

# **MPAC-02**

## **Dual Channel Portable Audiocodec Audiocodec Portátil de Doble Canal ED. 08/99**



A.E.Q., S.A. the manufacturer of this equipment, is "Registered Company" number ER-080/1/96 conforming to the AENOR UNE EN - ISO - 9001 quality assurance standard.

## INDEX

1. **DESCRIPTION OF THE EQUIPMENT**
    - 1.1. BASIC DESIGN CONCEPTS
    - 1.2. SPECIFICATIONS
    - 1.3. FUNCTIONAL DIAGRAM
  2. **POWER SUPPLY**
    - 2.1. GENERAL
      - 2.1.1. UNIT POWER SUPPLY
      - 2.1.2. SWITCHING ON
  3. **INSTALLATION AND WIRING**
    - 3.1. DESCRIPTION OF THE FRONT PANEL
      - 3.1.1. MICROPHONE INPUTS
      - 3.1.2. LINE INPUT CHANNEL (TAPE-RECORDER INPUT)
      - 3.1.3. MIC/TAPE SWITCH
    - 3.2. DESCRIPTION OF THE REAR PANEL
    - 3.3. DESCRIPTION OF THE LOWER PANEL
  4. **DESCRIPTION OF CONTROLS**
    - 4.1. CONTROL PANEL
    - 4.2. COMMENTATOR CONTROL SECTION
    - 4.3. MIC/TAPE SECTION
    - 4.4. VISUALISATION AND USER INTERFACE CONTROL SECTION
    - 4.5. DIALLING AND CHANNEL SELECTION SECTION
  5. **ISDN MODE USER INTERFACE**
    - 5.1. AUTOMATIC START-UP MODE
    - 5.2. MANUAL START-UP MODE
      - 5.2.1. ACCESS TO THE 'PHONE BOOK
      - 5.2.2. ACCESS TO RECALL
      - 5.2.3. ACCESS TO CODIFICATION CHANGING
      - 5.2.4. ACCESS TO START-UP CONFIGURATIONS
      - 5.2.5. MANUAL DIALLING
      - 5.2.6. CALL GENERATION
      - 5.2.7. CONNECTION ESTABLISHED
    - 5.3. GENERATION OF DTMF TONES FOR REMOTE CONTROL
  6. **TLE MODE USER INTERFACE**
    - 6.1. START-UP
    - 6.2. EXTENDED OPERATION MODE
    - 6.3. ACCESS TO THE 'PHONE BOOK AND RECALL
    - 6.4. CALL GENERATION
    - 6.5. GENERATION OF DTMF TONES FOR REMOTE CONTROL
  7. **UPGRADING THE INTERNAL SOFTWARE (FIRMWARE UPGRADE)**
    - 7.1. SYSTEM DESCRIPTION
    - 7.2. REQUIREMENTS OF THE PC USED FOR UPGRADING
    - 7.3. CONNECTIONS FOR CONTROL COMPUTER
    - 7.4. FIRMWARE UPGRADING
  8. **TECHNICAL SPECIFICATIONS**
- APPENDIX 1: GUIDE TO RAPID USE**
- 1.1. TO ESTABLISH COMMUNICATION
    - 1.1.1. CTN MODE
    - 1.1.2. ISDN MODE
  - 1.2. EQUIPMENT USE ONCE COMMUNICATION IS ESTABLISHED
- APPENDIX 2: COMPATIBILITY WITH TELOS AND CCS AUDIOCODECS.**
- APPENDIX 3: AEQ WARRANTY**

## 1. DESCRIPTION OF THE EQUIPMENT

### 1.1. Basic design concepts

The **AEQ MPAC-02** is a portable multiformat communications unit, that in a single unit offers a complete collection of all the tools necessary to establish an audio and data link between the studio and remote location, with the best possible sound quality and ease of use, independent of the type of communication line. The equipment permits two-channel audio communication, one for the Program and the other for Co-ordination, using a single line, and is equipped with independent listening and level controls for each channel.

Using the **Automatic Start-Up System**, it is possible to completely program the mode the unit will adopt on start-up. In this way, the technician can define all the communication parameters, including telephone numbers, and the commentator only has to select the switch on the rear panel that corresponds to the required configuration. When connecting the power supply automatically generates calls to the pre-set numbers.

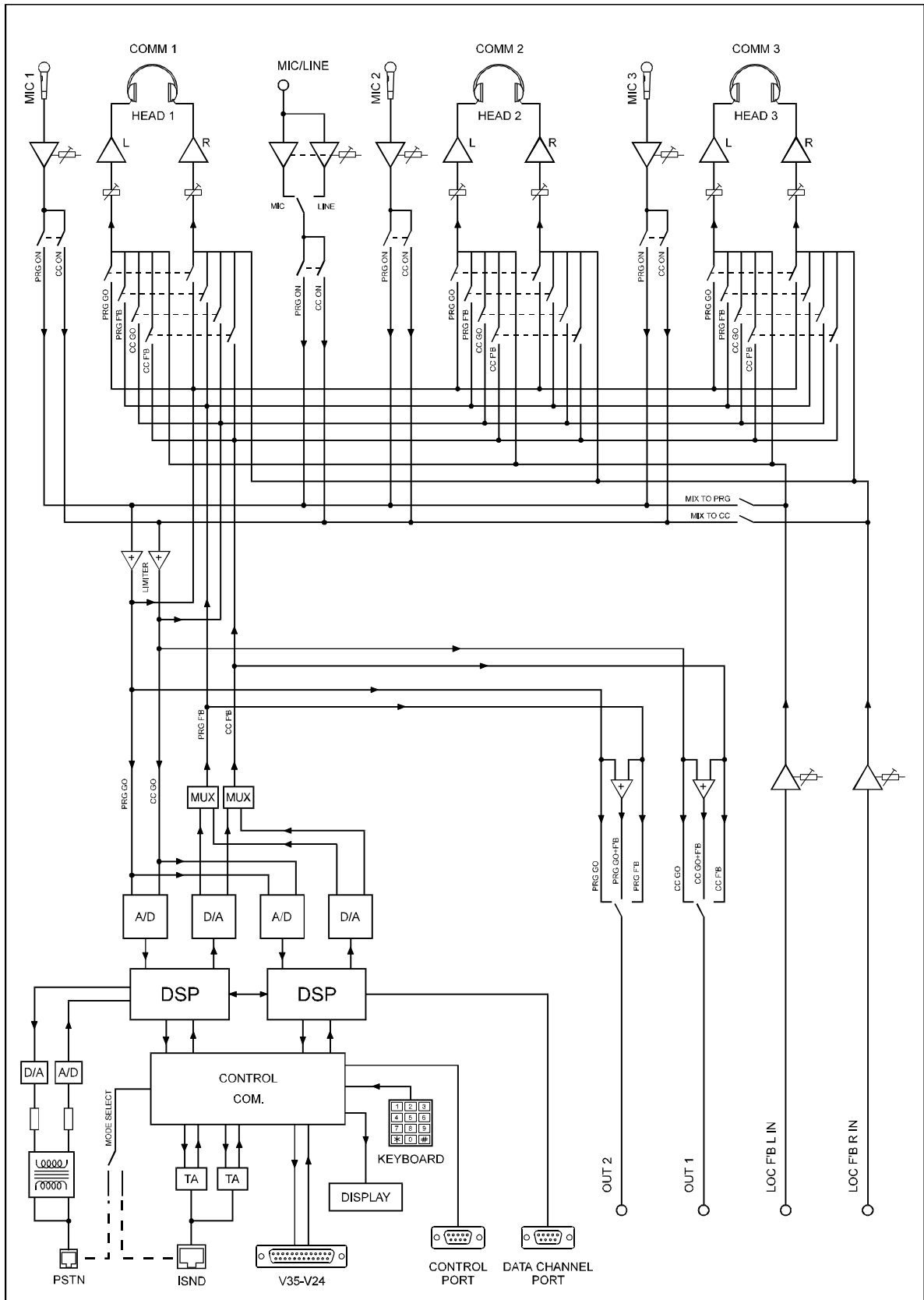
### 1.2. Specifications:

- Three microphone and one micro/line inputs, with COMBO connectors for XLR3 and Jack.
- Three stereo headphone outputs, with independent level controls for left and right outputs.
- Independent analogue mix level control for each input channel.
- Mixing Compressor/Limiter.
- Independent monitor selector for each of the three headphone amplifiers. The signals available are:
  - Program
  - Program return
  - Co-ordination
  - Co-ordination returnEach signal can be sent, independently, to the left ear, right ear, both ears, or neither.
- Independent dialling for each channel B, when using ISDN, with extension number capacity (where this is available).
- In 64 Kbps modes, it is possible to make the codification algorithm of each channel B independent.
- Display screen (2 lines X 24 characters). Indication of state, numbers dialled, telephone book and menu options.
- A line output for each audio channel, with selection of send, return or both.
- Access to the co-ordination circuit, with automatic Program disconnection, using a simple button.
- Line outputs, with selection for return, send or both, for each audio channel.
- Extended or Normal mode Operation (analogue lines).
- DTMF tone generation, to control remote equipment.
- 2 directed line inputs, one to the right and the other to the left earpiece of all the headphones. The left input can be added to the Program Go circuit; the right input can be added to the Coord Go circuit.
- Analogue access to the Program and Co-ordination audiocoders, with the possibility of using them as inputs for auxiliary return, Ambient Sound signals or public address for stereo transmissions.
- Up to 30 different microswitch selectable configurations may be defined and stored, which can be automatically activated when the equipment is switched-on.
- Available code algorithms:
  - G.711, 64Kbps, 3.5KHz audio
  - G.722 Statistical, 64Kbps, 7KHz audio
  - G.722 H.221/H.242, 64Kbps, 7KHz audio
  - LD-Extend, 15 KHz mono audio with low delay /128 Kbps
  - ISO/MPEG LII mono 24 KHz, 64Kbps, 11KHz audio
  - ISO/MPEG LII mono 32 KHz, 64Kbps, 10.5KHz audio
  - ISO/MPEG LII mono 48 KHz, multiplexing J.52/IMUX, 128 Kbps, 20KHz audio
  - ISO/MPEG LII Joint Stereo 48KHz, multiplexing J.52/IMUX, 128Kbps, 15KHz audio stereo
  - ISO/MPEG LII Dual 32 KHz, multiplexing J.52/IMUX, 128Kbps, 10.5KHz audio dual

## MPAC-02

### 1.3. Functional diagram

Schematic functional diagram of the Audio Codec.



The signal generated in each of the four channels (3 microphone and 1 micro/line) pass to the mixer circuits (Program or Co-ordination), and then, after passing through a limiter, are sent to the A/D converters on one hand, and the foldback circuits on the other.

When a commentator wishes to speak to the studio, the 'send to co-ordination' switch is pressed (CHANNEL COORD), which disconnects the Program circuit signal and sends it to the co-ordination circuit.

The foldback circuits allow each commentator to select from the following signals for monitoring in their left or right earpiece at will: Program send (PROGRAM GO), Program return (PROGRAM F'BACK), Co-ordination send (COORD. GO) and Co-ordination return (COORD. F'BACK).

The "CHANNEL ON" push-button allows the signal from the commentator to be sent to the Program circuit, provided that it is not already being sent to Co-ordination.

The channel level is adjusted by the Mix Level potentiometer.

