

## Device manual



### QAM Modulator

ASI - TS → DVB-C / ITU-T J.83 Annex B, C



**AMA 299**  
**Part N°: 9859.8x**

*...Setting Signals*

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## 1. Safety and operating instructions



When assembling, starting-up and adjusting the modules, it is necessary to consider the system specific references in the manual instruction!



The modules may only be installed and started up by authorized technical personnel!



When assembling the modules into the receiving points, the adherence of the EMC regulations is to be secured!



The assembly and wiring have to be done without voltage!



With all work the defaults of the DIN EN 50083 have to be considered! Especially the safety relevant execution of the DIN EN 60728-11 [3] is necessary!



The devices come under protection classification I. It is absolutely necessary, therefore, to insert the mains plug into a socket with protective contact.

## 2. Device variants

AMA 299	9859.81	ASI - TS → DVB-C / ITU-T J.83 Annex B, C
	9859.82	ASI - TS → IFI → DVB-C / ITU-T J.83 Annex B, C

## 3. General

The QAM Modulator AMA 299 is a module of the head end system A-LINE which is conceived as a complete system for big and middle-sized networks. The module converts one digital transponder into the digital cable standard DVB-C, ITU-T J.83 Annex B or C. The signal will be transcoded from the ASI transport stream into cable TV channels.

The status of the assembly will displayed with LEDs (see section 5.2 "Meaning of the LED signals").

## 4. Functional description

The data stream which results from the ASI input is passed to a FIFO. All services of the resulting transport stream which shall be processed into the QAM modulator will be chosen by controlling software of the module. The SI and PSI tables affected (i.e. the PAT, PMT, SDT, EIT, NIT) are automatically corrected. The changed SI an PSI tables are fed into the QAM modulator and an IF signal is generated at the output channel. There is a free choice of frequency in the output channel from 45 to 862 MHz. On the output side, the modulator does not leak to adjacent channels. For level error reporting a reference level is generated internally and is compared with current value permanently. After each programming of the level and/or frequency values an automatic measurement of the reference level takes place. The integrated management unit consists of the data interface for PC/LAN/WAN (IP/Ethernet - interface / RJ 45). The management of the module can be done via PC/Laptop (see programming). The IP address of each device can be edited and adjusted to the respective LAN.

## 5. Explanation of the operating elements

### 5.1 Front view



### 5.2 Meaning of the LED Signals

Designation (Colour)	Status	Meaning of display
POWER (green)	permanently illuminated	Device is ready for working
	off	Device off, without current supply
STATUS (green)	permanently illuminated	Device working, everything ok
	flashing	Dysfunction depending in signal (e.g. in case of invalid service)
	off	RF output is deactivated
SYNC. (green)	permanently illuminated	ASI input is synchronous
	flashing	ASI not sync (e.g. in case of missing input signal)
ERROR (red)	permanently illuminated	Device is on standby
	flashing	Device faulty (hardware)

### 5.3 Front panel keypad and tuning wheel

ESCAPE

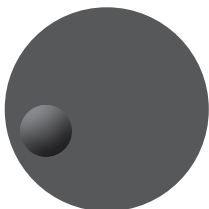


By activating the ESCAPE-Pad you exit the current menu cycle. The input function switches back to the inactive status and jumps to the status information (Start display)



BACK

By activating the BACK-Pad you leave the current mode (Menu selection) without any acceptance of settings or adjustments. The cursor jumps one menu level higher.

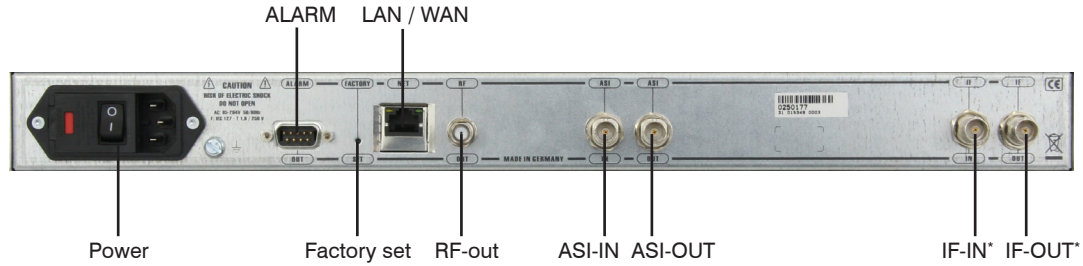


Pressing of the tuning wheel is equivalent to the ENTER-Function.

