ACOM 700S

1.8-54 MHz
Linear Amplifier

User's Manual

Installation, Operation
and Maintenance

OUTSTANDING HF POWER PRODUCTS

April 2024

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Title of Documentation ACOM 700S 1.8-54 MHz Linear Amplifier
User's Manual
Installation, Operation and Maintenance

Type of Documentation User's Manual

Purpose of Documentation This manual explains Installation, Operation and Maintenance of the ACOM 700S 1.8-54 MHz Linear Amplifier.

Record of Revisions

Description	Release Date	Notes
ACOM 700S User's Manual	12.2017	First edition
ACOM 700S User's Manual	-	Second edition
ACOM 700S User's Manual	17.12.2019	Third edition
ACOM 700S User's Manual	31.05.2021	Fourth edition, R01
ACOM 700S User's Manual	02.04.2024	Fourth edition, R02

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Note This manual has been printed on chlorine-free bleached paper.

Contents

Figures

Tables

1. GENERAL INFORMATION

Congratulations on purchasing one of the finest solid-state 1.8-54 MHz linear amplifiers in the world today.

ACOM is pleased that you have chosen one of our products, and we will endeavor to provide you with the information and support you need to enjoy your purchase for many years.

We urge you to read all of the following materials before you embark on operating your new amplifier.

1.1. Introduction and Description

This manual explains:

- Installation
- Operation and
- Maintenance

of the ACOM 700S 1.8-54 MHz solid-state linear power amplifier.

The ACOM 700S is a state-of-the art linear power amplifier that covers all amateur bands from 1.8 through 54 MHz and provides 700 W rated output power (PEP or continuous carrier). The amplifier operating information is shown on a multi-functional, high resolution color display. ACOM 700S can be controlled either by the six front-panel buttons or remotely.

1.2. To the Reader of this Manual

This document is written for the technically qualified users who will use the ACOM amplifier.

To ensure your safety in accordance with safety and security standards, read this manual carefully and follow the steps described in it.

Everyone who will use the amplifier must read this manual, and follow the instructions in it, and other accompanying ACOM documentation (see Section ***1.5 Additional Documentation***), and consider also the appropriate safety precautions.

Informational notes

Observe the informational notes provided in this manual to ensure reliable and efficient operation of the amplifier. In this manual, you will find the following informational notes:

The information symbol highlights operating procedures or practices that may improve equipment reliability and/or personnel performance, or to emphasize a concept.

*The book symbol represents a **cross reference** to external documentation, e.g., other ACOM manual.*

Symbols and fonts used for marking text

In this manual the following symbols and fonts are used for marking text:

Format	Meaning
Orange bold text	Identifies all internal links in the document between ***Sections***, ***Figures***, ***Tables***, etc. for your convenience.
BOLD TEXT IN CAPITAL LETTERS	Identifies the connectors, switches, and button names and labels.
TEXT IN CAPITAL LETTERS	Identifies the amplifier operating modes, menu names, messages, etc.

1.3. Product Features

- **Easy to operate**
  The overall operation of ACOM 700S is extremely simplified: the screen menus are intuitive and easy to follow, no special skill is required from the operator when changing frequency bands.
- **User-friendly automatic control**
  When connected to a transceiver with CAT capability, the amplifier will track the operating frequency, and will change bands accordingly.
  Even if not CAT connected, the amplifier monitors the input signal frequency through the built-in frequency counter and automatically switches bands.
- **High resolution color display**
  All amplifier status indications are explained via detailed text displayed on the 5" high resolution color display (108x65 mm, 800x480 pixels, and 24-bit color).
- **Transceiver-independent**
  Compatible with all transceiver models available on the market - does not need any special signals: "ground on transmit" and less than 40 W of RF drive power is sufficient.
- **LDMOS transistor technology**
  The ACOM 700S amplifier uses a rugged LDMOS transistor.
- **Broadband input circuit**
  Broadband input circuit, providing a perfect transceiver load with SWR below 1.2:1 (typically 1.1:1), without retuning throughout the whole frequency range from 1.8 to 54 MHz.
- **Intelligence**
  Takes care of itself via continuously working protection circuits in all modes.
  The operator can monitor numerically more than 10 parameters of the amplifier in operation.
- **Remote control capabilities**
  Controlled remotely via the Internet by the ACOM eBox Ethernet Remote Control device (optional equipment) and through an RS-232 port.
- **Easy maintenance**
  Detailed data (55 parameters) about each of the last 28 hard-fault protection trips is stored in the amplifier's non-volatile memory.
- **Compact and lightweight construction**
  Convenient for expeditions and field operation due to the extremely compact and lightweight construction and the built-in switching-mode power supply (SMPS). SMPS operates with extended mains voltage range of 100-240 VAC, with no internal switch over. The consumed current is purely sinusoidal, Power Factor Corrected (PFC) and inrush limited. This makes the operation from unstable mains and generators easy and trouble-free.
- **Electromagnetic compatibility**
  Perfect electromagnetic compatibility (EMC) with both highly sensitive devices and the powerful devices in the radio station (receivers, computers, other amplifiers) exceeding the standard EMC requirements due to the used PFC and built-in radio-frequency filters.

1.4. Product History and Documentation Validity

The ACOM 700S solid-state power amplifier serial production started in March 2018. The production has continued to these days without functional changes and with hardware improvements only.

This manual refers to the ACOM 700S amplifier and describes the operating possibilities of all amplifiers produced till the publishing date of this manual.

This manual is valid till a new manual is issued.

Production Version Release Date	Notes
03.2018	Basic design;

Table 1-1 | Production versions history

1.5. Additional Documentation

For further important information, please, refer to the following documentation:

- ***ACOM 700S Brochure***;
- ***ACOM CAT cables Technical Information***;
- ***ACOM 04AT User's Manual;***
- ***ACOM 06AT User's Manual;***
- ***ACOM eBox User's Manual***.

The documentation is available for download at ***www.acom-bg.com***.

1.6. Product Identification

Every ACOM product features an ID (identification) label/plate. On this label, you can find data identifying the device. Which product identification data are important?

- Model designation - The model designation is the name of the device;
- Serial Number - Most products have their own serial number. The serial number is a consecutive number for unique identification of products with the same model designation. It serves to ensure traceability of a product after it has been put in circulation, e.g., to find the date of invoice that is required to determine guarantee and warranty periods. The term serial number is mostly abbreviated to SN or S/N.

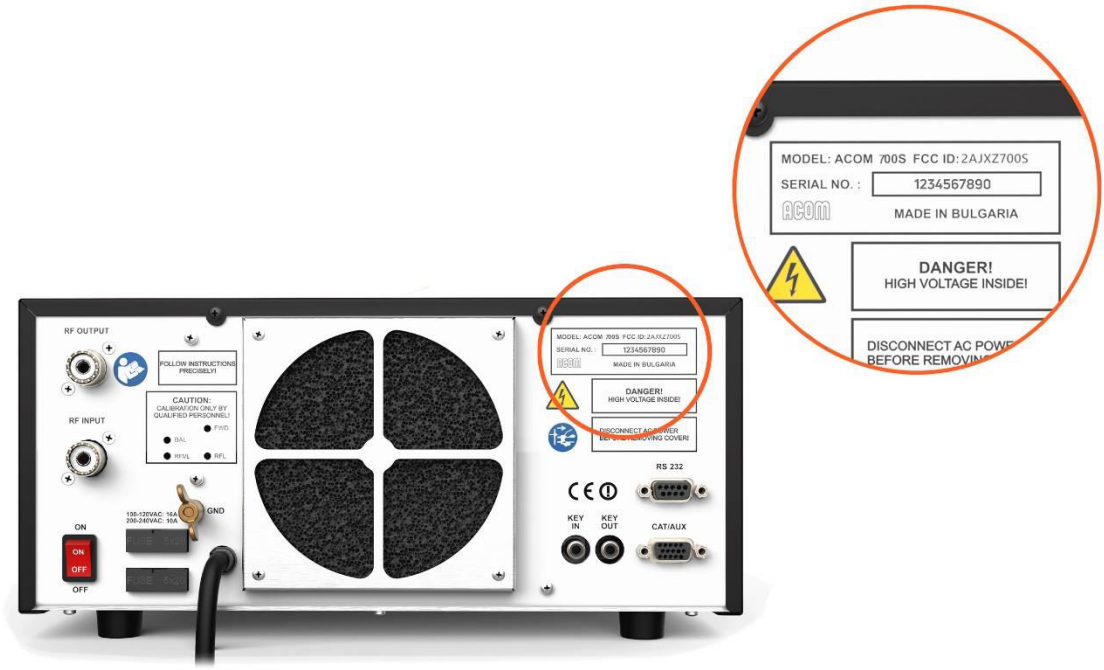


Figure 1-1 | ID (identification) label/plate, example

The serial number can be seen in the menu FAULTS LOG too.

1.7. Equipment Supplied

The ACOM 700S amplifier is shipped as package, consisting of:

Nr.	PACKAGE CONTENTS	Pcs.
1	Amplifier ACOM 700S	1
2	Quality Inspection Certificate (hard copy)	1

Table 1-2 | Package contents

The User's Manual is available as PDF-file only.
The latest version of the User's Manual is available at www.acom-bg.com.

1.8. Optional Equipment

There are several individual purchase options available. They are:

Nr.	OPTIONAL EQUIPMENT
1	ACOM 06AT | Automatic Antenna Tuner and Switch
2	ACOM 04AT | Remote Automatic Antenna Tuner and Switch
3	ACOM eBox | | Ethernet Remote Control Device

Table 1-3 | Optional equipment

The ACOM 04AT and 06AT automatic antenna tuners with four-way antenna switches are designed to work with our transistor (solid-state) amplifier series, including the ACOM 700S (see Section ***4.3 Operation with an External Antenna Tuner***).

Using the ACOM 06AT or 04AT with an ACOM 700S amplifier is highly recommended.

Figure 1-2 | ACOM 06AT automatic antenna tuner and switch (shown near 700S amplifier)

Wall mounted tuner | Mast mounted tuner | Desk mounted tuner

Figure 1-3 | ACOM 04AT remote automatic antenna tuner and switch

Remote control of ACOM 700S is provided by ACOM eBox Ethernet remote control device (see Section ***6 REMOTE CONTROL***).

Figure 1-4 | ACOM eBox Ethernet Remote Control device

1.9. Owner Assistance

If assistance is needed, you should contact your local dealer first. If necessary, your dealer will contact ACOM for additional guidance.

If you still have an issue you need to discuss with one of ACOM's specialists, the contact information is as follows:

ACOM Ltd.
Web-site: www.acom-bg.com -> **Support** page
E-mail: support@acom-bg.com

Bulgaria | Bozhurishte 2227
Sofia-Bozhurishte Industrial Park | 6 Valeri Petrov Str.
GPS coordinates: 42.748616° | 23.209801°

Including the ACOM equipment's model name, serial number, and a detailed problem description in your service assistance request is mandatory. Without this information, we cannot proceed with your request, or the proceeding will take longer.

1.10. Safety Considerations, Explicit Definitions

The ACOM 700S linear amplifier is a Safety Class I unit regarding protection against electric shock. The third grounding lead of its mains cord (which is colored yellow with two green stripes) and the ground stud on the rear panel of the amplifier (marked **GND**, see ***Figure 2-4 | Rear panel - Connections***, Pos. (a)) must be connected to the station's grounding system for safe operation.

The amplifier is designed to meet international safety standards and complies with CE safety and electromagnetic compatibility requirements, as well as FCC regulations.

This User's Manual contains information, warnings (signal words **Danger**, **Warning**, **Caution** and **Notice**) and instructions, related to hazards, that should be followed by the user in order to ensure safe operation and to keep the amplifier in a safe working condition at all times.

The safety instructions contained in this User's Manual feature specific signal words (**Danger**, **Warning**, **Caution** and **Notice**) and, where required, a safety alert symbol, in accordance with actual standards ISO 3864 or ANSI Z535.

The EXPLICIT DEFINITIONS described below apply to this User's Manual:

⚠ DANGER

*These notes call attention to a procedure or instructions which, if not correctly performed, **will result in serious personal injuries and even death**.*

⚠ WARNING

*These notes call attention to a procedure or instructions which, if not correctly performed, **could result in serious personal injuries and even death**.*

⚠ CAUTION

*These notes call attention to a procedure or instructions which, if not correctly performed, **could result in minor or moderate personal injuries**.*

NOTICE

*These notes call attention to a procedure or instructions which, if not correctly performed, **could result in property damage or equipment damage not exclusively to the amplifier but also to connected equipment**.*

PRECAUTIONS:

⚠ DANGER

For safe operation, the amplifier's grounding stud on the rear panel (marked **GND**, see ***Figure 2-4 | Rear panel - Connections***) should be connected according to the applicable standards and local regulations for electric safety, fire safety and lightning protection, in all cases when the radio station is equipped with outdoor antenna(s)!

⚠ DANGER

NEVER underestimate the danger of lightning!

To prevent accidents, connection/disconnection to the grounding and antennas should only be carried out in clear, quiet, and sunny weather when there is no danger of lightning and static discharges.

⚠ DANGER

Both the mains voltage and the high DC voltage up to 500 V inside the ACOM 700S amplifier are LETHAL!

For your safety, pull the amplifier power plug out of the mains wall outlet and WAIT AT LEAST 3 minutes EACH TIME BEFORE you remove the cover of the amplifier.

⚠ DANGER

Never allow anyone, ESPECIALLY CHILDREN, to push or put anything into holes in the case - this will cause electric shock. NEVER TOUCH AN ANTENNA or antenna insulators during transmission or tuning - this may result in an electric shock or burn. NEVER EXPOSE the amplifier to rain, snow, or any liquids. AVOID placing the amplifier in excessively dusty environments or in direct sunlight. DO NOT OBSTRUCT COOLING ducts or vents. Keep a minimum clearance distance of 10 cm (4 inches) to any other devices or objects.

⚠ WARNING

To avoid damage (not covered under warranty) read the Section ***2 INSTALLATION*** of this User's Manual carefully. Installation of the equipment must comply with local and national electrical codes.

If you have any doubts about the installation, operation, or safety of the amplifier, please, consult your dealer.

⚠ WARNING

NEVER operate the equipment if you notice an abnormal odor, sound, or smoke. Immediately turn off the power and contact your dealer for assistance (see Section ***1.9 Owner Assistance***).

⚠ WARNING

Do not undertake on your own repairs or changes in hardware or software of the amplifier in order not to endanger your or other's health and life and not to damage the amplifier and the equipment connected with it, not covered by warranty. The manufacturer is not liable for another's actions and responsibility shall be assumed by the doer.

⚠ WARNING

To be in compliance with the RF exposure requirements, please, read Section ***8.3.c) RF Exposure Information***.

2. INSTALLATION

2.1. Unpacking and Initial Inspection

Before you install your amplifier, thoroughly read this manual.

First, carefully inspect the cardboard carton and its contents for physical damage. ACOM ships amplifiers in highly protected containers, but it cannot assure that mistreatment by shippers will not occur. If damage is evident, notify your dealer immediately. Delay may void the carrier's warranty.

⚠ CAUTION

The packaged weight is about 16 kg and is recommended to be handled by two persons.

Keep all packing materials for possible future antenna tuner shipment (see Section ***8.4.4 Returning to the Service Provider***).

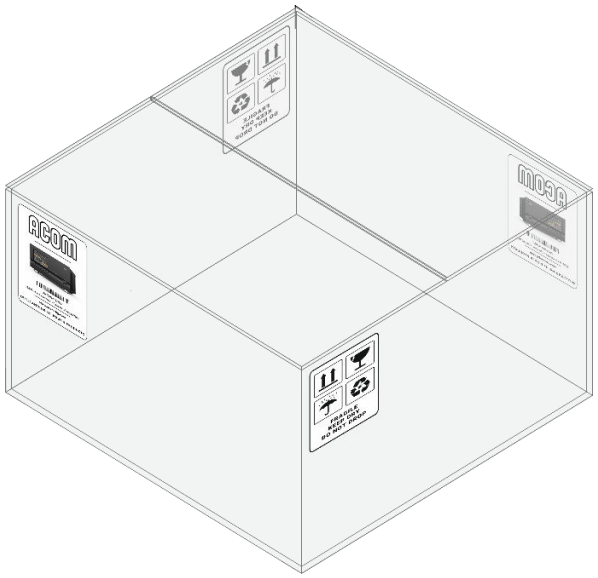


Figure 2-1 | Packaging carton (outside view)

Unpack the amplifier as described below:

- Open the cardboard carton (see ***Figure 2-1 | Packaging carton (outside view)*** and ***Figure 2-2 | ACOM 700S packaged in a cardboard box***, Pos. 1);
- Take out the top secure element (see ***Figure 2-2 | ACOM 700S packaged in a cardboard box***, Pos. 2);
- Open the internal cardboard carton (see ***Figure 2-2 | ACOM 700S packaged in a cardboard box***, Pos. 3);

- Take out the amplifier using handles of the middle secure element (see ***Figure 2-2 | ACOM 700S packaged in a cardboard box***, Pos. 4);
- Take out the amplifier (Pos. 8) from the middle secure element and remove top, bottom, and sides flat secure elements (see ***Figure 2-2 | ACOM 700S packaged in a cardboard box***, Pos. 5, 6 and 7);
- Now, the amplifier is ready for installation.

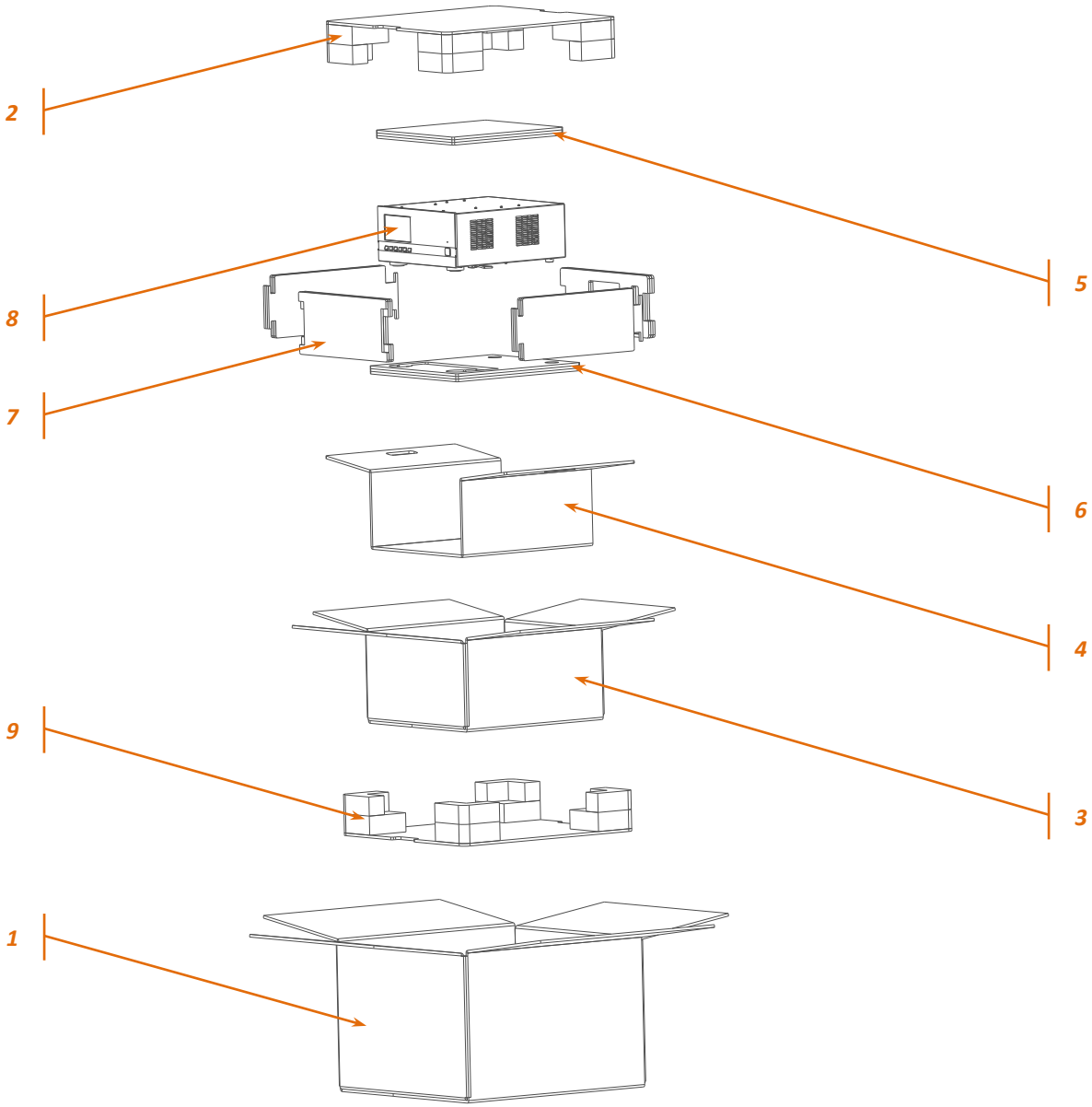


Figure 2-2 | ACOM 700S packaged in a cardboard box

It is not necessary to take out the bottom secure element.
(see ***Figure 2-2 | ACOM 700S packaged in a cardboard box***, Pos. 9)

2.2. Amplifier Location Selection

⚠ CAUTION

The unit's weight is about 12 kg, which should preferably be handled by two persons.

