Model DP569

Dolby Digital
Multichannel Audio Encoder
User's Manual

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Dolby Laboratories, Inc.

Corporate Headquarters

Dolby Laboratories, Inc.
100 Potrero Avenue
San Francisco, CA 94103-4813
Telephone 415-558-0200
Fax 415-863-1373
Email info@dolby.com
www.dolby.com

European Headquarters

Dolby Laboratories, Inc.
Wootton Bassett
Wiltshire, SN4 8QJ, England
Telephone (44) 1793-842100
Fax (44) 1793-842101

WARNING:

⚠

Troubleshooting must be performed by trained technicians. Do not attempt to service this equipment unless you are qualified to do so.

Check that the correct fuses have been installed. To reduce the risk of fire, replace the fuses only with the same type and rating. See page xi.

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Regulatory Notices and Fuse Information

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Canada

This Class A digital apparatus complies with Canadian ICES-003.

UL

WARNING: ⚠ ***Troubleshooting must be performed by a trained technician. Do not attempt to service this equipment unless you are qualified to do so.***

Check that the correct fuses have been installed. To reduce the risk of fire, replace only with fuses of the same type and rating.

Exposed portions of the power supply assembly are electrically "hot". In order to reduce the risk of electrical shock, the power cord MUST be disconnected when the power supply assembly is removed.

The ground terminal of the power plug is connected directly to the chassis of the unit. For continued protection against electric shock, a correctly wired and grounded (earthed) three-pin power outlet must be used. Do not use a ground-lifting adapter and never cut the ground pin on the three-prong plug.
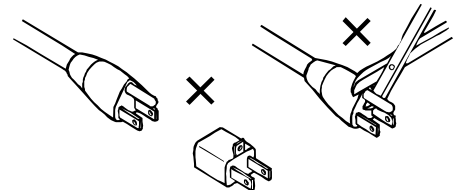
UK

The power cord Dolby part 92021 supplied for use in Europe is not suitable for use in the UK. To use the cord in the UK cut off the CEE7/7 plug and replace with an approved BS 1363 13A plug:

- The core that is coloured green and yellow must be connected to the terminal in the plug identified by the letter **E** or by the earth symbol ⏚ or coloured green or green and yellow.

- The core that is coloured blue must be connected to the terminal that is marked with the letter **N** or coloured black.

- The core that is coloured brown must be connected to the terminal that is marked with the letter L or coloured red.

- This apparatus must be earthed.

EU

This equipment complies with the EMC requirements of EN55103-1 and EN55103-2 when operated in an E2 environment in accordance with this manual.

IMPORTANT SAFETY NOTICE

This unit complies with the safety standard EN60065. The unit shall not be exposed to dripping or splashing and no objects filled with liquids, such as coffee cups, shall be placed on the equipment. To ensure safe operation and to guard against potential shock hazard or risk of fire, the following **must** be observed:
o Ensure that your mains supply is in the correct range for the input power requirement of the unit.
o Ensure **fuses** fitted are the **correct rating and type** as marked on the unit.
o The unit **must be earthed** by connecting to a correctly wired and **earthed** power outlet.
o The **power cord** supplied with this unit must be wired as follows:
Live—Brown   Neutral—Blue   Earth—Green/Yellow

(GB)

IMPORTANT – NOTE DE SECURITE

Ce materiel est conforme à la norme EN60065. Ne pas exposer cet appareil aux éclaboussures ou aux gouttes de liquide. Ne pas poser d'objets remplis de liquide, tels que des tasses de café, sur l'appareil. Pour vous assurer d'un fonctionnement sans danger et de prévenir
tout choc électrique ou tout risque d'incendie, veillez à observer les recommandations suivantes.
o Le selecteur de tension doit être placé sur la valeur correspondante à votre alimentation réseau.
o Les fusibles doivent correspondre à la valeur indiquée sur le materiel.
o Le materiel doit être correctement relié à la terre.
o Le cordon secteur livré avec le materiel doit être cablé de la manière suivante:
Phase—Brun   Neutre—Bleu   Terre—Vert/Jaune

(F)

WICHTIGER SICHERHEITSHINWEIS

Dieses Gerät entspricht der Sicherheitsnorm EN60065. Das Gerät darf nicht mit Flüssigkeiten (Spritzwasser usw.) in Berührung kommen; stellen Sie keine Gefäße, z.B. Kaffeetassen, auf das Gerät. Für das sichere Funktionieren des Gerätes und zur Unfallverhütung (elektrischer Schlag, Feuer) sind die folgenden Regeln unbedingt einzuhalten:
o Der Spannungswähler muß auf Ihre Netzspannung eingestellt sein.
o Die Sicherungen müssen in Typ und Stromwert mit den Angaben auf dem Gerät übereinstimmen.
o Die Erdung des Gerätes muß über eine geerdete Steckdose gewährleistet sein.
o Das mitgelieferte Netzkabel muß wie folgt verdrahtet werden:
Phase—braun   Nulleiter—blau   Erde—grün/gelb

(D)

NORME DI SICUREZZA – IMPORTANTE

Questa apparecchiatura è stata costruita in accordo alle norme di sicurezza EN60065. Il prodotto non deve essere sottoposto a schizzi, spruzzi e gocciolamenti, e nessun tipo di oggetto riempito con liquidi, come ad esempio tazze di caffè, deve essere appoggiato sul dispositivo. Per una perfetta sicurezza ed al fine di evitare eventuali rischi di scossa êlettrica o d'incendio vanno osservate le seguenti misure di sicurezza:
o Assicurarsi che il selettore di cambio tensione sia posizionato sul valore corretto.
o Assicurarsi che la portata ed il tipo di fusibili siano quelli prescritti dalla casa costruttrice.
o L'apparecchiatura deve avere un collegamento di messa a terra ben eseguito; anche la connessione rete deve avere un collegamento a terra.
o Il cavo di alimentazione a corredo dell'apparecchiatura deve essere collegato come segue:
Filo tensione—Marrone   Neutro—Blu   Massa—Verde/Giallo

(I)

AVISO IMPORTANTE DE SEGURIDAD

Esta unidad cumple con la norma de seguridad EN60065. La unidad no debe ser expuesta a goteos o salpicaduras y no deben colocarse sobre el equipo recipientes con liquidos, como tazas de cafe. Para asegurarse un funcionamiento seguro y prevenir cualquier posible peligro de descarga o riesgo de incendio, se han de observar las siguientes precauciones:
o Asegúrese que el selector de tensión esté ajustado a la tensión correcta para su alimentación.
o Asegúrese que los fusibles colocados son del tipo y valor correctos, tal como se marca en la unidad.
o La unidad debe ser puesta a tierra, conectándola a un conector de red correctamente cableado y puesto a tierra.
o El cable de red suministrado con esta unidad, debe ser cableado como sigue:
Vivo—Marrón   Neutro—Azul   Tierra—Verde/Amarillo

(E)

VIKTIGA SÄKERHETSÅTGÄRDER!

Denna enhet uppfyller säkerhetsstandard EN60065. Enheten får ej utsättas för yttre åverkan samt föremål innehållande vätska, såsom kaffemuggar, får ej placeras på utrustningen." För att garantera säkerheten och gardera mot eventuell elchock eller brandrisk, måste följande observeras:

⒮

o   Kontrollera att spänningsväljaren är inställd på korrekt nätspänning.
o   Konrollera att säkringarna är av rätt typ och för rätt strömstyrka så som anvisningarna på enheten föreskriver.
o   Enheten måste vara jordad genom anslutning till ett korrekt kopplat och jordat el-uttag.
o   El-sladden som medföljer denna enhet måste kopplas enligt foljande:

Fas—Brun   Neutral—Blå   Jord—Grön/Gul

BELANGRIJK VEILIGHEIDS-VOORSCHRIFT:

Deze unit voldoet aan de EN60065 veiligheids-standaards. Dit apparaat mag niet worden blootgesteld aan vocht. Vanwege het risico dat er druppels in het apparaat vallen, dient u er geen vloeistoffen in bekers op te plaatsen. Voor een veilig gebruik en om het gevaar van electrische schokken en het risico van brand te vermijden, dienen de volgende regels in acht te worden genomen:

Ⓝ Ⓛ

o   Controleer of de spanningscaroussel op het juiste Voltage staat.
o   Gebruik alleen zekeringen van de aangegeven typen en waarden.
o   Aansluiting van de unit alleen aan een geaarde wandcontactdoos.
o   De netkabel die met de unit wordt geleverd, moet als volgt worden aangesloten:

Fase—Bruin   Nul—Blauw   Aarde—Groen/Geel

Fuse Information

WARNING:

⚠

To reduce the risk of fire, replace fuses only with the same type and rating.

The unit uses a universal switching power supply that handles the full range of nominal mains voltages between 90 and 264 VAC and any frequency between 50 Hz and 60 Hz.

Check Main Fuse

The Main fuse rating is:

   1 Amp, 250 V, 20 mm, time-lag fuse (for all operating voltages)

WARNING:

⚠

The power to the unit must be off when the following steps are performed. Ensure that the main power cable to the unit is not connected to a power source.

1.   Open the fuse compartment door in the AC power input housing with a small flat-blade screwdriver (see figure next page). Carefully pull out the fuse carrier.

2.   Check that the fuse has the correct rating. The fuse carrier must be inserted into the compartment with the orientation shown in the figure below. *Do not force the carrier into the compartment or both could be damaged.*

3.   Snap the fuse compartment door closed.
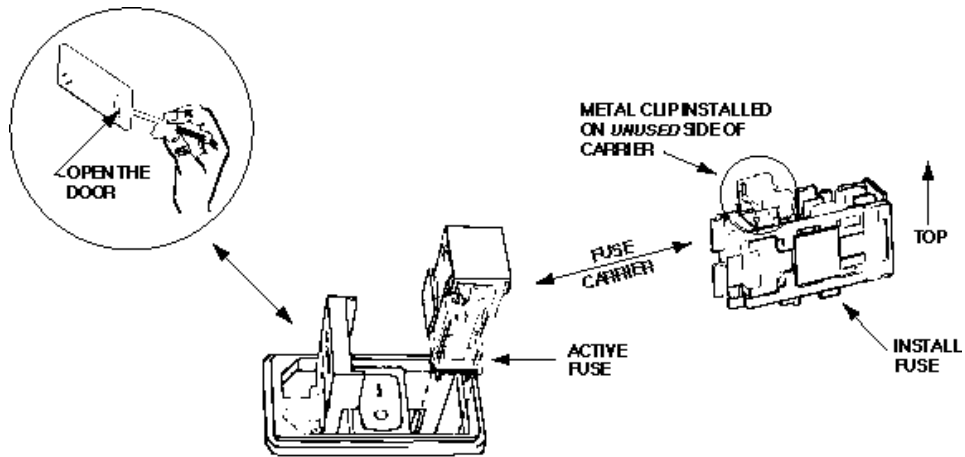
Checking the Main Fuse

Internal Fuse

The switching power supply contains a separate fuse. Most fault conditions should be protected by the main fuse.

If you find it necessary to replace the internal fuse, be certain to replace it with a fuse of the same type and rating as printed on the switching power supply board.

Chapter 1
Introduction

The Dolby DP569 is the reference Dolby Digital multichannel audio encoder. It supports encoded bit rates from 56 to 640 kbps and channel configurations from mono to 5.1-channel surround sound. The DP569 is intended for digital TV, cable, and disc authoring applications, including automated broadcast installations and mastering for DVD and other recorded media.

The DP569 provides three pairs of AES3 digital audio inputs and a single AES3 output. A separate AES3 input may be used for a clock reference signal. Previously encoded Dolby Digital audio bitstreams pass through unchanged—automatically, if the DP569's bitstream detection feature is activated. Matrix encoding on Dolby Surround input signals also remains unaffected.

EBU/SMPTE LTC and VITC timecode inputs make it possible to start and stop the encoder accurately to create separate program segments and soundtrack files for disc authoring. The DP569 can also derive the time stamps required for A/V synchronization.

The DP569 supports all metadata parameters, including the flag to indicate material encoded in Dolby Digital Surround EX. An automatic data rate setting allows the output data rate to follow the number of encoded channels dynamically for broadcast applications.

The rear-panel Metadata connector provides external metadata input from other Dolby products (such as a Dolby E decoder). Two additional connectors are provided for general-purpose I/O signals, including status and control signals. Fault-monitoring circuits warn of actual or potential system failure, and bypass connections enable a hot-standby mode for broadcast installations.

The DP569's front panel features an alphanumeric display showing status parameters and tri-color LEDs indicating channel activity. Controls include an elastomeric keypad for menu navigation and preset recall. Front- and rear-panel serial interfaces, along with supplied application software, make it possible to configure and control the DP569 from Windows 95/98/2000/NT-equipped PCs or other remote devices.

Chapter 2
Setting Up

This chapter covers all general connection and installation requirements for the DP569.

2.1   Unpacking

Before unpacking the DP569, inspect the outer carton for shipping damage. If the carton shows damage, inspect the unit in those areas.

Several accessories are provided with the unit.

- A power cord (US style)

- Floppy disks containing the DolbyRemote software

- A serial connection cable for the front-panel RS-232 port

- A bag containing BNC 75Ω terminators, rack-mount screws, washers, and fuses

- A foldout Quick Start Guide and this User's Manual

2.2   System Considerations

2.2.1   Jumpers

The Model DP569 allows you to choose options that are configured by internal jumpers. Factory default settings are shown in Figure 2-1, these are suitable for most installations.

To gain access to these jumpers, remove the top cover of the unit as follows:

WARNING: ⚠ ***The power to the DP569 must be off when the following steps are performed. Ensure that the main power cable to the unit is not connected to a power source and that a suitably qualified person is performing this task.***

1. Remove the 12 screws securing the top cover to the chassis (use the supplied hex wrench to remove the three screws on the upper front panel).

Note: The front panel is attached to the chassis by means of three screws at the lower end of the front panel. Do not remove these screws.

2. Gently lift the top cover upward and towards the rear. Carefully set aside.

3. Reverse the above procedure when re-assembling the unit.
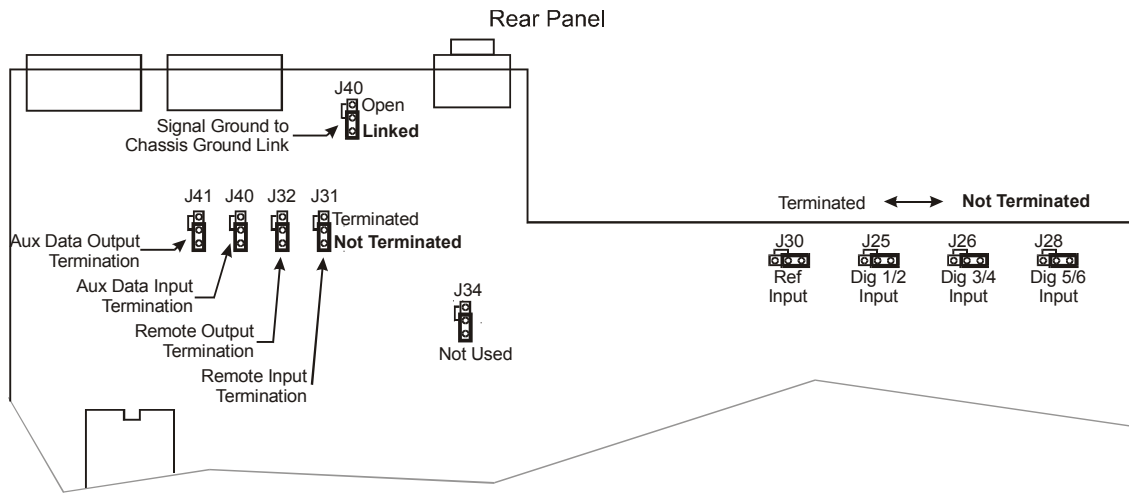
Figure 2-1 Jumper Locations

2.2.2   Digital Input and Output

The digital input and output connections on the DP569 may seem unfamiliar to the
first time user of a digital audio device. The Audio Engineering Society (AES)
created a standard electrical interface for digital audio with a balanced XLR
connector and 110Ω impedance called AES3-1995. This interface was later expanded
to include an unbalanced BNC connector, 1 V peak-to-peak signal level, and 75Ω
impedance; the new standard is known as both AES3-ID-1995 and SMPTE-276M.
The DP569 uses this new standard.

Note: These signals must be properly terminated with a 75Ω impedance on the last
device in the signal chain. External 75Ω terminations for standard installations
are supplied within the packing kit for the DP569.