The cursor switches to the active mode. Tuning the wheel right or left enables to select an menu entry, the menu selection will be confirmed by pressing the wheel.

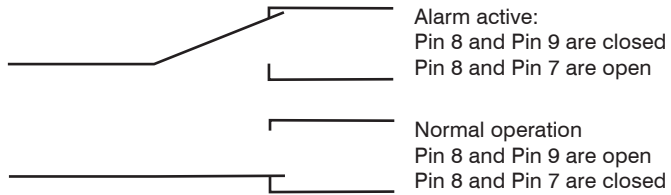
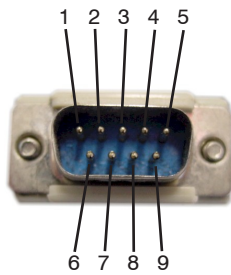
Each parameter function can be edited by pressing the tuning wheel (ENTER). By tuning the wheel you can position the cursor to the desired selection. By pressing the tuning wheel (ENTER) you switch to the Edit-mode. The text- and/or number positions can be individually selected by tuning the wheel. Pressing the wheel (ENTER) confirms your input and switches back to the selection mode. After a complete and correct adjustment you have to position the cursor right to the symbol ↵ ENTER and confirm it by pressing the tuning wheel. The display switches back to the selection mode of the parameter display!

**5.4 Rear view**



\* only in device variant 9859.82 available

**5.5 9-pin D-SUB connector configuration (alarm contact)**



## 6. Programming by web server

### 6.1 Network connection to computer



**System requirements:**

- PC/Laptop with 10/100 Mbit Ethernet interface
- Internet browser (e.g. Windows Internet Explorer), which accept JAVA-Script.

**Setup the connection:**

The AMA 299 must be connected to PC Network using an Ethernet cable. The IP address of the AMA 299 control port is 192.168.2.80 on delivery. The address of the network connection at the computer must be adapted to the IP address of the AMA 299 (subnet mask: 255.255.255.0, IP address: 192.168.2.XXX). Don't be use the same combination lock for XXX like the IP address of the AMA 299. The IP address of the AMA 299 is entered onto the browser interface.

When the link up has been successfully made, the device starts with the device status page.

The language (english/ german) can be selected on the right side of each page. To change the settings of the device at the first user log-in window will be open automatically.

The access to the configuration menu is password protected. Access data (factory settings):

Registration details	Valid string
User name	user
Password	password

After successful log-in the parameters can be modified.

The user log-in is only temporarily. The connection has to be refreshed after some time.

### 6.2 Device status

The screenshot shows the 'Status' page of the QAM Modulator - AMA 299. It features a navigation bar with tabs: Status, Std. settings, Ext. settings, Program filter, NIT-Table, Software, IP-Network, and MIB. The main content is divided into several sections:

- ASI input:** Shows 'ASYNC' status, packet size of 188 Byte, and input data rate of 38.015 Mbps.
- Data rate overview:** Shows data rate by filter (34.203 Mbps) and max. QAM-Data rate (38.152 Mbps).
- Reserve:** Shows a reserve of 3.948 Mbps.
- Device settings:** Lists various parameters like Identifier (xxxx), Frequency (314000 kHz), Level (-10 dBm), and QAM-Modulation mode (64 QAM).
- Information:** Shows the status of the transport stream (OK), TS-Manager/QAM-Modulator (OK), and RF-Amplifier (OK).

Choose language

german, english

#### ASI input

ASI-Input

ASI status display **SYNC**hronisation or **noSYNC**hronisation with the input in byte

Packet size

#### Data rate overview

Input data rate  
Data rate by filter  
max. QAM-Data rate

used data rate at input  
used data rate after program filter  
max. used data rate

#### Reserve

max. QAM-Data rate minus data rate after filter

#### Device settings

Identifier  
Frequency  
Level  
Level monitoring  
Tolerable level variation  
QAM-Symbol rate  
QAM-Modulation mode  
RF-Signal  
Operating mode QAM-Mod.  
QAM-Standard  
NIT-Processing  
CAT-Processing  
Change ID's  
Program filter function  
Original TS-ID's

e.g. program name acc. adjustments in 6.3  
acc. adjustments in 6.3  
acc. adjustments in 6.3  
acc. adjustments in 6.3  
acc. adjustments in 6.3  
acc. adjustments in 6.3  
acc. adjustments in 6.3  
on/ off acc. adjustments in 6.3  
acc. adjustments in 6.4  
on/ off acc. adjustments in 6.4  
on/ off acc. adjustments in 6.4  
on/ off acc. adjustments in 6.4  
on/ off acc. adjustments in 6.4  
display transport stream ID and network ID

