Document No.:

Short-Wave Transceiver Series

XPA125B

Maintenance Manual

Version: V1.0.0

Revision: 0

Final revision time:

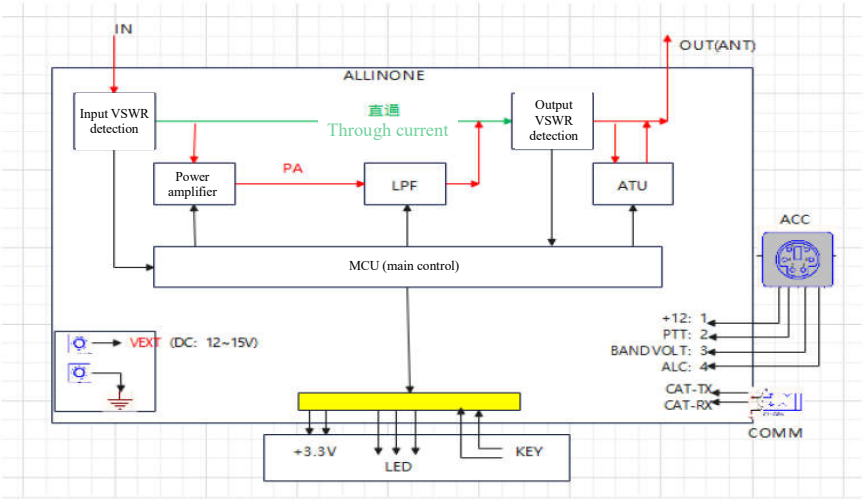
XIEGU

I. Device Overview

XPA125 is a **100W** solid-state linear power amplifier with built-in automatic antenna tuner.

The block diagram of each part of the device is as follows:

Mainboard unit:



Basic skills of board-level maintenance:

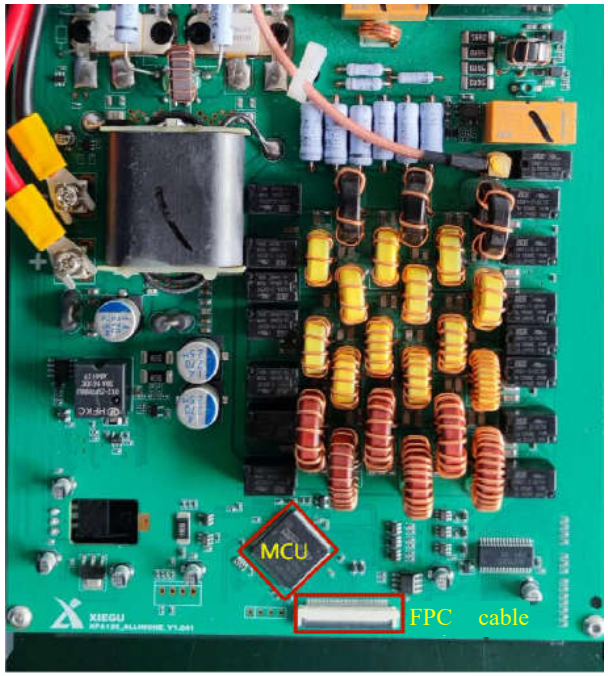
1. Be familiar with the circuit structure of the device and accurately grasp its signal flow.
2. Be familiar with the status of each working voltage and be able to measure it accurately.
3. Be able to operate the radio proficiently and combine various operations to support the maintenance process.
4. Be familiar with the meaning of each physical quantity and use it in combination with the actual situation of the overhauled product.
5. Be able to skillfully use and set commonly used measuring instruments and meters.

Next, each circuit board will be regarded as a unit to explain the judgment, detection and maintenance of faults by categories in combination with common fault phenomena. Some fault phenomena have appeared to be the same on the single board and the whole device. Therefore, the maintenance method of the same fault on the single board and the device will be explained at the same time.