2.3   Front Panel

The Model DP569 front-panel interface consists of a two-line alphanumeric liquid crystal display (LCD), a set of user-input buttons, a set of dedicated LED status indicators, and a remote port. Please see Figure 2-2 for the front-panel illustration.
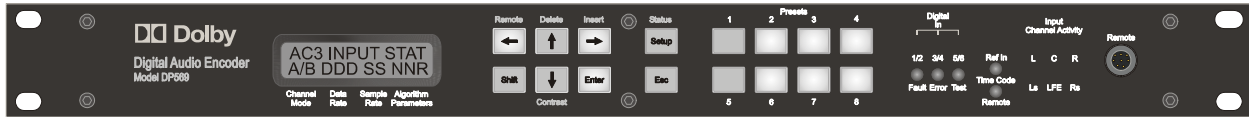
Figure 2-2 DP569 Front Panel

2.3.1   Front-Panel Interface

The menu system has two independent structures: setup and status. The setup menu lets you configure the DP569 to suit your environmental and program requirements, and the status menu displays information regarding the operating status and the condition of input signals.

Navigation Buttons

The eight buttons closest to the display window control navigation through the menus and selection of parameters within menu screens.
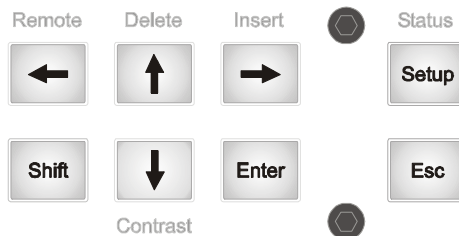
Figure 2-3 Front-Panel Navigation Buttons

To select the function listed above or below a button, first press **Shift**, then the associated button. For example, to select **Remote**, press **Shift**, ←. Do not hold down **Shift** while pressing the second button.

Insert and **Delete** have no impact except in text entry menus. For details on text entry, see Section 2.5.2, Entering Text.

2.3.2   Contrast Adjust

Press **Shift**, ↓ to access the contrast control.

Use the arrow buttons to adjust the contrast on the LCD. Press **Enter** or **Esc** to return to the previous menu.

2.3.3   Preset Buttons

The second group of buttons allows you to quickly select existing presets.
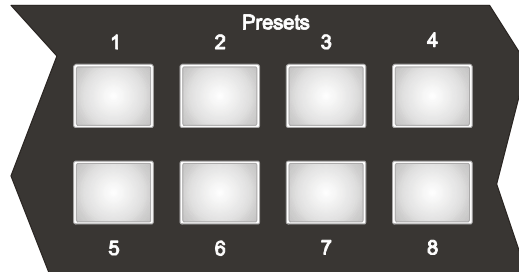
Figure 2-4 Preset and Program Buttons

To select a preset, press the appropriate **Preset** button. A table of factory default presets can be found in Appendix C. Presets 28–32 are copied to presets 1–5 when shipped from the factory.

2.4   Status Menu

To navigate the status menu, use the front-panel navigation buttons as shown in Table 2-1.

Table 2-1 Status Menu Navigation Buttons

Command	Result
← or ↑	Displays the previous status menu
↓ or →	Displays the next status menu
Esc	Displays main status menu

2.5   Setup Menu

To navigate the setup menu, use the front-panel navigation buttons as shown in Table 2-2.

Table 2-2 Setup Menu Navigation Buttons

Command	Result
← or ↑	Displays the previous menu item available on line 2 of the display.
↓ or →	Displays the next menu item available on line 2 of the display.
Enter	Enters the menu item on line 2 of the display; changes function status and menu display accordingly.
Esc	Displays the next higher menu level. If you have changed the display from the current parameter value without pressing **Enter**, **Esc** returns display to current parameter value.

These commands and results remain constant throughout the setup menu except during text entry. For details on text entry, see Section 2.5.2, Entering Text.

The commands in Table 2-3 exit the setup menu. (If you are in edit mode of a parameter, the **Status** key and the **Remote** keys do not respond.)

Table 2-3 Commands that Exit the Setup Menu

Command	Result
Status	Displays current status menu
Remote	Engages the remote control and displays the main status menu

To return to the setup menu, press **Setup**. If you engage the remote, to use the front-panel status menu you must first disengage the remote by pressing **Shift**, ←, then **Setup**.

2.5.1   Selecting Parameters

When line 2 of the display includes a flashing cursor, the parameter displayed on that line is not active. Pressing **Enter** activates that parameter. Pressing **Esc** while the cursor is flashing returns line 2 of the display to the active parameter for that menu.

Example:

```
  Clock Source
Internal 48kHz■
```
with flashing cursor

Press **Enter** to activate the Clock Source setting. Press **Esc** to return the display to the active status:

```
  Clock Source
 Digital Input
```
without cursor

If you press **Enter** from the active status display, there is no change. If you press **Esc**, the next higher menu level displays:

```
┌─────────────────────────┐
│      I/O Control        │
│      Clock Source       │
└─────────────────────────┘
```

2.5.2   Entering Text

In certain situations you will be prompted to enter text. In the text entry window,

```
┌─────────────────────────┐
│       Enter Name        │
│       PRESET 6          │
└─────────────────────────┘
```

the first line prompts you to enter text. The second line displays the current text for the parameter or, if no text is yet defined, a default text string. An underline cursor appears under the first character in the string.

Note: Do not use more than 12 characters, including spaces, for a preset name.

Button functions in Text Entry mode are described in Table 2-4.

Table 2-4 Navigation in Text Entry Menu

Command	Result
← or →	Moves the cursor to the left or right
↑	Displays the next character in the character set
↓	Displays the previous character in the character set
Enter	Saves the text on line 2 temporarily, pending confirmation; changes display to confirmation dialog
Esc	Returns text on line 2 to initial display; if text is unmodified, displays the next higher menu level
Insert	Places a blank space at the cursor location; if there are characters to the right of the cursor, moves all characters one space to the right
Delete	Deletes the character at the cursor location
Remote	Engages the remote control and displays the main status menu

2.6   Front-Panel Indicators
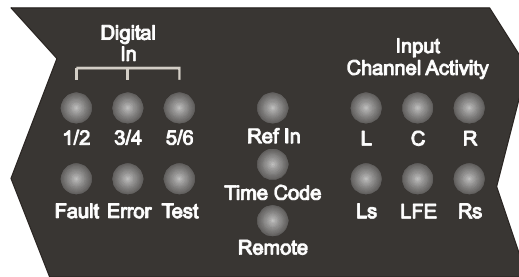
Figure 2-5 Front-Panel Indicators

The front-panel LED indicators provide information on the operational state of the DP569.

2.6.1   Digital Input Status LEDs

The front panel has three status LEDs for audio inputs **Digital In 1/2, 3/4,** and **5/6.** Each indicates if its respective input is in use and, if so, if it is valid.

Bypass mode does not affect the function of the status LEDs.

Table 2-5 Digital Input LED States

State	Description
Off	Input is unused.
Green	Input is in use and a valid input is detected.
Red	Input is required, but invalid or not present.

2.6.2   Fault, Error, Test, Ref In, Remote, and Timecode LEDs

Table 2-6 Status LED States

LED	State	Description
Fault	Off	PSU and processor status OK.
	Red	PSU or processor/memory fault.
Error	Off	No operational errors are detected by the DP569.
	Red	One or more operational errors are detected and the DP569 output is not valid.
Test	Off	Normal operation.
	Red	Test tone output is enabled. Audio from the system inputs is ignored.

LED	State	Description
Ref In	Off	The Ref In input is not selected.
	Green	The Ref In input is required and locked without errors.
	Red	The Ref In input is required, but invalid or not present.
Remote	Off	Remote interface is disabled.
	Green	Remote interface is enabled and operating without errors.
	Red	Remote interface is enabled but there is a low-level serial communications error.
Timecode	Off	The timecode input is not required.
	Green	Input is required and a valid input is detected.
	Red	Input is required, but invalid (e.g., stop time frame number >25 and timecode is at 25 fps) or not present.

2.6.3   Channel Activity LEDs

There are six-channel activity LEDs.

If an input channel is muted because its input source is missing or invalid, the respective activity LED will be turned off.

If the system is missing its clock signal then all activity indicators will be turned off even if audio inputs are present.

Table 2-7 Input Channel Activity LED States

State	Description
Off	Channel is not used. Channel is muted due to invalid input.
Yellow	Channel is selected and less than –60 dBFS.
Green	Channel is selected and between –0.1 and –60 dBFS.
Red	Channel is selected and is greater than –0.1 dBFS (clip).

2.6.4   Remote Connector

The front-panel RS-232 port is active only when a connector is physically attached to the port and the **Remote** mode or **Download** mode is enabled.

The following front-panel functions are active during the **Remote** mode:

- All front-panel status LEDs. This includes the LEDs on the front-panel preset buttons, although the buttons themselves are not active.

- The **Remote** mode remains active whether or not controlling devices are attached to the remote ports and whether or not commands are being received. Note that commands from the front-panel remote port override any commands received from the rear-panel port.

Chapter 3
Applications

The two main applications for the DP569 Dolby Digital encoder are:

- Digital Television Broadcasting

- DVD Authoring

Each environment has unique requirements in terms of installation and operation. In this chapter, we discuss each application in detail. This chapter assumes the user has some knowledge of the ideas and principles behind metadata. If this is not the case, we suggest you read Appendix A before continuing.

3.1   Digital Television Broadcasting

3.1.1   Basic Integration with an MPEG Encoder or Multiplexer

The DP569 is designed to integrate with existing MPEG encoders and transport stream multiplexers. Various methods can be used to control the encoder settings, particularly the metadata parameters used during the encoding process, each providing a different level of complexity and service.

The DP569 is connected as shown in Figure 3-1. This diagram shows a 5.1-channel installation; stereo and mono installations will be identical except for the number of digital audio inputs.

In the simplest mode of operation, all system settings (including metadata parameters) are set once in the encoder for all transmissions. In this mode the metadata settings will need to be configured to match the characteristics of the audio currently used within the TV station (for example, the levels, dynamic range, peak levels, and so forth). Consequently, all audio must conform to these characteristics before it reaches the DP569 in order to match these metadata settings. This is similar to the requirements of analog or MPEG digital transmissions, where the audio system has fixed characteristics and the program audio is conformed to match.

The next level of complexity uses the GPI status port to select up to four different user presets, allowing automation systems to choose different metadata settings for different types of programming. For example, one setting for network transmissions and another for local insertions, or settings for news, sports, feature films, and commercials. Again, the audio will need to be conformed to match the chosen setting; however, there is now a greater amount of flexibility available for audio transmissions.
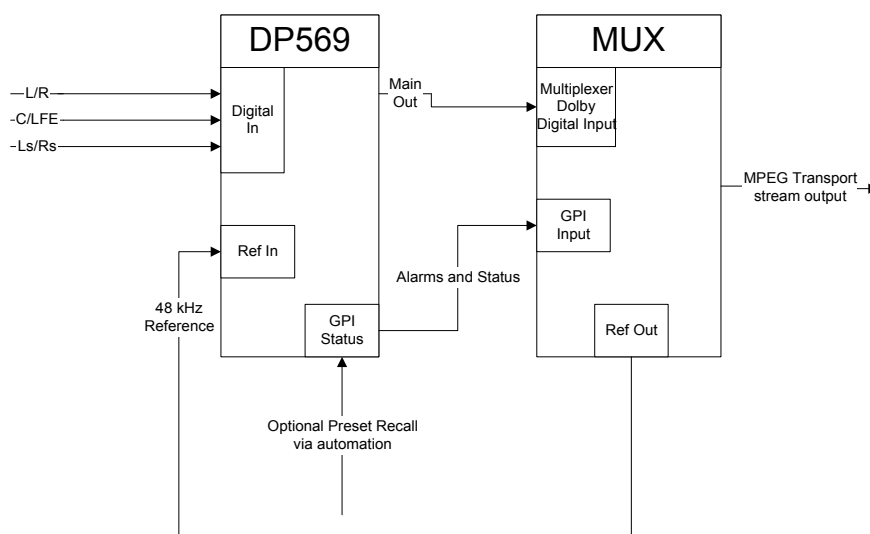
Figure 3-1 DP569 Integrated with a Multiplexer

3.1.2   Integration within a Dolby E System

More and more broadcast systems are using Dolby E to distribute multiple channels of audio within and between TV stations. Dolby E will provide both the audio and metadata for the DP569 encoder, in effect "remote controlling" the DP569 settings. Consequently, the configuration of the DP569 itself is simplified yet the whole audio transmission is highly flexible.

An example of a 5.1-channel installation is shown in Figure 3-2. Stereo or mono installations will follow a similar pattern. The DP572 decodes the Dolby E signal, extracts the audio and metadata, and sends it to the DP569.

Connect the DP572's **Digital Output** channels 1/2, 3/4, 5/6 to the DP569's **Digital Input** channels 1/2, 3/4, 5/6, respectively. Install 75Ω terminators if the loop-through BNC connectors on the DP569 are unused.

Use a standard DB9 male-to-male cable (not a null modem) to connect the Metadata output on the DP572 decoder to the Metadata input on the DP569. It is possible to connect one DP572 to many DP569 units by simply cascading the metadata connection.

When a DP569 receives external metadata, the following parameters must be explicitly set:

- Set the **Metadata Source** to the appropriate program—this is usually **Program 1**. See Section 4.2.2.

- Set the **Reversion Mode.** See Section 4.2.2.

This can also be done quickly by recalling factory preset 1 from the front panel (a copy is stored in preset 28).
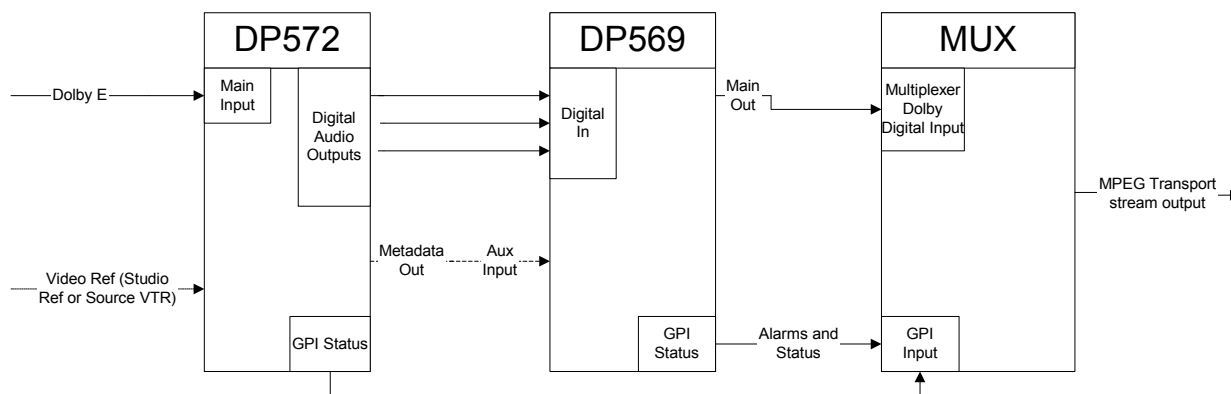
Figure 3-2 Connection Between a DP569 and DP572

3.1.3   Metadata Reversion

It is important to consider what will happen in situations where metadata does not exist. There are two common situations where metadata may not be available.

1.   When using audio material that has been supplied without metadata—for example, archived material or regular stereo broadcast programming such as news or local programming material.

2.   Equipment failure within the broadcast audio chain.

When a DP569 (or Dolby E products) does not receive metadata, it will revert to a set of preconfigured metadata parameters. This reversion behavior can be used as part of a systems design to apply the correct metadata values in case 1 above as well as providing suitable values in case 2. See Section 4.2.2.

We suggest you contact your systems designer or Dolby Laboratories to discuss the correct settings for your installation and operating practices.

3.1.4   Coding Delay and Audio/Video Synchronization

It is important to establish the correct system timing relationship between the video encoder or MPEG transport stream multiplexer and the DP569 in order to maintain sync. In most cases the MPEG encoder/multiplexer will be able to compensate internally for the DP569 encoding delay and will have a setting to enable this.

If possible, it is recommended that both the MPEG encoder/multiplexer and the DP569 be set to compensate for 200 ms of delay (plus an additional one frame in the multiplexer if also compensating for the decoding delay of Dolby E). As 200 ms is larger than the minimum delay value required by the DP569 (at 48 kHz) small timing adjustments can be made in the DP569 if necessary.

