BLA703

HF 25—30 MHz Linear Amplifier

Specifications:

Ver 1.2 May. 2024

Operation Frequency:	25—30 MHz (10m Amateur HF Band)
Modulation Types:	SSB,CW,AM, FM, data etc (All narrowband modes)
Transistor:	16x RM 3 MOSFET
Max I/P Current:	10A / 120V. 6A 230/240Vac
Power Supply:	110-120V or 230-240V Model specific
Input Fuse (Internal):	10A or 6A (5x20mm Fast)
Input RF Power:	1-30W max (All modes)
Output RF Power:	550W max
Maximum bypass power (Amplifier off):	50W max
Input VSWR:	1.1—1.5:1
Output VSWR Maximum:	2.5:1
Harmonic Output:	>-50dBc 25-30MHz
Dimensions:	410mm x 175mm x 305mm
Weight:	13kg

WARNING: Before using this product please read carefully all of the information in this manual or at least the quick start guide!!! To avoid damage or incorrect operation this is extremely important!!!

Quick Start Guide:

A more complete guide to the installation is featured later

1. **Connect the RTX input connector to transceiver with 50 Ohm patch cable.**

2. **Connect the ANT Output of the Amplifier to VSWR Bridge / Wattmeter (If required), and then the ATU (If required) then the Antenna (50 Ohm load Impedance).**

3. **Make sure that the amplifier AC switch is switched off.**

4. **Connect the Amplifier AC power cable to the AC Network. Pay attention that you have the correct BLA703 model for your countries AC voltage.**

5. **Adjust the Transceivers RF output power to 10 W (30W max) if it is capable of more than 30W output**

6. **Switch on the Amplifier. After a short boot period press the STB /OPR button until the LED turns green, 'Operate mode'.**

7. **Try a brief transmission to check that the antenna VSWR is acceptable with the amplifier in use. Any large increase in VSWR indicates that the Antenna is not suitable for the power being used. Operation should be halted immediately to avoid damage to the Amplifier / Radio / ATU etc.**

8. **If everything is OK you can increase the input drive and / or change the output power level to suit your output power requirements.**

Front / Rear Panel Description

Front Panel

1. Standby / Operate Switch and TX indicator
2. SSB Delay ON / OFF Switch and LED
3. Input Attenuator (LOW / MID / HIGH), (For output power adjustment).
4. RX Preamplifier ON / OFF Switch and LED
5. Alarm LED
6. Main AC Amplifier ON / OFF Switch
7. Output Power Indicator
8. VSWR Indicator
9. Cooling fans air intake

Rear Panel

1. Antenna SO239 RF Output connector
2. AC Input power connector. (AC Line voltage model specific)
3. RTX SO239 RF Input
4. Phono PTT input connector

Installation:

Unpack the amplifier from it's shipping carton and inspect for any signs of damage. The amplifier should be installed in a place that allows good ventilation and provides a suitable base to support it. Failure to allow for reasonable ventilation will cause the amplifier to overheat and shutdown prematurely. A short 50 Ohm patch lead should be used to connect the amplifiers RTX SO239 input ❸ connector to the output, (Antenna Socket) of the drive Radio. This length of this cable is not critical but should be of good quality and be kept as short as practically possible. The ANT output connector of the amplifier should then be connected to antenna being used. (If an external VSWR/Power meter is to be used the amplifier should be connected to the input and then the antenna to the output, This order of connection is very important. Check also that the Antenna is suitably rated for the power output level. (Antenna VSWR should not change much from low to high power). The antenna should be tuned before connecting the power amplifier or with the amplifier switched **OFF!** .

In SSB mode it is recommended that the PTT input be utilised if the drive radio has a suitable PTT output control. If there is no PTT input available the front panel button ❷ should be set to SSB. (LED Illuminated). This adds a short delay to the release time of the RTX relays so that pauses in speech do not cause the RTX relay to drop out. In AM or FM mode the SSB delay switch should be set to OFF.

The amplifier must be connected via the AC input connector ❷ ,on the rear panel, to a suitable AC power outlet of the correct voltage. The amplifier is supplied in either 115/120V or 230/240V versions.

The installation location must also provide a suitable ground system both for RF and the AC power supply, (if used). This is very important safety requirement for any radio transmission equipment but as power increases becomes increasingly important. A good RF ground will also help to prevent any returned RF from causing problems with the equipment. Usually erratic operation of equipment when in transmission may be attributed to RF being present or poor RF grounding. Installations where a good RF ground is not possible like operation above the ground floor may require alternative solutions such as artificial earths or the connection of 1/4 wave counterpoises to the operating equipment. Correct RF earthing techniques are however beyond the scope of this manual.

