BLAXH2H500/100/150

Amplifier 200-600MHz
Operating & Service Manual

Version 002

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This manual describes the units as they are at the date of printing. On request, the manufacturer shall supply circuit diagrams, lists of components, descriptions, calibrating instructions and any other information for use by qualified personnel of the user, in charge of repairing the parts of the unit which have been stated by the manufacturer to be "repairable". Such supply shall in no event constitute permission to modify or repair the units or approval of the same.

This unit is not designed for any type of use which is not specifically described in this manual. Such use may be hazardous.

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General Infomation 1

Introduction 1.1

The BLAXH2H500/100/150 is a linear broadband pulse power amplifier specifically designed for Nuclear Magnetic Resonance (NMR) applications for 4,7 to 14 Teslas Systems. It is commercialized under the BRUKER part number W1345058.

The class AB linear amplifier provides a 500W peak power output over the frequency range 6-365MHz on the X channel output, a 140W peak power output over the frequency range 220 to 564MHz (100W for 180 to 220MHz and at 600MHz) on the H channel output and a 150W peak power output over the frequency range 30-92MHz on the 2H channel output.

The amplifier is realized by employing N-CHANNEL MOS BROADBAND RF POWER FETs of the latest generation. The unit can provide full power for any combination of pulse width / duty cycle up to 100ms / 25% for the H100 channel, 60ms / 6% for the X500 channel and 5ms / 10% for 2H150 channel. Its built-in protection circuitry will allow lower power pulses for longer pulse widths and duty cycles, maintaining a 30W X channel, a 35W H channel and a 15W 2H channel average power.

An electronic protection circuitry has been designed to protect against:

- Excessive power output level (overdrive)
- Excessive pulse repetition rate (over duty-cycle protection)
- Excessive pulse duration (over pulse-width)
- More than 50% reflected RF power (mismatch $\geq$ 6)
- Thermal overload (overheat).
- The 2H channel is not protected against reflected RF power and excessive power output level.

The amplifier is powered by an internal switched power supply assembly that provides the +32VDC for the power amplifiers, in addition to all low level voltages for the system.

The supply is self protecting for overcurrent and overvoltage.

The entire unit is housed in a 19″, 3U, 520mm rack cabinet.

Safety

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The BLAXH2H500/100/150 200-600MHz amplifier is in accordance with the standard 61010-1 safety Requirements for Electrical Equipments.

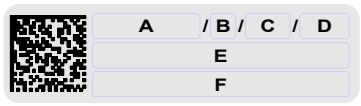
Labels 2.1

Labels are provided to alert operating and service personnel to conditions that may cause personal injury or damage to the equipment from misuse or abuse. Please read the labels and understand their meaning.

Identifying plate 2.1.1

The BLAXH2H500/100/150 200-600MHz can be identified by an identifying plate at the front panel of the unit that has following information.

Figure 2.1. Identifying plate

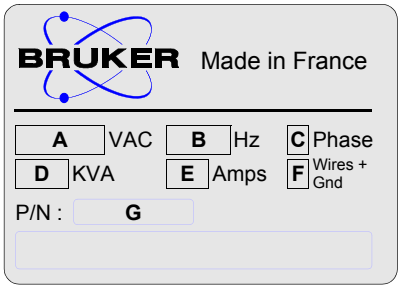


- **(A) Part Number**
  This field indicates the part number of the product.
- **(B) Variant**
  This field indicates the variant number that identifies the production category of the product. The default variant is 00.
- **(C) ECL**
  This field indicates the revision number that identifies the product configuration. The initial revision is 0.00.
- **(D) Serial Number**
  This field indicates the serial number of the product.
- **(E) Type**
  This field contains the designation of the product.
- **(F) Information**
  This field contains additional information about the product.

Manufacturer's nameplate *2.1.2*

The BLAXH2H500/100/150 200-600MHz can be identified by a manufacturer's nameplate at the back panel of the unit that has following information:

Figure 2.2. Manufacturer's nameplate



- **(A) Voltage**
  This field indicates the input mains voltage of the product.
- **(B) Frequency**
  This field indicates the input mains frequency of the product.
- **(C) Phases**
  This field indicates the number of phases of the mains.
- **(D) Power**
  This field indicates the absorbed power of the product.
- **(E) Current**
  This field indicates the absorbed current of the product.
- **(F) Wires**
  This field indicates number of wires with the ground in the mains cord.
- **(G) Part Number**
  This field indicates the assembly number that identifies the part number of the product.

Safety labels and symbols 2.2

Warning signs 2.2.1

WARNING! *Risk of electrical shocks*

Figure 2.3. General hazard symbol

Please disconnect line cord before opening or prevent potential hazards such as:

- Electric schock on power supply.
- Contact burn with the RF module and heatsink.
- Finger scratch due to the fan assembly on the RF module.

Installation 3

The installation of the device must be done only by an authorized and qualified technician, in total accordance with the running standards. Every breakdown due to a non-respect of the following instructions will not be attributable to Bruker and will not be covered by the guarantee clauses.

Initial inspection 3.1

Mechanical check 3.1.1

If damage of the shipping carton is evident, request the carrier's agent to be present when the instrument is unpacked. Check the equipment for damage and inspect the cabinet and panel surfaces for dents and scratches.

Claim for damage 3.1.2

If the unit is mechanically damaged or fails to meet specifications upon receipt, notify BRUKER or our representative immediately. Retain the shipping carton and packing material for the carriers inspection as well as for subsequent use in returning the unit if necessary.

Reshipment and repackaging requirements 3.1.3

Whenever possible, the original carton and packing material should be used for reshipment. If the original packing material is not available, wrap the instrument in heavy paper or plastic. Use a strong shipping container. If a cardboard is used, it should be at least 200 lbs. test material.

Use shock absorbing material around all sides of the instrument to provide a firm cushion and to prevent from movements inside the container wall on each side. Protect the front panel by means of cardboard spacers inserted between the front panel and the shipping carton. Make sure that the instrument cannot move in the container during shipping. Seal the carton with a good grade of shipping tape and mark the container :

" FRAGILE ELECTRONIC INSTRUMENT."

Environment requirements *3.1.4*

This amplifier is build for inside use only on a maximum high level of 2000m above sea level (6600 feet).
No specific cooling or ventilation is required.
Be sure that the amplifier has enough area around so that the free air flow into and out of the amplifier is not obstruct.
It should, however, be in an environment which conforms, the 5°C - 45°C (41°F - 113°F) thermal specifications, a 80% maximum relative humidity of air and a contamination level of 2 (means a normal, only non conductive contamination, temporary conductivity due to condensation is possible).

Installation requirements *3.2*

No special precautions are necessary. Mount the equipment in an area which is relatively free of vibration, and has sufficient room for cable connections.
The amplifier is a class II of installation category.

Bench operation *3.2.1*

The unit can be placed onto a secure flat surface.

System check *3.3*

Before applying power for the first time the following items should be checked:

- The AC input voltage 220-230 VAC ± 15% range must be compatible with.
- An external blanking (gating) pulse must be applied to the amplifier in order for the unit to function. Ensure that this pulse has a proper level and logic polarity.
- The BLAXH2H500/100/150 has a nominal input level of +4dBm. Ensure that the system drivers are operating at these levels.

Initial turn on procedure *3.4*

The following list describes how to turn on the BLAXH2H500/100/150 and what should be seen as this occurs.

Before starting this procedure, make sure that you have properly followed instructions in the section ***"System check"***.

1. Connect the amplifier to the AC line and turn the circuit breaker to ON.
2. Observe the indicators on the front panel :
   - The +32V ON LED's will illuminate
   - The +15V, -15V and + 5V ON LED's will illuminate
3. System is now fully operational.

4. For this amplifier both channels H100 and X500 are similar to the old BLAXH500/100 P/N: W1345082 (same input and output wiring).
   The third channel 2H is now located in the external amplifier housing and produce increased power Output for decoupling experiments.
   Therefore, a stand alone RCB (BSMS Real time Control Board) is available.
   The RF Input and Output label's are the same like on BSMS 2H-TX.