The signal, once it has been limited, passes to the analogue-digital converters and is processed in the DSP. These are programmed for transmission by ISDN or CTN (Commuted Telephone Network).

In the former case, the signals reach the TA (terminal adapters) or V35/V24 interface which are controlled by the communication controller, this accepts user instructions entered through the keyboard with this information being shown on the alphanumeric display.

In the latter case, the signals are sent to the CTN telephone socket through the D/A converter instead of the ISDN adapters (TA or V35/V24).

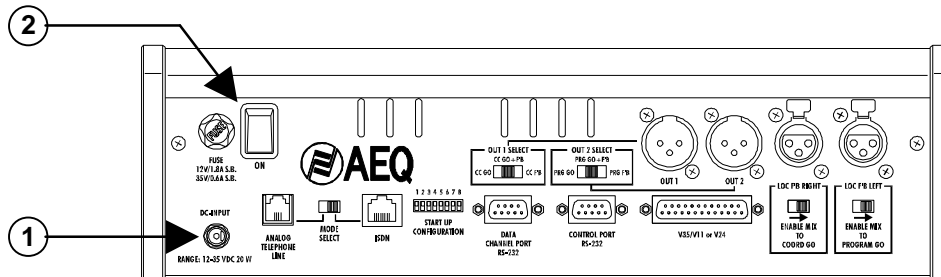
In both cases, a return signal (which may be two signals when using ISDN) travels in the reverse direction from the communication interface to the DSP, from where it passes to the D/A converters that generate the Program and Co-ordination return signals. These signals may be heard in the commentator's headphones as they are being sent to the corresponding outputs.

The Audiocodec in turn has a data port, to send and receive auxiliary data channels, and a control port for equipment configuration and upgrading.

## 2. POWER SUPPLY

### 2.1. General

The power supply connector (1) as well as the on/off switch (2) are found on the rear panel of the unit.



#### 2.1.1. Unit power supply

Power is supplied to the equipment through the connector marked **DC-INPUT** using the power supply unit delivered with the unit. The equipment accepts DC supplies between 12 and 35 V. Power consumption is between 1800mA at 12 volts and 600mA at 35 volts.

The power supply unit supplied with the equipment, or an alternative unit capable of delivering the correct voltage and current, must be used.

#### AEQ MPAC-02 uninterrupted power supply system:

The AEQ power supply supplied with the equipment includes a battery sufficient to allow approximately 30 minutes operation in the event of a network power supply failure. The power supply unit accepts inputs between 90 V and 264 V at 50/60 Hz.

The power supply connects to the electricity network and an on/off switch is situated over the network input.

The cable supplied with the power supply unit is fitted with a standard pin plug, which is lockable to prevent accidental disconnection.

#### 2.1.2. Switching on

Before connecting the power supply ensure the on/off switch is in the **OFF** position.

Once the lockable plug is correctly connected to the unit, it should be connected to the network supply.

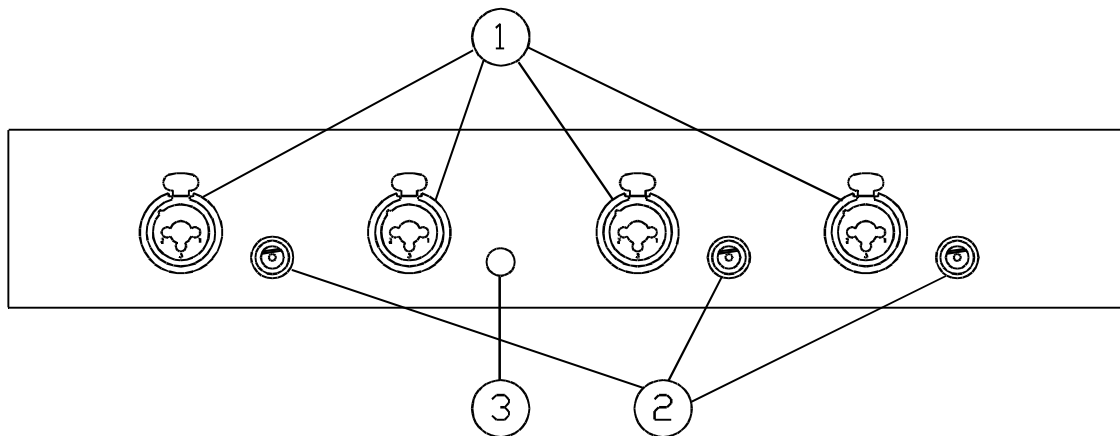
Turn the AEQ power supply unit on/off switch to the **ON** position.

Turn the power supply switch to **ON**. If all the previous steps have been correctly followed, the display will illuminate, indicating that the equipment is receiving power.

### 3. INSTALLATION AND WIRING

To clarify the installation and wiring process it is necessary to be familiar with the connectors and configurable elements (on the front and rear panels).

#### 3.1 Description of the front panel



A series of combo XLR3-Jacks (1) are found on the front panel, one is connected to each channel of each input. This type of connector allows the connection of male XLR3 or 1/4" male telephone type jack plugs, therefore admitting balanced or asymmetric signals.

The commentator channels are provided with 1/4" stereo telephone Jacks (2), for the connection of a headphone.

The Mic/Tape channel possesses a micro/line level selector switch (3).

##### 3.1.1. Microphone Inputs (1)

The microphones are normally supplied with the appropriate connectors for direct connection to the Audiocodec. The connector wiring is shown below:

##### XLR connectors

1: ground  
2: microphone V+  
3: microphone V-

##### 1/4" Jack connectors

sleeve: ground  
tip: microphone V+  
ring: microphone V-

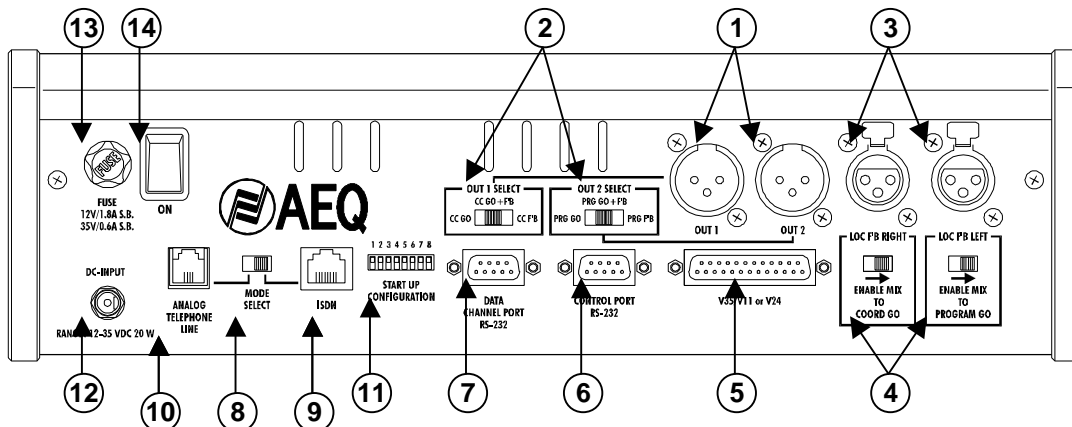
##### 3.1.2. Line Input

A cable with either a male XLR3 or 1/4" stereo Jack must be used. The connector wiring is the same as that for the microphone inputs.

##### 3.1.3. MIC/TAPE Switch (3)

To select microphone input level, the switch is set to the rest position (switch button out), and to select line input level, the switch is set to the activated position (switch button in).

### 3.2. Description of the rear panel



The numbered elements and their use are described in the following selection.

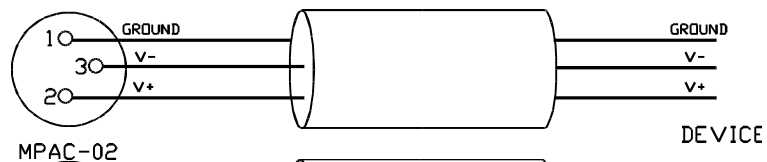
- (1) Output connectors (OUT 1 and 2) for Co-ordination and Program sends and returns respectively. XLR3 Male
- (2) Switches (OUT 1/2 SELECT) to obtain at the output: the send signal (GO), return signal (F'B) or both (send + return) from the Co-ordination (CC) and Program (PRG) circuits respectively.
- (3) Input connectors for local left channel foldback (LOC F'B LEFT) and right channel foldback (LOC F'B RIGHT). XLR3 Female
- (4) Switches for sending these signals to the Program send (ENABLE MIX TO PROGRAM GO) and Co-ordination send (ENABLE MIX TO COORD GO) respectively.
- (5) V35/V11 or V24 interface. Sub-D25 Female
- (6) RS232 control port (CONTROL PORT). Sub-D9 Female
- (7) RS232 data channel port (DATA CHANNEL PORT). Sub-D9 Female
- (8) Mode selector switch (MODE SELECT) ISDN (ISDN) – Analogue Telephone Line (ANALOG TELEPHONE LINE).
- (9) RJ45 ISDN line connector.
- (10) RJ11 Analogue Telephone Line (CTN) connector.
- (11) Configuration microswitches (STARTUP CONFIGURATION).
- (12) Power supply connector (DC-INPUT).
- (13) Fuses.
- (14) Power supply switch (ON)

#### Co-ordination and Program send and return output connectors (OUT 1 and 2):

The output cables must be connected to the Audiocodex using female XLR 3-pin connectors. The connector wiring is shown below (balanced or unbalanced depending on the receiver inputs):

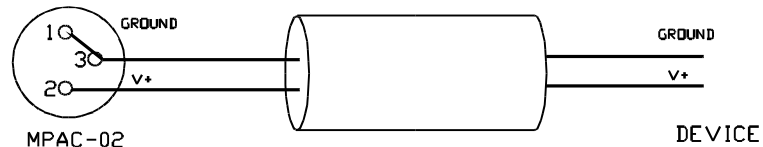
Balanced outputs:

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



Unbalanced outputs:

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



**Local listening input connectors left (LOC F'B LEFT) and right (LOC F'B RIGHT).**

The input cables must be connected to the Audiocdec using male XLR 3-pin connectors. The connector wiring is shown below (balanced or unbalanced depending on the receiver inputs):

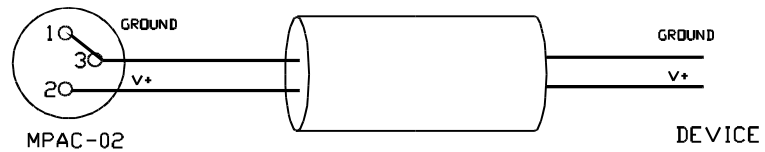
**Balanced inputs**

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



**Unbalanced input**

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



**V35/V11 or V24 Interface:**

DB25 connector:

Admits 2 types of external TA:

V35 interface (V11): Uses unbalanced asynchronous control signals, while synchronous clock and data signals are balanced.

V24 interface: This is a synchronous RS232.

