Multi-Standard Dual-Channel Digital Audio Codec

MPEG Layer III

USER'S MANUAL
ED. 12/05

Firmware Versions: Mcu 3.00 / Dsp 2.01 / Tav 5.00 or higher.
Software Versions: FU 2.00 / RTC 1.61.002 / Server 1.61.003 or higher.

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1. EQUIPMENT DESCRIPTION

1.1. Basic design concepts

The **EAGLE** is a multi-format dual audio codec for ISDN lines. Offering, in a single unit, the entire set of utilities needed to establish either two independent two-way mono audio circuits, or one stereo, or one 20 kHz mono circuit between two remote points, with top sound quality and ease of use. Along with each audio channel, a transparent two-way end-to-end data channel can be enabled.
It is equipped with a full-duplex Intercom, which allows communication with both audio channels, individually and simply, with no external operations or cables.
Its monitoring functions, also available on the front panel, make it possible to listen to all signals generated and received with the equipment, without affecting the studio's audio.
The equipment's connection capabilities are also noteworthy, with the ability to connect to a U ISDN interface (ANSI), S ISDN interface (ETSI) or through a V35 port.

Through the *Automatic Startup System*, the equipment's startup mode can be programmed, so the technician can define all communication parameters, including phone numbers. The technician just has to select the switch corresponding to the desired configuration, and it will automatically start up when the power is turned on, generating calls to the pre-set numbers.

1.2. Functional specifications:

- Multi-standard dual two-way digital audio codec for ISDN lines, with Intercommunication. It can make *two* independent ISDN calls at 64 kbps or *one* at 128 kbps, using U or S interfaces and EUROISDN or NATIONAL-1 protocols; or with the V.35 interface, it can make *one* digital connection at 64 kbps, *one* at 128 kbps, or *one* at 256 kbps.
- Connection to an RS-422 multi-station network, for simultaneous control and updating of up to 128 units.
- Independent dialing for each of the B channels.
- In the 64 kbps modes, it is possible to have separate encoding algorithms for the B channels.
- Two LCD indicator panels (2 lines x 24 characters). Indicate status, numbers dialed, phonebook, menu, and setup options.
- Off-hook, automatic and manual mode selection.
- Call status indicated on LCD screen (in progress, connected, in use, busy, call rejected, etc.)
- Intercom circuit, with microphone input and headphone output on front panel.
- Alphanumeric phone book with 256 entries. Configuration of audio encoding and editing modes can be done simply and intuitively, using the equipment's keypad.
- Configurable audio inputs and outputs: analog at the line level and/or digital in AES/EBU format. Send, return or their sum can be selected at the outputs.
- Generation of DTMF tones, for control of remote equipment.
- Flash EPROM-type internal memory, to update your equipment with future firmware versions with no need to open up the unit.
- Up to 30 different startup configurations can be defined, selectable through microswitches; these will automatically be activated when the equipment is turned on.

1.3. Encoding Algorithms.

Main function of the AUDIOCODEC is to establish one or two bidirectional audio channels between distant points for receiving a telephone chronicle, for transmitting with a high quality a sports commentary voice or for establishing an audio link between two studios. In the remote site, a telephone or another AUDIOCODEC will receive the encodec audio and will decode it into audio signal.
The requirementes of the communication channel in each of these applications are different and depends on the type of audio signal to be transmitted (voice or music, mono or stereo), required audio bandwith, delay time, etc.

All available encoding algorithms features are compared in the following figure:

Encoding Algorithms	Transmission rate	Audio format	Audio bandwith	approximate delay time*	Available in channels	Ancillary datachanel
VOICE ALGORITHMS – For transmitting voice with telephone quality.						
G.711 LAW-A (EUROPE)	64Kbps	Mono	3.5kHz	37 mseg	L1 & L2	NO
G.711 LAW-μ (USA & JAPAN)	64Kbps	Mono	3.5kHz	37 mseg	L1 & L2	NO
SPECIAL ALGORITHM AUDIO+DATA						
AEQ-3.5 32kb	64 (32+32)	Mono	3.5kHz	25 mseg	L1 & L2	YES
STANDARD ALGORITHMS – For transmitting voice with medium quality.						
G.722 STAT	64Kbps	Mono	7kHz	21 mseg	L1 & L2	NO
G.722 H.221	64Kbps	Mono	7kHz	20 mseg	L1 & L2	YES
MPEG 64 ALGORITHMS – For transmitting voice in high quality and music in medium quality.						
MPEG L2 64 24 kHz	64Kbps	Mono	11kHz	450 mseg	L1 & L2	YES
MPEG L2 64 32 kHz	64Kbps	Mono	10.5kHz	340 mseg	L1 & L2	YES
MPEG L2 64 48 kHz	64Kbps	Mono	10kHz	240 mseg	L1 & L2	YES
MPEG L3 64 48 kHz	64Kbps	Mono	15kHz	235 mseg	Only L1	NO
SPLIT 64 ALGORITHMS – To transmit and receive using different algorithms.						
MP3 SPLIT 64 cMP3 dG722	64Kbps	Mono	Tx 15kHz Rx 7kHz	Tx 235mseg Rx 21mseg	Only L1	NO
MP3 SPLIT 64 cG722 dMP3	64Kbps	Mono	Tx 7kHz Rx 15kHz	Tx 21mseg Rx 235mseg	Only L1	NO
128 MONO ALGORITHMS– For transmitting voice and music (mono) in very high quality.						
AEQ LD-2	128Kbps	Mono	15kHz	22 mseg	L1 + L2	NO
MPEG L2 128 MONO 48 kHz (J.52)	128Kbps	Mono	20kHz	320 mseg	L1 + L2	YES
MPEG L2 128 MONO 48 kHz (IMUX)	128Kbps	Mono	20kHz	240 mseg	L1 + L2	YES
MPEG L3 128 MONO 48kHz	128Kbps	Mono	15kHz	550 mseg	L1 + L2	NO
128 DUAL ALGORITHMS – For transmitting two voice channels in very high quality.						
MPEG L2 128 DUAL 32 kHz (J.52)	128Kbps	Dual	10.5kHz	470 mseg	L1 + L2	YES
MPEG L2 128 DUAL 32 kHz (IMUX)	128Kbps	Dual	10.5kHz	345 mseg	L1 + L2	YES
128 MPEG STEREO ALGORITHMS– For transmitting music in medium and high quality.						
MPEG L2 128 JOINT 48kHz (J.52)	128Kbps	Stereo	15kHz	300 mseg	L1 + L2	YES
MPEG L2 128 JOINT 48kHz (IMUX)	128Kbps	Stereo	15kHz	240 mseg	L1 + L2	YES
MPEG L3 128 STEREO 48kHz	128Kbps	Stereo	15kHz	550 mseg	L1 + L2	NO
256 MPEG STEREO ALGORITHMS – For transmitting music in very high quality (Only through V35).						
MPEG L2 256 STEREO 48kHz	256Kbps Only V.35	Stereo	20kHz	110 mseg**	-	YES

* Delay Time measures the time that goes between audio is feed into one AUDIOCODEC input until it reaches remote AUDIOCODEC output. It implies encoding time plus transmission time plus decoding time. This measures had been obtained using an ISDN switchboard that has very low transmission delay. So real time in a long distance communication will be higher than this. Ancilliary Data channel usage does not affect delay time.

In the following page, the different encoding algorithms are explained.

In the following Coding Algorithms, the Eagle both, transmits and receives on the same Encoding Algorithms:

- G.711: By using this algorithm it is possible to generate and receive voice calls, and to establish communication through ISDN with telephone numbers or lines pertaining to the basic and analogue telephone network (PSTN).

- G.722: This mode is widely accepted for bi-directional communication, thanks to the low delay induced, it is frequently used for voice-overs and commentator applications such as sport coverage.

- The G.722 H221/H242 mode provides a bi-directional ancillary data channel simultaneously with the Audio transmission.
- The statistical G.722 mode is performing a real-time Audio processing of the transmitted Audio signal that allows a continuous bandwidth adjustment, which improves the quality of some Audio signals, for example the voice of a sport commentator. In this case no ancillary data channel is needed.

- MPEG Layer II: Very well known and accepted encoding mode, used when delay is not a factor, as MPEG modes always have higher delay than G.722 modes. The EAGLE includes MPEG LII for mono, dual or stereo transmission.

The equipment implements two different framing modes for the transmission of 128 KBPS programs in MPEG Layer II, combining the two 64 KBPS B-channels of the ISDN line:

- **J.52 Multiplexing:** J.52 is the international standard that defines how to frame and transmit a Multi-channel. In the EAGLE, two 64 KBPS channels are framed and transmitted.
- **IMUX (Recommended mode):** Framing for 128 KBPS modes, implemented for compatibility with other equipment that are available on the market. This framing mode also offers a lower delay than the J.52 framing mode.

The framing modes are selected in the menu "8. Defaults"

- MPEG Layer III: very well-known and accepted algorithm that presents better Audio bandwidth at lower bit rates but at the cost of a longer encoding and decoding delay. The EAGLE includes MPEG LIII for transmission in mono or stereo.

- In order for MPEG Layer III at 128kbps to function properly the IMUX framing mode must be selected.
- In the transmission modes of MPEG Layer III at 64kbps only channel 1 can be used.
- In the MPEG Layer III modes it is not possible to generate DTMF tones.
- In the MPEG Layer III it is possible to use different modes simultaneously within a single transmission, for example MONO and STEREO within the same communication.

MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and Thomson

AEQ LD-2: AEQ proprietary mode (based on the previous AEQ LD-EXTEND) combining the low delay of the G.722 with the greater bandwidth of MPEG, thus optimizing both modes. It can only be used if there is equipment with the same encoding mode at the other end, i.e., another EAGLE, a COURSE, the AEQ model ACD-5001 (stationary) or an MPAC-02.

- ***If you have older AEQ CODECS that implement the AEQ LD-EXTEND and want to make them compatible with the EAGLE in this algorithm, visit our web-site http://www.aeq.es/ and upgrade them to the latest firmware version available.***

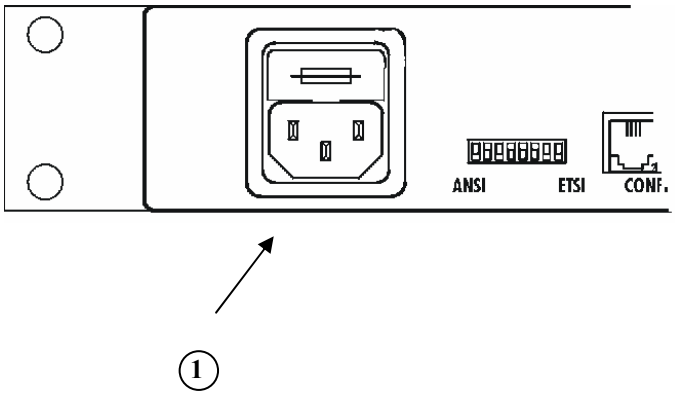
In the SPLIT modes, the transmission (encoding) is independent of the reception (decoding). This system allows you to receive a high quality Program Audio Signal from an event with a relatively low quality Return Audio Signal with low delay.

- SPLIT MODE: Allows to transmit in MPEG L3 64 MONO 48kHz (high quality) and to receive in G722 STAT (low delay) using only a single B-channel of the line ISDN line. The second B-channel of the ISDN line cannot be used. Evidently, the Audio Codec that receives the signal will have to carry out the inverse operation, to receive in MPEG L3 64 MONO 48kHz and to transmit in G722. To set up an EAGLE for this mode, "cMP3 dG722" should be selected and the remote EAGLE should be set to "cG722 dMP3".

In this Audio Codec, the encoding modes can be changed once a communication has been established and without the need of interrupting it thanks to the Terminal Adapter implemented in the equipment. When a connection at 128kbps is changed for one of 64kbps, channel 2 will be disconnected.

2. EQUIPMENT POWER SUPPLY

2.1. Equipment power supply. The power connector (1) is located on the unit's back panel.



The equipment receives power through the connector designed for that purpose (1), using the cable supplied. The equipment may be operated with alternating voltage of between 90V and 250V at 50 or 60 Hz; this type of power is considered "universal," as it will allow the EAGLE to be used in any country in the world with no need for a voltage selector switch. Consumption is approximately 40 VA.

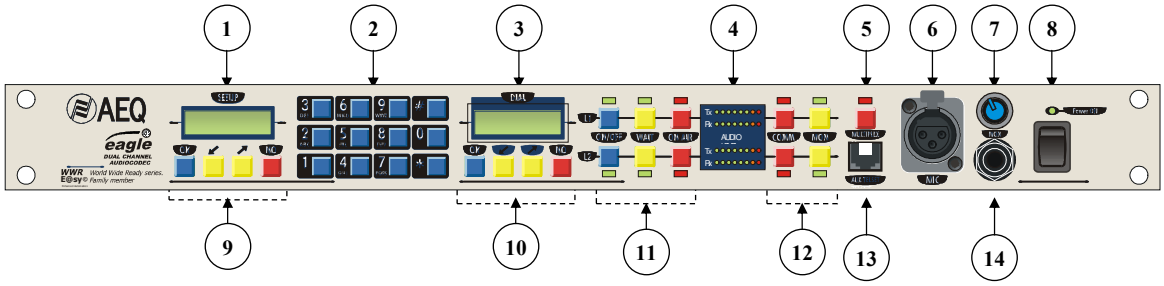
Inside the power connector compartment, there are two **1 Amp. Slow Blow** fuses (T), one of them used as a spare.

2.2. Turning on the equipment. Before connecting it, make sure the power switch, located on the front of the unit, is in the **OFF** position.
Once the power cable is properly connected to the equipment, you can connect the power cable to the electrical power outlet.
Activate the power switch (**ON** position). If all instructions have been correctly followed, the Power ON LED will light up, indicating that the equipment is receiving power.

3. INSTALLATION AND CABLING

To clarify the cabling and installation process, it is necessary to become familiar with the connectors and configurable elements on the front and back panels.

3.1 Description of front panel and connection.



1.- LCD Setup screen (SETUP). Displays the algorithm you are working with.
2.- Alphanumeric dialing pad, for manual dialing.
3.- LCD screen for dialing management (DIAL). Shows line status, and number our EAGLE unit is connected to.
4.- LED VU-meters to indicate audio, transmission and reception levels for both channels.
5.- Multiplex switch. Manual multiplexing of the two audio channels. Allows intercommunication between two simultaneous calls, one on each audio channel.
6.- XLR Intercom microphone input. The connection arrangement is:

For XLR connectors
Pin 1: ground Pin 2: V+ microphone Pin 3: V- microphone

7.- Headphone level regulator.
8.- Power switch and power-on indicator.
9.- Setup menu keypad. Has two yellow keys in the middle, each marked with an arrow for selecting, a blue key at the left (OK) for validating, and a red key at the right (NO) for canceling.
10.- Dialing management keypad (DIAL). Has two yellow keys in the middle, each marked with an arrow for selecting, a blue key at the left (OK) for validating, and a red key at the right (NO) for canceling.
11.- Line management: Connection/waiting/on air. Each line has: a blue-colored Connection/Disconnection key (ON/OFF), a yellow key to put the connection in waiting mode (WAIT) and a red key for the on-air connection (ON AIR).

- ***When Input is configured as DIGITAL, Line Management has no effect.***

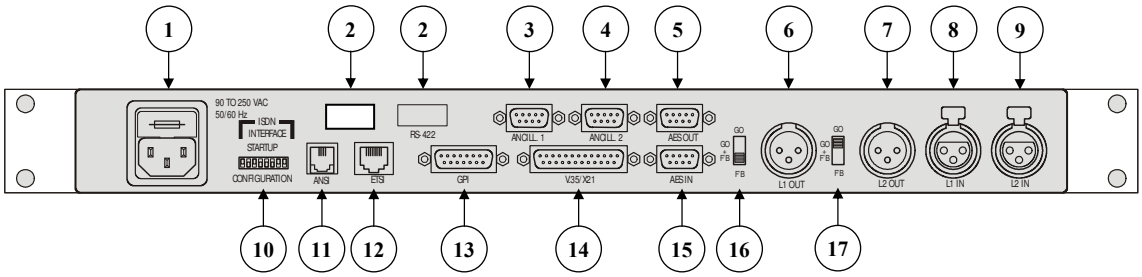
12.- Intercom management. Each line has a red key for communication (activates front microphone input) and a yellow key for monitoring.

- ***When Input is configured as ANALOG+DIGITAL, activating the intercom cuts-off the input and output signal on rear XLR connectors (ANALOG) but not the AES/EBU input and output.***
- ***When Input is configured as DIGITAL, Intercom has no effect.***

13.- RJ11 connector for connecting an auxiliary phone.
14.- Headphone output for monitoring audio signals being sent and received. Has standard TRS ¼" jack format. The connection arrangement for the connector is as follows:

Tip: Left headphone earpiece Ring: Right headphone earpiece Sleeve: Common ground

3.2. Description of back panel and connection.



1.- Power cable connector and fuse holder.

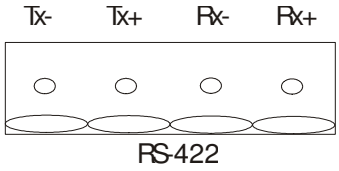
- *The connection is to be made using the cable supplied with the equipment.*

2.- E@sy Control port (RS-422).

Through the **E@sy** RS 422 or the RS 232 Control Ports, the unit is connected to an application server computer, from where it can be remotely controlled and updated by means of software.

> ***E@sy*** *is integration technology for digital audio and communications equipment that expands the equipment's control capabilities. In the* ***client*** *computers, software applications run that, together with the equipment, make up a high-performance system with powerful functionality.*

The control port has a four-contact connector, two for transmitting and two for receiving. The connection is:



The RS232 control port gives access to a RS232 to RS422 internal converter, which makes it possible to have a direct RS232 connection to the control PC using a standard RS232 (pin to pin) cable.
Active contacts are:

	EAGLE		PC
TX	**2**	**-----**	**2**
RX	**3**	**-----**	**3**
GND	**5**	**-----**	**5**
RTS	**7**	**-----**	**7**

3 and 4.- Auxiliary data channels 1 and 2. RS232 Ports.

There are two DB 9 female chassis connectors for auxiliary data transmission through the interface with an outside computer and RS 232 protocol. A male-female cable should be used, and connected to your PC's port.
The active contacts are:

	EAGLE		PC
TX	**2**	**-----**	**2**
RX	**3**	**-----**	**3**
GND	**5**	**-----**	**5**
RTS	**7**	**-----**	**8**
CTS	**8**	**-----**	**7**

Note that in this cable RTS and CTS are crossed

5 and 15.- AES/EBU Sub-D input/output/sync connectors.
There are two DB 9 connectors, the bottom one (female) for the AES/EBU inputs, and the top one (male) for the AES/EBU outputs. The connection for both connectors is:

Pin Number		Female connector connections
1	----------	V+ input Channel 1.
2	----------	Input ground Channel 1.
3	----------	V+ sync.
4	----------	V+ input Channel 2.
5	----------	Input ground Channel 2.
6	----------	V- input Channel 1.
7	----------	V- sync.
8	----------	Sync ground.
9	----------	V- input Channel 2.

Pin Number		Male connector connections
1	----------	V+ output Channel 1.
2	----------	Input ground Channel 1.
3	----------	V+ sync.
4	----------	V+ output Channel 2.
5	----------	Input ground Channel 2.
6	----------	V- output Channel 1.
7	----------	V- sync.
8	----------	Sync ground.
9	----------	V- output Channel 2.

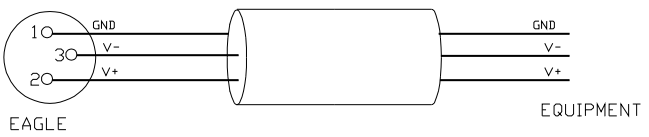
Notes:

- The signals that contain both audio and sync information (Channel 1 and 2) follow the AES-3 standard. The signals that contain only sync signal follow the AES-11 standard.
- Sync input signal can be used for modifying internal AES/EBU operating frequency (48kHz is used by default).
- Sync output will repeat the external sync input signal or will give the internal 48kHz and can be used as sync master clock for other AES/EBU equipment.
- When both channels of the audio codec are used as independent (2 mono communications), digital audio will be in pins labeled 'Channel 1' and 'Channel 2'.
- When both channels are used together in a 128kbps connection (mono, stereo or dual codification), only pins labeled 'channel 1' are used with a mono or stereo AES/EBU signal (Pins labeled 'channel 2' are not used).
- At the end of this manual, the standard AES/EBU cable pinout can be found.