Position the amplifier near the place where it will be used. You will need an easy access to the command knobs and indicator's area, as well as to the rear panel cabling.

NOTICE

The ACOM 700S is forced air cooled. Keep a minimum clearance distance of 10 cm (4 inches) to any other devices or objects.

The exhaust air can reach 65 °C (150 °F) and if the surrounding devices are sensitive to heating from outside or use forced air cooling themselves, increase the distances accordingly.

Figure 2-3 | Front panel - Ergonomic position with tilt foot bar

NOTICE

Do not leave accidental paper, cloth, or other lightweight pieces around and under the amplifier. They may be drawn in by the cooling air stream and block the vents. This will lead to overheating and accelerated material aging, not covered by the warranty.

2.3. Line Voltage Selection

The ACOM 700S amplifier is supplied with built-in switching-mode power supply (SMPS).

The amplifier operates in an extended mains voltage range of 100-240 VAC, with no internal switch over. The consumed current is purely sinusoidal, Power Factor Corrected (PFC) and inrush limited. This makes the operation from unstable mains and generators easy and trouble free.

Thanks to the built-in SMPS, the ACOM 700S has no mains line voltage selector to take care of!

See Section ***7.3 Fuse Replacement*** for correct fuse rating.

2.4. Connections

Please, see ***Figure 2-4 | Rear panel - Connections***.

Connection to your station must be accomplished in the order described below, before you apply mains voltage to the amplifier.

⚠ WARNING

Installation of the equipment must comply with local and national electrical codes.

The applicable standards and local regulations shall prevail if there is a difference in the requirements, and if they contain more or stricter requirements than the minimum for installation stated in our documentation.

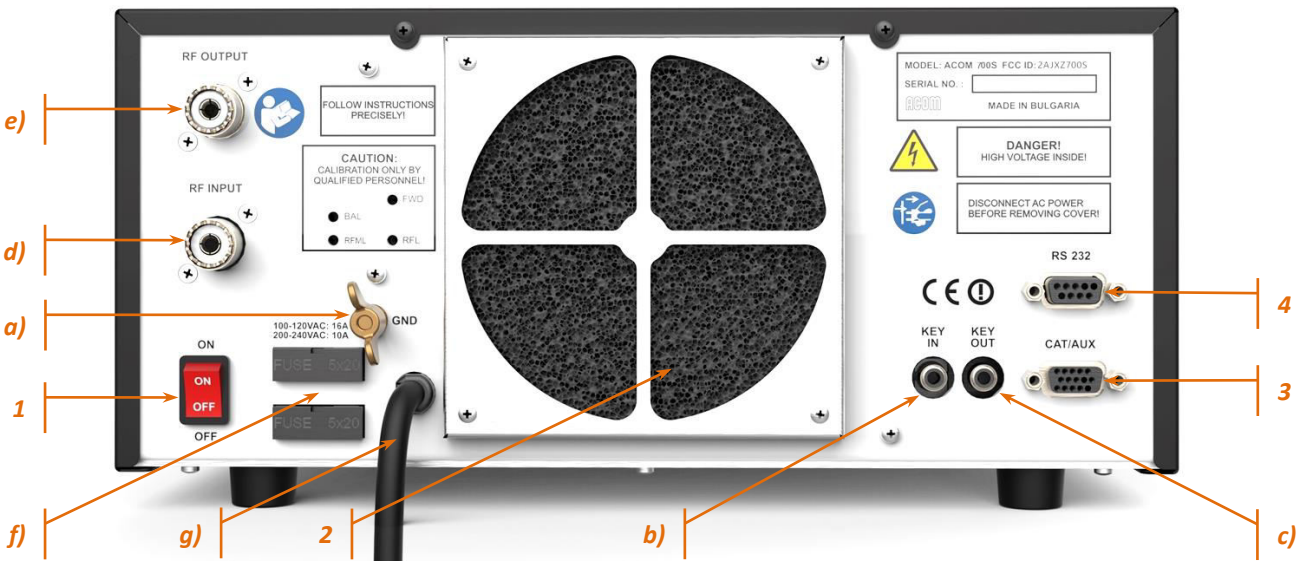


Figure 2-4 | Rear panel - Connections

a) **GND** stud for grounding

Before you connect the amplifier to external grounding, you should advise with a licensed electrician and confirm such kind of connection is allowed by your national standards and regulations for electric safety, fire safety, and lightning protection.

Simultaneous connection to the earth grounding and protective earth may be inadmissible or may fall under special requirements in some countries!

⚠ DANGER

Never use the gas installation pipes for grounding. This can cause an EXPLOSION!

⚠ DANGER

Do not use the steam-heating or water-supply network pipes for grounding! You may expose to dangerous voltage not only yourself but also other people using the same installation.

⚠ WARNING

This amplifier needs to be grounded.

When installing or replacing the unit, the ground connection must always be made first and disconnected last.

Note that the grounding system may have to withstand currents over 15 A with insignificant voltage drop on it. Therefore, it may be necessary to improve it considerably, i.e., to become less resistive, with heavier leads and lower-resistive ground path.

Use a green and yellow ground wire to connect the wing-nut grounding stud of the amplifier (on the rear panel, marked **GND**) to the station's grounding system. (See ***Figure 2-4 | Rear panel - Connections***, Pos. (a))

The grounding leads should be at least 4 mm² (AWG 11 or SWG 13).

If no other data is available, in order to avoid conduction of a lightning strike with all resulting consequences - death, injury, fire, equipment damage, destruction, etc., please, read and understand clearly:

- ***ACOM 03AT User's Manual***

Pay particular attention to Sections ***2-3 Remote Unit Installation*** in the downloaded manual;

- ***ACOM 04AT User's Manual***

Pay particular attention to ***Appendix 1 – Lightning Protection*** in the downloaded manual.

The documentation is available for download at ***www.acom-bg.com***.

For details and recommendations on the grounding and RF counterpoise system concerning the electromagnetic compatibility see also Section ***3.6.f) Elimination of electromagnetic compatibility (EMC) problems***.

b) **KEY IN** connector

This is the amplifier's input for receive/transmit control from the transceiver.

The transceiver switches the amplifier from receive mode into transmit mode (RX/TX) by grounding of the **KEY IN** input.

Run a shielded cable from the "ground on transmit" connector or terminal on your transceiver to the amplifier rear panel **KEY IN** connector (see ***Figure 2-4 | Rear panel - Connections***, Pos. (b)). The **KEY IN** connector uses a standard RCA phono plug.

The switching voltage presented from amplifier **KEY IN** connector to the transceiver "ground on transmit" output does not exceed 12 V (positive to the ground). The closed-circuit is below 6 mA (see Section ***8.2.a) Receive / transmit control***).

Your amplifier will NOT WORK if **KEY IN** input is not connected properly.

Transceiver producers give different names to this output and they are for instance TX-GND, SEND, T/R-LINE, PTT, etc. Some transceivers require that "ground on transmit" is implemented via a software command, or by changing the setting of a switch on the rear panel, or interior of the transceiver. Check your transceiver's manual.

c) **KEY OUT** connector

This is the amplifier's transmit-enabling control output from amplifier to the transceiver.

The **KEY OUT** connector provides an extra control signal from the amplifier to the transceiver. It can be used for improving the receive/transmit (RX/TX) switching safety.

NOTICE

KEY OUT is a low-power open-drain output, make sure that the signal voltage coming from the respective transceiver connection does not exceed 50 VDC (open circuit) and the closed-circuit current is below 20 mA.

If your transceiver has a suitable input that disables transmission unless grounded externally, we recommend that you connect it with a shielded cable terminated in a Phono (RCA) connector to the **KEY OUT** connector (see ***Figure 2-4 | Rear panel - Connections***, Pos. (c)) of the amplifier.

ACOM 700S will operate normally with **KEY OUT** unconnected if your transceiver has no such input.

Transceiver producers give different names to this input and they are for instance TX-INHIBIT, MUTE, LINEAR, etc. Check your transceiver's manual.

d) **RF INPUT** connector

Connect a suitable coaxial cable from the transceiver output to the amplifier **RF INPUT** SO-239 connector (see ***Figure 2-4 | Rear panel - Connections***, Pos. (d)), using PL-259 plug.

NOTICE

In order to avoid a damage, turn off your transceiver's internal antenna tuner.

e) **RF OUTPUT** connector

NOTICE

If this is the first time you will use a power amplifier in your station, pay attention to the coaxial cable type from the amplifier's output to the antenna. It must handle the increased power safely, particularly on the 10- and 6 meters bands. We recommend that you use RG213 cable or better. Check the same for the antenna switch and tuner, as well as the whole antenna system (especially multi-band trap antennas).

Connect a suitable coaxial cable with a PL-259 plug from the **RF OUTPUT** (see ***Figure 2-4 | Rear panel - Connections***, Pos. (e)) to the antenna switch or tuner, or to antenna for the respective frequency band.

The ACOM 04AT and 06AT automatic antenna tuners with four-way antenna switches are designed to work with our transistor (solid-state) amplifier series, including the ACOM 700S (see Section ***4.3 Operation with an External Antenna Tuner***).

Using the ACOM 06AT or 04AT with an ACOM 700S amplifier is highly recommended.

We recommend coordinating, with ACOM, the use of non-ACOM antenna tuners for connection to **RF OUTPUT**.
ACOM, as an Original Equipment Manufacturer, keeps the right to refuse the guarantee claims if non-suitable equipment is used.

f) Main fuses

Please, see ***Figure 2-4 | Rear panel - Connections***, Pos. (f).

> ***NOTICE***
>
> Make sure you check whether the main fuses installed in your amplifier correspond to your local mains nominal voltage. If occasion should require replacement of the mains fuses, replace them as described in Section ***7.3 Fuse Replacement***!

g) Power cord

Please, see ***Figure 2-4 | Rear panel - Connections***, Pos. (g).

Due to the different standards in different countries, the mains plug for the amplifier power supply cable is supplied and mounted by the dealer. He connects to the mains cord end a standard mains supply plug which meets the Safety Class I unit standard in your country.

The ground lead of the amplifier's power cord is colored yellow with two green stripes and the blue and brown leads are active. When the amplifier is to be used with only one mains fuse, it is connected in series with the brown lead, which must be the active.

	Wire name	Description	Colors
ACOM amplifier	N	Neutral	Blue
	L	Line, Active, Live	Brown
	G or PE or E	Ground (Protective Earthing conductor)	Yellow - Green

Table 2-1 | Power cord connections

If you have any doubts about the correct way of connecting the wires, consult your dealer.

h) Preparation of wall outlet

⚠ WARNING

Before connecting the amplifier to your mains supply using a licensed electrician, check that the supply is correctly wired, and is adequate for the current drawn by the amplifier (up to 10 A from 200/240 VAC mains and up to 16 A from 100/120 VAC mains). Make certain that the grounding lead is connected properly and that it has a cross section not less than the cross section of the phase conductor in the wall outlet for the amplifier.

It is preferable that you use the wall outlet closest to the source. The installation leads should be at least 1.5 mm² (AWG 15 or SWG 17) at operating 200-240 VAC and 2.5 mm² (AWG 13 or SWG 15) at 100-120 VAC (recommended values if there are no stricter requirements by your local standard).

Check that the panel fuse has a free capacity for the additional load from the amplifier as specified in Section Specifications ***8.1.h) Mains Power Consumption at Full Output Power***. If you connect the amplifier to a different mains outlet, be sure that you check it, too.

2.5. Connecting to External Devices (transceiver, computer, etc.) and User Settings

a) **CAT/AUX** interface connector

Please, see ***Figure 2-4 | Rear panel - Connections***, Pos. (3).

CAT/AUX interface is used for connecting and operating with various transceiver models (see ***Table 2-2 | Signals and pin out of the CAT/AUX connector*** below and the respective menu in Section ***5.3 Menu CAT/AUX SETTINGS (Selection of CAT/AUX interface)***, ***Table 5-1 | Transceiver interface***, and ***Figure 5-4 | Menu CAT/AUX SETTINGS***).

Most of the modern transceivers can be connected by CAT to the ACOM 700S. This will allow the amplifier to track the transceiver frequency without any transmission and change the bands automatically when in OPERATE mode.

The cable can be ordered separately from a third-party supplier or home-brewed according to ***Table 2-2 | Signals and pin out of the CAT/AUX connector*** and the transceiver's manual.

NOTICE

The CAT connection requires a cable made especially for the ACOM 700S and your transceiver. Using an inappropriate cable may cause a serious damage to the amplifier and your transceiver!

If you need cable wiring diagrams, please, see our document

- ***ACOM CAT cables Technical Information***.

The documentation is available for download at ***www.acom-bg.com***.

Note that some of the connections - to the transceiver's BCD band data outputs and Band Voltage outputs do not provide an exact frequency data, but only band data. Those connections cannot be used when ACOM 700S works together with ACOM 04AT or 06AT because the tuner needs to know the exact frequency, not only the band.

Besides the RS-232 and TTL compatible serial interface, the **CAT** connector also carries the KEY IN and KEY OUT lines, which can be used instead of using separate cables for those functions from the transceiver to the sockets of the same names.

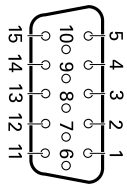
CAT/AUX interface	Pin Nr.	Pin name	Description	Specification
 D-sub connector, 15-pin, 3-row, female (Rear panel view)	1	RxD	Receive Data	TTL input
	2	RxD	Receive Data	RS-232 input
	3	TxD	Transmit Data	RS-232 output
	4	TxD	Transmit Data	TTL output
	5	GND	Ground	0 Volt
	6	BAND voltage	Analogue input	0 to +8 V
	7	Band data 0	Bit 0	TTL input
	8	Band data 1	Bit 1	TTL input
	9	Band data 2	Bit 2	TTL input
	10	Band data 3	Bit 3	TTL input
	11	ON RMT	Remote Pwr On	+4.5 to +15 V / 3 mA max
	12	Debug mode	CPU only Pwr input	+8 to +15 V / 0.4 A
	13	KEY IN	Tx request	Less than +12 V / 6 mA
	14	KEY OUT	Tx Ready	O.C. output, up to +50 V / 20 mA
	15	GND	Ground	0 Volt

Table 2-2 | Signals and pin out of the CAT/AUX connector

b) **RS-232** interface connector

Please, see ***Figure 2-4 | Rear panel - Connections***, Pos. (4).

RS-232 interface is used for Firmware Updates (see Section ***7.5 Firmware***) and for remote control (see Section ***6 REMOTE CONTROL***).

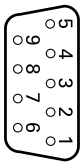
RS-232 interface	Pin Nr.	Pin name	Description	Specification
 D-sub connector, 9-pin, female (Rear panel view)	1	-	Not connected	-
	2	TxD	Transmit Data	RS-232 level output
	3	RxD	Receive Data	RS-232 level input
	4	-	Not connected	-
	5	GND	Ground	0 Volt
	6	DSR	Remote Power On	RS-232 level input
	7	-	Not connected	-
	8	CTS	Remote Power On	RS-232 level input
	9	-	Not connected	-

Table 2-3 | Signals and pin out of the RS-232 connector

3. FIRST POWER-ON, CONTROL SYSTEM, AND INITIAL CHECK

NOTICE

Do not turn the amplifier on for at least 2 hours after unpacking it in the room where it will be used. Pay particular attention when you move it from a very cold into a warm place - condensation is likely and this could result in damage to the high voltage circuits. In such a case, wait at least 4 hours. A similar effect can occur after a rapid warming of the operating room (for instance after switching on a powerful heater in a cold shack).

NOTICE

To avoid any damage (not covered by the warranty), never connect, or disconnect cables while power is applied at either end of the cable.

Hot-plugging is technically incorrect and is a bad practice to connect or disconnect any piece of equipment while it is powered on. Make sure the device is switched off before connecting or disconnecting any cable.

After following all instructions in Section ***2 INSTALLATION***, check whether the rear panel mains rocker switch (marked **ON**/**OFF**) is turned **OFF** (see ***Figure 2-4 | Rear panel - Connections***, Pos. (1)). Then insert amplifier's mains plug into the wall outlet prepared for it. The amplifier remains switched off.

Figure 3-1 | Front panel - Controls and Readouts

3.1. Low Energy STANDBY Mode of the Power Supply

Now you can turn on the mains rocker switch marked **ON**/**OFF** (see ***Figure 2-4 | Rear panel - Connections***, Pos. (1)). This will activate only the low-energy STANDBY mode of the amplifier power supply and the red LED above **POWER** button will light up (see ***Figure 3-1 | Front panel - Controls and Readouts***, Pos. (b)), while the main power supply is still off and the display is dark.

3.2. Front Panel

a) **POWER** button

Please, see ***Figure 3-1 | Front panel - Controls and Readouts*** (Pos. (a).

When the rear panel mains rocker switch is turned on, push, and hold the **POWER** button for 1-2 seconds to start the amplifier up. When the amplifier is turned on, push the **POWER** button to turn off the amplifier (back to low energy STANDBY mode).

b) **LED** indicator above the **POWER** button

Please, see ***Figure 3-1 | Front panel - Controls and Readouts*** (Pos. (b).

When lit red and the screen is dark, the amplifier is in low energy STANDBY mode and may be turned on by pushing the **POWER** button.

When you want to fully disconnect the mains power, switch off also the rear panel rocker switch (see ***Figure 2-4 | Rear panel - Connections***, Pos. (1)). The front-panel red LED should go off and the **POWER** button will become inoperative.

c) Functional buttons

Please, see ***Figure 3-1 | Front panel - Controls and Readouts*** (Pos. (c).

Six functional buttons keypad for manual (local) control of the amplifier. The function of each button is indicated on the display above it. Depending on the displayed menu, the buttons may have different functions (soft key).

d) A high resolution, 24-bit color display showing the operating information.

Please, see ***Figure 3-1 | Front panel - Controls and Readouts*** (Pos. (d).

3.3. Initial Turning On

In order to start up the amplifier, push and hold the front panel **POWER** button for one or two seconds. About ten seconds later (boot sequence) the display will flash and show the basic screen with the amplifier information (see ***Figure 3-2 | Basic screen***).

The amplifier may start in either STANDBY or OPERATE mode depending on AUTO OPERATE user setting (see Section ***4.1.c) AUTO OPERATE user setting***).

3.4. Basic Screen

The following information areas are to be distinguished on the basic screen:

a) Information area for the frequency band

Please, see ***Figure 3-2 | Basic screen***, Pos. (a).

The edges of the currently selected BAND are displayed. If the amplifier does not receive any operating frequency data from CAT or via RS-232, it will switch to the last used band.

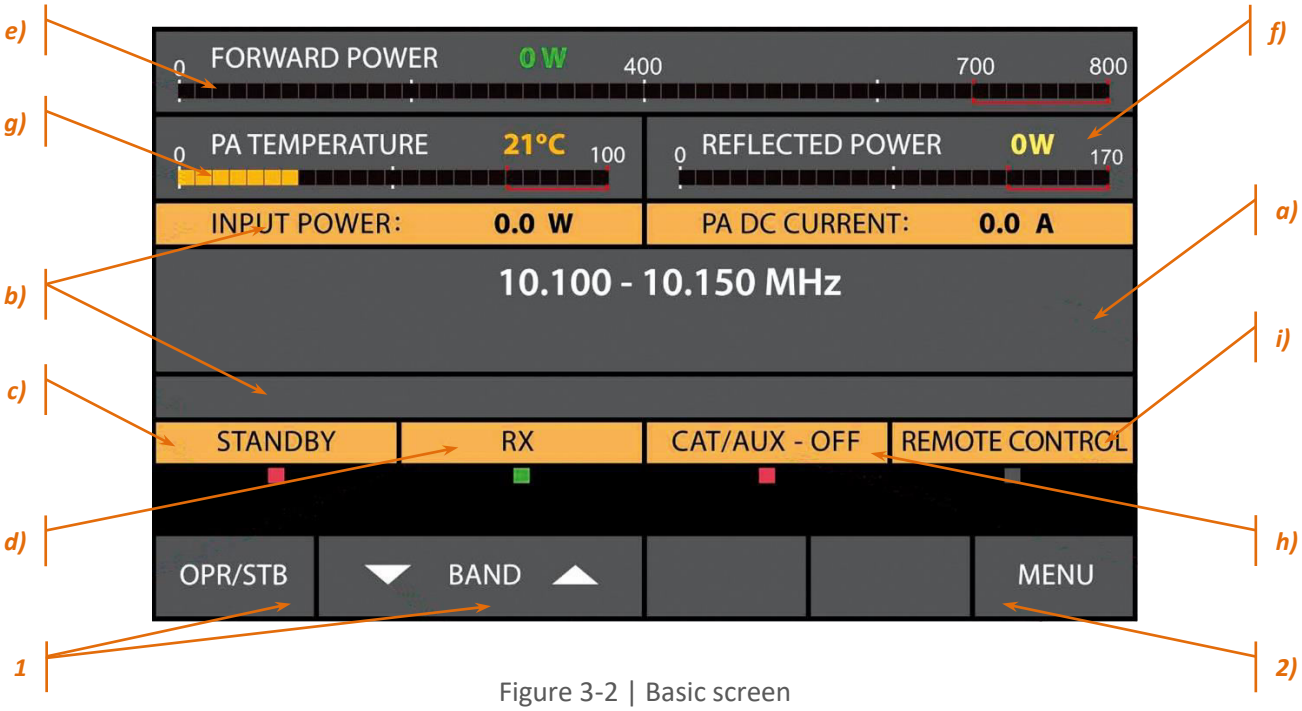


Figure 3-2 | Basic screen

b) Operating values and alarm messages area

Please, see ***Figure 3-2 | Basic screen***, Pos. (b).