The active contacts are:

<b>V35/V11</b>	<b>PIN</b>
Clock (RCX) V +	13
Clock (RCX) V -	14
TX V +	11
TX V -	10
RX V +	21
RX V -	19
<b>Common (V35/V11 – V24) PIN</b>	
DTR (Data Terminal Ready)	20
CD (Carrier Detect)	8
GND	7
CTS (Clear to send)	5
RTS (Request to send)	4
<b>V24</b>	<b>PIN</b>
TX	2
RX	3
Clock (RXC)	17

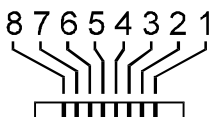
**Connections for Control (CONTROL PORT) and Data (DATA CHANNEL PORT) (RS232 ports)**

The unit has two female DB 9 chassis mounted connectors for configuration and transmission of auxiliary data in conjunction with an external computer communicating through RS 232 protocol (a cable fitted with male connectors must therefore be used). The active contacts are:

**TX 2**  
**RX 3**  
**GND 5**

For details of the PC serial communication port, consult the user manual supplied with the computer.

**RJ45 chassis connector wiring**



**FRONT VIEW**

The RJ 45 connector connects the terminal adapter, which is included in the equipment, with the ISDN access point (Network terminal). This connector wiring is standard according to the following diagram.

For connection to the ISDN line socket the cable supplied with the equipment, or similar, must be used.

**Cable Number Connections**

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

**RJ11 chassis connector wiring:**

Connection to the telephone line is by 4 contact RJ11 type connector. The telephone line must be connected according to the standard for RJ11 connectors (using the two centre contacts, 2 and 3).

For connection to the telephone line socket the cable supplied with the equipment, or similar, must be used.

**Selector Switch for ISDN-Analogue Telephone Line Mode (MODE SELECT ISDN/ANALOG TELEPHONE LINE):**

This selects the required line type (ISDN - CTN).

*Important: To change the line type selection the equipment must be switched-off and restarted with the new configuration.*

## DIP Microswitches

Eight DIP microswitches, numbered 1 to 8, are incorporated in the unit. These are accessed from the rear panel. Each microswitch functions as follows:

Microswitch	Function
1	None
2	Multiplexing (J.52/IMUX) 128Kbps modes
4 - 8	Automatic start-up configurations

All changes to the microswitch positions to modify the start-up configuration must be made before starting the unit (*with the unit switched-off*). Alterations made to the microswitch positions once the unit is in operation will have no effect and will not change the current configuration.

- The selection of multiplex mode for the 128 Kbps channels is performed using microswitch 2: the up position selects IMUX; the down position selects J.52. The multiplex mode is shown in the LCD panel. See also Appendix 2.
- Automatic start-up function configurations: Allow the unit to start-up using predetermined pre-programmed parameters (code, numbers to dial, etc.). The unit has two pre-programmed software configurations available (configuration C00 – Test mode, and configuration C01 – Manual Start-up mode) these cannot be modified. The remaining 30 configurations (C002 – C031) are freely available to the user.

*Important: Check that your **AEQ MPAC-02** is not set in Test mode.*

Configuration of microswitches 4 - 8 for access to the automatic start-up configurations:

<u>Conf.</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>Conf.</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
C00 *	0	0	0	0	0	C16	1	0	0	0	0
C01 *	0	0	0	0	1	C17	1	0	0	0	1
C02	0	0	0	1	0	C18	1	0	0	1	0
C03	0	0	0	1	1	C19	1	0	0	1	1
C04	0	0	1	0	0	C20	1	0	1	0	0
C05	0	0	1	0	1	C21	1	0	1	0	1
C06	0	0	1	1	0	C22	1	0	1	1	0
C07	0	0	1	1	1	C23	1	0	1	1	1
C08	0	1	0	0	0	C24	1	1	0	0	0
C09	0	1	0	0	1	C25	1	1	0	0	1
C10	0	1	0	1	0	C26	1	1	0	1	0
C11	0	1	0	1	1	C27	1	1	0	1	1
C12	0	1	1	0	0	C28	1	1	1	0	0
C13	0	1	1	0	1	C29	1	1	1	0	1
C14	0	1	1	1	0	C30	1	1	1	1	0
C15	0	1	1	1	1	C31	1	1	1	1	1

(1 = ON, microswitch in the 'up' position; 0 = OFF, microswitch in the 'down' position)

\* Pre-set configurations, these cannot be modified by the user.

### Power supply:

Power is delivered to the Audiocodec by the AEQ MPAC-02 Uninterrupted Power Supply System, or another suitable power supply, through the DC-INPUT connector

DC Voltage: 12 to 35 V  
Polarity: V+ : centre pin; V- : exterior  
Current: 1.7 A @ 12V, less at V > 12V  
Connector: Standard cylindrical DC, 2 mm internal, 6 mm external  
Power consumption: Approx. 22W

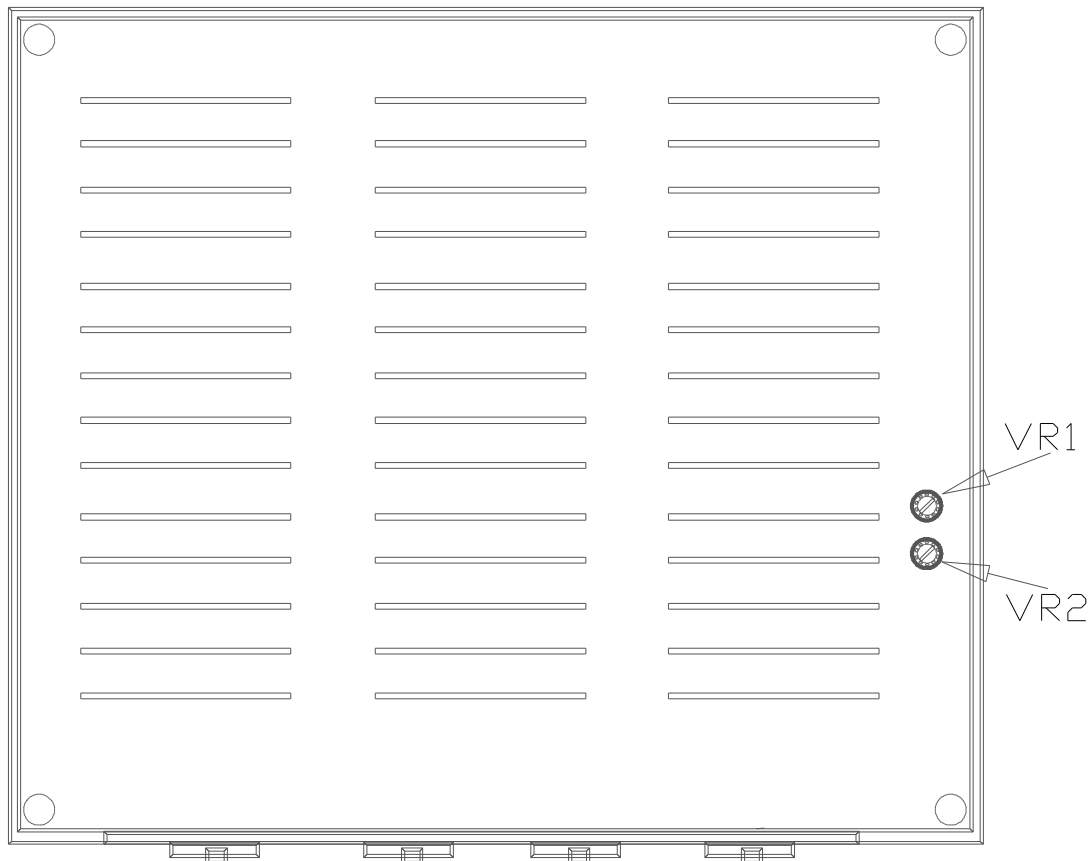
### Fuses:

Various types (depending on the power supply voltage to be used, calculated by  $I_{FUSE} \cong 22W / V_{dc}$  supplied):

Examples at the extremes:

- 12V/1.8A Slow blow
- 35V/0.6A Slow blow

### 3.3 Description of the lower panel



The following elements are found on the lower panel:

- 2 Trimmers for analogue input sensitivity adjustment of the Local Return Left (LOC F'B LEFT) (VR1) and Local Return Right. (LOC F'B RIGHT) (VR2).

#### 4. DESCRIPTION OF CONTROLS

##### 4.1. Control Panel

From the operational point of view, the control panel is divided into four sections:

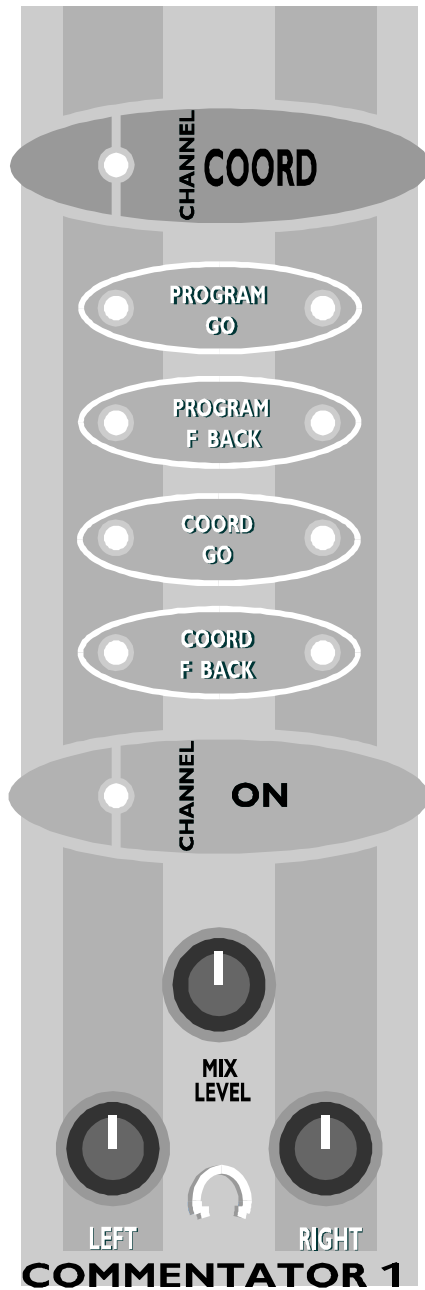
- Commentators control section: COMMENTATOR 1, 2 and 3.
- Mic/Tape Section
- Visualisation and Control Section
- Dialling and Channel Selection Section



Fig. 4.1 Position of the control panel elements.

#### 4.2. Commentator control section:

The figure in the left column shows the different controls associated to each of the three commentary channels: COMMENTATOR 1, 2 and 3.



- **CHANNEL COORD.** Disconnects the commentary microphone from the Program circuit and connects it to the Co-ordination circuit. Pressing the button again disconnects the Co-ordination circuit and reconnects it to the Program circuit (when the channel was previously connected to Program).

#### Send to Headphones Control Switch:

These press-buttons route the corresponding signals to the commentator's headphones. If the button is pressed repeatedly, the signal is routed to the earphones in the following order: Left, right, both or neither of the two, the chosen option is indicated by the on/off status of the LEDs associated with each earpiece.

- **PROGRAM GO.** Is the foldback from the Program circuit. The local mix signal is heard.
- **PROGRAM F'BACK.** Is the foldback from the Program Return Circuit. The return signal from the central receiver is heard.
- **COORD GO.** Is the foldback from the Co-ordination circuit. The local mix signal is heard.
- **COORD F'BACK.** Is the foldback from the Co-ordination Return circuit. The return signal from the central receiver is heard.
- **CHANNEL ON.** Activates the commentary microphone in the Program circuit.
- **MIX LEVEL.** Controls the level of the commentary microphone in the mix (Program or Co-ordination).
- **LEFT and RIGHT.** On the lower part of the module there are two level controls associated with the left and right earpiece outputs, to regulate the level in each of the commentator's earpieces.