3-3

3.1.5 Alarms and Monitoring

The DP569 has a bypass input that can be used for redundant or hot standby operation. In order to connect a pair of DP569 for hot standby, the following connections should be made.
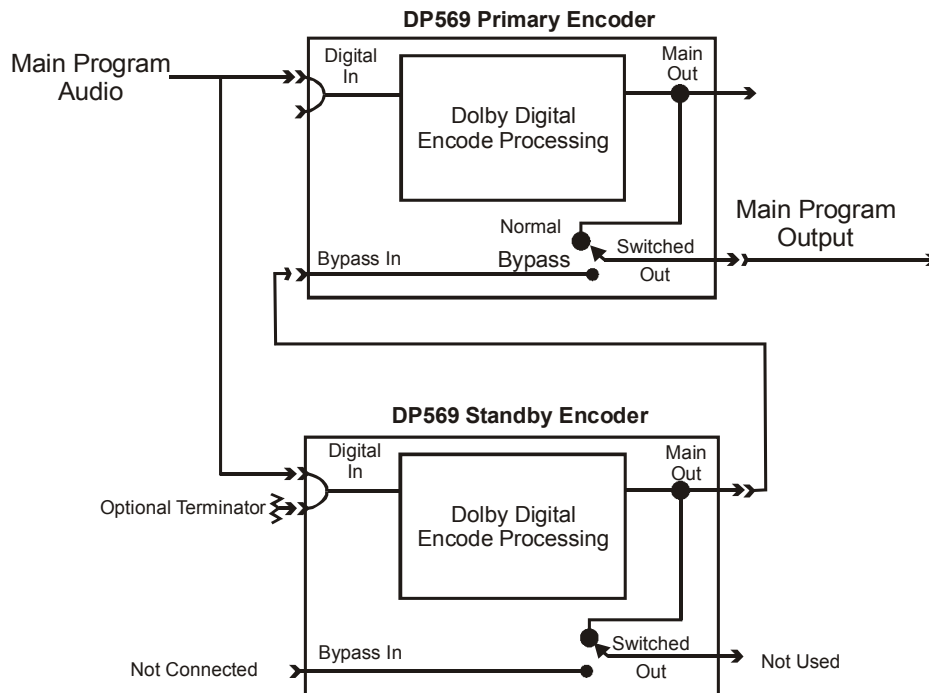
Figure 3-3 Hot-Standby Operation of the DP569

The unit automatically enters Bypass mode when an internal fault occurs or when power to one unit is lost. Bypass mode can also be selected from the I/O Control menu or via the GPI/O input port.

For further security, pins 1 and 9 (ground) of the GPI/O ports can be used to control a unit fault alert. If pin 1 goes "low," then a power supply or hardware fault has occurred. These can be used on both the encoders so that a faulty standby encoder can be identified before it is required. Pins 3, 4, and 9 can also be used to ascertain whether the unit is producing an encoded output, and to trigger a warning.

3.1.6 Quick Start for Digital Television Broadcasting

This section describes the steps necessary to configure the DP569 for typical operation.

1. After unpacking the unit, connect the Digital Audio Inputs to the DP569 using termination as required. See Section 2.2.2, Digital Audio Inputs.

2. If you wish to clock the DP569 using an external AES reference, connect this reference and change the Clock Source menu to Ref-In SRC On. See Section 4.2.5.

3. If required, connect the appropriate GPIs to an alarm system and/or a second encoder for redundant operation. See Section 3.1.5

4. Connect the main output (or switched output) to the Dolby Digital input of the transmission multiplexer.

5. Configure the transmission multiplexer to accept a pre-encoded Dolby Digital bitstream, as per the unit's instructions.

6. Set the correct Coding Delay. See Section 3.1.4.

7. Define the Input Channels configuration. See Section 4.2.5.

In a Dolby E facility

8. Recall preset number 1 (copied in preset 28), the DP569 will now be configured to follow the metadata supplied by the DP572 Dolby E decoder.

In an installation without Dolby E

8. Connect the GPI preset recall pins to the automation as required.

9. You will now need to create individual user preset(s), stored in numbers 1–4, to hold sets of metadata parameters suitable for your station. Presets 2–5 (copied from 29–32) provide starting points for the most common types of program. We recommend that you use the DolbyRemote software to configure and back up these presets.

3.2   DVD Authoring

3.2.1   Overview

The DP569 can be used as part of an integrated system for encoding audio for DVD applications. The system consists of the following hardware and software:

- PC computer running Windows with a suitable digital I/O soundcard installed (A list of soundcards is available at *www.dolby.com*.)

- DP569 Dolby Digital Encoder

- DP562 Multichannel Dolby Digital/Pro Logic Decoder

- DolbyRemote software (supplied with a DP569)

- Dolby Digital Recorder software (Cat. No. 542)

3-5

Dolby Laboratories can also supply an interface kit to aid the installation of this system into studios that use balanced digital audio connections. This kit is called the Cat. No. 541 cable kit and contains four BNC cables along with four impedance transformers.

3.2.2   Quick Start for DVD Authoring

This section describes the steps necessary to configure the DP569 for typical operation. Refer to Figure 3-4 as necessary.
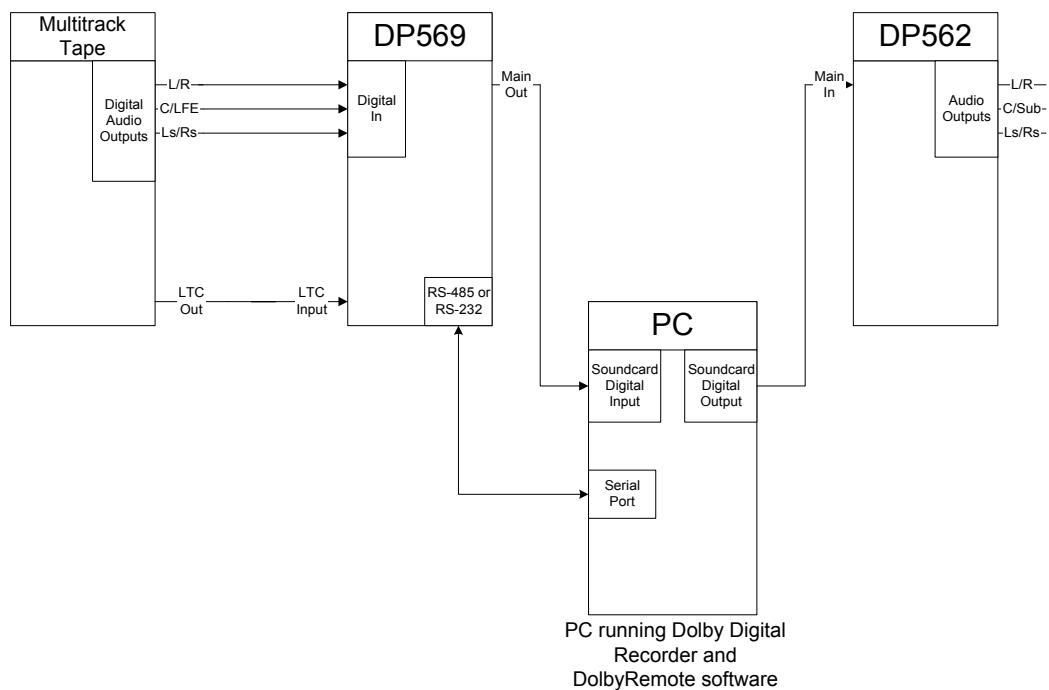
Figure 3-4 DVD Encoding System Block Diagram

1. After unpacking the unit connect the source audio to the digital audio inputs of the DP569 using terminations as required. See Section 2.2.2 and 4.2.5, Digital Audio Inputs.

2. Install the soundcard in the PC and connect the main output of the DP569 to the digital input of the soundcard.

3. Install and calibrate the DP562 Dolby Digital decoder as shown in Figure 3-4 and described the DP562 user's manual.

4. Install the DolbyRemote and Dolby Digital Recorder applications on the PC. See Section 5.2 and the Dolby Digital Recorder user's manual.

5. Using the supplied cable, connect the COM port of the PC to the front panel remote port of the DP569. See Section 5.2.3.

6. Recall factory preset number 2 (copied in preset 29) from the front panel; this configures the unit to generate all metadata settings internally.

7. Place the DP569 in remote mode by sequentially pressing shift and ← keys.

8. Launch the DolbyRemote software and connect to the DP569. See Section 5.3.

You are now ready to create a Dolby Digital file.

9. Using the DolbyRemote software, set the following parameters:

    - The Input Channels configuration. See Section 4.2.5 and 5.6.5

    - Include timecode packets. See Sections 4.2.5 and 5.6.7.

    - Metadata parameters to suit the current audio selection. See Section 4.2.3 and Appendix A.

    - Start and stop timecode values. See Sections 4.2.1 and 5.6.7.

10. Click the Stop button to place the encoder into timecode control.

11. To configure the Dolby Digital recorder:

    - Create a new file using the Toolbar or File New menu.

    - Click the record button to place the Dolby Digital Recorder into Record Ready mode. The status bar should display **Record Ready—Waiting for data.**

    - Click the play button to place the Dolby Digital Recorder into Record mode. The status bar should display **Recording—Waiting for data**.

12. Start the audio source multitrack machine a few seconds before the start timecode value.

When the encoder receives the start time value from the multitrack machine, it will begin encoding and the Dolby Digital Recorder will begin to record the file. The bitstream parameters will be displayed in the main window, and the status bar will display **Recording—Receiving stream *X*,** where *X* is the stream ID set in the Recording Preferences dialog box**.**

To replay this file, simply click on the play button in the Dolby Digital recorder software.

Chapter 4
Front-Panel Menus

This chapter provides an overview of the terms and selections available in the front-panel LCD window.

4.1 Status Menu

The main status menu appears when you turn the power on, press the Status button combination (**Shift**, **Setup**), or activate the remote control.

Main Status

```
Encoder Status
3/2L 448 48 27 0
```

The top line shows the current **unit name** or the name of the **current preset.** The second line shows the current encoding status. **Stopped** indicates encoding has been manually disabled, **Not Encoding** indicates that the unit has been set to encode but is prevented from doing so because a required input is missing or the timecode start value has not be reached. If the unit is encoding, then the second line displays the current value of the **channel mode** and **LFE channel** metadata parameters, followed by the output **data rate** and **sampling rate.** The last two numbers show the current **dialogue level** value and the output **stream number.** The second line will also show if the unit is in **multiplexing mode.**

Other Status Menus

Information displayed are:

- **Center** and **surround downmix** level metadata parameters.
- Condition of the **digital input** and **reference input.**
- Current status of the **timecode input** and if the unit is under **timecode control.**
- Current **coding delay.**
- **Timestamp delay word.**
- The **metadata input** status, its **current reversion mode,** and the **current metadata source.** "P" indicates preset; "L," last used; and "A," adaptive reversion modes. An asterisk indicates that parameters are being overridden.
- **Errors menu**
- **Firmware version**

4.2   Setup Menu

Options in the top menu level are:

- Operating Mode
- Metadata Control
- Metadata Params
- User Presets
- I/O Control
- System Settings

4.2.1   Operating Mode

In this menu you control whether the DP569 is encoding, and whether it is being controlled by timecode.

The submenus are:

- Encoder Control
- TC Start Time
- TC Stop Time

Encoder Control

The DP569 encode can be controlled in two ways. The simplest is using the **Encode** or **Stop** options in the Encoder control menu.

The second method is using **Timecode Ctrl.** This mode enables and disables the encoding process based on the **TC Start Time** and **TC Stop Time** values. This is used to create encoded streams of a specific length and position in time for DVD authoring.

The start and stop times are specified in the format **HH:MM:SS:FF:ssss,** where:

- HH = hours (00 to 23)
- MM = minutes (00 to 59)
- SS = seconds (00 to 59)
- FF = frames (00 to 29)
- ssss = samples (0000 to 1536)

The first sample of the first encoded frame will correspond to the sample specified by the start time. The last sample of the last encoded frame cannot be specified because encoding must end at a Dolby Digital frame boundary. For this reason, the samples field of **TC Stop Time** is not user-adjustable. Encoding will actually end at the completion of the first Dolby Digital frame following the specified stop time. At the

completion of encoding the actual value of stop time, including samples, will be shown in the **TC Stop Time** display. This samples value can then be used to offset the next piece of encoded material, if necessary, to maintain A/V sync. For more information consult Appendix B.

Timecode control can be entered only when the following conditions are met:

- **Input Format** is set to PCM.
- **Multiplex Mode** is disabled.
- Timecode controlled preset recalls are not pending.

The time stamp must be enabled for timecode to exist in the bitstream. For further information, see Appendix B.

4.2.2   Metadata Control

This menu controls the source for metadata for the DP569 and what to do in the situations where the metadata disappears.

The submenus are:

- Metadata Source
- Override Params
- Reversion Mode
- Reversion Preset

Metadata Source

Chooses the source or origin of the metadata values used in the encoding process. **Internal** uses the current values as defined in the **Metadata Params** menus, these values can be modified at any time. Choosing a specific program number uses the metadata contained within that program from the metadata stream connected to the Metadata port.

Override Params

When using metadata from a chosen external program, this setting allows either the **dialogue level** and/or **compression profile** parameter to be replaced by the internal metadata parameter setting.

Reversion Mode, Reversion Preset

These parameters determine what happens when the external metadata source, if selected, is interrupted.

- **Last Used** continues encoding using the last values set by the external source.
- **Preset** continues encoding using the values contained in the chosen Reversion preset.

4-3

- **Adaptive** behaves like **Last Used** if the metadata disappears completely; behaves like **Preset** if any individual metadata parameters are missing.

4.2.3   Metadata Params

This menu contains 30 metadata parameter selection menus. Table 4-1 provides a basic definition for each of the metadata parameters available, listed by the text shown on the front-panel display. See Appendix A for more detailed information about metadata.

Table 4-1 Metadata Params Submenus

LCD	Description
Dialogue Lev	Controls dialogue level or dialnorm. See Appendix A for detail.
Channel Mode	Designates the number of active channels.
LFE Channel	Indicates whether LFE channel is present. Available only in channel modes 3/2, 3/1, 3/0, 2/2, and 2/1.
Data Rate	Sets the output data rate.
Bitstrm Mode	Describes the audio service carried in the bitstream. Informational only.
Line Mode Pro	Designates preset compression configuration for line-mode decoding.
RF Mode Pro	Designates preset compression configuration for RF-mode decoding.
RF Ov Protect	Protects against overmodulation when decoded and subsequently modulated onto an RF carrier.
Center Dwnmx	Designates downmix level for center channel when end user has no center speaker. Default is 0.707 (−3.0 dB).
Srnd Dwnmx	Designates downmix level for surround channels when end user has no surround speakers. Note that the 0 (-999 dB) setting discards the surround channels. Default is 0.707 (−3.0 dB).
Dolby Srnd	Indicates whether a two-channel encoded bitstream contains a Dolby Surround (Lt/Rt) program and requires Pro Logic decoding. Default Not Dolby Srnd.
Audio Prod Info	Indicates whether the Mixing Level and Room Type parameter settings are carried in the bitstream.
Mixing Level	Indicates absolute acoustic SPL of main dialogue channel during final mixing session. Informational only.
Room Type	Indicates size and calibration of the mixing room used for the final mixing session. Informational only.
Copyright	Indicates whether the encoded bitstream is copyright protected. Informational only.
Orig Bitstrm	Indicates whether the encoded Dolby Digital bitstream is the master version. Informational only.
Extnd Bitstrm	Setting controls whether extended bitstream parameters are included in the encoded output.
Pref Dwnmx	Designates preference for Lt/Rt or Lo/Ro stereo downmix.

LCD	Description
Lt/Rt C Dwnmx	When the stereo downmix is Lt/Rt, designates downmix level for center channel when end user has no center speaker.
Lt/Rt S Dwnmx	When the stereo downmix is Lt/Rt, designates downmix level for surround channels when end user has no surround speakers.
Lo/Ro C Dwnmx	When the stereo downmix is Lo/Ro, designates downmix level for center channel when end user has no center speaker.
Lo/Ro S Dwnmx	When the stereo downmix is Lo/Ro, designates downmix level for surround channels when end user has no surround speakers.
Dolby Srnd EX	Identifies if audio is encoded as Surround EX and requires Surround EX decoding.
A/D Conv Type	Identifies the setting for type of A/D converter. Informational only.
De-emphasis	Parameter controls whether or not 50/15 µs digital de-emphasis is applied to the main input channels.
DC Filter	Applies a DC-blocking 3 Hz highpass filter before Dolby Digital encoding.
Lowpass Filt	Applies a lowpass filter to the main input channels before Dolby Digital encoding.
LFE Filter	Applies a 120 Hz lowpass filter to LFE channel before Dolby Digital encoding.
Srnd 3dB Attn	Attenuates surround channels 3 dB before encoding.
Srnd Ph Shift	Before encoding, creates the phase-shifted surround channels necessary to create an Lt/Rt output in a decoder that can be Pro Logic decoded to L, C, R, S.

4.2.4   User Presets

Allows the user to save and recall 32 individual unit configurations. Presets 28–32 contain presets stored in factory ROM. When shipped from the factory, presets 1–5 contain a copy of presets 28–32. Each preset can be given a name of up to 12 characters. A table of factory default presets can be found in Appendix C.

Preset Pending

A special recall preset state allows a selected preset to be recalled at a time, based on the timecode input. When this has been enabled, the selected preset will be considered pending until the specified time is reached, and the preset becomes active.

For instance, you might want the **Stereo Music** preset to take effect at timecode 00:12:22:12.

