

SA-4W-REPEATER

SA-PAM-RG2N-IP-x xDSL TRANSMISSION SYSTEMS

USER MANUAL

Version	1.0
Revision	11 February 2005
Document name	UM_SA-4W-Repeater_v1-0.doc

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VERSION CONTROL

User Manual Version	Date	Version of Firmware	Major changes to previous version
1.0	2.02.2005	1.0.0.0	Start Version

Warnings

IN INCORRECT USE OF THIS DEVICE, USE IN ANY OTHER ENVIRONMENT AND/OR CHASSIS/HOUSING THAN PROVIDED BY S-ACCESS MIGHT LEAD TO HARMFUL CONDITIONS. FAILURE TO FOLLOW THESE PRECAUTIONS MAY RESULT IN DEATH, SEVERE INJURY OR PROPERTY DAMAGE.

S-ACCESS GMBH REFUSES TO TAKE ANY RESPONSIBILITY; FURTHERMORE, NO WARRANTY IS GRANTED IN SUCH CASE!

Please read this manual carefully before operating the system.
Installation of this equipment has to be done by qualified personnel only.

1 SELECTION GUIDE

Model	Type	2 wire	4 wire	Add Drop	Cross Connect	ATM	Power Passthrough	Remotely powerable	Power source
SA-PAM-RG2N-IP-E,V2	IP4								
SA-PAM-RG2N-IP-P,V2	IP4								

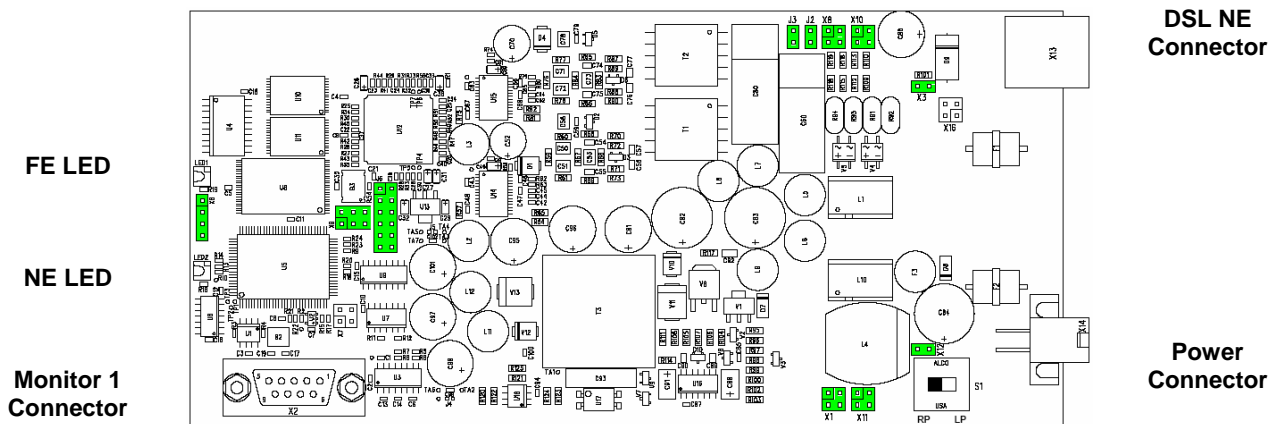
2 UNIT DESCRIPTION

The unit was designed to be used as dual or four wire repeater. It's delivered in a IP67 housing.

2.1 Assembled Device

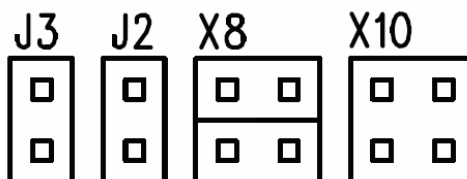


2.2 Connector Mainboard

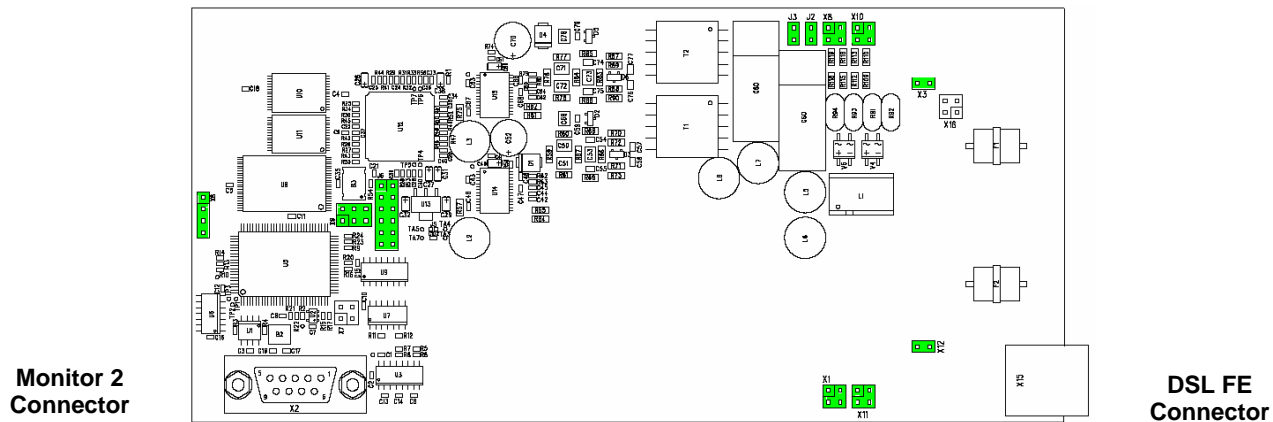


2.2.1 Jumper X8 Detail

If the jumper X8 is used, it has to be setup the following way:



2.3 Connector Upperboard



Monitor 2 Connector

DSL FE Connector

2.4 Jumper Description

Nbr	Function
X6:	Serial Interface
X9:	Power
J6:	DSP Signals
J2:	Wetting Current Channel A (to N-Side)
J3:	Wetting Current Channel B (to C-Side)
X8:	Passthrough 2-Wire Remote Power
X10:	Only Holder for Jumper, No Signals
X1:	Passthrough 4-Wire Remote Power
X11:	Only Holder for Interconnect, No Signals
X12:	Interconnection Remote Power to Local Power
X3:	Interconnection Remote Power to Local Power

2.4.1 Jumper settings for 2-Wire Repeater (Only PCB 1)

Nbr	Required Settings	
X6:	Open	
X9:	Open	
J6:	Close 6 jumpers, interconnect DSP signals	
J2:	Close for Wetting Current Channel A On	Open for Wetting Current Channel A Off
J3:	Close for Wetting Current Channel B On	Open for Wetting Current Channel B On
X8:	Close for Pass-through 2-Wire Remote Power	Open for not Pass-through 2-Wire Remote Power
X10:	Only Holder for Jumper, No Signals	
X1:	Open	
X11:	Open	
X12:	Open	
X3:	Open	

2.4.2 Jumper settings for 4-Wire Repeater

Nbr	Required Settings	
X6:	Interconnect PCB1 to PCB 2	
X9:	Interconnect PCB1 to PCB 2	
J6:	Interconnect PCB1 to PCB 2	
J2:	Close for Wetting Current Channel A On (PCB1/2)	Open for Wetting Current Channel A Off (PCB1/2)
J3:	Close for Wetting Current Channel B On (PCB1/2)	Open for Wetting Current Channel B On (PCB1/2)
X8:	Open	
X10:	Open	
X1:	Interconnect Passthrough 4-Wire Remote Power	No Passthrough 4-Wire Remote Power
X11:	Only Holder for Interconnect, No Signals	
X12:	Interconnect PCB1 to PCB 2	
X3:	Interconnect PCB1 to PCB 2	

3 CONFIGURATION / ACCESS

This chapter describes the different configuration access possibilities. The settings for the Repeater are configurable via the V.24 monitor interface or via the EOC Service Channel with the CONNECT xx command.

The following chapters refer to the xDSL configuration and does not impact the E1 and Nx64 behavior.

3.1 Repeater xDSL interfaces

The xDSL Repeater has two xDSL interfaces: Network (N-side) xDSL interface (operates in slave mode) and Customer (C-side) xDSL interface (operates in master mode). N-side interface operates toward CO side while C-side transceiver works toward CP side. Are there one or more repeaters in the xDSL link, there C-side and N-side interfaces must be connected by appreciated method. Otherwise start-up might occur only for several segments of the link.

3.1.1 N-side / C-side xDSL interface operating modes

N-side xDSL interface operates in rate adaptation mode or in fixerate mode. The C-side takes over the mode from the N-side

4 LED INDICATORS

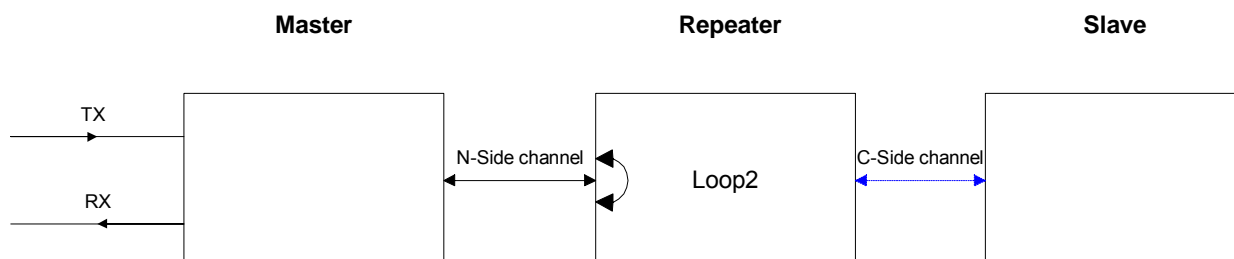
Repeaters have two LED for power representation, link status- and test loop indication. The following table shows the possible LED states.