6 and 7.- Analog audio output connectors 2 and 1.
May be configured as send Tx (GO), send and return Tx+Rx (GO+FB) or return Rx (F'B) outputs. Each cable should be connected with an XLR three-contact female connector. The connection arrangement is specified as follows (depending on whether the input from the receiving equipment is balanced or asymmetric):

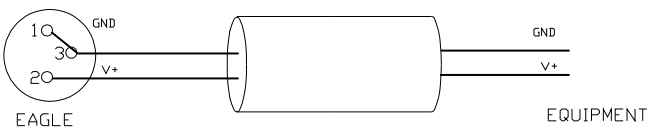
Balanced outputs:

1: Ground
2: V+ output
3: V- output



Unbalanced outputs:

1: V- output and Ground
2: V+ output
3: V- output and Ground



8 and 9.- Analog audio input connectors 2 and 1.
The connection is the same as the one outlined for connectors 6 and 7.

10.- DIP configuration microswitches (STARTUP CONFIGURATION).
These are numbered from 1 to 8, and are accessible on the back panel. Each microswitch's functionality is the following:

Microswitch	***Functionality***
1	BACKUP mode
2 and 3	None.
4 to 8	Automatic startup configurations.

- The position of the microswitches should be established before turning on the equipment. Any modification to the microswitches once the equipment is started up will not be taken into account.
- BACKUP mode operation is explained in ANNEX A.5.
- Functional automatic startup configurations allow the equipment to be started up with certain pre-programmed parameters (encoding, numbers to be dialed, etc.). There are two configurations that are pre-programmed by the software (C00 configuration – Test mode and C01 configuration – Manual Startup mode), which cannot be modified. The remaining 30 configurations (C002 – C031) are available and at the user's disposal.
- Configuration numbers **C030** and **C031** will be used in BACKUP mode.

The following chart explains the position on which the microswitches have to be placed, in order to select a pre-programmed automatic startup configuration number.

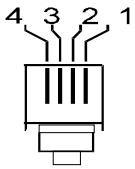
Configuration of microswitches 4 – 8, for access to the automatic startup configurations:
0 = microswitch down, 1 = microswitch up

	Microswitch				
Conf. No.	**4**	**5**	**6**	**7**	**8**
C00 *	**0**	**0**	**0**	**0**	**0**
C01 *	**0**	**0**	**0**	**0**	**1**
C02	**0**	**0**	**0**	**1**	**0**
C03	**0**	**0**	**0**	**1**	**1**
C04	**0**	**0**	**1**	**0**	**0**
C05	**0**	**0**	**1**	**0**	**1**
C06	**0**	**0**	**1**	**1**	**0**
C07	**0**	**0**	**1**	**1**	**1**
C08	**0**	**1**	**0**	**0**	**0**
C09	**0**	**1**	**0**	**0**	**1**
C10	**0**	**1**	**0**	**1**	**0**
C11	**0**	**1**	**0**	**1**	**1**
C12	**0**	**1**	**1**	**0**	**0**
C13	**0**	**1**	**1**	**0**	**1**
C14	**0**	**1**	**1**	**1**	**0**
C15	**0**	**1**	**1**	**1**	**1**

	Microswitch				
	Conf. No.	**4**	**5**	**6**	**7**	**8**
C	**C16**	**1**	**0**	**0**	**0**	**0**
	C17	**1**	**0**	**0**	**0**	**1**
	C18	**1**	**0**	**0**	**1**	**0**
	C19	**1**	**0**	**0**	**1**	**1**
	C20	**1**	**0**	**1**	**0**	**0**
	C21	**1**	**0**	**1**	**0**	**1**
	C22	**1**	**0**	**1**	**1**	**0**
	C23	**1**	**0**	**1**	**1**	**1**
	C24	**1**	**1**	**0**	**0**	**0**
	C25	**1**	**1**	**0**	**0**	**1**
	C26	**1**	**1**	**0**	**1**	**0**
	C27	**1**	**1**	**0**	**1**	**1**
	C28	**1**	**1**	**1**	**0**	**0**
	C29	**1**	**1**	**1**	**0**	**1**
	C30	**1**	**1**	**1**	**1**	**0**
	C31	**1**	**1**	**1**	**1**	**1**

11.- RJ11 connector for ISDN line U interface

The RJ11 connector joins the terminal adapter included in the equipment to the ISDN network access point. This interface is common in NATIONAL-1 (USA) and uses two wires. In this case, Network Termination (NT1) is provided by the AUDIOCODEC. This connector's pin arrangement is standard, and is shown as follows.

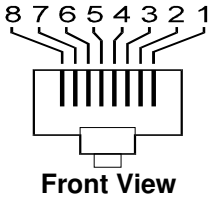


Cable no.	Connections
1	
2	--------- Lin V+
3	--------- Lin V-
4	

- *Use the cable supplied with the equipment to connect it to the 'U' ISDN connection.*

12.- RJ45 connector for ISDN line S interface.

The RJ45 connector joins the terminal adapter included in the equipment to the ISDN network access point (Network Termination or NT1). This interface is common for EUROISDN and uses 4 wires. In this case, the ISDN service provider provides NT1. This connector's pin arrangement is standard, and is shown as follows.



Front View

Cable number	Connections
1	
2	
3	---------- Tx V+
4	---------- Rx V -
5	---------- Rx V+
6	---------- Tx V -
7	
8	

- *Use the cable supplied with the equipment to connect it to the 'S' ISDN connection.*

13.- General-purpose port

This port allows implementing a basic external control system, making possible, for example, the connection to a broadcast mixer.

SIGNAL	PIN	DIRECTION	SIGNAL	PURPOSE
GPIO-0	9	OUT	/CONNECT L1	Indicates that line 1 is connected
GPIO-1	2	OUT	/IN. CALL L1	Indicates incoming call on line 1
GPIO-2	10	OUT	/SYNC L1	Indicates that line 1 is synchronized
GPIO-3	3	OUT	/CONNECT L2	Indicates that line 2 is connected
GPIO-4	11	OUT	/IN. CALL L2	Indicates incoming call on line 2
GPIO-5	4	OUT	/SYNC L2	Indicates that line 2 is synchronized
GPIO-6	12	INPUT	MUX	Multiplex activated between L1 & L2
GPIO-7	5	INPUT	COMM L2	Intercom activated with line 2
GPIO-8	13	INPUT	COMM L1	Intercom activated with line 1
GPIO-9	6	INPUT	ON-AIR L2	Line 2 goes to On Air
GPIO-10	14	INPUT	ON-AIR L1	Line 1 goes to On Air
GPIO-11	7	INPUT	WAIT L2	Line 2 goes to waiting
GPIO-12	15	INPUT	WAIT L1	Line 1 goes to waiting
GND	8	GND		
+5V	1	POWER OUT		+5V DC power delivered to the outside

NOTES:

- The output signals are "open collector", active at a low level (e.g., a zero in GPI-0 indicates that Line 1 is connected and an open L1 Not Connected).
- Input signals are active at a high level and only edges are detected (e.g. a rising edge in GPI-6 => MULTIPLEX activation and a falling edge => deactivation).
- Check electrical specifications in chapter 7.

14.- V35 interface. DB25 connector:
It accepts two types of external TA at 64, 128 or 256kbps:
- V35 (V11) interface: Uses unbalanced asynchronous control signals, while the synchronous clock and data signals are balanced.
- Physical level interface, compatible with X.21 / RS422 protocol levels.

The pin-out diagram and the signals available in the DB-25 provided in the AEQ Eagle are as follows:

Physical Level	Signal	Pin
RS 422 Bal	Clock (RCX) V+	13
RS 422 Bal	Clock (RCX) V -	14
RS 422 Bal	TX V+	11
RS 422 Bal	TX V-	10
RS 422 Bal	RX V+	21
RS 422 Bal	RX V-	19
RS232Unbal	DTR (Data Terminal Ready)	20
RS232Unbal	DCD (Data Carrier Detect)	8
RS232Unbal	GND	7

Pins 4 and 5, equivalent to RS232 signals RTS and CTS are internally looped.

The AEQ EAGLE can be configured from real time control software to choose if DCD signal is going to be used (DCD CONTROLLED) or ignored (PERMANENT). In this case, it would be necessary to connect only Tx, Rx and Clock signals.

CAUTION:
Unplugging the v.35 interface when power is on could damage EAGLE internal circuits.

To connect the AEQ Eagle to an external TA, it will be necessary checking the external TA user's manual to make sure its pin arrangement corresponds exactly, due to the variety of connectors that a TA may have.

The pin out showed below is an example and corresponds to ISO-2593 standard in a MRAC-34 connector.

CCITT	DESCRIPTION	DTE	DB25		Terminal Adapter MRAC-34 connector	DCE
102	SIGNAL GROUND	**GND**	7	→	B	**GND**
103	TRANSMITTED DATA A	**TXD A**	11	→	P	**TXD A**
	TRANSMITTED DATA B	**TXD B**	10	→	S	**TXD B**
104	RECEIVED DATA A	**RXD A**	21	→	R	**RXD A**
	RECEIVED DATA B	**RXD B**	19	→	T	**RXD B**
115	RX. CLOCK V+	**RXC A**	13	→	V	**RXC A**
	RX. CLOCK V-	**RXC B**	14	→	X	**RXC B**

Some External Terminal Adapters need to be configured. In those cases, check this parameters:
- 64kbps, 128kbps or 256kbps
- Synchronous
- CD Forced (ON)
- Ignore DTR

15.- Audio selection switch 1.
To obtain the send (Tx) (GO), return (Rx) (F'B) or both, send + return (Tx+Rx) (GO+F'B) signals at the output.

- *In standard operation conditions, this swich will be set to 'FB' position. Then, incoming audio from the remote codec will be available at the EAGLE's XLR outputs.*

16.- Audio selection switch 2.
To obtain the send (Tx) (GO), return (Rx) (F'B) or both, send + return (Tx+Rx) (GO+F'B) signals at the output.

- *In standard operation conditions, this swich will be set to 'FB' position. Then, incoming audio from the remote codec will be available at the EAGLE's XLR outputs.*

4. OPERATION AND USER INTERFACE

4.1. Phone book.

The phone book allows us to store the phone numbers we frequently need to use in our communications, up to 256. This feature might let us, for example, store all the numbers of a transmitter's regional centers.

1.- Create a new entry:
Configuration of the phone book is done in the DIAL section (Front panel, no. 10).
- On the main screen, press the direction arrows located under the DIAL LCD.

This menu will be displayed:

- 001 –EMPTY-
  002 –EMPTY-

- With the cursor arrows, move up and down until reaching the number of the phone book position you want to use. Press OK in that position.
This menu will be displayed:

- EDIT
  DELETE

- Press OK on the EDIT line. Using the number pad, type the name that will be in this position.
- Press OK and type in the phone number.
- Press OK to complete the process.

2.- Delete an entry:
- With the cursor arrows, move up and down until reaching the number of the phone book position you want to delete. Press OK in that position.
This menu will be displayed:

- EDIT
  DELETE

- Press OK on the DELETE line.
- Press OK to complete the process.

3.- Search for an entry:
A search is performed in the DIAL section (Front panel, no. 10) by pressing the direction arrows located under the DIAL LCD (middle yellow keys). Thus, we move up or down until we find the entry selected.

4.- Calling from the phone book:
If the number is stored in the phone book, instead of keying it in, we would press the cursor arrows until we reach the desired phone book position. Press OK to start the call.

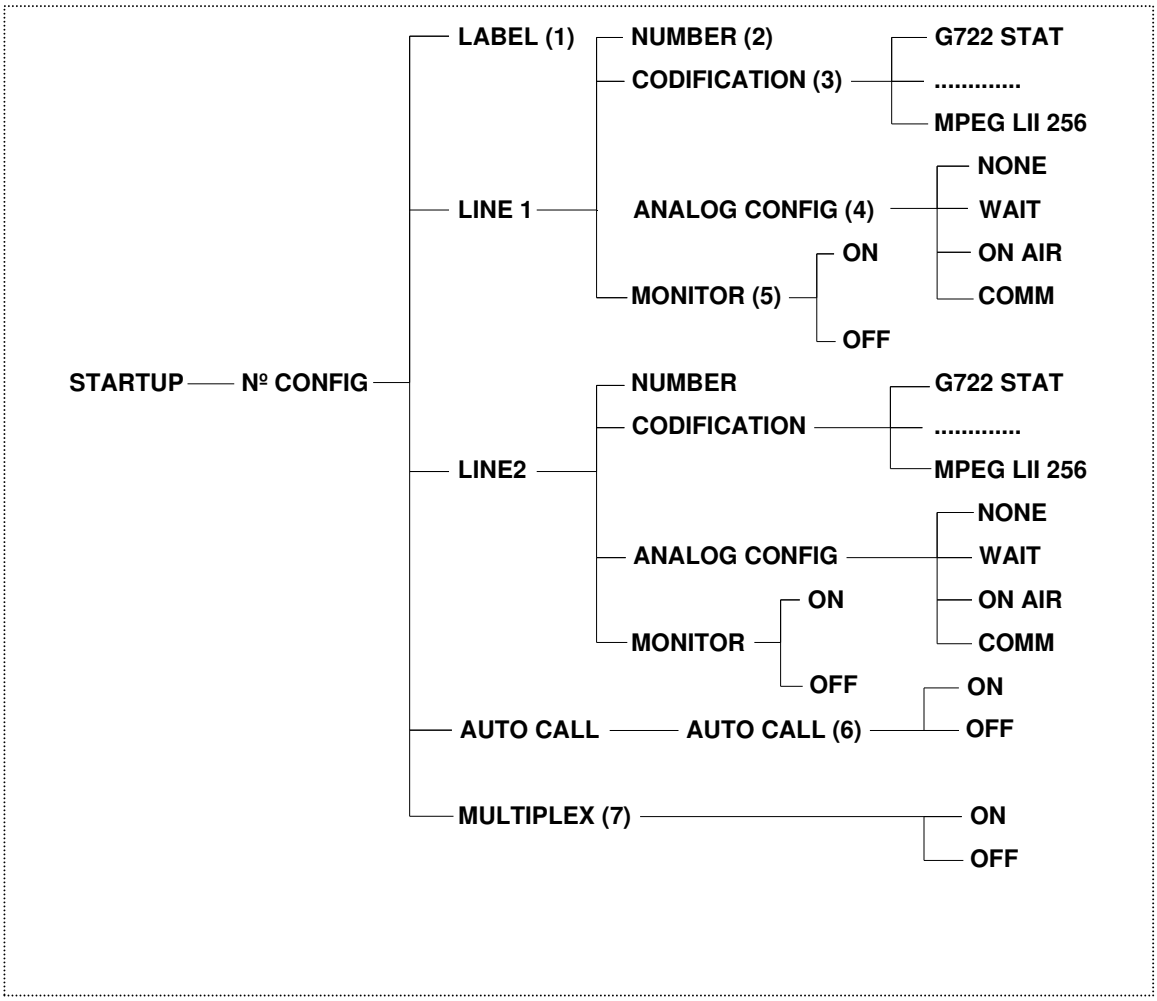
Stored numbers can be read from remote control application.

4.2. Automatic startup.

There are 30 possible automatic startup configurations that can be programmed by the user. These startup configurations can then be selected through five of the DIP microswitches on the back of the unit. The user can configure positions C02 to C31.
DIP switches position and number relation can be found in chapter 3.2, section 10.

Position C00 ..... Test mode, used when so instructed by Technical Service
Position C01 ..... Manual startup mode.
Positions C02 to C31 ….. Automatic startup modes.

Automatic startup configurations are created in the SETUP section, using the keypad (no. 9) on the Front panel and the LCD (no. 1).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, scroll to the STARTUP option and press OK.
- Complete the following diagram using the cursor arrows:

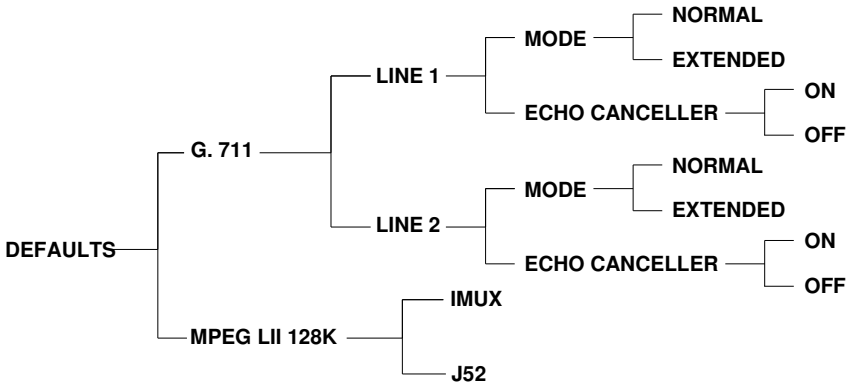


(1) Name of startup configuration. Names are introduced through the alphanumeric keyboard.
(2) ISDN Number to call in automatic way. This field will be empty if no number has to be dialled. AUTO CALL (6) has to be ON to enable call generation.
(3) Encoding type to use.
(4) Configuration of the status the audio channel will have when synchronized:
- NONE: no audio output, channel is muted.
- WAIT: the remote equipment or caller does not go on air, but is able to receive a return signal. "WAIT" button will be active.
- ON AIR: the remote equipment or caller receives the return signal and is placed on air. "ON AIR" button will be active.
- COMM: activates the unit's intercom, so the remote will only communicate with the intercom operator. "COMM" and "MON" buttons will be active.

(5) Monitoring feature active when power up.
(6) Automatic call generation activation and automatic recall when line cuts off.
(7) Multiplexing between the two channels

4.3. Default startup.

The equipment needs prior configuration of certain parameters in voice calls (G.711) and links at 128 kbps, in order to be compatible with other units, as well as, to meet certain requirements of the user. These configurations will be active as soon as the unit is turned on. The '**8.DEFAULTS'** menu allows for these configurations to be made, as well as the activation of the remote echo canceller for voice calls.



4.3.1. Voice calls.

Typical phone circuits have a limited bandwidth between 300 and 4000 Hz. Unfortunately, most of the voice's energy is located in frequencies lower than 300 Hz, which are lost during transmission through the phone line. This is why the audio signal has the typical telephone sound, with substantial loss of low frequencies, perhaps, its most representative aspect.

AEQ S.A. offers equipment capable of transmitting signals between 50 and 3750 Hz. This mode of operation is called "extended mode." Evidently, this mode allows the band of frequencies included between 50 and 300 Hz to be transmitted through the phone line. To achieve this, the signal sent undergoes a 250 Hz frequency shift, improving the quality of the signal received in its lower frequencies at the expense of the higher band. The bandwidth transmitted is, thus, between 50 and 3750 Hz. The 250 Hz lost from the higher frequencies are not very significant, given the logarithmic nature of the audio frequency response.

The translation of frequencies takes place by encoding the audio signal before it is sent to the phone line. Decoding, i.e., the reverse frequency shift, takes place at the receiving end; the decoding must be done by equipment design to accomplish this function. The decoded signal has the original bandwidth (50-3750 Hz) without having suffered any alteration. Thus, greater depth and clarity is achieved in the voice signal, even in those communications that take place under the worst conditions.

- **G711 Extended:** Used to establish communications (in both directions) on non-digital lines (basic telephone network). Equipment such as the AEQ TLE02, TLE02D, TH-02 MkII, SWING or MPAC02 must be placed at the other end of the line, with the extended frequency function activated.

- **G711 Normal:** In all other cases.
  Access to the menu is through the SETUP section (front panel, no. 9)
  - On the main screen, press NO (red) to access the SETUP menu.
  - With the cursor arrows, go to the DEFAULTS option and press OK.
  - With the cursor arrows, select G.711 and press OK
  - With the cursor arrows, select the channel to be configured, and press OK.
  - With the cursor arrows, select MODE option and press OK.
  - With the cursor arrows, select NORMAL or EXTENDED mode.

4.3.2. Remote echo canceller.

It is possible to activate an adaptive remote echo canceller from this menu in G711 communications. This option is independent for C1 and C2 channels.

Access to the menu is through the SETUP section (front panel, no. 9)
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the DEFAULTS option and press OK.
- With the cursor arrows, select G.711 and press OK
- With the cursor arrows, select the channel to be configured, and press OK.
- With the cursor arrows, select ECHO CANCELLER option and press OK.
- With the cursor arrows, select ON or OFF.

4.3.3. ISDN Calls at 128 Kbps.

When a call at 128kbps has to be made, it will be necessary to select an audio codification (MPEG or LD-2), first dial from the first channel (L1), wait until this call is connected and then dial again from second channel (L2).

It is also necessary to configure, in the DEFAULTS menu, the type of multiplexing to be used when calls are made at a 128 kbps.

The normal operating mode is **J52**-type multiplexing; however, for the EAGLE to be compatible with TELOS (ZEPHYR model) and CCS (CDQ model) audio codecs for 128 kbps modes, it is necessary to select **IMUX** multiplexing.

This parameter is in the DEFAULTS section of the menu.