II. Board-Level Maintenance

2.1 Mainboard

- Fault phenomenon: failure to save the state; the key is unresponsive

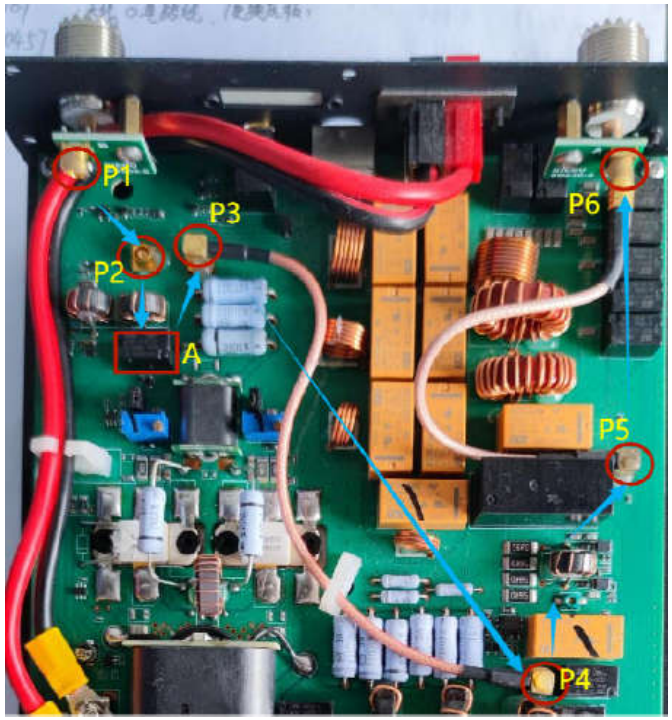


Maintenance methods:

Fault phenomenon	Maintenance method	
	Mainboard	**Check points**
Failure to save the state; the key is unresponsive	Check the chip and FPC cable socket for cold solder	MCU & FPC cable socket

■ This fault is mainly caused by cold solder joints on the component.

- Fault phenomenon: no through current



Maintenance methods:

1. Unplug P2 and P5 signal terminals and check the antenna pedestal and signal line to see whether there is a short to-ground and a smooth path.
2. Check the path from P2 to P5.

■ In the shutdown mode, the signal routing is in a through-current state by default

■ Check whether the three signal lines are correctly inserted or in good condition (via the on/off position (gear) of a multimeter)

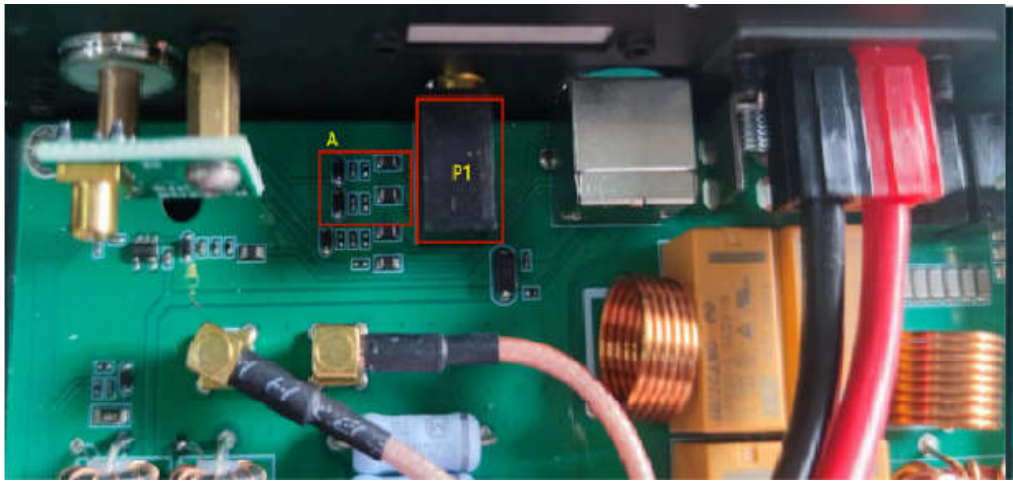
3. Check whether the core of the signal terminal is damaged or broken after insertion

