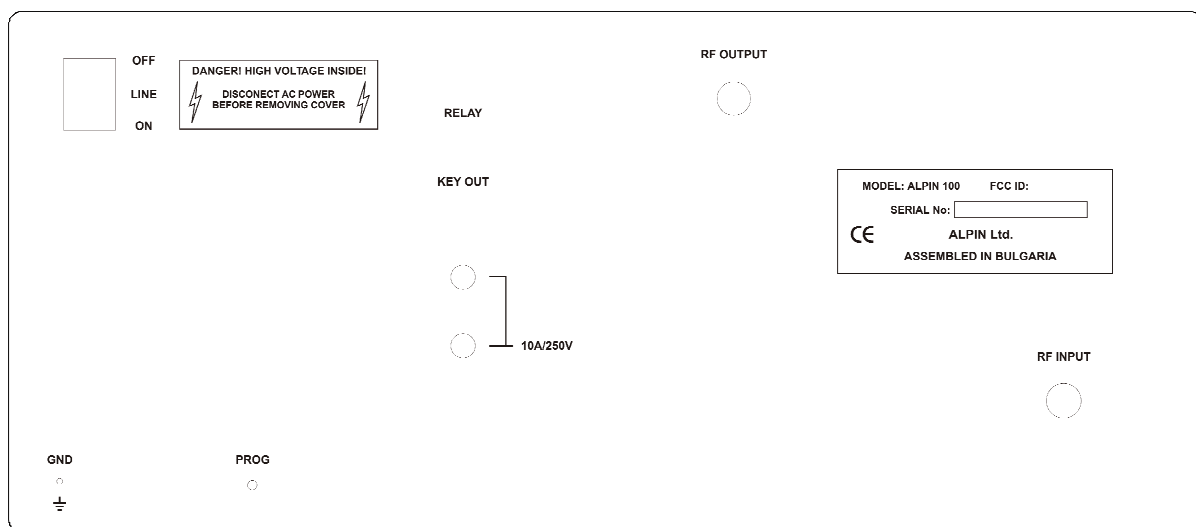
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1. INSTALLATION AND SETUP

1.1. PACKAGE

When the amplifier is delivered to you it is packed in a cardboard box with styropor inlays. Please handle the package with care. In case of damage you may need it for the ALPIN 100 to be transported back safely.

1.2. CONNECTIONS



POWER CABLE

The green-yellow wire is a chassis safety ground and **must always** be connected to the safety ground of the AC mains. (the AC-PLUG will not be supplied with the amplifier) The blue and brown wires are the powerleads. Please take care that the groundlead be cut a bit longer than the power leads (blue and brown) at installing the plug.

GND

Connect the ground stud of the amplifier on the rear panel to the grounding system. The wire used should be of large diameter and run to a good earth ground.

RF INPUT AND OUTPUT

Use a 50 Ohm coax cable with PL259 plugs. Take RG 213 or any better antenna cable and have a look on the antenna section on page no. 9.

CONTROL CONNECTIONS

Use a shielded cable with a Phono (RCA) connector from the Relay socket on the rear panel to the transceiver socket, providing "ground on transmit".

SETUP

- 1) Connect the RF-Input connector from the ALPIN 100 to the Transceiver Antenna Port (TRX IN/Out).
- 2) Connect a suitable antenna or artificial load being able to handle the output power delivered by the ALPIN 100.
- 3) Connect the PTT – Line from your transceiver to the RELAY jack of the ALPIN 100. The voltage on the Relay Jack is 12V and the current to ground is 11mA.
- 4) For QSK Operation connect your KEYER to the “RELAY” Jack and connect the KEY OUT jack on the rear of the ALPIN 100 to the KEY INPUT of your transceiver.
- 5) Connect the amplifier to the AC – Mains (230VAC) and switch on the MAINS POWER SWITCH on the rear of the ALPIN 100.

1.3. TRANSFORMER

!!! ATTENTION !!!

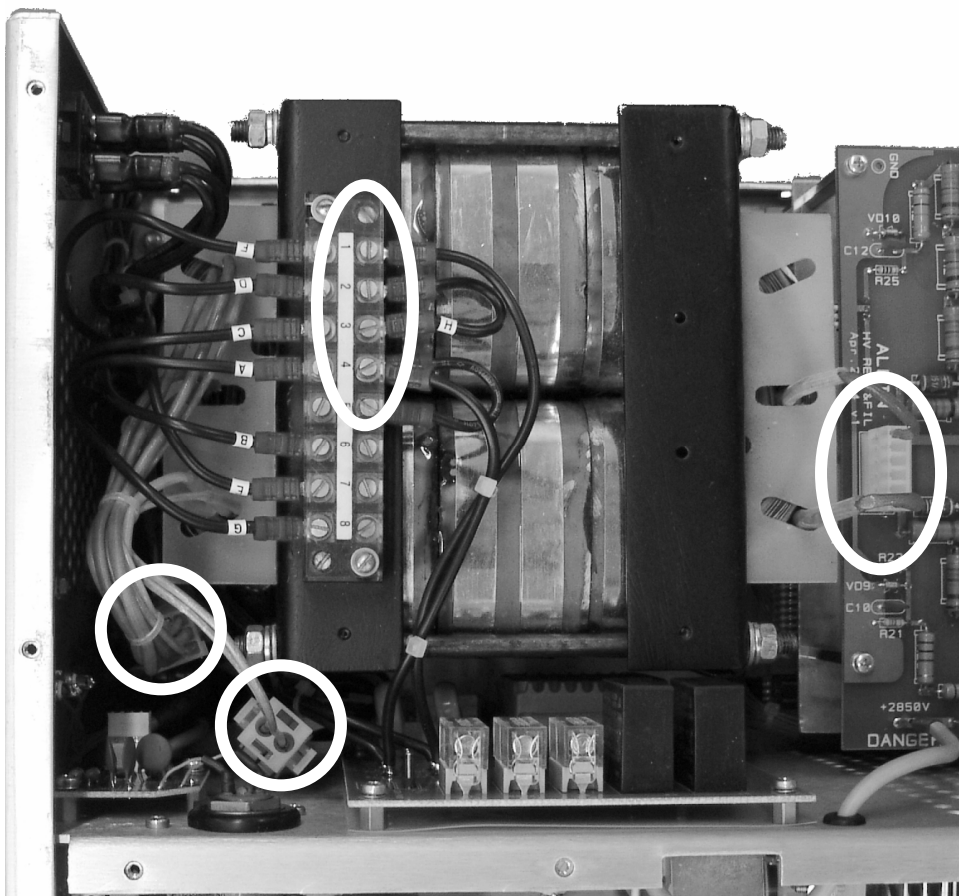
To avoid any damages, please remove the transformer before shipping.