Operation:

Before using the amplifier the user must be familiar with all of the controls and be sure that it has been connected correctly. Refer to Page 3 of this instruction manual.

Important!!

Before the amplifier is switched on, (switch ❻), the power output of the drive radio should be adjusted correctly if it is capable of outputting a power greater than 30W. This may be done with the amplifier connected but switched off. At 35W input the amplifier will sound and alarm and enter into protection, approximately 25-30W input should be sufficient to realise full output, and an input power of 5-30W is OK as it is not necessary to run the amplifier at full output if not required. (See '**Input Drive and Output Power** on page 7).

It is recommended to start with the amplifier set with the input attenuator set to the LOW position for the first transmission and the input power adjusted between 5 and 10W. (Low is the default setting at switch on).

Switch on the Amplifier AC switch (❻). Then switch the amplifier from 'Standby' to 'Operate' by pressing button (❶). The microphone PTT can then be pressed and if in AM or FM mode the amplifier will switch to TX, (TX LED Illuminated), and amplify the input signal. In SSB mode there will need to be modulation otherwise with no modulation there will be no RF output from the drive radio.

The output power meter ❼ shows the relative output power of the amplifier. The last line of the scale relates to 550W output. If the output is driven beyond this then the amplifier will sound an alarm, (6 beeps and the alarm led will flash 6 times) and transmission will be blocked.

If the drive radio cannot be reduced below 35W then it may not be used with the amplifier as the input attenuator **CANNOT** be used to lower the input to the amplifier. The input attenuator can and should only be used to reduce the output of the amplifier if required. There are 3 levels of attenuation LOW, MID and HIGH. Pressing button ❸ repeatedly will cycle through the 3 levels. With LOW being the default when the amplifier is switched on.

Damage will occur if the amplifier is repeatedly operated above 35W input power.

The VSWR indicator ❽ displays the output VSWR as measured at the antenna connector of the BLA703. VSWR protection protects the BLA703 against excessive antenna mismatch. When the load VSWR as measured at the ANT output connector increases above 2.5:1, (the last red line of the VSWR indicator), the amplifier will sound an error, (Two beeps and the Alarm LED will flash twice) and transmission will be blocked. To reset the error it will be necessary to retune the antenna to reduce the VSWR and then return to 'Standby' and back to 'Operate'.

The BLA703 is protected against out of band transmissions. The export model will sound an alarm, (Four beeps / Four flashes), if the transmission frequency is below 25MHz or above 30MHz. The FCC version will sound an alarm (Three beeps and three flashes if the frequency is below 28.000MHz and above 29.700MHz. To reset the error it will be necessary to change the input frequency to that suited by the BLA703 and then return to 'Standby' and back to 'Operate'.

The BLA703 is protected against excessive output power. As the gain of the BLA703 varies slightly over its range of frequency operation it is possible to overdrive the amplifier on the lower frequencies when the input attenuator is set to HIGH. The output power of the amplifier is limited to 550W. Exceeding this will cause the amplifier to sound an Alarm, (6 beeps and the Alarm LED will flash 6 times). To reset the error it will be necessary to reduce the input power and then return to 'Standby' and back to 'Operate'.

Antenna Considerations:

The amplifier is designed to work into a 50 ohms resistive load and any antenna outside of this requirement must use an antenna tuning unit between the output of the amplifier and antenna.

It is recommended to check that the antenna to be used is sufficiently rated for at least 1000W power handling before connecting this amplifier. It is also recommended to check that the VSWR does not change considerably with increased power as this would indicate that the antenna was not suitable for high power use.

Cable losses particularly increase with increasing frequency. Always use a good quality 50 Ohm feeder and keep the length as short as possible. Not only will this allow more power to reach the antenna but will also increase the signal strength at the receiver.

This amplifier should not be operated into mismatched loads, (high VSWR) An acceptable level should be less than 1.5:1. Less than 2.5:1 is still possible but some reduction in power may be seen and the amplifier will work less efficiently and generate more heat. Beyond 2.5:1 VSWR the amplifier will enter protection mode.

Mode:

The BLA703 may be used for all of the common narrow band transmission modes such as SSB, CW,AM,FM, SSTV and data modes etc.

RX Preamplifier:

The BLA703 is fitted with an RX preamplifier, that when activated can help to increase the received signal level. This can be used when the signal level is low to help improve intelligibility of the received signal. The RX preamp can be used independently of the amplifier however when the amplifier and preamp are both activated the preamp is automatically switched out of line when the amplifier is in transmission. Button ❹ is used to switch the preamp on and off. The PRE LED is illuminated when the preamp is switched on.