Status	Local (NE) LED	Remote (FE) LED
Power failure	off	off
DSL training N-side xDSL	red blinking	don't care
DSL training C-side xDSL	don't care	red blinking
LOOP2 initialized	green blinking	don't care
Normal operation of N-side xDSL	green	don't care
Normal operation of C-side xDSL	don't care	green

5 TEST LOOPS

5.1 Standard Test Loop

The test loop can be activated via the EOC service Channel interface.



On the 4 wire repeater its only possible to activate the LOOP2 from the master over the EOC channel. You will find the LOOP2 command in the maintenance menu of the LTU.

6 PERFORMANCE MONITORING

The monitoring of the xDSL signal is typically used during the installation and maintenance. Its possible to monitor the xDSL link in two different ways.

The G.826 error parameters are designed to observe xDSL links over longer time periods.

The NM is used to determine the residual S/N value before the DSL link becomes critical.

Please refer to the "NM" and "G826" monitor commands described in the "S-Access Monitor" section.

7 POWER

7.1 Power inputs

The unit can be feeded over the following inputs:

- Molex connector
- DSL line (remotely feeded from the LTU)

7.2 Wetting current

The unit is able to handle the wetting current feature. Please use the jumper description table for the desired settings.

8 MONITOR

8.1 General

The module can be connected to a terminal or a PC (with terminal emulation) in order to monitor relevant events and to display additional information such as the signal quality of the xDSL link or the G.826 error performance parameters. In addition, full system configuration and fault localization can be done over the monitor interface

The terminal for monitoring should be VT100 compatible and configured as follows:

- 9600 baud, asynchronous
- 8 bits, no parity, one stop bit
- no new line on carriage return (i.e. no line feed on carriage return)
- flow control none

8.2 Structure & Organization

The structure and organization of the S-Access monitor is adapted to ITU-T Recommendation M.3400 for TMNs with its five sub-sets.

Sub-set	Short-form
Performance management	PM
Fault and maintenance management	FMM
Configuration management	CM
Accounting management	AM
Security management	SM

A S-Access does neither support Accounting management nor Security management. AM and SM are not in the monitor's main menu.

At any time, the <H> ("Help") command shows and explains the available commands and their parameters.

For details or a more precise explanation of a command type: H *'command'*

The prompt on the screen consists of:

- a repeater indication (RR_)
- the repeater address indication
- the short form of the specified sub-set menu.

"RR_04_FMM>".

Note: Repeater address is calculated as repeater position (starting from CO side) in the xDSL chain plus 2. Thus the repeater nearest to CO side has address 03, second one – 04, etc.

8.3 Repeater command tree

The repeater command set tree is shown below:

Main Menu		
Performance	Fault and Maintenance	Configuration
G826	NM	CONFIG
G826 C	STATUS	MODE
RESETG826	ALARM	ANNEX
	ALARM T	BASERATE
	RESET	ADAPTIVE
		DEFAULT
		ID

Figure 8-1: Repeater Monitor Command Set Tree

8.3.1 Main Menu

SDSL Dual Pair Repeater

HW Rev. D1
SW Rev. 1.0.0.0
FW Rev. 1.10.3

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```
----- Main Menu -----
1. Performance management (PM)
2. Fault and maintenance management (FMM)
3. Configuration management (CM)
```

```
5. Exit
-----
```

```
RR_00_MM>Select [1..5]:
```

To select the sub-menus type 1 to 5.

Note: Each command must be terminated by a carriage return.

8.3.2 Common Commands

Common commands are available in every sub menu.

8.3.2.1 HELP Command

By typing the letter "H" followed by [ENTER], all available commands of the actual sub menu are displayed.

8.3.2.2 MAIN Command

By typing the letter "M" followed by [ENTER], you return to the Main Menu Screen.

8.3.2.3 DISCONNECT Command

This command will be only displayed if the unit is accessed from the LTU with the remote terminal functionality.

With the disconnect command you will leave the remote terminal mode and return to the LTU terminal mode.

8.3.3 Performance management PM

Performance management activated

Enter <M> to return to MAIN, or <H> for HELP information

Type <H> and the monitor lists all available commands in the performance sub-menu.

8.3.3.1 G826 Command

The G826 command displays the ITU-T G.826 error performance on xDSL line side:

```

-----
Master Side
G.826 Error Performance :   CRC6-A   FEBE-A   CRC6-B   FEBE-B
-----
Errored blocks          : 00000000 00000000 00000000 00000000
Errored seconds         : 00000000 00000000 00000000 00000000
Severely errored seconds : 00000000 00000000 00000000 00000000
Background block errors : 00000000 00000000 00000000 00000000
Available time          : 00000000 00000000 00000000 00000000
Unavailable time        : 00000382 00000382 00000382 00000382
-----
Slave Side
G.826 Error Performance :   CRC6-A   FEBE-A   CRC6-B   FEBE-B
-----
Errored blocks          : 00000000 00000000 00000000 00000000
Errored seconds         : 00000000 00000000 00000000 00000000
Severely errored seconds : 00000000 00000000 00000000 00000000
Background block errors : 00000000 00000000 00000000 00000000
Available time          : 00000000 00000000 00000000 00000000
Unavailable time        : 00058651 00058651 00058651 00058651
-----
RR_00_PM>

```

Option:

C Updates the G.826 parameters continuously

Definitions:

1. CRC6_x: Cyclic redundancy check indicating errored blocks received on the local xDSL side.
2. FEBE_x: Far end block error indicating errored blocks received on the remote xDSL side.
3. Errored blocks (EB): A block in which one or more bits are in error.
4. Errored seconds (ES): A one second period with one or more errored blocks. SES defined below is a subset of ES.
5. Severely errored second (SES): A one second period which contains $\geq 30\%$ errored blocks.
6. Background block error (BBE): An errored block not occurring as part of an SES.

8.3.3.2 RESETG826 Command

The RESETG826 command sets the G.826 error performance parameters back to zero.

```
RR_00_PM>RESETG826
G.826 error performance parameter reset
RR_00_PM>
```

8.3.4 Fault and maintenance management FMM

Fault and maintenance management activated
Enter <M> to return to MAIN, or <H> for HELP information

Type <H> and the monitor lists all available commands in the fault and maintenance sub-menu.

8.3.4.1 NM Command

The NM command allows the user to switch on/off the signal quality of the DSL lines:

```
RR_00_FMM>NM
Noise margin trace on
xDSL NM: Mst-Side ChA: 10.9dB, ChB: 11.2dB   Slv-Side ChA: 15.8dB, ChB: 15.4dB

Noise margin trace off
RR_00_FMM>
```

8.3.4.2 STATUS Command

The STATUS command displays the actual system status:

```
-----
Local System Status:   N-Side CH A   CH B       C-Side CH A   CH B
-----
LOSD      :              1       1           1       1
SEGA      :              1       1           1       1
PS        :              1       1           1       1
SEGD      :              1       1           1       1
Tx power  :             07.5   07.5 dBm       07.5   07.5 dBm
Rx gain   :             13.4   13.7 dB         14.0   13.4 dB
Loop attn.:             00.0   00.0 dB         00.0   00.0 dB
NM        :             26.2   27.0 dB         25.8   26.2 dB
Bitrate   :             1024   1024 kBit/s     1024   1024 kBit/s
-----
```

RR_03_FMM>

Definitions:

LOSD: (Loss of Signal) Indicates the loss of signal from the application interface. Loss of Signal = 0, Normal = 1.

SEGA: (Segment Anomaly) Indicates a CRC error on the incoming xDSL frame. A segment anomaly indicates that a regenerator operating on a segment has received corrupted data and therefore the regenerated data is unreliable. CRC Error = 0, Normal = 1.

PS: (Power Status)

SEGD: (Segment Defect)

Tx power: Local transmit power in dBm

Rx gain: Local receiver gain in dB

Loop attn.: Estimate of the loop attenuation in dB of the actual connection

NM: Noise margin

Bitrate: Bitrate of the actual connection

8.3.4.3 ALARM Command

The ALARM command displays the actual alarm status:

CO_01_FMM> ALARM

RR_03_FMM>

```
-----
Local Alarm Status:   Mst-Side CH A   CH B   Slv-Side CH A   CH B
-----
LOS/LFA-H:           off   off           off   off
SEGD      :           off   off           off   off
BER-H     :           off   off           off   off
LOOP2     :           off
-----
```

RR_03_FMM>CO_01_FMM>

Options:

T Turns alarm trace on / off

Definitions:

LOS/LFA-H:	Loss of signal or frame alignment at xDSL loop
SEGD:	Segment Defect indication
BER-H:	xDSL block-error-rate according G.826 $\geq 30\%$
LOOP2:	xDSL test loop 2 active

8.3.4.4 RESET Command

By typing RESET, the system unit will be restarted.