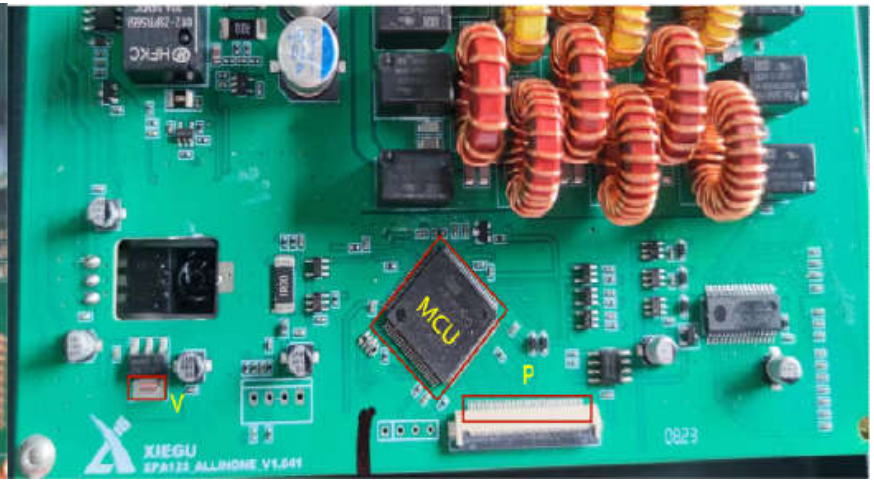
Check points
Check whether the three signal lines are damaged
Check the antenna pedestal for short
Check the path between P2-P3 and between P4-P5
Check whether the terminal blocks are intact after insertion

■ There have been instances where the device has no through current due to missing solder in the pin of relay A.

♦ This fault is mainly caused by damaged signal line.

- Fault phenomenon: failure to write any program (Boot loader, firmware)





Maintenance methods:

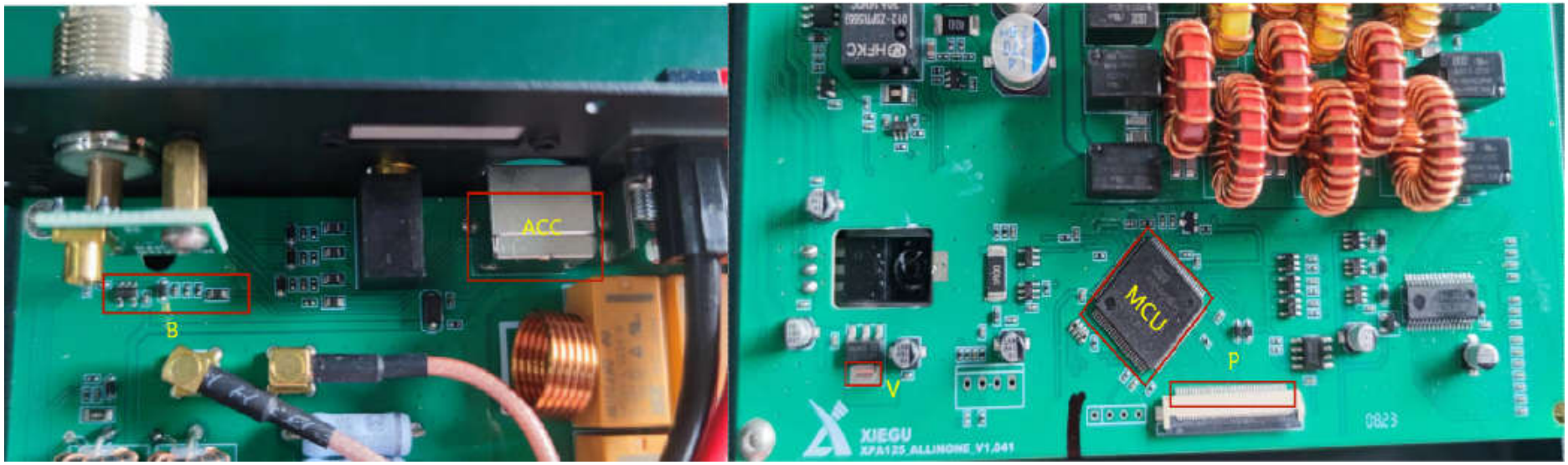
Failure to write any program:

Fault phenomenon	Maintenance method	Check points
Failure to write Boot loader	Check whether the (main control power supply) point is 3.3 V	V
	Check whether the programmer (aka writer) is correctly connected	
	Check the chip pin for cold solder	MCU

Failure to write any firmware:

Fault phenomenon	Maintenance method	Check points
Unable to write the firmware	Check the component for damage	A
	Check the pedestal for cold solder	P1
	Check the MCU for cold solder	MCU

- Fault phenomenon: the automatic switching of the relay does not work (wave band voltage control failure)