Any two operating values selected in the AMP MEASURE menu will be shown here (see Section ***5.1 Menu AMP MEASURE (Amplifier Measurements)***).

The alarm messages (either WARNING or SOFT FAULT) appear on yellow background on the same area and are flashing frequently in order to attract the operator's attention (see ***Figure 4-4 | Appearance of an alarm message***).

The WARNING messages appear only temporarily (for about three seconds), afterwards the indication of the operating values is restored automatically (see Section ***4.4.a) First protection level - WARNING***).

The SOFT FAULT messages appear in the same field but they remain on the screen until the AUTO OPERATE time is elapsed (see Section ***4.1.c) AUTO OPERATE user setting***) or until the operator pushes any button, then the operating values (regime measurands) indication is restored too.

c) Working mode indicator - OPR, STB or AUTO OPER

Please, see ***Figure 3-2 | Basic screen***, Pos. (c).
For detailed information, please, see Section ***4.1 Change of Modes RX/TX and OPERATE/STANDBY; AUTO OPERATE User Setting***.

d) RX/TX indicator

Please, see ***Figure 3-2 | Basic screen***, Pos. (d).
RX/TX indicator reads the request for transmit (**KEY IN** input). The RX indication is green and the TX is red. The indicator will flash frequently if switch over is impossible.

e) Forward power bar graph and digital readout

Please, see ***Figure 3-2 | Basic screen***, Pos. (e).
Displays the forward power fed into the antenna.

f) Reflected power bar graph and digital readout

Please, see ***Figure 3-2 | Basic screen***, Pos. (f).
Displays the power reflected from the antenna. Entering the red zone is not allowed.

g) PA transistor temperature bar graph and digital readout

Please, see ***Figure 3-2 | Basic screen***, Pos. (g).
Entering the red zone is not allowed.

h) CAT interface information

Please, see ***Figure 3-2 | Basic screen***, Pos. (h).
When CAT is deactivated, this field is shaded.

i) REMOTE CONTROL information field

Please, see ***Figure 3-2 | Basic screen***, Pos. (i).
Flashing the REMOTE CONTROL represents RS-232 port dataflow.

3.5. Control System - Buttons and Menus

1) The **OPR/STB** and the **BAND** buttons

The **OPR/STB** and the **BAND** buttons are used for manual (local) control.

Please, see ***Figure 3-2 | Basic screen***, Pos. (1):

- The left-most button **OPR/STB** switches over the amplifier between OPERATE and STANDBY modes;
- The next two buttons - **BAND** up △ and down ▽ arrows change the frequency bands in ascending or descending order.

When ACOM 04AT or 06AT tuner is assigned, **BAND** buttons are called **SEGMENT** and change the tuner frequency segments (see Section ***4.3 Operation with an External Antenna Tuner***).

2) **MENU** button

The right-most button **MENU** provides access to the amplifier's settings and service functions.

Please, see ***Figure 3-2 | Basic screen***), Pos. (2).

- In each menu the left-most button is always **HELP** and the right-most - always **EXIT**;
- The **HELP** button provides information about the active screen.

For more details of the control system and use of the menus see Section ***5 MENUS - SETTINGS AND OPTIONS***.

3.6. Test Transmission

To make sure that you have installed the amplifier correctly, make a test transmission as described below. Repeat these tests for each new band and antenna, as well as after installing a new or modified antenna, antenna switch, tuner, and/or connecting cables.

a) Check of RF bypass path of a non-driven amplifier

When the ACOM 700S is powered off, there is a bypass from **RF INPUT** to **RF OUTPUT**.

For this check the amplifier must be completely installed and connected according to Section ***2 INSTALLATION***, but not powered by the mains, i.e., the mains rocker switch on the rear panel must be turned off. In any case the LED above the **POWER** button on the front panel must be dark for this test.

First, check if the transceiver's reception is normal in some band that should be "open" at the time of test. Be sure to connect to the amplifier output an antenna having good SWR in the band being tested. If you observe a significant worsening of reception, first check for a problem in the coaxial connections to the amplifier (see Sections ***2.4.d) RF INPUT connector*** and ***2.4.e) RF OUTPUT connector***).

Provided the reception is normal, prepare the transceiver as follows:

- Select a continuous carrier mode (CW, RTTY, FM);
- Switch the microphone off (decrease the mic gain), disable FSK;
- Reduce the output power control to a minimum;
- Select a suitable indication so that you can watch the RF power and SWR at the transceiver output;
- If the transceiver has a built-in antenna tuner - switch it off.

Now in RECEIVE mode select a frequency which is not occupied at the moment and press shortly the PTT or TX key while watching the output power and the SWR readings. If the power or SWR at the transceiver output are too high (over 5 W or SWR over 2:1) release the key and check for the reason as follows:

- Check again whether the power control is set at minimum;
- Check whether the frequency is within the operating range of the selected antenna;
- Check the good working order of the coaxial cables, connectors, and feed lines from the transceiver antenna connector through the amplifier, the antenna switch or external tuner (if there is one) to the BALUN transformer, and the antenna itself (see Section ***2.4.e) RF OUTPUT connector***).

If the power and SWR are as expected, transmit again and while watching the power and the SWR readings, increase transceiver power gradually from minimum to maximum (but not more than 200 W in order to not overload the RF by-pass circuit in the amplifier).

If SWR remains below 2:1 (preferably below 1.5:1) at the last test, decrease the power from the transceiver to minimum again and continue with the next check-up.

b) Check-up in STANDBY mode

Turn the amplifier on, as described in Sections ***3.1 Low Energy STANDBY Mode of the Power Supply***, ***3.2 Front Panel***, ***3.3 Initial Turning On*** and ***3.4 Basic Screen*** (see ***Figure 3-2 | Basic screen***).

Make sure that the amplifier is in STANDBY mode. Push the **OPR/STB** button if needed to change to STB.

Repeat receive and transmit tests the same way you just did with the amplifier turned off. During these tests note also whether the forward and reflected power bar graph and digital readout (see Sections ***3.4.e) Forward power bar graph and digital*** readout and ***3.4.f) Reflected power bar graph and*** digital readout) show respective RF power presence. If the reflected power exceeds the forward power, verify that the input and output coaxial cables to the amplifier are not interchanged (see Section ***2.4.d) RF INPUT connector*** and ***2.4.e) RF OUTPUT connector***).

The power indication accuracy is optimized around the 700 W level and usually it is unreliable below 40 W.

c) Entering OPERATE mode

At OPERATE mode the transceiver receiving should not suffer. If it worsens and together with this the indicator RX changes into TX although the transceiver is in receive mode, check the control cable connected to the **KEY IN** input (see Section ***2.4.b) KEY IN connector***) for a short circuit. A wrong connection to the transceiver could cause the same problem.

d) Test transmission with the amplifier

If not readily set by CAT, switch the amplifier to the same band as the transceiver and antenna (see Section ***3.5.1) The OPR/STB and the BAND buttons***).

Set the transceiver to a continuous carrier mode and minimum power. In OPERATE mode choose a free frequency and push the PTT or CW key briefly, while watching the amplifier's behavior:

- RX mode must change to TX;
- The reflected power must read below 20 W;
- The forward power must read between 20 and 150 W with minimum drive power from the transceiver (between 1 and 5 W).

If the above test goes normally, push briefly the PTT once again, this time watching the transceiver's SWR reading (i.e., the input SWR of the amplifier) - this must be below 1.2.
If the SWR to the transceiver is higher than 1.2, check the coaxial cable between transceiver's output and amplifier's input socket (see Section ***2.4.d) RF INPUT connector***).

e) Setting of drive level and typical operation

After successfully passing of the above tests push PTT or CW key for several seconds, watching the forward and reflected power. Increase the drive power until the forward power bar graph and digital readout reach 700 W.

Upon reaching 700 W forward power check the following parameters (continuous carrier operation):

- The reflected power must not exceed ~78 W (for SWR 2:1) or better still to be below 28 W (for SWR 1.5:1);
- PA DC CURRENT must be between 23 and 30 A; it is normal that the current varies within these limits when changing operating frequency and antenna impedance;
- PA DC VOLTAGE must be within 42-44 V;
- The transceiver's SWR reading must be below 1.2:1.

Enter the MEASURE menu (see ***Figure 5-2 | Menu AMP MEASURE***) and check:

- The drive power from the transceiver must be between 22 W and 29 W;
- PA BIAS, which must be between 2.4 and 2.8 V;
- PA TEMPERATURE, which must be between the ambient and 95 °C (203 °F), depending on the power level and the duration of transmission.

f) Elimination of electromagnetic compatibility (EMC) problems

If you use an amplifier for the first time in your shack, you may need to make some improvements in the setup. It is possible you might experience tingling from metallic objects due to the stronger radiated RF field. It could affect the operation of your station or systems outside, if they are too sensitive - typical examples are the microphone, CW keyer, computer keyboard or mouse, as well as TV receivers, Hi-Fi, intercom or telephone setups and others.

For instance, induction of RF currents into the microphone, CW keyer or computer keyboard, may lead to distortion in the peaks or relaxation oscillation in SSB mode, "sticking" or breaking off the dots or dashes from a Morse keyer, or garbling computer screen images.

For the elimination of such problems, we recommend that you take the following general measures:

- Minimize the radiation from the feed lines by reducing the common mode currents in them, improve the balance of antennas and feedlines;
- In case you use asymmetric antennas (GP and similar) install as many radials as practical (use a well-developed counterpoise system);
- Add current chokes on the coaxial feeders;
- Place as far away as possible (also by height) the radiating elements of antennas from the premises, where the affected devices are located; in this sense, asymmetrical antennas without a separate feeder (Long Wire, Windom, and similar) may cause more interference because their radiating element begins immediately from the shack (part of it is the feeder itself);
- If the use of asymmetrical directly fed "wire" antennas is inevitable, use mainly half wave or half wave multiple - they have a high input impedance, operate respectively with a small current in the feed point, and in the grounding of the shack; thus you can reduce the strength of the disturbing RF fields more than 10 times (at the same radiated power) compared to the case with quarter-wave and multiple to quarter-wave antennas of this class - you should avoid them because they have a low input impedance and operate with a large RF current in the grounding system and in the power supply network respectively, i.e. they create stronger disturbances (RFI);
- Improve the RF grounding system: use the shortest and widest possible metal strips for the connections to ground and between the different gear in the shack; connect one or more counterpoises (sized for the problematic band) to the feeder shield at the point, where it enters the building, and the same point - with the possibly shortest and widest connections - to the grounding system: this is a very efficient measure, in particular if the shack is located on a high floor above ground;
- To reduce the RF impedance of the grounding connections sheet metal stripes instead of flexible braids are preferred;
- Thread ferrite beads or snap-in ferrites with medium permeability (800-4000) over the power cord, the feeder and the signal cables leading to the affected devices (TV, etc.); besides the size, consider the frequency range in which the offered ferrites are effective - normally they are optimized for suppression of interferences on HF (with larger permeability), with medium permeability for HF-VHF or with low permeability - only the VHF range. The latter are ineffective for HF;
- Whenever possible use shielded cables and ground their shields at both ends;
- The addition of even quite simple low pass L/C or R/C filters directly to the disturbed inputs or outputs of the devices is very effective, provided it is practically applicable.

Last but not least, bear in mind that the benefit of the above measures is two-fold.

Firstly - they reduce the interferences from your transmissions to the ambient environment and secondly - they reduce the background noise floor for your reception.

Practically, with no great efforts, implementing the above measures, you can reduce the receive background noise floor with one or more S-units across the different bands. This will allow you not to miss weaker stations, which will hear you because of your increased transmission power.

And third, but very important: the EMI environment at your station will become safer for you and those close to you.

4. OPERATION

4.1. Change of Modes RX/TX and OPERATE/STANDBY; AUTO OPERATE User Setting

a) STANDBY mode

In STANDBY mode, as well as, when the amplifier is powered off, receiving and transmitting (no more than 200 W) with the transceiver is done via RF bypass path through **RF INPUT** to **RF OUTPUT** of the amplifier.

In STANDBY mode, as well as when the amplifier is powered off, the transceiver's RF power is not amplified, the control **KEY IN** input does not affect the operation, and the **KEY OUT** output (see Section ***2.4.c) KEY OUT connector***) follows the **KEY IN** input unconditionally. The bands cannot be changed neither manually nor by CAT or remotely.

b) OPERATE mode

In OPERATE mode the receive-transmit (RX/TX) direction is controlled by the **KEY IN** input:

- At open **KEY IN** (OPERATE/RX mode), the transceiver receives the signals from the antenna through the same RF bypass path between **RF INPUT** and **RF OUTPUT** as with amplifier turned off or in STANDBY mode;
- At grounded **KEY IN** (OPERATE/TX mode) the RF drive is amplified and fed to the antenna through the **RF OUTPUT** connector.

The transceiver must send a "Ground on transmit" signal to the amplifier **KEY IN** input at least 10 ms before sending the RF drive signal to the amp's **RF INPUT**. This time (10 ms or more) is necessary for the amp's relays to switch safely from receive to transmit status. Read your transceiver's manual for instructions.

Otherwise, the protection system will read "HOT SWITCHING ATTEMPT" and will trip off.

In OPERATE mode the **KEY OUT** output (see Section ***2.4.c) KEY OUT connector***) follows the **KEY IN** input only after all conditions for safe transmission have been found good by the amplifier control unit. The **KEY OUT** output duly disables transmission while the amplifier is not ready.

The two modes OPERATE and STANDBY may be changed in three ways:

- Manually (locally) - by pressing the **OPR/STB** button alternatively (see ***Figure 3-2 | Basic screen***);
- Automatically at a SOFT FAULT protection trip - when the AUTO OPERATE user setting is activated (see Section ***5.4.c) AUTO OPERATE***);
- By a remote-control command.

Access to the OPERATE mode can be locked in the AMP SERVICE menu, the OPERATE ACCESS user setting (see Section ***5.2 Menu AMP SERVICE (Amplifier Service Functions)*** and ***Figure 5-3 | Menu AMP SERVICE***).

c) AUTO OPERATE user setting

AUTO OPERATE user setting can be turned on/off by the operator in the USER PREFERENCES menu (see Section ***5.4 Menu USER PREFERENCES*** and ***Figure 5-5 | Menu USER PREFERENCES***) or by a remote control command.

When the AUTO OPERATE user setting is OFF, the two modes OPERATE and STANDBY can be changed alternatively by the **OPR/STB** button or by a remote-control command. At a SOFT FAULT protection trip, the amplifier will revert to STANDBY and wait for the operator to return it to OPERATE by pressing the **OPR/STB** button.

When AUTO OPERATE is ON (see Section ***5.4 Menu USER PREFERENCES***), the amplifier will start up in OPERATE mode as soon as you turn it on. At a SOFT FAULT protection trip, the amplifier will also revert to STANDBY, but will return automatically to OPERATE mode in about 4 seconds.

Even at AUTO OPERATE on, the operator can revert to and remain in a STANDBY mode manually by the **OPR/STB** button or by a remote command. The next **OPR/STB** button push or remote command will switch the amplifier to the OPERATE mode and restore the normal operation of the AUTO OPERATE user setting.

4.2. Band Change, Standard and Expanded Frequency Coverage

When connected to a transceiver with CAT, the amplifier will change frequency bands automatically, following the transceiver's operating frequency changes.

Without CAT connection, the bands can be changed either manually or automatically (by the built-in frequency counter).

The bands are changed manually by the up △ and down ▽ **BAND** buttons.

For an automatic band change via the built-in frequency counter, make a quite short pre-transmission (100 ms is enough) - a CW dit, or a sound on SSB) and release the PTT for a moment before the main transmission.

If the new frequency is out of the amplifier's frequency range (see Section ***8.1.a) Standard Frequency Coverage***), the transmission request will be denied and the following fault message will appear on the screen:

"FREQUENCY OUT OF RANGE"

The amplifier specifications are guaranteed within the bands listed in Section ***8.1.a) Standard Frequency Coverage***.

4.3. Operation with an External Antenna Tuner

NOTICE

To avoid damage (not covered by the warranty) do not change antennas while transmitting. Do not transmit into an antenna output if it is not connected to an antenna or a dummy load via a suitable coaxial cable with a PL-259 plug (see Section ***2.4.e) RF OUTPUT connector***).

At antenna SWR over 1.5:1, it is advisable you use an external tuner.

The ACOM 04AT Remote Automatic Antenna Tuner and Switch (see ***Figure 4-1 | ACOM 04AT tuner mounting possibilities***) and ACOM 06AT Automatic Antenna Tuner and Switch (see ***Figure 4-2 | ACOM 06AT automatic antenna tuner and switch (shown near 700S amplifier)***) are designed to work with our transistor (solid-state) amplifier series, including the ACOM 700S.

ACOM 04AT and 06AT tune antennas having SWR up to 3:1 automatically, thus providing an optimum load for the amplifier within 5 seconds with improved harmonic suppression at that. The four-way antenna switch is controlled automatically or from the amplifier front panel.

The ACOM 04AT can be installed both in the shack and in a remote location (even out in the open, close to the antennas). It can be distanced up to 100 m (330 ft) from the amplifier, using a single coaxial cable.

Wall mounted tuner | Mast mounted tuner | Desk mounted tuner

Figure 4-1 | ACOM 04AT tuner mounting possibilities

ACOM 06AT tuner is designed for indoor use only! It can be located up to 100 m (330 ft) away from the shack, using a single coaxial cable.

The connection of ACOM 04AT or 06AT tuner will make accessible specific features on the amplifier display that provide a transparent operation by following frequency and antenna selection changes in less than 50 ms.

Figure 4-2 | ACOM 06AT automatic antenna tuner and switch (shown near 700S amplifier)

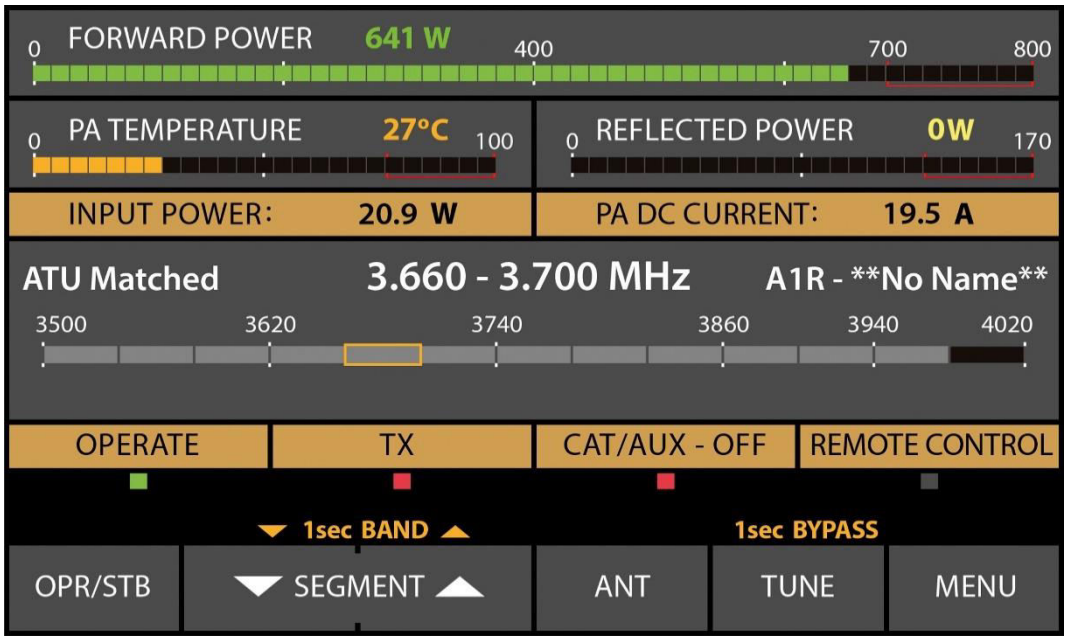


Figure 4-3 | Amplifier screen with ACOM 04AT or 06AT antenna tuner installed

The operation of ACOM S-series amplifiers (solid-state devices) with ACOM 04AT and 06AT are described in detail in the respective User's Manual:

- ***ACOM 04AT User's Manual;***
- ***ACOM 06AT User's Manual.***

The documentation is available for download at ***www.acom-bg.com***.