```
CO_01_FMM> RESET
system reset
```

8.3.5 Configuration management CM

```
Configuration management activated
Enter <M> to return to MAIN, or <H> for HELP information
```

Type **<H>** and the monitor lists all available commands in the configuration sub-menu.

8.3.5.1 General note

If the repeater works in 4 wire mode the commands ANNEX, BASERATE, RATEADAPTION in some modes the user has to enter 2 parameters.

Example: Annex A,B

8.3.5.2 CONFIG Command

The CONFIG command displays the configuration of the unit.

8.3.5.3 MODE Command

This command sets the operation mode.

Parameters: S → Normal mode
D → Dual pair mode

8.3.5.4 ANNEX Command

This command sets the Annex to the desired mode.

Parameters: A → Annex A
B → Annex B
AUTO → Auto selection

8.3.5.5 ID Command

This command sets a unique identification string printed on the main screen.

8.3.5.6 BASERATE Command

This command sets the base rate for xDSL interface. This value must be between 3 and 32 and defines the available 64 kbit/s channels. To optimize the bandwidth of your connection, you have to set the base rate value to the maximum where you get a stable connection.

Parameters: 3 → 32

8.3.5.7 ADAPTIVE Command

Set rate adaption on / off.

Parameters: on
off

8.3.5.8 DEFAULT Command

The DEFAULT command sets a default configuration. Six default settings are available (three for master, three for slave) in each of following modes: E1 only Normal or Dual Pair mode; Nx64 only Normal or Dual Pair mode; fE1 & Nx64 Normal or Dual Pair mode and Multipoint Mode.

9 SOFTWARE UPDATE

9.1 General

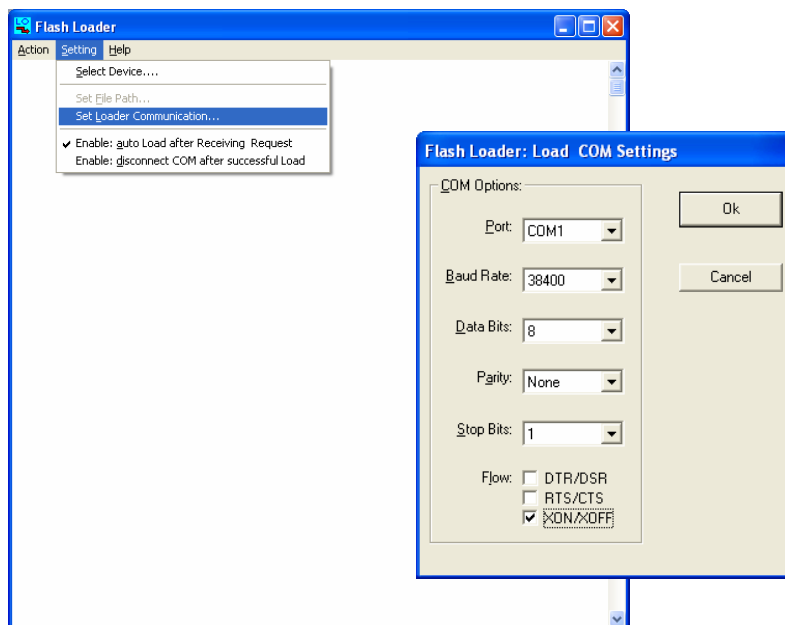
The software of the S-Access boards has the possibility for field updates. To do a field update, you need only a Windows 95/98/NT computer, the *Flash Loader* program installed, a connection between the Windows computer and the repeater Monitor connector and the newest release of the S-Access software.