Access to the menu is done through the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, scroll to the DEFAULTS option and press OK.
- With the cursor arrows scroll to MPEG LII 128K, and press OK
- With the cursor arrows scroll to IMUX or J52 mode, and press OK to select.
- Press the NO button three times to go back to main screen.

The J.52/IMUX feature should be configured in the same way in both local and remote audiocodecs when using 128k MPEG encoding algorithms.

4.4. Aux telset.

Located on the front panel, the TELSET connector (13) makes it possible to perform two functions: Remote control and Intercommunication. To do this, it is necessary to connect an analog, fixed or wireless phone to this connector.

- Intercom. With the telephone equipment connected to the TELSET connector (13) and when communication is established, the telephone handset replaces the intercom microphone (6) and its respective headset (14), and intercommunication tasks can be performed through that telephone.

- Using the auxiliary phone as an intercom disables the intercom incorporated in the equipment.
- Activating the intercom interrupts incoming signal from rear XLR connectors.

- **Remote control**. When a connection is established, DTMF tones generated in the analog control phone are used to perform remote control functions. This system is different to the DTMF tones generation in audio channels (see chapter 4.19).
The control functions and the commands currently available are the following:

∗ 1 (telephone no.) ∗ Makes a call on line 1 to the phone number dialed.
∗2 (telephone no.) ∗ Makes a call on line 2 to the phone number dialed.
∗ 1 ∗ Selects line 1 to make a call on that line. Hangs up a call established on line 1. Takes a call coming in on line 1 off hook in the OFF HOOK MANUAL mode.
∗ 2 ∗ Selects line 2 to make a call on that line. Hangs up a call established on line 2. Takes a call coming in on line 2 off hook in the OFF HOOK MANUAL mode.
∗ 3 ∗ Recalls the last number dialed on line 1.
∗ 4 ∗ Recalls the last number dialed on line 2.
Lets you escape to return to initial status in generating DTMF control commands.

Note: All control commands begin and end with "∗".

4.5. Auxiliary data channels. ANCILLARY DATA PORT 1 and 2.

It is possible to enable one transparent two-way end-to-end data channel along with each audio channel, to which we can interface data terminal equipment between both units (for example, computers). This is a transparent two-way variable-speed end-to-end link, one for each audio channel.

The data channel may be set up according to the encoding mode being used in the connection that is established. Data channels are not available in G. 711 and G. 722 STAT voice modes.

There are some possible connection speeds:

- ***Maximum (MAXIMUM)***, where you can transmit and receive at up to 64 kbps in one 64 kbps connection (one B channel), or transmit and receive at up to 115 kbps in a 128k connection. With this option, the audio bandwidth may be reduced if the data flow is large, and an interruption in the audio may occur because of the data transmission requirements.

- User's fixed *(CUSTOM),* where the user through a PC defines the speed.

- ***Minimum (MINIMUM),*** where the speed is set at 1200bps. In this option, the quality of the audio being transmitted does not deteriorate.

- 1200/2400/4800/9600 a permanent data channel is established at the selected baud rate. In this configuration, selected baud rate is the same as the speed used in the hardware RS232 interface.

The configuration of the auxiliary data channels is done through the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the ANCILL DATA option and press OK.
- With the cursor arrows, select the channel where you want to configure your data channel, and press OK.
- With the cursor arrows, select BAUD RATE to define the speed of the data channel, then press OK
- With the cursor arrows, select: MAXIME, FIXED or MINIME, then press OK.
- Press NO to return to previous menu and select ENABLE, then press OK.
- Select between DISABLE, RX ONLY, TX ONLY, TX&RX

- **Consult Annex A.4. Acilliary Data Channel at the end of this users manual.**

4.6. Terminal adapter configuration.

The EAGLE can be connected to EUROISDN (European ISDN) or NATIONAL-1 (American ISDN) through a U interface (ANSI) or S interface (ETSI) at 64 or 128kbps and can be connected to an external terminal adapter through the V35 port at 64, 128 or 256kbps.
These features make it possible for the EAGLE to be functional in many countries around the world.

V35 Interface. The selection of the terminal adapter speed (bit-rate) is done automatically, as the EAGLE detects whether the external TA provides a 64k, 128k or 256k clock.
It is possible to configure DCD signal operation and set default speed between 64kbps, 128kbps and 256kbps.

IMPORTANT: Higher speed connections could damage the equipment.

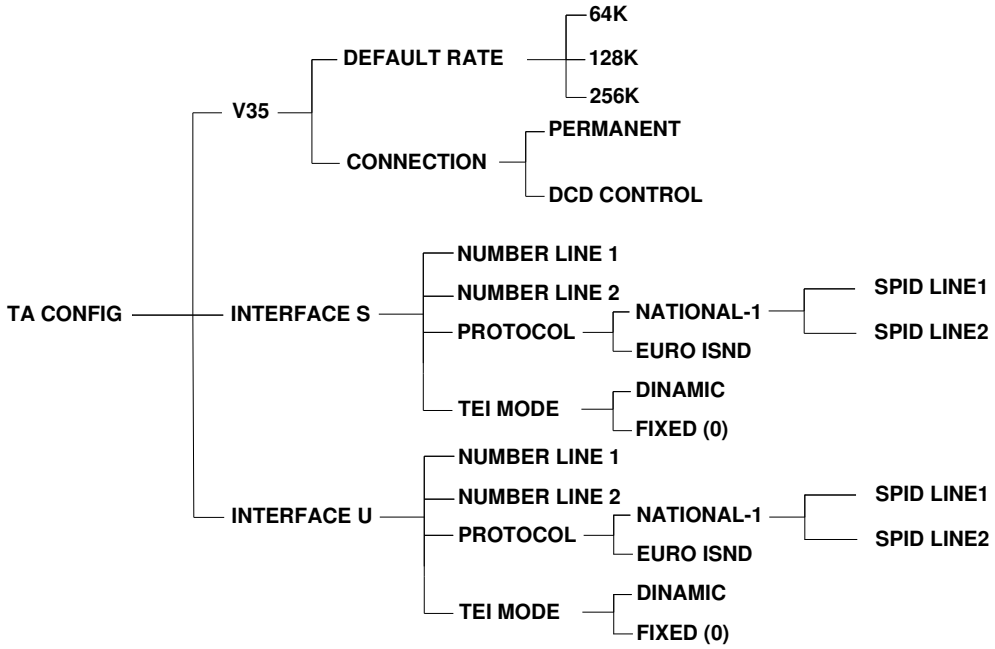
The V35 interface can be used to connect the EAGLE to an external ISDN Terminal Adaptor that supports other protocols apart from EUROISDN and NATIONAL-1, or it can be used to connect to a leased point-to-point digital 64, 128 or 256kbps link.

***U Interface*.** This 2-wire interface (RJ11) is commonly used in NATIONAL-1 protocol, which is the most widespread protocol in the USA. In this case, Network Terminal (NT1) is included inside the EAGLE.

***S Interface*.** This 4-wire interface (RJ45) is commonly used in EUROISDN protocol, which is the most widespread protocol in European countries. In this case, the ISDN service provider installs the external Network Terminal (NT1).

- *In order to cover all possibilities, it is possible to connect either of the two ISDN interfaces with either of the two ISDN protocols available.*

TA configuration menu diagram



The configuration of the terminal adapter is done in the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the TA CONFIG option and press OK
- With the cursor arrows:
    - Select ISDN S for a connection through the RJ45 (12) on the back.
    - Select ISDN U for a connection through the RJ11 (11) on the back.
    - Select V.35 for a connection through the sub-d connector (14) on the back, and communication through an external terminal adapter.

EUROISDN:
When this protocol is selected, NUMBER LINE 1 and NUMBER LINE 2 parameters can be used to configure **MSN** numbers of each channel.

- **MSN Number**:
    It is possible to identify each channel with the basic ISDN access number, so each channel will only off-hook calls placed to that specific number. This makes it possible to connect various ISDN equipments, sharing the same basic access constructing an ISDN bus. This feature allows routing incoming calls to L1 or L2.
    NOTES:
    - In case that stored number does not correspond with one of the numbers of the basic access, the audiocodec will never off-hook.
    - If both numbers are not set, incoming call will enter in C1. If C1 is busy, it will enter in C2.
    - If second channel number is set and channel one is not set, incoming calls will enter first in C2 and if C2 is busy, it will enter C1.
    - If both numbers are set and are the same, the first incoming call will be received by C1.

➢ ***NOTE:*** *This facility has to be requested to the ISDN provider because it is not a standard feature.*

TEI (Terminal Identifier) MODE can be configured as DYNAMIC or FIXED. The dynamic mode lets the network assign the TEI. In the fixed mode, the terminal forces a TEI = 0. The choice of one mode or the other is only important in some special types of lines that only accept one of the two possibilities, so the standard setting is DYNAMIC.

NATIONAL-1:
When this protocol is selected, NUMBER LINE 1 and NUMBER LINE 2 parameters are used to configure Directory Number (**DN**) that will be provided by the Telecom company. The Service Profile ID (**SPID**), which will be assigned by the provider, must be configured for each line.

➢ ***If DN and SPID numbers are not correctly configured, the terminal will not work.***

TEI (Terminal Identifier) MODE can be configured as DYNAMIC or FIXED. The dynamic mode lets the network assign the TEI. In the fixed mode, the terminal forces a TEI = 0. The choice of one mode or the other is only important in some special types of lines that only accept one of the two possibilities, so the standard setting is DYNAMIC.

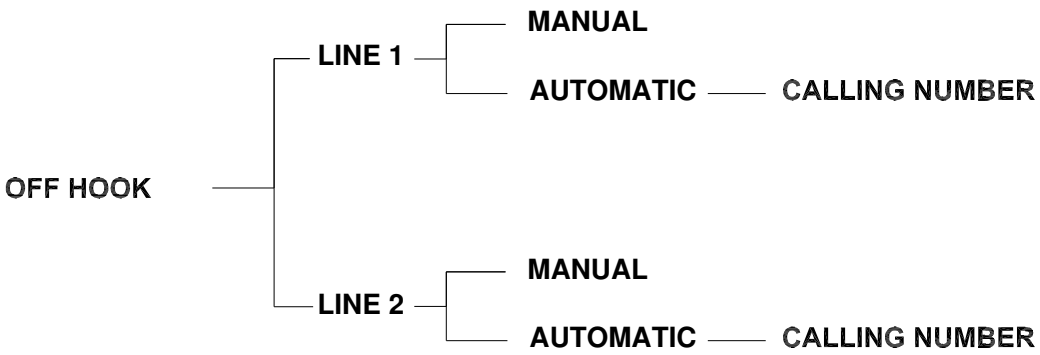
This equipment has internal programming jumpers to add (100 ohm) to the S-bus termination. If the bus termination needs to be removed, contact our technical department.
sat@aeq.es - http:\\www.aeq.es

➢ **Chapters A.2 and A.3 show configuration examples.**

4.7. Automatic off-hook.

The equipment allows the off-hook process to be automatic as soon as a call is received, or manual, thus allowing the user to decide whether to answer and connect to the incoming call.

This selection is done in the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the OFF HOOK option and press OK
- With the cursor arrows:
    - Select MANUAL for the user to take the call off hook.
    - Select AUTOMATIC for automatic off-hook when a call is received.



Incoming call filter.

It is possible to filter incoming calls, that is, it is possible to set the audiocodec so that it will only automatically off-hook incoming calls from a previously specified ISDN number. The AUDIOCODEC will only off-hook if incoming number matches with the one that was configured.

In case that incoming call origin number is not the one stored, incoming call message will be showed so the user can decide to manual off-hook.

This filter can be set for both channels independently.

This numbers are set in '5.OFF-HOOK' setup menu, selecting Line 1 or Line 2, in the 'CALLING NUMBER' parameter.

Automatic off-hook has to be selected before storing these numbers.

4.8. Generating and managing calls, dialing.

Manual dialing is done in the DIAL section (3) (10) (11). Up to 31 digits numbers are allowed.

- Press the top ON/OFF key to launch a call from channel 1, or press the bottom ON/OFF key to launch a call from channel 2. When these keys are pressed, their associated LED's light up in red, indicating that these channels are in use.
- Key in the desired number using the number pad (2). If the number is stored in the phone book, then instead of dialing it, press the cursor arrows until you get to the desired phone book position. Press OK to launch the call.

Once a connection is made, the red light indicator associated with the ON/OFF key may show two statuses:
AMBER when connected but not synchronized.
GREEN when it is both connected and synchronized.

Once the call has been made, we can put it in waiting mode (WAIT) or on the air (ON AIR).
- If we put the call in waiting mode (WAIT), the remote point can receive audio from our equipment, but it is prevented from going on the air.
- If we put the call on the air (ON AIR), the remote point can both receive audio and go on the air through our equipment.

4.9. Intercom and monitoring.

The EAGLE is equipped with a full-duplex Intercom, which allows communication with both audio channels, individually and effortlessly, with no external operations or cables. This facilitates its use in Central Control Rooms that have to prepare communications with broadcasting studios

The Intercom system lets the technician use one of the two channels (or both at the same time) to communicate with the remote position through a microphone connected to the front of the unit (6).

The intercom works by simply pushing the COMM button corresponding to the channel you wish to speak on.

When one of the two buttons is pushed, the LED associated with it lights up, and monitoring is simultaneously activated on the same channel, to monitor the return signal. Intercommunication can take place on channel 1, channel 2 or both at the same time.

To end intercommunication, push the same button (COMM), and the associated LED will go off, as will monitoring.

The monitoring functions, also available on the front panel, make it possible to listen to all signals generated and received with the equipment, without affecting the studio's audio.

Exclusively for use in monitoring the signals existing in the equipment, the **EAGLE** audio codec has a headphone output (14) on the front, through which both channels can be monitored, channel one through the left headphone earpiece and channel 2 through the right. There is a common level adjustment potentiometer for both channels.

Thus, sending and return on each channel can be jointly monitored with one set of headphones, in a 50-50 proportion.

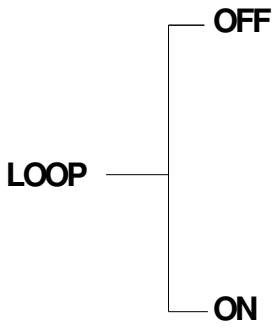
If the intercom is active, the microphone signal will be heard through the earpiece corresponding to the channel being used (or both, if both are being used).

Input has to be configured as ANALOG+DIGITAL. When analog signal is used (XLR connectors), intercom interrupts audio. When digital signal is used (AES-EBU), intercom is mixed with digital signal.

4.10. Loop

The **EAGLE** audio codec has a test mode that allows the correct operation of the equipment to be independently verified in loop mode, checking the encoding and decoding mechanisms if there are transmission problems.
When this facility is activated, the audio codec loops audio signal in the way that incoming audio signal from the XLR input connectors appears in XLR output connectors as Feedback, and audio received from the ISDN or V.35 is sent back to the ISDN.

This selection is done in the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the LOOP option and press OK.
- With the cursor arrows Select ON to activate the loop or OFF for normal operation.



4.11. Multiplex

When we have two 64k calls connected, they can be multiplexed, i.e., intercommunication between them can take place. For this function to occur in all possible directions, both channels need to be ON AIR. This scenario can also possible: one channel is ON AIR, the other on WAIT mode, and Multiplex is pressed; here, the channel on WAIT mode can listen to the program or the orders, but cannot participate.

- *When multiplex option is activated, input 1 and output 1 is the same for both channels.*

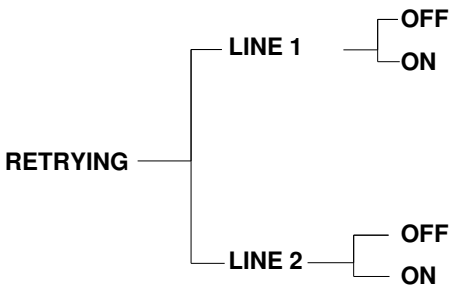
4.12. Node.

Identifies the address the equipment occupies on the multi-station control network.
If several units are connected on a network, up to 128, this number must be different from the numbers on the rest of the units to avoid conflicts on the network.

NODE selection is done in the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the NODE option and press OK.
- Key in the desired figure using the number pad (2), and press OK to finish.

4.13. Retrying.

By activating this option, you configure the unit to automatically retry those calls where the connection was unsuccessful or has been cut off.



- *This option has to be activated after the call is connected. If it is activated when no call is established, the EAGLE will dial the last called number.*

4.14. Encoding mode selection.

There is a great variety of encoding modes, previously explained in chapter 1.3. To select a mode, you must do the following:

This selection is done from the SETUP section (1) (9).
- On the main screen, select the desired channel using the cursor arrows.
- Press OK to access the encoding menu.
- With the cursor arrows, scroll to the desired encoding mode, and press OK to finish.
- Press NO to go back to main screen.

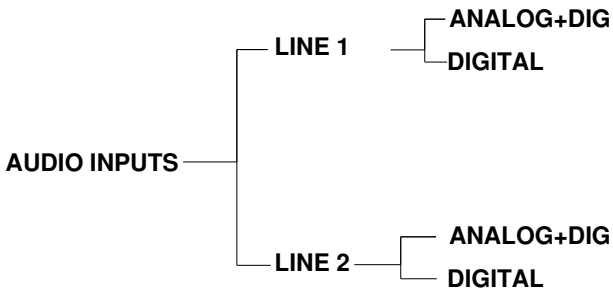
4.15. Audio type selection.

The equipment can work with analog or digital audio signals in AES/EBU format.

There is an analog input for channel 1 (8), an analog input for channel 2 (9) and their respective outputs (6) for channel 1 and (7) for channel 2. Connection formats are standard XLR (see sections 6 and 7 in chapter 3).
The digital inputs and outputs are in Sub-d connectors, one female (15) for the inputs, and one male (5) for the outputs (see sections 5 and 15 in chapter 3).
The menu allows you to choose between two possible audio sources for the inputs, while the outputs are always present. In other words, you can choose between DIGITAL and ANALOG+DIGITAL for the input, while the signals at the outputs are always present, both in analog and in digital. Thus, the audio source selection process is as follows:

This selection is done in the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the AUDIO INPUTS option and press OK.
- With the cursor arrows, select the channel to be configured, and press OK.
- With the cursor arrows, select the desired mode, and press OK.

NOTES:
1.- The equipment incorporates mono operating modes; in these cases, the inputs and outputs available are the ones for channel 1.
2.- There is a special "MULTIPLEX" capability that joins existing audio between both channels. If this feature is activated, it automatically configures the equipment so that there is only one input and one output, those corresponding to channel 1.
3.- When a stereo or dual communication is established and digital inputs are selected, the digital audio input and output to be used is the one for channel 1. Obviously, the audio signal to be entered must contain the L and R channels.



This configuration affects intercom operation. See chapter 4.9.

4.16. Firmware version.

When the equipment is started up, the SETUP LCD (1) shows the software versions the equipment has been upgraded to. There are three modules that have a version: the microprocessor, the digital audio processor, and the terminal adapter.
To display these software versions once the equipment is running, do the following:

This FIRMWARE information is found in the SETUP section (1) (9).
- On the main screen, press NO (red) to access the SETUP menu.
- With the cursor arrows, go to the FIRMWARE option and press OK.
- With the cursor arrows, go to the module whose version you want to find out, and press OK..

➢ *See chapter 6 for upgrade information.*

4.17. VU-meters.

Input and output levels for both channels can be displayed through four meters (4) located on the front panel.
It is advisable not to exceed the recommended input levels to avoid saturating the equipment.
The top line of the meter displays the input level to channel 1.
The next line shows the return level for channel 1.
The third line shows the input signal to channel 2.
The last line shows the return signal for channel 2.

4.18. Autosync and slave mode.

***Autosync*:** This option in the SETUP menu lets the equipment automatically look for the encoding algorithm of the remote equipment (Master mode). Thus, it can be classified as *an automatic encoding mode (slave mode).*
This function is very practical when the encoding mode the remote equipment is working with is unknown, as it allows automatic synchronization between the two units.
When this operating mode is used, the units' sync times will be increased, due to the obvious fact that the unit that has this option selected must scan all available encoding algorithms until it achieves the right synchronization.
For this reason, it is not recommended that both of the units that you wish to interconnect be placed in Autosync mode, as this may result in a longer sync time, so its use is not practical. One should act as a Master and the other as a slave.

The AUTOSYNC feature does not support MPEG Layer III encoding algorithms, so in this case it will be set manually.

4.19 DTMF tones generation.

The AEQ EAGLE is able to generate DTMF tones in both audio circuits, in all audio modes, except for those using MPEG Layer 3. It can generate the tones locally, through the front panel, or remotely, using the “Eagle Real Time Control” software.