To do this, use the following procedure:

- Enter 00:12:22:12 in the **TC Start Time** field

- Recall the **Stereo Music** preset.

- Choose Yes when asked **Recall at Start?**

When timecode 00:12:22:12 occurs, the unit will switch to the **Stereo Music** preset.

There are a few restrictions on the recall preset on timecode feature:

- Once you have selected a start time and a preset, you can't change the start time.

- Pressing any of the preset buttons, immediately invoking a preset, cancels any pending preset.

- If the unit is in **Timecode Control** mode, it cannot also recall a preset based on timecode.

4.2.5   I/O Control

In the I/O Control menu you can set the configuration of the DP569's inputs and outputs.

The submenus are:

- Input Channels
- Clock Source
- Input Format
- Output Format
- Timecode Input
- Mono Channel
- Multiplex Mode
- Coding Delay
- Bypass Mode

Input Channels

Allows you to determine the mapping of input sources to audio channels. Channel assignment is represented in the form A/B C/D E/F, where channels A through F are mapped to input sources 1 through 6, respectively.

For example, when the **Input Channels** parameter is set to L/R C/LFE Ls/Rs, the 1/2 input is the source for the Left and Right channels, the 3/4 input is the source for the Center and Low Frequency Effects channels, and the 5/6 input is the source for the Left Surround and Right Surround channels.

Clock Source

Specifies the reference clock source for the encoding process as well as the reference for the output signal. The encoder will not produce a valid output signal if a clock source is not present. There are three types of clock sources:

- **Digital Input:** a valid AES3 signal must be present at the **Dig In 1/2** input.
- **Ref In:** a valid AES3 signal must be present at the **Ref In** input.
- **Internal** (48, 44.1 or 32 kHz): always valid when selected.

The clock source setting also controls the state of the internal sample rate conversion (SRC). SRC is disabled for the **Digital Input** and **Ref In – SRC Off** settings. SRC is enabled for the **Ref In – SRC On** and **Internal** clock source settings. SRC is required

if the input audio signals are not both synchronous and phase aligned with the reference signal.

There are some restrictions on the clock source selection:

- If **Ref In-SRC On** or an **Internal** clock source is selected the current **Input Format** must be PCM.
- If **Digital Input** or an **Internal** clock source is selected, the **Multiplex Mode** must be disabled.

Input Format

- **PCM:** Dolby Digital encoding will be enabled.

- **Pre-encoded:** Pass-through mode will be enabled. Pre-encoded bitstreams move through the unit, unmodified, to the output.

- **Autodetect:** Automatically detects and encodes PCM audio, and passes through pre-encoded bitstreams. Invalid bitstreams will be assumed to be PCM data, and encoding will be enabled.

WARNING: ⚠ *If you choose input format PCM but supply the input with pre-encoded material, you could damage your ears, speakers, or both due to the full-scale digital output.*

Output Format

Output Stream

The default setting is zero.

Output Mode

Determines the mode of the AES3 output bitstream and how the data is packed within that bitstream. The selection is either professional or consumer and 16 or 32-bit. The default is **Professional 32-bit.**

Time Stamp

If enabled the encoded output bitstream contains timecode information packets, known as timestamps. These are used by DVD authoring systems to synchronize the encoded audio to video. This is set to disabled for broadcast applications.

Time Stamp Delay Word

If enabled each Dolby Digital audio frame will be preceded by a data packet that reports the current delay through the DP569 encoder. This is used in some broadcast multiplexers to adjust A/V timing to maintain lipsync. Options are included to offset the current delay value carried in this data packet, or override the current value with a user-defined value. This is set to disabled for DVD applications.

Audio Mode

Sets the audio bit in the output bitstream as either audio or non-audio (i.e., data). Default is non-audio.

Timecode Input

Selects either the LTC or VITC inputs as the timecode input.

Mono Channel

Allows you to determine the mapping of a mono input source when in 1/0 mode. Options are **channel 1** of digital input 1/2, **channel 2** of digital input 1/2 or the current **center** channel.

Multiplex Mode

Allows a second encoded bitstream to be combined with the main output bitstream. When enabled, an internally encoded Dolby Digital bitstream is multiplexed with another pre-encoded bitstream supplied by the reference-input signal.

When **Multiplex Mode** is active, the DP569 overwrites the contents of the channel selected by the **Output Mode**.

The following options should be selected in order to enable **Multiplex Mode**:

- The **Reference Input** must be selected as the **Clock Source**.

- **Timecode Control** must be disabled.

- The **Output Mode** must be set to either **Pro 16-bit Ch 1** or **Pro 16-bit Ch 2.**

- The bitstream in the **Reference Input** must have been encoded in the **Pro 16-bit** mode, and cannot be present in the same channel selected by the output format.

Coding Delay

Select **Internal** to specify the amount of coding delay in milliseconds. If **External** mode is selected the delay is determined from the signal applied to the TTL delay input. This control only affects the coding latency through the DP569, it does not affect the **time stamp** values if enabled. The minimum allowable coding delay at each sample rate is shown in Table 4-2.

Table 4-2 Coding Delay

Sample Rate	Minimum Coding Delay
32 kHz	280 ms
44.1 kHz	204 ms
48 kHz	187 ms

Bypass Mode

Is used to route the output of a secondary (standby) encoder to the switched audio output of the primary encoder. See Section 3.1.5.

4.2.6   System Settings

This menu gives you access to submenus controlling communication with other devices, and for upgrading software.

The submenus are:

- Remote Baud Rate
- Unit Address
- Unit Name
- Test Tone
- Firmware Upgrade

Remote Baud Rate

Sets the baud rate for remote port communications.

Unit Address

The unit address is four characters long. The first character is limited to the numbers 8–F, and the other characters are restricted to 0–F. The last character must be even.

Unit Name

Assign any text name you wish to your DP569; this is displayed on the top line of the main status menu.

Test Tone

Activates an internally generated test signal as the input to the encoding process rather than the currently selected input signal. In order to get a valid Dolby Digital output, encoding must also be active, which requires that the selected clock source be valid.

Firmware Upgrade

Enter the firmware upgrade menu when you have an upgrade to install. Download status information is displayed while in progress and when completed. See the documentation that accompanies the upgrade kit.

Chapter 5
DolbyRemote

5.1 DolbyRemote Overview

The DolbyRemote application, version 2.01, is used to remotely control the DP569. Key features of the software include:

- Offline mode, without the presence of a unit, to create and edit parameter files.

- Save a unit configuration in a file on a PC. Restore the unit's configuration from a saved DolbyRemote file.

- Export an encoder's configuration in human readable form in either text or HTML format.

- Control of multiple DP569 encoders from a single instance of the DolbyRemote application, hardware permitting.

5.2 Installation

5.2.1 PC System Requirements

The minimum PC system requirements include a Pentium 90 processor and either:

- Windows 95 or 98 with 16 MB RAM, or

- Windows NT 4.0, Service Pack 3, and 24 MB RAM, or

- Windows 2000 or Me and 128MB RAM.

We recommended that you dedicate this PC to Dolby applications. If this is not possible, additional memory may be needed to run other applications simultaneously. Additionally, a faster processor may be required for newer operating systems.

5.2.2 Software Installation

The DolbyRemote application is installed from two diskettes.

1. Remove any previously installed version of DolbyRemote using the Add/Remove Program command from the Control Panel.

Note: It is strongly recommended that you exit all Windows programs before beginning the installation.

2. Insert the DolbyRemote Software Install Disk 1 into the computer.

3. Click Start and Run.

4. Browse to the DolbyRemote diskette. Select setup.exe and click OK.

5. Please read the Limitation of Liability and Welcome screens before proceeding with the installation.

6. The default installation destination for DolbyRemote is C:\Program Files\Dolby Laboratories. Click Next to accept the default, or click Browse to select an alternative location.

7. Use the program folder default Dolby Laboratories, or enter an alternate folder name and click Next.

8. Insert the DolbyRemote Software Install Disk 2 when prompted to do so, and click OK.

9. To use the Help files in HTML format, click Yes. When the update is complete click OK. If a previous copy of DolbyRemote has been installed, this prompt may not appear.

10. DolbyRemote installation is complete.

Microsoft DLL Files

If you have an older version of Windows 95, you may see an error message about Oleaut32.dll when you launch DolbyRemote. If this occurs, download and install the *Windows Library Update* from Microsoft *(www.microsoft.com/windows95/downloads).*

5.2.3 Serial Cable Installation

There are two types of serial interface used on the DP569, RS-232, and RS-485. It is important to use the correct type of interface and the correct cable to ensure a reliable connection.

Each RS-232 port on a PC must be connected to a single DP569; the application can, however, control many RS-232 ports. For example, with five free RS-232 ports on a computer, five DP569 devices may be controlled with a single instance of the DolbyRemote application.

A single RS-485 computer port may connect to several devices, provided the devices use the RS-485 connection and they have all been configured with different unit addresses. See Section 4.2.6.

DolbyRemote ships with a cable for RS-232 connection between a PC and the front-panel of a DP569 encoder. Additional cables may be purchased from Dolby Laboratories.

RS-485 connection for the DP569 requires a separate cable, not provided. This connects to the rear panel serial port of the unit. Consult Section 6.2.6 for RS-485 support information.

5.2.4   DP569 Setup

To operate using DolbyRemote it is necessary to place the DP569 into remote mode. Press **Shift, ←**to access remote mode.

5.3   Starting DolbyRemote

From the Windows **Start** button, select **DolbyRemote** from the folder in which you installed the DolbyRemote application. The **Open Device** window is displayed, Figure 5-1.
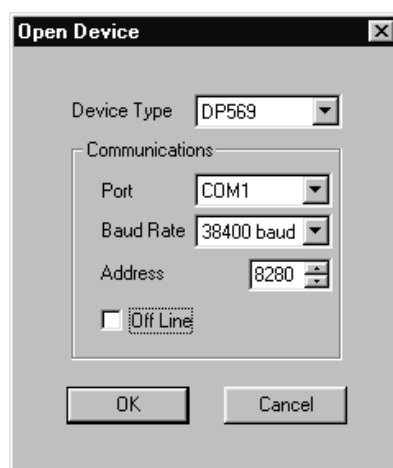
Figure 5-1 DolbyRemote Open Device Window

5.3.1   Device Type

Select the Dolby encoder model to be controlled. The application will also control older Dolby encoders (i.e., the DP561 and DP567).

5.3.2   Communications

Port

Select the computer communications port to be used. DolbyRemote allows COM1 through COM10. The correct port will depend on the computer configuration.

Baud Rate

The communication baud rate for the DP569 may be set to 9,600, 19,200**,** or **38,400** (the default rate). The baud rate is configurable through the front panel of the encoder. The rate you select in DolbyRemote must match the rate selected in the unit.

Address

The default address setting for the DP569 is **0x8280.** If the address has been changed from the front panel of the encoder, set the remote address accordingly.

Off-Line

The DolbyRemote application may be used off-line, without the presence of an encoder. This allows configurations to be preprogrammed and stored.

Once the desired parameters have been set, as described above, click OK. When the DolbyRemote application establishes communication with the unit, it will display the unit's current settings.
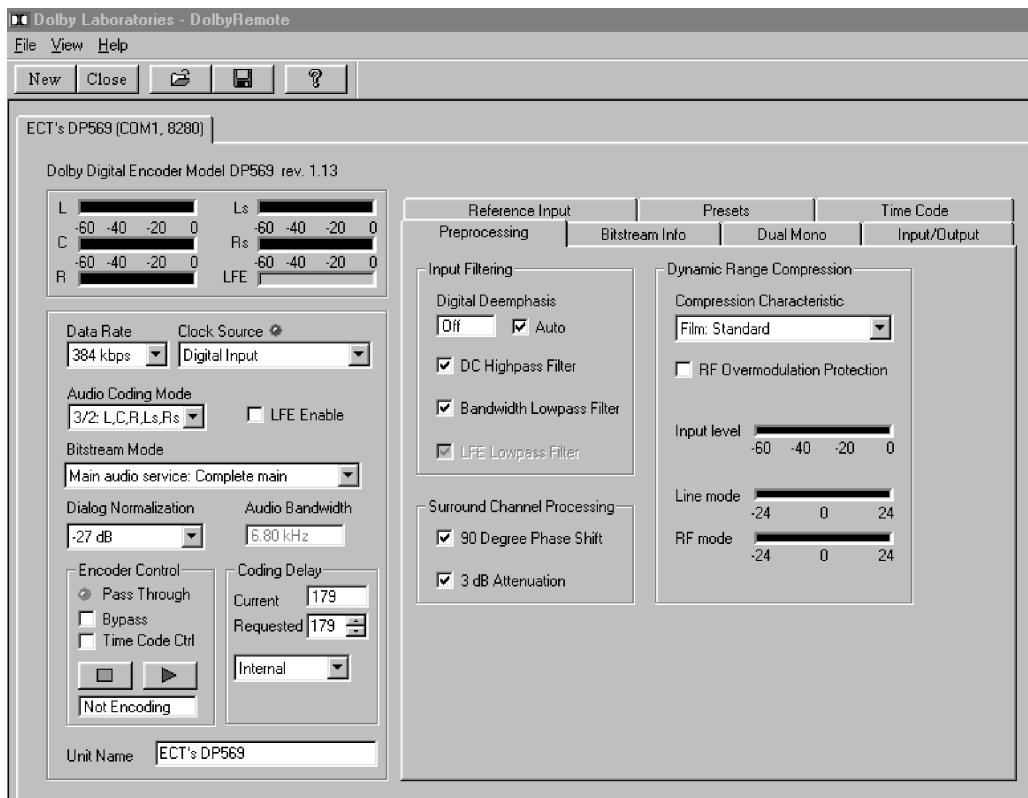
Figure 5-2 DolbyRemote Window

5.3.3   Adding or Removing Additional Devices

To add additional encoders, click the **New** button or select **File, New Device.** The **Open Device** window is again displayed. See Section 5.3 for parameter details.
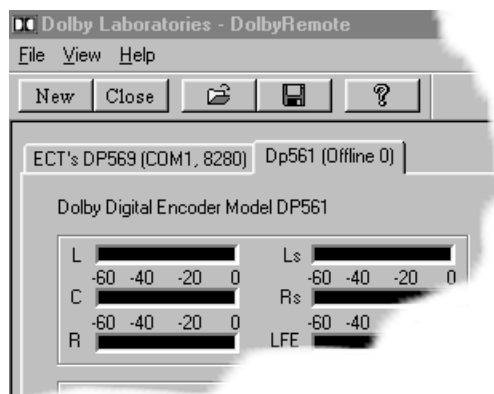
Figure 5-3 Controlling Two Encoders

To remove or discontinue the remote control of a device, click **Close** or select **File, Close Device**.

5.4   General Operation

5.4.1   Saving and Restoring Configurations

DolbyRemote can save the configuration of the active device so that it can easily be recalled later. The file extension for these configurations is *.dby* and can only be read with DolbyRemote. Configurations can be transferred between different DP569 encoders, using this function.

Configuration files can be opened or saved from the **File** menu, or from buttons on the **Tool Bar**.

5.4.2   Exporting Configurations

Export file gives two different options for saving the current configuration as a file that can be read and printed outside of the remote software. It is not possible to use these file types to configure a unit. You may export the current settings in either a text file or an HTML file.

5.5   Common Setup Problems

Make sure the unit is in remote mode (press **Shift,** ←). The remote LED should be lit.

Make sure that you are either using a RS-232 connection through the front panel or a RS-485 connection through the rear panel.

Verify that the baud rate and device address of the unit to be controlled match the parameters given to the DolbyRemote application in the **Open Device** window. On the unit, these parameters are found in the **System Settings** section of the DP569 setup menu.

It is possible that hardware constraints on the controlling PC can cause problems with the remote connection. The DolbyRemote application transfers data continuously to update dynamic information such as meter values. If the port is using a shared IRQ with another device, then it is possible that the connection may be lost. In this case using another COM port can solve the problem.

If the connection is lost, the unit will continue to operate with the current set of parameters contained immediately before the connection was broken; it is not advisable, however, to use the unit in this way if this problem persists.

5.6   Display Overview

This section describes the parameters that are available in the windows of DolbyRemote. Parameters that are not accessible through the setup menus are described in detail, for more detailed information about other parameters see Chapter 4 and Appendix A.

5.6.1   Audio Service Parameters
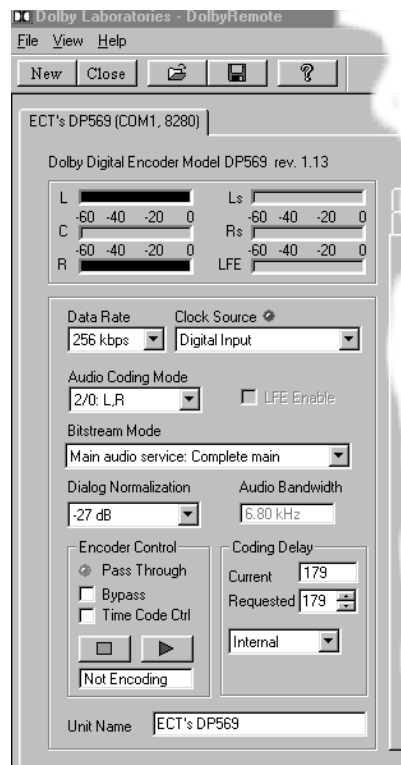
Figure 5-4 Audio Service Parameters

Input Meters show the input level of the channels enabled in the current encoding mode in dBFS.