#### Information

TS-Interface  
TS-Manager/QAM-Modul.  
Up Converter  
RF-Amplifier  
Date  
Time

status of transport stream  
status of TS-Manager/ QAM-Modulator  
status of up converter  
status of RF-Amplifier  
acc. adjustments in 6.3  
acc. adjustments in 6.3,  
12/ 24-h-mode selectable  
display of the device number  
display of the device index (hardware)  
temperature of device, °C/ F selectable

Device number

Device index

Temperature

### 6.3 Standard settings

The screenshot shows the 'Std. settings' page of the QAM Modulator - AMA 299. It features a navigation bar with tabs: Status, Std. settings, Ext. settings, Program filter, NIT-Table, Software, IP-Network, and MIB. The main content is divided into several sections:

- Identifier:** Name field set to 'xxxx'.
- Output:** Channel (S21 306.00 MHz), Level (-14 dBm), QAM-Symbol rate (5310 kSps), QAM-Modulation mode (64 QAM), Interleaver (12/17).
- IF-Loop:** Input/Output (Deactivated), Input frequency (36.000 MHz), Output frequency (36.000 MHz).
- SNMP:** SNMP trap message (On).
- Date/Time:** Date (06.10.09), Time (08:20), and a 'Transmit' button.

Choose language

german, english

#### Identifier

Name

independent text field for device identification (max. 30 characters)

#### Output

Channel  
Level  
QAM-Symbol rate

channel selection (2 ... 69, standard B/G)  
adjustment range -10 ... +14 dBm  
selection: 6995, 6900, 6875, 6111, 6000, 3450, 1750 kSps  
selection: 16, 32, 64, 128, 256 QAM  
selection: 12/17 (DVB-C/ Annex A)  
12/17, 8/16, 16/8, 32/4, 64/2, 128/1, ... , 128/8 (ITU-T J.83 Annex B)  
12/17 (ITU-T J.83 Annex C)

QAM-Modulation mode  
Interleaver

RF-Signal  
Level monitoring  
Tolerable level variation

selection: on/ off  
selection: on/ off  
selection: ± 1 dB ... ± 5 dB, 0.5 dB steps

#### IF-Loop

Input/ Output  
Input frequency

selection: Activated/ Deactivated  
selection: 36.000, 36.125, 36.150, 38.900, 44.000, 45.750 MHz  
36.000 MHz

Output frequency

SNMP

SNMP trap message

on/ off /locked (if not supported by software)

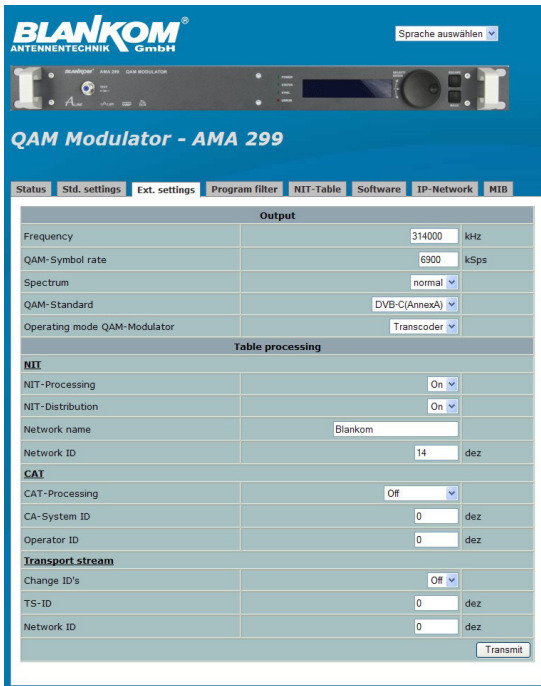
#### Date/ Time

Date

Time

input format: dd.mm.yy  
input format: hh:mm (AM/ PM)  
Date/Time input must be set to initialize internal clock (after first start-up of device or reinitializing after a longer shut-down).  
Additional selection of AM/PM in 12-h-mode.