### 4.3. Mic/Tape Section

The Portable Audiocodec can be used by three commentators and one guest simultaneously. The Mic/Tape section corresponds to the guest microphone input channel. The input can also be used for reproduction of a pre-recorded tape or for a line connection.

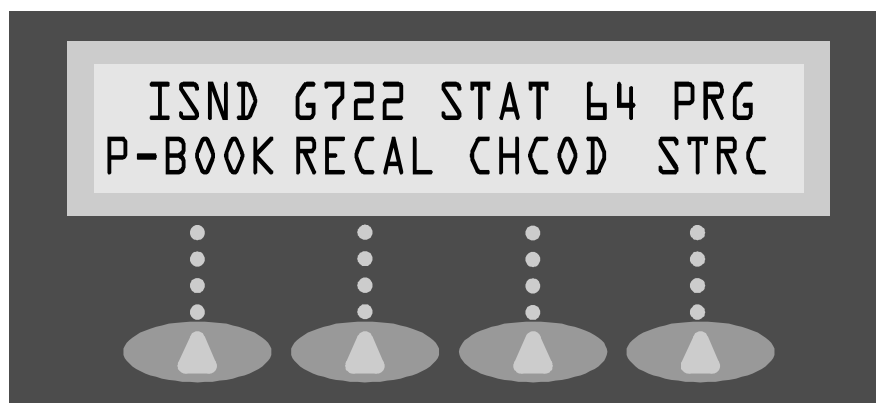


- **MIC/TAPE.** A switch on the front panel selects the appropriate input gain and impedance for the connection of a dynamic microphone or a portable tape-recorder. The switch selection in the 'out' position is for a microphone input. The 'in' position selects the line input.
- **OUTPUT SELECT.** A Pushbutton that directs the output of the Mic/Tape channel to the Program output (PRG), Co-ordination output (CC), to both outputs, or to neither of the two. When this is pressed repeatedly these options are selected in the order as written, the status is indicated by the on/off condition of the LEDs associated with each output.
- **CHANNEL ON.** Connects or disconnects the Mic/Tape channel to output circuit selected by the OUTPUT SELECT.
- **MIX LEVEL.** Mic/Tape channel level control in the selected circuit.

### 4.4. Visualisation and User Interface Control Section

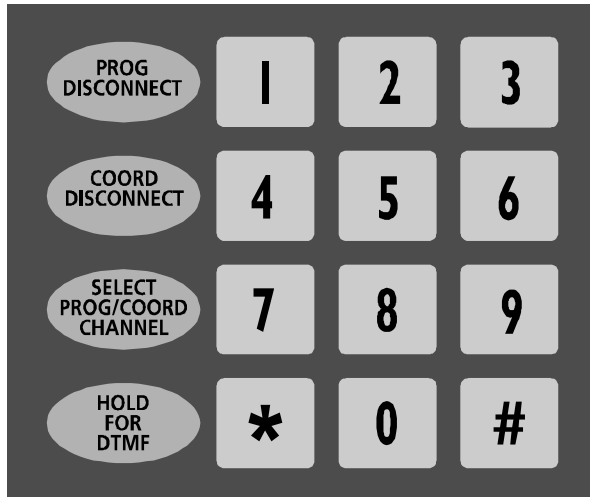
The status of the **AEQ MPAC-02** Portable Audiocodec (connection, codification, number dialled, etc.), as well as the configuration, can be visualised on the Display (2 lines X 24 characters). Access is gained to the various configuration menus, dialling, telephone book, etc. by using the four pushbuttons (Multifunction Keys) situated under the visual Display.

The upper line of the Display is for user information and the lower line shows the function associated with each of the four Multifunction keys. The use of the Multifunction keys is explained in sections 5 and 6 "User Interface".



#### 4.5. Dialling and Channel Selection Section

Disconnection of the Audiocodec from the various circuits (Program/ Co-ordination), as well as the selection of the channel to dial and generation of DTMF Tones for remote control and other uses, is executed from the Dialler and Channel Selection Section.



- **NUMERIC KEYBOARD.** This is for entering the correspondent's number.
- **PROG DISCONNECT.** Pressing this button will disconnect the established Program output line.
- **COORD DISCONNECT.** Pressing this button will disconnect the established Co-ordination output line.  
*If the connection is in 128 mode, pressing either of the two switches will effect disconnection.*
- **SELECT PROG/COORD CHANNEL.** Pressing this button selects the desired output circuit (Program/Co-ordination) for making the connection, dialling or DTMF tone generation. The current selection is shown in the upper left corner of the Display.
- **HOLD FOR DTMF.** DTMF tones for remote control and other functions can be generated by keeping this button pressed and using the numeric keyboard. The tones are then sent via the selected output (Program/Co-ordination) using the SELECT PROG/COORD CHANNEL key. (The audio signal in the corresponding output channel is muted during tone keying/generation).

## 5. ISDN MODE USER INTERFACE.

### Start-up:

The unit starts-up by default (in either Automatic or Manual mode) with all channels muted, but retains the foldback Pre-selector configurations set on each channel before the equipment was switched-off.

### 5.1. Automatic Start-up Mode:

There are 30 possible automatic start-up configurations that are selectable through 5 DIP switches on the back of the unit. Positions C02 to C31 may be user configured. *For the implementation of automatic start-up configurations see section 3.2. "DIP Microswitches".*

Position C00 ..... Test mode, used under Technical Service instructions  
Position C01 ..... Manual start-up mode (see section 5.2)  
Positions C02 to C31 ..... User defined modes

The following window appears when the equipment is started with the DIP SWITCHES in any position between C02 and C31:

MPAC-02 POWERED BY AEQ AUDIOCODEC                      ISDN
--

Two seconds later, an informative window appears showing the loaded versions of different modules (Micro, DSP, and TA's) of **AEQ MPAC-02**, besides a PAUSE label. When the that label is pressed, it is substituted with the label CONT, keeping the information of the versions until CONT is pressed.

MCUV1.10    DSPV1.06
TA1V1.04    TA1V1.04    PAUSE

If you have not pressed PAUSE, two seconds later the unit passes to the stand-by window (initial window), in which the configuration number is indicated, in this example number 2 (C02):

CONFIGURATION NUMBER 2 AUTOMATIC MODE STARTUP
--

Following this, a call is automatically generated to the number selected for the PROGRAM using the selected codification mode. Once the call is established, or a corresponding release message is seen, the unit automatically generates the call for the CO-ORDINATION circuit.

Once the connection is established with the remote terminal, the connection established windows appear.

If the configuration chosen for the automatic start-up is free the following window will appear:

STARTUP CONFIGURATION SELECTED IS FREE
---

indicating that there are no numbers to dial.

One second later the unit automatically passes to the manual start-up mode stand-by window (initial window).

**MPAC-02**

Finally if the automatically established communications are freed using the “PROG DISCONNECT” and/or “COORD DISCONNECT” keys, the unit will pass to the manual start-up mode stand-by window.



The following window appears on starting the unit:

MPAC-02 POWERED BY AEQ ISDN MODE STARTUP
---

Fig. 0

Two seconds later the stand-by or manual mode initial window appears:

ISDN G711 A-LAW 64	PRG
P-BOOK RECAL	CHCOD STRC

Fig. 1

In the initial window (1), the default codification mode selected for the establishment of the Program circuit connection appears on the top line of the display. The key "SELECT PROG/COORD CHANNEL" is used to change to the circuit desired for the connection. The message "ISDN G711 A-LAW 64 CC" will appear on the top line, indicating that the codification mode is active and that the Co-ordination circuit has been selected.

The function associated with each of the multifunction keys appears on the bottom line of the display.

"P-BOOK" "RECAL" "CHCOD" "STRC"

In this situation the user can perform five operations:

- 1.- Activating "P-BOOK" (Telephone Book) displays the 'phone book which is included in the unit.
- 2.- Activating "RECAL" (RECALL) displays the number and circuit used in the last connexion.
- 3.- Activating "CHCOD" (CHANGE CODIFICATION) accesses the window which allows the mode of connection codification to be changed.
- 4.- Activating "STRC" (SAVE CONFIGURATION) accesses the window which allows a new or existing modified start-up configuration to be saved.
- 5.- Finally, if the numerical keyboard is used in the stand-by state, the manual number composition window appears and the user can manually enter a telephone number and make a call.

The following describes the use of the above functions:

### 5.2.1. Access to the 'phone book

On activating "P-BOOK" the following window appears:

A001	LABEL		
OK	UP	DOWN	ESC

(2)

The first entry stored in the 'phone book's non-volatile RAM memory appears on the upper line of the display.

Each 'phone book entry has three fields:

- Position number field: A001.....A256, to designate the position of the entry in the 'phone book.
- LABEL field: maximum 10 characters, to give a name to the entry.
- NUMBER field: maximum 20 digits, to save the telephone number.

If the 'phone book registry is empty only the registry number is displayed, and the label field does not appear. The user can select the desired entry by using the "UP" and "DOWN" keys to pass through the 255 available registers.

Using the "DOWN" key will display entry number 2, and using the "UP" key will display entry number 256 (reserved).

Note: The 256 register of the phone book entry is reserved for future applications.

Pressing “ESC” will return to the stand-by window (1).

The “OK” key validates the entry selected by the user and passes to window (3):

A001	LABEL	PRG	
DIAL	EDIT	NUMB	ESC

(3)

The “DIAL” key is pressed to establish the connection. The unit dials the corresponding number via the selected circuit (shown in the top right corner), the said circuit can be selected using the “SELECT PROG/COORD CHANNEL” key.

Activating “NUMB” displays the telephone number associated with this ‘phone book entry (3’).

TELEPHONE NUMBER	ESC
------------------	-----

(3’)

Pressing “ESC” will return to the previous window (3).

The “EDIT” key summons the edit/modify window for the selected entry.

First, the number associated to the entry in question is edited (4).

TELEPHONE NUMBER			
OK	←	→	DEL

(4)

The telephone number associated to the selected ‘phone book registry appears on the top line of the display. If the said registry is empty, the top line of the display will be blank (the cursor position is marked by the corresponding display position blinking. Initially the cursor is displaced to first position on the display).

The numerical keyboard enters the number directly onto the top line of the display and automatically advances the cursor.

The “←” and “→” keys move the cursor backwards or forwards respectively to modify the numbers which have been introduced.

The “DEL” key erases the digit above the cursor and advances the cursor.

Finally, the “OK” key validates the number and passes to the label edit window (5).

A001	L <u>A</u> BEL		
OK	UP	DOWN	SEL

(5)

If the registry is empty, the registry number is shown on the top line of the display and the cursor blinks in the first modifiable position, with the “LABEL” field remaining blank.

The characters which form the label are selected using the “UP” and “DOWN” keys to pass through the table containing all the alphabetical and special characters such as *blank space* (“ ”) and *hyphen* (“-“). (“ , - , A, B,...,Z). When starting from an empty registry, pressing “DOWN” will show “-“ and pressing “UP” will show “Z”.

It is only necessary to pause for one second after pressing “UP” or “DOWN” to select the desired character and pass to the next position in the label. The cursor automatically advances to the next position.

The numerical keyboard is used to introduce the “\*” or the “#” and numerical characters into the label, in this case the cursor will advance automatically.