Software installation *3.5*

- The BLAXH2H500/100/150 200-600MHz has, like all other BLA's, an address selector on the front side of the amplifier. Starting from this address, the software counts, during "cf", how many amplifiers are present in BBIS and reserves the following addresses.
  So the 2H amplifier is ever seen as a third channel.
- The BLAXH2H500/100/150 200-600MHz amplifier has in addition a "software switch", which can be set or read by the ACBTool 4.0 or higher.
  Both X and 2H channels address can be changed (remapping) to a wished address higher than 3. These information are stored in a new BBIS.
- For systems with not more than 3 channels, RO3 from router 1 (address 3) must be used for the FX IN of the 2H amplifier.
  No remapping is necessary.

Figure 3.1. "cf" report before remapping

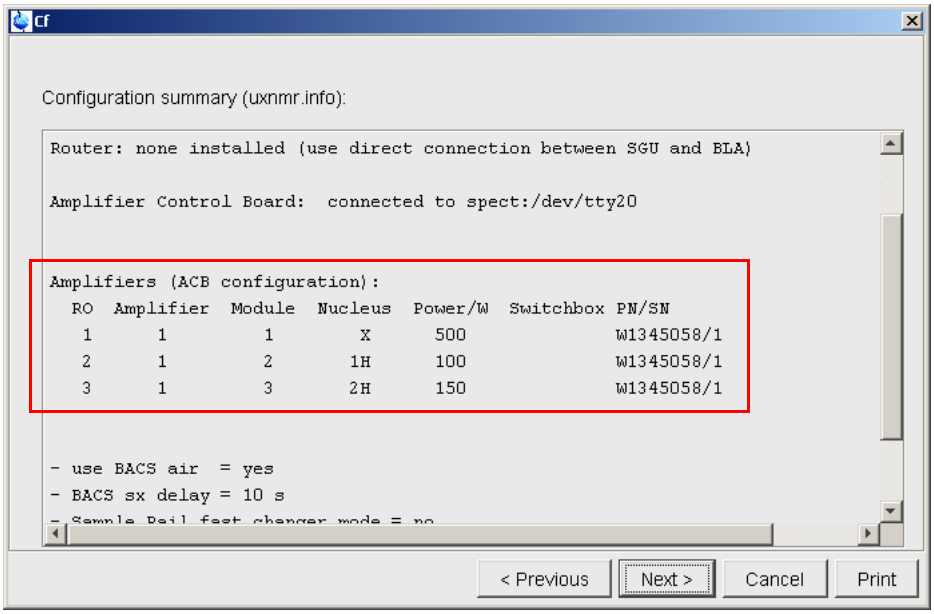
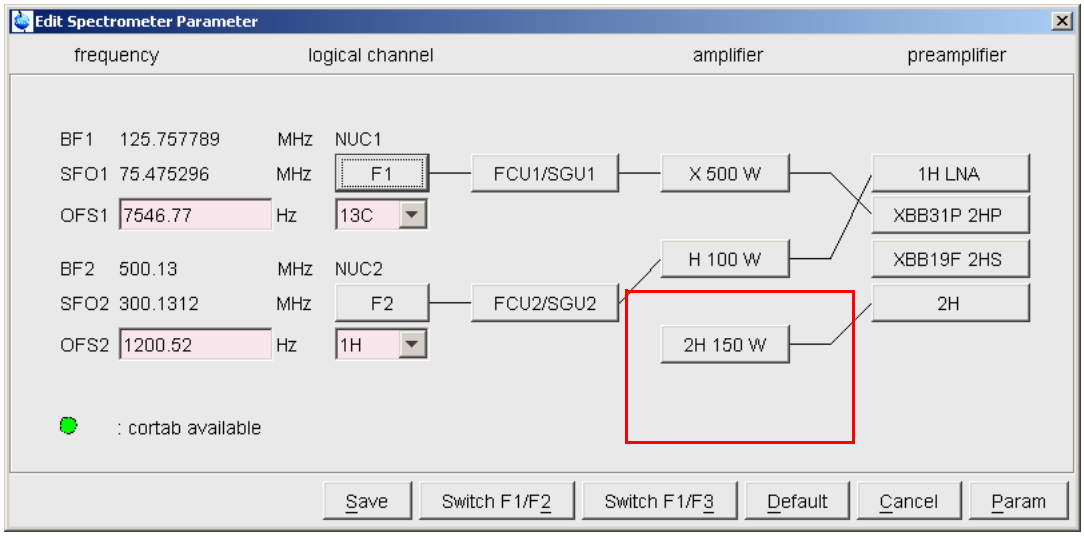


Figure 3.2. "edasp" window before remapping



- For systems with more then 3 channels, the first free router output must be used (address 7 or higher)
  ACBTool 4.0 or higher allows the remapping of the 2H amplifier address.
  See ACBTool "read me".

Figure 3.3. "cf" report after remapping

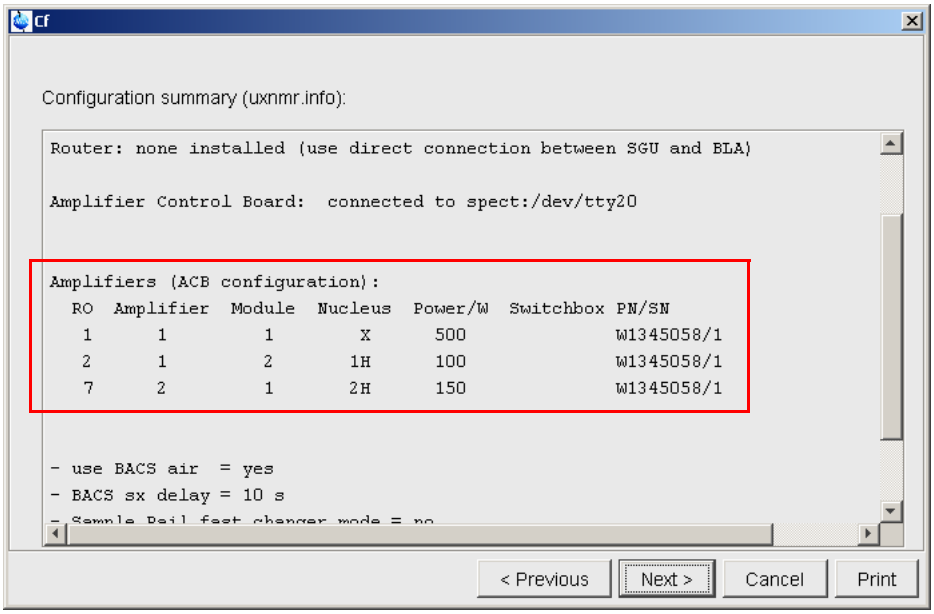
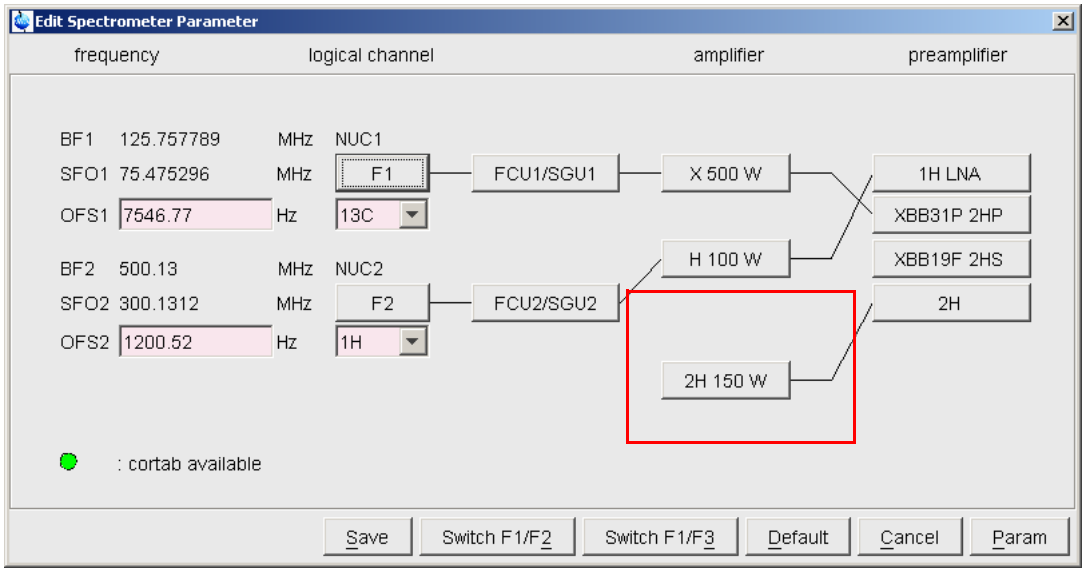