ASSEMBLING AND DISMOUNTING

It is very easy to assemble or to remove the plug-in transformer. There are only very few connections and screws to other parts of the amplifier.

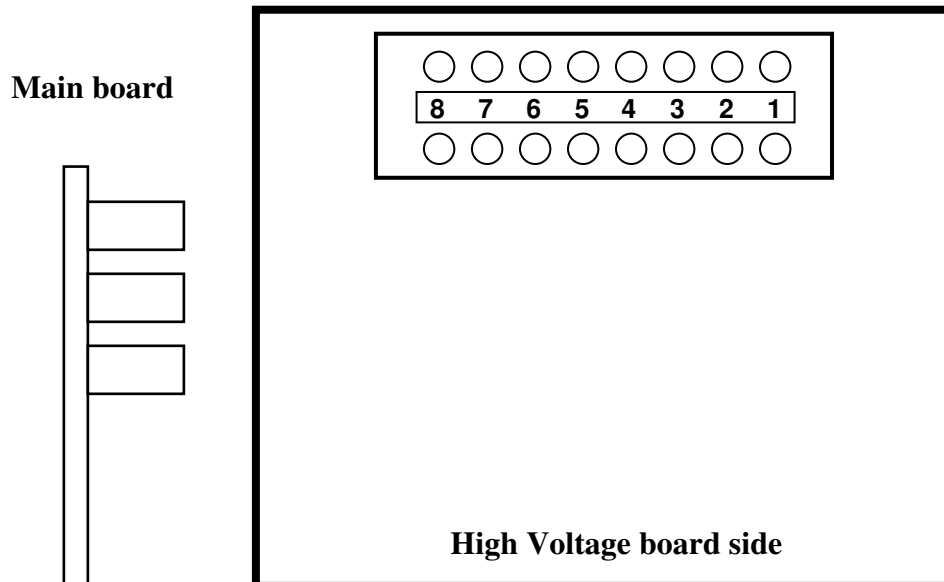
The Following parts have to be (dis)connected:

- *6 pin plug socket to the high voltage board (only 2 pins connected)*
- *9 pin plug socket to main board and G1/G2 board*
- *2 pin plug socket to tube deck*
- *2 cables (Pin #1 and #4) from the connectors on top of the transformer*
- *4 screws on the bottom of the box*



TOP SIDE CONNECTIONS

The default configuration of the top side connections of the transformer is configured for 230V shown in the table below. The 2 cables from the fuse board are always connected to **1** and **4**.



If the voltage of the power system is different from the default configuration you will have to change the position of the connector cables as shown in the table. The cables are marked from A to H and the connection points from 1 to 8. :

Line	1	2	3	4	5	6	7	8	Fuse
120V	H&G	C		D	A	B	E	F	20A
200V	E	D	B&H	A		C	F	G	12A
210V	F	D	B&H	A		C	E	G	12A
220V	G	D	B&H	A		C	E	F	12A
230V	F	D	C&H	A		B	E	G	10A
240V	G	D	C&H	A		B	E	F	10A

Besides this, you have to configure two jumpers on the main board next to the transformer. The pin numbers are printed on the board.