## 6.4 Extended settings



Choose language

german, english

### Output

Frequency  
QAM-Symbol rate  
Spectrum  
QAM-Standard

adjustment range 45000...862000 kHz  
adjustment range 1000...7200 kSps  
selection: normal/invers  
selection: DVB-C (Annex A), ITU-T/J.83 (Annex B), ITU-T/J.83 (Annex C)  
selection: Transcoder, Testlevel, Testsignal

Operating mode QAM-Mod.

### Table processing

#### NIT

NIT-Processing  
NIT-Distribution  
Network name  
Network ID

activate or deactivate  
activate or deactivate  
selectable (max. 30 characters)  
selectable (0...65535)

#### CAT

CAT-Processing  
CA-System-ID  
Operator-ID

activate or deactivate  
selectable (0...65535)  
selectable (0...65535)

#### Transport stream

Change ID's  
TS-ID  
Network ID

activate or deactivate  
selectable (0...65535)  
selectable (0...65535)

## 6.5 NIT table



Choose language

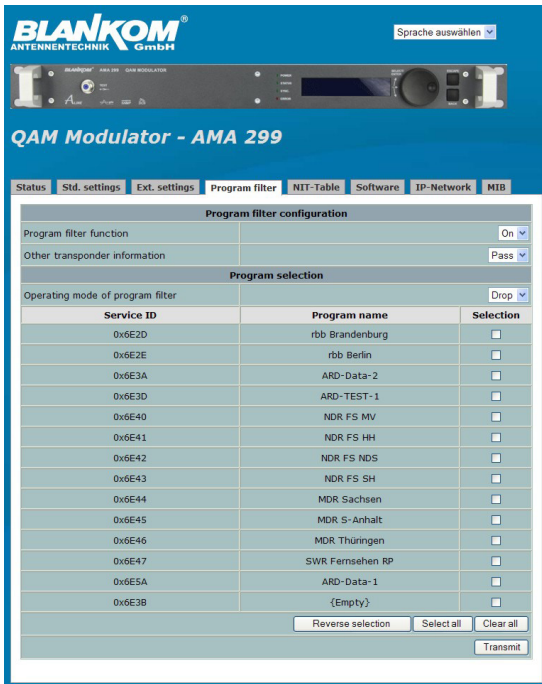
german/english

NIT table with all additional entered informations.

By clicking of the button all NIT entries are cleared.



## 6.6 Program filter



Choose language                      german, english

### Program filter configuration

Program filter function                activate or deactivate

Other transponder information        pass or drop of additional informations (e.g. electronic program guide), which are contained in data stream as "other"

### Program selection

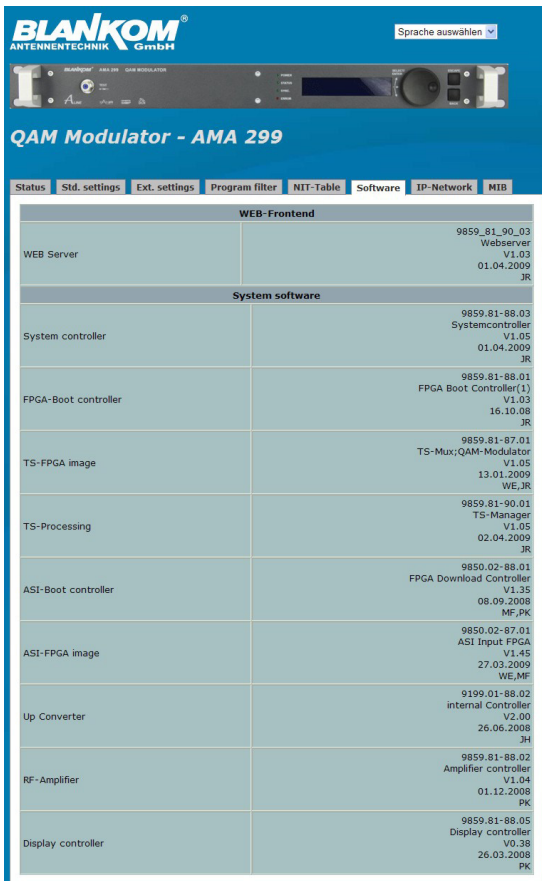
Operating mode program filter        pass or drop of the market programs

Reserve selection                      all not marked programs are chosen or vice versa