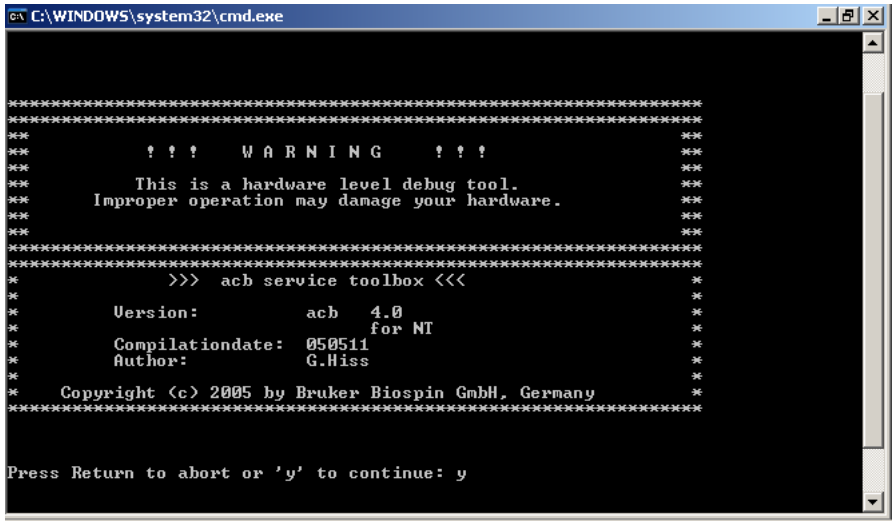
Figure 3.4. "edasp" window after remapping



How to remap the 2H channel using ACBTool *3.5.1*

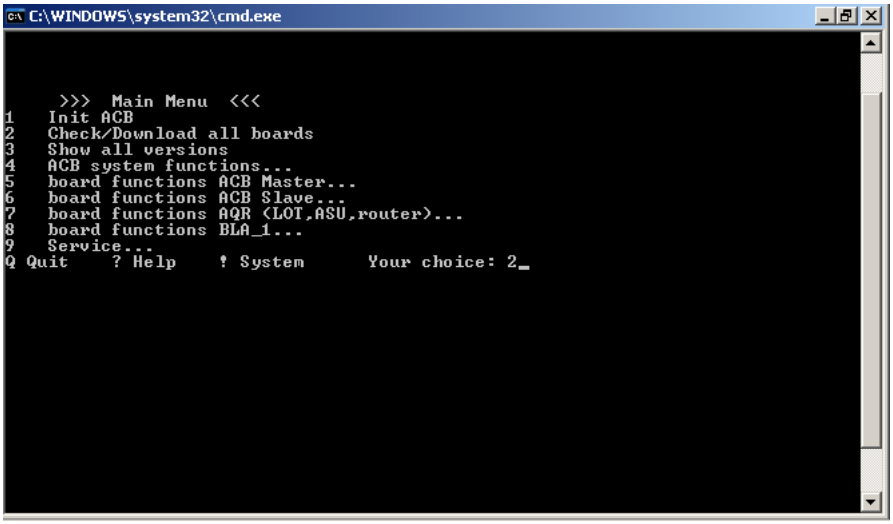
1. Launch ACBTool and check its version. It should be 4.0 or higher.

Figure 3.5. ACBTool Check Version



2. Select "*2 Check/Download all boards*" in the main menu.

Figure 3.6. ACBTool Main Menu

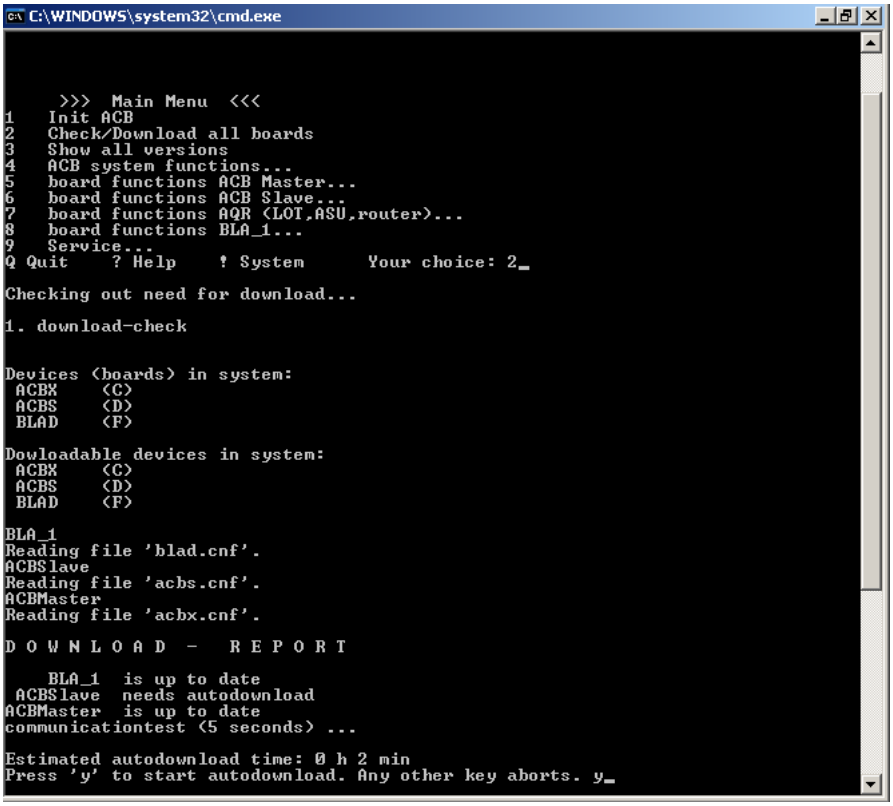


See comments from "*DOWNLOAD - REPORT*"

2 Download - Report situations :

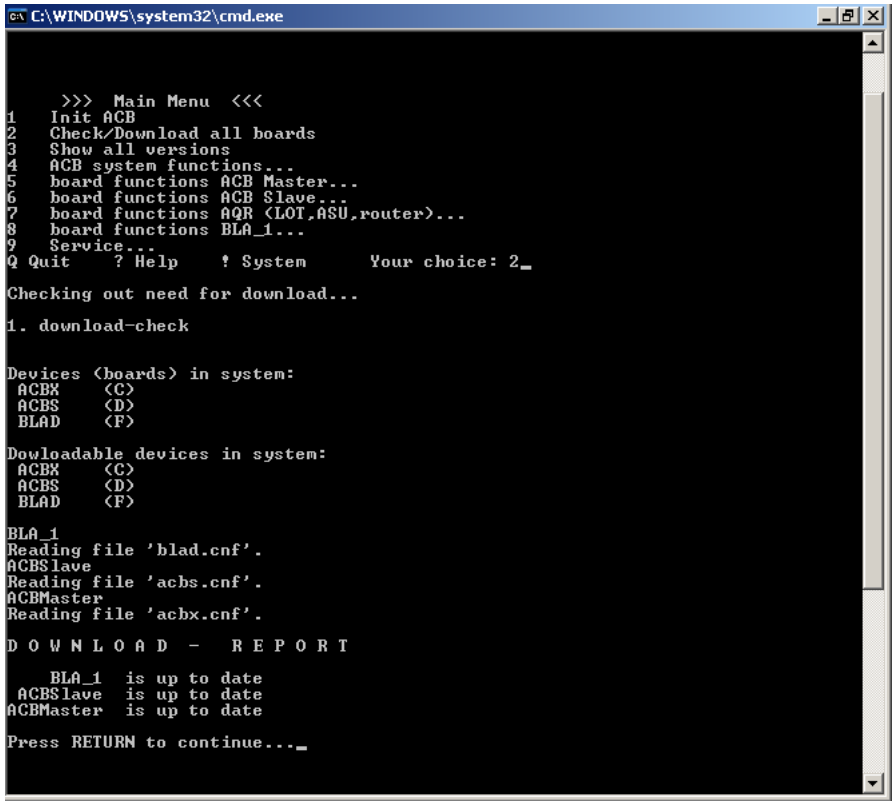
- ACBSlaves needs autodownload then press "*y*" to start autodownload.