Line	Jumper 1	Jumper 2
120V	Pin 1 & 2	Pin 3 & 4
200-240V	Pin 2 & 3	Pin 4 & 5

1.4. ANTENNA

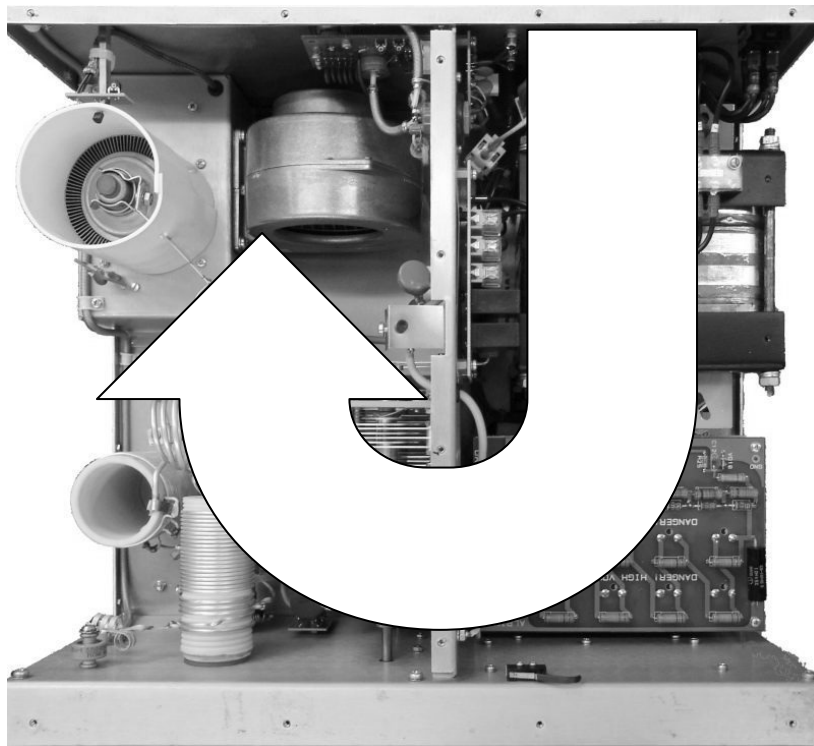
The ALPIN 100 is able to match antennas up to an SWR of 1:3 (16..150 Ohms).

It is very important to take a suitable cable (RG213 or better) with a diameter as large as possible for connecting the antenna.

All the rest (i.e. : cable, antenna, balloon...) behind the RF output jack of the amplifier should be able to resist 1 kW RF power. You have to make sure about this before you start operating with the ALPIN 100. If you are not sure, please check the data sheets to avoid damages.

1.5. COOLING SYSTEM

The cooling of the ALPIN 100 is realized by a high-quality blower. The air input port is to be found on the back panel of the amplifier and the output outlet on the top side.

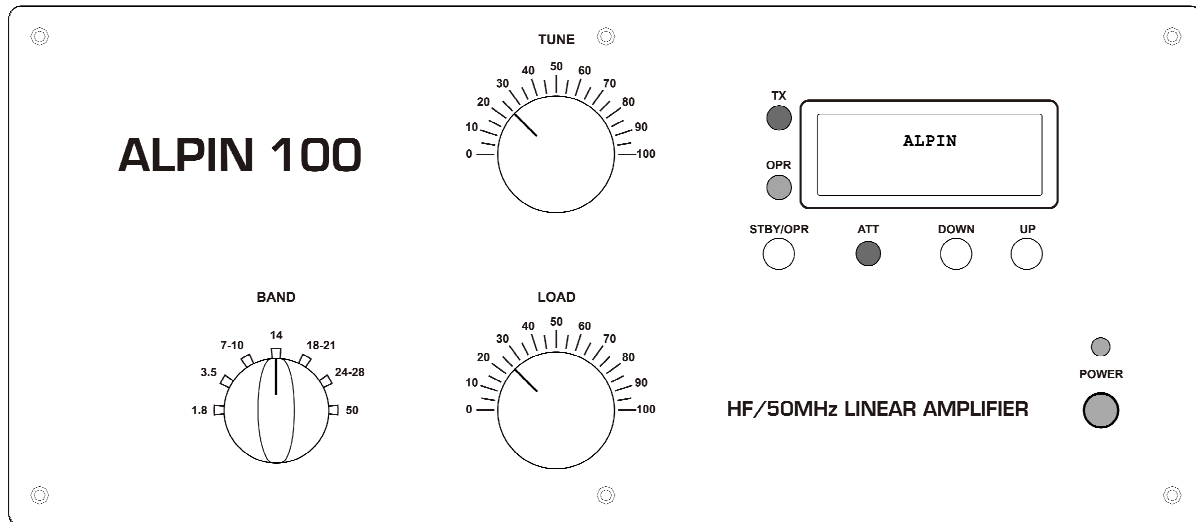


!!! ATTENTION !!!

It is very important to guarantee a free air flow from the input- to the output side. Leave at least 20cm of free space to both openings. Please free the air filter on the rear panel from dust regularly.

2. OPERATION

2.1. FRONT PANEL



The front panel is divided into two parts: One for tuning and band switching (left) and another for the visualization.(right)

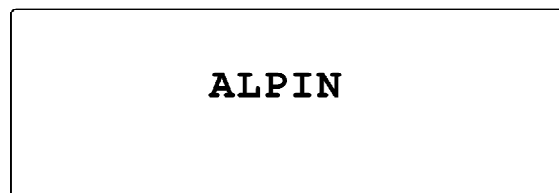
The tuning part consists of a *TUNE*, *LOAD* and *BAND* knob.

In the visualization part there are three buttons: *STBY/OPR*, *DOWN* and *UP* for standby/operate switching and display control. Besides, there are three LEDs: a red TX (lights up when transmitting), a green OPR (lights up when in operate mode) and a yellow ATT (lights up when the built-in attenuator is switched on).