To activate the DTMF generation mode and generate tones, follow the next steps:

1) Once communication has been established, leave the ‘*’ key pressed for 5 seconds. DTMF mode should be activated and a ‘D’ will appear on the DIAL display. DTMF tones can now be generated on either C1 or C2, by pressing over the keypad. The cursor arrows under the Setup display are used to choose which channel generates the tones.
2) In MPEG L II 128 MONO, DTMF tones could only be sent through C1. In MPEG LII 128 STEREO and DUAL, tones can be sent through both channels.
3) To exit DTMF generation mode, press any of the keys under the DIAL display or the ON/OFF keys.

DTMF is not available for all those modes using MPEG Layer 3.

5. . E@sy CONTROL SOFTWARE

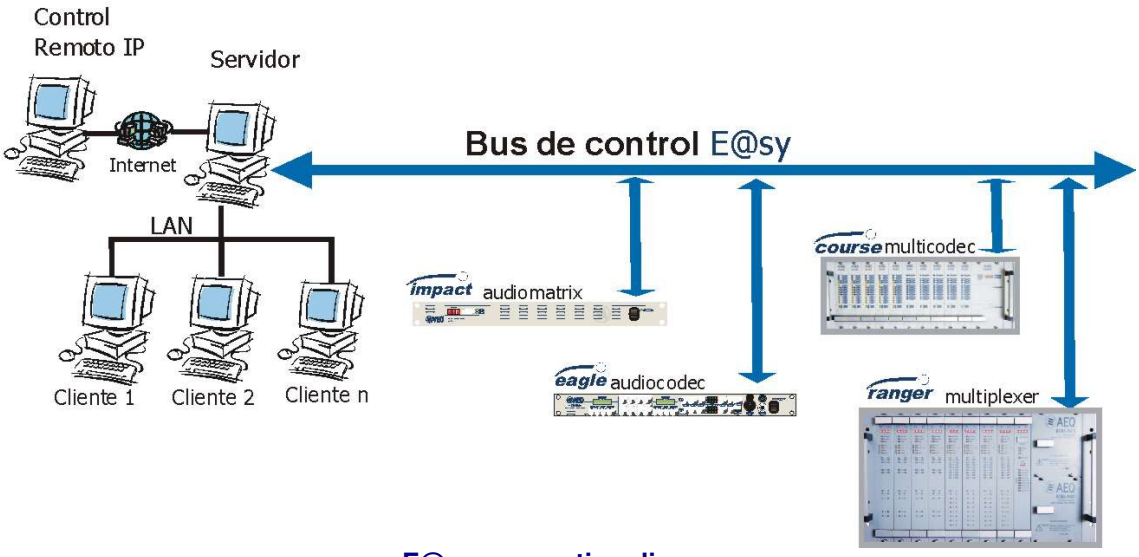
5.1. SYSTEM DESCRIPTION

5.1.1. E@sy SYSTEM

This equipment includes a new software technology called **E@sy.**

E@sy is an audio and communications digital devices integration technology that expands controlling capacity to a never before reached levels and that includes both equipment and software applications. Equipment connects to a **server** computer through a RS-422 bus. Software applications in **client/server** computers form a high performance and powerful system.

The EAGLE can be controlled remotely through the RS-422 bus. The basic **E@sy** software allows controlling from a single PC all the equipment connected to the same bus through a (LAN o WAN) IP network, setting encoding algorithms, calling, monitoring each line status, activating 'multiplex', line cut alarms, etc.



E@sy connection diagram

In all **E@sy** equipment, a firmware upgrading application for future updating is included. It will be explained in chapter 6 of this document.

5.2. PACKAGE DESCRIPTION

5.2.1. CD-ROM CONTENT

In this package, you receive an auto-start up CD-ROM containing Manuals, the latest firmware files and these applications:

- **E@sy*Server***. Server software application.
- ***Eagle***. Client/Controlling application.
- ***EagleFu***. Upgrading application.

To install the applications, insert the CD in your PC's CDROM drive and wait until the menu appears. In case it does not appear, check that the auto start feature of your CDROM drive is enabled.

5.2.2. HARDWARE AND SOFTWARE REQUIREMENTS

This system can work over an IP network or in a stand-alone PC.

In both cases, minimum requirements are:
Compatible PC with a Pentium processor or higher, 32MB RAM Memory and a hard drive.
When using a remote-control application, remote PC should have an IP connection with server PC. This can be through a LAN or a WAN network.
Server computer must have one free serial port. It will be necessary a RS232 to RS422 standard converter for interconnecting the PC and the EAGLE.

Software runs on Windows NT, Windows 2000 and Windows XP operating systems.

This software requires the TCP/IP extension to be installed in the operating system. This extension is automatically installed when a network card or a modem is installed. In case of using a stand-alone PC, it is necessary to install the "MSLoopback" driver, which is included in both operating systems installation disks.

E@syServer.exe **program will be installed in the PC connected to the E@sy bus.**

eagle.exe **will be installed in those remote computers from where equipment is going to be controlled. In case of a stand-alone computer, both programs should be installed in the same PC.**

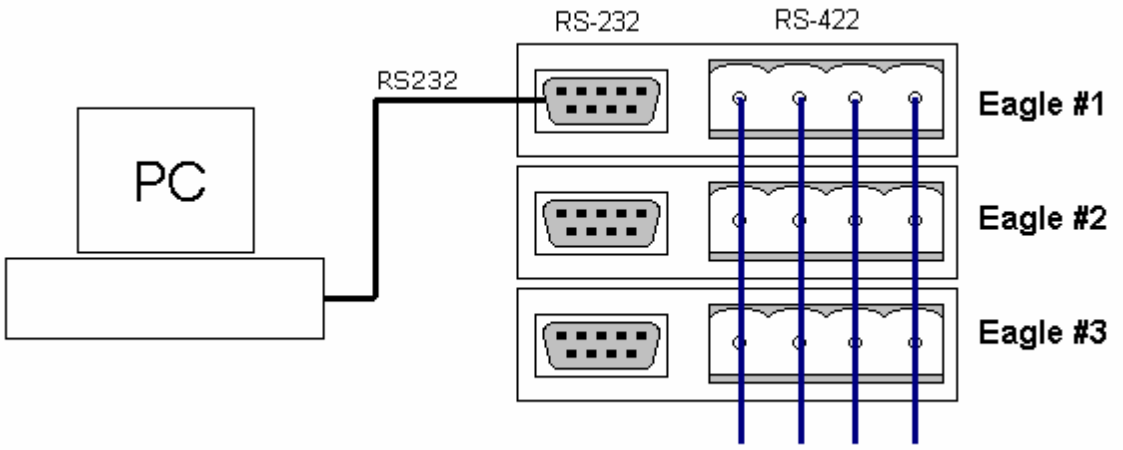
EagleFu.exe **upgrading application works from a PC with direct connection to the EAGLE audio codec.**

5.3. REMOTE CONTROL SYSTEM

5.3.1. SYSTEM CONNECTION

The EAGLE is controlled through the RS-422 or RS-232 control port.

The EAGLE will be connected to the PC where the **E@sy Server** is installed through a connection between serial port and the RS-232 control port.



If using an **E@sy** equipment network, with more than one **E@sy** equipment, connection should be made in parallel.

When all the connections are made, software should be installed as indicated in the following pages.

If control software is going to be installed in a different PC than the server one, it is necessary to check that there is an IP connection between both computers. To do that, it is necessary to know the network name or IP address of the server PC inside the network.
Consult ANNEX A-1 at the end of this manual in order to obtain more information about IP connections.

Once these steps have been done, It is just necessary to install the applications.

5.3.1.2 SERVER APPLICATION

E@syServer.exe application is installed in the PC where the codecs are connected.
This application is the interface between the computer network and the control bus where the **E@sy** equipment is**.**

5.3.1.2.1 INSTALLATION

Run the "E@syServer.EXE" application and follow all the steps.

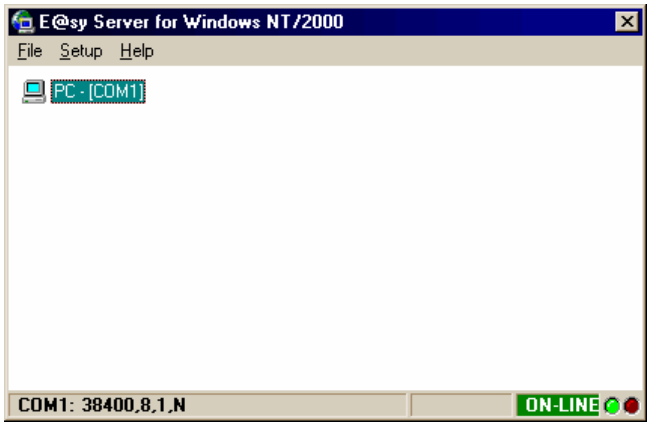
NOTES:

- Installing this software in a PC belonging to an intranet requires supervisor rights over the computer. In that case, consult your system supervisor.
- The first time this Install Shield Wizard is used, it will ask you to restart the system. If you have used this wizard before, It won't be necessary to restart.

5.3.1.2.2 OPERATION:

Once the installation is finished and executed through the icon created in the desktop, the icon representing it will appear in the task bar:

Clicking over the icon with the mouse right key, 'SHOW' option is showed, allowing to see the program window:

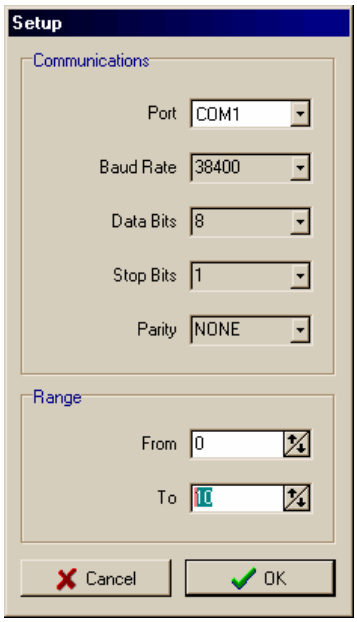


Select the *Setup* / *Port* option and configure in the *Communications* label the port to use.

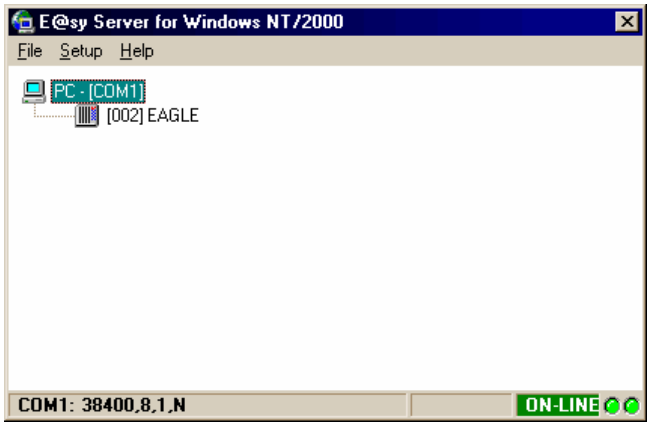
E@sy equipment have a node number that con be configured for identifying them in a network. Configure in the *Range* label the number of nodes that are to be controlled, i.e., how many **E@sy** devices are available in the network.

When RANGE is big, process becomes slow. It is recommended to put the minimum range in order to obtain the best performance. In that case, both leds should be fixed in green.

- Consult the "4.12 Node" chapter to know how to program this number in each equipment.



Once all steps have been completed and all the connections have been made, program window will look like this:



In this case, there is an EAGLE connected to the server PC identified as the 002 node, and it is possible to control it.

Setup/Socket Server and *Setup/Schedule* options are used to control other **E@sy** equipment.

This server program is resident and always active.

In the *File* menu, it is possible to search again the network with the *Update* option and to close program window with the *Close* option.

- *To stop server application execution and exit, it is necessary to click on the icon situated in the task bar with the right button and select the Exit option.*

  In order to avoid connection failures produced by accidental mistakes, the PC cannot be turned off until server application is stopped.

UNINSTALLING:

To uninstall this program, you should do it from the "ADD OR REMOVE PROGRAMS" panel of windows clicking Start-Configuration-Control Panel.
In this menu, locate "E@sy Server", click on it and choose the Add or Remove option to uninstall server software from the PC.

5.3.1.3 CLIENT APPLICATION

5.3.1.3.1 INSTALLATION

Run the "Eagle.exe" program which is contained in the CD-ROM and follow all the steps of the install shield wizard.

NOTES:
- Installing this software in a PC that is inside an intranet requires supervisor rights over the computer. In that case, consult your system supervisor.
- The first time this Install Shield Wizard is used, it will ask you to restart the system. If you have used this wizard before, It won't be necessary to restart.

5.3.1.3.2 OPERATION

When installation is finished, the EAGLE Real-time Control program is executed clicking on the icon created in the desktop.

Before executing the program, IP configuration has to be made:

To configure it, the EAGLE.INI file has to be edited. This file is in the path: "C:\Program files\Aeq\ EAGLE Realtime Control\" , and will look like this:

```
[EASY SERVER]
PORT=60300
HOST=LocalHost
PROXY=211
```

In 'HOST', the IP address or name of the server PC has to be set. By default, program is installed in local mode (HOST=127.0.0.1), that is, the EAGLE is controlled from the same PC it is connected to. If this PC is not the same as the the one where the **E@sy server** is, this has to be changed to the new value.

When IP address can not be reached or when E@sy server is not running, an error message will be displayed:

- *This change will be operative the next time the program is started.*

Now the program can be started:

When there is IP connection between client PC and the EAGLE, a message will appear:

CONNECTED:OK

On the contrary, if there is not a connection, it will read:

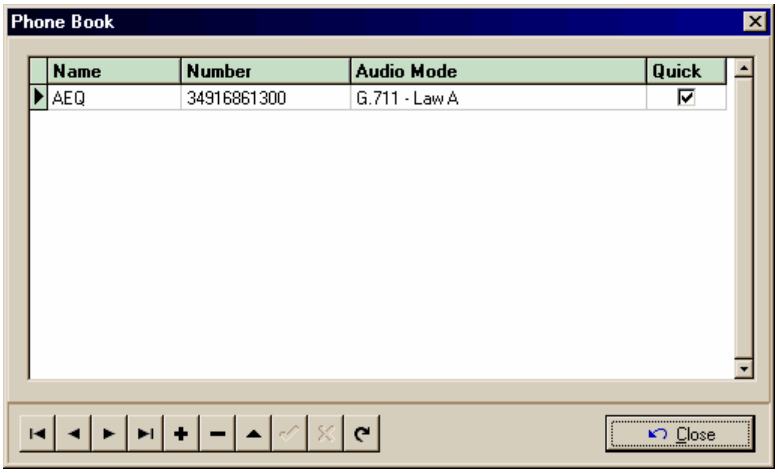
CONNECTION: REFUSED

In that case, all previous steps have to be checked.

When the EAGLE Real-time Control application is working, a control panel of the EAGLE appears in the screen.

Close option in *File* menu exits the program.

Phone Book option of the *Setup* menu shows the software phone book.



NOTE: This phone book is independent of the phone book stored in the EAGLE memory but it is possible to read EAGLE's memory phone book from Remote Control Software, as explained in the following chapters.

To introduce a new entry in the phone book, it is possible to write directly in Name and Number fields. The '+' button is used to introduce a new blank entry and '-' button is used to erase an entry.

In those entries that one wanted to be used in the quick access of the dialing window, the **'Quick'** option should be clicked. That means it is possible to store hundreds of numbers but select only a ten of them in a specific situation.

It is possible to change window size of the program in the *Setup/Size* option. When selecting a new size, application will automatically exit and the change will be done when starting again the application.

When *Sirens* option is activated, a sound simulating a siren is produced when a kind of failure is detected in communications. When *Ring* option is activated, a sound simulating the ring signal of a telephone is produced whenever an incoming call is received.

To be able to hear those sounds, a multimedia soundcard should be installed in the PC.

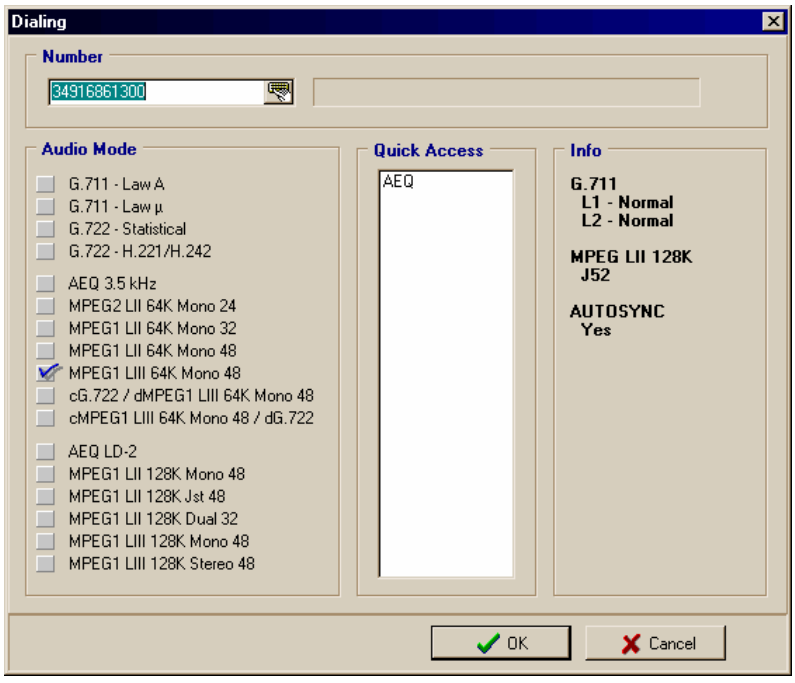
When *Options/Restore Window* option is active, program window comes to the foreground when an event (for example incoming calls) happens. It is necessary to close and open the program to activate this change.

EAGLE CONTROL PANEL:

The EAGLE operation is controlled though this 'virtual' panel. NUM number indicates node number and allows identifying the different **E@sy** equipment connected to the bus.

All buttons have a direct connection with the physical buttons on the EAGLE, except for the '**setup**' one, which is the one that gives access to the configuration window.

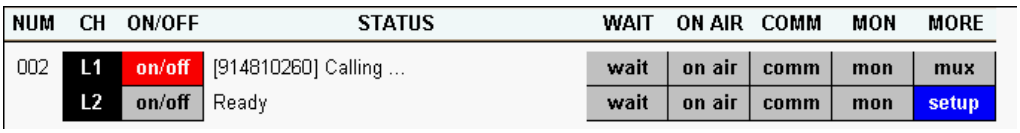
The '**on/off**' button has an added feature, which is the activation of the dialing window:



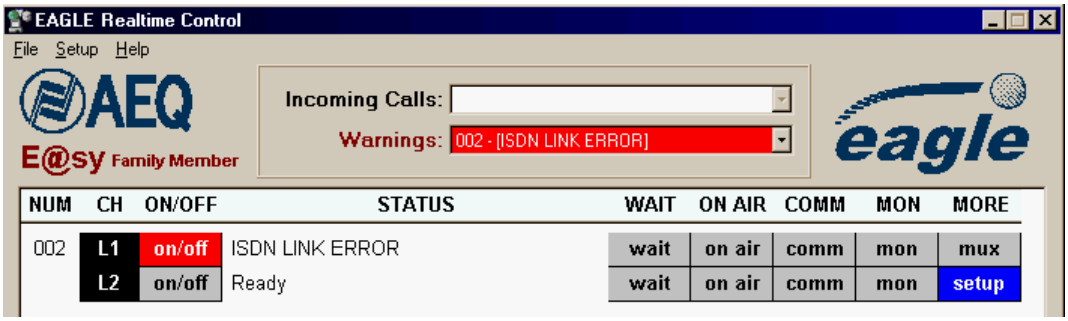
Number field is used to introduce the number to be called. A quick graphic dialer can be used clicking in the icon. In the **Quick Access** window, all numbers of the phone book with the 'Quick' feature activated are showed.

In the **Audio Mode** and **Info** fields, configured settings are showed. If these are not the desired ones, they have to be changed in the setup windows.