Warning: Transmit Time.

Hi Duty cycle modes such as FM and Data modes etc. operate the amplifier at full power all of the time unlike modes like SSB and CW that are either intermittent or only reach peak output for very short times, these high duty cycle modes will run the amplifier much harder and generate more heat in the same amount of time. It should be noted that the amplifier although capable of being used with these modes should not be operated continuously. A transmission time of more than a few minutes should be avoided to avoid excessive transistor junction temperature. The exact time for transmission in these modes will depend on numerous factors such as, how good the ventilation around the amplifier is if there is sufficient space for freely flowing air to circulate, etc. If the ambient temperature is high this will reduce the total time in transmission. Common sense should be exercised. The BLA703 is fitted with two large cooling fans which offer a very efficient way of cooling the heatsink. At switch on they will run for a few seconds and then switch off. When the heatsink temperature reaches 40°C they will switch on and remain on until the heatsink returns below this temperature. As the heatsink temperature increases so will the speed of the fans, there are 3 levels. If the heatsink temperature becomes excessively high, (65°C), the amplifier will block further transmission sound an audible alarm, the amplifier will automatically reset this condition when the heatsink temperature returns to 55°C.

Input Drive and Power Output:

The amplifier should give full output with approximately 25-30W input depending on the transmission frequency. Excessive input power should be avoided and the amplifier should always be operated in a responsible manner. If the input power exceeds 35W the amplifier will sound an audible alarm, (1 beep and the Alarm LED will flash once) and transmission will be blocked. In order to reset this condition it is necessary to reduce the input power, and switch the amplifier from 'Operate' to 'Standby' then back to 'Operate'

The BLA703 features an input attenuator ❸ that may be used to reduce the output of the amplifier if the drive radio does not have the facility to reduce its output power.
The input attenuator should NOT however be used to reduce the input power level of the drive radio if it is greater than 35W! Otherwise the attenuator may be damaged from overheating.
There are 2 levels of input attenuation LOW and MID and position HIGH is direct input, with no attenuation. So setting to position LOW will provide the lowest output power from the amplifier, and position Hi the maximum output.

When using SSB mode it is recommended to use the PTT input connector to switch the amplifier from RX to TX. If there is no PTT input available the front panel switch ❹ should be set to SSB. This adds a short delay to the release time of the RTX relays so that pauses in speech do not cause the RTX relay to drop out. In AM or FM mode the SSB delay switch should be set to Off.

Maximum Output Power Considerations:

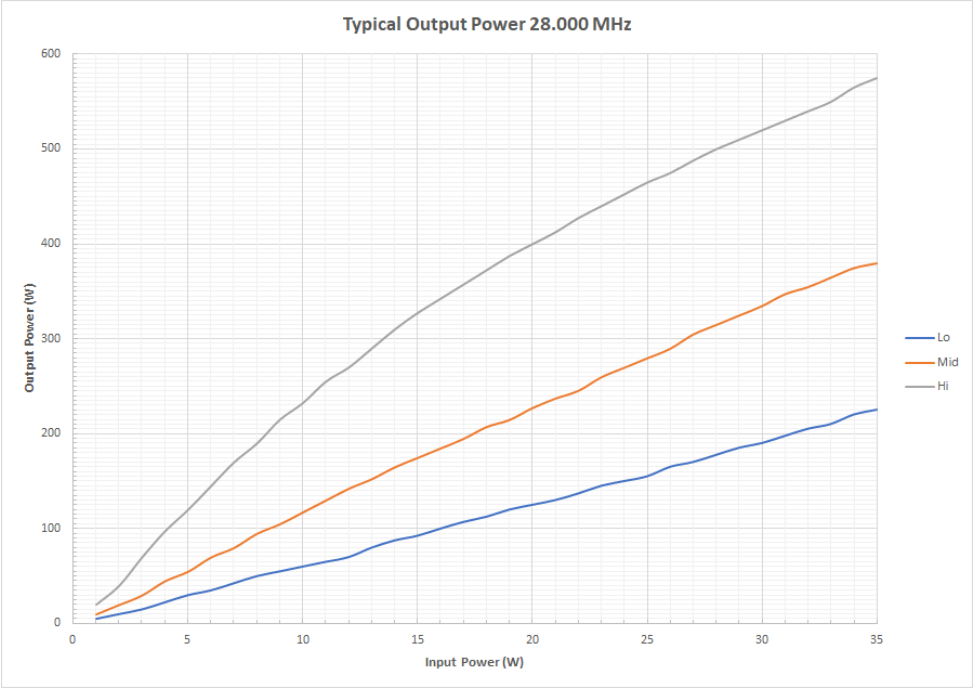
All amplifiers have a maximum output and this occurs shortly after gain compression where by Pin no longer produces a proportionate increase in power output . The amplifier should always be operated at a point below its saturated output. Trying to extract every last watt by overdriving the amplifier will not actually help your signal to be stronger, you will in fact cause higher levels of distortion which will make your signal less intelligible at the distant receiver station.