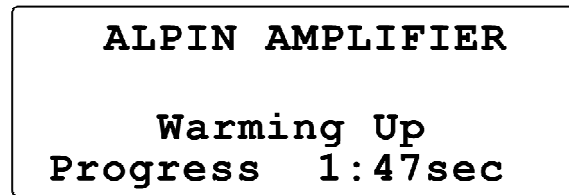
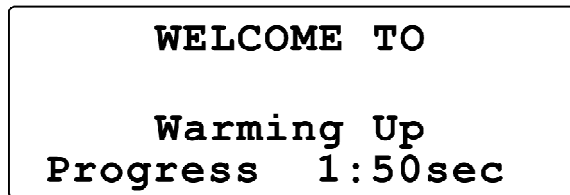
The *POWER* switch is in the lower right corner of the front panel.

2.2. POWER ON

To start up the amplifier, use the *LINE SWITCH* on the back panel of the amplifier. Now you will see the following message coming up on the LCD display at the front panel:



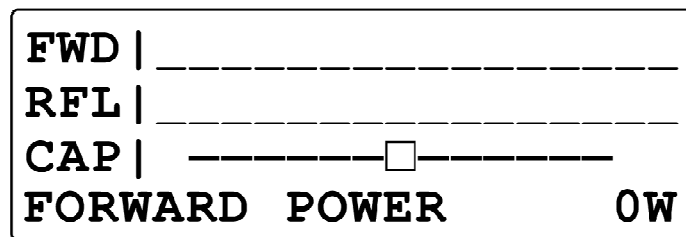
Now you can switch on the ALPIN 100 with the *POWER SWITCH* on the front panel. After this, it will need another 2:30 min for heating up the tube. The LCD display will inform you about the remaining time until the amplifier has reached *STANDBY MODE* with the following two messages. They will alternate with a 5-second- cycle.



While the amplifier is heating up, the protection system will monitor all the important data. Please have a look at page 15 for more information.

2.3. STANDBY MODE

When the warming-up time is over, the ALPIN 100 will move to standby mode. Here you can see the forward power for the first time, the reflected power, and the CAP meter. The fourth row of the display is used to show individual and /or the most essential values of the amplifier.



You may alter the displayed data with the *UP* and *DOWN* buttons next to the display.

The Following data will be shown:

- *Forward power*
- *Temperature of the exhaust air*
- *Drive RF power*
- *Screen current*
- *High voltage*
- *Plate current*
- *Antenna SWR*
- *Reflected power*

In standby mode the following values are measured: temperature of exhaust air, screen current and high voltage. You can see all the values either in operate mode or in transmit mode.

2.4. OPERATE MODE

To enter the operate mode press the *OPR/STBY* button. After this, the green OPR LED will light. Only in this mode you will be able to transmit.

2.5. ELECTRONIC BIAS SYSTEM (EBS) only ALPIN 100 MK II

The amplifier has an integrated EBS which can be activated and deactivated after switching on. The buttons UP and DOWN have to be pressed down while pressing the LINE switch on the backside.

After this the display will show the message “EBS is on” or “EBS is off”. The status can be changed by doing this procedure again. The default configuration is an activated EBS.

2.6. TUNING PROCEDURE

Below, you can find a step-by-step description of the tuning procedure. It may vary from one band to another, but these are the basic things to do. For a better and faster tuning use the tune table in the following section to find a rough starting point.

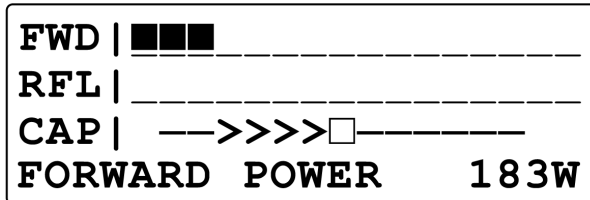
!!! ATTENTION !!!

Before tuning decrease the drive power to approximately 20W to avoid damages! After you have found the correct tuning, you may increase the drive power.

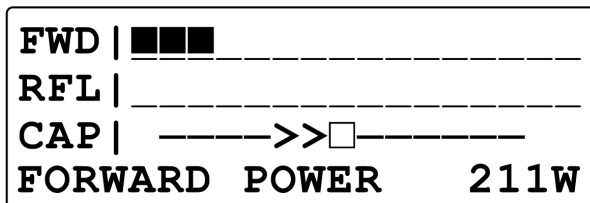
- 1) Set the Amplifier to the desired band with the *BAND SWITCH* on the left of the front panel. **Never change the position of the *BAND SWITCH* while transmitting!**
- 2) Apply approximately 20W of drive power to the amplifier.
- 3) Tune the *LOAD KNOB* on the front panel while observing the *CAP tune meter* on the *LCD* display. Turn the knob into the direction of the arrows of the *CAP tune meter*. Please use the tune table in the next chapter for the first configuration of *TUNE* and *LOAD KNOBS*.
- 4) Now we have to turn the *TUNE KNOB* on the front panel to the maximum reading of the *FORWARD POWER* in the display. While tuning it is possible that the built-in *INPUT ATTENUATOR* is activated and the *ATT LED* will light. Don't care about that and try to find the optimum position for *LOAD* and *TUNE*. After releasing the *PTT* and pressing it again the *INPUT ATTENUATOR* will be deactivated again (when tuning is good) and in the next step some fine tuning can be done.
- 5) After readjusting the transceiver output power a slight retune could be necessary and steps 4) and 5) have to be repeated.