Figure 3.7. ACBSlaves needs autodownload



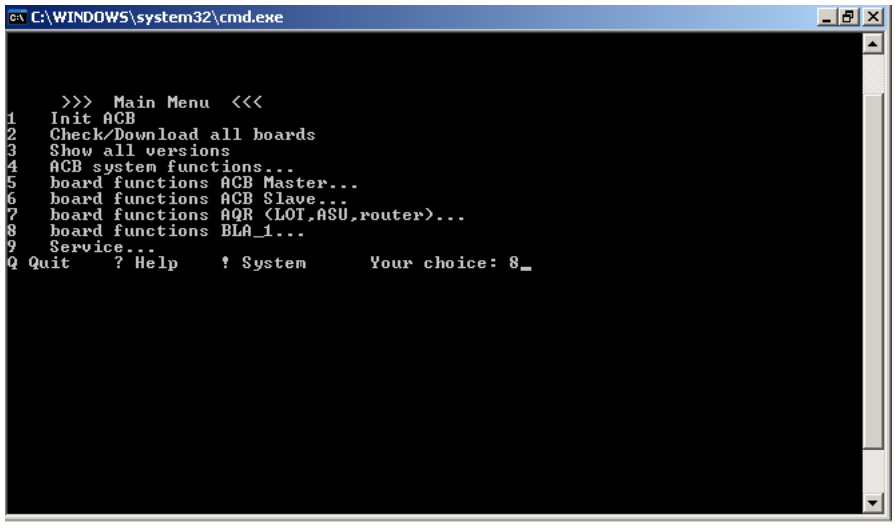
- ACBSlaves is up to date then press **RETURN** to continue.

Figure 3.8. ACBSlaves is up to date



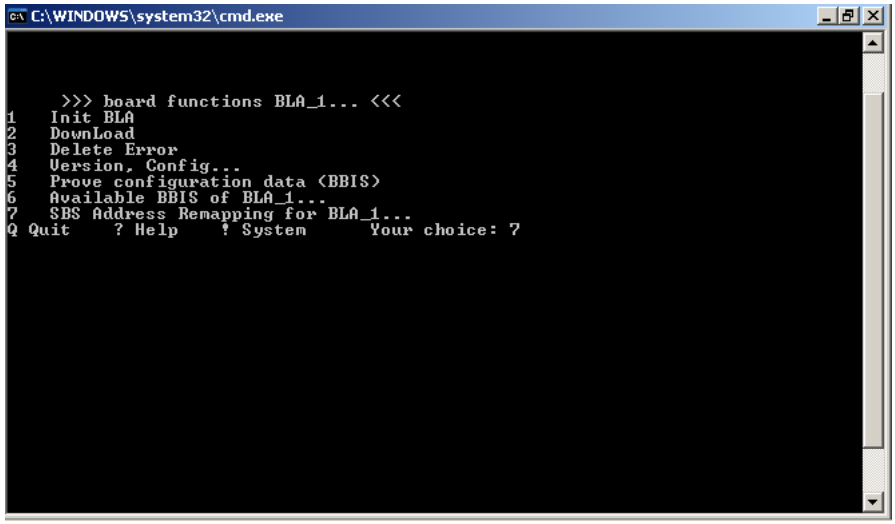
3. Select "*8 board functions BLA_1...*" in the main menu.

Figure 3.9. ACBTool Main Menu



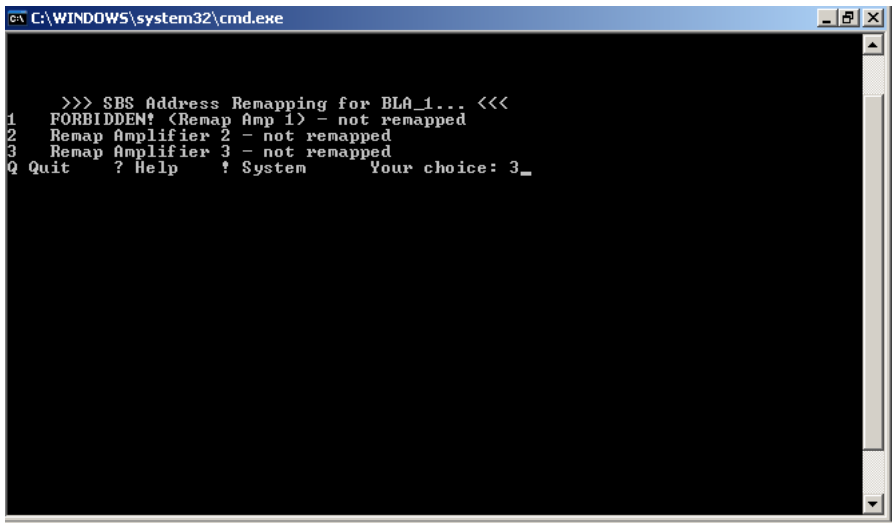
4. Then select "*7 SBS Address Remapping for BLA_1...*".

Figure 3.10. ACBTool Board Functions_BLA1 Menu



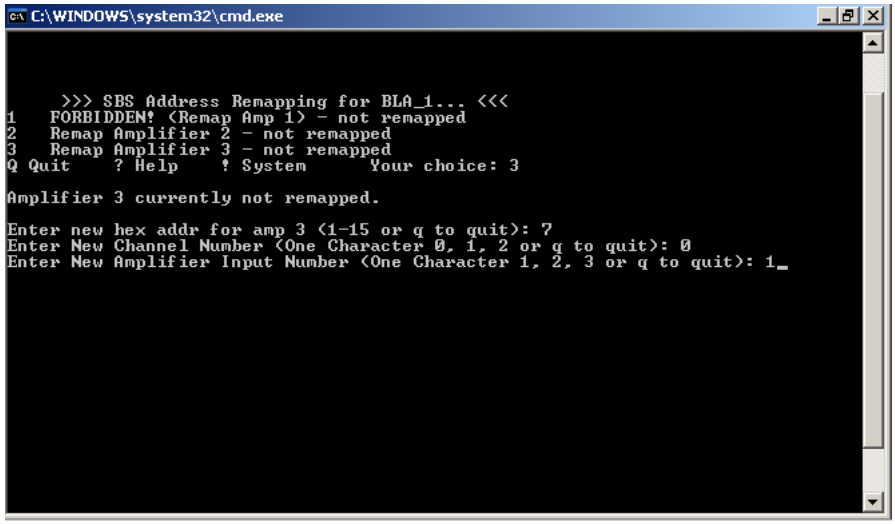
5. For 2H remapping, select "*3 Remap Amplifier 3 - not remapped*".
   For X remapping, select "*2 Remap Amplifier 2 - not remapped*".