Pay particular attention to Sections ***3.2 Indications, controls and menus***, and ***4.2 Tuner Assignment and Unassignment*** in the downloaded manual for details on ACOM 04AT or 06AT control from amplifier front panel.

The use of non-ACOM antenna tuners is not recommended.
ACOM, as an Original Equipment Manufacturer, keeps the right to refuse the guarantee claims if the non-ACOM tuner is used.

4.4. Automatic Protection System

The ACOM 700S control unit (see Section ***7.4 Using the Fault Codes (signatures) for Diagnostics***) keeps track of most amplifier analogue and logic signals in all modes.

Those are the receive/transmit control signal, the output relay contact state and switching times, the RF drive frequency and drive power (the input power), the final transistors DC current and DC voltage on the drains as well as, the gates bias voltage and the heat sink temperature, the main power-supply components temperature, the RF output forward and reflected power, and others. Some derivative parameters, as the power gain, the antenna SWR, and others, are watched too.

In the event a parameter limit is violated, the amplifier will assess the risk and will trigger one of the three levels of protection, as described in items (a) to (c) below. Every event is accompanied by a warning text on the screen (see ***Figure 4-4 | Appearance of an alarm message***). A sound alarm will be also produced, if set on in the USER PREFERENCES (see ***Figure 5-5 | Menu USER PREFERENCES***).

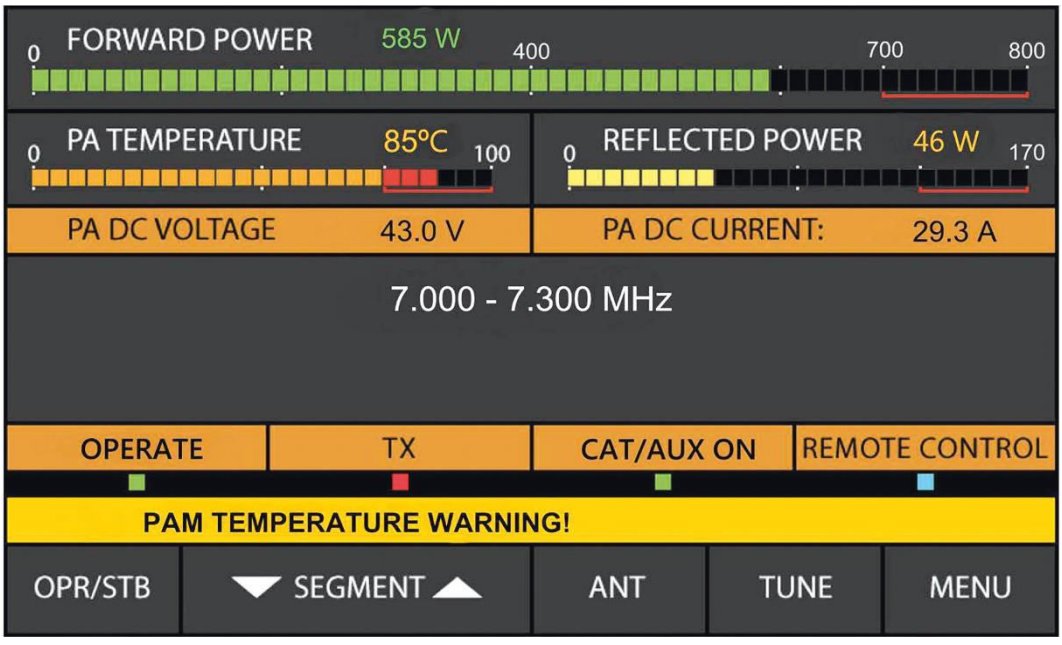


Figure 4-4 | Appearance of an alarm message

a) **First protection level - WARNING**

The first (most forgiving) protection level is WARNING. When a value watched by the control unit approaches the protection threshold, the transmission is not interrupted, but a message appears - for example:

"DRIVE POWER TOO HIGH"

"DRAIN CURRENT TOO HIGH"

or another (see ***Figure 4-4 | Appearance of an alarm message***).

You can continue to transmit in these conditions, but you have to take some measures, for example, to reduce a bit the drive power from the transceiver. The warnings remain on the screen for at least three seconds so that they can be read through and will disappear after the reason has dropped off.

b) **Second protection level - SOFT FAULT**

The second protection level is a SOFT FAULT - when a value exceeded the safe level, but does not put the amplifier in a danger of a failure.

At the second level (SOFT FAULT) the amplifier reverts to STANDBY mode for four seconds or permanently if the AUTO OPERATE user setting had been activated (see Section ***4.1.c) AUTO OPERATE user setting***). A respective message is shown on the screen, for example:

"EXCESSIVE REFLECTED POWER"

"EXCESSIVE DRAIN CURRENT"

and others, accompanied by a sound alarm (unless the sound had not been muted - see Section ***5.4 Menu USER PREFERENCES***).

Unlike those for a WARNING, the SOFT FAULT messages remain on the screen and persist until the operator pushes any button - in order to confirm that the message is read - or until the OPERATE mode is resumed automatically if the AUTO OPERATE user setting is active (see Section ***5.4 Menu USER PREFERENCES***).

A SOFT FAULT calls for fast and simple correcting actions by the operator, such as, for example, reducing the drive power, improving of load SWR through retuning the antenna tuner, antenna change, etc.

c) **Third protection level - HARD FAULT**

The third and most serious protection level is a HARD FAULT. The amplifier will be turned off automatically to avoid possible further damages.

When the protection trips off, the data about the fault is stored in the memory and the front panel screen is blanked. There is also a sound alarm - a series of "F" sent in CW.

If the reason for tripping the protection is not obvious, you can try to turn on the amplifier. If the amplifier allows this after the fault, a fault message will appear with information about the reason for the latest automatic shutdown (for example, overheating of the power supply unit or of the PA stage).

After pushing any button, the fault message will disappear, and if there are no further problems (for example, the overheated unit has already cooled down), the amplifier operation will be restored. In the event a threshold is still violated, a new message will appear on the screen, or the protection will trip again immediately after the recovery attempt.

If the problem persists, contact your dealer (see Section ***1.9 Owner Assistance***).

At each "HARD FAULT" shutdown the amplifier stores diagnostic data, concerning the controls and values, the trip time, and others. Your dealer or his service may ask you to copy or take a picture on the data from the amplifier screen or download it by RS-232 interface and store it in a computer file (see Section ***5.5 Menu FAULTS LOG*** and ***7.5 Firmware***).

5. MENUS - SETTINGS AND OPTIONS

By pushing the **MENU** button (the rightmost on ***Figure 3-2 | Basic screen***) the user invokes the MENU SELECTION screen (see ***Figure 5-1 | MENU SELECTION***). Each menu can be selected by the ▽ **ITEM** or **ITEM** △ buttons and **SELECT** button. These are described below.

The items in each menu are selected and controlled by the same six buttons as in the basic screen, but they have new functions now.

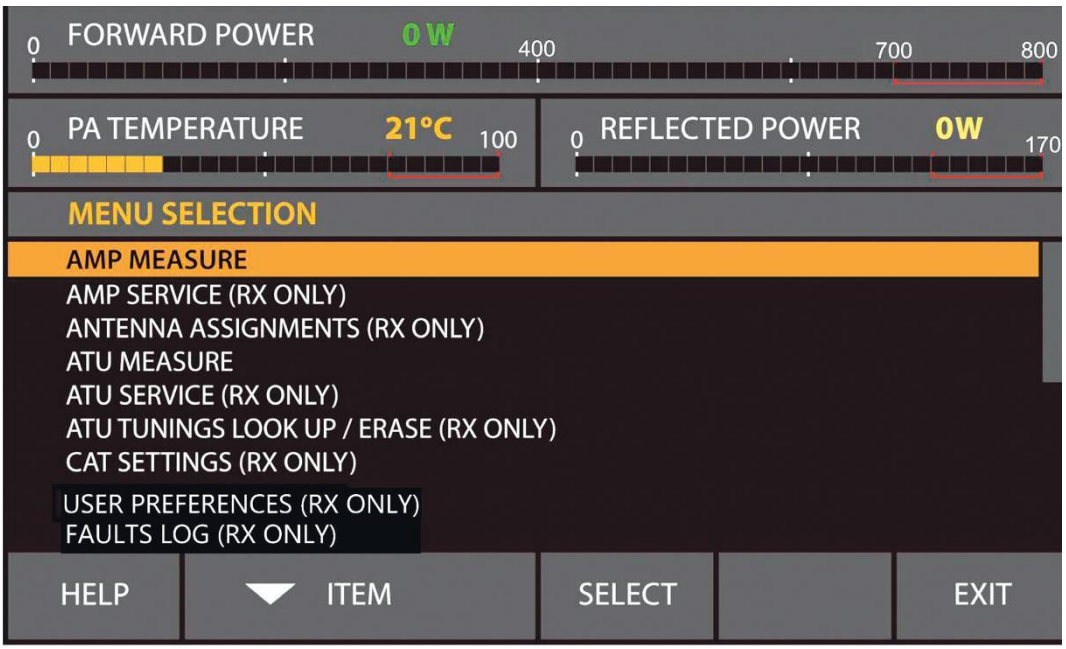


Figure 5-1 | MENU SELECTION

5.1. Menu AMP MEASURE (Amplifier Measurements)

The menu AMP MEASURE (see ***Figure 5-2 | Menu AMP MEASURE***) is accessible from the MENU SELECTION screen (see ***Figure 5-1 | MENU SELECTION***) in all modes. Here you can constantly observe the values of eleven parameters.

Two identical lists appear on the left and the right halves of the screen, each one containing the same 11 values.

Any value can be selected in each screen half. Using buttons ▽ **ITEM** and **ITEM** △ (up and down arrows) select the desired values. The two selected values will appear also on the basic screen continuously (see ***Figure 3-2 | Basic screen***, Pos (b)) - after leaving this menu (**EXIT** button).

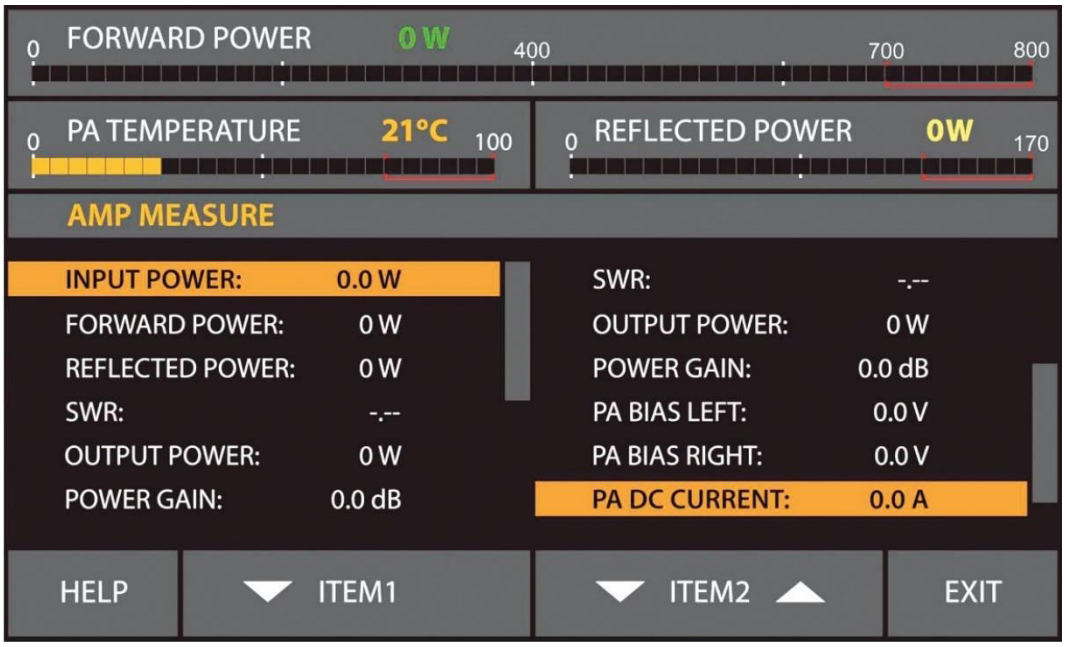


Figure 5-2 | Menu AMP MEASURE

The measured values of the quantities in the AMP SERVICE menu are indicative only.

The ACOM amplifier is not a measuring instrument in the sense of a calibrated (laboratory) instrument, i.e. the measured values can not be used as a reference or compared with any other measured values from calibrated (laboratory) instruments.

5.2. Menu AMP SERVICE (Amplifier Service Functions)

The amplifier service menu (see ***Figure 5-3 | Menu AMP SERVICE***) is accessible from the MENU SELECTION screen (see ***Figure 5-1 | MENU SELECTION***) at RX mode only.

NOTICE

The AMP SERVICE menu is used for checking and adjustment of the zero-signal (idle) drain current of the final transistors and for testing some functions and circuits of the amplifier when serviced. We recommend these procedures are carried out only by a trained service technician!

The necessary service function is selected with the buttons ▽ **ITEM** and **ITEM** △ (up and down arrows). With the ◁ **SELECT** and **SELECT** ▷ buttons (left or right arrows) the selected function is turned ON or OFF.

The inactive functions are greyed out and the active are red. When leaving a function submenu, it is turned off and deactivated automatically. At pressing the **EXIT** button all service functions are turned off, and the MENU SELECTION screen comes back (see ***Figure 5-1 | MENU SELECTION***). At consecutive pushing of the **EXIT** button, the basic screen returns (see ***Figure 3-2 | Basic screen***).

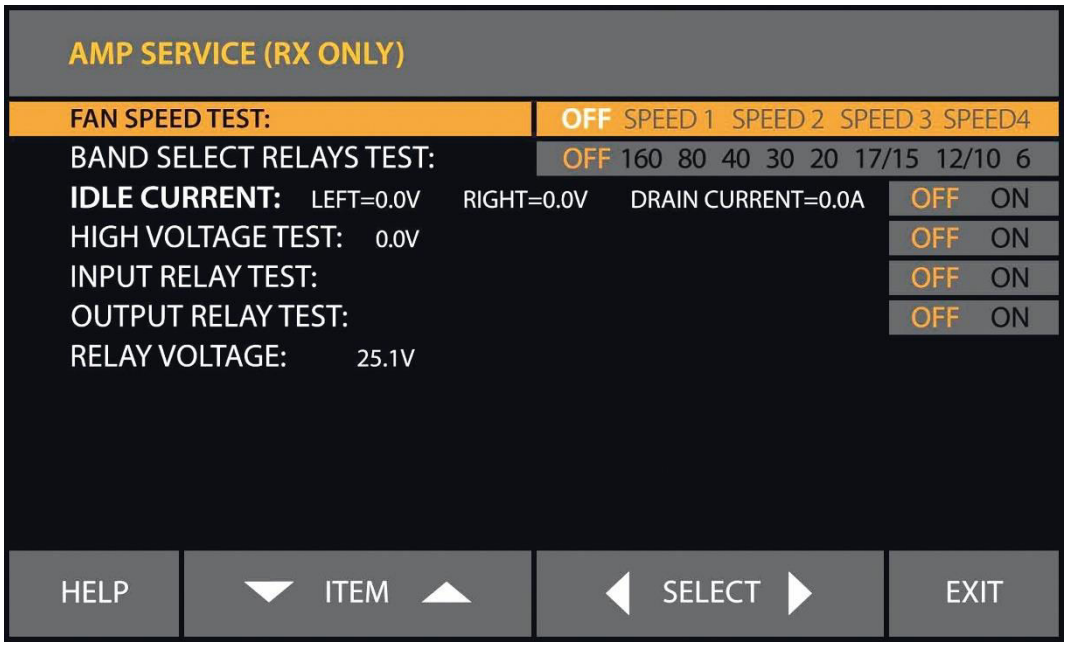


Figure 5-3 | Menu AMP SERVICE

5.3. Menu CAT/AUX SETTINGS (Selection of CAT/AUX interface)

After a CAT cable is connected to both the transceiver and amplifier, the correct settings for the transceiver have to be entered via this menu. If there is no CAT connection, OFF has to be selected as Interface type.

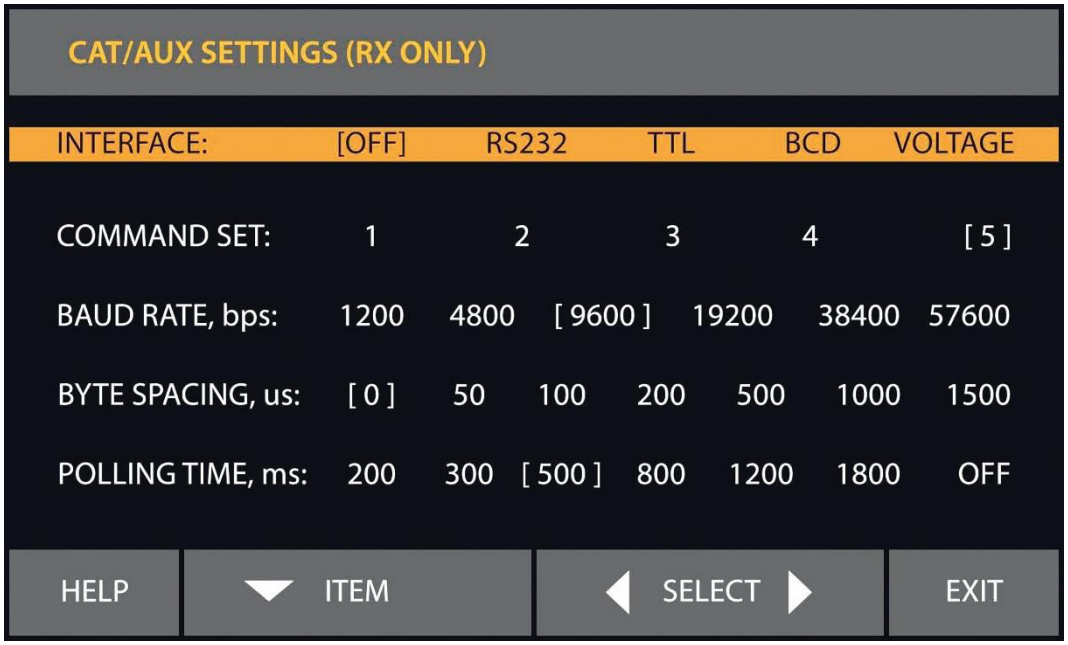


Figure 5-4 | Menu CAT/AUX SETTINGS

The CAT settings are accessible only in RX mode (see ***Figure 5-1 | MENU SELECTION*** and ***Figure 5-4 | Menu CAT/AUX SETTINGS***. An item is selected by the ▽ **ITEM** and **ITEM** △ buttons (up and down arrows). The value is set with the ◁ **SELECT** and **SELECT** ▷ buttons (left or right arrows). Your selection appears in square brackets [x] on the screen.

If the amplifier **CAT** port is connected to the transceiver via either BCD Band Data or Band VOLTAGE output, select the respective interface type on top row and push **EXIT** button. The other items and values will be ignored with such a selection.

If the CAT cable is plugged into the transceiver's serial port, select the interface and command set according to ***Table 5-1 | Transceiver interface***. The baud rate has to be set to the same value as the transceiver's. The byte spacing and polling time may be left unchanged.

Last select the interface type (RS-232 or TTL) according to the ***Table 5-1 | Transceiver interface*** and used connection, then push **EXIT** button to return to MENU SELECTION.

NOTICE

If there is no CAT connection, but CAT INTERFACE is selected (activated) an error message will be displayed when you change the band.

Transceivers	Interface	Command set
ELECRAFT	RS-232	5
ICOM (Connection to the REMOTE connector)	TTL	1
ICOM (Connection to the RS-232 port or CT17)	RS-232	1
KENWOOD TS-2000, 480, 590, 890, 990 and similar	RS-232	5
YAESU FT-101, 450, 950, 991, 1200, 2000, 3000, 5000, 9000 and similar	RS-232	2
YAESU FT-1000MP	RS-232	4
YAESU FT-817, 857, 897	TTL	3

Table 5-1 | Transceiver interface

Under CAT interface control, the amplifier follows the VFO "A" frequency changes only. The ACOM 04AT and 06AT automatic antenna tuners follow the frequency of the amplifier.