Audio Bandwidth displays the current audio bandwidth of the main channels. This is dependent on the number of channels being encoded and the data rate.

Pass Through indicates if the unit is in pass-through mode, (i.e., a pre-encoded bitstream has been detected).

Figure 5-5 Encoder Stop and Start Buttons

Encoder State displays the status of encoding for the current device.

- **Not Encoding:** The user has requested that the unit start encoding, but the encoder is unable to encode because it is missing a required input signal, or the **timecode start value** has not been reached.

- **Encoding:** The unit is encoding.

- **Stopped:** The user has directed the unit to not encode.

5.6.2   Preprocessing
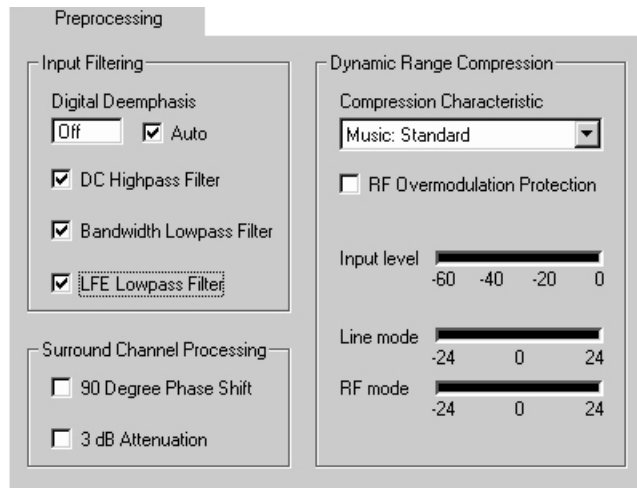
Figure 5-6 Preprocessing Tab

Input Level Meter shows the input signal used by the dynamic range control process to determine the amount of boost or cut required.

Line Mode and **RF Mode** meters show the current value of the dynamic range control cut and boost words being included in the Dolby Digital bitstream. Red shows compression (cut) and green shows expansion (boost), calibrated in dB.

5.6.3   Bitstream Info
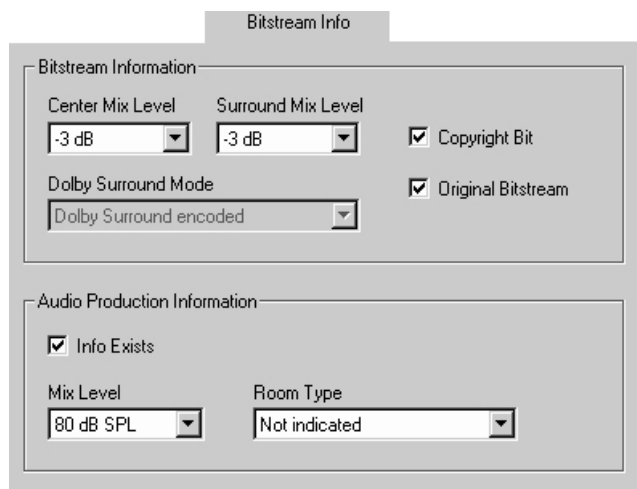
Figure 5-7 Bitstream Info Tab

5.6.4 Dual Mono

These fields are only applied when the coding mode is set to 1+1. In this case, these parameters apply to channel 2.
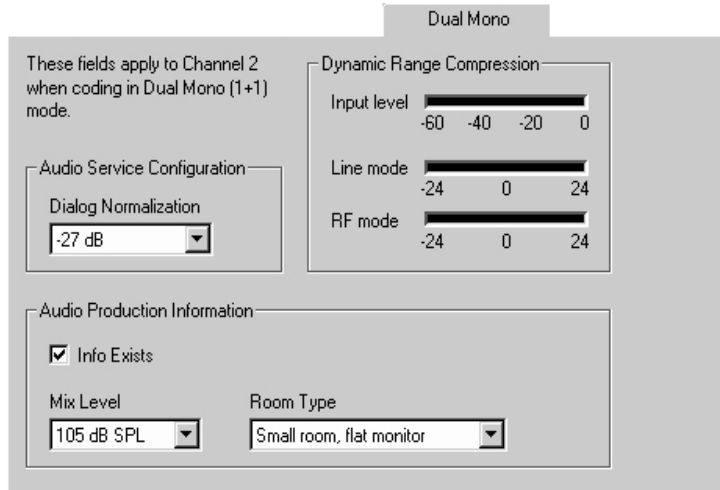
Figure 5-8 Dual Mono Tab

5.6.5 Input and Output Settings and Reference Input
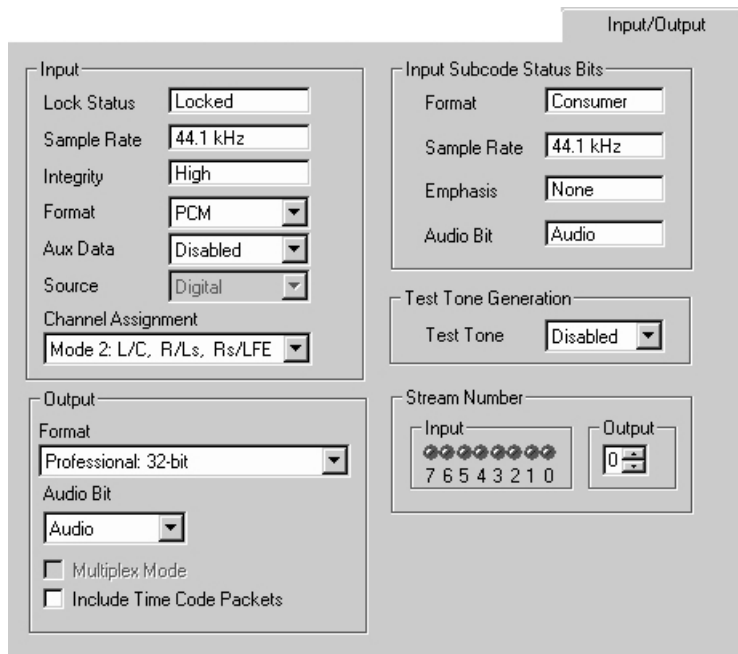
Figure 5-9 Input/Output Tab
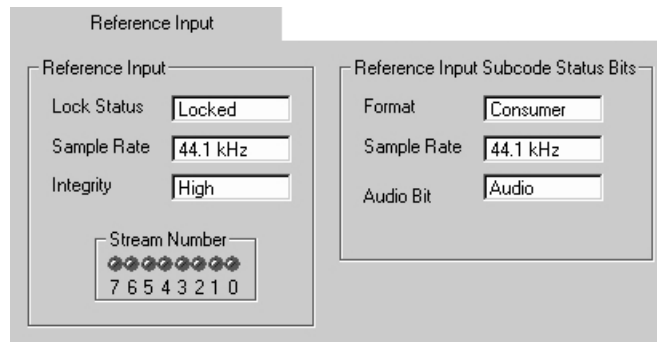
Figure 5-10 Reference Input

Lock Status shows whether the input channels have been detected and locked by the encoder.

Sample Rate shows the sample rate of the input channels.

Integrity shows the data integrity of the input channels.

Input Subcode Status Bits show the format, sample rate, emphasis, and audio bit as indicated in the subcode of the input signal.

Stream Number shows the input stream number for a pre-encoded signal present at the reference input.

5.6.6   Presets
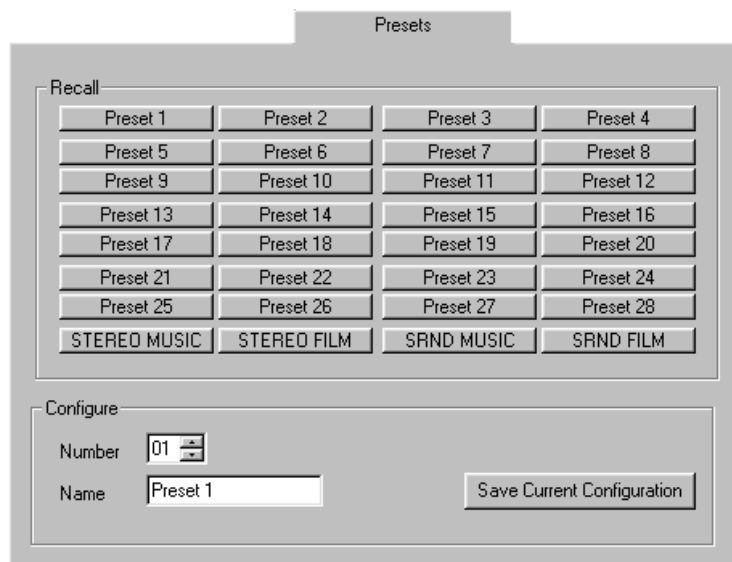
Figure 5-11 Presets Tab

Click on any of the 32 preset buttons to recall a user preset. These presets are stored internally within the decoder, not within the DolbyRemote application.

Configure

Number selects the number of the present you wish to configure, **1** through **27**. Presets **28** through **32** are factory defaults and cannot be overwritten.

Save Current Configuration

Click this button to save the current configuration in the selected preset.

5.6.7   Timecode Parameters

Figure 5-12 Timecode Tab

Status shows if a valid timecode signal is present.

Current Timecode shows both the current timecode value and frame rate in HH:MM:SS:FF format. If no timecode input is present, this box will be grayed out.

The **Resume** button copies the **Stop Timecode** value to the **Start Timecode** value. This allows seamless encoding of two sections of continuous material.

Chapter 6
Specifications

6.1 System Block Diagram
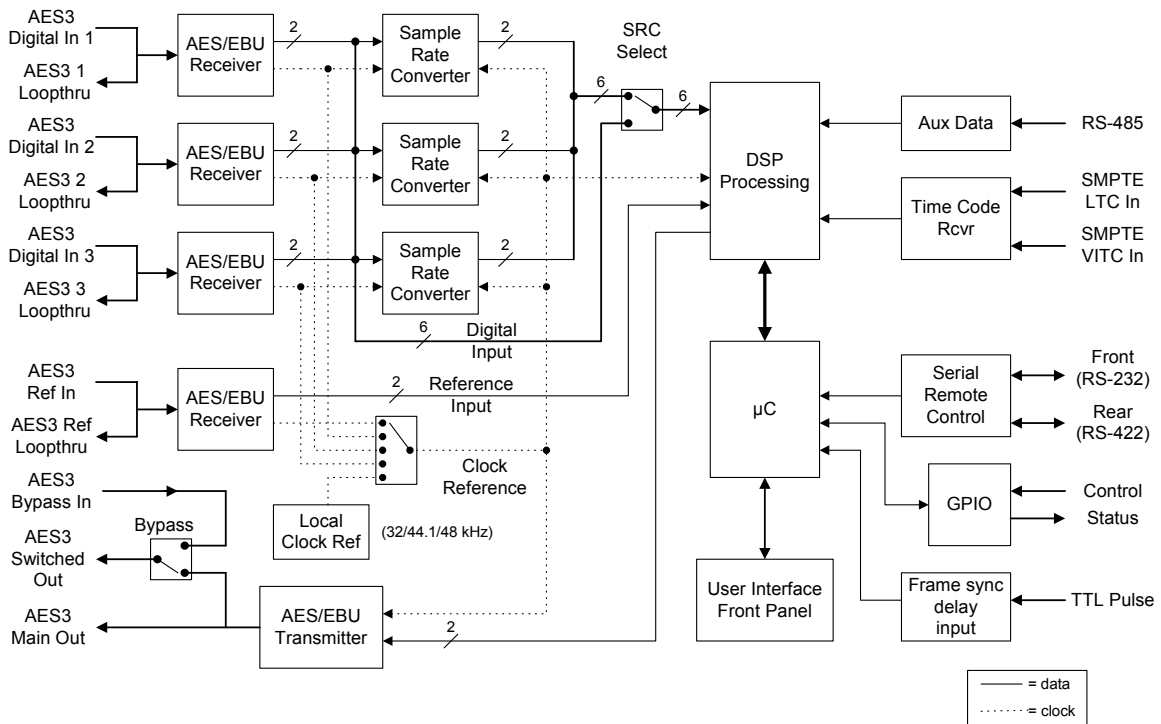
Figure 6-1 System Block Diagram

6.2 Connections
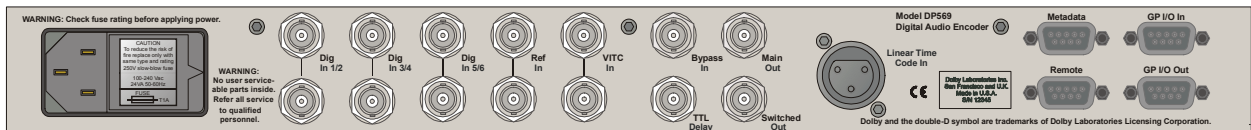
Figure 6-2 DP569 Rear Panel

6.2.1   Digital Audio Connections

Inputs

(Digital In 1/2, 3/4, 5/6), Reference Digital Input (Ref In), Bypass Digital Audio Input (Bypass In)

BNC female connectors per AES3ID-1995

Outputs

Main Digital Audio Output (Main Out), Switched Digital Audio Output (Switched Out)

BNC female connectors per AES3ID-1995

6.2.2   Vertical Interval Timecode Input (VITC In)

BNC female connectors, composite video input

6.2.3   Delay Control Input (TTL Delay)

BNC female connector, 5V TTL level active high pulse

6.2.4   Linear Timecode Input

XLR female connector

Table 6-1 Linear Timecode Input Pins

Pin	Connection
1	Signal ground
2	LTC In +
3	LTC In −

6.2.5   Metadata Serial Port

9-pin female D-connector, electrical specifications per SMPTE 207M

Table 6-2 Metadata Serial Port Pin-Outs

Pin	Connection
1	Shield
2	TX A asynchronous data out –
3	RX B asynchronous data in +
4	Ground
5	NC
6	Ground
7	TX B asynchronous data out +
8	RX A asynchronous data in –
9	Shield

6.2.6   Rear Panel Remote Control Serial Port (Remote)

9-pin female D-connector per SMPTE 207M

Table 6-3 Rear Panel Remote Control Serial Port Pin-Outs

Pin	Connection
1	Shield
2	TX B asynchronous data out –
3	RX A asynchronous data in +
4	Ground
5	NC
6	Ground
7	TX A asynchronous data out +
8	RX B asynchronous data in –
9	Shield

6.2.7   Front Panel Remote Control Serial Port (Remote)

8-pin female mini-DIN connector, electrical specifications per EIA RS-232

Table 6-4 Front Panel Remote Control Serial Port Pin-Outs

Pin	Connection
1	NC
2	NC
3	RX asynchronous data out
4	Ground
5	TX asynchronous data in
6	NC
7	NC
8	Sense select front panel

6.2.8   General Purpose Control Input Port (GPI/O In)

9-pin female D-connector, 5 V CMOS input levels (active low)

Table 6-5 General Purpose Control Input Port Pin-Outs

Pin	Connection	Comments
1	Bypass	Select Ref input as source for Switched output.
2	Autodetect	Autodetect and pass-through valid AC-3 signals.
3	Pre-encoded	Force Pass-through mode (no AC-3 encoding).
4	PCM	Force AC-3 encoding (no pass-through mode).
5	User Preset 1	Select user preset mode 1.
6	User Preset 2	Select user preset mode 2.
7	User Preset 3	Select user preset mode 3.
8	User Preset 4	Select user preset mode 4.
9	Ground	--

6.2.9   General Purpose Status Output Port (GP I/O Out)

9-pin female D-connector, 5 V CMOS output levels (active low)

Table 6-6 General Purpose Status Output Port Pin-Outs

Pin	Connection	Comments
1	Fault	Power supply or processor/memory fault
2	Not Locked	Invalid input or clock source
3	Pass-through	Valid AC-3 input signal being passed through
4	Encoding	AC-3 encoding of input signal active
5	User Preset 1	User preset mode 1 selected and active
6	User Preset 2	User preset mode 2 selected and active
7	User Preset 3	User preset mode 3 selected and active
8	User Preset 4	User preset mode 4 selected and active
9	Ground	

6.3   Mechanical Specifications

Table 6-7 Mechanical Specifications

Dimensions	$44 \times 483 \times 330$ mm ($1.75 \times 19 \times 13$ inches)
Net Weight	4 kg (8.5 lb) approximate
Shipping Weight:	6 kg (13 lb) approximate
Power Requirements	90–264 VAC, 50–60 Hz
Power Consumption	15 W maximum

6.4   Environmental Specifications

Table 6-8 Environmental Specifications

Temperature	
Operating	5˚ to 45˚ C (41˚ to 113˚ F), natural convection cooling
Non Operating (Storage)	–20˚ to +70˚ C (–4˚ to +158˚ F)
Humidity	Up to 90% relative humidity, non-condensing
EMC Limits	
Radiated	Per EN 55103-1, FCC Part 15 Class A, ICES-003
Immunity	Per EN 55103-2

Appendix A
Metadata

Metadata provides unprecedented capability for content producers to deliver the highest quality audio to consumers in a range of listening environments. It also provides choices that allow consumers to adjust their settings to best suit their listening environments.