Once we have the number and the configuration, connection is launched clicking the **OK** button:



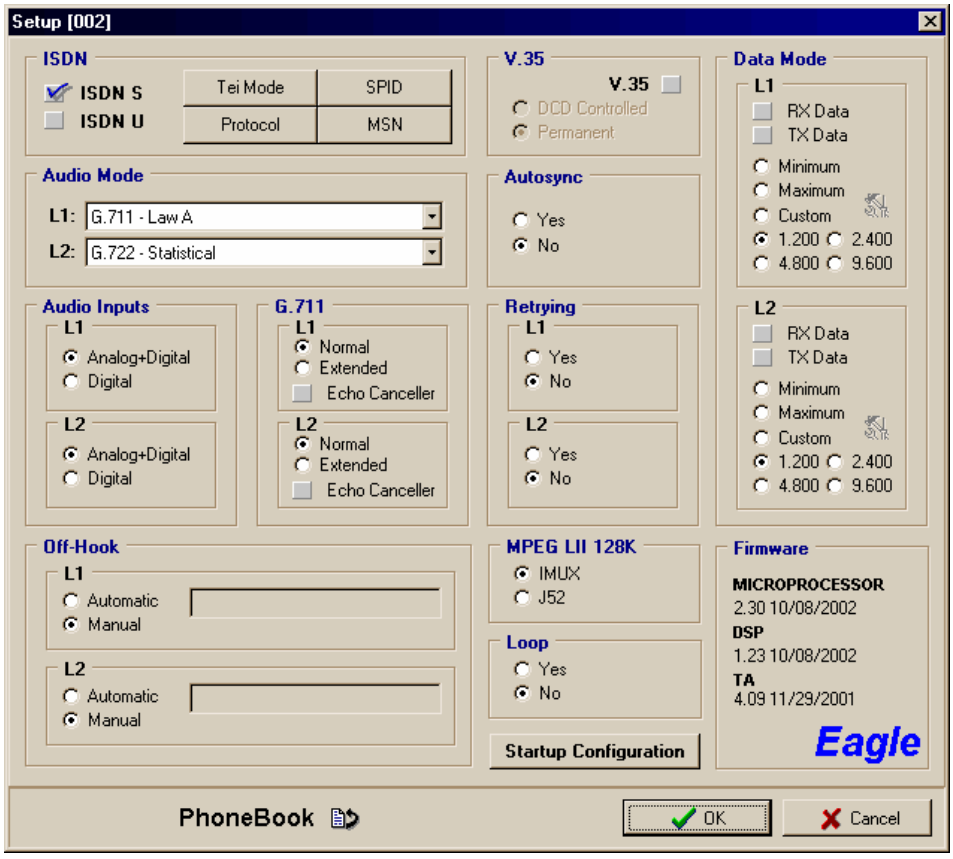
In following example, this EAGLE has no ISDN and shows an error message:



In following picture, we call from channel 2 to the EAGLE own ISDN number so this call is received in channel 1 (which is free) and is showed in **Incoming Calls** and in **STATUS**:

In this example, there is a G711 A-Law communication established in channel 1:

Clicking the **setup** button of the 'virtual' EAGLE front panel, set up window is showed:



In this window all configuration parameters can be set.

When clicking in '**PhoneBook**', the phone-book stored in the audiocodec internal memory is read so after some time it can be viewed in the *Setup/Phone Book* option. This process might take some seconds and it is done in the background.

REMOTE RESET
It is possible to use a remote reset signal from this window. To activate it, eagle.ini file has to be edited and a password has to be wrote where it says:

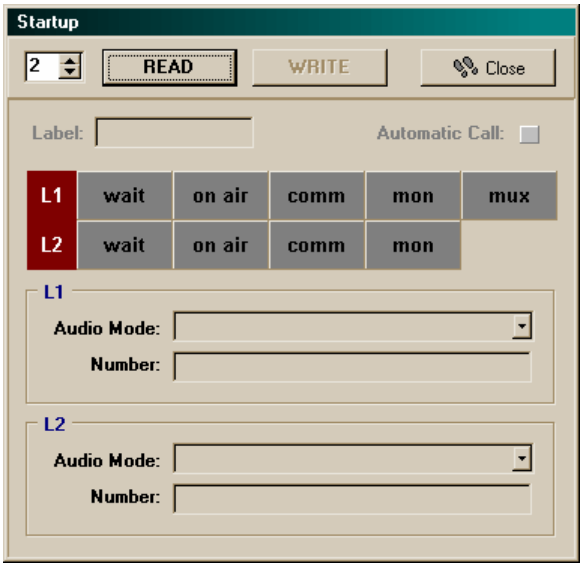
"PASSWORD="

This key-word would be asked as a confirmation each time somebody clicks the '**Reset**' button that will appear close to the '**PhoneBook**' one, the next time the program is run.

NOTES:
- This reset signal makes configuration come to its original factory settings.
- Only equipment connected physically to the E@sy bus can be reseted.

AUTOMATIC STARTUP CONFIGURATION

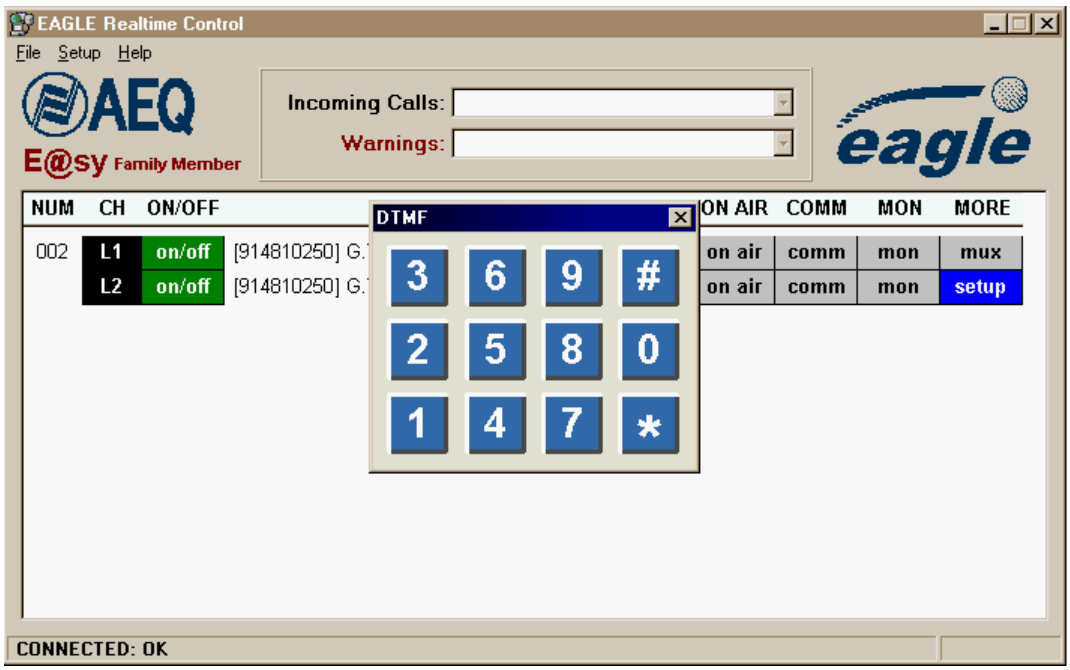
Clicking in Startup Configuration button, it is possible to read, modify and write startup configurations stored in the audiocodec memory, in the same way as showed in chapter 4.2.



To edit configuration, select startup number and press READ. After that, all parameters can be modified. When finished, press WRITE and Close.

DTMF TONE GENERATION

While a communication is established, it is possible to generate DTMF tones from main control window. To do that, it is necessary to click in L1 or L2 and a new window will appear:



Since the new release version 1.60.003, the EAGLE Real Time Control application adds two new operating features:

EQUIPMENT ON SCREEN FILTERING

When many EAGLEs are used from different studios, every user has access to all the codecs from all locations.

It is possible to filter which EAGLEs will appear in the control screen. This mode is useful when many users from different studios have to control different EAGLEs from the same E@sy network.

This option is configured in 'FILTER' section of the *eagle.ini* file, in each of the computers where the EAGLE Real Time Control application is installed.

In the *eagle.ini* file will appear this:

```
[FILTER]
INCLUDE=
EXCLUDE=
```

If we would like to see on the screen only the EAGLEs which node number are 1, 2 and 3, it would be:

```
[FILTER]
INCLUDE=1,2,3
EXCLUDE=
```

If we would like to see all the EAGLEs except numbers 9 and 10, it would be:

```
[FILTER]
INCLUDE=
EXCLUDE=9,10
```

CUSTOMICING SOUNDS

It is possible to change default sounds used in the application modifying the *eagle.ini* file as showed:

```
[SOUND]
RING=C:\SOUNDS\RING.WAV
SIRENS=C:\SOUNDS\SIRENS.WAV
```

In this example, the wav file 'C:\SOUNDS\RING.WAV' will sound when a call is received and the wav file 'C:\SOUNDS\SIRENS.WAV' will sound when a warning or error happens.

If the file cannot be found, the default sound will work.

Audio files should be linear PCM WAV format.

- *Sound options should be activated in the application setup menu.*

6. FIRMWARE UPGRADING

WHEN UPGRADING?

This EAGLE has the latest firmware version available when it was manufactured. However, it is possible than in the future, new firmware versions will appear adding new features to this codec. These software versions will be published on AEQ web site:

http:\\www.aeq.es

PRECAUTIONS BEFORE UPGRADING:

Firmware upgrade process is a delicate process and it is recommended to take some basic precautions before doing it.

It is strongly recommended to take the EAGLE off the rack, unplugging everything except for power cable and PC connection cable. The PC should be connected to the same electrical ground.

In any case, AEQ offers free upgrade.

In case of doubt, contact our Technical Assistance Service: ***sat@aeq.es***

6.1. SYSTEM CONNECTION

The EAGLE has to be connected to a RS232 port of a PC through RS-232 or RS-422.

If there is more than one EAGLE connected to the **E@sy** bus, this software will show the different equipment and its software version. Each one has to be upgraded individually but in some cases it is possible to run an automatic process.

6.2. INSTALLATION

Run the **EagleFu.exe** file to install the software:

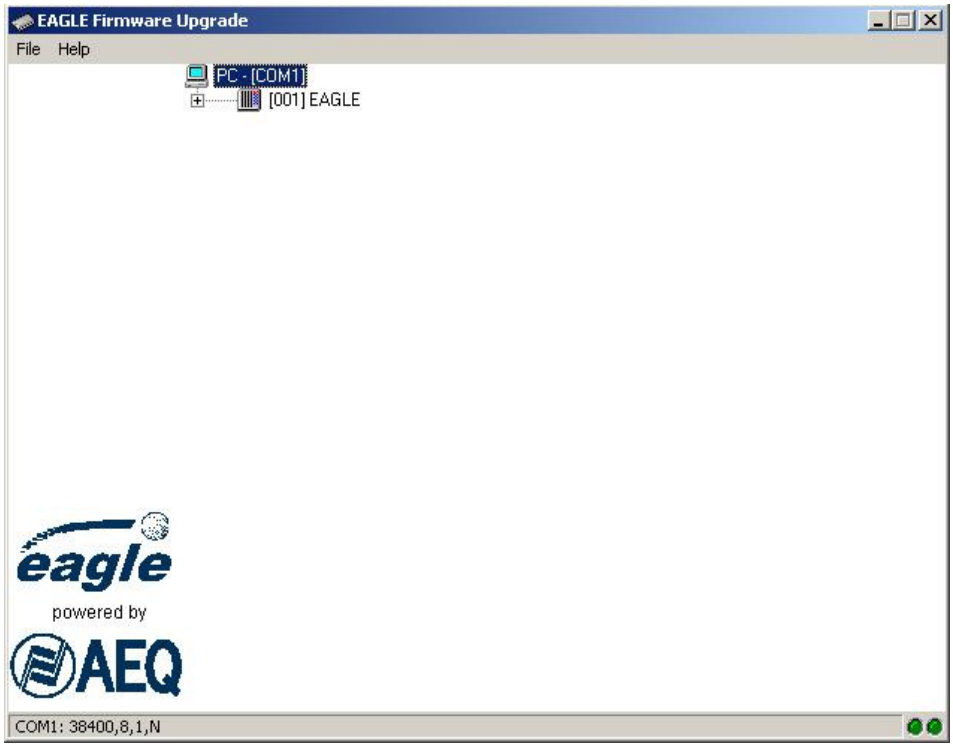
Follow all the steps until the process is finished.

6.3. OPERATION

IMPORTANT
Upgrading software has to be used separately from the server/remote control software.

Double click on the icon to start the application:

Program window will open and looks like this:



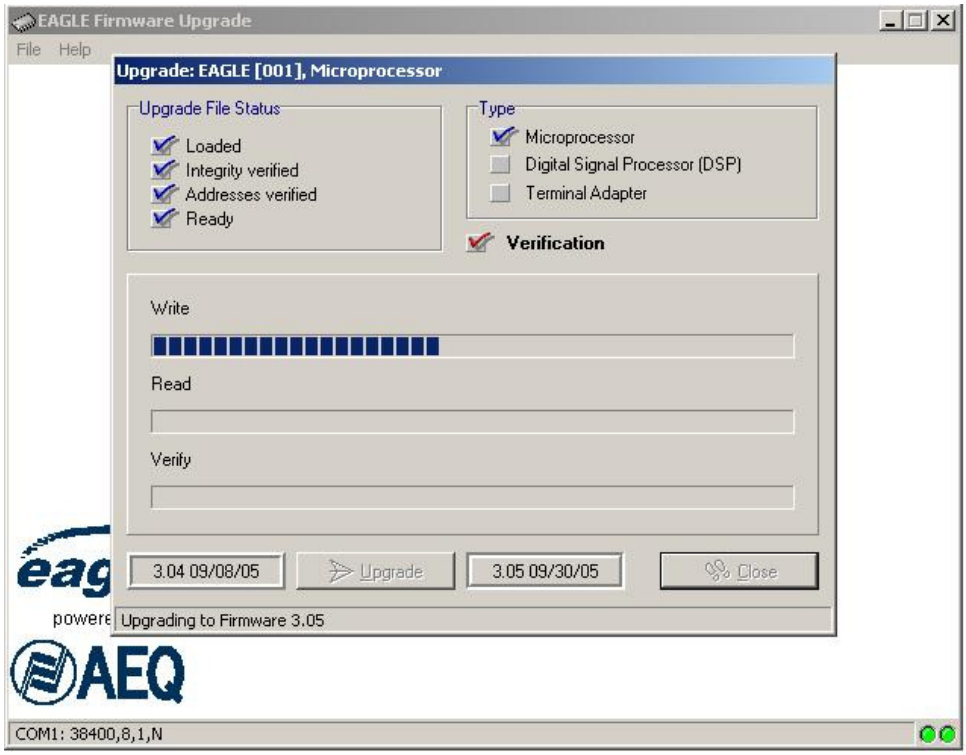
In the *File/Setup PC* option, communications port of the PC that is going to be used has to be selected. In the same option, Range window is used for specifying the range of nodes to search for.

Clicking on the '+' icon, the three EAGLE modules (Micro, DSP and Terminal Adapter) are shown:

- You can upgrade the whole EAGLE (with an AFP file) or the modules one by one (with AFU files). It is recommended the first option.

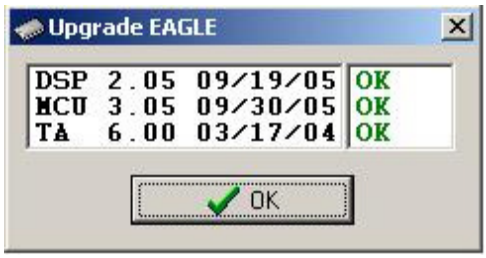
To upgrade the whole EAGLE, you have to select it and click the right button of the mouse. *Open* option appears. When we click this option with the left button, an explorer window appears for specifying the AFP (AEQ Firmware Pack) file with the new firmware versions.

After specifying the path and name of the file, upgrading window opens and the software upgrades the modules automatically (the system checks the firmware versions installed and, if there are changes, loads the new version):



In this picture, 3.04 version of the Microprocessor firmware has been detected and it is loading the 3.05 version.

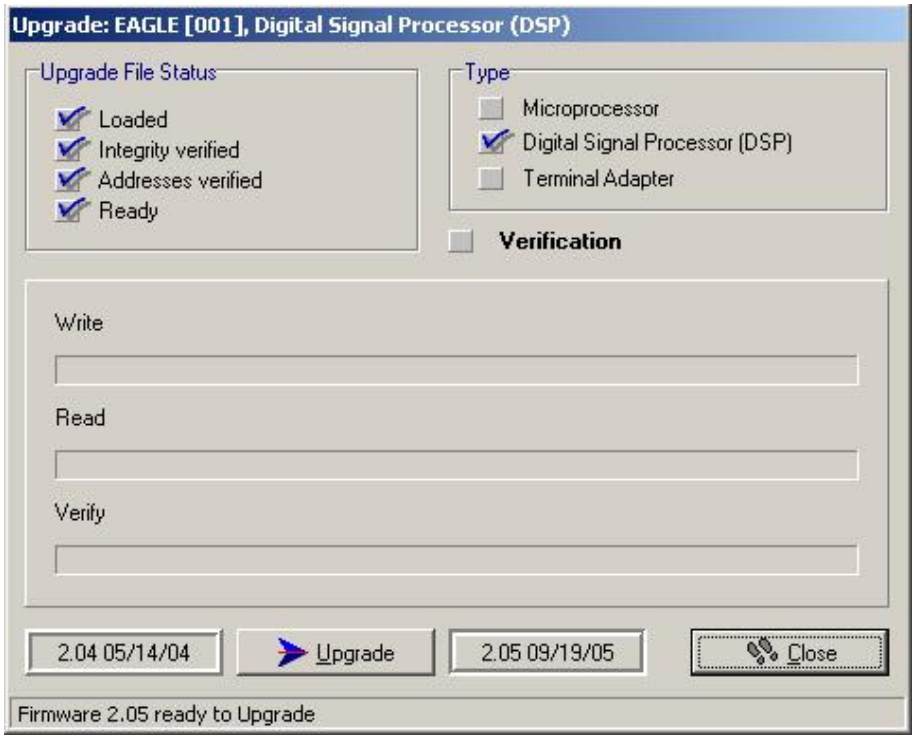
When upgrading process is finished, the software will show a message that indicates the firmware versions of each one of the three modules:



IMPORTANT
The right order to upgrade the modules one by one is DSP – MICRO – TA.

To upgrade one of the modules, you have to select it and click the right button of the mouse. *Open* option appears. When we click this option with the left button, an explorer window appears for specifying the new AFU (AEQ Firmware Upgrade) file.

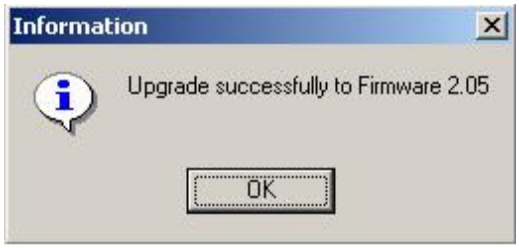
After specifying the path and name of the file, upgrading window opens:



In this picture, 2.04 version of the Digital Signal Processor (DSP) has been detected and it is ready to be upgraded to the 2.05 version.

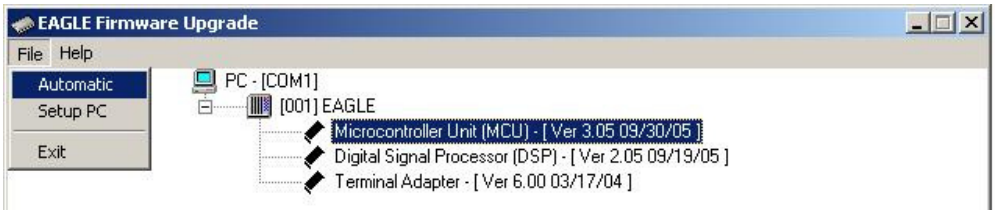
To continue and upgrade, click *Upgrade* option. To cancel, click *Close*.

When upgrading process is finished, the EAGLE will restart-up and the software will show a message that indicates that the new version is active:

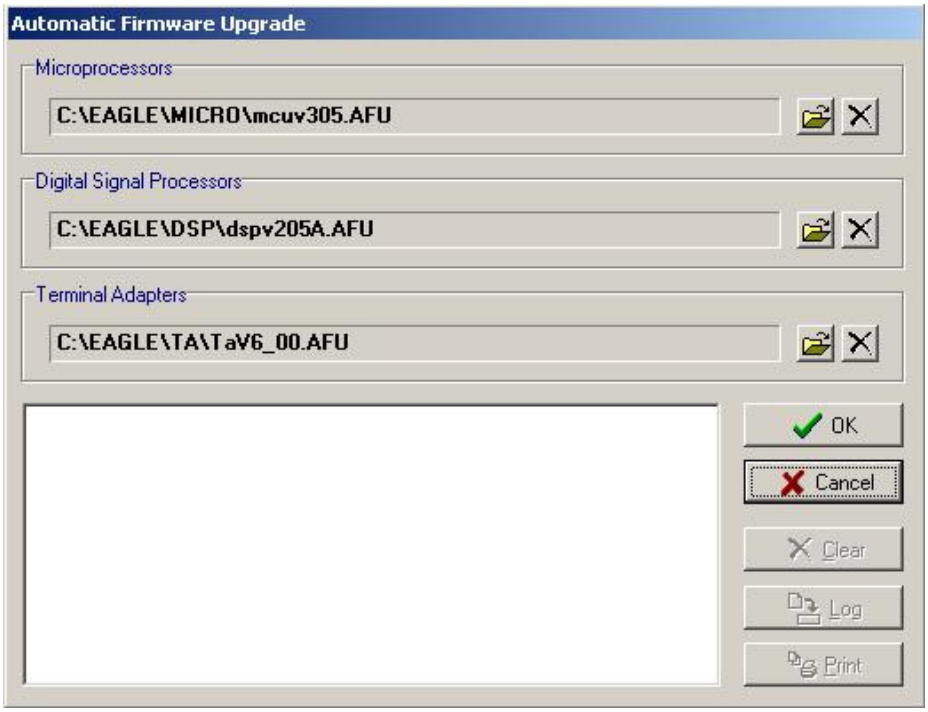


- ***Some new Microprocessor versions need to erase existing configuration, including node number. The EAGLE will loose phone-book and start up configurations and <u>will loose communication with the software</u> so it will be necessary to set this number again before continuing upgrading.***

There is another option in the software that allows running an automatic upgrading process when many EAGLE have to be upgraded. Run *<u>F</u>ile/<u>A</u>utomatic*.