Figure 3.11. ACBTool SBS Address Remapping for BLA_1 Menu



6. After, follow the indications on screen.

Figure 3.12. ACBTool SBS Address Remapping for BLA_1 with entries

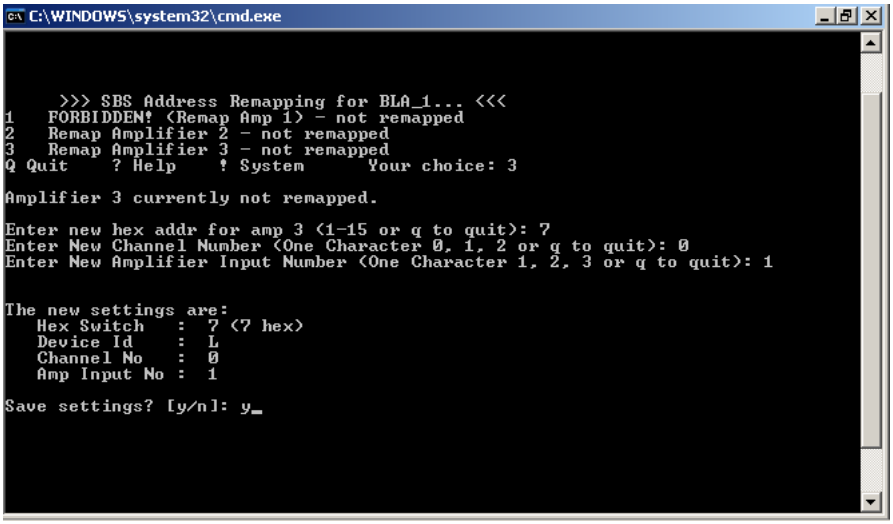


- New hex address is the address you want to give to 2H Amplifier.
- New channel number should be "0" in this case.
- New Amplifier Input Number sould be "1" in this case.

- If the parameter "`New Channel Number`" is N, the parameter "`New Amplifier Input Number`" must be set to N+1.
- If you want to remap Amplifier 2 (e.g. X channel) and Amplifier 3 (e.g. 2H channel) at the same new hex address, the parameter "`New Channel Number`" must be different for the 2 channels (respectively 0 and 1 for example).

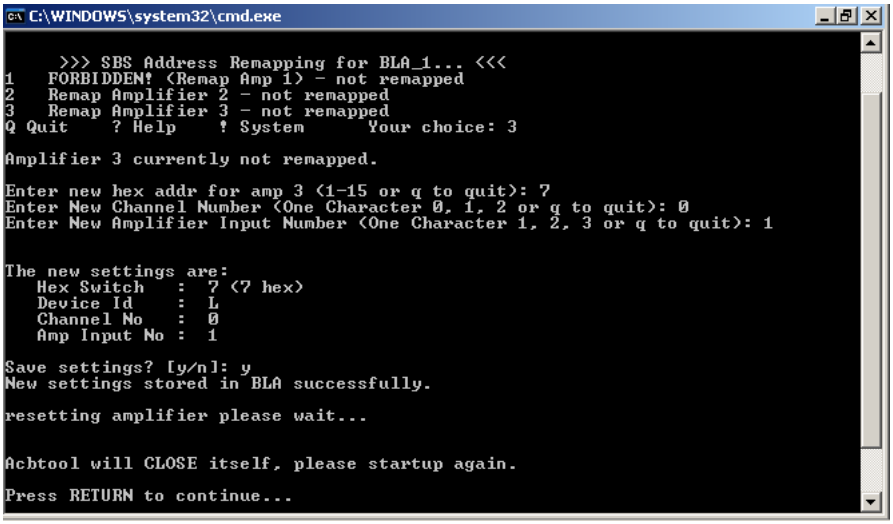
7. In the next menu, type "y" to perform remapping.

Figure 3.13. ACBTool New Settings



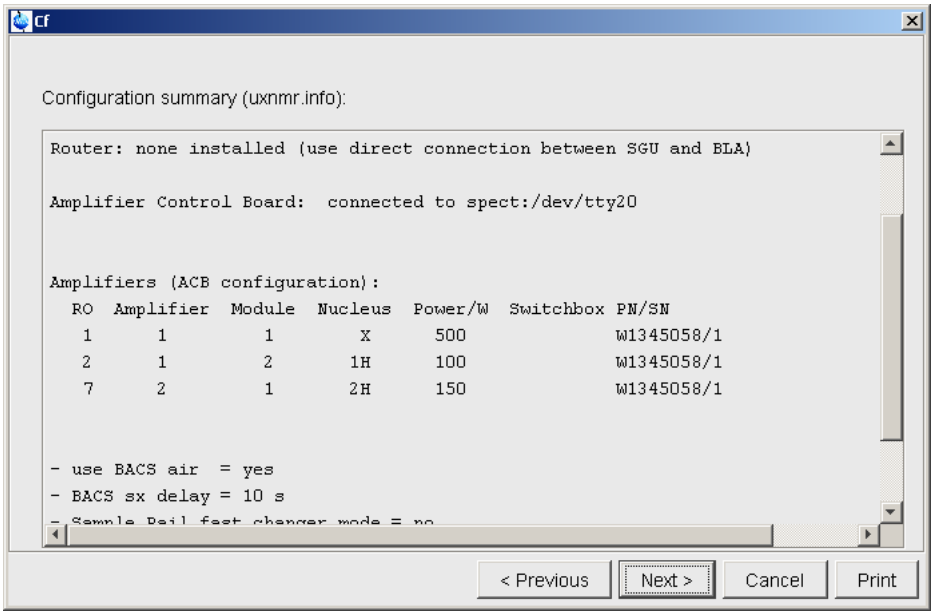
8. If successful, ACBTool should write the message below.

Figure 3.14. ACBTool Save and Close



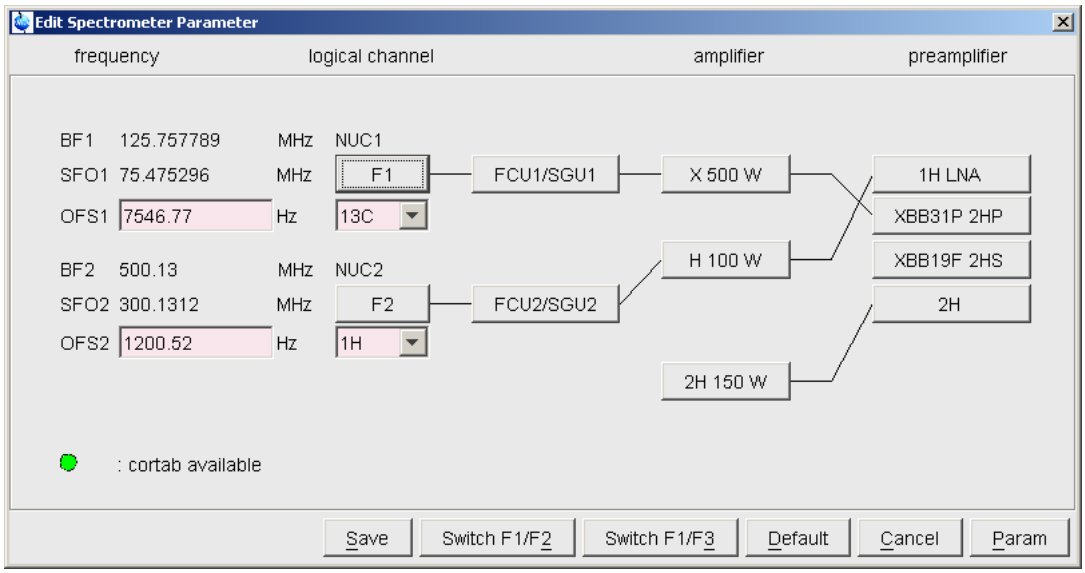
9. Do "cf" again.

Figure 3.15. "cf" report after remapping



10. After, do "edasp" and you should see the windows below.

Figure 3.16. "edasp" window after remapping



Operation 4

Front Panel 4.1

The BLAXH2H500/100/150 front panel is provided with 2 x 13 indicators for status monitoring, 11 connectors and 2 interface connectors.