In this appendix, we first discuss the concept of metadata:

- Metadata overview

We then discuss the three factors controlled by metadata that most directly affect the consumer's experience:

- Dialogue level

- Dynamic range control (DRC)

- Downmixing

We then define each of the adjustable parameters, and provide sample combinations:

- Individual parameters

- Metadata combinations

A.1   Metadata Overview

Dolby Digital and Dolby E are both bit-rate reduction technologies that use metadata to describe the encoded multichannel audio. In normal operation the encoded audio and metadata are carried together as a data stream on two regular digital audio channels (AES/EBU or S/PDIF). Metadata is carried in the Dolby Digital or Dolby E bitstream, describing the encoded audio and conveying information that precisely controls downstream encoders and decoders. Metadata allows content providers unprecedented control over how original program material is reproduced in the home.

Dolby Digital is a *transmission bitstream* (sometimes called an *emission bitstream*) intended for delivery to the consumer. It consists of a single encoded program of up to six channels described by one metadata stream. The consumer's Dolby Digital decoder processes the metadata stream according to parameters set by the program creator, as well as certain settings for bass management and dynamic range that are chosen by the consumer to reflect their specific home theater equipment and environmental conditions.

Dolby E is a *distribution bitstream* capable of carrying up to eight channels of encoded audio and metadata. The number of programs ranges from one single

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program (Program Config: 5.1) to eight individual programs on a single Dolby E stream (Program Config: 8 × 1). Each program is discrete with its own metadata in the Dolby E stream. Some control metadata parameters in a Dolby E stream automatically configure a Dolby Digital encoder while others are passed through to the consumer's Dolby Digital decoder.

Dolby E is a professional technology used for broadcast applications such as program origination and distribution; the Dolby E bitstream carries the entire metadata parameter set. Dolby Digital, used for consumer applications such as transmission to the home or for DVD authoring, employs a subset of the entire metadata parameter set called *Dolby Digital metadata*; the Dolby Digital bitstream carries only those parameters necessary for proper decoding by the consumer.

Metadata is first inserted during program creation or mastering, and is carried through transmission in a broadcast application or directly onto a DVD. The metadata provides control over how the encoded bitstream is treated at each step on the way to the consumer's decoder.

Example:

In a broadcast truck parked outside a football stadium, the program mixer chooses the appropriate metadata for the audio program being created. The resulting audio program, together with metadata, is encoded as Dolby E and sent to the television station via fiber, microwave, or other transmission link. At the receiving end of this transmission, the Dolby E stream is decoded back to baseband audio and metadata. The audio program is monitored and the metadata is altered or re-created as other elements of the program are added in preparation for broadcast. This new audio program/metadata pair is re-encoded as Dolby E, leaves the postproduction studio and is passed through the television station to Master Control, where many incoming Dolby E streams are once again decoded back to their individual baseband digital audio/metadata programs. The audio program/metadata pair that is selected to air is sent to the transmission Dolby Digital encoder, which encodes the incoming audio program according to the metadata stream associated with it, thereby simplifying the transmission process. Finally, the Dolby Digital signal is decoded in the consumer's home, with metadata providing the information for that decoding process. Through the use of metadata, the mixer in the truck has been able to control the home decoder for the sporting event, while news breaks, commercials, station Ids, and the like are similarly appropriately decoded.

This control, however, requires the producer to correctly set the metadata parameters because they affect important aspects of the audio—and can seriously compromise the final product if set improperly. Although most metadata parameters are transparent to consumers, certain parameters affect the output of a home decoder, like when downmixing for a specific speaker configuration, or when the consumer chooses Dynamic Range Control to avoid disturbing family and neighbors.

Figure A-1 shows a 5.1 + 2 Program Config consisting of a 5.1-channel program and a two-channel Secondary Audio Program (SAP).
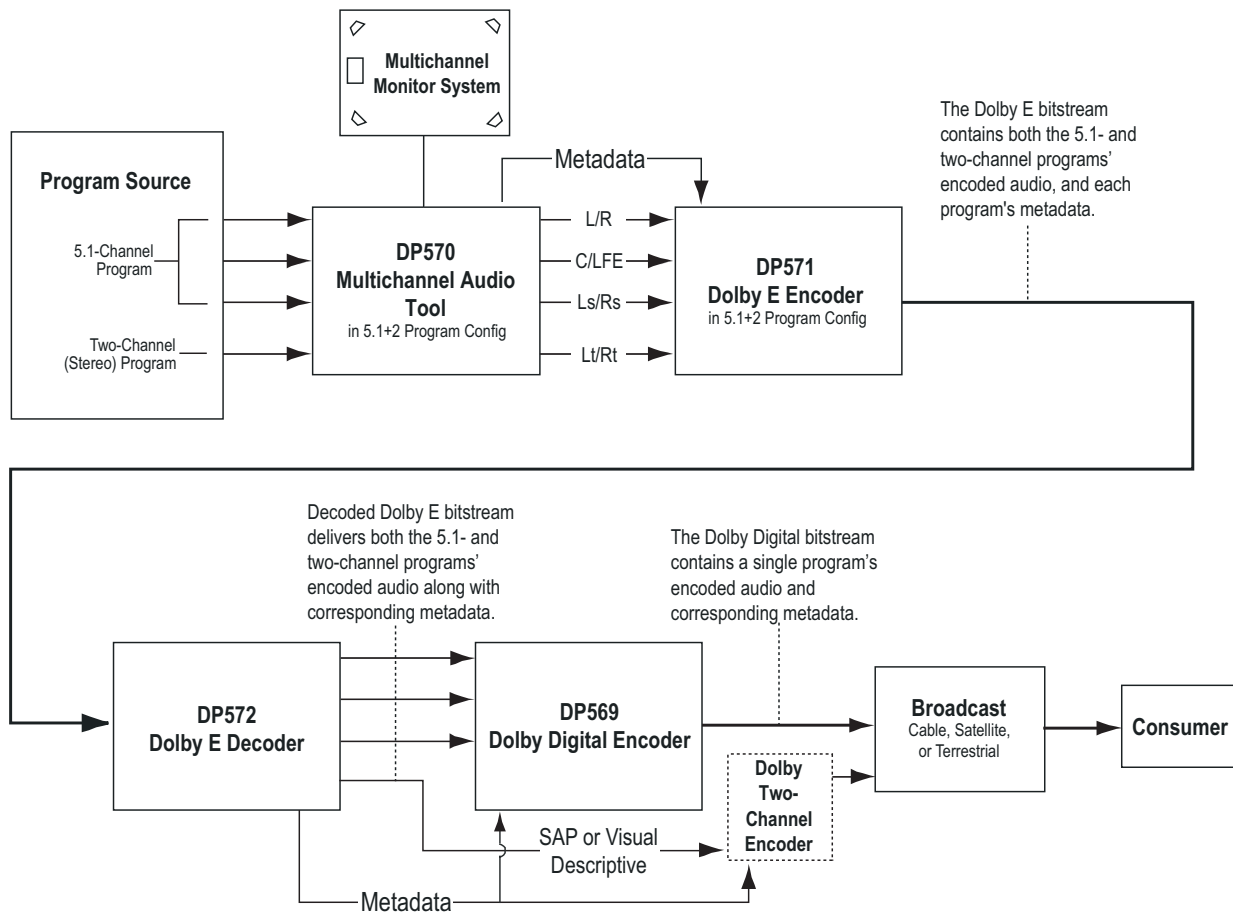
Figure A-1 Metadata Flow from Production to Consumer

In the simplest terms, there are two functional classifications of metadata:

Informational: These parameters convey information but do not affect either the encoded bitstream or the decoding process. For example, the Bitstream Mode parameter describes the audio service provided in the bitstream according to the ATSC specification. This information may be used by certain components in the audio system.

Control: These parameters direct how the decoder, encoder, or both process the audio when certain modes are applied to the encoder or decoder. For example, the Lowpass Filter parameter determines whether a lowpass filter is applied to the main inputs of a Dolby Digital encoder, and the Surround Downmix Level parameter instructs the Dolby Digital decoder how to mix the surround channels during downmixing.

Both types of metadata can be examined, modified, or passed through during encoding. Table A-1 lists the active metadata parameters and indicates if each parameter is informational or control.

Table A-1 Metadata Parameters

Extended Bitstream Information parameters are in italics.

Metadata Parameter	Informational	Control
Dialogue Level		✕
Channel Mode		✕
LFE Channel		✕
Bitstream Mode	✕	
Line Mode Compression		✕
RF Mode Compression		✕
RF Overmodulation Protection		✕
Center Downmix Level		✕
Surround Downmix Level		✕
Dolby Surround Mode		✕
Audio Production Information	✕	
Mix Level	✕	
Room type	✕	
Copyright Bit	✕	
Original Bitstream	✕	
Preferred Stereo Downmix		✕
Lt/Rt Center Downmix Level		✕
Lt/Rt Surround Downmix Level		✕
Lo/Ro Center Downmix Level		✕
Lo/Ro Surround Downmix Level		✕
Dolby Surround EX Mode		✕
A/D Converter Type	✕	
DC Filter		✕
Lowpass Filter		✕
LFE Lowpass Filter		✕
Surround 3 dB Attenuation		✕
Surround Phase Shift		✕

A.2   Dialogue Level

Dialogue level (also known as *dialogue normalization* or *dialnorm*) is perhaps the single most important metadata parameter. The dialogue level setting represents the average loudness of dialogue in a presentation.

When received at the consumer's Dolby Digital decoder, this parameter setting determines the level shift in the decoder that sets, or *normalizes,* the average audio output of the decoder to a preset level. This aids in matching audio volume between program sources.

The proper setting of the dialogue level parameter enables the Dynamic Range Control profiles chosen by the content producer to work as intended in less-than-optimal listening environments, and is essential in any content production, whether it is for transmission in a broadcast stream or for direct distribution to consumers, as in DVDs.

In broadcast transmission, standard setting of dialogue level ensures that the consumer can switch channels or watch a television program without having to adjust the volume control during commercial breaks. Using that standard for all content, whether conveyed by broadcast television, DVD, or other media, enables the consumer to switch between sources and programs while maintaining a comfortable listening level.

Note: Programs without dialogue, such as an all-music program, still require a careful setting of the dialogue level parameter. When setting the parameter for such content, it is useful to compare the program to the level of other programs. The goal is to allow the consumer to switch to your program without having to adjust the volume control.

The Scale

The scale used in the dialogue level setting is from −1 to −31 dBFSLeqA in 1 dB steps. Contrary to what you might assume at first, a setting of −31 represents no level shift in the consumer's decoder, and −1 represents the maximum level shift. Here's why:

Dolby Digital consumer decoders standardize the average loudness (averaged over time by the formula LeqA) to −31 dBFS (31 dB below 0 dB full-scale digital output) by applying a shift in level based on the dialogue level parameter setting. When a decoder receives an input signal with a dialogue level setting of −31, it applies no level shift to the signal because this indicates to the decoder that the signal already matches the target level and therefore requires no shift. In contrast, a louder program requires a shift to match the −31 dB standard. When the dialogue level parameter setting is −21, the decoder applies a 10 dB level shift to the signal. When the setting is −11, it applies a 20 dB level shift, and so on.

A Simple Rule:

31 + (dialogue level value) = Shift applied

Example:

31 + (−21) = 10 dB

The most important point to remember is that in setting the dialogue level parameter, you are providing your listener with an essential service. For your listeners, setting this level properly means:

- The volume level is consistent with other programs.

- The DRC profiles you make available to them work as you intend.

Once dialogue level is set, you can set up DRC profiles to further benefit the consumer.

A.3   Dynamic Range Control

Different home listening environments present a wide range of requirements regarding dynamic range. Rather than simply compressing the audio program to work well in the poorest listening environments, Dolby Digital encoders calculate and send Dynamic Range Control (DRC) metadata with the signal. This metadata can be applied to the signal by the decoder to reduce the signal's dynamic range.

Through the proper setting of DRC profiles during the mastering process, the content producer can provide the best possible presentation of program content in virtually any listening environment, regardless of the quality of the equipment, number of channels, or ambient noise level in the consumer's home.

Many Dolby Digital decoders offer the consumer the option of defeating the Dynamic Range Control metadata, but some do not. Decoders with six discrete channel outputs (full 5.1-channel capability) typically offer this option. Decoders with stereo, mono, or RF-remodulated outputs, such as those found on DVD players and set-top boxes, often do not. In these cases the decoder automatically applies the DRC metadata associated with the decoder's selected operating mode.

The Dolby Digital stream carries metadata for the two possible operating modes of the decoder. The operating modes are known as Line Mode and RF Mode due to the type of output they are typically associated with. Line Mode is typically used on decoders with six- or two-channel line-level outputs and RF Mode is used on decoders that have an RF-remodulated output. Full-featured decoders allow the consumer to select whether to use DRC and if so, which operating mode to use. The consumer sees options such as Off, Light Compression, and Heavy Compression instead of None, Line Mode, and RF Mode. Advanced decoders may also allow custom scaling of the DRC metadata.

All that needs to be done during encoding is selection of the dynamic range control profiles for Line Mode and RF Mode. The profiles are described in the following sections.

> **Note:** While the use of DRC modes during decoding is a consumer-selectable feature, the dialogue level parameter setting is not. Therefore, the proper setting of the dialogue level parameter is essential before previewing a DRC profile.

A.3.1   Line Mode

Line Mode offers these features:

- Low-level boost compression scaling is allowed.
- High-level cut compression scaling is allowed when not downmixing.
- Dialogue, as set by the dialogue level parameter, is reproduced at a constant level of –31 dBFSLeqA.

All line-level or power-amplified outputs from two-channel set-top decoders, two-channel digital televisions, 5.1-channel digital televisions, Dolby Digital A/V surround decoders, and outboard Dolby Digital adapters use Line mode.

Consumer control of the dynamic range is limited when downmixing. Products with stereo or mono outputs do not usually allow consumer scaling of Line Mode. This is because these devices are usually downmixing, (for example, when receiving a 5.1-channel signal.) However, in these products the consumer may have a choice between Line Mode and RF Mode.

A.3.2   RF Mode

RF Mode offers these features:

- High- and low-level compression scaling is not allowed (when active, always fully applied).
- +11 dB gain shift raises overall program level.
- Dialogue, as set by the dialogue level parameter and combined with the +11 dB gain shift, is reproduced at a constant level of –20 dBFSLeqA.

RF Mode is designed for products (such as set-top boxes) that generate a downmixed signal for connection to the RF/Antenna input of a television set; however, it is also useful in situations where heavy DRC is required—for example, when small PC speakers are used for DVD playback. In RF Mode, the overall program level is raised 11 dB, while the peaks are limited to prevent signal overload in the D/A converter. By limiting headroom, severe overmodulation of television receivers is prevented. The 11 dB gain provides an RF modulation level that compares well with analog television broadcasts and premium movie channels.

In some situations it may be necessary to further constrain signal peaks above the average dialogue level so that there is less than 20 dB headroom. The selection of a suitable RF Mode profile achieves this.

A.3.3   Dynamic Range Control Profiles

Six preset DRC profiles are available to content producers: Film Light, Film Standard, Music Light, Music Standard, Speech, and None. Each is applied in the pattern shown in Figure A-2. All DRC profiles are encoded using a modified B-weighted curve.
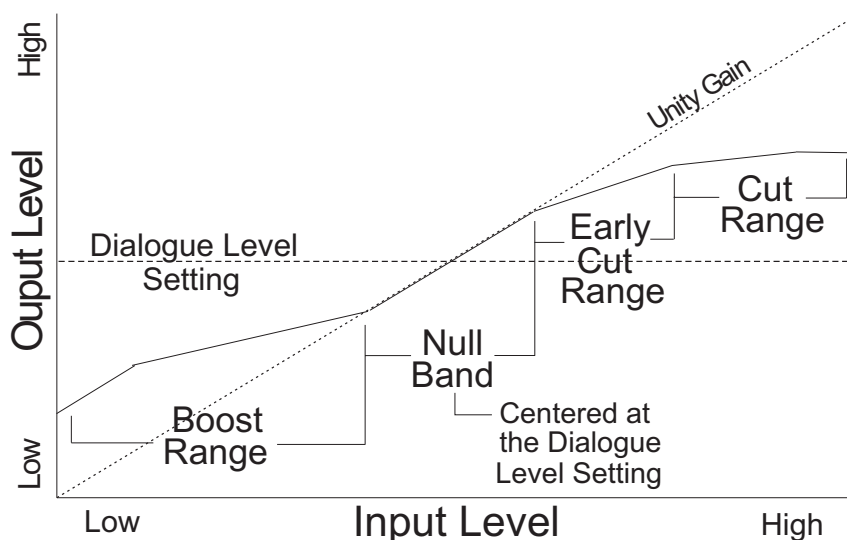
Figure A-2 DRC Profile Pattern

In each case the center of the null band is assigned to the dialogue level parameter setting, and the DRC profile is applied in relation to that level.