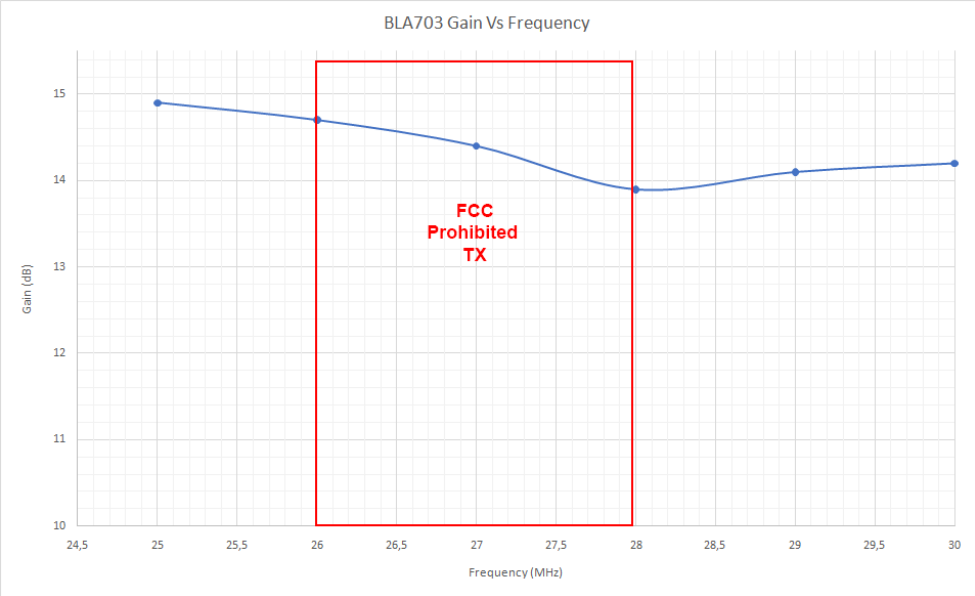
Running the amplifier a little under max output will also allow the amplifier to run cooler and make it more reliable for many years of use.

As an example consider the following situation.

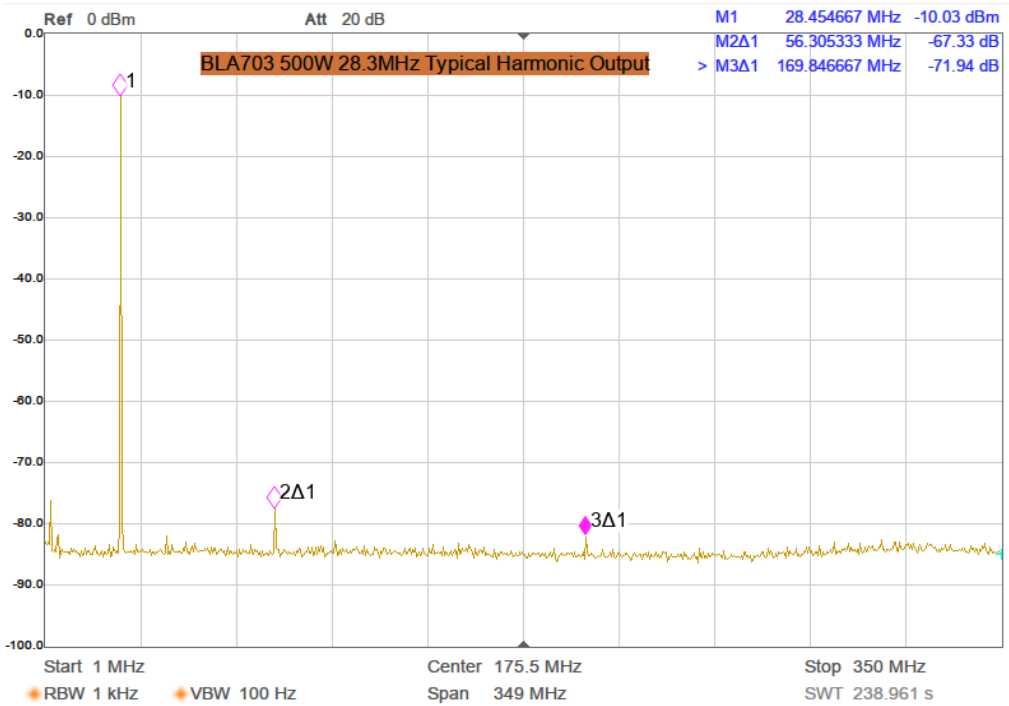
1 'S' point on a receiver is usually approximately calibrated at 6dB so for example the difference between S5 and S7 2 'S' points is 12dB.