Indicators 4.1.1

Normal operation is indicated when following LED's are on:

Table 4.1. Indicators

+32V ON	Indicates that the +32V supply is applied.
+15V ON	Indicates that the +15V supply is applied.
-15V ON	Indicates that the -15V supply is applied.
+5V ON	Indicates that the +5V supply is applied.
Overdrive	Indicates when the peak power limit has been reached.
Duty Cycle	Indicates when the duty cycle limit has been reached.
Pulse Width	Indicates when the pulse width limit has been reached.
Mismatch	Indicates when the max. reflected power limit has been reached.
RF Power FLT	Lights ON when one of the above limits has been reached.
Overheat	Indicates that the thermistor located on the RF Module heatsink has sensed excessive heatsink temperature. All gatings are removed from the amplifier until the unit cools. The function is self-resetting and no maintenance is needed. Indicates that a fan on the assembly stops turning. The gatings are cut off and fans must be changed for good working.
Channel ON	Lights on when RF Power is present on H channel or X channel.
2H ON	Lights on when RF power is present on the 2H amplifier.
2H Error	Indicates when an error has occured on the 2H channel. This could be a: - Duty cycle error, - Pulse width error. This Led is also coupled with the overheat error.

Connectors 4.2

Table 4.2. Connectors

X / H in	RF In SMA type connectors (female). Nominal +4dBm drive to the BLAXH2H Serie to deliver full power.
X / H out	RF OUT N type connectors (female).
BLNKX / BLNKH	Blanking signals BNC type connector (female). TTL logic, 5V = blanking ON, 0V = blanking OFF. When BLANKING signal is at TTL level high (+5V), no gating is applied to the amplifier stages, and no RF Power is possible. When BLANKING signal is at TTL level low (0V), the amplifier stages are gated and RF Power is possible.
FX IN	Connection from the Router or the SGU auxiliary RF output. This is the input of the 2H amplifier.
FO IN	Connection from the L-TX 2H-TR. This is the 2H lock signal.
2H OUT	Connection to the HPPR 2H-module. This is either the output of the 2H amplifier and the 2H lock signal.
SEL 2H AMP	This is the SEL2H/DEC connection from TCUT3L. This signal is used to command the RF switch located on the 2H amplifier board. It is also used to blank the 2H amplifier (same polarity as a BLNK signal).
LTX BLNK	Connection to L-TX TX-BLNK. This signal, the same as SEL2HAMP, is used to blank the L-TX (ECL02 or higher) during Deuterium decoupling.

Interface Connector RS485 4.2.1

The Control I/O interface connections are 15 pin, D shape sub-miniature type connectors mounted on the SBS BUS Controller.

SBS BUS = Serial Bruker Spectrospin Bus

The next table shows the pinout of the master and slave connectors.

Table 4.3. RS485 pinout assignment

Pin 1	Shield	**Pin 9**	Transmit data line -
Pin 2	Transmit data line +	**Pin 10**	NC
Pin 3	Wake up line /WUP	**Pin 11**	Receive data line -
Pin 4	Receive data line +	**Pin 12**	NC
Pin 5	NC	**Pin 13**	VRS (+12V)
Pin 6	GND	**Pin 14**	VRS (+12V)
Pin 7	GND	**Pin 15**	VRS (+12V)
Pin 8	GND		

Figure 4.1. BLAXH2H500/100/150 Front Panel Design

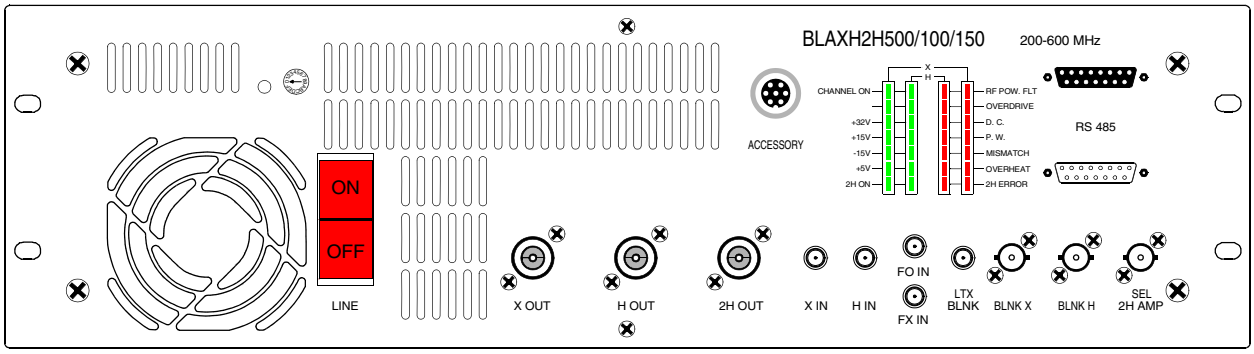
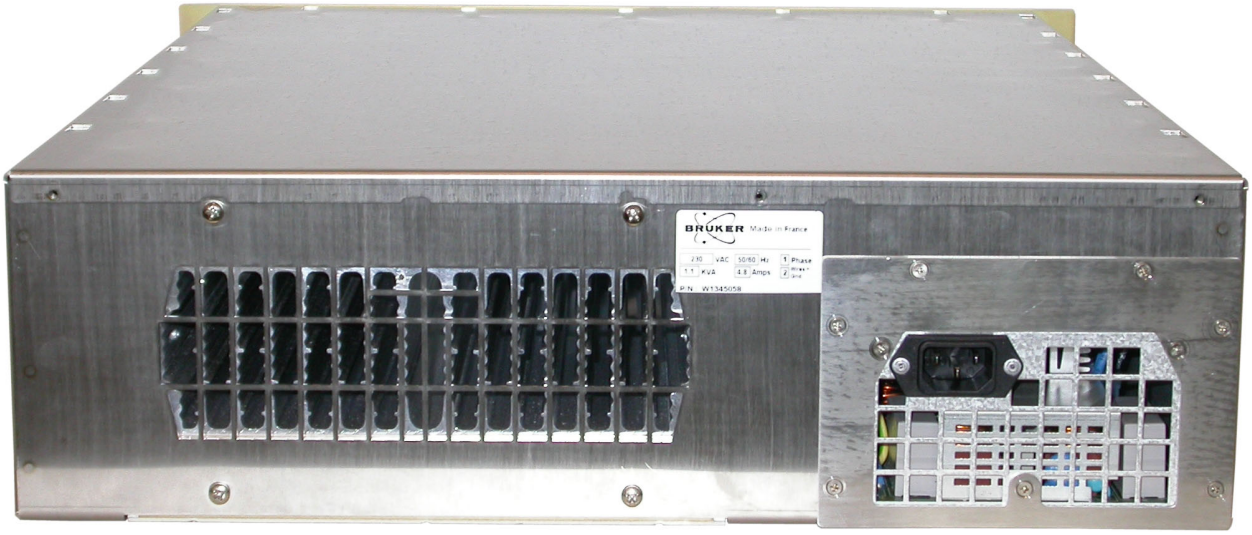


Figure 4.2. BLAXH2H500/100/150 Front Panel View

Rear panel *4.3*

The rear Panel of the BLAXH2H Serie Amplifiers is free of elements in exception of the three pole (2P + E) line filter socket.

Figure 4.3. BLAXH2H500/100/150 Rear Panel Design



Technical description

5

System Overview 5.1

The BLAXH2H500/100/150 amplifier provides a RF Output Power of 500W in the 6-365MHz frequency range for the X channel and a 140W RF Output Power in the 220 to 564MHz frequency range (100W from 180 to 220MHz and at 600MHz). A third amplifier provides a RF output Power of 150W in the 30-92MHz frequency range for the 2H channel.

The RF section of the system consists of a linear module BLMXH2H500/100/150, mounted around a single, self-contained Push fan assembly, heatsink.

The linear module BLMXH2H500/100/150 includes three class AB power amplifiers. The amplifiers for the H and 2H channels are located on the top side of the module, and the one for the X channel on the bottom side.