Select all                                all programs of the list are marked

Clear all                                 no program the list is marked

## 6.7 Software overview



Choose language                      german/english

### Software versions:

#### WEB-Frontend

WEB Server

#### System software

System controller

FPGA-Boot controller

TS-FPGA image

TS-Processing

ASI-Boot controller

ASI-FPGA image

Up Converter

RF-Amplifier

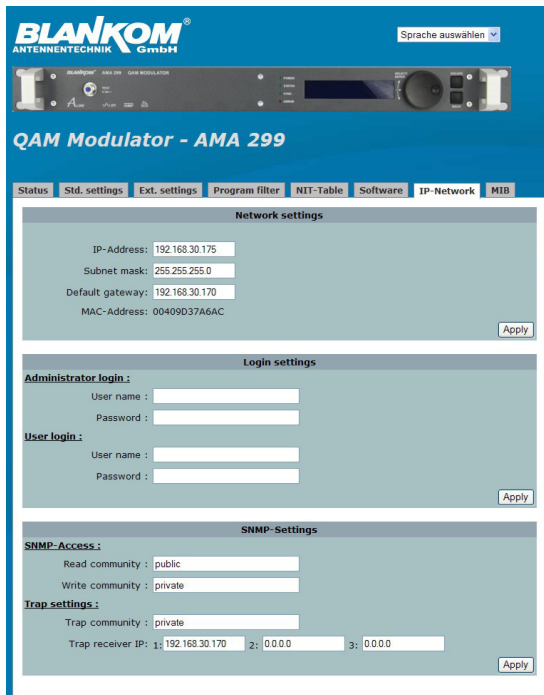
Display controller

## 6.8 IP network



Selecting this menu at first the administrator log-in window will be open automatically.

Following successful log-in the network and log-in settings can be changed.



Choose language                      german/english

Factory settings are:

### Network settings

IP-Address:                                192.168.2.80  
Subnet mask:                              255.255.255.0  
Default gateway:                        192.168.2.1  
MAC-Address:                             display of MAC-Address

### Login settings

#### Administrator login:

User name:                                admin  
Password:                                 password

#### User login:

User name:                                user  
Password:                                 password

### SNMP-Settings

#### SNMP-Access:

Read community:                        public  
Write community:                        public

#### Trap settings:

Trap community:                        public  
Trap receiver IP    1            0.0.0.0  
                          2            0.0.0.0  
                          3            0.0.0.0

- Administrator- and/or user-login can be deactivated by clearing of user name and password.
- The addresses must be matched to the respective network.