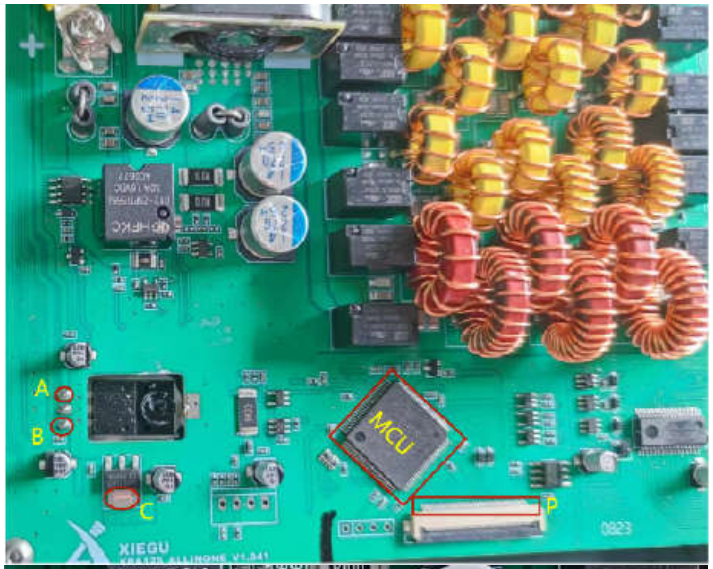
Maintenance methods:

1. Check to see whether there is wave band voltage.
2. Switching the frequency band will cause changes in the wave band voltage accordingly.
3. Check area B for cold solder joints on the component.
4. Check ACC welding.
5. Check whether there is a path between area B and MCU.
6. Check MCR for cold solder.

Check points
ACC seat
Area B
MCU

♦ This fault occurs largely because the wave band voltage control line of ACC is broken due to the cold soldering of the component in area B.

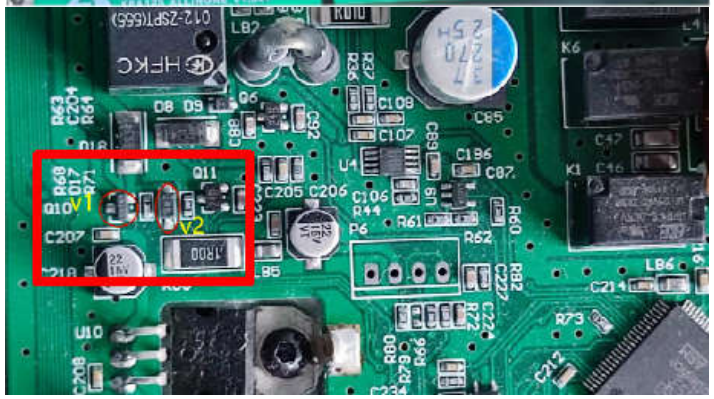
- Fault phenomenon: failure to start up



Maintenance methods:

1. Check whether all voltages are normal.
2. Check whether MCU has a program.
3. Check whether MCU and cable socket P for cold soldering.
4. Check whether the FFC cable connected to the head of the device is damaged.