Note: The software has to be downloaded to the Main- and Upper board.

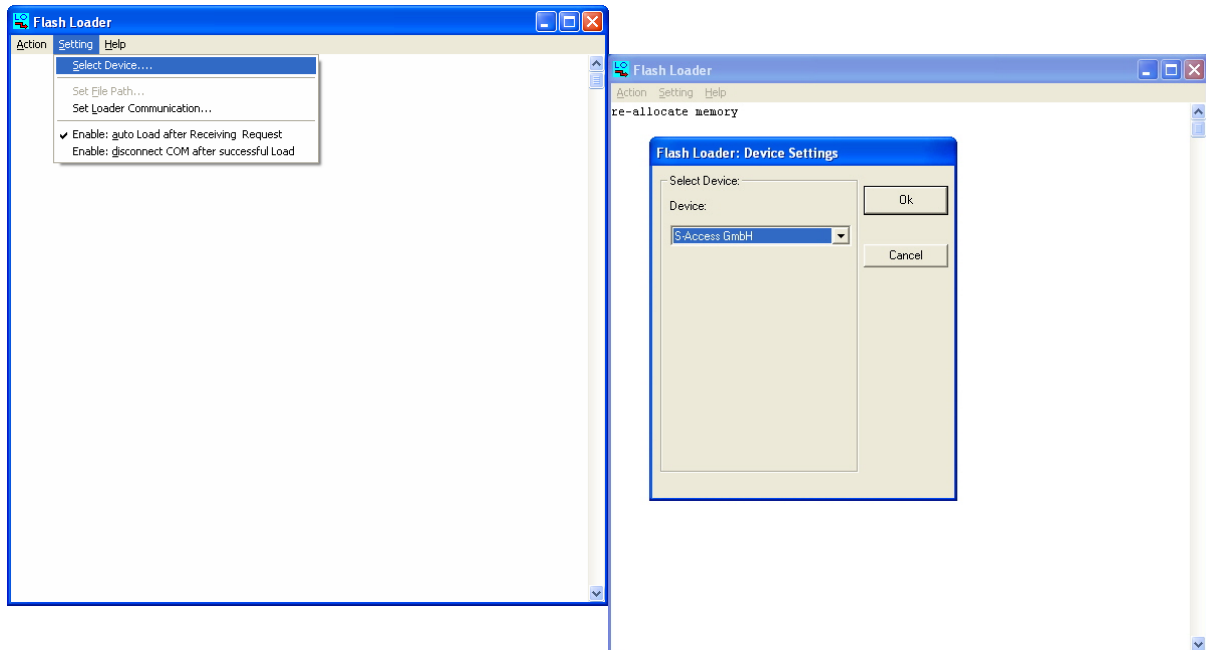
9.2 Software download

To update the software on your repeater you have to run through the following steps:

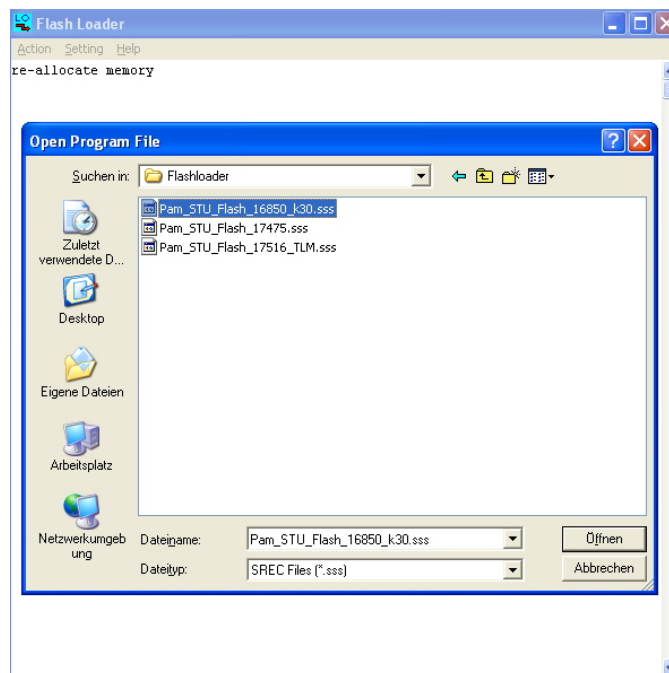
1. Switch off the power of your repeater.
2. Connect the repeater monitor connector with your Windows computer's RS232 interface.
3. Start the *Flash Loader* software on your Windows computer
4. Choose *Set Loader Communication* in the menu *Setting*. Select the right communication port, the communication information and press *Ok*.



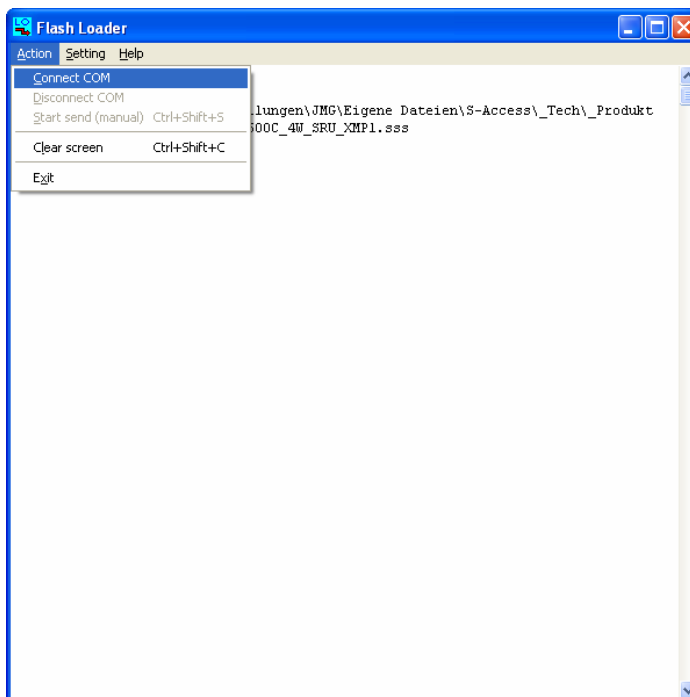
5. Choose *Select Device* in the *Setting* menu, select the device *S-Access* and press *Ok*.



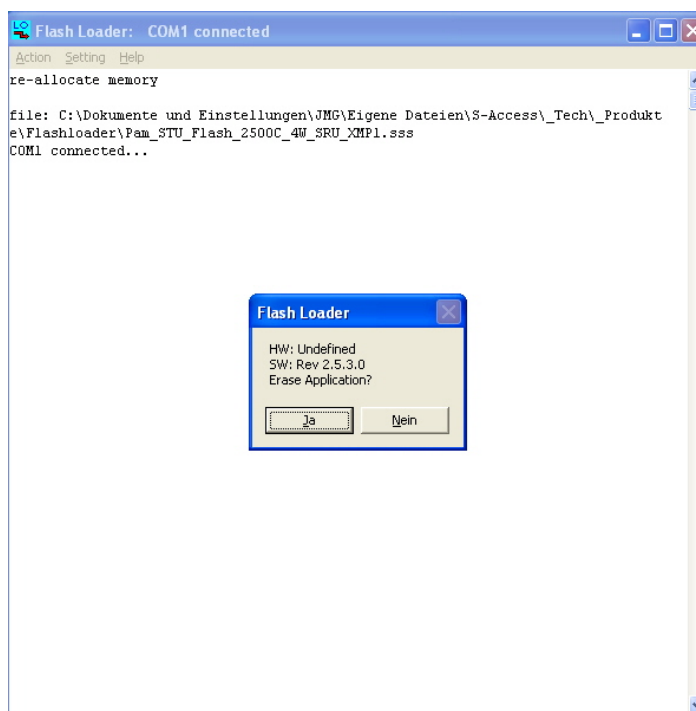
6. Choose the newest software version and press *Öffnen*.



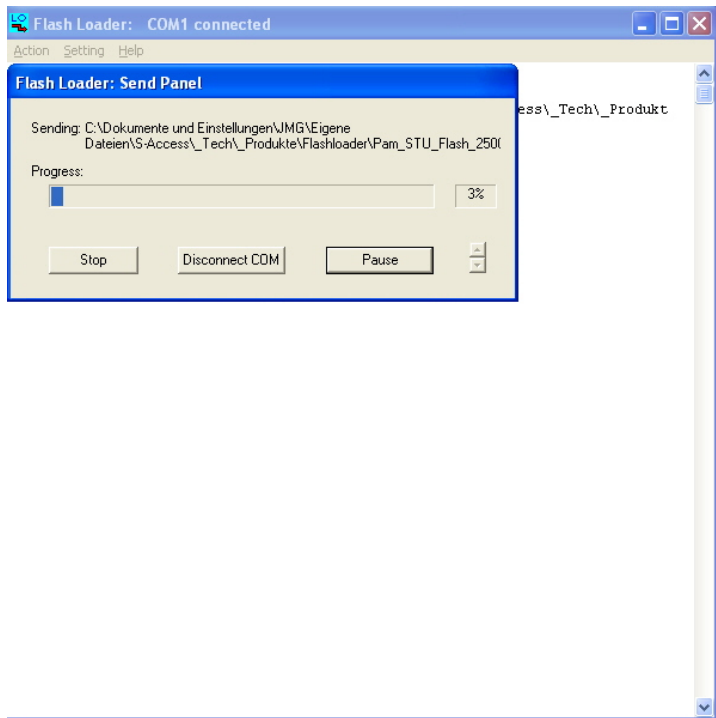
- Execute the command *Connect COM* in the menu *Action*.



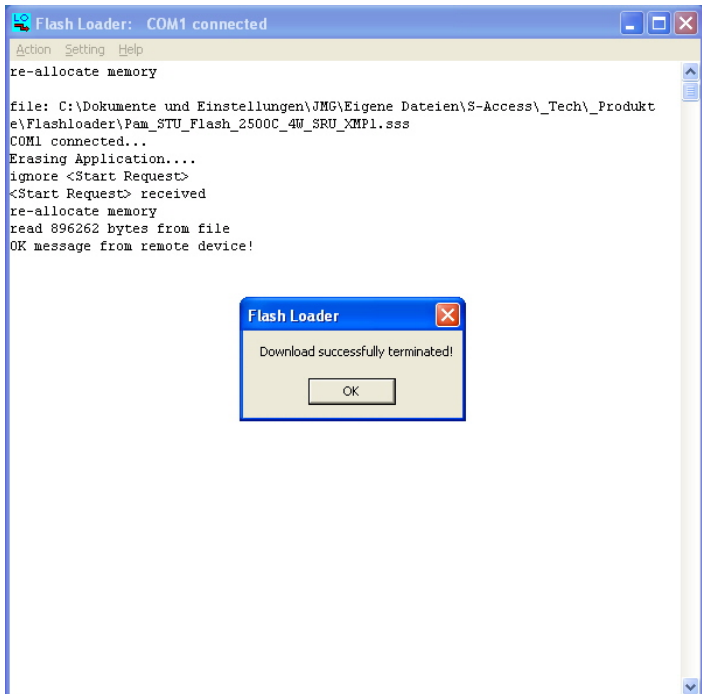
- Switch on the power of your repeater.
- The following message appears on the screen, then press *Ja*.



10. On the Windows screen you see the ongoing download.

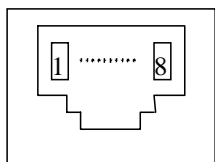


11. If the download is successfully finished the *Flash Loader* program sends the following message:



10 CONNECTOR DESCRIPTION

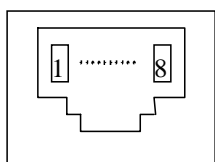
10.1 4 wire xDSL Connector Mainboard (Slave/CPE)



Front View
RJ45-8

Pin	Signal	Description
1	NC	Not used
2	NC	Not used
3	RXB.a	Loop B, Tip (Slave-N-side)
4	RXA.a	Loop A, Tip (Slave-N-side)
5	RXA.b	Loop A, Ring (Slave-N-side)
6	RXB.b	Loop B, Ring (Slave-N-side)
7	NC	Not used
8	NC	Not used

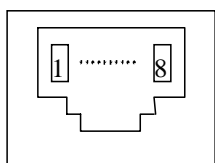
10.2 4 wire xDSL Connector Upperboard (Master/COE)



Front View
RJ45-8