2.7. TUNING EXAMPLE

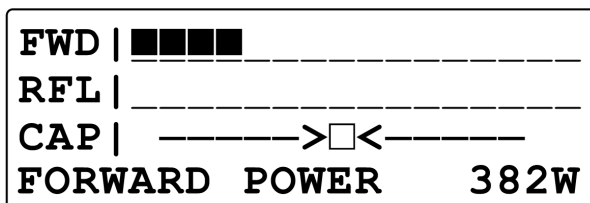
You can find an example of the tuning procedure below.



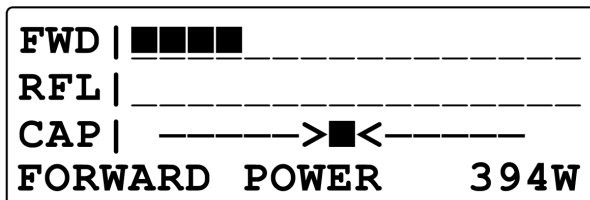
The *LOAD TUNIG KNOB* has to be rotated clockwise.



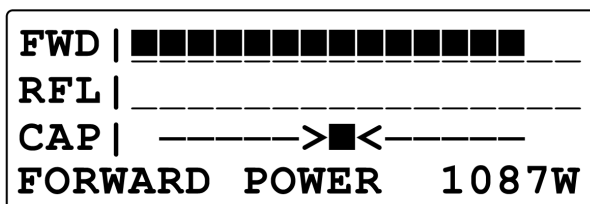
While rotating the *LOAD* capacitor the *CAP METER* is close to the optimum tuning point.



We are next to the optimum point. Just a small correction of *LOAD* and *TUNE* will be necessary to reach the point.



Here, we have found the optimum point for the *LOAD* Capacitor. Now we can release the *PTT* and increase the drive power.



After pressing the *PTT* again it might be possible to readjust the amplifier a bit.

2.8. TUNE TABLE

The table below shows the approximate settings for the *TUNE* and *LOAD* knobs on each band. These settings are not exact but they can give you a starting point for a faster tuning of the amplifier.

Band	Tune	Load
1.8	66	85
3.56	29	48
7.05	49	81
10.1	15	30
14.25	44	38
18.15	87	81
21.25	39	56
24.92	57	54
28.5	22	39
50.2	15	14

These settings will vary from one amplifier to another.

2.9. ALPIN100 US VERSION

In the US version the ALPIN100 amplifier is shipped with disabled operation on the 24-28 MHz range to comply with FCC Rules. **The PTT circuit will not work on this band and even with keyed down PTT the TX LED will not light.** Operators with an appropriate licence who want to operate on these bands should contact their ALPIN dealer for a 24-28 MHz upgrade.

3. PROTECTION SYSTEM

This amplifier uses a very complex protection system. If an error occurs, the amplifier switches to standby or off mode and prints an error code to the display.

In this way, the protection system is able to avoid a series of potential damages to the amplifier, but there is no reason to operate carelessly.

3.1. Errors in Power On mode:

Code	Legend
17	average plate voltage too high
18	IG2 too high
19	plate current too high
20	grid RF too high
21	problem with output relay contact
22	screen current too high
23	HV < 350V for more than 120 ms
24	HV > 3300V or HV < 1500V
25	low air for > 90 s

3.2. Errors in Standby mode:

Code	Legend
33	plate current > 25mA
34	high voltage > 3300V or high voltage < 1500V
35	temperature > 115°C
36	problem with output relay contact
37	G1 screen current
38	low air for > 90 s
39	problem in low voltage supply
40	drive power > 0.44W
41	average plate voltage > 480V
42	G2 screen current > 5mA

3.3. Errors in Operate mode:

Code	Legend
49	plate current > 1.2 A
50	problem in low voltage supply
51	low air for > 90 s
52	HV > 3300V or HV < 1500V