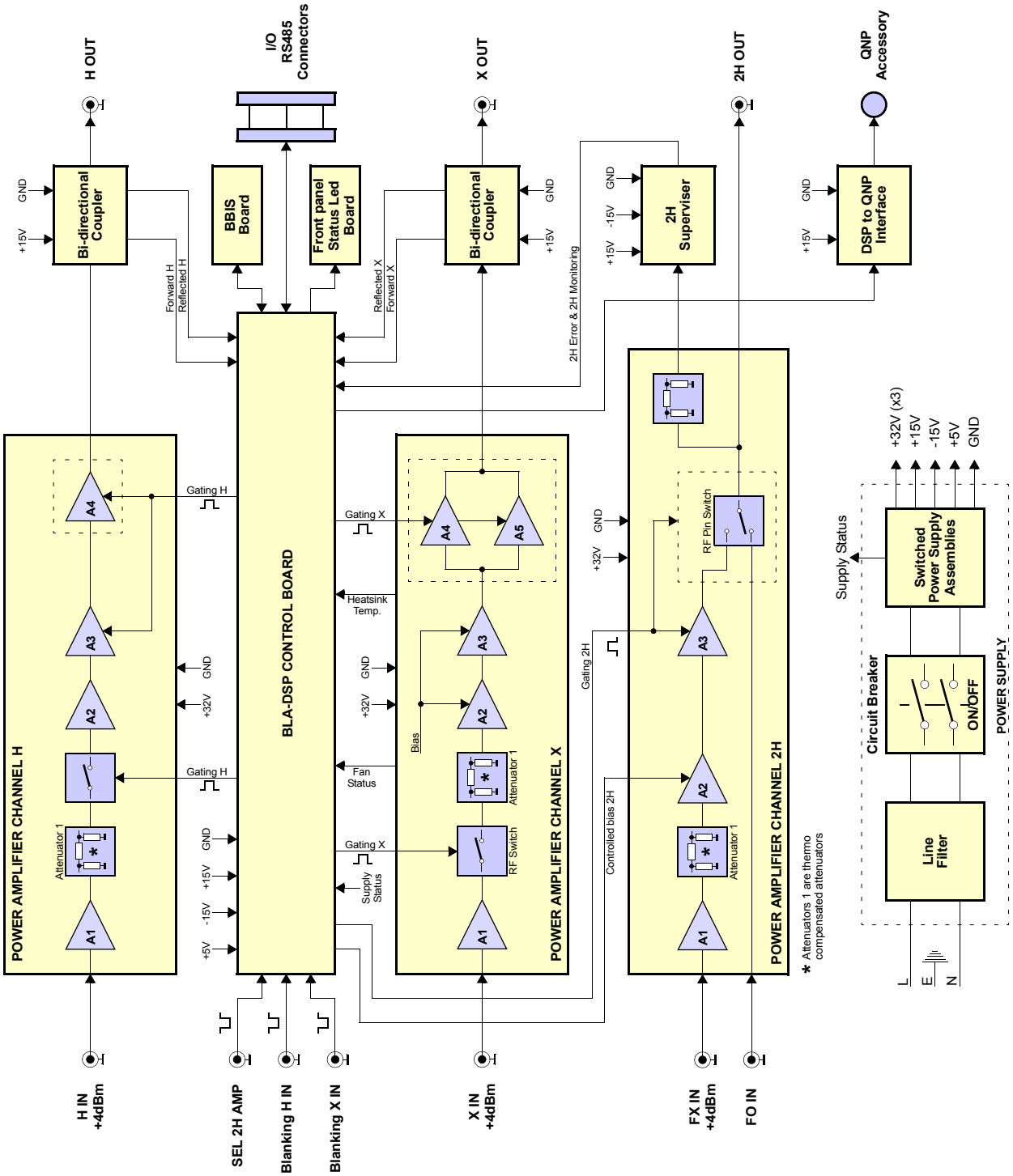
X and H channel are connected to the front panel of the amplifier via a bi-directional coupler. The 2H channel is connected directly to the front panel.

The entire system is tied together by a Digital Signal Processing control board, processing information from the amplifier and blanking signal, providing protection to X and H channels from excessive peak power, duty cycle and pulse width for average power, maximum reflected power and heatsink overtemperature. The DSP control board reads identification information of the amplifier (BBIS).
Monitoring of Fan status, Supply status & LED status is also performed by the control board.

Moreover, a 2H supervisor print is in relation with the DSP control board, to ensure protection of the 2H channel.
These are the following:

- Duty cycle and Pulse width (Average Power).
- Heatsink overtemperature.
- Fan assembly misfunction.

Figure 5.1. BLAXH2H500/100/150 System Block Diagram



Theory of operation 5.2

RF Path 5.2.1

The BLAXH2H500/100/150 amplifier (P/N: W1345058) consists of three Class AB power amplifiers.

A nominal input power level of +4dBm produces a nominal output peak power of :

- 500W for 6% duty cycle at 60ms pulse width maximum on the X channel output.
- 140W for 25% duty cycle at 100ms pulse width maximum on the H channel output.
- 150W for 10% duty cycle at 5ms pulse width maximum on the 2H channel output.

The unit is also capable of longer pulses for lower average power.

RF Power amplifier Channel X500

In the first section of this power amplifier, the input RF signal is fed directly to a hybrid amplifier followed, via an AsGa RF Switch, by a thermo compensated attenuator and two class A drivers to build a nominal 40dB to 44dB gain block.

In this section, only the RF switch requires a control board conditioned gating signal to control the operation of the switching element.

The second section of the PA includes two FET transistors.

The circuitry around the transistors consists of complementary input and output transformers and baluns and operates the devices in push-pull.

This section requires a control board conditioned gating signal in order to control the bias gate voltage on the gates of the FETs.

The input-output gain of this section is at nominal 13dB.

The entire RF power amplifier has a 57dB nominal gain, and operates at +32VDC.

RF Power Amplifier Channel H100

In the first section of this power amplifier, the input RF signal is fed through a hybrid amplifier followed by a thermo compensated attenuator, a RF switch and two class A drivers to build a nominal 41dB gain block.

In this section, the RF switch and the second class A transistor require a control board conditioned gating signal to improve better anti-droop behavior.

The second section of the PA includes one FET transistor.

The circuitry around the transistor consists of complementary input and output transformers and baluns and operates the devices in push-pull.

This section requires a control board conditioned gating signal in order to control the bias gate voltage on the gates of the FET.

The input-output gain of this section is at nominal 10dB.

The entire RF power amplifier has a 51dB nominal gain, and operates off +32VDC.

RF Power Amplifier Channel 2H150

In the first section of this power amplifier, the input RF signal is fed directly to a hybrid amplifier followed by a thermo compensated attenuator followed by a class A driver to build a nominal 37dB gain block.

The second section of the PA includes a FET transistor.

The circuitry around consists of complementary input and output transformers and baluns.This transistor requires a control board conditionned gating signal in order to control the bias gate voltage. The input-output nominal gain value of this section is 13dB.

The entire RF power amplifier has a 50dB nominal gain and operates at +32VDC.

2H RF Power Switch

The output of the 2H150W power amplifier is connected directly to an RF Power switch, located on the same board. This switch is used to select either the 2H amplifier or the lock transmitter.

It is composed of PIN diodes and provides a 60dB isolation between the 2H OUTPUT and the FO IN input when the 2H amplifier is selected. PIN diodes also have 0.4dB insertion between FO IN and 2H OUTPUT when the 2H amplifier is not selected. In this mode, the LTX signal can feed through.

RF Coupler

The bi-directional couplers on the front panel provides an approximate 1V peak DC signal for full output power from the envelope.

The bi-directional couplers also provides peak DC signal for reflected power.

Both signals, forward and reflected, are analyzed by the control board for monitoring and protection setting.

Control Board *5.2.2*

The BLA Control Board consists of circuitry to monitor the output characteristics of the amplifiers, as determined from the DC peak detection’s from the bi-directional couplers, and to condition the input blanking (gating) signals and deliver them to the above mentioned RF Paths.

The monitoring circuitry also serves to process the information from the detection and protect the amplifier from overstress in peak power, average power versus duty cycle and pulse width, so as reflected power.

The control board also monitors the RF Path heatsink temperature to protect against thermal overstress, and reads identification information of the amplifier.