## 7. SNMP management

### 7.1 Generate MIB



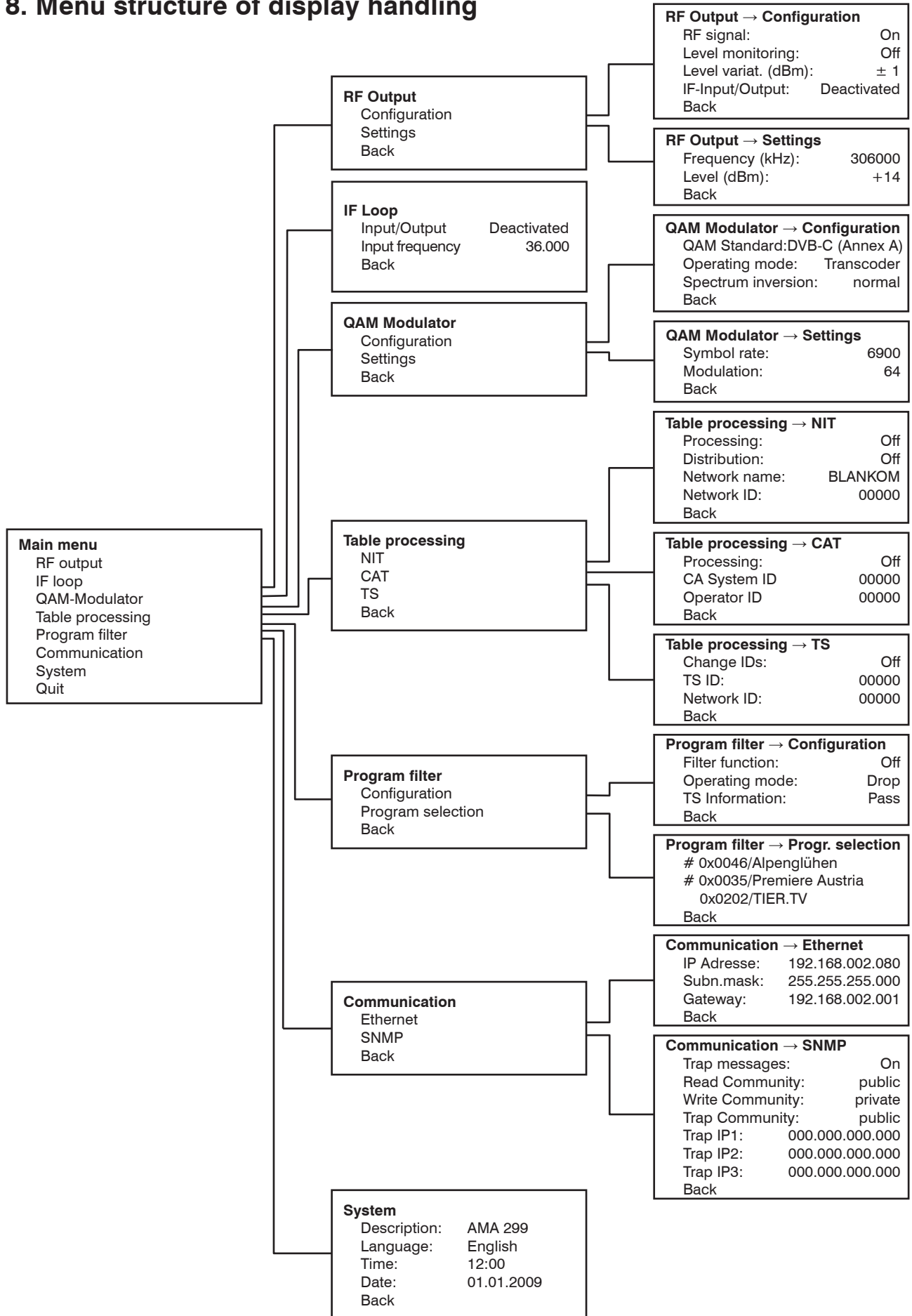
Choose language                      german/english

The complete MIB for an AMA 299 can be downloaded like described under "Instructions" on this web-site and clicking the "MIB Download" - link. With the aid of an MIB browser, the relevant one can be decided upon and taken over to control the device via a network and/or an SNMP manager capable of SNMPv2c