If your transceiver has more than one VFO, as well as in SPLIT mode, use VFO "A" for transmission and for tuner control. If the amplifier frequency does not change over the CAT interface, make sure you are using VFO "A" on the transceiver, as the amplifier CAT interface only uses VFO "A" data.

5.4. Menu USER PREFERENCES

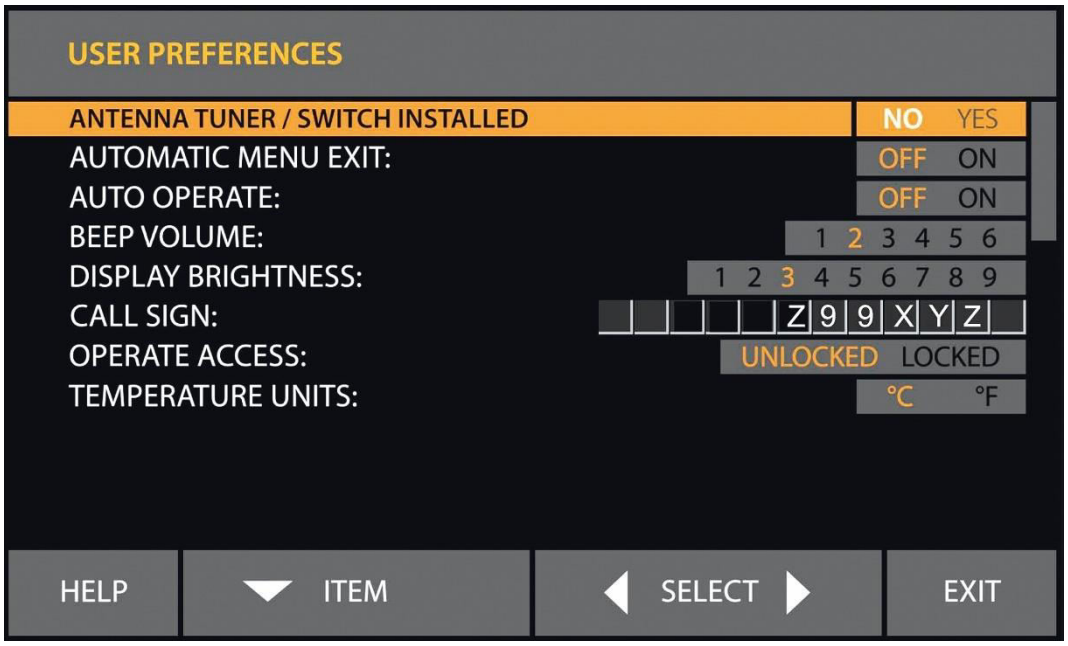


Figure 5-5 | Menu USER PREFERENCES

a) ANTENNA TUNER/SWITCH INSTALLED

If ACOM 04AT or 06AT antenna tuner is connected, select YES. See Section ***4.3 Operation with an External Antenna Tuner*** and refer to ACOM 04AT or 06AT User's Manual (available for download at ***www.acom-bg.com***).

b) AUTOMATIC MENU EXIT

When AUTOMATIC MENU EXIT is turned on, the amplifier exits the currently selected menu if no button has been pressed for more than 5 minutes.

If AUTOMATIC MENU EXIT is turned off, the amplifier remains in the currently selected menu until the **EXIT** button is pushed.

c) AUTO OPERATE

The AUTO OPERATE user setting is described in Sections ***3.3 Initial Turning On*** and ***4.1.c) AUTO OPERATE user setting***.

d) CALL SIGN

If entered here, a call sign (or another text) will be included in any Fault Log file generated by the amplifier (see Section ***5.5 Menu FAULTS LOG***). The call sign (or another text) will not replace ACOM 700S logo on the startup screen.

Use the ◁ **SELECT** and **SELECT** ▷ buttons (left or right arrows) to select the character position. The ▽ **ITEM** and **ITEM** △ buttons (up and down arrows) change the characters.

Finish by moving the pointer out of the editable fields by means of the ◁ **SELECT** (left arrow) button.

e) OPERATE ACCESS

When locked, the amplifier remains in STANDBY and cannot be switched to OPERATE unless unlocked in the same menu. Passwords are not used - this is only a simple protection against possible child actions, or involuntary switching to OPERATE mode. While locked, an attempt for entering OPERATE mode will result in a message:

"OPERATE MODE IS LOCKED"

The other preference items do not need explanation.

5.5. Menu FAULTS LOG

This function reads on the screen the information stored in the memory about the last 28 HARD FAULT protection trips (see ***Figure 5-6 | Menu FAULTS LOG***). By pushing the FILE button, the information may be also downloaded in a plain-text format file through the RS-232 port and a computer using a standard terminal emulating program (TTY). The RS-232 protocol settings are: 9600, 8 N 1.

Please, see Section ***7.4 Using the Fault Codes (signatures) for Diagnostics***.

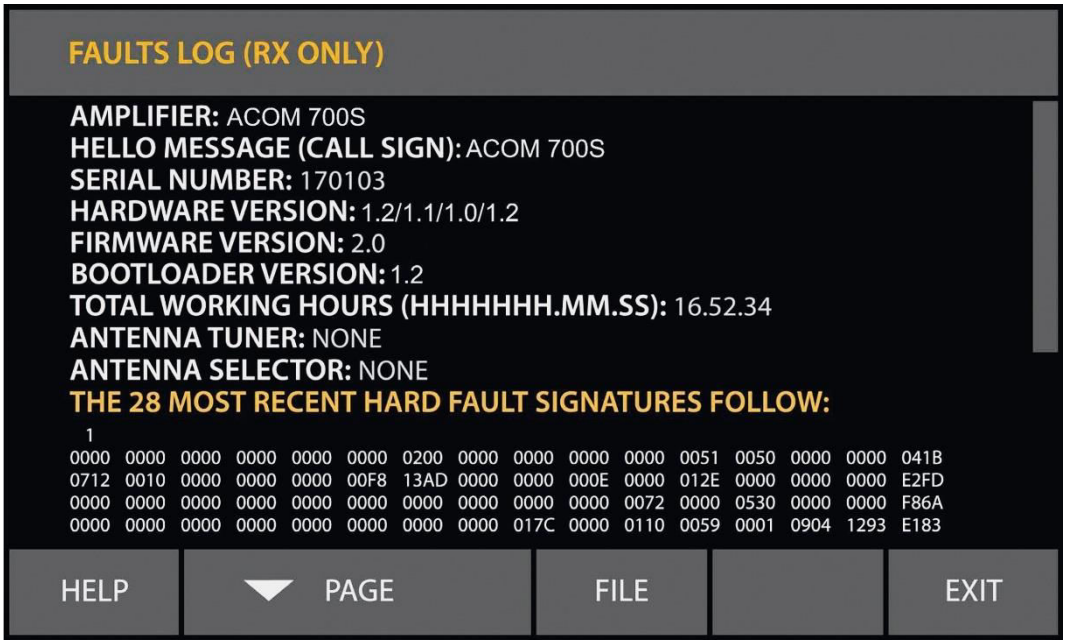


Figure 5-6 | Menu FAULTS LOG

5.6. Menu RESTORE DEFAULT SETTINGS

Four different factory-reset levels are available (see ***Figure 5-7 | Menu RESTORE DEFAULT SETTINGS***).

In order to confirm the selected action, the operator must push the ▽ **ACTION** (down arrow) button once more (as YES confirmation). After restoring the default settings, the control will return to the MENU SELECTION screen (see ***Figure 5-1 | MENU SELECTION***).

If the **ACTION** △ (up arrow) button is pressed, the NO is selected again, and the control will not leave the current position.

At pressing the **EXIT** button in this position, the control leaves this menu without changing anything and returns in the previous window (the MENU SELECTION screen).

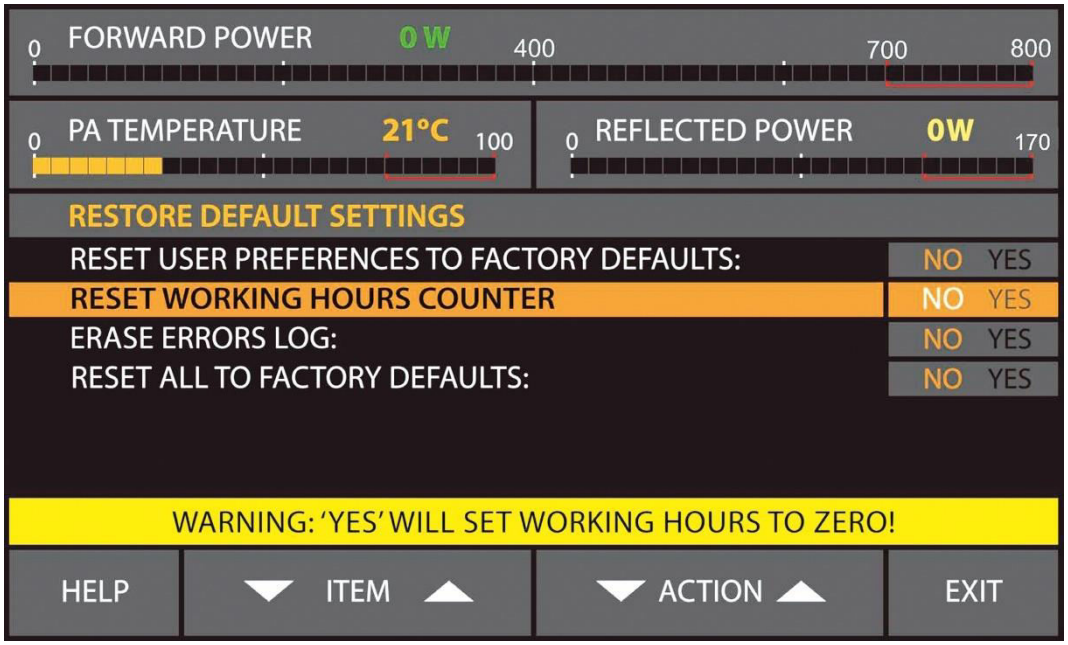


Figure 5-7 | Menu RESTORE DEFAULT SETTINGS

6. REMOTE CONTROL

Remote control of ACOM 700S is provided by either ACOM eBox Ethernet Remote Control device or RS-232 port.

6.1. Remote Control via ACOM eBox

Remote control of ACOM 700S via Internet is provided by the ACOM eBox Ethernet Remote Control device.

Figure 6-1 | ACOM eBox Ethernet Remote Control device

The operation of ACOM 700S with ACOM eBox is described in ACOM eBox User's Manual.

For further information, please, see our document
- ***ACOM eBox User's Manual***.

The documentation is available for download at ***www.acom-bg.com***.

If you need cable wiring diagrams, please, see our document
- ***ACOM CAT cables Technical Information***.

The documentation is available for download at ***www.acom-bg.com***.

Use of other remote-control devices is not recommended.

6.2. Remote Control via RS-232 interface

The ACOM 700S may be controlled remotely by the RS-232 port.
For cable connection, please see Section ***2.5.b) RS-232 interface connector*** and ***Table 2-3 | Signals and pin out of the RS-232 connector***.

For ACOM 700S RS-232 interface protocol, please, contact your dealer (see Section ***1.9 Owner Assistance***).

7. MAINTENANCE

⚠ DANGER

Both the mains voltage and the high DC voltage up to 500 V inside the ACOM 700S amplifier are LETHAL!

For your safety, pull the amplifier power plug out of the mains wall outlet and WAIT AT LEAST 3 minutes EACH TIME BEFORE you remove the cover of the amplifier.

If no indicator glows upon switching the amplifier ON, the main fuse(s) may have blown (see Section ***7.3 Fuse Replacement***).

7.1. Periodic Maintenance

a) Periodic checks

Periodically (but at least once per year) check all connections, contact cleanliness and the tightening of all connectors, in particular the coaxial ones.

Check the integrity of the cables, in particular when they are laid on the floor. Check also if the cables are secured well in the area where they come out of the connector body.

Pay particular attention to the mains plug and the wall outlet (see Sections ***2.4.g) Power cord*** and ***2.4.h) Preparation of wall outlet***. If you have any doubts consult with a qualified electrician.

Periodically check the SWR of the antennas and if this changes over time. Problems could occur more often in poor weather conditions - rain, snow, strong wind etc.

b) Air filter

ACOM 700S has one air filter that is accessible from the rear (see ***Figure 2-4 | Rear panel - Connections***, Pos. (2)).

Periodically (more often in a dusty environment, but at least once per year) clean the air filter **without opening the amplifier**.

⚠ CAUTION

The air filter may be too dusty - be careful how you clean it so that you DO NOT INHALE (BREATHE IN) neither spill the dust over! Wrap it, for instance, in a wet cloth before cleaning!

The filter is contained in an externally mounted plastic enclosure. The cover of the enclosure, together with the filter itself, is removed by gently pulling it away from the amplifier. Carefully clean the filter and cover from dust, wash it with tap water and leave it to dry up before you mount it back.

Finally put the filter back in the filter enclosure cover and click the cover back in place.

7.2. Cleaning

⚠ CAUTION

Do not use any solvents for cleaning. They may be dangerous to you and damage amplifier surfaces, paint, and plastic components.

Do not open the amplifier. Cleaning of the amplifier outer surfaces can be done with a piece of soft cotton cloth lightly moistened with clean water.

Also, clean (as much as possible from the outside, without opening the amplifier) all ventilation apertures on the cover and the chassis, including the ones on the bottom.

⚠ DANGER

Never push or put anything into holes in the case - this will cause electric shock.

7.3. Fuse Replacement

⚠ DANGER

If replacement of fuses is necessary, first pull out the amplifier mains plug from the mains outlet and wait for at least 3 minutes!

NOTICE

For replacement, only use standard fuses from the types recommended below.

The two Primary Mains Fuses of the amplifier are located on the rear panel (see ***Figure 2-4 | Rear panel - Connections***, Pos. (f)). They are fuses of the "F" type (fast-acting / quick-acting / quick blow), European size 5x20 mm, ceramic (or glass) body cartridge.

The fuses must be rated for a current corresponding to your mains nominal voltage:

- 10 A / 250 V for operation from 200-240 VAC;
- 16 A / 250 V for operation from 100-120 VAC.

Suitable 10 A fuse is:

- Littelfuse, PN: 0217010.H (glass body cartridge);

  This fuse can be ordered from:

  - DigiKey (www.digikey.com), PN: 0217010.MXBP-ND;
  - Farnell (www.farnell.com), PN: 1191761;
  - Mouser (www.mouser.com), PN: 576-0217010.

Suitable 16 A fuses are:

- Littelfuse, PN: 0216016.MXP (ceramic body cartridge);
  This fuse can be ordered from:
  - Farnell (www.farnell.com), PN: 1354551;
  - Mouser (www.mouser.com), PN: 576-0216016.
- ESKA, PN: 520.030 (glass body cartridge);
  This fuse can be ordered from:
  - TME (www.tme.eu), PN: ZKS-16A/250V.

If, after Primary Mains Fuses replacement, the device does not operate normally, we recommend repair, performed only by a trained service technician.

Contact your ACOM dealer for assistance (see Section ***1.9 Owner Assistance***).

Besides the primary fuses, there are internal fuses inside the amplifier.

⚠ WARNING

Do not replace internal fuses located inside the amplifier.

Blown internal fuses can be a symptom of a more serious problem, which should be resolved beforehand. A fault of this type will not occur under normal operating circumstances.

Replacing internal fuses is a complex and potentially dangerous operation.
For this reason, we recommend this work be carried out only by a trained service technician.

Contact your ACOM dealer for assistance (see Section ***1.9 Owner Assistance***).

Unauthorized replacement of inside fuses infringes the warranty conditions!

Besides several specific national standards, the principal fuses standard applied worldwide is IEC 60127.

7.4. Using the Fault Codes (signatures) for Diagnostics

The data of the last 28 HARD FAULT protection trips is stored in the amplifier memory (see Section ***5.5 Menu FAULTS LOG***).

The data can be downloaded from the memory through the RS-232 port and stored in a computer file even if the amplifier cannot be turned on after a serious fault - only external power has to be fed to the Control unit in either of the following ways:

- External 8 to 15 VDC voltage applied to the "DEBUG mode" input (see ***Table 2-2 | Signals and pin out of the CAT/AUX connector***) of the CAT/AUX port. The power supply has to be capable to provide 0.4 A of current;

- If the Control board has already been removed from the amplifier, it can be powered directly with +5 V (0.4 A) and the fault log downloaded via the RS-232 port.

In the FAULT LOG reading mode (see ***Figure 5-6 | Menu FAULTS LOG***), the Control board automatically transmits the data from the memory trough the RS-232 interface (see Section ***2.5.b) RS-232 interface connector***). The RS-232 protocol settings are: 9600, 8 N 1. Depending on the number of fault events stored in the memory, the transmission may take between 0.5 and 12 seconds. A pause of 6 seconds follows, then transmission starts again. The data can be read in a plain-text format with a computer, using a standard terminal emulating program (TTY).

You can send the recorded file to your dealer or to ACOM accordingly.

To decode the downloaded hexadecimal data, you have to use the **ACOM Hard Faults Signatures Converter** (Excel file), distributed by ACOM free of charge. You can download it from ***www.acom-bg.com***.

7.5. Firmware

7.5.1. Firmware Versions

The history of available ACOM 700S CPU Module firmware versions is shown in ***Table 7-1 | ACOM 700S firmware versions history***.

Version	Release Date	Notes / Summary of changes
1.0	2018	Base firmware version;
1.6	19.05.2022	Small firmware improvements based on minor hardware changes;
1.8	19.02.2024	- NEW function: "Active automatic protection" - CAT interface: properly set power before tune - Increase threshold for 5V max - YAESU CAT interface: restore MIC gain after tune - Improve code readability and add HW division (These changes are purely internal and have no effect on end user experience) - Disable Auto-Operate after Hard Fault Error - Fix: selection of polling time and byte spacing

Table 7-1 | ACOM 700S firmware versions history

The new firmware is issued as a file, for example **ACOM_700S_FW V1.8 - 19.02.2024.DAT**.

The latest firmware versions for our products are available at ***www.acom-bg.com*** free of charge.

7.5.2. Prequistments

Before you change the firmware version, check the new version compatibility with the revisions of the hardware and of the boot loader in your amplifier (***see Figure 5-6 | Menu FAULTS LOG***). If you have any doubts about the versions, please, consult your dealer before you undertake any action.

When ACOM issues a new firmware version, the user can upload it in the amplifier after he checks the compatibility. When compatibility is confirmed a return to an earlier version is also possible.

We highly recommend updating your ACOM 700S amplifier with firmware version 1.8 or newer.
The ACOM 700S firmware version 1.8 is compatible with all ACOM 700S amplifiers produced (see Section ***1.4 Product History and Documentation Validity***).

For uploading (or backup) a firmware to ACOM 700S you have to use the **ACOM Terminal S** software, distributed by ACOM free of charge. You can download it from ***www.acom-bg.com***.

The ACOM **Terminal S** is available for MS Windows operation systems only.

ACOM Technical Support Team can advise you om **Terminal S** use in the Windows environment.

The **ACOM Terminal S** communicates with the amplifier via the RS-232 interface.

To use the **ACOM Terminal S**, you have to install the software on PC equipped with:

- RS-232 port (real port / build-in) as marked on the picture below:

Figure 7-1 | Example of PC with RS-232 port (interface)

For the necessary RS-232 connecting cable see ***Table 7-2 | RS-232 connection cable wiring***.

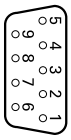
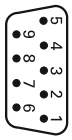
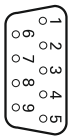
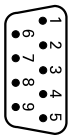
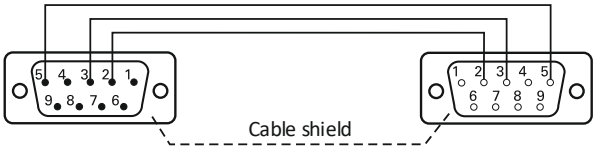
ACOM 700S Rear panel		Connecting cable				Personal Computer	
RS-232 connector						RS-232 connector	
 D-sub connector, 9-pin, female (Front view)	1 | Not connected	 D-sub connector, 9-pin, male (Solder view)	1	Not connected	-	 D-sub connector, 9-pin, female (Solder view)	1 | DCD	 D-sub connector, 9-pin, male (Front view)
	2 | TxD		2	————	2		2 | RxD	
	3 | RxD		3	————	3		3 | TxD	
	4 | Not connected		4	Not connected	-		4 | DTR	
	5 | GND		5	————	5		5 | GND	
	6 | DSR		6	Not connected	-		6 | DSR	
	7 | Not connected		7	Not connected	-		7 | RTS	
	8 | CTS		8	Not connected	-		8 | CTS	
	9 | Not connected		9	Not connected	-		9 | RI	
	Housing		Housing	Ext. shield	Housing		Housing	
								

Table 7-2 | RS-232 connection cable wiring

OR

- "USB to RS-232" converter.