Fault phenomenon	Check points	Voltage, V
Failure to start up	A	12
	B	5
	C	3.3

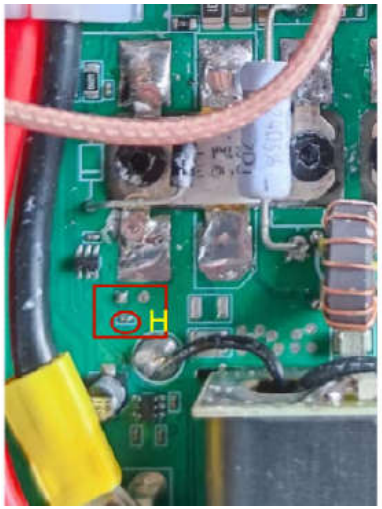


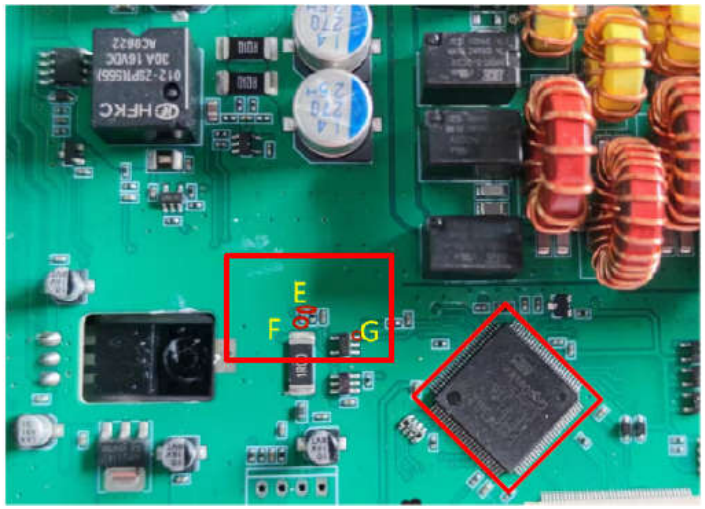
■ Older version. Before the power supply module was updated: failure to start up.

1. Check the red box in the left figure for component burnthrough (this is often the main reason for sending the device back for repair).
2. Replacement of components V1 and V2:

Component	Replacement
V1 (IRLML5203PBF)	Si2309
V2 (BZT52C5V1)	Change for new

- Fault phenomenon: abnormal temperature display



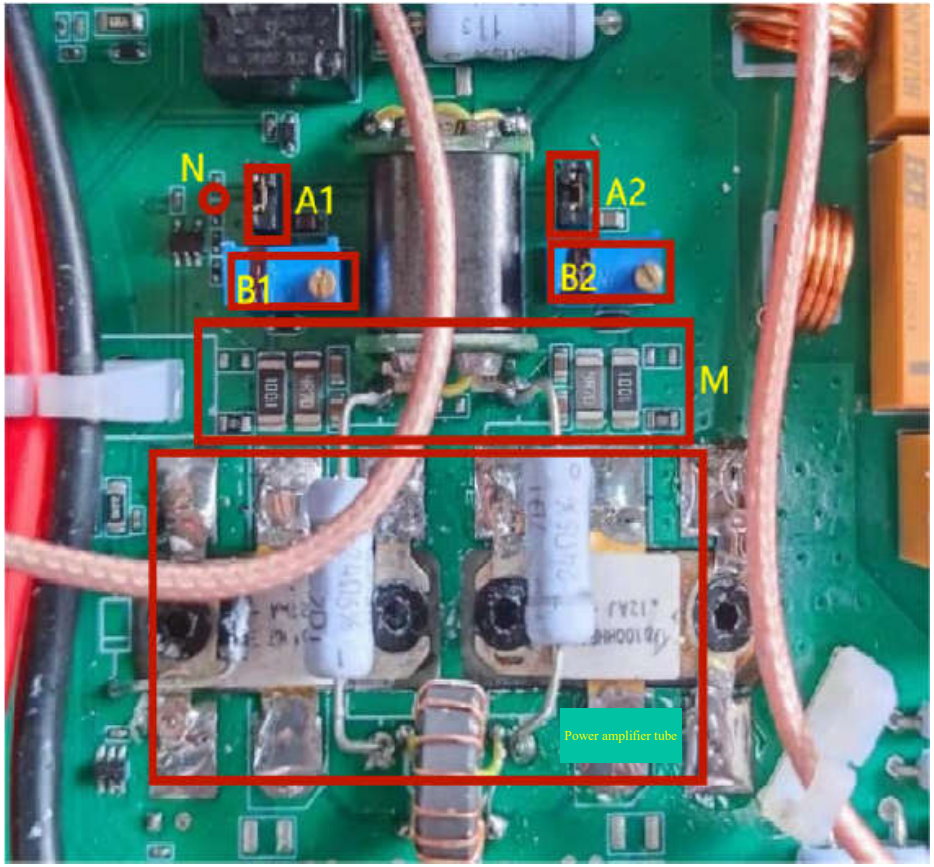


Maintenance methods:

■ As the thermistor is soldered by hand, point H is the focus of checking.