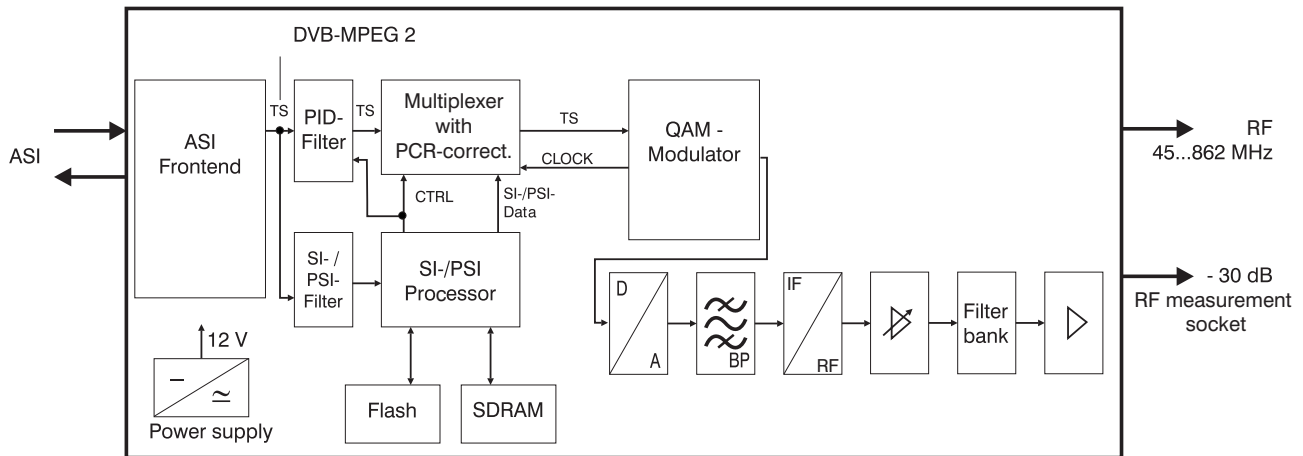
### 7.2 Trap messages

Item	Message	Message Type	Explanation
01	Power Fail	CRITICAL	short circuit
02	System Reset	WARNING	reset by internal error
03	Signal ok	INFORMATION	module works correctly
04	ASI input not sync	WARNING	no input signal at the ASI input
05	IIC error	CRITICAL	IIC-Bus-error
06	TS-MUX not sync	WARNING	no transport stream at the FPGA
07	Internal controller reset	WARNING	error when accessing internal controller
08	FPGA: Program memory full	WARNING	overflow of program memory in the FPGA
09	FPGA: PID memory	WARNING	overflow of PID memory in the FPGA
10	FPGA: Directory full	WARNING	overflow of directory in the FPGA
11	FPGA: FAT memory full	WARNING	overflow of FAT memory in the FPGA
12	FPGA: TS-Packed buffer overflow	WARNING	overflow of TS-Packet buffer
13	QAM overflow	CRITICAL	overflow of QAM
14	Sync error data FIFO	CRITICAL	data FIFO doesn't work correctly
15	No response to OPEN command	CRITICAL	error internal port
16	Up Converter: PLL1 not locked	CRITICAL	no funktion at the PLL 1 converter
17	Up Converter: PLL1 not locked	CRITICAL	no funktion at the PLL 2 converter
18	Up Converter: IF input too small	WARNING	IF level at Up converter input too smal
19	Up Converter: IF input too large	WARNING	IF level at Up converter input too large
20	UP Converter: IF input ok	INFORMATION	IF level at Up converter input ok
21	Amplifier: RF Level too large	WARNING	RF level at amplifier too large
22	Amplifier: RF Level too small	WARNING	RF level at amplifier too smal
23	Amplifier: RF Level ok	INFORMATION	RF level at amplifier ok
24	ASI input sync	INFORMATION	signal at ASI input ok

## 8. Menu structure of display handling



### 9. Block diagram



### 10. Technical data

#### ASI Input

Level range	200 ... 880 mV <sub>pp</sub>
Connector	BNC socket
Impedance	75 Ω
ASI polarity	regular / inverted

#### ASI Output

Level	800 mV <sub>pp</sub> (± 10 %)
Connector	BNC socket
Impedance	75 Ω
ASI polarity	regular

#### ASI Signal processing

Data rate	0.625...213 Mbps
ASI transfer format	
Input	continuous, burst
Output	burst
TS transfer format	
Input	188, 204 Byte
Output	188, 204 Byte
Signal processing	EN 50083-9 [1]

#### QAM Modulator

Symbol rate	1.0 ... 7.2 MSps		
QAM Modulation	ITU-T J.83 Annex B, C, DVB-C		
	<b>Annex B</b>	<b>Annex C</b>	<b>DVB-C</b>
QAM Constell.	64; 256	64	16; 32; 64; 128; 256
Roll off	12 %, 18 %	13 %	15%
Interleaving	Conv. I=128, J=4	Conv. I=12	Conv. I=12
Forward error correction (FEC)	Reed Solomon (128,122) + Trellis	Reed Solomon (204, 188,8)	Reed Solomon (204, 188,8)

Test signals	according adjustment symbol rate & QAM constellation
Measurement signal	unmod. carrier (signal level)
PSI-/SI processing	disconnectable
Zero stuffing	continuously
Signal processing	EN 300 429 [2] (DVB-C) ITU-T J.83[4] (Annex B, C)

#### IF loop\*

Output/ input	internal jumpered or external available (switchable)
Output frequency	36.000 MHz
Input frequency	36.000, 36.125, 36.150, 38.900, 44.000, 45.750 MHz
Output/ input level	- 14 dBm (95 dBμV)
Connector	2 x BNC socket, 75 Ω
IF decoupling	≥ 80 dB