### 5.2.3. Access to codification changing

Activating the “CHCOD” key when in the stand-by state (1), opens the codification change window (7):

ISDN G711 LAW-A 64?	PRG
OK UP DOWN ESC	(7)

The user can view the different codification modes available by using the “UP” and “DOWN” keys to pass through the table:

64 Kbps Modes:

- ISDN G711 A-Law 64 ..... Law A, 64Kbps, 3.5KHz audio
- ISDN G711  $\mu$ -Law 64 ..... Law  $\mu$ , 64Kbps, 3.5KHz audio
- ISDN G722 STAT 64 ..... G722 Statistical, 64Kbps, 7KHz audio
- ISDN G722 H221 64 ..... G722 H221/H242, 64Kbps, 7KHz audio
- ISDN MPEG 32MON 64 ..... MPEG1 LII 32KHz MONO, 64Kbps, 10.5KHz audio
- ISDN MPEG 24MON 64 ..... MPEG2 LII 24KHz MONO, 64Kbps, 11KHz audio

128 Kbps Modes:

- ISDN AEQ LD-EXT 128 ..... Mode AEQ Extended, 128Kbps, 15KHz audio
- ISDN MPEG 48MONO 128 ..... MPEG1 LII, 48 KHz MONO, 128Kbps, 20KHz audio
- ISDN MPEG 48JSTR 128 ..... MPEG1 LII, 48 KHz Joint stereo, 128Kbps, 15KHz audio
- ISDN MPEG 32DUAL 128 ..... MPEG1 LII, 32 KHz Dual, 128Kbps, 10.5KHz audio dual

(If the “DOWN” key is pressed in the state represented by (Fig.7) the legend “ISDN G711  $\mu$ -LAW 64” will appear on the top line of the display, and if “UP” is pressed “ISDN MPEG 32DUAL 128” will appear). Next to the label of each mode, a blinking quotation mark appears.

There is one more codification mode selected when you press OK button in the next window:

ISDN AUTOMATIC MODE ?	PRG
OK UP DOWN ESC	

This is the Automatic code Searching mode: the unit works as Slave and automatically detects the transmission code being used by the receiver and adapts accordingly (using the same code for transmission) If the unit works as Master, the user decides the transmission code mode to be used. It must be remembered that if a voice call is made (G711 codification), it forces the codification in the receiver, independently of the equipment being master or slave.

Pressing the “ESC” key will return to the initial window without modifying the current codification setting.

Pressing “OK” validates the selected codification mode and the stand-by window (1) will appear with the new codification mode being shown on the top line of the display and without the flashing block. For example, if “ISDN G722 STAT 64” is selected, the following will be seen on returning to the stand-by state:

ISDN G722 STAT 64	PRG
P-BOOK RECAL CHCOD STRC	

#### 5.2.4. Access to start-up configurations

The **AEQ MPAC-02** Portable Audiocodect allows the storage of up to 30 distinct ISDN start-up configurations in non-volatile RAM, which makes automatic start-up possible through the DIP microswitches on the rear panel. For details of microswitch configuration, see section 3.2 “DIP microswitches”.

C02 to C31 (30) are user-defined configurations. Configurations C00 and C01 are reserved (Test Mode and Manual Start-up Mode) and cannot be edited or modified.

Codification information and the number to use for each communication channel is stored in each configuration (Program - Co-ordination), each register consists of three fields (LABEL, NUMBER and CODIFICATION) for each channel (Program and Co-ordination). Therefore, in one configuration register it is possible to store one codification type with the number to dial for the Program channel using a specific label, and one codification type and number to dial for the Co-ordination channel with a different label.

*Important:* Given that 128Kb codifications use both 64Kb channels, it is only possible to store the information related to the channel (Program) and (Coordination).

The following explains the configuration register edition/modification procedure. Given that editing the fields in a register is performed similarly to editing the ‘phone book, the procedure will be roughly explained, with those aspects which differ to the edition/modification of the ‘phone book being explained in more detail.

From the stand-by status (1), pressing the ”STRC” key will open window (8):

C02	LABEL	PRG	(8)
OK	UP      DOWN	ESC	

The first configuration register will appear on the top line of the display, with the corresponding label for the Program channel.

The “UP” and “DOWN” keys are used to select the register number required for display or modification and storage in RAM. The “DOWN” key will present register C03, and the “UP” key will present register C31. If you keep held down any of these keys, you will get fast movement through all the registers.

The “SELECT PROG/COORD CHANNEL” key is used to select the channel required for display/edition (Program/Co-ordination).

Once the register and desired channel have been selected, the selection is validated with the “OK” key and passes on to the edit window (9).

C02	LABEL	PRG	(9)
EDIT	CODIF      NUMB	ESC	

The “ESC” key will return to the stand-by state (1).

*Note:* As the process of editing/modifying a start-up configuration is the same for both Program and Co-ordination, only the Program example is referred to here.

Using the “ESC” key returns to window (8).

The codification and ISDN number associated to the selected Program circuit start-up configuration are visualised using the “CODIF” and “NUMB” keys. Windows similar to those of the ‘phone book appear (3’).

For example:

“CODIF”

“NUMB”

ISDN	G722 H221 64	PRG	916857020
		ESC	ESC



If the communication continues successfully and connection is established the connection established window (15) will open.

PRG CONNECTED	SYNC.	
CODIF DATCHN		VU

 (15)

This window is detailed in the following section.

If on the other hand the connection cannot be established, the user will be informed of the reason for the failure. The following call release messages are issued by the equipment:

- i) ERROR: An internal error has occurred in the call generation process.
- ii) CHANNEL NOT AVAILABLE: An attempt is being made to establish communication through a channel that is already occupied in the unit.
- iii) NO ISDN AVAILABLE: An attempt has been made to establish communication when there is no ISDN line available.
- iv) DESTINATION BUSY: The remote terminal is occupied.
- v) NO ANSWER: The remote terminal has not responded to the incoming call.
- vi) CALL REJECTED: The network has rejected the call, this includes all the remaining possible causes of release.
- vii) CALL NOT CONNECTED: The waiting time set for the unit to establish connection with a remote terminal has expired.

The equipment will return to the stand-by window (1) following the emission of any of these release messages.

### 5.2.7. Connection established

The following message will appear in the display after window (14) if the connection is established:

CALL CONNECTED
----------------

 (14')

and the following window will appear one second later:

PRG CONNECTED	
CODIF DATCHN	VU

 (15)

If the call is established through the Co-ordination circuit, "CC. CONNECTED SINC" will appear on the top line of the display.

SINC/NON SINC: The connection is established and sincronized/non sincronized.

CODIF: Opens the codification window.

DATCHN: Opens the window for the establishment of auxiliary data channel.

VU: Opens the VU-meter mode window.

### 5.2.7.1. Data channel:

This is a transparent bi-directional point-to-point 1200 baud channel. For the channel to operate correctly, the transmission configuration should be set to:

- 1200 bauds
- No parity
- 8 data bits
- 1 stop bit

The data channel can be established in relation to the codification mode being used in the established connection.

- An auxiliary data channel may be established in the following modes:

- Modes 64:
  - G722 H221 64
  - MPEG 32 MONO 64
  - MPEG 24 MONO 64
- Modes 128:
  - MPEG 48 MONO 128
  - MPEG 48 JSTR 128
  - MPEG 32 DUAL 128

- Modes which do not accept auxiliary data channels:

- The remaining modes shown in the table in section 5.2.3

The following message will be displayed for one second if the "DATCHN" key is operated in window (15) while using a mode that does not allow the establishment of a data channel:

DATA CHANNEL  
NOT AVAILABLE

and then return to window (15).

If the "DATCHN" key is activated while using mode 64, which permits the establishment of a data channel, window (16) is opened:

PG: TXof	RXof	CC: TXof	RXof	(16)
CHANN	RX	TX	ESC	

Pressing the "ESC" key will return to window (15).

When window (16) is opened, the cursor appears on the letter "P" of Program circuit, indicating that this channel is selected by default. The other channel may be selected by pressing the "CHANN" key, and the cursor will pass to the letter "C" of Co-ordination circuit.

Pressing the "Rx" and "Tx" keys activates (On) or deactivates (Off) the transmission (Tx) or reception (Rx) of the corresponding data channel to the channel that is currently active.

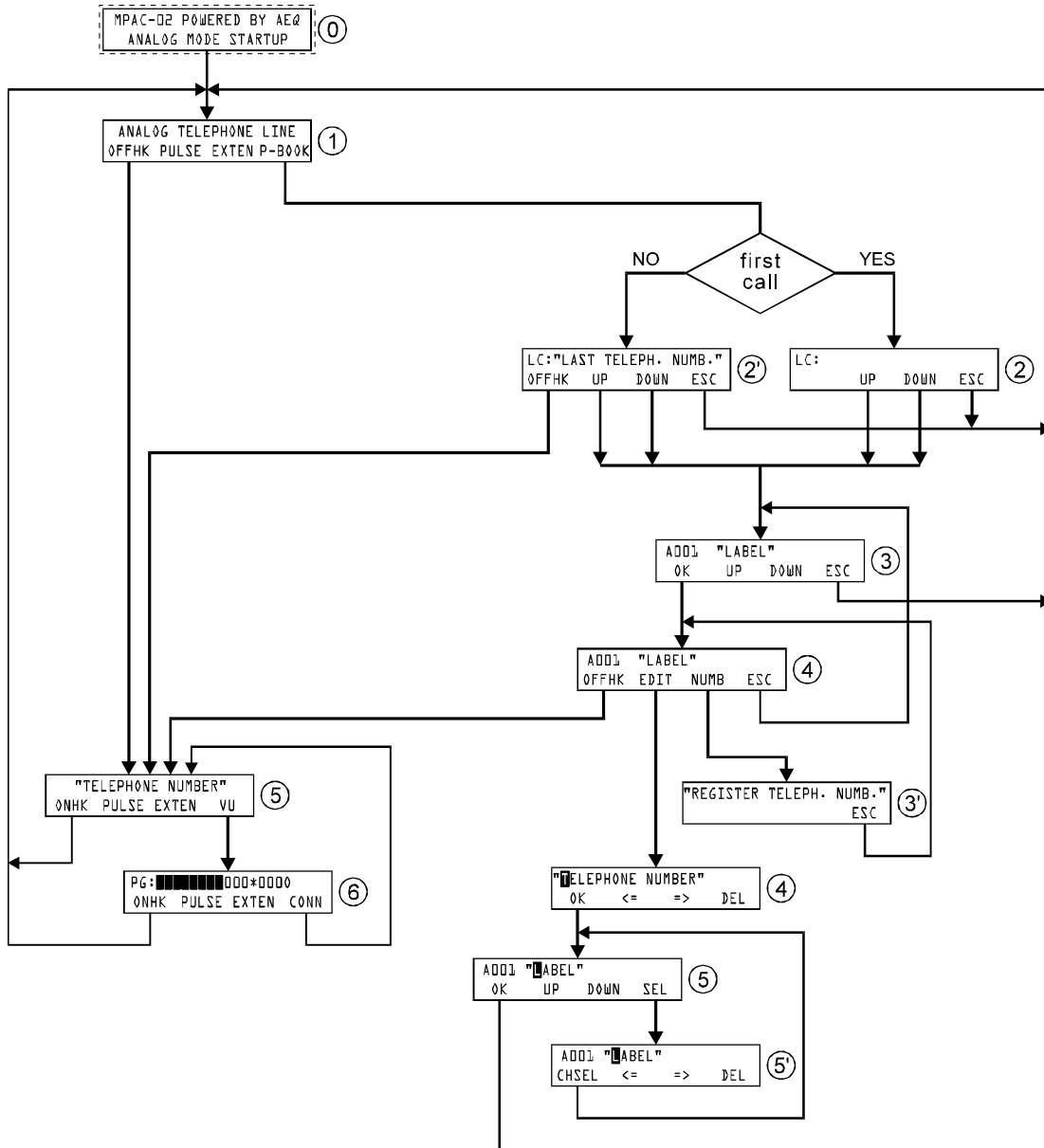
Given that there is only one data channel available, only one data transmission and one data reception can be established simultaneously, that is to say, if one channel (e.g. Program) is transmitting, the other channel (Co-ordination) can only receive, and vice-versa; if one channel is simultaneously transmitting and receiving data, the other cannot be used for either transmission or reception, because the data channel is already occupied.