- **Film Light**
  Max Boost: 6 dB (below –53 dB)
  Boost Range: –53 dB to –41 dB (2:1 ratio)
  Null Band Width: 20 dB (–41 dB to –21 dB)
  Early Cut Range: –26 dB to –11 dB (2:1 ratio)
  Cut Range: –11 dB to +4 dB (20:1 ratio)

- **Film Standard**
  Max Boost: 6 dB (below –43 dB)
  Boost Range: –43 dB to –31 dB (2:1 ratio)
  Null Band Width: 5 dB (–31 dB to –26 dB)
  Early Cut Range: –26 dB to –16 dB (2:1 ratio)
  Cut Range: –16 dB to +4 dB (20:1 ratio)

- **Music Light** (No early cut range)
  Max Boost: 12 dB (below –65 dB)
  Boost Range: –65 dB to –41 dB (2:1 ratio)
  Null Band Width: 20 dB (–41 dB to –21 dB)
  Cut Range: –21 dB to +9 dB (2:1 ratio)

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- **Music Standard**
  Max Boost: 12 dB (below –55 dB)
  Boost Range: –55 dB to –31 dB (2:1 ratio)
  Null Band Width: 5 dB (–31 dB to –26 dB)
  Early Cut Range: –26 dB to –16 dB (2:1 ratio)
  Cut Range: –16 dB to +4 dB (20:1 ratio)

- **Speech**
  Max Boost: 15 dB (below –50 dB)
  Boost Range: –50 dB to –31 dB (5:1 ratio)
  Null Band Width: 5 dB (–31 dB to –26 dB)
  Early Cut Range: –26 dB to –16 dB (2:1 ratio)
  Cut Range: –16 dB to +4 dB (20:1 ratio)

- **None**
  No DRC profile selected. The dialogue level parameter *(dialnorm)* is still applied.

These choices are available to the content producer for both Line Mode and RF Mode. The content producer chooses which of these profiles to assign to each mode; when the consumer or decoder selects a DRC mode, the profile chosen by the producer is applied.

In addition to the DRC profile, metadata can limit signal peaks to prevent clipping during downmixing. This metadata, known as overload protection, is inserted by the encoder only if necessary. For example, consider a 5.1-channel program with signals at digital full scale on all channels being played through a stereo, downmixed line-level output. Without some form of attenuation or limiting the output signal would obviously clip. Correct setting of the dialogue level and DRC profiles normally prevents clipping and unnecessary application of overload protection.

Note: DRC profile settings are dependent on an accurate dialogue level setting. Improper setting of the dialogue level parameter may result in excessive and audible application of overload protection.

A.4   Downmixing

Downmixing is a function of Dolby Digital that allows a multichannel program to be reproduced over fewer speaker channels than for which the program is optimally intended. Simply put, downmixing allows consumers to enjoy a DVD or digital television broadcast without requiring a full-blown home theater setup.

As with stereo mixing where the mix is monitored in mono on occasion to maintain compatibility, multichannel audio mixing requires the engineer to reference the mix to fewer speaker channels to ensure compatibility in downmixing situations. In this way, Dolby Digital, using the metadata parameters that control downmixing, is an "equal opportunity technology" in that every consumer who receives the Dolby Digital data stream can enjoy the best audio reproduction possible, regardless of the playback system.

It is important to consider the output signals from each piece of equipment that can receive a Dolby Digital program in the home. Table A-2 shows the output types from different equipment.

Table A-2 Outputs from Various Dolby Digital Signal Processing Equipment

Equipment	Output			
	Digital	5.1-Channel Analog	Two-Channel Analog	RF Remodulated
5.1-channel amplifier Standard home theater A/V amp	✕	✕		
5.1-channel decoder	✕	✕		
High-end DVD player	✕	✕	✕	
DVD player	✕		✕	
PC Includes games consoles	✕	(some units)	✕	
High-end set-top box Often HDTV	✕	✕	✕	✕
Set-top box Usually SDTV	✕		✕	✕
IDTV TV set with integrated digital TV tuner	✕		✕	
High-end TV Large screen TV with 5.1-channel speaker system	✕	✕		

Set-top boxes, used for the reception of terrestrial, cable, or satellite Digital Television, typically offer an analog mono signal modulated on the RF/Antenna output, a line-level analog stereo signal, and an optical or coaxial digital output. DVD players offer an analog stereo and a digital output, and some offer a six-channel analog output (for a 5.1-channel presentation). Portable DVD players offer analog stereo, headphone, and digital outputs. DVD players in computers and game consoles offer a digital output as well as analog stereo, headphone, and possibly six-channel analog outputs. 5.1-channel amplifiers, decoders and receivers have six-channel analog outputs and possibly six speaker-level outputs.

In all of these cases, a Dolby Digital decoder creates the analog audio output signal.

In the case of the set-top box or DVD player, the analog stereo output is a downmixed version of the Dolby Digital data stream. The digital output delivers the Dolby Digital data stream to either a downstream decoder or a Dolby Digital capable integrated amplifier.

In each of these devices, the analog stereo output is one of two different stereo downmixes. One type is a stereo-compatible Dolby Surround downmix (also called Pro Logic, left-total/right-total, or Lt/Rt) of the multichannel source program that is suitable for Dolby Surround Pro Logic decoding. The other type is a simple stereo representation (called a left-only/right-only, or Lo/Ro) suitable for playback on a

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stereo hi-fi or on headphones, and from which a mono signal is derived for use on an RF/Antenna output. The difference between the downmixes is how the surround channels are handled. The Lt/Rt downmix sums the surround channels and adds them, in-phase to the left channel and out-of-phase to the right channel. This allows a Dolby Surround Pro Logic decoder to reconstruct the L/C/R/S channels for a Pro Logic home theater. The Lo/Ro downmix adds the right and left surround channels discretely to the left and right speaker channels. This preserves the stereo separation for stereo-only monitoring and produces a mono-compatible signal. In all downmixes, the LFE channel is not included.

On most home equipment, the consumer can use the product's user interface to choose the appropriate stereo output for their playback system. The mono signal feeding the RF/Antenna output is always derived from the Lo/Ro downmix.

There are separate metadata parameters for the adjustment of the Lo/Ro and Lt/Rt downmix conditions. Certain metadata parameters allow the engineer to select how the stereo downmix is constructed and which stereo analog signal is preferred, but Lt/Rt is the default selection in all consumer decoders. See Section A.5 for more information on individual parameters.

During downmixing, as we have seen, the adjustment of dynamic range control parameters is limited. Broadly speaking, the stereo outputs use the Line Mode compression profile and the mono signal uses RF Mode compression. As with dynamic range control, downmixing is ultimately dependent upon each consumer's unique listening environment.

While the engineer must optimize the multichannel mix for reproduction in an ideal listening environment, it is also important to preview the mix in downmixing conditions to ensure compatibility with different playback systems when selecting the downmixing metadata parameters. These previews can be achieved in real time using the DP570 Multichannel Audio Tool.

A.5   Parameter Definitions

Metadata parameters include:

- Universal parameters
- Extended Bitstream Information (Extended BSI) parameters

Extended BSI parameters are active only when the consumer's decoder is capable of reading them *and* when the producer chooses to use them. All decoders can successfully decode a metadata stream without Extended BSI parameters, and Extended BSI parameters translate seamlessly to decoders that read only universal parameters.

A.5.1 Universal Parameters

Universal parameters are present in all Dolby Digital encoders and decoders.

Dialogue Level

The Dialogue Level parameter is discussed in Section A.2.

Channel Mode

This parameter (also known as *audio coding mode*) indicates the active channels within the encoded bitstream and affects both the encoder and consumer decoder. This parameter instructs the encoder as to which inputs to use for this particular program; it tells the decoder what channels are present in this program so the decoder can deliver the audio to the correct speakers.

The setting is described as X/Y, where X is the number of front channels (Left, Center, Right) and Y the number of rear (surround) channels.

The availability of certain channel modes depends on the data rate and whether the LFE Channel is present. For example, you can't have a mono stream with an LFE channel (1.1!) or a 3/2 stream at 96 kbps. Appropriate data rates are shown in the definition of each setting.

Note: The presence of the LFE channel is indicated through a different metadata parameter (see LFE Channel).

Table A-3 Channel Mode Settingsd

Channel Mode Setting	Definition and Data Rate
1+1	Dual mono (not valid for DTV broadcast or DVD production)
1/0 Mono	From 56 kbps, usually 96 kbps
2/0 Stereo	From 112 kbps, usually 192 kbps
3/0	From 256 kbps
2/1	From 256 kbps
3/1	From 320 kbps
2/2	From 320 kbps
3/2	From 384 kbps, often 448 kbps

LFE Channel

The status of the LFE Channel parameter indicates to a Dolby Digital encoder whether an LFE Channel is present within the bitstream. Channel Mode determines

whether the LFE Channel parameter can be set. You must have at least three channels in order to be able to add an LFE channel.

LFE Channel Setting
Enable
Disable

Bitstream Mode

This parameter describes the audio service contained within the Dolby Digital bitstream. A complete audio program may consist of a main audio service (a complete mix of all the program audio), an associated audio service comprising a complete mix, or one main service combined with an associated service. To form a complete audio program, it may be (but rarely is) necessary to decode both a main service and an associated service using a maximum total bit rate of 512 kbps. Refer to the *Guide to the Use of the ATSC Digital Television Standard*, Document A/54 (*www.atsc.org*) for further information. Although a detailed description of each option follows, in practice most programming uses the default setting, Complete Main. An example of an exception to this rule is a special karaoke DVD, or an emergency service within digital television.

Table A-4 Bitstream Mode Definitions

Bitstream Mode Setting	Definition
Complete Main (CM)	CM flags the bitstream as the Main Audio Service for the program and all elements are present to form a complete audio program. Currently, this is the most common setting. The CM Service may contain from one (mono) to six (5.1) channels.
Main M&E (ME)	The bitstream is the Main Audio Service for the program, minus a dialogue channel. The dialogue channel, if any, is intended to be carried by an Associated Dialogue Service. Different Dialogue Services can be associated with a single ME Service to support multiple languages.
Assc. Visual Imp. (VI)	This is typically a single-channel program intended to provide a narrative description of the picture content to be decoded along with the Main Audio Service. The VI Service may also be a complete mix of all program channels, comprising up to six channels.
Assc. Hear Imp. (HI)	This is typically a single-channel program intended to convey audio that has been processed for increased intelligibility and decoded along with the Main Audio Service. The HI Service may also be a complete mix of all program channels, comprising up to six channels.
Assc. Dialogue (D)	This is typically a single-channel program intended to provide a dialogue channel for an ME Service. If the ME Service contains more than two channels, the D Service is limited to only one channel. If the ME Service is two channels, the D Service can be a stereo pair; the appropriate channels of each service are mixed together (requires special decoders).

Bitstream Mode Setting	Definition
Assc. Commentary ©	This is typically a single-channel program intended to convey additional commentary that can be optionally decoded along with the Main Audio Service. This service differs from a Dialogue Service because it contains an optional, rather than a required, dialogue channel. The C Service may also be a complete mix of all program channels, comprising up to six channels.
Assc. Emergency (E)	This is a single channel service that is given priority in reproduction. When the E Service appears in the bitstream, it is given priority in the decoder and the Main Service is muted.
Assc. Voice Over (VO)	This is a single channel service intended to be decoded and mixed to the center channel (requires special decoders).
Main Sv Karaoke (K)	The bitstream is a special service for karaoke playback.

Line Mode Compression Profile

Line Mode is discussed in Section A.3.1.

RF Mode Compression Profile

RF Mode is discussed in Section A.3.2, Dynamic Range Control.

RF Overmodulation Protection

This parameter is designed to protect against overmodulation when a decoded Dolby Digital bitstream is RF modulated. When enabled the Dolby Digital encoder includes pre-emphasis in its calculations for RF Mode compression. The parameter has no effect when decoding using Line Mode compression. *Except in rare cases, this parameter should be disabled.*

RF Overmodulation Protection
Enable
Disable

Center Downmix Level

When the encoded audio has three front channels (L, C, R), but the consumer has only left and right front speakers, this parameter indicates the nominal downmix level for the center channel with respect to the left and right channels. Dolby Digital decoders use this parameter during downmixing in Lo/Ro mode when Extended BSI parameters are not active.

Table A-5 Center Downmix Level

Center Downmix Level Setting	Definition
0.707 (–3 dB) default	The center channel is attenuated 3 dB and sent to the left and right channels.
0.596 (–4.5 dB)	The center channel is attenuated 4.5 dB and sent to the left and right channels.
0.500 (–6 dB)	The center channel is attenuated 6 dB and sent to the left and right channels.

Surround Downmix Level

When the encoded audio has one or more surround channels but the consumer does not have surround speakers, this parameter indicates the nominal downmix level for the surround channel(s) with respect to the left and right front channels. Dolby Digital decoders use this parameter during downmixing in Lo/Ro mode when Extended BSI parameters are not active.

Table A-6 Surround Downmix Level

Surround Downmix Level Setting	Definition
0.707 (–3 dB) default	The left and right surround channels are each attenuated 3 dB and sent to the left and right front channels, respectively.
0.5 (–6 dB)	Same as above, but the signal is attenuated 6 dB.
0 (–999 dB)	The surround channel(s) are discarded.

Dolby Surround Mode

This parameter indicates to a Dolby Digital decoding product that also contains a Dolby Pro Logic decoder (for example a 5.1-channel amplifier) whether the two-channel encoded bitstream contains a Dolby Surround (Lt/Rt) program that requires Pro Logic decoding. Decoders can use this flag to automatically switch on Pro Logic decoding as required.

Table A-7 Dolby Surround Mode

Dolby Surround Mode Setting	Definition
Not Dolby Surround default	The bitstream contains information that was not Dolby Surround encoded.
Dolby Surround	The bitstream contains information that was Dolby Surround encoded. After Dolby Digital decoding, the bitstream is Pro Logic decoded.
Not Indicated	There is no indication either way.

Audio Production Information

This parameter indicates whether the mixing level and room type values are valid. If *Yes*, then a receiver or amplifier could use these values as described below. If *No*, then the values in these fields are invalid. In practice only high-end consumer equipment implements these features.

Table A-8 Audio Production Information

Audio Production Information Setting	Definition
Yes	**Mixing Level** and **Room Type** parameters are valid.
No	**Mixing Level** and **Room Type** parameters are invalid and should be ignored.

Mixing Level

The Mixing Level parameter describes the peak sound pressure level (SPL) as experienced during the final mixing session at the studio or on the dubbing stage. The parameter allows an amplifier to set its volume control such that the SPL in the replay environment matches that of the mixing room. This control operates in addition to the dialogue level control, and is best thought of as the final volume setting on the consumer's equipment. This value can be determined by measuring the SPL of pink noise at studio reference level and then adding the amount of digital headroom above that level. For example, 85 dB equates to a reference level of –20dBFS; the mixing level is 85+20, or 105 dB.

Mixing Level Setting
80 to 111 dB in 1 dB increments

Room Type

The Room Type parameter describes the equalization used during the final mixing session at the studio or on the dubbing stage. A *Large* room is a dubbing stage with the industry standard X-curve equalization; a *Small* room has flat equalization. This parameter allows an amplifier to set the same equalization as heard in the final mixing environment.

Room Type Setting
Not Indicated
Large
Small

Copyright Bit

This parameter indicates whether the encoded Dolby Digital bitstream is copyright protected. It has no affect on Dolby Digital decoders and is purely for information.

Copyright Bit Setting
Yes
No

Original Bitstream

This parameter indicates whether the encoded Dolby Digital bitstream is the master version or a copy. It has no affect on Dolby Digital decoders and is purely for information.

Original Bitstream Setting
Yes
No

Note: The parameters *DC Filter*, *Lowpass Filter*, *LFE Lowpass Filter*, *Surround 3 dB Attenuation*, and *Surround Phase Shift* appear *after* the Extended BSI parameters on Dolby E and Dolby Digital equipment menus.