3.4. Errors in TX/RX mode:

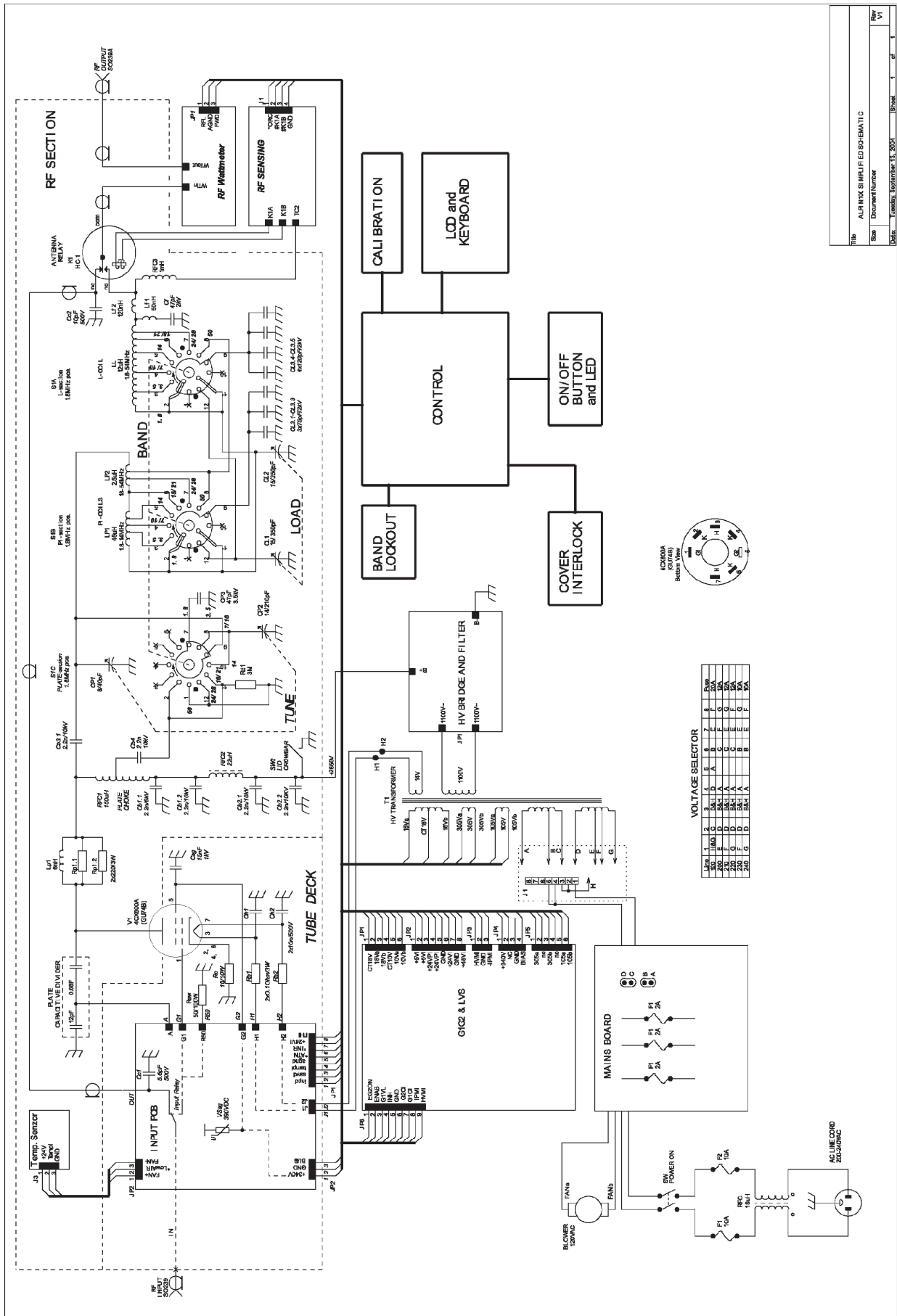
Code	Legend
64	problem with output relay contact
66	output relay contact switch 5ms problem
67	output relay contact switch 5ms problem
68	Grid RF and PANT are not ok

3.5. Warnings in Operate mode:

Besides those errors there are some warnings in the *Operate* mode. The amplifier shows a flashing warning message and/or will switch to *Standby* mode.

Message	Legend	Action
REFLECTED PWR	Reflected power > 350W	<i>Standby</i> mode
DRIVE TOO HIGH	Drive power > 90W for less than 5 s Drive power > 90W for more than 5s Drive power > 120W	<i>Warning</i> <i>Standby</i> mode <i>Standby</i> mode
SCREEN CURRENT	Screen current > 80mA for more than 1s	<i>Standby</i> mode
PLATE CURRENT	Plate current > 700mA Plate current > 800mA for more than 2s	<i>Warning</i> <i>Standby</i> mode
OVERHEATING	Temperature > 97°C (207° F) Temperature > 115°C (239° F)	<i>Warning</i> <i>Standby</i> mode
ARC FAULT	Recognized arc	<i>Standby</i> mode
GRID CURRENT	Grid current too high	<i>Standby</i> mode