The following window will appear:



Use the icons in the right part of the screen for selecting the new upgrade files to be loaded on the EAGLE and press OK to start.

- ***NOTE:** This procedure will work on equipments that have a Microprocessor version higher than 2.20 because when upgrading from a previous version, a non-volatile memory reset is needed. This reset will set node number to 255 loosing this EAGLE control until node number is set again. If this is the case, the upgrade process should be done manually.*

7.EAGLE TECHNICAL SPECIFICATIONS

Communications interfaces.

ISDN.
-"S" 2B+D Euro ISDN-compatible interface (ETS 300 012, ETS 300 125, ETS 300102), RJ-45 format.
-"U" 2B1Q ANSI-compatible interface (ANSI T1.601-1992, T1.602-1996, T1.607-1998), RJ-11 format.

Point to point (Leased lines)
-RS-422 physical interface, connectable to V.35 or X.21, DB-25 format. Analog input/output.

Protocols Available

Euro ISDN
National-1 under 5ESS AT&T, Northern Telecom DMS-100, and Siemens EWSD

Analog inputs / outputs.

Main Inputs.
-Transformer balanced, with built-in RF filters, female XLR-3.
-Input impedance: > 6 kOhms.
-Maximum level: + 22 dBv.
-24-bit A/D converters.

Intercom Mic Input.
-Transformer balanced, with built-in RF filter, female XLR-3.
-Nominal level: - 50 dBv.

Main outputs.
- Transformer balanced, male XLR-3.
-Output impedance: < 50 Ohms.
-Maximum level: + 22 dBm.
-24-bit D/A converters.

Headphone output.
-Stereo, ¼" jack, with volume control.
-Maximum power: 150 mW.
-Takes 8 or 600 Ohm headphones.

Auxiliary phone interface.
-RJ-11 Connector.
-Power supply: 18 mA CC.
-DTMF Decoder.
-On/off-hook detection.

Digital audio interfaces

- AES/EBU (AES-3), with transformer.
-Sample rates supported: from 16kHz to 48kHz.
-Sample rate converters (SRC): range 1:3 and 3:1, 24 real bits without truncating, independent on inputs and outputs.
-External AES-11 synchronism input.
-Dynamic range in the SRC: 128 dB
-THD + noise in the SRC @1kHz: -117 dB.
-Dual AES/EBU interface for independent mono inputs (with different sample rates), configurable to a single dual input.
-Format: DB-9 connectors.

GPI (general-purpose interface):

- DB-15.
- 2 power pins and 13 factory pre-assigned Input/Output.
- INPUTS:
  - Vih min=2,7V
  - Vih max=50V
  - Vil max=0.8V
  - Vil min=-0,6V
  - Zi(Vi<5V)=110K
  - Zi(Vi>5V)=10K
- OUTPUTS:
  - Open collector
  - Voh max = 50V
  - Vol max (Iol=50mA)=0,8V
  - Iol max = 50mA
- '+5V' OUTPUT:
  - Vo min=4.8V
  - Vo typ=5V
  - Vo max=5,2V
  - Io max=100mA

Other interfaces.

Auxiliary data: DB-9, RS-232, asynchronous, 8 data bits, no parity, 1 stop bit. From 1200 to 9600 bauds.

Remote control: DB-9, multi-point full-duplex RS-422, 38,400.

Power.

Auto-range, from 90 to 250 VAC, 50/60Hz, with automatic power factor correction.
Power consumption: 40VA

Weight:

4.6kg

Dimensions:

Height: 1 u
Depth: 340mm

Standards

Electromagnetic Compatibility EN 50081-1, EN 50082-2.
CE Marking.

8. A.E.Q. GUARANTEE

AEQ guarantees that this product has been designed and manufactured under a certified Quality Assurance System and according to the ISO 9001/2002 Standard. AEQ therefore Guarantees that the necessary test protocols to assure the proper operation and the specified technical characteristics of the product have been followed and accomplished. This includes that the general protocols for design and production and the particular ones for this product are conveniently documented.

1. - The present guarantee does not exclude or limit in any way any legally recognized right of the client.

2. - The period of guarantee is defined to be twelve natural months starting from the date of purchase of the product by the first client. To be able to apply to the established in this guarantee, it is compulsory condition to inform the authorized distributor or –to its effect- an AEQ Sales office or the Technical Service of AEQ within thirty days of the appearance of the defect and within the period of guarantee, as well as to facilitate a copy of the purchase invoice and serial number of the product.

It will be equally necessary the previous and expressed conformity from the AEQ Technical Service for the shipment to AEQ of products for their repair or substitution in application of the present guarantee. In consequence, return of equipment that does not comply with these conditions will not be accepted.

3. -AEQ will at its own cost repair the faulty product once returned, including the necessary labour to carry out such repair, whenever the failure is caused by defects of the materials, design or workmanship. The repair will be carried out in any of the AEQ authorized Technical Service Center. This guarantee does not include the freight charges of the product to or from such Authorized Technical Service Center.

4. – No Extension of the Guarantee Period for repaired product shall be applied. Nor shall a Substituted Products in application of this Guarantee be subject to Guarantee Period Extension.

5. - The present guarantee will not be applicable in the following situations:
Improper use or Contrary use of the product as per the User or Instruction Manual; violent manipulation; exhibition to humidity or extreme thermal or environmental conditions or sudden changes of such conditions; electrical discharges or lightning; oxidation; modifications or not authorized connections; repairs or non-authorized disassembly of the product; spill of liquids or chemical products.

6. - Under no circumstances, whether based upon this Limited Guarantee or otherwise, shall AEQ, S.A. be liable for incidental, special, or consequential damages derived from the use or from the impossibility of using the product.

AEQ shall not be liable for loss of information in the disks or data support that have been altered or found to be inexact, neither for any accidental damage caused by the user or other persons manipulating the product.

ANNEX A.1. IP Connections

- To know the name of a computer inside a LAN network:

From windows desktop, click with mouse right button in NETWORK NEIGBOURHOOD icon and choose the Properties option. Computer name can be found in the Identification tab.

Another possibility is to execute the '**set computername**' command from the MSDOS command interface.

```
C:\>set computername
COMPUTERNAME=OFTECNICA05

C:\>
```

In this example, the name of our computer is *OFTECNICA05.*

- To know the IP address of a computer:

Execute the '**ipconfig**' command from the MSDOS command interface.

```
C:\>ipconfig

Windows NT IP configuration

Ethernet adapter E100B1:

      IP Address . . . . . . . . . : 192.50.11.5
      Subnet mask . . . . . . . . : 255.255.0.0
```

In this example, IP address is 192.50.11.5

- To test IP communication status:

The '**ping**' command is used to know if a remote equipment can be reached via IP, indicating the name or IP address of the remote equipment. This command sends a contact message. If remote equipment is reached, it will reply and response time will be shown:

```
C:\>ping OFTECNICA09

Pinging oftecnica09 [192.50.11.5] with 32 data bytes:

Response from 192.50.11.5: bytes=32 time<10ms TDV=128
Response from 192.50.11.5: bytes=32 time<10ms TDV=128
Response from 192.50.11.5: bytes=32 time<10ms TDV=128
Response from 192.50.11.5: bytes=32 time<10ms TDV=128
```

In this case, 4 messages have been sent and replied in less than 10 milliseconds to a computer named 'OFTECNICA09' which IP address is the 192.50.11.5

> **NOTE:** Response time depends on many facts. IP distance between them and network traffic are the most important ones. Therefore, in a remote connection over the INTERNET, response time will be higher than the one in a LAN connection.

In case that response time is very high or there is no response, contact your systems administrator to check the network connection

A.2. ISDN NATIONAL-1 communications guide (USA)

1.- Notes about the ISDN and the peculiarities of the different types of ISDN

1.1.- Generalities about the ISDN

The ISDN (Integrated Services Digital Network) is a telephone connection system that permits the establishment of fully digital end-to-end communications.
There are two types of ISDN links, depending on the number of 64 Kbps channels: Basic links (BRI – Basic Rate Interface) and Primary links (PRI – Primary Rate Interface).

Basic links allow the simultaneous establishment of two connections or data channels, each with a capacity of 64Kbps.

Primary links allow 23 - 64 Kbps channels to be established in the USA, and 31 - 64Kbps channels in Europe.

To access ISDN services, you must subscribe to an ISDN phone line and connect equipment to it, such as an audio codec, that has an ISDN Terminal Adapter device to perform the tasks of establishing and maintaining connections through digital ISDN phone lines.

The Eagle has an ISDN Terminal Adapter for Basic links (BRI), which gives it a communications capacity of two independent 64 Kbps data channels. Eagle allows these channels to be grouped into a single 128 Kbps channel, doubling the bandwidth and the communications cost.

1.2.- Types of connection to Basic ISDN Links

We can find two types of physical connection to the ISDN: connection to a type U interface, and connection to a type S/T interface.

The U interface connects the telephone exchange with the subscriber. It has two wires; the same as in conventional analog telephony, and only allows a point-to-point connection (a single device connected to the interface).

The S/T interface is obtained from the U interface, passing it through a Network Terminator (NT1) located at the subscriber's premises. It has four wires and allows a multipoint connection of up to 7 devices.

In the USA, phone companies do not supply the NT1, so the user is the one who must install it if he wants it. The most common situation is for there to be no NT1, and therefore access is through a U interface.

In summary, in the USA, access via a U interface is most common, unless the subscriber has asked the phone company to install an NT1 or has installed it himself (the NT1 is usually a box attached to the wall, with a power supply, and some kind of light indicator, to which the two-wire external line enters and which has RJ-45 jacks).

The Eagle's universal TA (terminal adapter) allows both types of connections, and thus has two ISDN connectors, one marked ETSI (RJ-45, 8 pins) for the S/T interface connection, and the other marked ANSI (RJ-11, 6 pins) for the type U interface connection. The type of connection used must be configured in the unit's setup.

1.3.- Protocol

Although the ISDN is supposed to be a standard, differences can be found between the protocols used by different countries.

In the USA, there are several protocols that are incompatible with each other; fortunately, however, there is one protocol that is fairly standardized (called **National-1**), which is usually available at all exchanges.

The Eagle's Universal Terminal Adapter can work with the NATIONAL-1 protocol (the most widely used in the USA). Selection of the desired protocol, in our case the NATIONAL-1, must be configured in the unit's setup.

In Europe and in other geographic areas, there is a protocol called **EURO ISDN**. There are minor differences between the EURO ISDN in different countries. These differences do not affect the Eagle.

1.4.- Directory Numbers (DN's)

These are the telephone directory numbers assigned to the line.

In the **National-1** protocol, there will be two numbers, each associated with one of the line's channels. These numbers must be programmed in the unit for it to work correctly "NUMBER LINE X" option) and therefore, each channel will only respond to its associated number (Note: In the USA, the directory number that must be programmed in the terminal should not contain the area code, in other words, use only the seven-digit local number.)

If the directory numbers are programmed incorrectly in the unit, it will be able to make outgoing calls but will not respond to incoming calls.

1.5.- SPID's (Service Profile Identification Numbers)

In the case of the NATIONAL-1 protocol, the SPID's (Service Profile Identification Number) as well as the directory numbers (DN's) must be programmed in the terminal. SPID's are numbers that the phone company assigns, which are associated with each of the line's two channels. If the SPID's are not configured correctly, the terminal will not work.

1.6.- Line characteristics for the USA. Model line request.

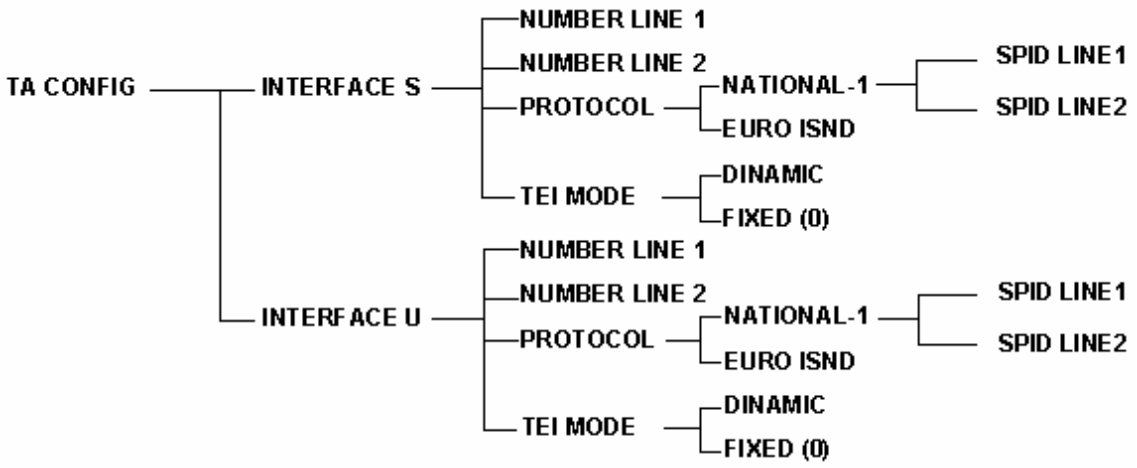
In the case of the USA, ISDN lines have many configurable parameters, such as the protocol used, number of channels, type of call the channels accept (analog and digital, only analog, etc.), etc.
To ensure that the line's characteristics are appropriate for use with the Eagle, we recommend you use the line request model of ANNEX A-9 to request it:

2.- Connecting the Eagle to the ISDN line

If the U interface is to be used (more common in the USA), the line will be connected to the RJ-11 jack (6 pins) on the back of the equipment marked ISDN-ANSI, using a 6-pin modular telephone cable (RJ-11 to RJ-11). Note that the connection point to the U interface provided by the phone company may be a 6-pin RJ-11 type jack or an 8-pin RJ-45 type (the standard allows both types). *If the jack provided is an RJ-45 type, the RJ-11 connector (6 pins) on the cable may be inserted into the center of the RJ-45 jack (8 pins)*.

3.- Configuration Parameters for the Eagle TA

3.1.- Terminal Adapter Configuration Menu



3.1.1.- ISDN U / ISDN S Selection

```
SETUP->TA CONFIG->ISDN U <*>  (*indicates the option selected)
                 ISDN S < >
```

ISDN U should be selected if the U interface has been used (RJ-11 jack marked ISDN-ANSI). If this option is configured incorrectly, the effect will be the same as if we did not have an ISDN line connected ("Inactive" status with National-1 protocol).

3.1.2.- TEI MODE Configuration

```
SETUP->TA CONFIG-> ISDN X <*>-> TEI MODE -> DYNAMIC <*>
                                            FIXED   < >
```

The **TEI** (**Terminal Endpoint Identification**) is an identification number used in the signaling protocol to identify each terminal connected to the same ISDN line.
The "TEI MODE" parameter allows the assignment of the TEI identifier to be configured as DYNAMIC or FIXED mode. *The dynamic mode lets the network assign the TEI. In the fixed mode, the terminal forces a TEI = 0.*
The choice of one mode or the other is only important in some special types of lines that only allow one of the two possibilities. In general, this parameter will be left in the DYNAMIC mode.

3.1.3.- PROTOCOL Configuration

```
SETUP->TA CONFIG-> ISDN X <*>-> PROTOCOL -> NATIONAL-1 <*>
                                           EUROISDN   < >
```

This defines the protocol used by the Terminal Adapter. There are two options: the NATIONAL-1, which is the one most used in the USA, and the EUROISDN, which is the standard protocol in Europe.

When the National-1 protocol is configured, the line status will go through several stages before reaching "Ready." First it will show "Inactive," indicating that the line is in the process of activation, then it will show "SPID pending," indicating that the line has been activated and is in the process of sending the SPID's; and finally, it will show "Ready" if the SPID has been sent correctly, or "SPID error" if the exchange did not recognize the SPID.

When the EUROISDN protocol is configured, the line status will go directly to "Ready".

If the EUROISDN protocol is configured by mistake on a line with National-1 protocol, the line status will go directly to "Ready" (it will not go through the SPID-sending stages) and the unit will not work properly (incoming calls may work but not outgoing ones, calls may work on one channel but not on the other, etc.).

3.1.4.- NUMBER LINE 1 and NUMBER LINE 2

```
SETUP-> TA CONFIG-> ISDN X <*>-> NUMBER LINE 1 ->  "Number Channel 1"
SETUP-> TA CONFIG-> ISDN X <*>-> NUMBER LINE 2 ->  "Number Channel 2"
```

These define the Directory Numbers (DN's) for each of the ISDN line's channels. If the National-1 protocol is being used, their configuration is mandatory. If EUROISDN is being used, their configuration is optional (they can be left blank). If a number is programmed for a certain channel, that channel will only respond to incoming calls made to that number.

If these numbers are programmed incorrectly, the unit will allow outgoing calls but will not receive calls.

Note: In the USA, the directory number to be programmed in the terminal should not contain the area code, i.e., only the seven-digit local number should be used.

SPID LINE 1 and SPID LINE 2 (only for NATIONAL-1 protocol)

```
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1-> SPID LINE 1 = "Number"
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1-> SPID LINE 2 = "Number"
```

These define the SPID's for each of the channels. The SPID's are associated with each of the channels and are provided by the phone company. Usually, the SPID's are made up of the "**area code + directory number + 0101**," but there may be many other variations, so it is important to get these from the phone company.

If the SPID's are programmed incorrectly, the line status will show "SPID error" and the unit will not allow calls to be made.

3.2.- Configuration summary for the Eagle TA

USA configuration summary

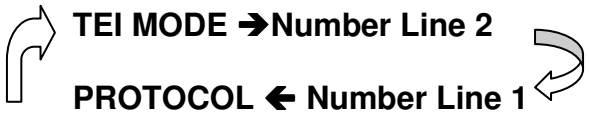
```
TA CONFIG-> ISDN U <*>     (type U interfaces are the most common)
TA CONFIG-> ISDN U <*>-> TEI MODE-> DYNAMIC <*>
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1 <*>
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1-> SPID LINE 1 = "First SPID"
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1-> SPID LINE 2 = "Second SPID"
TA CONFIG-> ISDN U <*>-> NUMBER LINE 1 = First line number without area code
TA CONFIG-> ISDN U <*>-> NUMBER LINE 2 = Second line number without area code
```

Europe configuration summary

```
TA CONFIG-> ISDN S <*>
TA CONFIG-> ISDN S <*>-> TEI MODE-> DYNAMIC <*>
TA CONFIG-> ISDN S <*>-> PROTOCOL-> EUROISDN <*>
TA CONFIG-> ISDN S <*>-> NUMBER LINE 1 = (Optional) "First line number"
TA CONFIG-> ISDN S <*>-> NUMBER LINE 2 = (Optional) "Second line number"
```

CONDENSED USER GUIDE FOR THE "U" INTERFACE TERMINAL ADAPTER CONFIGURATION

TA CONFIG ➔ ISDN U [◆] press blue button OK
Then with the Yellow keys you may select:



TA CONFIG ➔ ISDN U [◆] (press blue button OK)➔ TEI MODE (press blue button OK)➔ select DYNAMIC [◆]

TA CONFIG ➔ ISDN U [◆](press blue button OK)➔(with UP/DOWN Yellow Key select) PROTOCOL (press blue button OK)➔ select NATIONAL-1 [◆]

TA CONFIG ➔ ISDN U [◆] ➔ PROTOCOL➔ NATIONAL-1 (press blue button OK)➔(with UP/DOWN Yellow Key select SPID 1 or 2) ➔ SPID LINE 1 = "First SPID #"

TA CONFIG-> ISDN U [◆] ➔ PROTOCOL ➔ NATIONAL-1 (press blue button OK)➔(with UP/DOWN Yellow Key select SPID 1 or 2) ➔ SPID LINE 2 = "Second SPID #"

TA CONFIG ➔ ISDN U [◆]➔ NUMBER LINE 1 (press blue button OK)= Phone number for line 1

TA CONFIG-> ISDN U [◆] ➔ NUMBER LINE 2 (press blue button OK)= Phone number for line 2

A.3. EUROISDN communications guide (EUROPE)

1.- Notes about the ISDN and the peculiarities of the different types of ISDN

1.1.- Generalities about the ISDN

The ISDN (Integrated Services Digital Network) is a telephone connection system that permits the establishment of fully digital end-to-end communications.
There are two types of ISDN links, depending on the number of 64 Kbps channels: Basic links (BRI – Basic Rate Interface) and Primary links (PRI – Primary Rate Interface).