Pin	Signal	Description
1	NC	Not used
2	NC	Not used
3	TXB.a	Loop B, Tip (Master-C-side)
4	TXA.a	Loop A, Tip (Master-C-side)
5	TXA.b	Loop A, Ring (Master-C-side)
6	TXB.b	Loop B, Ring (Master-C-side)
7	NC	Not used
8	NC	Not used

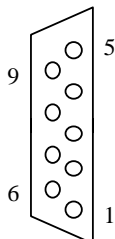
10.3 2 wire xDSL Connector only Mainboard is required



Front View
RJ45-8

Pin	Signal	Description
1	NC	Not used
2	NC	Not used
3	TXB.a	Loop B, Tip (Master-C-side)
4	RXA.a	Loop A, Tip (Slave-N-side)
5	RXA.b	Loop A, Ring (Slave-N-side)
6	TXB.b	Loop B, Ring (Master-C-side)
7	NC	Not used
8	NC	Not used

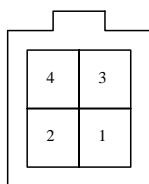
10.4 Monitor Interface



Pin	Signal	Description
1	FPE	Functional Protective Earth
2	TXD	EIA-232 Transmit Data
3	RXD	EIA-232 Receive Data
4	NC	Not used
5	SGND	EIA-232 Signal Ground
6	NC	Not used
7	NC	Not used
8	NC	Not used
9	NC	Not used

* on NTU only

10.5 Power Interface



Pin	Signal	Description
1	-MainsPWR	-48/60Vdc
2	FPE	Functional Protective Earth
3	NC	-
4	+PWR	Positive power supply terminal (0V)

Molex Mini-Fit, 4-pin

11 TECHNICAL SPECIFICATION

11.1 Interfaces

11.1.1 xDSL Line Interface

Specification	ITU-T G.SHDSL, Rec G.991.2
Option	4-wire Interface (separate Tx and Rx Pairs)
Line Code	TC-PAM
Impedance	135 Ω
Transmit Power	13.5 dBm @ 135 Ω
Number of Pairs	1 or 2 (option: 2 or 4)
Bit Rate	192 to 2064 kbps
Connector Type	RJ-45, 8 pin
Overvoltage Protection	ITU-T Rec. K.20/K.21
Specification	ITU-T G.SHDSL, Rec G.991.2
Wetting Current	2-4 mA @ 60 V

11.1.2 Monitor Interface

Specification	EIA-232 / V.28
Data Rate	9600 baud, asynchronous
Protocol	8 bit, no parity, 1 stop bit no linefeed with carriage return XON/XOFF enabled
Signal Level	V.28 on DB9 female connector
Connector Type	DB9 female connector

11.2 Power Supply

Specification	ETSI ETS 300 132-2
Plug-in	2 x 40V/60V _{DC} over backpanel (redundant)