Fault phenomenon	**Mainboard**	**Check points**
Abnormal temperature display	Check the thermistor bypass capacitor for bridging (short)	H
	Check whether VCC voltage is 3.3 V	F
	Comparator input voltage (about 1.46 V)	E
	Comparator output voltage (about 1.46 V)	G
	Check the MCU for cold solder	Chip

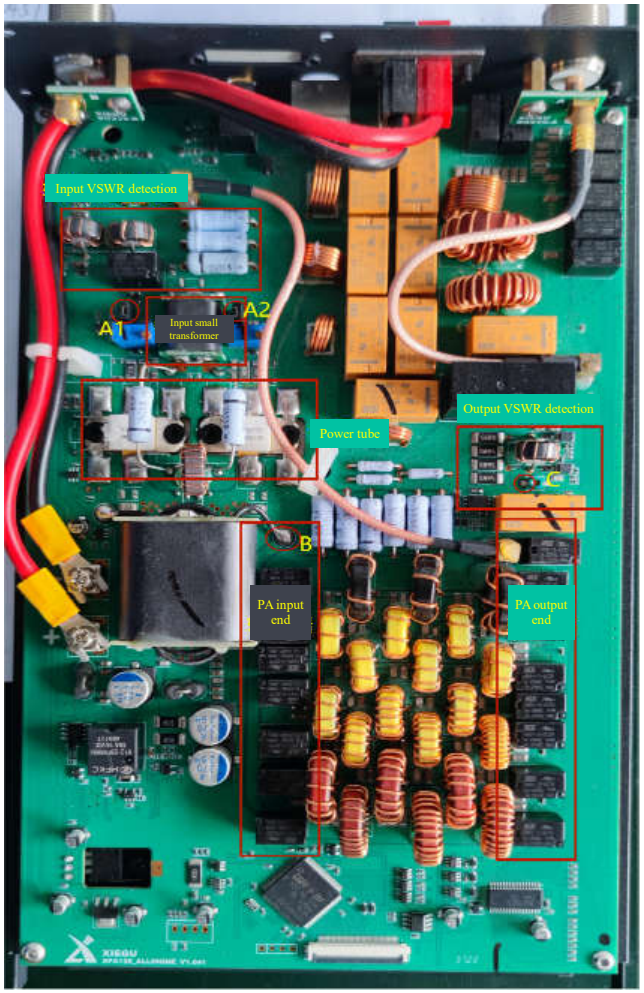
- Fault phenomenon: failure to tune the quiescent current



Maintenance methods:

1. First, measure the power amplifier tube by use of a multimeter to see whether damaged or broken down.
2. Then, check whether A1 and A2 short-circuiting caps are installed in place.
3. Measure the voltage at point N, which should be around 5V (measure in the transmitting state).
4. Check B1 and B2 potentiometers for damage and cold solder.
5. Finally, check area M for component burnthrough or cold solder.

- Fault phenomenon: reactive power (high standing wave, low efficiency), high standing wave



Maintenance methods:

I. Prompt for high standing wave at input end

1. Confirm whether the through-current state is normal (it might be caused by damages to the signal line at input end)

2. Check the detected part of input standing wave (the fault of this part is mainly caused by coil breakage).

II. Prompt for high standing wave at output end

1. Confirm whether the through-current state is normal (it might be caused by damages to the signal line at output end)

2. Check the detected part of input standing wave:

① whether the coil is broken

② whether there is any missing step in the standing wave modulation procedure

III. One or several frequency bands are found to have low efficiency, reactive power, and high standing wave

♦ This fault is mainly caused by damages to the relay at Pa input and output ends as shown the left figure

Check methods:

First method: measure PA input and output ends with an oscilloscope (100V/100ns) and check the signal output.

♦ Note: this method requires short-time detection (to avoid damaging the oscilloscope probe).

Second method: 1. Remove A1 and A2 short-circuiting caps;