If this is the case and an attempt is made to activate the other channel to transmit or receive data, the equipment will reject the request and display the window:



## 6. TLE MODE USER INTERFACE.

TLE Mode User Interface Flow diagram:



## 6.1. Start-up:

The equipment starts-up with all channels *muted*, but conserves the foldback Pre-selector configurations as set for each channel prior to switch-off.

When the equipment is switched-on and TLE mode is selected by the switch on the rear panel, the following window will be displayed:

```
MPAC-02 POWERED BY AEQ
ANALOG MODE STARTUP MODE
```

and two seconds later the analogue stand-by window (1) will appear:

```
ANALOG TELEPHONE LINE      (1)
OFFHK PULSE EXTEN P-BOOK
```

When the equipment is switched-on DTMF dialling and NORMAL operations are selected by default. Pressing the "PULSE" and "EXTEN" keys changes the dialling mode to PULSE and the operational mode to EXTENDED respectively. The stand-by window changes to show the new "DTMF" and "NORM" keys respectively (1').

However, the "PULSE/DTMF" and "EXTEN/NORM" keys do not indicate the actual unit status but only indicate the status selectable by the corresponding key.

```
ANALOG TELEPHONE LINE      (1')
OFFHK MFDT NORM P-BOOK
```

## 6.2. Extended operation mode.

Typical telephone circuits have a limited band width between 300 and 4000 Hz. Unfortunately, the major part of voice energy is in frequencies below 300 Hz, and is lost during transmission over telephone lines. Telephone audio signals have their characteristic sound, the loss of voice body being the most notable, for this reason.

The extended operation mode allows the transmission of frequencies between 50 and 300 Hz through telephone lines. To achieve this, the signal is subjected to a 250 Hz frequency shift before being sent, thereby improving the low frequency band quality of the signal received at the expense of the highest band. The bandwidth transmitted is, therefore, between 50 and 3750 Hz. The 250 Hz lost in the highest frequencies are not very significant given the logarithmic nature of audio frequency response.

The frequency shift is performed by encoding the audio signal before it is sent to the telephone line. The suitably equipped receiver decodes the signal, that is to say, the frequency shift is reversed. The decoded signal contains the original band (50-3750 HZ) without suffering any type of degradation. In this way, a voice signal with improved clarity and depth is achieved, including during those communications that take place under the worst conditions.

Switching between Extended and Normal mode is performed using the "EXTEN/NORM" key during TLE stand-by mode (1).

### 6.3. Access to the Phone Book and Recall:

The 'phone book is shared by both the equipment's working modes (ISDN and TLE). Access is identical to that described in ISDN mode section 5.2.1. The differences are as follows:

Pressing the "P-BOOK" key in stand-by (1) opens the 'phone book and recall window (2).

UL: UP      DOWN      ESC	(2)
------------------------------	-----

The last number dialled is shown on the top line. If the 'phone book is entered from start-up no number is displayed (2), if any calls have been made, the last number dialled (UL) will be seen, window (2').

UL: 6861300 OFFHK  UP      DOWN      ESC	(2')
---	------

Recall is effected using the "OFFHK" key. The "UP" and "DOWN" keys are used to enter the 'phone book and pass through the 256 entries as explained in the ISDN section. The "OFFHK" key replaces the "DIAL" key used in ISDN mode.

A001 LABEL OFFHK  EDIT      NUMB      ESC	(3)
--	-----

Pressing the "ESC" key will return to the stand-by state (1).

### 6.4. Call generation:

Pressing the "OFFHK" (Off Hook) key in any window will produce a dialling tone. Windows (1), (1'), (2') and (3).

Activating the "OFFHK" key from any of these windows will open window (4).

ONHK  PULSE  EXTEN  VU	(4)
------------------------	-----

Dialling is automatic if the number is taken from the 'phone book, or is a recall which is shown on the top line of the display. Dialling can also be performed manually using the numeric keyboard.

Pressing the "VU" key will open the VU-meter window to enable visualisation of the Program output level in the same way as in ISDN mode, except only one channel will be seen (5).

PG:       fΦfff ● ONHK  PULSE  EXTEN  CONN	(5)
---	-----

If "ONHK" (On Hook) is pressed in windows (4) or (5) once the call is established, or during dialling, the call will be terminated and the unit will return to stand-by status (1). Pressing the "CONN" key will return to the previous window (4).

### 6.5. Generation of DTMF tones for remote control.

It is possible to generate and send DTMF tones to line to effect remote control operations when operating in TLE mode and in connection established status (4). It is necessary to press and hold the "HOLD FOR DTMF" key and at the same time press the corresponding digit on the keyboard. The audio Program is cut during tone generation.

*DTMF dialling mode must be used to establish the call for this function to work correctly.*

## 7. UPGRADING THE INTERNAL SOFTWARE (FIRMWARE UPGRADE):

This section describes the procedure to upgrade the **AEQ MPAC-02** Audiocodec internal software.

### 7.1. System description

The system allows the internal software in the three basic MPAC-02 modules to be upgraded, i.e. the Microprocessor, Terminal Adapters (TAs) and Digital Signal Processors (DSPs).

### 7.2. Requirements of the PC used for upgrading

The system requirements are determined by the Operative System in use: Windows 95<sup>®</sup> or Windows NT<sup>®</sup>. These operative systems dictate the computer's minimum processor and available RAM memory specifications. With Windows 95<sup>®</sup> the minimum configuration is a Pentium family processor with 16 MB RAM memory. The software installation requires 3 MB hard disk space and up to 20 MB for user configurations. A mouse and a free serial port are also required.

### 7.3. Connections for computer control

A female connector, labelled "CONTROL PORT", is mounted on the rear of the Audiocodec chassis for connection to an external computer communicating through RS-232 protocol. The PC is connected through its serial port. The connections are as follows:

<b>RX</b>	<b>2</b>
<b>TX</b>	<b>3</b>
<b>GND</b>	<b>5</b>

The pins connecting the Audiocodec and PC are as follows:

<b>MPAC-02: DB-9 MALE</b>	<b>PC: DB-9 FEMALE</b>
2 -----	2
3 -----	3
5 -----	5

<b>MPAC-02: DB-9 MALE</b>	<b>PC: DB-25 FEMALE</b>
2 -----	3
3 -----	2
5 -----	7

### 7.4 Firmware upgrading

The operation to upgrade the firmware is very simple. A floppy disk is available for Firmware upgrading.

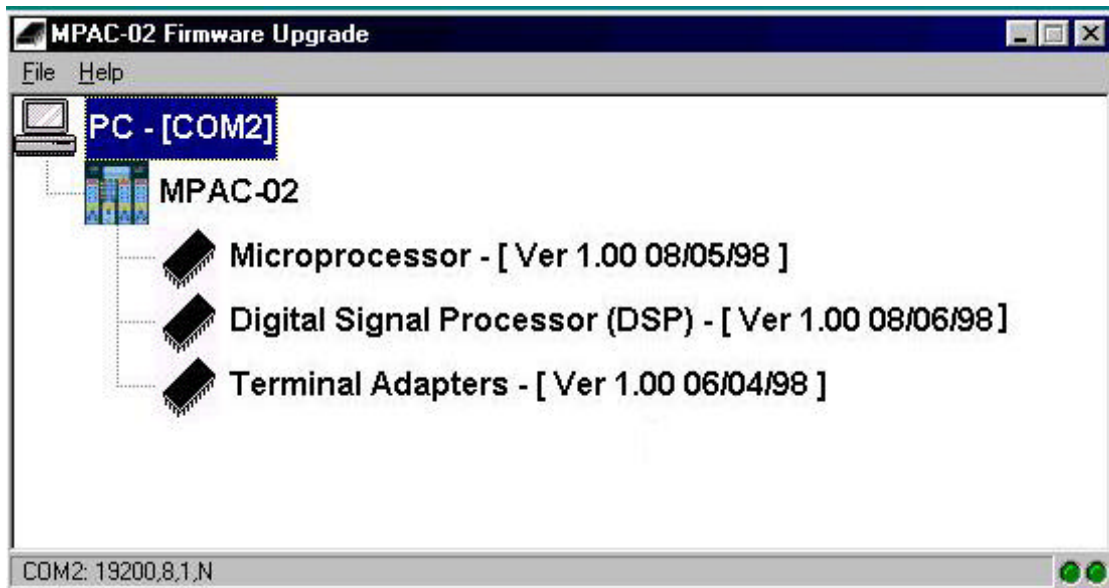
***Important:** Ensure that the start-up configuration is NOT set to Test Mode. Also, the equipment cannot be used for any other operation, such as making a call etc., during the process of upgrading the Firmware.*

#### **The upgrading procedure is as follows:**

Before commencing the upgrading process, the PC and **AEQ MPAC-02** must be interconnected using the PC serial port and the **AEQ MPAC-02** Control port as previously described.

Once connected, open the floppy disk containing the Firmware upgrade.

Find the application “MPAC-02 Firmware Upgrade” and *double click* on the application icon, whereupon the following screen will be seen:



**Fig. 7.1. MPAC-02 Firmware Upgrade screen**

If communication is correctly established with the **AEQ MPAC-02**, the screen shows the three basic modules, the Microprocessor, Digital Signal Processor (DSP) and Terminal Adapters, each with the current Firmware version and date (e.g. Microprocessor - (Ver 1.00 08/05/98)). Luminous indicators in the bottom right hand corner of the screen display the state of communication between the PC and **AEQ MPAC-02**. (They should be green and blinking). The serial channel communication parameters are displayed in the bottom left hand corner of the screen.

If communication is not established correctly, the user must indicate the port to be used for communication.

The corresponding screen is:



**Fig. 7.2. Without communication**



**Fig. 7.3. File menu**

Access must be gained through the “File – Setup PC” menu to configure the corresponding communication port.

The “Setup PC” option opens a window that allows modification of the communications port. *Note: this is the only recourse that may be modified.*

*Important: The option “Constructor” in the File menu is exclusively for use by Technical Service and is not user definable.*

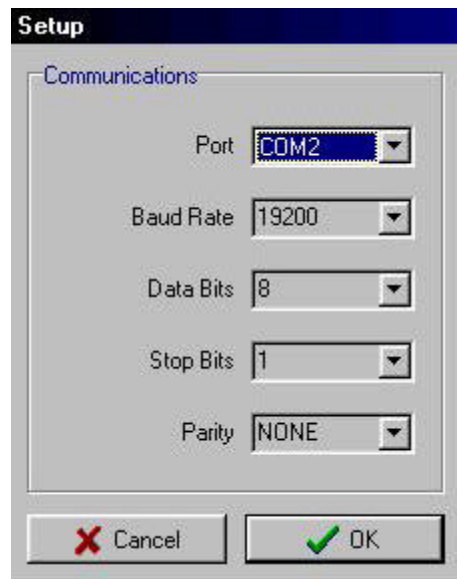


Fig. 7.4. Configuration

Once communication with the **AEQ MPAC-02** is correctly established and the screen in figure 7.1 is visible, the module upgrading process can continue.