The difference between 25W and 500W is about 12dB a healthy increase to your signal strength, 2 'S' points, with the same antenna. Now lets say for example you run the amplifier at a moderate 400W output by slightly reducing the input power, the difference between 500W and 400W is less than 1dB which when you compare this to 6 dB per S point is actually very little and as the amplifier is not running at its absolute maximum will give a cleaner output with less distortion that will actually make a difference at the distant receiver for the better!!





Typical Harmonic Output



Error List:

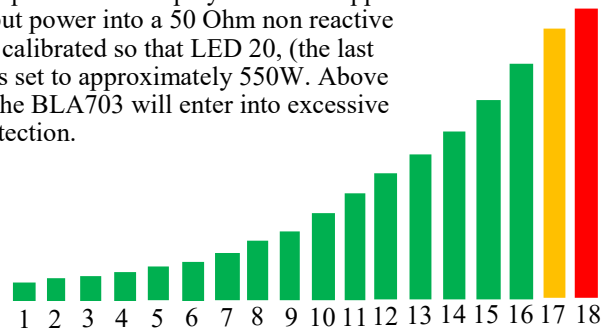
When the amplifier enters into protection mode an audible tone is emitted and the Alarm LED will be flashing. Depending on the number of flashes/beeps the error can be decoded from the following table.

1. Excessive input power >35W
2. Excessive Antenna VSWR >2.5:1 (BLA703 O/P antenna connector)
3. Error Frequency FCC (25.000MHz-27.995MHz and 29.705MHz –30.000 MHz)
4. Error frequency <25MHz and >30MHz
5. Error excessive temperature. Heatsink >65°C
6. Error excessive output power >550W

To reset the amplifier from one of the above alarm conditions it is necessary to first fix the error, be it reduce the antenna VSWR, or reduce the input power. Then switch the amplifier from 'Operate' to 'Standby' and back to 'Operate'. If the error is from excessive temperature the amplifier will reset itself when the heatsink temperature has returned to an acceptable level. 55°C.

Output Power Meter

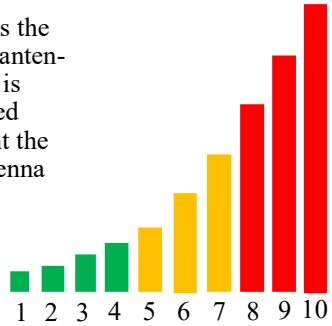
The output power LED display shows the approximate output power into a 50 Ohm non reactive load. It is calibrated so that LED 20, (the last column), is set to approximately 550W. Above this level the BLA703 will enter into excessive power protection.



1:	<25W	10:	320W
2:	25W	11:	335W
3:	100W	12:	365W
4:	130W	13:	415W
5:	135W	14:	420W
6:	155W	15:	450W
7:	225W	16:	480W
8:	265W	17:	505W
9:	290W	18:	550W

VSWR Meter

The VSWR Meter LED display shows the current level of reflected RF from the antenna at the ANT port of the amplifier. It is calibrated so that LED 10 is illuminated with a VSWR of 2.5:1 and at this point the amplifier will enter into excessive antenna VSWR protection.



1:	<1,6:1	6:	2.1:1
2:	1.7:1	7:	2.2:1
3:	1.8:1	8:	2.3:1
4:	1.9:1	9:	2.4:1
5:	2.0:1	10:	2.5:1

Notes:

Attention:

The use of Linear Amplifiers are controlled by specific laws within the country of use. These laws must be known to the user and are entirely the responsibility of the user. The manufacturer declines any responsibility from unlawful use.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

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

FCC ID: #####-#####

Warranty:

This product is covered by a 24 month warranty commencing from the date of purchase. The original purchase receipt will be required for any claim. This warranty does not cover aesthetic damage or damage to the RF power transistors from incorrect use.

e-mail: rm@rmitaly.com **www.rmitaly.com**