  Nowadays, most computers do not have a built-in RS-232 interface (port). But all computers have a couple of USB ports. So, if this is your case you have to use a "USB to RS-232" interface converter.

The ACOM recommends using "USB to RS-232" converters produced by FTDI (www.ftdichip.com) or based on an FTDI chip.

USB (connector type C) to RS-232 converter

USB (connector type A) to RS-232 converter

Figure 7-2 | Examples of "USB to RS-232" converters

Suitable "USB to RS-232" converters are:

- FTDI, PN: UT232R-200 (USB (connector type A) to RS-232 (connector D-sub, 9-pin, male), 2 m cable length)
  This converter can be ordered from:
  - DigiKey (www.digikey.com), PN: 768-1084-ND;
  - Mouser (www.mouser.com), PN: 895-UT232R-200;
  - Farnell (www.farnell.com), PN: 2352013.

- FTDI, PN: UT232R-500 (USB (connector type A) to RS-232 (connector D-sub, 9-pin, male), 5 m cable length)
  This converter can be ordered from:
  - DigiKey (www.digikey.com), PN: 768-1085-ND;
  - TME (www.tme.eu), PN: UT232R-500;
  - Mouser (www.mouser.com), PN: 895-UT232R-500;
  - Farnell (www.farnell.com), PN: 2352014.

- Digitus, PN: DA-70166 (USB (connector type C) to RS-232 (connector D-sub, 9-pin, male), 1 m cable length)
  This converter can be ordered from:
  - TME (www.tme.eu), PN: DA-70166.

7.5.3. Firmware Update Procedure

The firmware update procedure below is based on a PC with Windows 11 operating system and the use of a "USB to RS-232" converter. The used PC has both RS-232 interfaces:
- "USB to RS-232" interface converter
- RS-232 serial port/interface (in-build).

The sample images below are based on used Terminal S software with a connected ACOM 500S amplifier. The firmware update procedure is the same for ACOM 700S and 1200S amplifiers.

STEP 1 – RS-232 Interface Settings on your PC

- Switch On your PC. Connect the "USB to RS-232" converter to any USB port on your computer, and **do not connect** the converter to the amplifier.

- Go to **Device Manager** on your PC (right mouse click over Windows Start button -> Device Manager). The converter's driver should be installed automatically, and you can see a situation similar to ***Figure 7-3 | PC Device manager*** (if driver installation is OK).

  Make sure that the correct (newest) driver for your hardware is installed.

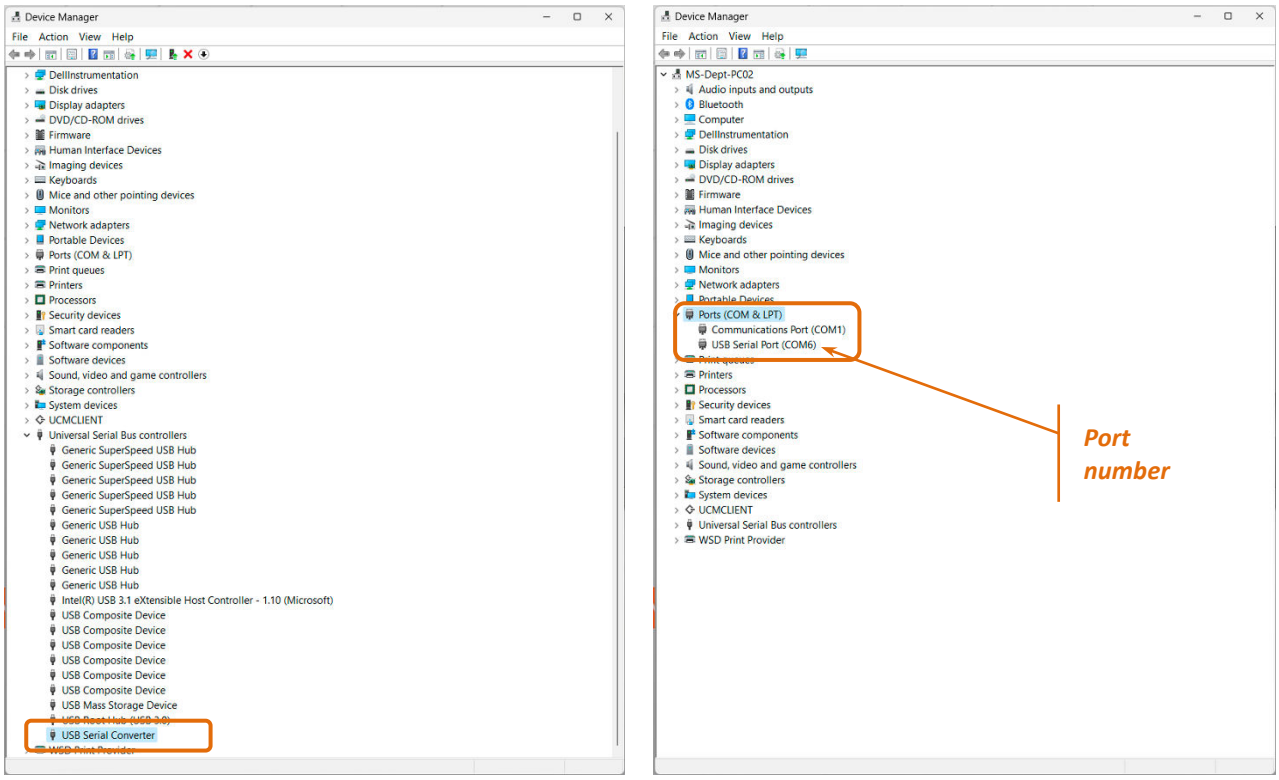


Figure 7-3 | PC Device manager

Remember the serial (RS-232) port number.

- Go to Serial port Properties (right mouse click over Device Manager -> Ports -> USB Serial Port -> Properties). You can see a situation similar to this:

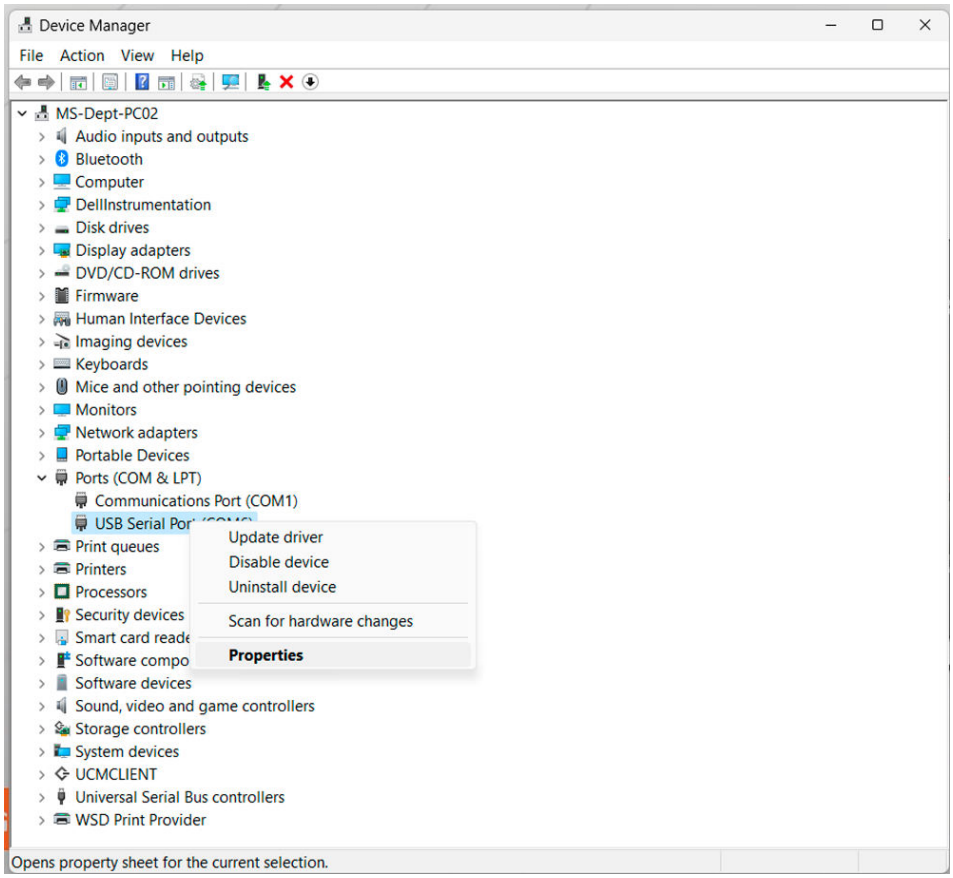


Figure 7-4 | PC Device manager -> Port properties

- Go to **Port Settings** tab -> **Advanced** tab and change **Latency Timer** parameter to 1 msec.

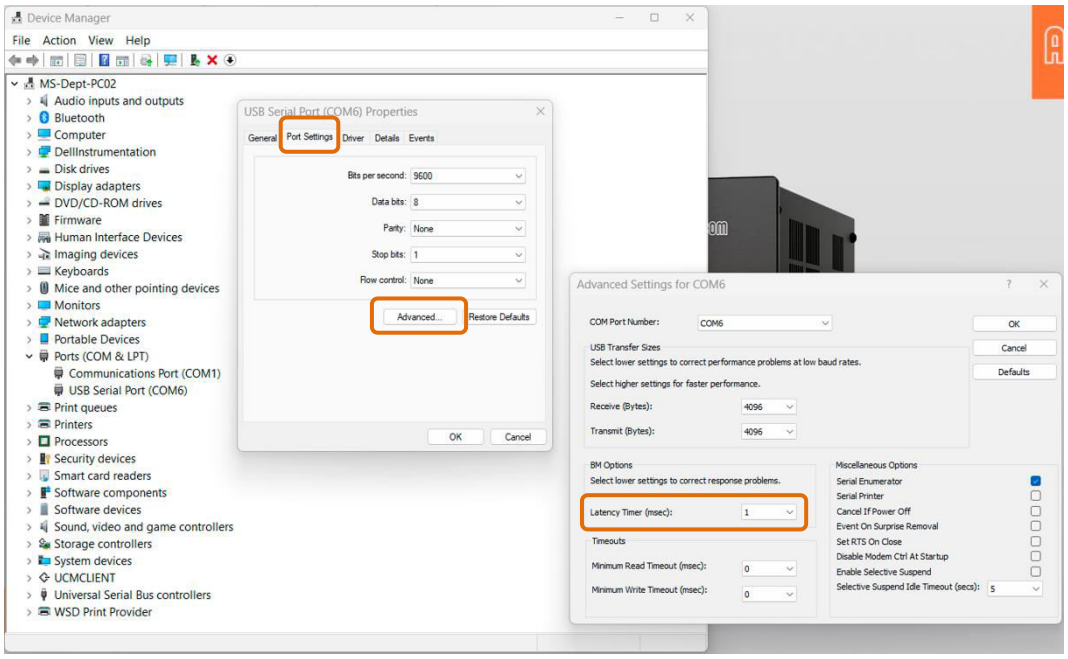


Figure 7-5 | PC Device manager -> USB Serial Port properties

- Restart your PC

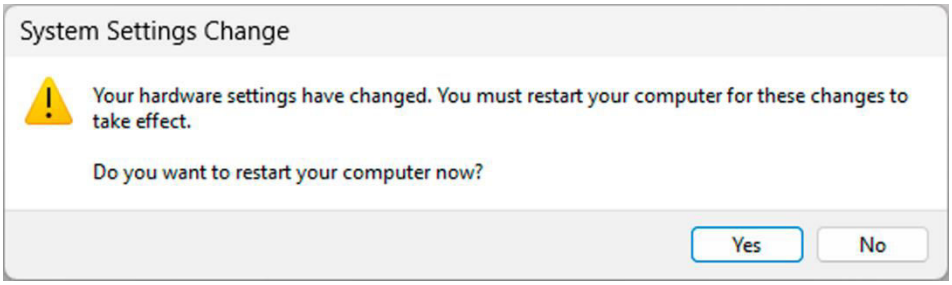


Figure 7-6 | Restart Windows PC

If you are using a PC with a built-in RS-232 port the above **STEP 1** is similar and you have to go to **Port Settings** tab -> **Advanced** tab and change **Receive/Transit buffer** parameters to 1.

Please note that these parameters depend on the hardware type/model of your built-in RS-232 port and may look different than the example below.

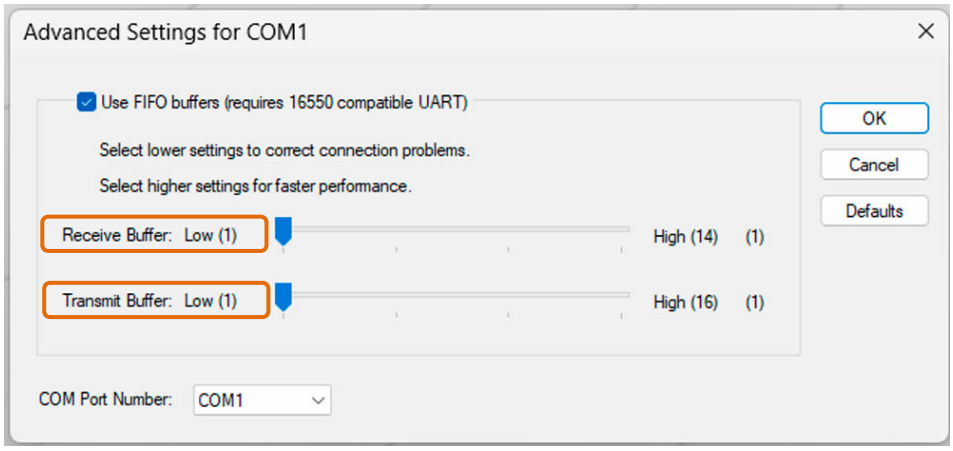


Figure 7-7 | Examples PC Device manager -> Built-in RS-232 Port properties

STEP 2 – Amplifier Settings

- When the amplifier is turned on, push the **POWER** button to turn off the amplifier (back to Low Energy standby mode);
- Switch off the amplifier via Main Power Rocker Switch (see ***Figure 2-4 | Rear panel - Connections***, Pos. 1); Make sure the Main Power Rocker Switch is in OFF position;
- Pull the amplifier's line (mains) plug out of the outlet;
- Do not disconnect **GND** connection;
- Disconnect all cables (except **GND** connection) from the rear panel of the amplifier – transceiver, antennas, etc.

⚠ DANGER

Remove the **GND** connection last (see ***Figure 2-4 | Rear panel - Connections***, Pos. (a)) and wait 30 minutes for safety.

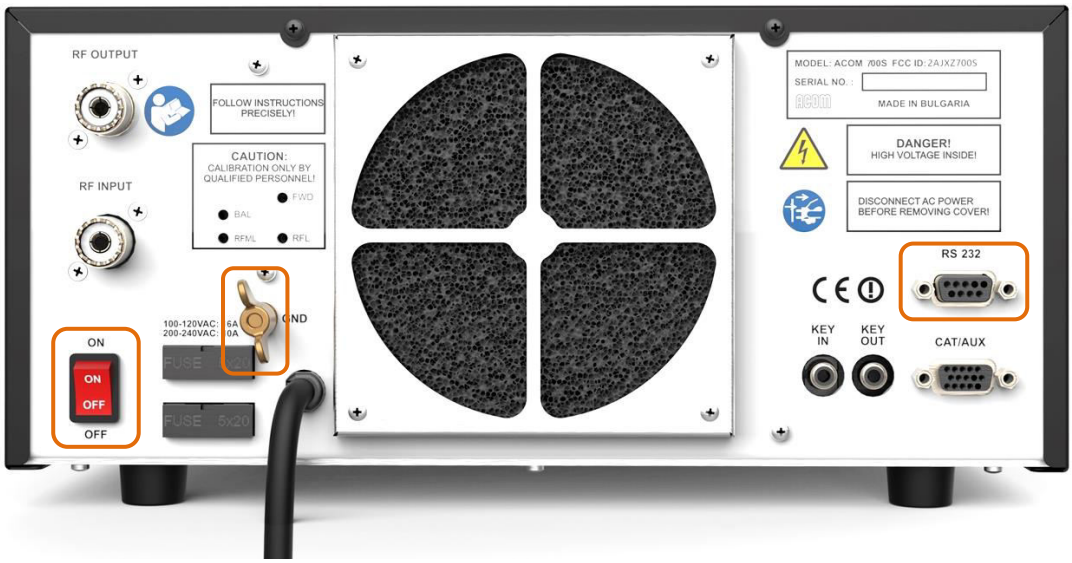


Figure 7-8 | Rear panel – RS-232 port

- Connect the amplifier to the PC via RS-232 interface on the rear panel of the amplifier (see ***Figure 7-8 | Rear panel – RS-232 port***).
  - If your PC has a built-in RS-232 port, you have to use an RS-232 cable (see ***Table 7-2 | RS-232 connection cable wiring***) to connect an amplifier to the PC.
  - If your computer does not have a built-in serial RS-232 interface use an "USB to RS-232" converter (see ***Figure 7-2 | Examples of "USB to RS-232" converters***).
- Check whether the rear panel mains rocker switch (marked ON/OFF) is turned off (must be). Insert amplifier's mains plug into the wall outlet;

- Switch on the amplifier via Main Power Rocker Switch
  (see ***Figure 2-4 | Rear panel - Connections***, Pos. 1);
- Push and hold for 1-2 seconds the **POWER** button to start the amplifier and enter STANDBY mode.

If the amplifier starts normally there will be a couple of beeps from the amplifier.