In the installation directory, together with the Upgrade application, there are three files, each labelled according to the module software they contain: Micro, DSP and TA.

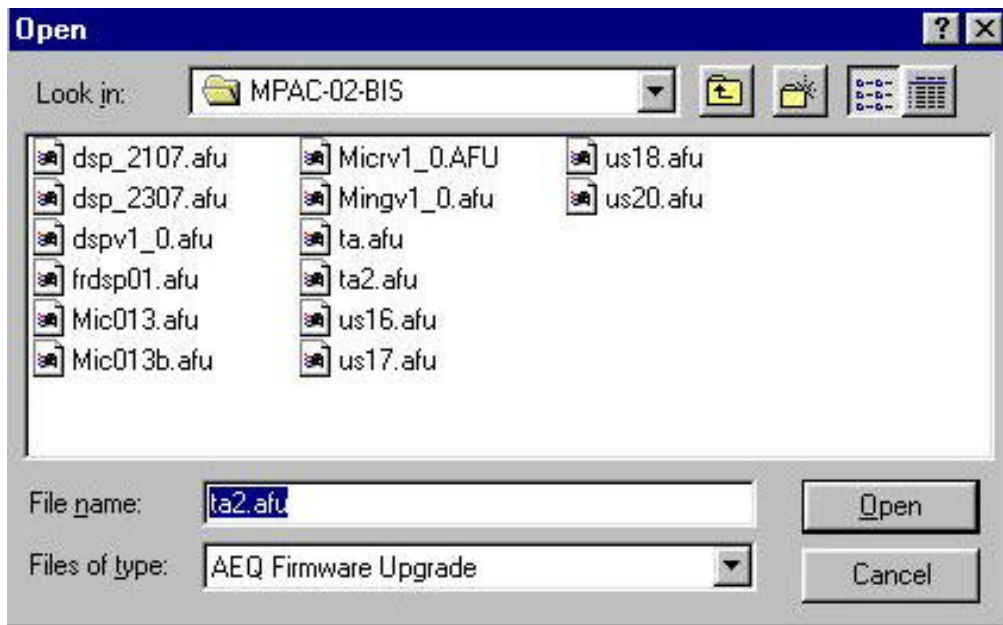
The software upgrading process for each module is as follows (this operation is identical for all modules, therefore only one generic example is described):

From the screen shown in figure 7.1 click on the required module for upgrading with the right mouse button, for example the Microprocessor. An option "Open" will be displayed.



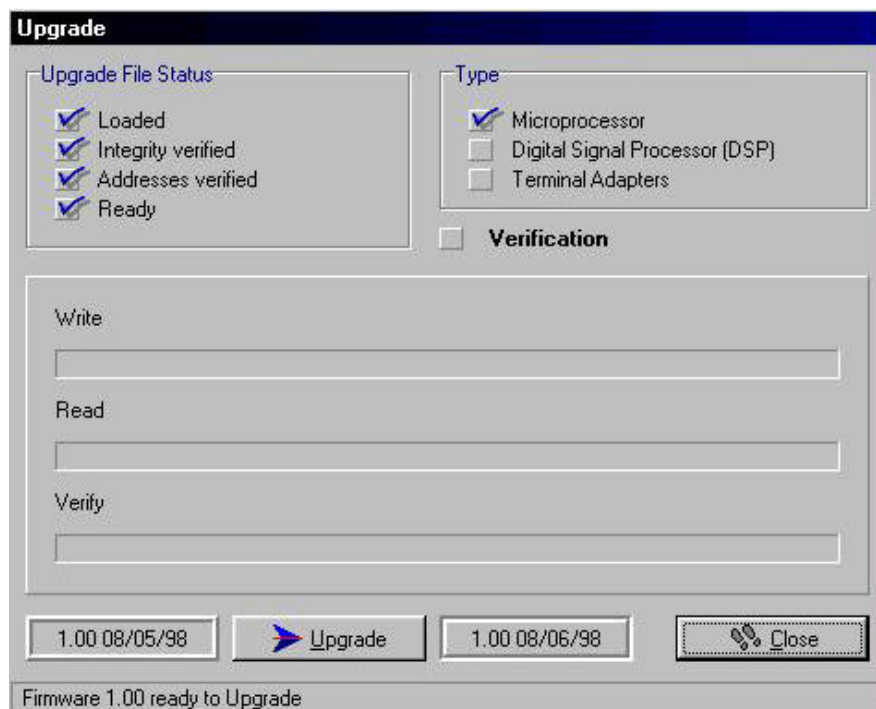
Fig. 7.5. Open option

Select "Open" with the left mouse button. A window for the selection of the Upgrade file will open. The appropriate directory must be selected for each module, within which the upgrade file for each module can be found.



**Fig. 7.6. Open Upgrade File**

Once the file with the latest software version is selected, the Upgrade window opens:

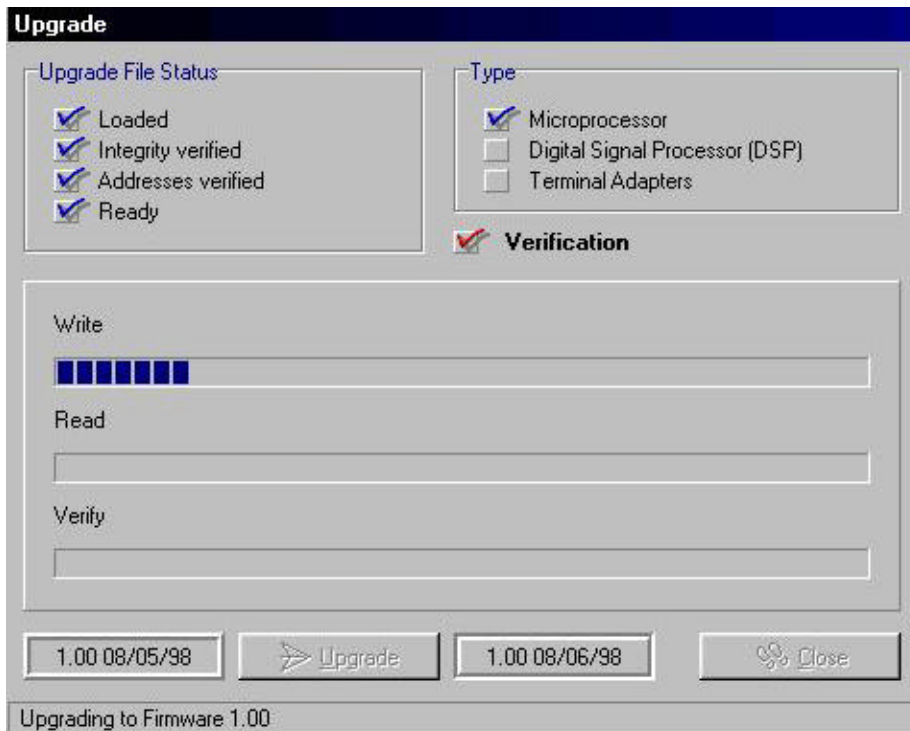


**Fig. 7.7. Upgrade Window**

The current MPAC-02 module software version is shown in the bottom left section of the window, and the version for the upgrade in the right.

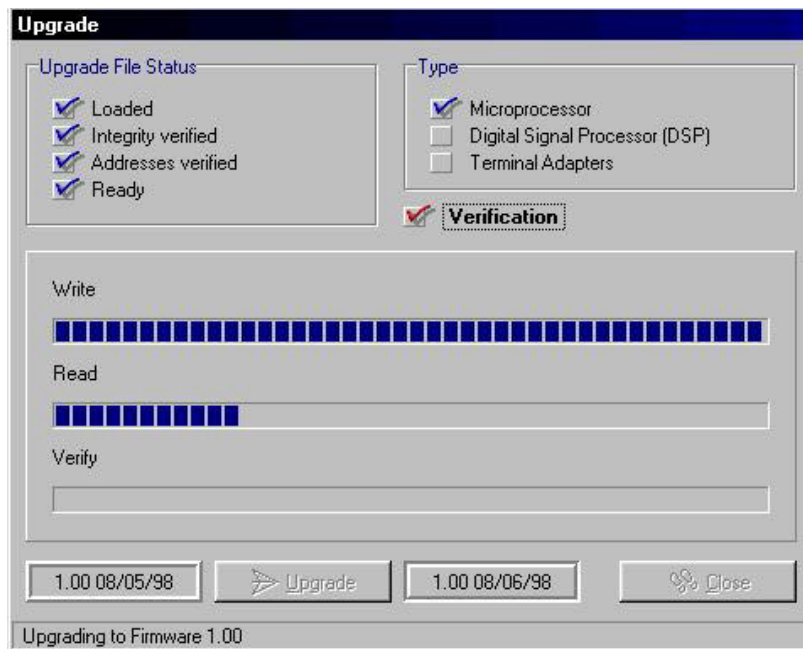
The “Upgrade” button is pressed to proceed with the software upgrade.

A progress indicator appears that shows the time remaining to complete the process.



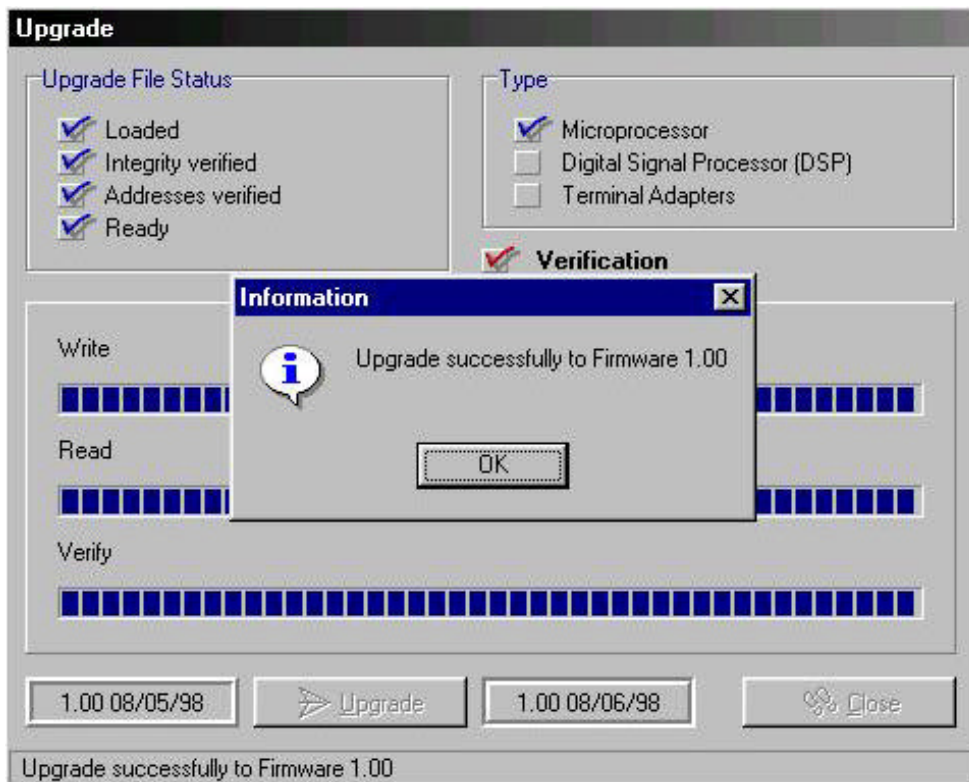
**Fig. 7.8. Upgrading process**

It is possible to verify the firmware transmission after writing by clicking on the corresponding box in the Upgrade window *before commencing the process*. In this case, the program reads the upgraded version following installation. *This verification process should not normally be necessary.*



**Fig. 7.9. Verification**

After writing (and verification when selected), the Upgrade program will confirm that the process has been successfully completed:



**Fig. 7.10. Upgrade successful.**

This process must be carried out for each of the three modules (Microprocessor, DSP and TA).