#### RF Output

Output frequency range	45 ... 862 MHz
Tuning step	10 kHz / 25 kHz**
Max. output level	14 dBm (123 dBμV)
Level adjustment range	-10 ... +14 dBm
Channel allocation	adjacent channel ability
Connector	F socket, 75 Ω
Return loss	≥ 18 dB 45 MHz
Test output	- 1.5 dB / Octave
Signal quality	- 30 dB (± 1 dB)
MER	≥ 43 dB (14 dBm)
	≥ 45 dB (11 dBm)
Shoulder attenuation	≥ 50 dB (14 dBm)
	≥ 58 dB (11 dBm)
Spurious 45...862 MHz	≥ 60 dB (14 dBm)
	≥ 63 dB (11 dBm)
C/N (> 25 MHz space from channel center)	
BW = 6 MHz	typ. 79 dB
BW = 8 MHz	typ. 78 dB
Phase noise	1 kHz; typ. -92 dBc/Hz
	10 kHz; typ. -101 dBc/Hz
	100 kHz; typ. -108 dBc/Hz
Max. frequency stability	± 30 kHz
Output level stability	± 0.5 dB (5 .. 45 °C)
Output level accuracy	± 1.5 dB
Amplitude frequency response channel (8 MHz)	max. 1 dB <sub>pp</sub>

#### Operation parameters

Voltage / current	100 ... 240 V ~ 50/60Hz
	100 ... 353 V =
Power consumption	18 W

#### Environmental conditions

Temperature range	-10 ... +55 °C
Temperature range (for data keeping)	5 ... 45 °C
Relative humidity	≤ 80 % (non condensing)
Mounting location	splash-proof and drip-proof

#### Delivery content

Dimensions (w x h x d)	448 x 44 x 350 mm
Weight	4,200 g

\* only in device variant 9859.82 available

\*\* 25-kHz-step only with active IF loop and 36.125 MHz input frequency

## 11. Glossary

ASI	Asynchronous Serial Interface
BW	Bandwidth
CA	Conditional Access
CAT	Conditional Access Table
DVB	Digital Video Broadcasting (-C Cable, -S Satellite, -S2 Satellite 2, -T Terrestrial)
EIT	Event Information Table
ETSI	European Telecommunications Standards Institute
FAT	File Allocation Table
FEC	Forward Error Correction
FIFO	First In – First Out
FPGA	Field Programmable Gate Array
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
I/Q	In-phase/Quadrature-phase
ID	Identifier
IF	Intermediate Frequency
IFI	Intermediate Frequency Interface
IIC	Inter-Integrated Circuit (I <sup>2</sup> C bus, data bus within device)
IP	Internet Protocol
LED	Light Emitting Diode
MAC	Media Access Control
MER	Modulation Error Ratio
MIB	Management Information Base
MPEG	Moving Picture Experts Group
NIM	Network Interface Module
Nios	Product name of a processor
NIT	Network Information Table
PAT	Program Association Table
PCR	Program Clock Reference
PID	Program Identifier
PMT	Program Map Table
PSI	Program Specific Information
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
SDT	Service Description Table
SI	Service Information
SNMP	Simple Network Management Protocol
TS	Transport Stream

## 12. Bibliography

- [1] EN 50083-9: Cabled distribution systems for television, sound and interactive multimedia signals, part 9: Interfaces for CATV/SMATV head ends and similar professional equipment for DVB/MPEG-2 transport streams
- [2] EN 300 429: Digital Video Broadcasting (DVB): Framing structure, channel coding and modulation for cable systems
- [3] EN 60728-11: Cable networks for television signals, sound signals and interactive services Part 11: Safety (IEC 60728-11:2005); German version EN 60728-11:2005
- [4] ITU-T J.83 Digital multi-programme systems for television, sound and data services for cable distribution, Amendment to Annex B and C (2006)
- [5] RFC 1157 Request for Comments (RFC): RFC Database URL: [Http://www.rfc-editor.org/rfc.html](http://www.rfc-editor.org/rfc.html)

## 13. Document history

Version	Date	Modification	Author
1.00	16.01.2009	basic dokument	Rudolph
1.01	07.04.2009	revision	Rudolph, Häußer
1.02	06.10.2009	revision (chapter 6.3)	Häußer

Options and other TV standards available upon request! Subjects to changes due to technical progress.

# Declaration of Conformity

## The Manufacturer

BLANKOM Antennentechnik GmbH · Hermann-Petersilge-Str. 1 · 07422 Bad Blankenburg · Germany

herewith declares the conformity of the product group

**Product name:** QAM Modulator

**Type:** AMA 299

**Product number:** 9859.8x

according to the following regulations

EN 50083-2

EN 60728-11 (as far as relevant)

and additional device-specific regulations, enclosed above, which these products are subjected to.

**Date:** 25.02.2009

**Signature:**



Piero Kirchner  
(Managing Director)