STEP 3 – Using Terminal S software for Firmware Update

- Exit all programs running on your computer and **DISABLE/DEACTIVATE** any antivirus software;
- Start **ACOM Terminal S** software (We assume that you downloaded **Terminal S** software from ***www.acom-bg.com*** and installed it on your PC);

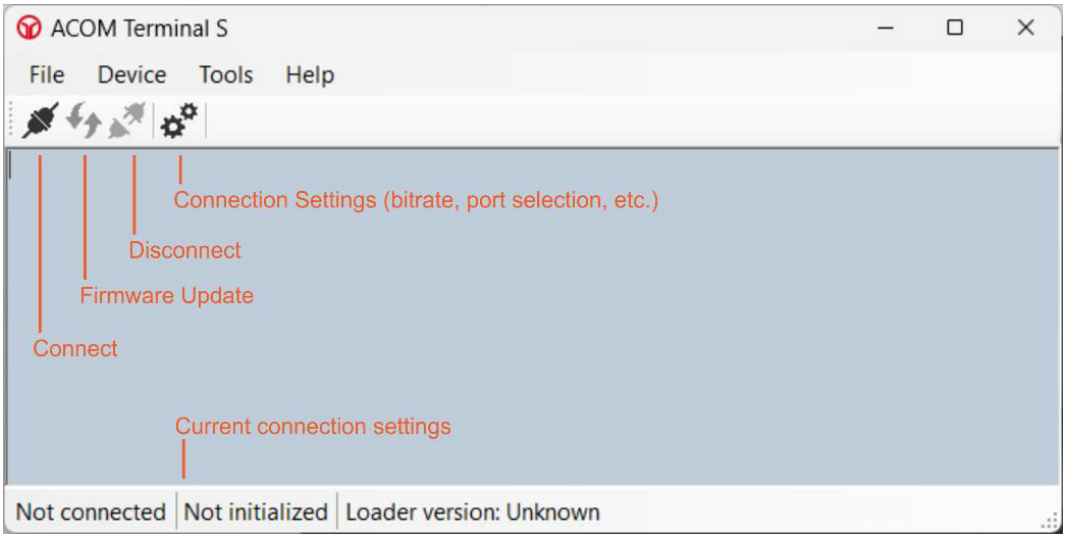


Figure 7-9 | ACOM Terminal S screenshot

- Open the **Settings** window by clicking on the **Settings** icon (two gears) or use **Tools** -> **Settings** from the menu bar. In the **Settings** window -> tab **General**, configure the settings as shown in ***Figure 7-10 | Terminal S - Tools -> Setting -> General menu***:
  - Command timeout (ms) 10000;
- In the **Settings** window -> tab **Serial port**, configure the settings as shown in ***Figure 7-11 | Terminal S - Tools -> Setting -> Serial port menu***. For actual serial port number see ***STEP 1 – RS-232 Interface Settings on your PC***:
  - Serial port settings 9600, 8, None, 1;

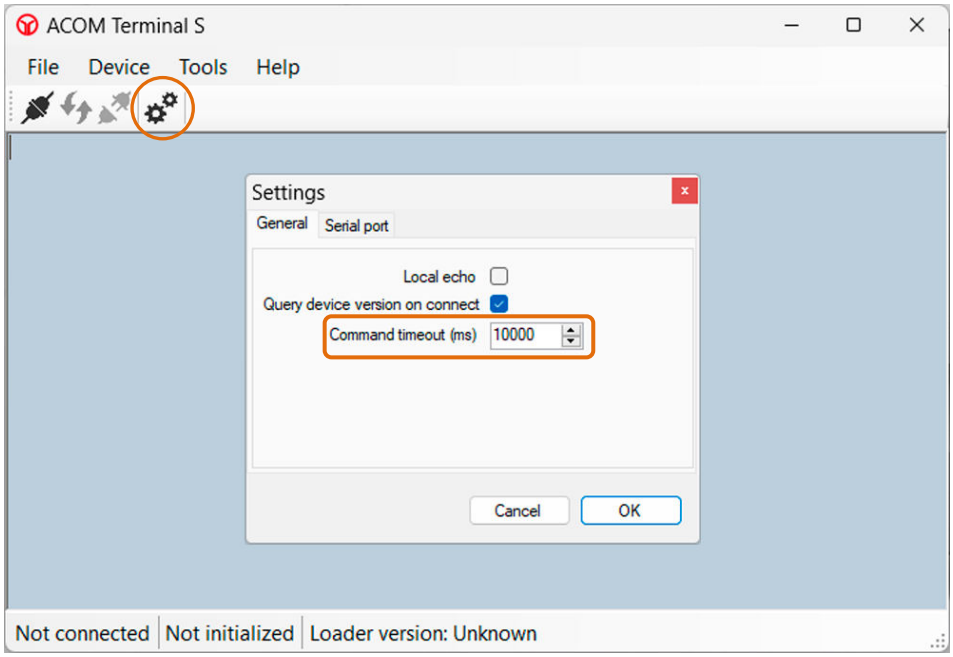


Figure 7-10 | Terminal S - Tools -> Setting -> General menu

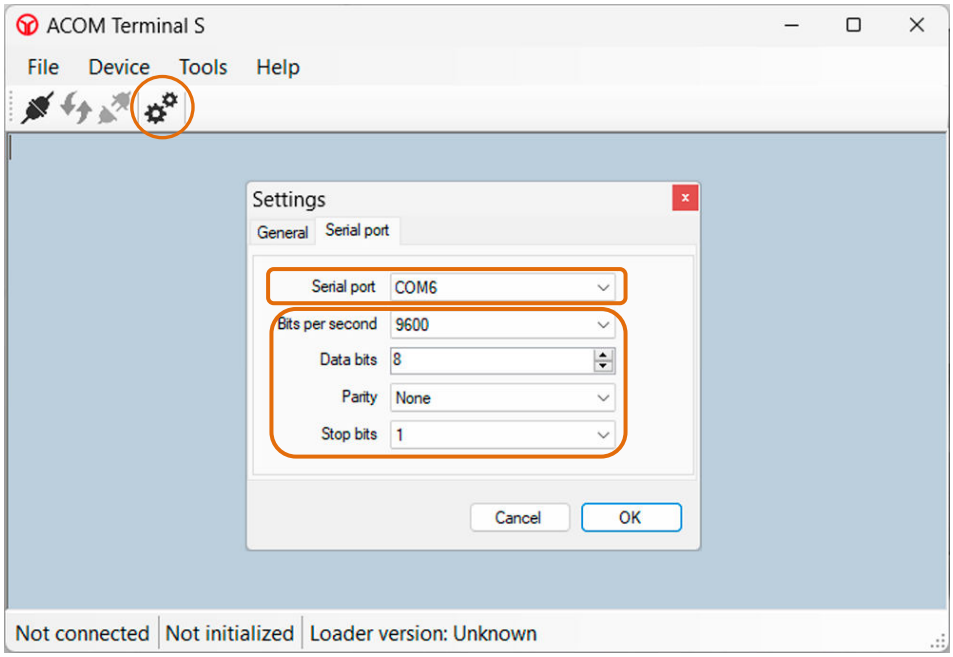


Figure 7-11 | Terminal S - Tools -> Setting -> Serial port menu

- Connect **ACOM Terminal S** to the amplifier by clicking on the **Connect** icon (two connected plugs) or use **Device** -> **Connect** from the menu bar;

Figure 7-12 | Terminal S - Connect to amplifier

- When connected click on the **Firmware Upload/Download** icon (two arrows in opposite directions) or use **Device** -> **Firmware upload/download** from the menu bar to activate the **Bootloader**;

Figure 7-13 | Terminal S - Firmware Upload/Download

When the bootloader has been activated there will be beeps from the amplifier and the front display will go black.

- Click on the **Disconnect** icon (two separated plugs) or use **Device** -> **Disconnect** from the menu bar to disconnect from the amplifier.

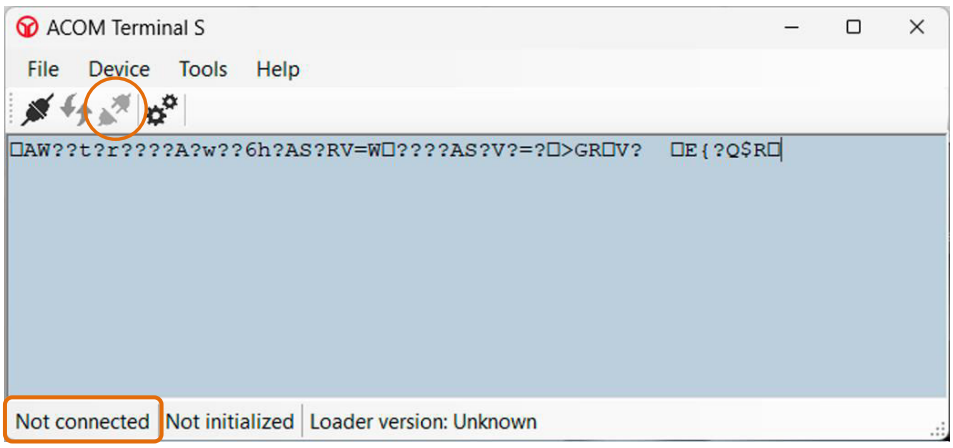


Figure 7-14 | Terminal S - Disconnect

- Open the **Settings** window by clicking on the **Settings** icon (two gears) or use **Tools** -> **Settings** from the menu bar. In the **Settings** window -> tab **Serial port**, configure the settings as shown in ***Figure 7-15 | Terminal S - Change Bits per Second***:
  - Serial port settings **34800**, 8, None, 1 (change "Bits per second" parameter only);

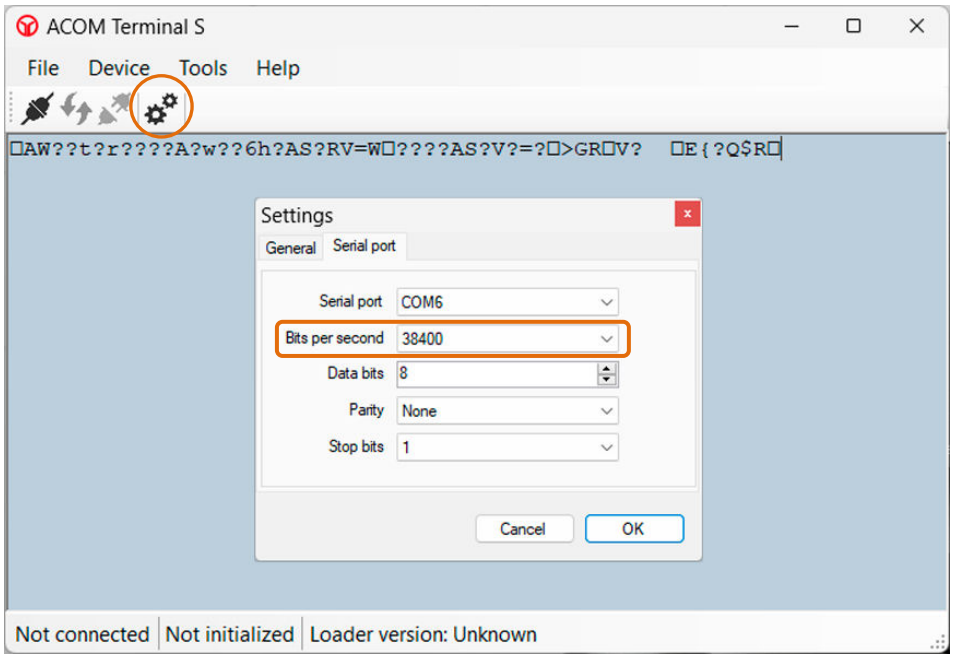


Figure 7-15 | Terminal S - Change Bits per Second

- Re-connect to the amplifier by clicking on the **Connect** icon (two connected plugs) or use **Device** -> **Connect** from the menu bar;

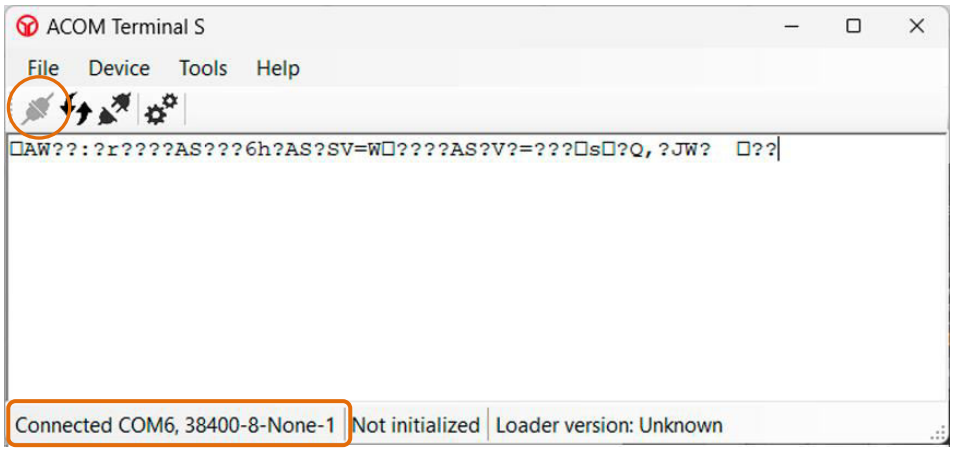


Figure 7-16 | Terminal S - Reconnect

- When connected click on the **Firmware Upload/Download** icon (two arrows in opposite directions) or use **Device** -> **Firmware upload/download** from the menu bar to activate the bootloader. A **Bootloader** menu will appear in the text box as shown below;

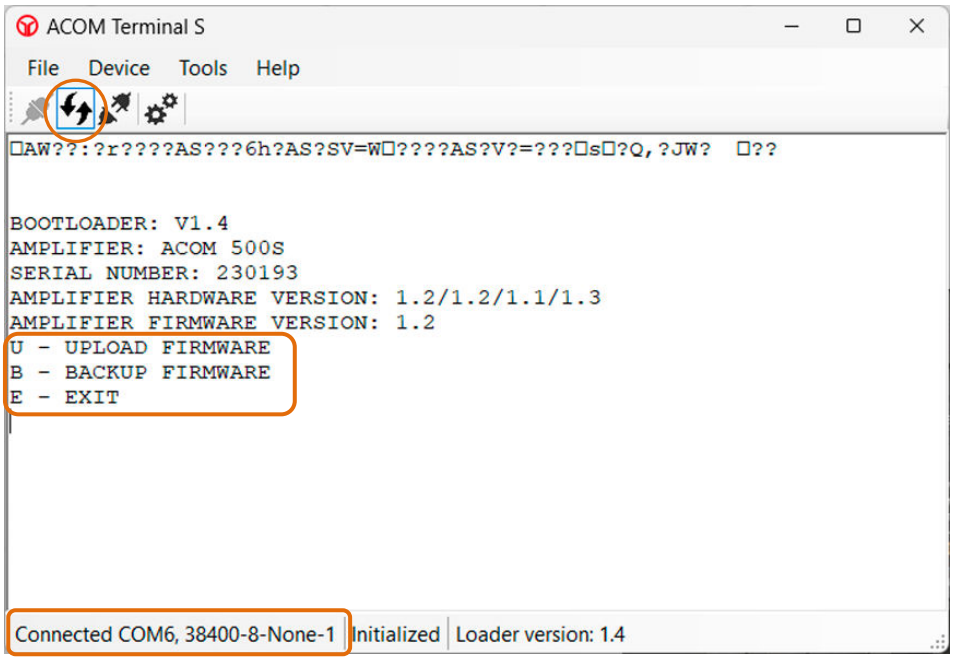


Figure 7-17 | Terminal S - Bootloader menu

- Press the **U** letter from your keyboard to activate the Firmware Upload process.
  Press the **Y** letter from your keyboard to answer the question that appears:

  CURRENT FIRMWARE WILL BE ERASED! ARE YOU SURE (N/N)?

  A new dialog box will open asking for the new firmware file name and location. Open the folder that contains the new firmware file (*.dat), select the file, and press the **Upload** button (We assume that you downloaded the newest firmware from ***www.acom-bg.com*** and unzipped it on your PC);

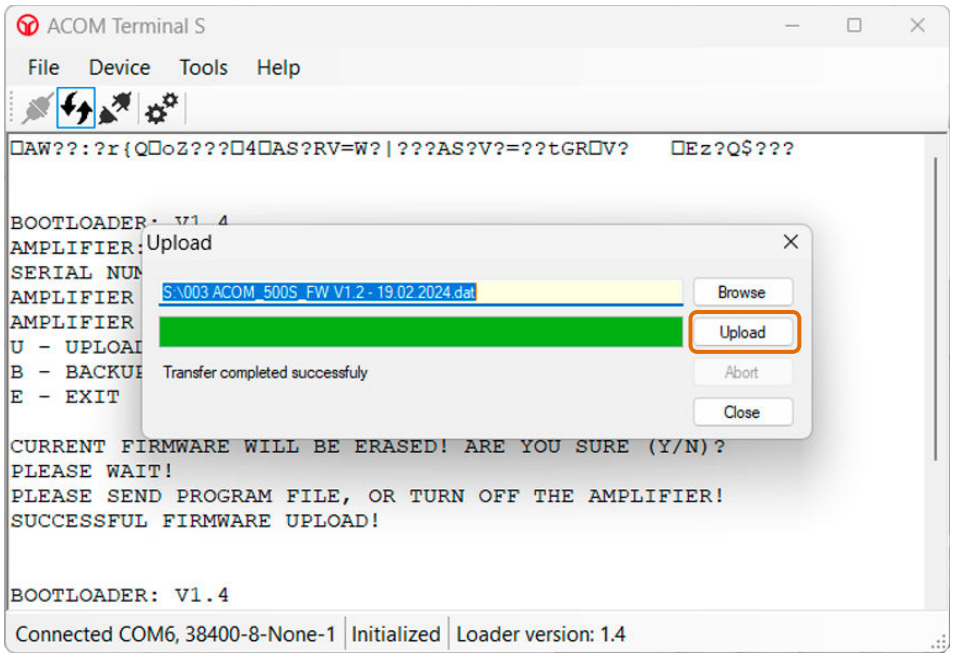


Figure 7-18 | Terminal S - Upload firmware process

The Upload firmware process may take approx. 3-6 minutes.

During the Firmware Update Process, the user's amplifier settings are kept and are available in the new firmware version.

- Press the **B** letter from your keyboard to activate the Firmware Backup process.
  A new dialog box will open prompting you to enter a name and location for the new backup file. Press the **Download** button to start the process;

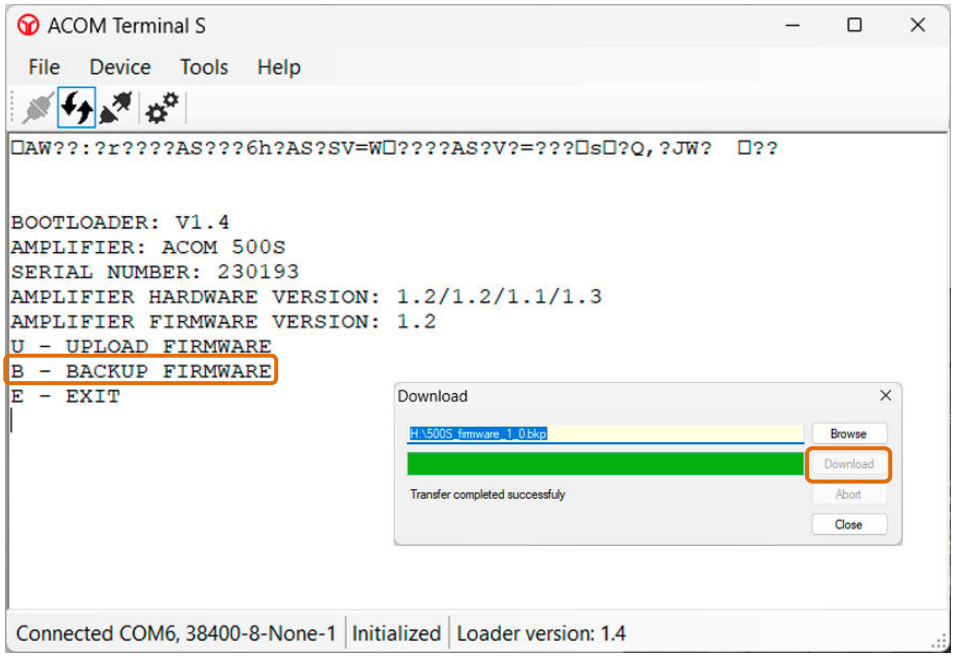


Figure 7-19 | Terminal S - Backup firmware process

The Backup firmware process may take approx. 3-6 minutes.

It is not obligatory to back up your current firmware because all firmware versions are available for download from ***www.acom-bg.com***.

- Press the **E** letter from your keyboard to exit from the process. Click on the **Disconnect** icon (two separated plugs) or use **Device** -> **Disconnect** from the menu bar to disconnect from the amplifier. Click on the **File** -> **Quit** from the menu bar to close **Terminal S**;

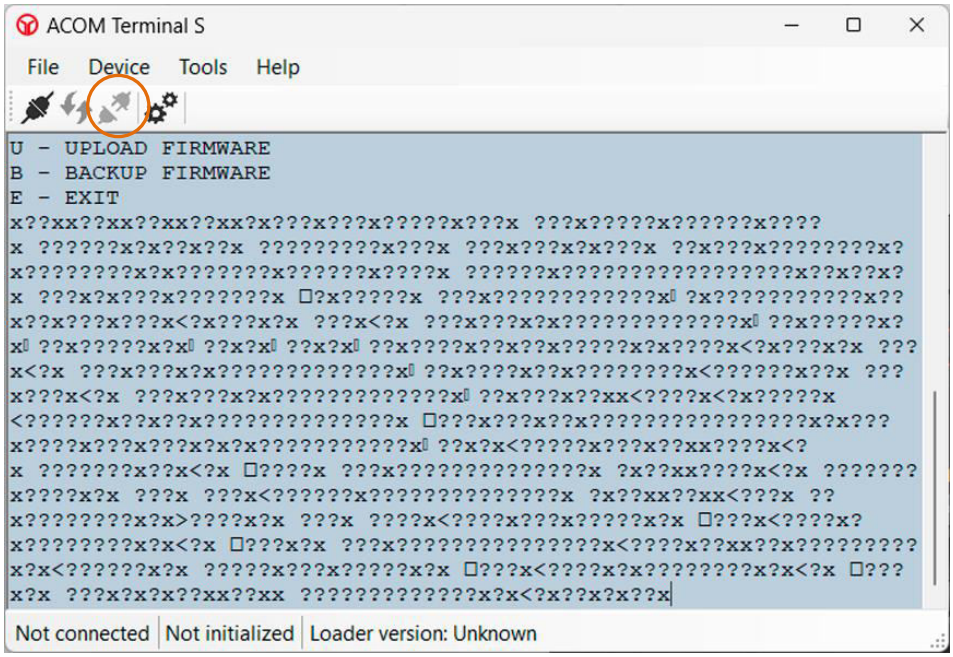


Figure 7-20 | Terminal S - Backup firmware process

- Push and hold for 1-2 seconds the **POWER** button to restart the amplifier and enter STANDBY mode.
  You can check the current firmware version in the amplifier's menu FAULT LOG (see Section ***5.5 Menu FAULTS LOG***);

- Push the **POWER** button to turn off the amplifier (back to low energy STANDBY mode);

- Switch off the amplifier via Main Power Rocker Switch (see ***Figure 2-4 | Rear panel - Connections***, Pos. 1); Make sure the Main Power Rocker Switch is in OFF position;

- Pull the line (mains) plug out of the outlet;

- Disconnect "USB to RS-232" converter or RS-232 cable;

- Follow the instructions in Section ***2.4 Connections*** to re-connect the amplifier to your station.