Basic links allow the simultaneous establishment of two connections or data channels, each with a capacity of 64Kbps.

Primary links allow 31 – 64 Kbps channels to be established in Europe and 23 - 64 Kbps channels in USA.

To access ISDN services, you must subscribe to an ISDN phone line and connect equipment to it, such as an audio codec, that has an ISDN Terminal Adapter device to perform the tasks of establishing and maintaining connections through digital ISDN phone lines.

The Eagle has an ISDN Terminal Adapter for Basic links (BRI), which gives it a communications capacity of two independent 64 Kbps data channels. Eagle allows these channels to be grouped into a single 128 Kbps channel, doubling the bandwidth and the communications cost.

1.2.- Types of connection to Basic ISDN Links

We can find two types of physical connection to the ISDN: connection to a type U interface, and connection to a type S/T interface.

The U interface connects the telephone exchange with the subscriber. It has two wires; the same as in conventional analog line (telephony), and only allows a point-to-point connection (a single device connected to the interface).

The S/T interface is obtained from the U interface, passing it through a Network Terminator (NT1) located at the subscriber's premises. It has four wires and allows a multipoint connection of up to 7 devices.

In Europe, phone companies put the NT1 directly on the subscriber's premises, and force access through the S/T interface.

In summary, access in Europe is always through the S/T interface. This is made up of two transmit lines, one for each direction of the communication, and each of the lines must have a load of 100 ohms at each end. At the NT1 end, the NT1 itself gives the load. At the other end, the load may be located at some point on the bus cabling (usually on the connector furthest from the NT1) or inside one of the pieces of equipment connected to it. The Eagle has two internal jumpers that allow you to configure whether the termination will be made inside the equipment or not. By default (factory configuration), these jumpers are set, with the termination being made (100 ohms load) in both directions inside the equipment.

In the USA, phone companies do not supply the NT1, so the user is the one who must install it if he wants it. The most common situation is for there to be no NT1, and therefore access is through a U interface.

The Eagle's universal TA (terminal adapter) allows both types of connections, and thus has two ISDN connectors, one marked ETSI (RJ-45, 8 pins) for the S/T interface connection, and the other marked ANSI (RJ-11, 6 pins) for the type U interface connection. The type of connection used must be configured in the unit's setup.

1.3.- Protocol

Although the ISDN is supposed to be a standard, differences can be found between the protocols used by different countries.

In Europe and in other geographic areas, there is a protocol called **EURO ISDN**. There are minor differences between the EURO ISDN in different countries. These differences do not affect the Eagle.

1.4.- Directory Numbers (DN's)

These are the telephone directory numbers assigned to the line.

In the case of the EUROISDN protocol, there may be one or several directory numbers, depending on the configuration of the line; these numbers are not associated with either of the two communication channels, unless this association is specifically made by programming them in the Terminal Adapter. In the case of the Eagle, the directory numbers are programmed in the "NUMBER LINE X" Terminal Adapter configuration options. If the numbers are not programmed in the terminal (NUMBER LINE X options blank), any of the directory numbers can be used to call either of the equipment's channels, with the general rule being that the call will enter through channel 1 if it's free, and otherwise will enter through 2. If a number is programmed for a certain channel, that channel will only respond to calls made to that number.

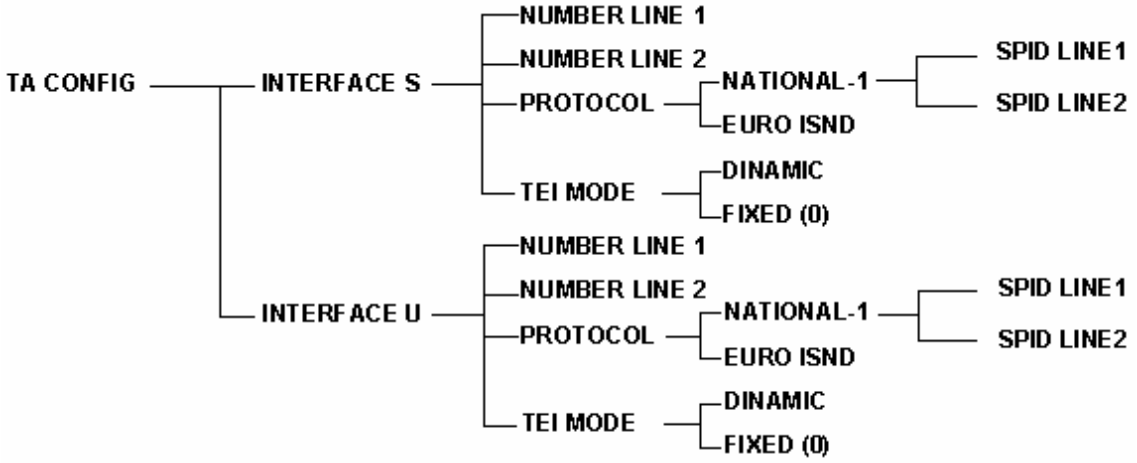
If the directory numbers are programmed incorrectly in the unit, it will be able to make outgoing calls but will not respond to incoming calls.

2.- Connecting the Eagle to the ISDN line

If the physical interface used is the S/T (Europe), the line will be connected to the RJ-45 jack (8 pins) marked ISDN-ETSI on the back of the equipment, using an 8-wire modular phone cable (RJ-45 to RJ-45).

3.- Configuration Parameters for the Eagle TA

3.1.- Terminal Adapter Configuration Menu



3.1.1.- ISDN U / ISDN S Selection

```
SETUP->TA CONFIG->ISDN U <*>  (* indicates the option selected)
                 ISDN S < >
```

Allows the type of physical interface used for the connection to the ISDN to be configured. If the S interface has been used (RJ-45 connector marked ISDN-ETSI), select ISDN S, and if the U interface has been used (RJ-11 connector marked ISDN-ANSI), select ISDN U.
If this option is configured incorrectly, the effect will be the same as if we did not have the ISDN line connected ("Inactive" status with National-1 protocol and "ISDN Link Error" message when trying to make a call with EUROISDN protocol).

3.1.2.- TEI MODE Configuration

```
SETUP->TA CONFIG-> ISDN X <*>-> TEI MODE -> DYNAMIC <*>
                                            FIXED   < >
```

The **TEI** (**Terminal Endpoint Identification**) is an identification number used in the signaling protocol to identify each terminal connected to the same ISDN line.
The "TEI MODE" parameter allows the assignment of the TEI identifier to be configured as DYNAMIC or FIXED mode. *The dynamic mode lets the network assign the TEI. In the fixed mode, the terminal forces a TEI = 0.*
The choice of one mode or the other is only important in some special types of lines that only allow one of the two possibilities. In general, this parameter will be left in the DYNAMIC mode.

3.1.3.- PROTOCOL Configuration

```
SETUP->TA CONFIG-> ISDN X <*>-> PROTOCOL -> NATIONAL-1 <*>
                                            EUROISDN   < >
```

This defines the protocol used by the Terminal Adapter. There are two options: the NATIONAL-1, which is the one most used in the USA, and the EUROISDN, which is the standard protocol in Europe.

When the National-1 protocol is configured, the line status will go through several stages before reaching "Ready." First it will show "Inactive," indicating that the line is in the process of activation, then it will show "SPID pending," indicating that the line has been activated and is in the process of sending the SPID's; and finally, it will show "Ready" if the SPID has been sent correctly, or "SPID error" if the exchange did not recognize the SPID.

When the EUROISDN protocol is configured, the line status will go directly to "Ready."

If the NATIONAL-1 protocol is configured by mistake on a line with EUROISDN protocol, the line status will continue to show "Inactive" or "SPID pending," and calls cannot be made.

3.1.4.- NUMBER LINE 1 and NUMBER LINE 2

```
SETUP-> TA CONFIG-> ISDN X <*>-> NUMBER LINE 1 ->  "Number Channel 1"

SETUP-> TA CONFIG-> ISDN X <*>-> NUMBER LINE 2 ->  "Number Channel 2"
```

These define the Directory Numbers (DN's) for each of the ISDN line's channels. If the National-1 protocol is being used, their configuration is mandatory. If EUROISDN is being used, their configuration is optional (they can be left blank). If a number is programmed for a certain channel, that channel will only respond to incoming calls made to that number.
If these numbers are programmed incorrectly, the unit will allow outgoing calls but will not receive calls.

SPID LINE 1 and SPID LINE 2 (only for NATIONAL-1 protocol), not applicable for EURO ISDN protocol).

3.2.- Configuration summary for the Eagle TA

Europe configuration summary

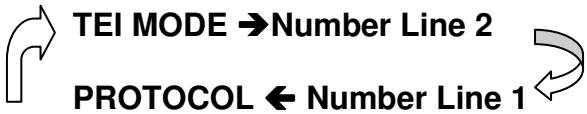
```
TA CONFIG-> ISDN S <*>
TA CONFIG-> ISDN S <*>-> TEI MODE-> DINAMIC <*>
TA CONFIG-> ISDN S <*>-> PROTOCOL-> EUROISDN <*>
TA CONFIG-> ISDN S <*>-> NUMBER LINE 1 = (Optional) "First line number"
TA CONFIG-> ISDN S <*>-> NUMBER LINE 2 = (Optional) "Second line number"
```

USA configuration summary

```
TA CONFIG-> ISDN U <*>     (type U interfaces are the most common)
TA CONFIG-> ISDN U <*>-> TEI MODE-> DYNAMIC <*>
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1 <*>
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1-> SPID LINE 1 = "First SPID"
TA CONFIG-> ISDN U <*>-> PROTOCOL-> NATIONAL-1-> SPID LINE 2 = "Second SPID"
TA CONFIG-> ISDN U <*>-> NUMBER LINE 1 = First line number
TA CONFIG-> ISDN U <*>-> NUMBER LINE 2 = Second line number
```

CONDENSED USER GUIDE FOR THE "S" INTERFACE TERMINAL ADAPTER CONFIGURATION

TA CONFIG ➔ ISDN S [◆] press the blue button OK
Then with the Yellow keys you may select:



TA CONFIG ➔ ISDN S [◆] (press blue button OK)➔ TEI MODE (press green button OK)➔ select DYNAMIC [◆]

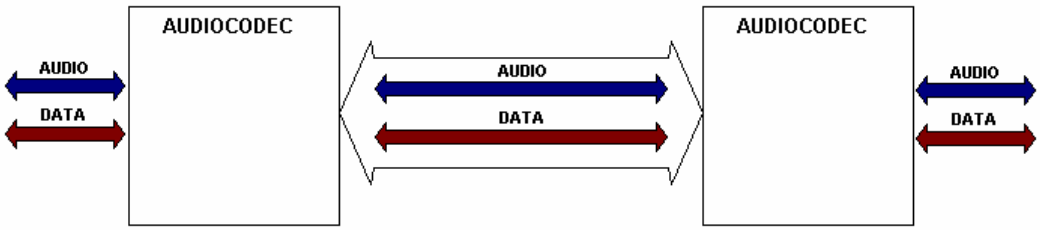
TA CONFIG ➔ ISDN U [◆](press blue button OK)➔(with UP/DOWN Yellow Key select) PROTOCOL (press blue button OK)➔ select EUROISDN [◆]

TA CONFIG ➔ ISDN S [◆]➔ NUMBER LINE 1 (press blue button OK)= Phone number for line 1 as provided by the Telecom Company

TA CONFIG-> ISDN U [◆] ➔ NUMBER LINE 2 (press blue button OK)= Phone number for line 2 as provided by the Telecom Company

A.4. ANCILLARY DATA CHANNEL

AEQ audio codecs have the capability of inserting a configurable, two-way, transparent end-to-end auxiliary data channel in communications that have been established.

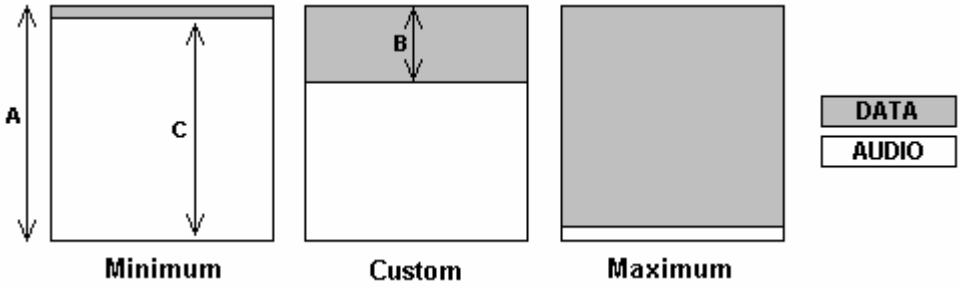


The link used by audio codecs on which the data channel is defined may be ISDN (64 Kbps or 128 Kbps), or using the V35/X21 interface (64 Kbps, 128 Kbps or 256 Kbps in some models) connected to modems or external terminal adapters.

AEQ's first generations of audio codecs (ACD3001, ACD5001, MPAC-02, TLE-02D) already had this feature incorporated, but they only had a limited number of binary speeds that could be assigned to that data channel (300, 1200, 4800, 9600 bauds).

The new generation of audio codecs (EAGLE, COURSE, SWING) improves and expands the use and configuration capabilities of the data channel.

The new AEQ audio codecs use the capacity of the channel available for the transmission of audio circuits, and are also able to model a transparent data channel, as represented in the following diagram:



A – Represents the channel capacity or bandwidth available in the link. It may be 64 kbps, 128 kbps or 256 kbps.

B – Represents the effective bit rate of the data channel or the part of the bandwidth available in the link used for inserting the data channel (configurable by the user).

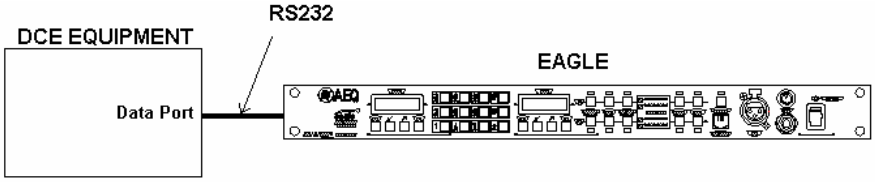
C – Represents the bit rate available for transmitting audio. The audio codec transmits the audio, compressing it according to the available bit rate.

- If data channels with reduced binary rates are used, there is no perceptible degradation of quality in the audio signal transmitted.

PORT CONFIGURATION

The external device that transmits and/or receives data through the data channel will be connected to the audio codec using the RS232 ANCILLARY PORTS; a RS232 cable like this will be used:

PC	***EAGLE***
Tx	**Tx**
Rx	**Rx**
GND	**GND**
CTS	**RTS**
RTS	**CTS**



- *Consult ANCILLARY CHANNELS pinout in chapter 3.1 of this manual.*

HARDWARE CONFIGURATION

There are two operating modes of the data channel.

a) Variable –software controlled- speed:
The serial data port of the external equipment must be configured at the maximum speed (115200 bauds). Software will determine the effective speed of the data transmission. External equipment should be configured in the following way:

- **115200** bits per second. (Note that this speed is fixed and independent of the bit rate of the (A) channel and of the effective transmission bit rate of the data channel (B).)
- **8** data bits
- **1** stop bit
- **No** parity
- Flow control: **Hardware**

When a PC is used as a data terminal, the audio codec can be connected directly to a COM serial port. If another type of device that has a configuration other than the one specified is used, it will be necessary to place an RS232 BAUD RATE CONVERTER between the audio codec and the device. This device can be easily found in the market.

b) Fixed speed:
Physical connection between the EAGLE and the external device will be done using a fixed baud rate equal to the effective baud-rate of the transmission, that can be 1200, 2400, 4800 or 9600 bauds.

SOFTWARE CONFIGURATION

The software configuration of the Eagle's data channel is performed by selecting:

- The effective bit rate.
- Enabling the data channel: tx or rx direction, or both.

To select the effective bit rate in the variable speed configuration, there are three possible modes, accessible in the configuration menu: Minimum, Maximum and Custom. The latter is programmed from the control software in real time, and is a value between the minimum value and the maximum value defined for each case. For the fixed speed connections, the selection between 1200/2400/4800 and 9600 can be done in the same menu.

Enabling or disabling the data channel is also available in the configuration menu of the audio codecs.

In summary:

- The external equipment will be connected with a fixed baud rate of 115200 or 9600 or 4800 or 2400 or 1200 bps to the ANCILLARY port of the audio codec.

- The audio codec will establish a permanent link at 256 Kbps, 128 Kbps or 64 Kbps with the remote audio codec, selecting an operating (audio encoding) mode that allows the use of the data channel.

- Configuration of the data channel will be done selecting the effective bit rate, and enabling tx, rx or both.

AEQ AUDIO CODECS

The ***EAGLE*** audio codec has TWO independent ancillary ports. This means that both ports can operate simultaneously.

- ***Ancillary data port1*** is available in the following modes:
  - MPEG128, MPEG256,
  - MPEG64, G722/H221 and AEQ3.5 on circuit 1

- ***Ancillary data port2*** is available in the following modes:
  - MPEG64 on circuit 2

In G711, G722 STAT and AEQ LD-2 audio encoding modes, the auxiliary data channel is not available.

The ***COURSE*** has a SINGLE ancillary port for each audio codec card, and is available in the following modes:

- MPEG128, MPEG256,
- MPEG64, G722/H221 and AEQ3.5 on circuit 1
- MPEG64, G722/H221 and AEQ3.5 on circuit 2

In G711, G722 STAT and AEQ LD-2 audio encoding modes, the auxiliary data channel is not available.

The ***SWING*** portable audio codec has a SINGLE ancillary port, and is available in the following modes:

- MPEG128,
- MPEG64, G722/H221 and AEQ3.5

In G711, G722 STAT and AEQ LD-2 audio encoding modes, the auxiliary data channel is not available.

CONFIGURATION OF THE *EFFECTIVE BIT RATE* IN THE DIFFERENT MODES

To select the effective bit rate through the software, there are three possible modes:

Minimum: The data channel has an effective bit rate of 1200 bauds. In this mode, compatibility is maintained with earlier models of audio codecs (ACD5001 and MPAC02) in MPEG 64 Kbps and 128 Kbps modes.

Maximum: The bandwidth for the data channel occupies nearly all of the link's capacity, so the audio transmitted is very low quality or non-existent.

Custom: The effective bit rate for the data-channel is *programmed by the user* through *REAL TIME CONTROL* software. According to the type of encoding chosen, a menu is displayed with the effective bit rate values that can be selected. The greater the capacity of the data channel, the smaller the channel capacity for the audio circuits, and the lower the audio quality.

In H221-H242 mode, compatibility with the ACD5001, MPAC-02 and TLE-02D is achieved by using CUSTOM programming with a value of 0.

In G722, H221-H242 and AEQ3.5 modes, it is important to select the same effective bit rate at both ends.

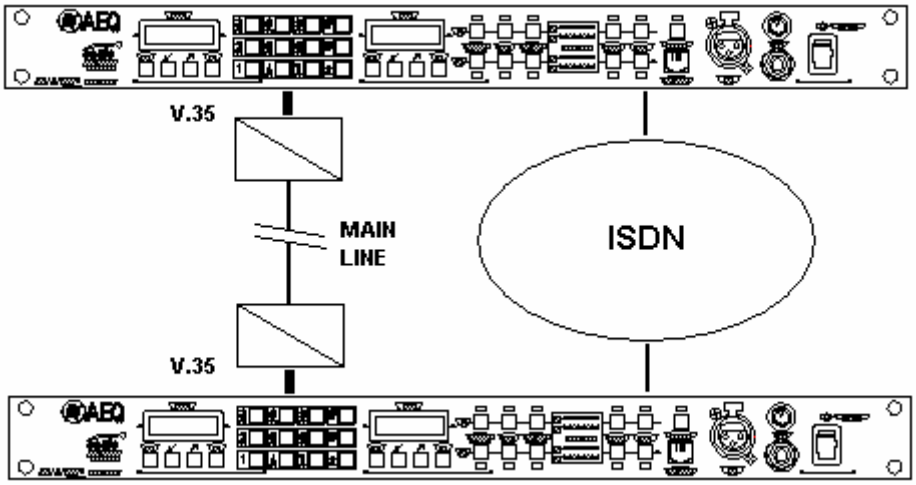
EXAMPLES

A) When you want to transmit a data channel at **19200** between two PC's through a communication between two **EAGLES**, you must:
   - Configure the serial port on both PC's at 115200.
   - Program the next higher effective bit rate after 19200 (for example, 20000 on a 64K circuit using MPEG48MONO) with the *REAL TIME CONTROL* software.
   - Select CUSTOM
   - Select ENABLE on both EAGLES (Enable Tx, and Rx)

B) When you want to communicate two pieces of data equipment that use a **hardware** serial port at **2400** bauds through a communication between two **EAGLES**,
   - Connect the EAGLEs to the data equipment through the RS232 port.
   - Select 2400
   - Select ENABLE on both EAGLES (Enable Tx, and Rx)

A-5 ISDN BACKUP FACILITY.