Information from supply and fans are also being analyzed by the control board.

If one of the above overstresses, or faults on power supplies or fans, appears, the gating signals are disabled, and the status led board on the front panel displays the fault.

SBS Bus Controller 5.2.3

The SBS Bus Controller, via the RS485 connector, could read all the information given by the control board as described before, read information about forward and reflected power, information of identifications of the amplifier (Bruker Board Identification System = BBIS).
The SBS Bus controller, via the RS485 connector, also could minimize absolute ratings for pulse width, duty cycle, reflected power and peak power limitations.

Warning: the operating of the SBS Bus Controller needs the exploitation of a Spectrometer Management Software such as BRUKER XWIN-NMR in addition of the ACB (Amplifier Control Board)

Status Led Board 5.2.4

The Status Led Board, on the front panel of the amplifier, displays overstress functions, supplies status, and so on, as described in ***"Indicators" on page 23***.

BBIS Board 5.2.5

The Universal BBIS board is located on the amplifier case and contains identification information of the amplifier.

Technical help: please contact your local representative.

Specifications 6

General specifications 6.1

Table 6.1. BLAXH2H500/100/150 channel X500 specifications

Frequency range	6 to 365MHz
Linear Gain	57dB ±1dB typ.
Gain Flatness	±1dB max.
Minimum Pulsed Output Power (at nominal input +4dBm)	600W typ. to 100MHz 500W typ. to 300MHz 400W min. to 365MHz
CW Output Power (int. limitation)	30W max.
Linear Output Power	300W typ. @ 1dB compression
Linearity	±1dB to 400W typ.
Amplifier biasing	Class AB Operation
Blanking Delay Time	1µs min.
RF Rise Time	< 100ns
RF Fall Time	< 50ns
DC Ringing	±500mV typ. (due to blanking signal)
Input Noise Figure	6dB typ.
Output Noise Power (Unblanked)	< -110dBm / 1Hz
Output Noise Power (Blanked)	< 25dB over Thermal noise
IN / OUT Impedance	50Ω
Input V.S.W.R.	1.3 max.
Output Harmonics 2fc ; 3fc	30dBc ; 10dBc max. @ 500W
Pulse Width (int. limitation)	60ms @ 500W (up CW @ 30W)
Duty Cycle (int. limitation)	6% @ 500W (up to 100% @ 30W)
Droop & Pulse Flatness	±3% @ 300W for 20ms Pulse Width ±1.5% @ 500W for 1ms Pulse Width
Amplitude stability versus temperature	±0,1% / °C

Table 6.2. BLAXH2H500/100/150 channel H100 specifications

Frequency range	180 to 600MHz
Linear Gain	51dB ± 1typ.
Gain Flatness	±1dB max.
Minimum Pulsed Output Power (at nominal input +4dBm)	140W min. 220 to 564MHz 100W min. 180 to 220MHz and at 600MHz
CW Output Power (int. limitation)	35W max.
Linear Output Power	80W typ. @ 1dB compression
Linearity	±1dB to 80W typ.
Amplifier biasing	Class AB Operation
Blanking Delay Time	1µs min.
RF Rise Time	< 100ns
RF Fall Time	< 50ns
DC Ringing	±200mV typ. (due to blanking signal)
Input Noise Figure	6dB typ.
Output Noise Power (Unblanked)	< -117dBm @ 1Hz
Output Noise Power (Blanked)	Thermal noise
IN / OUT Impedance	50Ω
Input V.S.W.R.	1.3 Max.
Output Harmonics 2fc ; 3fc	40dBc ; 16dBc max. @ 100W
Pulse Width (int. limitation)	100ms @ 140W (up to CW @ 35W)
Duty Cycle (int. limitation)	25% @ 140W (up to 100% @ 35W)
Droop & Pulse Flatness	±2% @ 140W for 20ms Pulse Width
Amplitude stability versus temperature	± 0,1% / °C

Table 6.3. BLAXH2H500/100/150 channel 2H150 specifications

Frequency range	30 to 92MHz
Linear Gain	50dB ±1 typ.
Gain Flatness	±1dB max.
Minimum Pulsed Output Power (at nominal input +4dBm)	150W min. full range
CW Output Power (int. limitation)	15W max.
Linear Output Power	150W typ. @ 1dB compression
Linearity	±1dB to 150W typ.
Amplifier biasing	Class AB Operation
Blanking Delay Time	3µs min. (due to PIN diodes switch)
RF Rise Time	< 500ns (due to PIN diodes switch)
RF Fall Time	< 50ns
DC Ringing	N/A
Input Noise Figure	4,5dB typ.
Output Noise Power (Unblanked)	< -120dBm @ 1Hz
Output Noise Power (Blanked)	Thermal noise
IN / OUT Impedance	50Ω
Input V.S.W.R.	1.3 Max.
Output Harmonics 2fc ; 3fc	25dBc ; 11dBc max. @ 150W
Pulse Width (int. limitation)	5ms @ 150W (up to 100% @ 15W)
Duty Cycle (int. limitation)	10% @ 150W (up to 100% @ 15W)
Droop & Pulse Flatness	±2% @ 150W for 5ms Pulse Width
Amplitude stability versus temperature	±0,15% / °C

Table 6.4. Channel 2H250 Pin diode switching specification

Insertion FO_IN vs 2HOUT	0.4dB typ.
Isolation 2HOUT vs FO_IN	> 60dB full range

Table 6.5. BLAXH2H500/100/150 Common Specifications

Constant Internal Protection	Supplies & Fans faults & Over temperature Forward Power for X and H channels: Peak & CW Power Pulse Width Duty Cycle Reflected Power : Peak & CW Power Pulse Width and Duty Cycle for 2H channel
Front Panel Indicators	Amplifier Status Led Board
Front Panel Interfaces	2 x I/O 15-pin subminiature type D connectors
Front Panel controls	AC Line ON / OFF
Front Panel connectors	4 x RF input, 3 x RF output, 3 x gating input, 1 x gating output
Rear Panel Interface	AC Line in socket
Cooling System	Forced air cooling (from front to rear)
Size	7" H x 19" rack cabinet x 20,4" D (17,8 x 48,3 x 52cm)
Weight	23kg
Power requirements	220-230VAC ±15%, single phase 50-60Hz

Service information and maintenance 7

Every intervention on the device must be carried out by a authorized and qualified person. Any failure due to a non-respect of the following instructions will not be attributable to BRUKER and will not be covered by the guarantee clauses.

Preventive maintenance of the RF module on BLA-type Amplifiers 7.1

The RF module inside BLA's Amplifiers is equipped with a easily extractible PUSH FAN Assembly.

Fan's on assembly have a high reliability and manufacturer gives a expected live time of 70000 hours (8 years) at 25°C and 5 years at 60°C.

Replacement of the assembly could be done in the field when a misfonction of fans is detected by lightning from the OVERHEAT Status Led.

To prevent such a misfonction, a preventive maintenance could be done every 4 years.

This assembly can be ordered on the manufactory BBIO-FR by P/N:**W1346523** «PUSH FAN ASSEMBLY 6».

Operation :

1. Disconnect all cables from the front panel and the line cord on the rear pa-nel, take out the amplifier from the NMR console and place it to a secure flat surface.
2. Unscrew and remove the coverage plat from the amplifier.
3. Disconnect the 2 wires (red +32V / black GND) from the dispatch supply connector on the RF module and disconnect the fan status wires (white) from connector J18 on BLA control board.
4. Unscrew the 2 screws on the top of the push fan assembly.
5. Remove the push fan assembly.
6. Placed the new fan assembly in the holes on the bottom of the RF module and screw it on.
7. Connect all wires (status and supply).
8. Connect line cord and turn on the BLA amplifier.
9. Note that the fans are turning and no OVERHEAT status led appears on front panel.
10. Put the coverage plat on the BLA amplifier and screw it.

11. Put the amplifier in the NMR console, connect all cables on the front panel and the line cord on the rear panel.

Figures

Figures

Tables

Tables