7.5.4. Troubleshooting

Sometimes the procedure for Firmware Update/Backup is unsuccessful.

A. Error **Timeout** when using **Terminal S** software

If you see an error message related to **Timeout**, please check:

- **Latency Timer** parameter as describer in Section ***7.5.3 Firmware Update Procedure*** (STEP 1 – RS-232 Interface Settings on your PC);

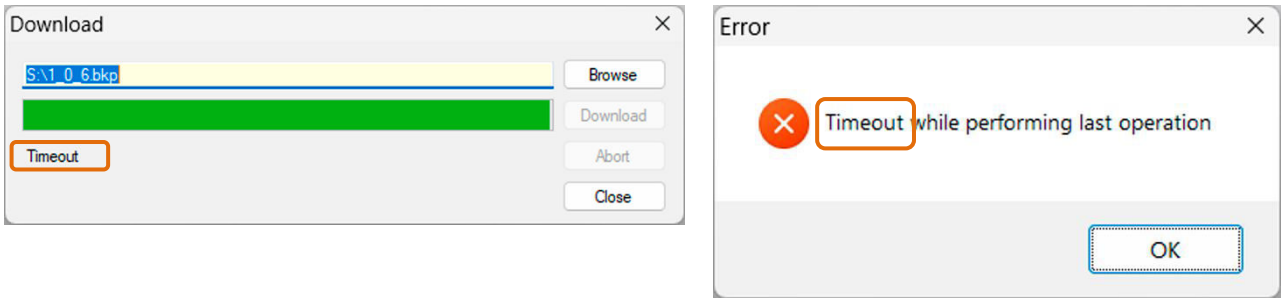


Figure 7-21 | Terminal S - Error Timeout

- If using a PC with a built-in RS-232 port:
  - Check **Receive/Transit buffer** parameters as described in Section ***7.5.3 Firmware Update Procedure*** (STEP 1 – RS-232 Interface Settings on your PC);
  - Check the used connection cable. See ***Table 7-2 | RS-232 connection cable wiring*** for correct cabling;
- **Command timeout** parameter as describer in Section ***7.5.3 Firmware Update Procedure*** (STEP 3 – Using Terminal S software for Firmware Update).

The other possible reasons for **Timeout** error could be, for example:

- Windows Device Manager -> USB Serial Converter Properties -> Advanced
  Below are shown the recommended settings (VCP = Virtual Com Port):

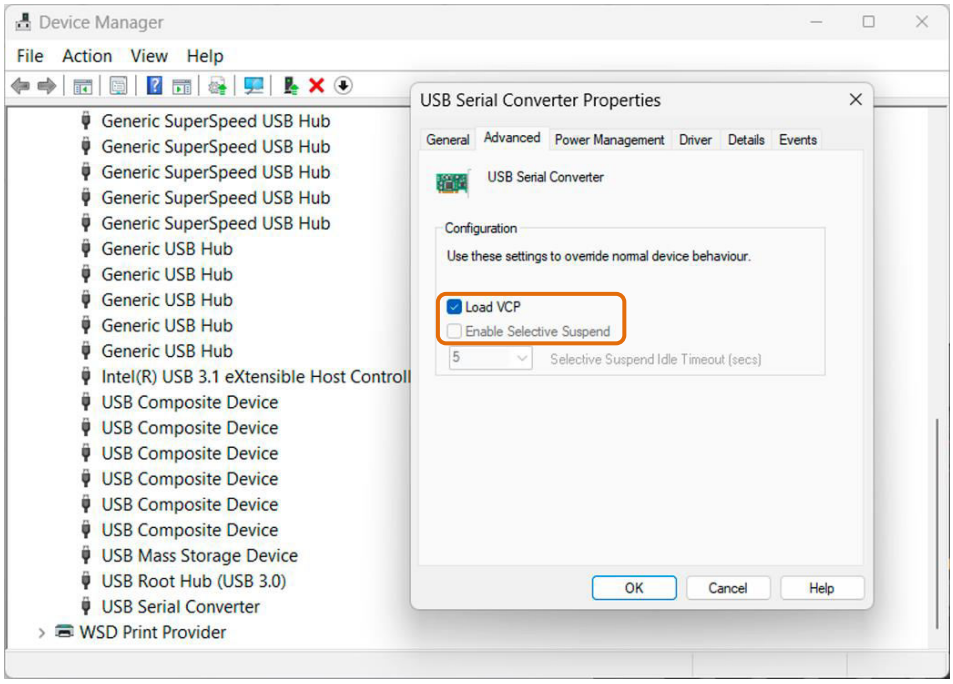


Figure 7-22 | Windows Device Manager - Load VCP

- Windows Device Manager -> USB Serial Converter Properties -> Power Management
  Below are shown the recommended settings:

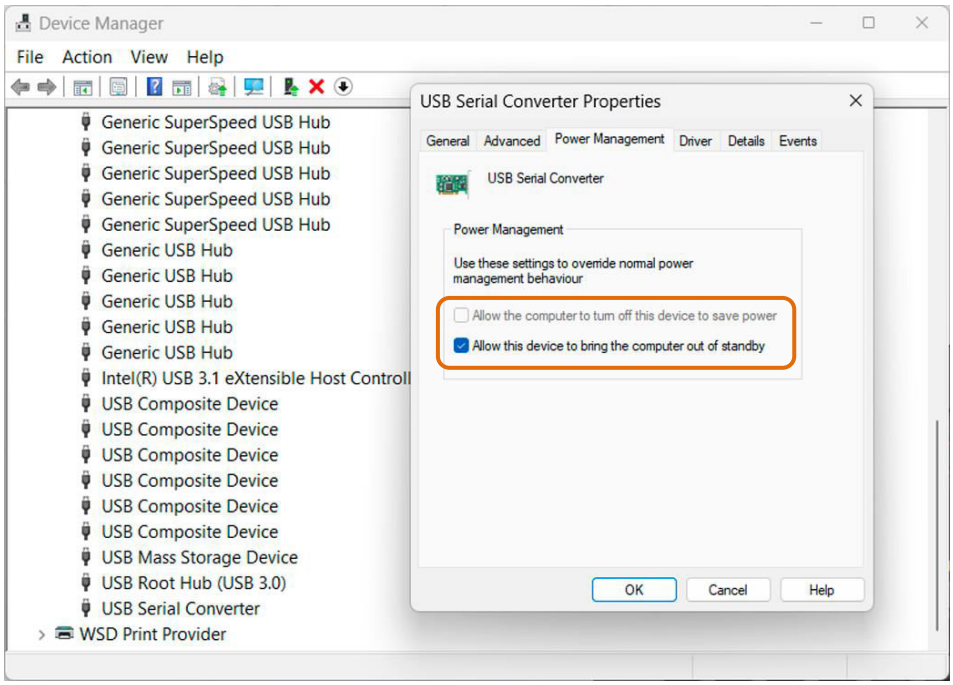


Figure 7-23 | Windows Device Manager - Power Management

- Windows Power plan
  Below are shown the recommended settings:

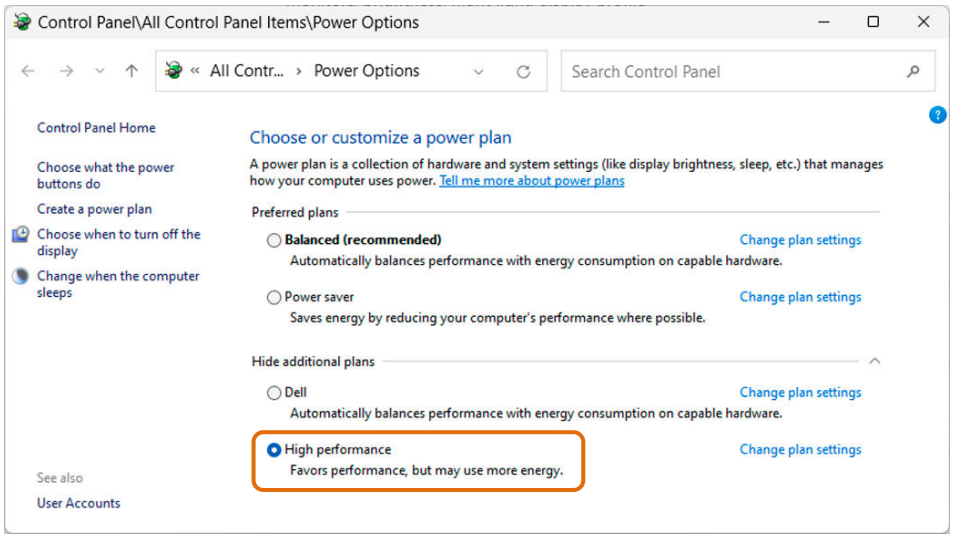


Figure 7-24 | Windows Control Panel - Power plan

B. If, for some reason (mostly human error), the Firmware Update/Backup process is interrupted, the following scenarios are possible:

- The amplifier is in STANDBY mode (the monitor shows the user interface) but nothing happens when you press the **Terminal S** buttons.

  Solution:

  - Click on the **Disconnect** icon (two separated plugs) to disconnect from the amplifier;
  - Click on the **File** -> **Quit** from the menu bar to close **Terminal S;**
  - Push and hold for 1-2 seconds the **POWER** button to shut down the amplifier;
  - Power up the amplifier again;
  - Start **Terminal S**;
  - Start the Firmware Update procedure from the beginning.

- The amplifier's monitor is black/no image (BOOTLOADER mode) but nothing happens when you press the **Terminal S** buttons.

  Solution:

  - Click on the **Disconnect** icon (two separated plugs) to disconnect from the amplifier;
  - Click on the **File** -> **Quit** from the menu bar to close **Terminal S**;
  - Push and hold for 1-2 seconds the **POWER** button to shut down the amplifier;
  - Power up the amplifier again;
    - If the amplifier starts normal and goes to STB mode, then:
      - Start the **Terminal S** and continue with the Firmware Update procedure from the beginning;
    - If the amplifier starts with a black monitor (BOOTLOADER mode), then start the **Terminal S** and change Serial port settings to 38400, 8, None, 1;
      - Connect to the amplifier by clicking on the **Connect** icon (two connected plugs);
      - Click on the **Firmware Upload/Download** icon (two arrows in opposite directions) to activate the bootloader. A bootloader menu should now appear in the text box;
      - Continue with the Firmware Update procedure as usual.

If the problem persists, contact your dealer (see Section ***1.9 Owner Assistance***).

8. SPECIFICATIONS

8.1. Parameters

a) Standard Frequency Coverage

1.800 - 2.000 MHz	(160 m band)
3.500 - 4.000 MHz	(80 m band)
5.250 - 5.450 MHz	(60 m band)*
7.000 - 7.300 MHz	(40 m band)
10.100 - 10.150 MHz	(30 m band)
14.000 - 14.350 MHz	(20 m band)
18.068 - 18.168 MHz	(17 m band)
21.000 - 21.450 MHz	(15 m band)
24.890 - 24.990 MHz	(12 m band)
28.000 - 29.700 MHz	(10 m band)
50.000 - 54.000 MHz	(6 m band)*

* Please, refer the applicable regional band plans and laws for specific allocations and limitations.

In specific business cases, extensions or changes of the frequency coverage can be discussed, but this must be agreed upon before ordering. In any case, this is not the producer's obligation and can not be against local rules and laws.

b) Rated Output Power

- 700 W ±0.5 dB, PEP or continuous carrier;

c) Intermodulation Distortions (IMD_3)

- Better than 31 dB below the rated PEP;

d) Harmonic and Parasitic Emissions Output Suppression

- Better than 60 dB (65 dB typically);

e) Input and Output Impedances

- Nominal value: 50 Ohm unbalanced, UHF (SO-239) type connectors;
- Input circuit: Broadband, SWR below 1.2:1 (1.1:1 typically), 1.8-54 MHz continuous range without retuning or switching;
- RF bypass path: SWR - below 1.1:1, 1.8-54 MHz;
- Acceptable SWR at the output load (the antenna): up to 3:1 with proportional power reduction and up to 1.5:1 for full output power;

f) RF power gain
- 14 dB ±1 dB (typically 27 W for 700 W output power);

g) Mains Power Supply Voltage
- 100-240 VAC (see Section ***7.3 Fuse Replacement*** for correct fuse rating and mains voltage range selections);

h) Mains Power Consumption at Full Output Power
- 1350 VA or less with power factor of 0.95 or higher;

i) Mains Power Consumption in Low Energy (Waiting) Mode
- Less than 1 VA;

j) Complies with CE safety and electromagnetic compatibility requirements, as well as with the US Federal Communications Commission (FCC) regulations;

k) Size & Weight (operating, excluding connected cables and opened tilt foot bar)
- WxDxH: 326x388x155 mm, 11.6 kg (12.9x15.3x6.1 inches, 25.6 lbs.);

l) Operating Environments
- Temperature range: -10 to +40 degrees Celsius (14 °F to 104 °F);
- Relative air humidity: up to 95% @ 35 degrees Celsius (95 °F);
- Height above sea level: up to 3050 m (10000 ft) without output deterioration.

8.2. Functions

a) Receive / transmit control
- **KEY IN** input - Phono RCA connector. Voltage applied to the transceiver keying output - up to +12 V; Current flown to the transceiver keying output - up to 6 mA;
- **KEY OUT** output - Phono RCA connector. Output resistance: not more than 120 Ohm; Maximum safe input voltage from the transceiver +50 V; maximum safe current flawn by the transceiver: 20 mA;
- Minimum dead time, necessary for safe amplifier switching over from receive to transmit: 10 ms between the transmit request on the **KEY IN** input and the RF drive on the **RF INPUT** connector.

b) Protections
- Inrush power-on current is limited
- PA drain current
- Overheating
- T/R sequencing

- Antenna relay contacts against hot switching
- Reflected power
- Overdrive.

c) Frequency control by either internal frequency counter or directly by CAT from the transceiver, as well as via front panel buttons

d) Remote control through ACOM eBox Ethernet Remote Control device or via RS-232 interface

e) Remote POWER ON by DSR/DTR and CTS/RTS lines on the RS-232 port or by ACOM eBox Ethernet Remote Control device

f) Remote POWER ON / TURN OFF by DC voltage impulse or continuous DC voltage on CAT/AUX port ON_RMT input

g) Protection against relay switching under RF power (hot switching).

8.3. Regulatory Requirements

a) European conformity

CE mark (Conformitè Europëenne)

This symbol explains that "CE" marked ACOM product meets the essential requirements of the Radio Equipment Directive, 2014/53/EU, and the restriction of the use of certain hazardous substances in electrical and electronic equipment Directive, 2011/65/EU.

b) US Federal Communications Commission (FCC) regulations

FCC ID: **2AJXZ700S**

FCC ID number

The FCC ID number explains that market ACOM product complies with the US Federal Communications Commission (FCC) regulations.

The FCC ID number can be checked at *www.fcc.gov/oet/ea/fccid*.

FCC ID numbers consists of two elements:

- A grantee code (for example **2AJXZ**), and
- An equipment product code (for example **700S**).

c) RF Exposure Information

⚠ WARNING

Using the ACOM 700S amplifier, antennas must be operated at certain minimum distance between the radiator and any person's body.

This unit (ACOM 700S amplifier) complies with the FCC RF Exposure limits for an uncontrolled environment.

To comply with CFR Title 47 Part 97.13(C) and the Guidelines and Limits for Human Exposure to RF electromagnetic fields adopted by the FCC, you should evaluate your Radio Station Facilities as described in OET BULLETIN 65 plus SUPPLEMENT B - Additional Information for Amateur Radio Stations.

OET BULLETIN 65 plus SUPPLEMENT B can be found at:

- ***https://www.fcc.gov/bureaus/oet/info/documents/bulletins/oet65/oet65.pdf***;
- ***https://www.fcc.gov/bureaus/oet/info/documents/bulletins/oet65/oet65b.pdf***.

In addition to the above guidelines, please, see Section ***3.6.f) Elimination of electromagnetic compatibility (EMC) problems***.

8.4. Storage and Shipment

8.4.1. Storage Environment

The amplifier may be kept packed in a dry, ventilated, and unheated location (with no chemically active substances such as acids or alkalis) within the following environment ranges:

- Temperature range: -40 to +70 degrees Celsius (-40 °F to 158 °F);
- Humidity: up to 75% @ +35 degrees Celsius (95 °F).

8.4.2. Shipping Size and Weight

- WxDxH: Approx. 535x595x375 mm, 16.0 kg (21.1x23.5x14.8 inches, 35.3 lbs.).

Please, contact ACOM (see ***1.9 Owner Assistance***) for shipment details.

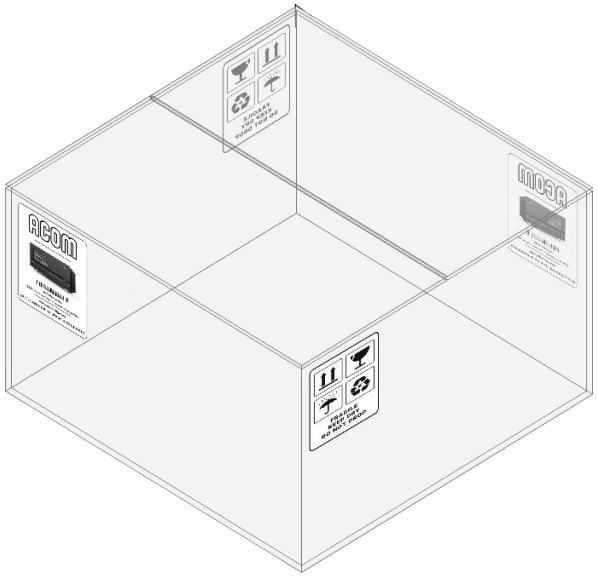


Figure 8-1 | Packaging cardboard box

8.4.3. Transportation

All types of transportation may be used, including storage in an aircraft baggage compartment at up to 12000 meters (40000 ft) above sea level.

8.4.4. Returning to the Service Provider

This document section contains the general information on packing and shipping an amplifier for diagnostics and repair.

NOTICE

Should it be necessary to ship the amplifier, use the original packing as described below.

NOTICE

Before shipping the amplifier, you should contact your local dealer first.

Your dealer can have a specific shipment requirement, e.g., a different shipping address. It is the sole customer's responsibility to ensure the commutator and all accessories are properly packaged to avoid any shipping damage.

If transporting for diagnostics and repair, you may not need to ship some cables or accessories. Please, consult with your dealer first.

Prepare the amplifier for shipping as described below:

- Switch off the amplifier via Main Power Rocker Switch (see ***Figure 2-4 | Rear panel - Connections***, Pos. 1); Make sure the Main Power Rocker Switch is in OFF position;
- Pull the amplifier's line (mains) plug out of the outlet;
- Do not disconnect **GND** connection;
- Disconnect all cables (except **GND** connection) from the rear panel of the amplifier;

⚠ DANGER

Remove the **GND** connection last (see ***Figure 2-4 | Rear panel - Connections***, Pos. (a)) and wait 30 minutes for safety.

- Pack the amplifier in its original cardboard carton. Please, follow the instructions in section ***2.1 Unpacking and Initial Inspection*** but in reverse order;
- Seal the amplifier carton with heavy duty, 2-inch-wide self-adhesive tape;
- Finally, the external strapping needs to be added over the amplifier carton. Either plastic or metal bands can be used;
- Now, the amplifier is ready for shipment.

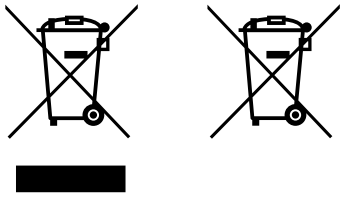
Basic shipping insurance is provided by the customer when sending in an amplifier - you can verify the amount covered by the shipping company by looking on their website. If you are shipping the amplifier, full/upgraded coverage is available as a suggested option.

For alternative shipping instructions, please, contact your local dealer.

8.5. Information on Disposing and Recycling of Old Electrical and Electronic Equipment

The information in this section is applicable for countries that have adopted separate waste collection systems.

ACOM products cannot be disposed as household waste.



Waste electricals

This symbol (crossed-out wheeled bin) explains that you should not place the electrical item in the general waste.

Waste electricals

This symbol (three green arrows going in a triangle with electrical plug in the center) means that according to local laws and regulations this product should be sent for recycling.

Old electrical and electronic equipment and batteries should be recycled at a facility capable of handling these items and their waste byproducts.

Contact your local authority for details in locating a recycle facility nearest to you.

Proper recycling and waste disposal will help conserve resources whilst preventing detrimental effects on our health and the environment.

Ultimate disposal of this product should be handled according to all national laws and regulations.

NOTES

This manual is for electronic distribution mainly.
If you have it on paper and you no longer need it, please, recycle it!

The latest versions of our User's Manuals are available at
www.acom-bg.com

Dealer/Partner's address:

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