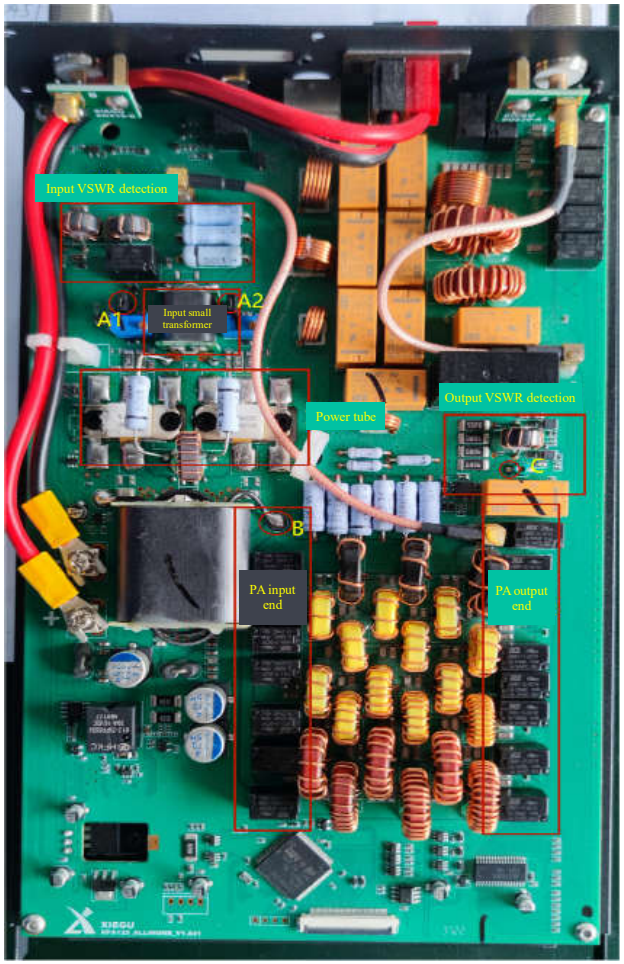
2. Disconnect point B at the large transformer's output end via a soldering iron;

3. Make the device transmit waves in the required frequency band via quiescent current tuning tools and manual switching of frequency bands;

4. Check the working condition of PA input/output relay in the corresponding frequency band via the on/off position (gear) of the multimeter.

(It can tell which relay is damaged)

♦ This method is to avoid generation of large current and large signals.



IV. All-band low efficiency and reactive power

1. First, confirm whether everything is normal in the through-current state.
2. Next, confirm whether the power amplifier tube is damaged and whether the quiescent current is correct.
3. Check whether PA switching replay is task switching (measure with an oscilloscope).
4. Check the welding of the small transformer.
5. Check the manufacturing process and welding of the large transformer.

♦ In most cases, it is caused by poor contact of the PA relay and cold soldering at the bottom of the small transformer.

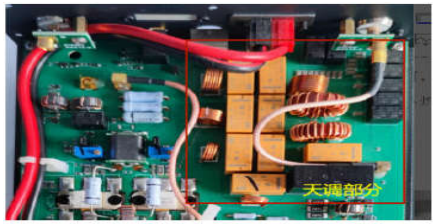
♦ The power amplifier has a high requirement for large transformer manufacturing process.

V. Failure to modulate the standing wave and high standing waves

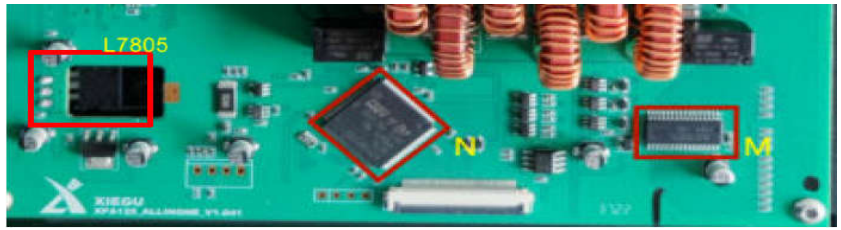
1. Check whether the coil in the output standing wave detection area is broken;
2. Check adjustable capacitor C for damage or cold soldering;
3. Then, check whether the component in the output standing wave detection area is damaged.

♦ If measurement in the standing wave detection area reveals a burnt-out component on one side of the standing wave bridge, replace the components on both ends.

- Fault phenomenon: high standing wave of antenna tuner



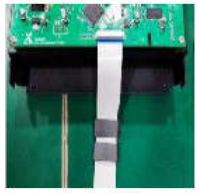
Antenna tuner



Test methods:

1. First, confirm whether the power is normal if the antenna tuner is not in use (do not use the rooftop antenna);
2. Check whether the relay and capacitor of the antenna tuner are burnt out;
3. Check whether any component of the antenna tuner has cold solder joints (on the back side of PCB board, requiring another patch-welding)
4. Check the welding of the control part (patch-welding for N and M).

- Fault phenomenon: the antenna tuner screen is blurred or does not light up



Maintenance methods:

1. Check L7805 output voltage (there was a time when a relatively low L7805 output voltage was found during antenna tuning).
2. Add two magnet rings on the FFP cable between the mainboard and the display panel (or use double-side insulating aluminum film shielded FFC flexible cables) to enhance the anti-jamming capability.