Tabletop	1 x 48Vdc (36-72V _{DC}) over Molex type safety approved connector or 38..200Vdc over xDSL

11.3 Environmental

11.3.1 Climatic Conditions

Storage:	ETS 300 019-1-1 Class 1.2	(-25°C ... +55°C)
Transportation:	ETS 300 019-1-2 Class 2.3	(-40°C ... +70°C)
Operation:	ETS 300 019-1-3 Class 3.2	(-5°C ... +45°C)

11.3.2 Safety / EMC

According to EN60950 / EN55022, Class B

11.4 Physical Dimensions and Weight

IP:	Dimensions:	300(W)x166(D)x65(H) mm
	Weight:	2.5 kg

12 APPENDICES

12.1 Standards

ETSI ETR 152, "Transmission and Multiplexing (TM); High Bit Rate Digital Subscriber Line (xDSL) Transmission System on Metallic Local Lines; xDSL Core Specification and Applications for 2048 kbit/s Based Access Digital Sections"

ITU-T G.821, "Error Performance of an International Digital Connection Forming Part of an Integrated Services Digital Network"

ITU-T G.826, "Error Performance Parameters and Objectives for International, Constant Bit Rate Digital Paths at or above the Primary Rate"

ITU-T G.823, "The Control of Jitter and Wander within Digital Networks Which Are Based on the 2048 kbit/s Hierarchy"

ITU-T G.703, "Physical/Electrical Characteristics of Hierarchical Digital Interfaces"

ITU-T G.704, "Synchronous Frame Structures Used at Primary and Secondary Hierarchical Levels"

ITU-T M.3400, "TMN Management Functions"

ITU-T K.20, "Resistibility of Telecommunication Switching Equipment to Over voltages and Overcurrents"

ITU-T K.21, "Resistibility of Subscribers' Terminals to Over voltages and Over currents"

EN 60950, "Safety of Information Technology Equipment Including Electrical Business Equipment"

EN 55022, "Grenzwerte und Messverfahren für Funkstörungen von informationstechnischen Einrichtungen"

ETS 300 019, "Equipment Engineering; Environmental Conditions and Environmental Tests for Telecommunications Equipment"