4. SCHEMATIC

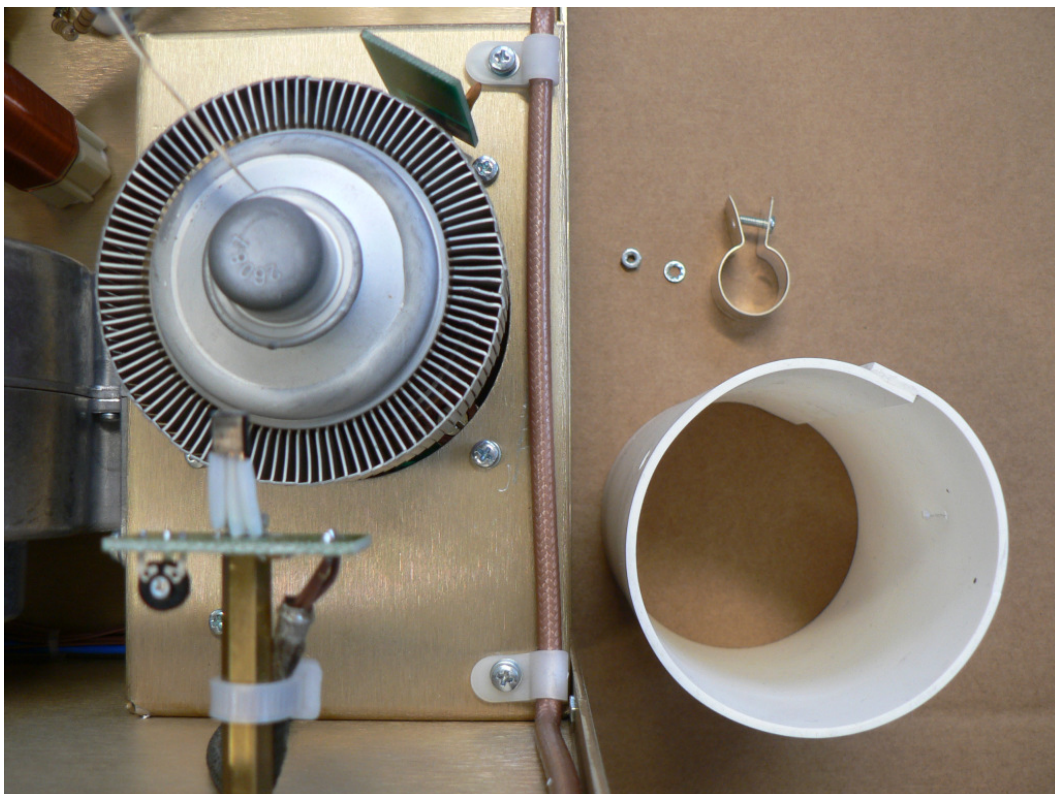


5. EXHIBIT

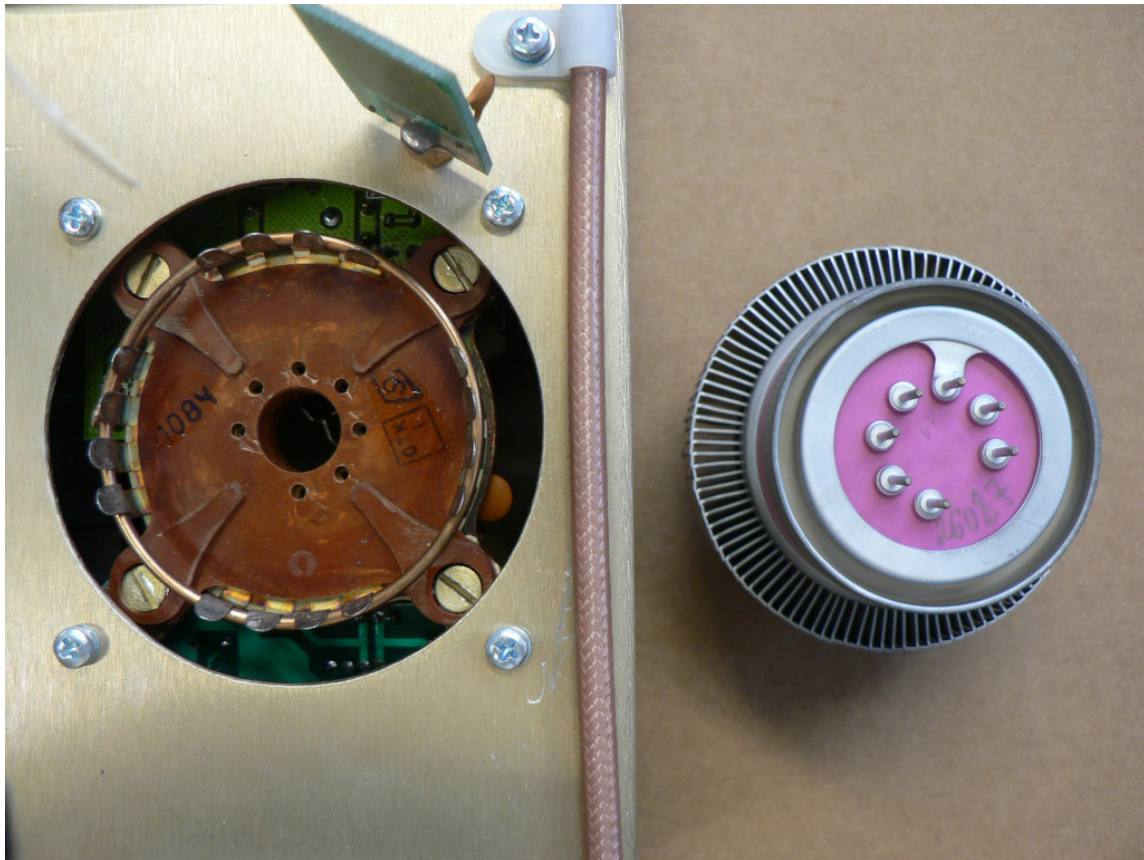
5.1. Changing the tube



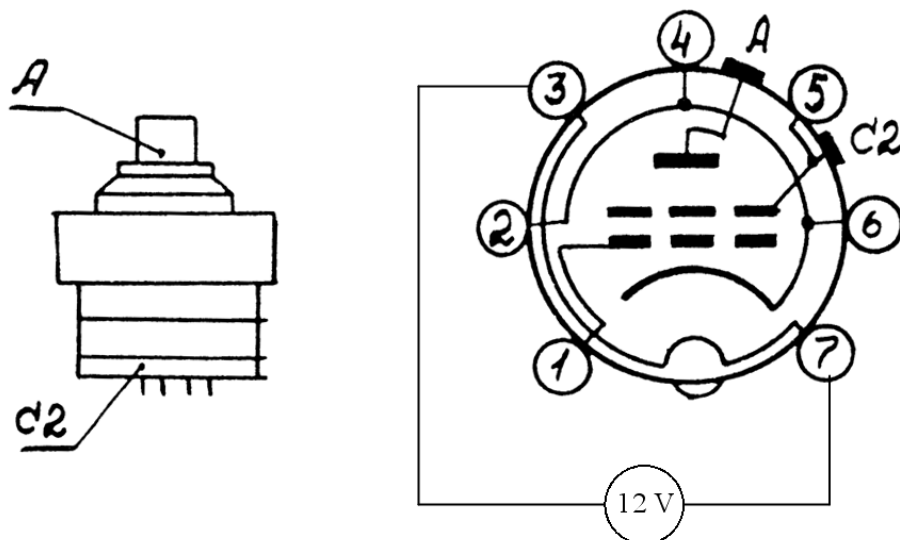
First disassemble the items from the anode from the tube as shown in the pictures