A new operating mode allows using the EAGLE over leased lines through the v35 port, in the way that, if this connection fails, the codec will detect it and automatically make an ISDN call as a 'backup' line of the main one, so the audio link is restored.
Setting microswitch #1 in the UP position activates this mode.
To deactivate this mode, this switch has to be set DOWN.
All changes will be effective next time the EAGLE starts up.



In this mode, two of the automatic start-up configurations are reserved, number C30 for the V35 start-up and C31 for the ISDN backup start-up.

- ***See microswitches positions in chapter 3.2.***
- ***See chapters 4.2 and 5.3.1.3 to know how to program an automatic start up position through EAGLE front panel or through the real time control software.***

The V35 main connection configuration has to be stored in automatic start-up number 30 and ISDN backup connection has to be stored in automatic start-up number 31.

- Configuration C30 of both EAGLE units has to be the same.
- Configuration C31 of the EAGLE that generates the ISDN call in case of v.35 failure has to include the number(s) to call and the AUTOCALL feature has to be active (This is necessary for the codec to be able to make the ISDN call automatically).
- Configuration C31 of the EAGLE that receives the ISDN call in case of v.35 failure is the same as the other EAGLE, but in this case no number has to be stored and AUTOCALL has to be off.

- **In all configurations, ANALOG CONFIG has to be set to "ON AIR". Then, the ON AIR key will be on when the equipment starts-up.**

Once the configuration is done, micro-switches 1, 4, 5, 6 and 7 in the EAGLE units will be set UP and 2, 3 and 8 DOWN. This selects backup and C30 main connection. When both EAGLE are turned on, they will connect through the main V.35 connection.

Both EAGLE will monitor the V.35 clock signal in the interface. If the V.35 clock signal is not detected during 5 consecutive seconds (connection lost), the EAGLE will restart using C31 configuration (ISDN).

It is necessary to ensure that in case of line failure, local and remote equipment loose v35 clock signal. Otherwise, the EAGLE could not detect line failure. Ask your v.35 Terminal provider for this feature.

The EAGLE will monitor v.35 clock signal and will stop ISDN communication and re-start to restore main v.35 connection five seconds after it detects v35 clock signal is again in the interface.

- *The V.35 connection has the higher priority because the ISDN is used only when the main connection fails.*

- *The EAGLE that receives the call has to be configured as automatic off-hook.*

- *In order to test that backup system works, we recommend to turn off v.35 terminal.* **Never disconnect v.35 connector when the equipment is on.**

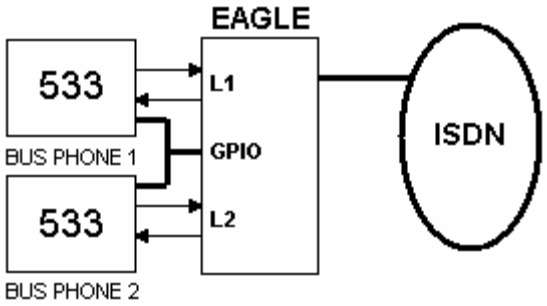
- In case that the test is not succesfully, check the following:
  - make sure that both audiocodec work fine when connected in the V.35 line.
  - make sure that both audiocodec work fine when connected in the ISDN line.
  - make sure that both audiocodec detect the line failure.
  - make sure that both audiocodec have the same firmware versions and these accept the backup facility. Version must be higher than MCU 2.20 / DSP 1.10 / TA 4.09

A.6. Installation of the EAGLE as an ISDN hybrid.

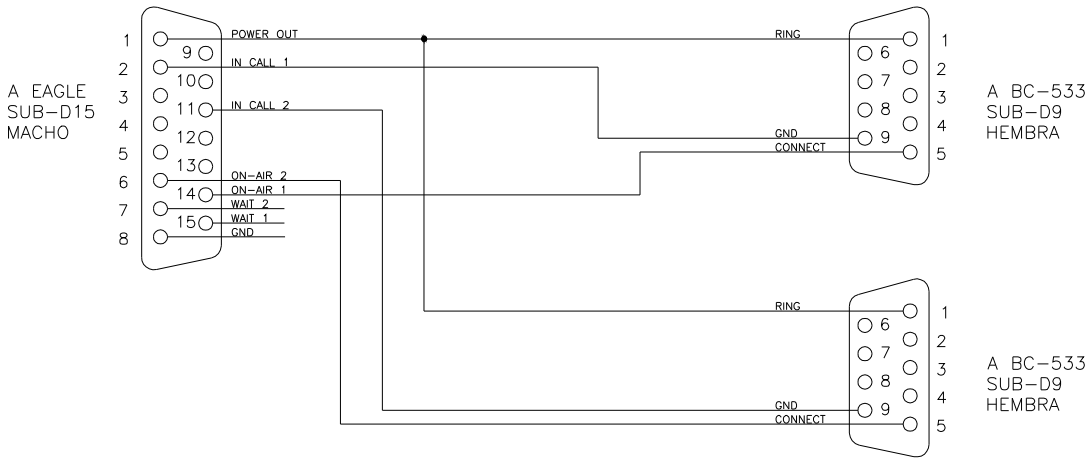
In some cases, the EAGLE audio codec is installed in a radio studio in order to replace an analog hybrid, as the AEQ TH-02 Ex MkII, for using ISDN lines.

Connection of an EAGLE to an AEQ BC-500 MIXER:

In order to connect an EAGLE to a BC-500 mixer, two BC533 (without internal hybrid) modules are used. First audio channel input and output will be connected to the first BC533 (Configured as PHONE 1 bus). Second channel input and output will be connected to the second BC533 module (Configured as PHONE 2 bus).



In order to control the EAGLE hybrid features from the broadcast mixer, the GPIO port will be used. Programming bridges of the BC533 have to be configured this way:
PDP3: ON
PDP4 and PDP5: OFF (removed)
The following cable diagram will carry control signals:

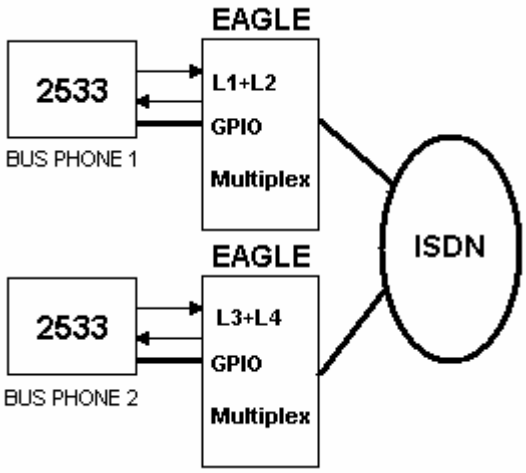


In this configuration, there are two possible operating ways:
- As two independent lines: Each EAGLE channel will be controlled by each BC533.
- As MULTIPLEX: By pressing the MULTIPLEX FEATURE in the EAGLE, both ISDN channels will be mixed together and get into the mixer through the first BC533. The PHONE 1 bus signal will be sent to both ISDN communications.

Connection of an EAGLE to an AEQ BC-2500 MIXER:

In order to connect an EAGLE to a BC-2500 Mixer for using the hybrid features, module BC2533 is used. It is possible to connect the EAGLE to one BC2533 or two BC2533.

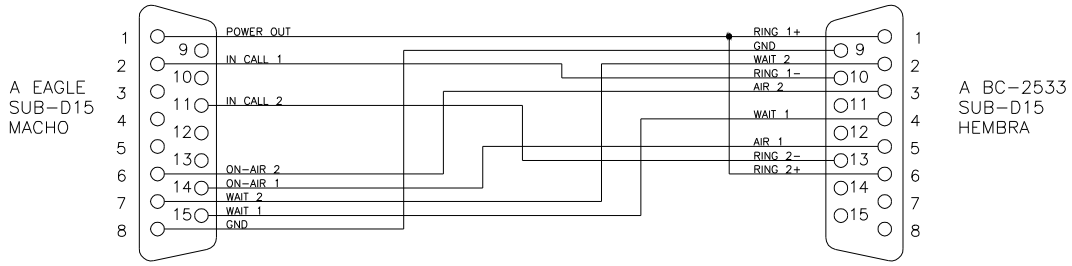
Connection of an EAGLE to ONE BC-2533 channel:



In this configuration, with two BC2533 and two EAGLES, there can be up to 4 calls in conference.

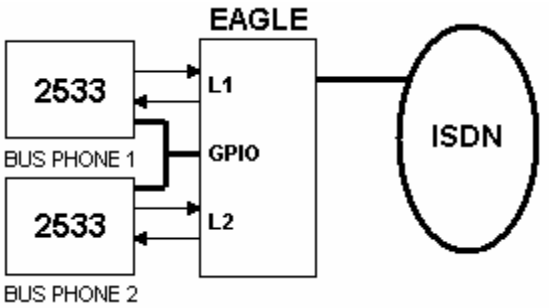
As the BC2533 has only one audio input and output, it will be connected to EAGLE first line. The EAGLE has to be set to MULTIPLEX. This way it is possible to have 2 communications in conference though this module.

In order to configure remote control, the following programming bridges of the BC2533 has to be set:
PDP 7 and 10: ON
PDP 8, 9, 11 and 12: OFF (removed)
Control cable pinout would be:



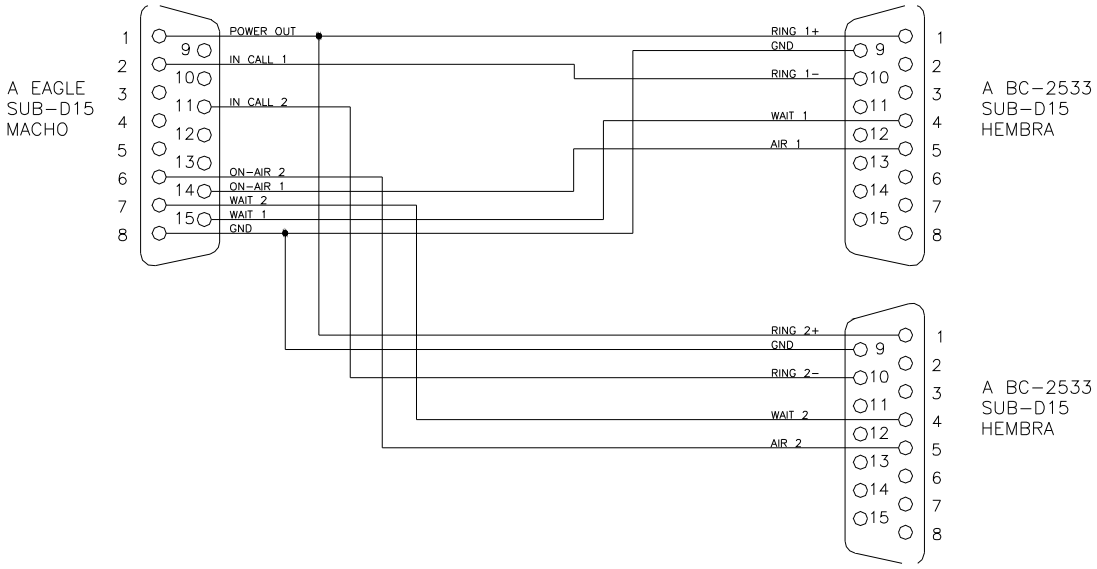
Connection of an EAGLE to TWO BC-2533 channel:

In this case, both channels will be used as independet and the mixer will do the multiplex in case it is needed.

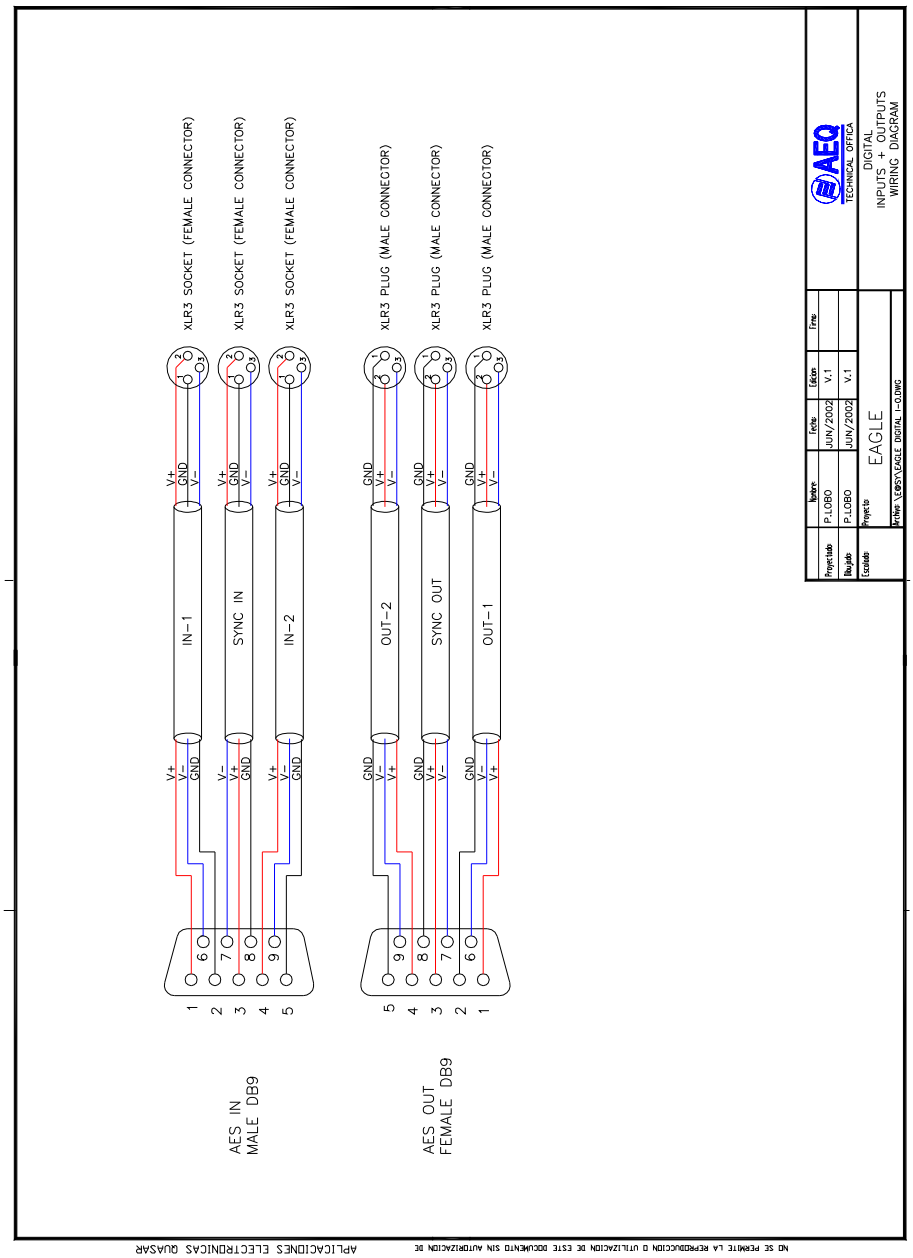


In order to configure remote control, the following programming bridges of the BC2533 has to be set:
PDP 7 and 10: ON
PDP 8, 9, 11 and 12: OFF (removed)

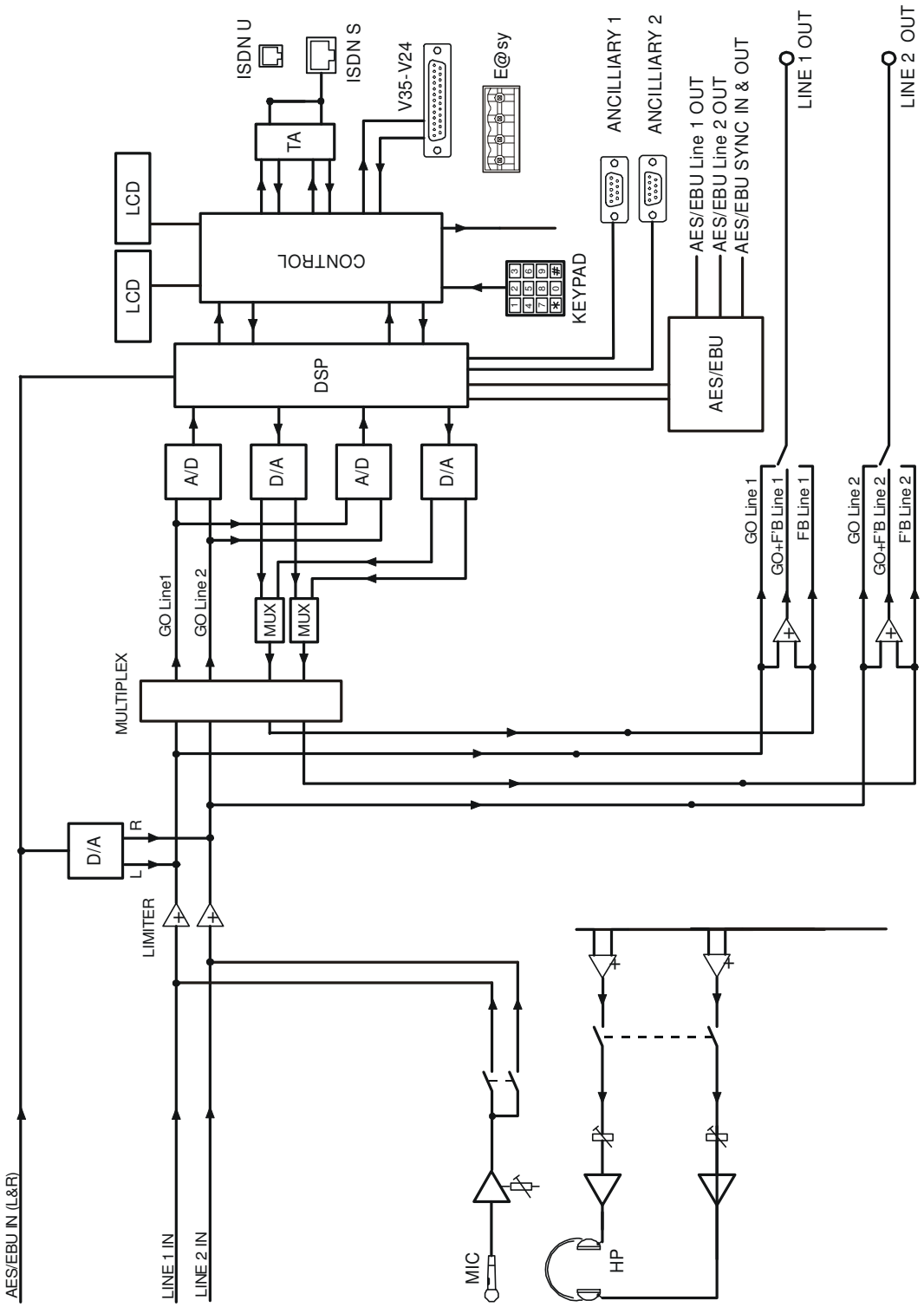
In the proposed cable diagram, each EAGLE channel is controlled by the upper part of the remote buttons of each BC2533:



ANEXO A.7 –AES/EBU STANDARD CABLE



ANNEX A.8. BLOCK DIAGRAM



ANNEX A.9. LINE REQUEST MODEL

We request an ISDN Basic Rate Interface (BRI) line for an Audio Codec Equipment.

We will provide the NT1 and need a U 2B1Q interface on a standard RJ-11 jack.
We support *National ISDN-1 Protocol (*5ESS, DMS-100 & EWSD).
We need clear 64Kbps access. (56Kbps is not acceptable)
Long distance prefix (10XXX) must be enable.
Long distance carriers: MCI, AT&T, Sprint

If you use IOC Capability Packages, please use *Bellcore Capability Package M*. If you do not use IOCs, use the next information:

- Two B channels.
- Circuit Switched data (CSD) and Circuit Switched Voice (CSV) on both channels
- Dynamic TEI assignment.
- No features or special services such as packed mode data on D channel, CACH EKTS, call forwarding, hunt groups, etc..

Please provide:
- Two SPID numbers.
- Two DNs.