## 8. MPAC-02 TECHNICAL SPECIFICATIONS

- **Microphone inputs (transformer balanced):**
  - Input impedance:  $>3K\Omega$
  - Nominal input level for PRG GO = 0dBu: -60dBu
  - Maximum input level for nominal adjustment: -34.5dBu
  - Input range for PRG GO = 0dBu: -70dBu ÷ -34.5dBu
  - Output variation limits for nominal input:  $-\infty \div +10$ dBu
  - Bandwidth: 20Hz ÷ 20KHz -1.3dB
  - EIN: (G= 60dB; Absolute noise = -60.5dBu) = -120.5dBu (with BPF)
  - EIN: (G= 70dB; Absolute noise = -52.5dBu) = -122.5dBu (with BPF)
  
- **Line input (transformer balanced):**
  - Input impedance:  $>6K5\Omega$
  - Nominal input level for PRG GO = 0dBu: +1.5dBu
  - Maximum input level for nominal adjustment: +26dBu
  - Input range for PRG GO = 0dBu: -9dBu ÷ +26dBu
  - Output variation limits for nominal input:  $-\infty \div +10$ dBu
  - Bandwidth: 20Hz ÷ 20KHz -1dB
  
- **LOC F'B LEFT and RIGHT inputs (transformer balanced):**
  - Input impedance:  $>6K5\Omega$
  - Nominal input level for PRG GO = 0dBu: 0dBu
  - Maximum input level for nominal adjustment: +26dBu
  - Range adjustment for PRG GO = 0dBu: -10dBu ÷ +10dBu
  - Bandwidth: 20Hz ÷ 20KHz -1dB
  
- **Outputs 1 and 2 (transformer balanced):**
  - Output impedance:  $<75\Omega$
  - Nominal output level: 0dBu
  - Maximum output level: +16dBu
  - Absolute noise (with all sends cut):
    - SEND (GO): -63dBu
    - RETURN (F'BACK): -69dBu; -51dBu with all codecs activated
  
- **Headphone outputs:**
  - Nominal load impedance: 2 x 600 $\Omega$
  - Nominal output level (potentiometer at maximum): +6dBu
  - Maximum output level: +7dBu
  - Output absolute noise (pot. at maximum, sends cut): -70dBu

- Output power (into 600Ω): 5mW
  
- **Crosstalk (20Hz ÷ 20KHz):**
  - PROG - COORD (nominal adjustment): <-60dB
  - Headphones over microphone (nominal adjustment, pot. at max., microphone input load 200Ω): <-36dB
  
- **Telephone line interface:**
  - Input / Output: Transformer
  - Impedance: 600Ω
  - Nominal input level: -10dBu
  - Nominal output level: - 6.5dBu
  - Bandwidth
    - Expander inactive (Normal mode):  
Telephone line: 300Hz ÷ 4000Hz -1dB  
Output PROG F'B: 300Hz ÷ 4000Hz -1dB
    - Expander active (Extended mode):  
Telephone line: 50Hz ÷ 3750Hz -1dB  
Output PROG F'B: 50HZ ÷ 3750Hz -1dB
  - Distortion (1KHz at nominal input and output levels):  
Telephone line: 0.15%  
Output PROG F'B: 0.25%
  - Absolute noise:  
Telephone line: -66dBu  
Output PROG F'B: -51dBu
  - Frequency extension:  
TX: +250Hz  
RX: -250Hz
  - Electrical echo suppression:  
Line Impedance 600Ω  
Signal source 1KHz.  
Adjusted for PRG GO = +15dBu  
Output PROG F'B: -49dBu (64dB rejection)
  
- **Approximate dimensions:**
  - Width: 34.5 cm
  - Height: 10.3 cm
  - Depth: 30 cm
  - Weight: 6 Kg (approx.)

- **AEQ MPAC-02 Uninterrupted Power Supply System:**

- Input voltage: 90 to 264 Vac, 50/60 Hz
- Output voltage: 13.7 Vdc / 1.6 A
- Autonomy: 30 minutes
- Weight: 1300 gr. max.

## APPENDIX I: GUIDE TO RAPID USE

### 1.1. To establish communication:

Before making a call, and with the unit switched-off, select the analogue telephone line CTN (ANALOG TELEPHONE LINE), or ISDN digital line (ISDN) option. Selection of the required line mode is by the (MODE SELECT) switch found on the rear panel.

#### 1.1.1. Analogue telephone line (CTN)

Switch-on the unit and the display will illuminate with the message "ANALOG TELEPHONE LINE".

##### Manual call:

- To make a call press the "OFFHK" key that appears in the display.
- Enter the required telephone number using the numeric keyboard (the number will be shown in the LCD display).

In this mode, the equipment selects both DTMF (multifrequency) dialling and NORMAL frequency response by default. These modes may be changed to PULSE and EXTENDED respectively by pressing the corresponding keys in the display.

##### Automatic call (calling from the 'phone book):

- Select the P-BOOK using the corresponding key in the display.
- Using the UP – DOWN keys, look for the required telephone number.
- Press the VALID key to select the required number.
- Press the OFFHK key to make the call.

If the call is not established at the first attempt (line busy, no reply) in any call mode (manual or automatic), it is possible to redial by accessing the 'phone book where the last number dialled will be stored in the first position.

To disconnect the equipment from the line it is only necessary to press the ONHK button found in the display.

#### 1.1.2. Digital line (ISDN)

Before switching-on the equipment the microswitches on the rear panel must be configured for manual start-up: 3 and 8 in the "up" position and the remainder in the "down" position.

Switch-on the unit and the display will illuminate with the message "ISDN G722 64 STAT".

When calls are made over ISDN digital lines, the **AEQ MPAC-02** is capable of communicating through two independent 64Kb channels, one for program and the other for orders. Once connection is established in one channel, the second channel may be connected.

The destination selector (SELECT PROG/COORD CHANNEL) situated on the left of the numeric keyboard must be pressed to select the desired channel (Program/Co-ordination) for the connection. The channel selected will be shown in the top right corner of the LCD display. By default, the Program will be passed to the channel used for the initial dialling, and Co-ordination to the second channel.

### Manual call:

- Select the necessary transmission codification (if not the one shown in the display) by pressing the corresponding CHCOD (Change Codification) key.
  - Press UP - DOWN to select the required code.  
The codification must be the same as used by the remote equipment for communication.
  - Press OK to set the selected codification.
- Dial the desired telephone number using the numeric keyboard.
- Press the DIAL key to initiate the dialling process.

The message CALL IN PROGRESS appears in the display during the establishment of a call. If the communication is successfully realised, the message CALL CONNECTED will appear. If the call fails, an error message will appear indicating the possible cause.

The dialling process for the second channel is the same as described above.

### Automatic call:

- Select the P-BOOK key in the display.
- Using the UP – DOWN keys, look for the required telephone number.
- Press the OK key to select the required number.
- Press the DIAL key to initiate the dialling process.

If the call is not established at the first attempt (line busy, no reply) and independent of the mode being used (manual or automatic), redial may be effected using the RECAL option where the last number dialled will be stored.

To disconnect the unit from the corresponding line (CTN or ISDN), the button corresponding to the channel for disconnection (PROG DISCONNECT or COORD DISCONNECT) situated at the left of the numeric keyboard must be pressed. In ISDN 128Kb mode (using both 64Kb channels as one channel) pressing either of the two buttons will disconnect the equipment

VU mode (VU-meter) may be selected to monitor the output signal level once communication has been established through either analogue CTN or ISDN digital line.

### 1.2. Equipment use once communication is established:

The **AEQ MPAC-02** Portable Audiocodect behaves like a small mixer.

The equipment has three commentator channels, each with a microphone input, a control for microphone mix level, a headphone output with independent level controls for each earpiece, push-buttons to assign channels to the mix circuits (Program or Co-ordination), and push-buttons to independently send the various signals available in the unit to the left and right earphones of the commentator.

The Audiocodect also has a microphone/line channel for the connection of a fourth guest microphone, or the output from a portable tape-recorder, and has its own corresponding mix level control, as well as a send to mix circuit selector (Program, Co-ordination, both or none).

## **APPENDIX 2: Compatibility with TELOS y CCS audiocodexs.**

For the **AEQ MPAC-02** to be compatible with TELOS (ZEPHYR) and CCS (CDQ PRIMA) audiocodexs in all 128Kbps modes, IMUX multiplex should be selected using microswitch 2 found on the rear panel of the **AEQ MPAC-02**. This microswitch should be set in the up positioned. Be sure that, once you have restarted from computer, the LCD screen displays the wished multiplex. For more information, see section 3.2.

- Compatibility with **TELOS/ZEPHYR**

- 64 Kbps Modes:

- G711 Law A

- G722 Statistical

- MPEG LII, 64Kbps, 24KHz

- 128Kbps Modes:

- MPEG LII MONO, 128Kbps, 48 KHz

- MPEG LII JOINT STEREO, 128Kbps, 48 KHz

- MPEG LII STEREO, 128Kbps, 48 KHz

ZEPHYR can generate voice calls, but it can not receive them.

- Compatibility with **CCS/CDQ PRIMA**

- 64 Kbps Modes:

- G722 Statistical

- MPEG LII MONO, 64Kbps, 24KHz

- MPEG LII MONO, 64Kbps, 32KHz

- 128Kbps Modes:

- MPEG LII MONO, 128Kbps, 48 KHz

- MPEG LII JOINT STEREO, 128Kbps, 48 KHz

- MPEG LII STEREO, 128Kbps, 48 KHz

- MPEG LII DUAL, 128Kbps, 32 KHz

Note: the CDQ PRIMA audiocodex should be configured with the following parameters:

- configure as an independent decoder
- the header menu configuration:
  - Protect (transmits with CRC)
  - Original (ON)
  - ISO Algorithm
- CCSIMUX transmission mode, if using 128Kbps mode

### **APPENDIX 3: AEQ WARRANTY**

A.E.Q. S.A. warrants, for one year period from the purchase date of the equipment, the free substitution at our Technical Service workshops, of any damaged or defective component due to manufacture error, including the labour required to carry on such substitution and the subsequent adjustment of the equipment.

This warranty does not include transport, installation and setting of the equipment, nor cleaning or substitution of pieces subject to normal operative wear.

This warranty also excludes any kind of failure or damage which are attributable to the improper use of the equipment, or to the handling by persons outside our Technical Service.