Now you can remove the tube

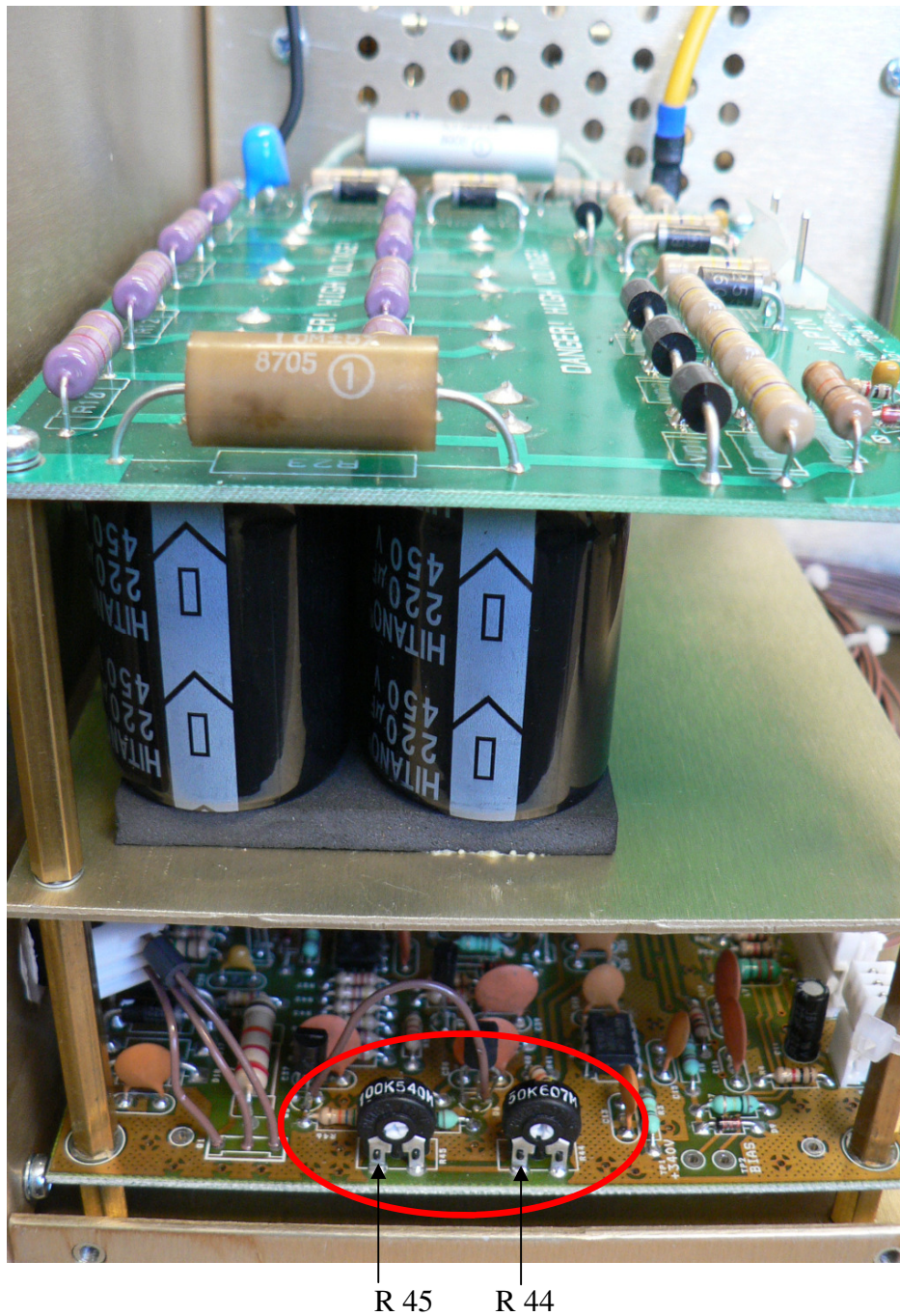


Before assembling the new tube it must be “conditioned”.



Connect Pin 3 and Pin 7 to a power supply with 12V DC and adjustable current limiter.
Supply each of the following currents for 3 minutes:
0,5 A / 1 A / 2 A / 3 A / max current ca. 4 A .

The procedure should be finished after 15 minutes to prevent heat problems



After assembling the new tube it would be necessary to adjust the plate current.
Run the Alpin 100 without cover and connect to a transceiver.

a. **Setup of Poti R44**

Without power from the transceiver in TX mode; adjust with R44 a plate current (as shown in display from Alpin) to 50mA.

b. **Setup of Poti R45**

Slowly increase the power of the transceiver until the plate current jumps in the range of 200mA, then adjust with R45 the current to 180mA.