DC Filter

This parameter determines whether a DC blocking 3 Hz highpass filter is applied to the main input channels of a Dolby Digital encoder prior to encoding. This parameter is not carried to the consumer decoder. It is used to remove DC offsets in the program audio and would only be switched off in exceptional circumstances.

DC Filter Setting
Enable default
Disable

Lowpass Filter

This parameter determines whether a lowpass filter is applied to the main input channels of a Dolby Digital encoder prior to encoding. This filter removes high-

frequency signals that are not encoded. At the suitable data rates this filter operates above 20 kHz. In all cases it prevents aliasing on decoding and is normally switched on. This parameter is not passed to the consumer decoder.

Lowpass Filter Setting
Enable default
Disable

LFE Lowpass Filter

This parameter determines whether a 120 Hz 8th order lowpass filter is applied to the LFE channel input of a Dolby Digital encoder prior to encoding. It is ignored if the LFE channel is disabled. This parameter is not sent to the consumer decoder. The filter removes frequencies above 120 Hz that would cause aliasing when decoded. This filter should only be switched off if the audio to be encoded is known to have no signal above 120 Hz.

LFE Lowpass Filter Setting
Enable default
Disable

Surround 3 dB Attenuation

The Surround 3 dB Attenuation parameter determines whether the surround channel(s) are attenuated 3 dB before encoding. The attenuation actually takes place inside the Dolby Digital encoder. It balances the signal levels between theatrical mixing rooms (dubbing stages) and consumer mixing rooms (DVD or TV studios). Consumer mixing rooms are calibrated so that all five main channels are at the same sound pressure level (SPL). For compatibility reasons with older film formats, theatrical mixing rooms calibrate the surround channels 3 dB lower in SPL than the front channels. The consequence is that signal levels on tape are 3 dB louder. Therefore, to convert to a consumer mix from a theatrical calibration it is necessary to reduce the surround levels by 3 dB by enabling this parameter.

Surround 3 dB Attenuation Setting
Enable
Disable

Surround Phase Shift

This parameter causes the Dolby Digital encoder to apply a 90-degree phase shift to the surround channels. This allows a Dolby Digital decoder to create an Lt/Rt downmix simply. For most material the phase shift has a minimal impact when the Dolby Digital program is decoded to 5.1 channels, but provides an Lt/Rt output that can be Pro Logic decoded to L, C, R, S, if desired. However, for some phase-critical material (such as music) this phase shift is audible when listening in 5.1 channels. Likewise some material downmixes to a satisfactory Lt/Rt signal without needing this phase shift. It is therefore important to balance the needs of the 5.1 mix and the Lt/Rt downmix for each program.

Surround Phase Shift Setting
Enable (default)
Disable

A.5.2   Extended Bitstream Information Parameters

In response to requests from content producers, Dolby Laboratories recently modified the definitions of several metadata parameters from their original definition as described in ATSC document A/52. The original parameters were rarely, if ever used. The revised definitions allow more information to be carried about the audio program and allow more choices for stereo downmixing. When the metadata parameters carried in Dolby Digital were first described, they were generically called *Bitstream Information* or BSI. We refer to the alternate parameter definitions as *Extended BSI*.

Because the revised definitions affect metadata parameters that were not used by the consumer decoders, all decoders will be compatible with the revised bitstream. Newer decoders that are programmed to detect and decode the new parameters will be able to implement the new features the Extended BSI provides.

Products that allow emulation of the effects of metadata, such as the DP570, normally have a feature that allows emulation of a new (or compliant) decoder or a legacy decoder.

Preferred Stereo Downmix Mode

This parameter allows the producer to select either the Lt/ Rt or the Lo/Ro downmix in a consumer decoder that has stereo outputs. Consumer receivers are able to override this selection, but this parameter provides the opportunity for a 5.1-channel soundtrack to play in Lo/Ro mode without user intervention. This is especially useful on music material.

Preferred Stereo Downmix Mode Setting
Not Indicated
Lt/Rt Preferred
Lo/Ro Preferred

Lt/Rt Center Mix Level

This parameter indicates the level shift applied to the center channel when adding to the left and right outputs when downmixing to an Lt/Rt output. Its operation is similar to the center downmix level in the universal metadata.

Lt/Rt Center Mix Level Setting
1.414 (+3.0 dB)
1.189 (+1.5 dB)
1.000 (0.0 dB)
0.841 (−1.5 dB)
0.707 (−3.0 dB)
0.595 (−4.5 dB)
0.500 (−6.0 dB)
0.000 (−999 dB)

Lt/Rt Surround Mix Level

This parameter indicates the level shift applied to the surround channels when downmixing to an Lt/Rt output. Its operation is similar to the surround downmix level in the universal metadata.

Lt/Rt Surround Mix Level Setting
1.414 (+3.0 dB)
1.189 (+1.5 dB)
1.000 (0.0 dB)
0.841 (−1.5 dB)
0.707 (−3.0 dB)
0.595 (−4.5 dB)
0.500 (−6.0 dB)
0.000 (−999 dB)

Lo/Ro Center Mix Level

This parameter indicates the level shift applied to the center channel when adding to the left and right outputs when downmixing to a Lo/Ro output. When Extended BSI parameters are active, this parameter is used and the Center Mix Level parameter in the universal parameters is not.

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Lo/Ro Center Mix Level Setting
1.414 (+3.0 dB)
1.189 (+1.5 dB)
1.000 (0.0 dB)
0.841 (−1.5 dB)
0.707 (−3.0 dB)
0.595 (−4.5 dB)
0.500 (−6.0 dB)
0.000 (−999 dB)

Lo/Ro Surround Mix Level

This parameter indicates the level shift applied to the surround channels when downmixing to a Lo/Ro output. When Extended BSI parameters are active, this parameter is used, and the Surround Mix Level parameter in the universal parameters is not.

Lo/Ro Surround Mix Level Setting
1.414 (+3.0 dB)
1.189 (+1.5 dB)
1.000 (0.0 dB)
0.841 (−1.5 dB)
0.707 (−3.0 dB)
0.595 (−4.5 dB)
0.500 (−6.0 dB)
0.000 (−999 dB)

Surround EX Mode

This parameter is used to identify the encoded audio as Surround EX encoded material. This parameter is only used if the encoded audio has two surround channels. An amplifier or receiver with Dolby Digital Surround EX decoding can use this parameter as a flag to switch the decoding on or off automatically. The behavior is similar to the Dolby Surround Mode parameter.

Surround EX Setting
Not Indicated
Not Surround EX
Dolby Surround EX

A/D Converter Type

This parameter allows audio that has passed through a particular A/D conversion stage to be marked as such so that a decoder may apply the complementary D/A process.

A/D Converter Type Setting
Standard
HDCD

A.6   Metadata Combinations

Table A- provides examples of combinations of parameters that could be used as a preset.

Note: These parameter settings are provided as examples to demonstrate that different settings can be saved, named, and brought up as needed for quick use in different situations. The settings are not recommendations, but could provide a baseline starting point from which to create your own metadata values.

Table A-9 Examples of Possible Metadata Settings

Extended Bitstream Information parameters are in italics.

Parameter	Action Film (5.1)	Drama (Lt/Rt)	Local News (Mono)	Music (5.0)	Live Sporting Events (5.0)
Dialogue Level	–27 dB	–27 dB	–20 dB	–15 dB	–18 dB
Channel Mode	3/2L	2/0	1/0	3/2	3/2
LFE Channel	Enable	N/A	N/A	Disable	Disable
Bitstream Mode	Main Complete	Main Complete	Main Complete	Main Complete	Main Complete
Line Mode Pro	Film Standard	Film Light	Speech	Music Standard	Film Standard
RF Mode Pro	Film Standard	Film Light	Speech	Music Standard	Film Standard
RF Ovrmd Protect	Disable	Disable	Disable	Disable	Disable
Center Dwnmix Lev	–0.707 dB (–3 dB)	N/A	N/A	–0.707dB (–3 dB)	–0.707 dB (–3 dB)
Srnd Dwnmix Lev	–0.707 dB (–3 dB)	N/A	N/A	–0.707 dB (–3 dB)	–0.707 dB (–3 dB)
Dolby Srnd Mode	N/A	Dolby Surround	N/A	N/A	N/A
Audio Prod Info	Yes	Yes	No	Yes	No
Mix Level	101 dB	90 dB	N/A	95 dB	N/A

Extended Bitstream Information parameters are in italics.

Parameter	Action Film (5.1)	Drama (Lt/Rt)	Local News (Mono)	Music (5.0)	Live Sporting Events (5.0)
Room type	Large	Small	N/A	Large	N/A
Copyright	Yes	Yes	Yes	Yes	Yes
Original Bitstream	Yes	Yes	Yes	Yes	Yes
Preferred Stereo Downmix	Lt/Rt	Lt/Rt	N/A	Lo/Ro	Lt/Rt
Lt/Rt Center Downmix Level	−0.707 (−3 dB)	N/A	N/A	−0.707 (−3 dB)	−0.707 (−3 dB)
Lt/Rt Surround Downmix Level	−0.707 (−3 dB)	N/A	N/A	−0.707 (−3 dB)	0.595 (−4.5 dB)
Lo/Ro Center Downmix Level	−0.707 (−3 dB)	N/A	N/A	−0.707 (−3 dB)	−0.707 (−3 dB)
Lo/Ro Surround Downmix Level	−0.707 (−3 dB)	N/A	N/A	−0.707 (−3 dB)	0.595 (−4.5 dB)
Dolby Surround EX Mode	Dolby Surround EX	N/A	N/A	Not Dolby Surround EX	Not Dolby Surround EX
A/D Converter Type	Standard	Standard	Standard	Standard	Standard
DC Filter	Enable	Enable	Enable	Enable	Enable
Lowpass Filter	Enable	Enable	Enable	Enable	Enable
LFE Lowpass Filter	Enable	N/A	N/A	N/A	N/A
Srnd 3 dB Atten	Enable	N/A	N/A	Disable	Disable
Srnd Phase Shift	Enable	N/A	N/A	Enable	Enable

Appendix B
SMPTE Time Stamp

An edited excerpt from Annex B of ATSC Document A/52 ("Digital Audio Compression Standard (AC-3)") is reproduced below.

The Time Stamp Data_type

Time stamps are useful in applications where time information must be kept closely associated with encoded audio data (see Figure B-1). An example of this would be in a digital audio/video transmission system where both audio and video sources have SMPTE timecodes. When the audio and video are digitally compressed it is useful if each output compressed bit stream contains the original SMPTE timecode information. When a time stamp is included in this interface, its value applies to the single coded audio access unit that immediately follows.
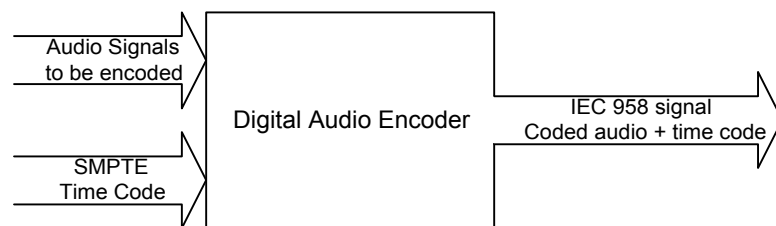
Figure B-1 Encoding Audio with Timecode

Values of SMPTE timecode occur only once per picture frame, and thus have a resolution in their value of approximately 33 ms (for 30 Hz frame rate). Audio samples occur much more frequently, approximately once every 21 μs (48 kHz sample rate). The AC-3 audio access units occur every 32 ms (48 kHz sample rate). It is desirable for the time stamp to precisely indicate the time of the first audio sample contained in each audio access unit, but this is not practical due to the coarse nature of the source of the timing information (SMPTE timecode). The method adopted here is to let the time stamp contain both a SMPTE timecode value, and an indicator as to the audio sample within the following audio access unit to which the timecode value applies.

Depending on the precise timecode frame rate, and the audio access unit frequency (which depends on the audio sample rate), it is possible for all audio samples within a single audio access unit to be between two sequential timecode values. In this case, the time stamp cannot point to a sample in the audio access unit, but must point to a sample in the following audio access unit (see Figure B-2). It is also possible for two

timecode values to occur within a single audio access unit. In this case, the timecode value that applies to the earliest sample in the access unit is used.

It should be recognized that the time stamp values will have a small amount of inherent jitter. The sources of the jitter could be, for example, the ±1 sample ambiguity in relating timecode to an exact sample value or bandwidth limitations in the source of linear timecode.

Figure B-2 Time Stamps and AC-3 Frames in the IEC958 Datastream

Appendix C
Factory Default Presets

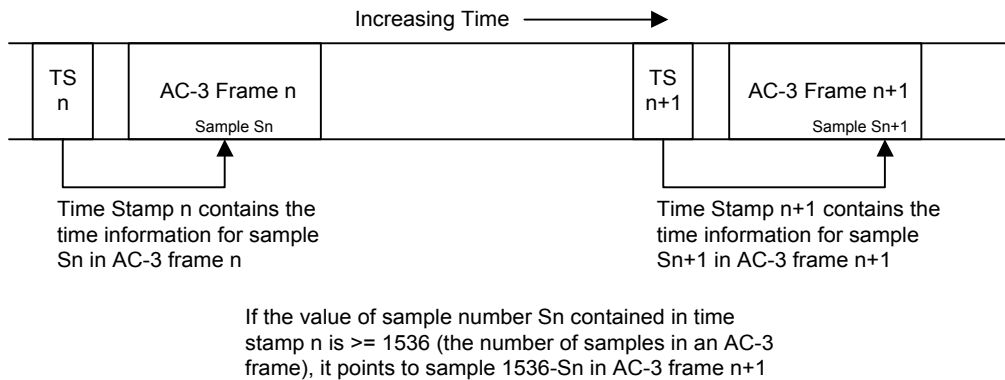| Preset Number	28	29	30	31	32
Preset Name	Externl Metadata	Stereo Film	Stereo Music	Surround Film	Surround Music
Dialogue Level	–27 dB	–27 dB	–27 dB	–27 dB	–27 dB
Channel Mode	3/2	2/0 Stereo	2/0 Stereo	3/2	3/2
LFE Channel	Enabled	Disabled	Disabled	Enabled	Disabled
Data Rate	Automatic 384	192 kbps	256 kbps	448 kbps	448 kbps
Bitstream Mode	Main Complete	Main Complete	Main Complete	Main Complete	Main Complete
Line Mode Profile	Film Standard	Film Standard	Music Standard	Film Standard	Music Standard
RF Mode Profile	Film Standard	Film Standard	Music Standard	Film Standard	Music Standard
RF Ov Protect	Disabled	Disabled	Disabled	Disabled	Disabled
Cntr Dwnmx	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)
Srnd Dwnmx	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)
Dolby Srnd	Not Dolby Srnd	Dolby Srnd	Not Dolby Srnd	Not Dolby Srnd	Not Dolby Srnd
Audio Prod Info	No	No	No	No	No
Mixing Level	80 dB	85 dB	80 dB	85 dB	80 dB
Room Type	Not Indicated	Not Indicated	Not Indicated	Not Indicated	Not Indicated
Copyright	Yes	Yes	Yes	Yes	Yes
Original Bitstream	Yes	Yes	Yes	Yes	Yes
Extnd Bitstream	Disabled	Disabled	Disabled	Disabled	Disabled
Preferred Dwnmx	Lt/Rt	Lt/Rt	Lo/Ro	Lt/Rt	Lo/Ro
Lt/Rt C Downmix	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)
Lt/Rt S Downmix	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)
Lo/Ro C Dowmix	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)
Lo/Ro S Downmix	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)	0.707 (–3.0 dB)
Dolby Srnd EX	Not Dolby EX	Not Dolby EX	Not Dolby EX	Not Dolby EX	Not Dolby EX
A/D Conv Type	Standard	Standard	Standard	Standard	Standard
De-emphasis	Autodetect	Autodetect	Autodetect	Autodetect	Autodetect
DC Filter	Enabled	Enabled	Enabled	Enabled	Enabled
Lowpass Filter	Enabled	Enabled	Enabled	Enabled	Enabled
LFE Lowpass Filt	Enabled	Disabled	Disabled	Disabled	Enabled
Srnd 3 dB Atten	Disabled	Disabled	Disabled	Disabled	Enabled
Srnd Phase Shift	Enabled	Disabled	Disabled	Enabled	Enabled
Input Chan Assign	L/R C/LFE Ls/Rs	L/R C/LFE Ls/Rs	L/R C/LFE Ls/Rs	L/R C/LFE Ls/Rs	L/R C/LFE Ls/Rs
Clock Source	Digital Input	Digital Input	Digital Input	Digital Input	Digital Input
Input Format	PCM	PCM	PCM	PCM	PCM
Output Stream #	0	0	0	0	0
Output Mode	Pro 32-bit	Pro 32-bit	Pro 32-bit	Pro 32-bit	Pro 32-bit

Preset Number	28	29	30	31	32
Preset Name	Externl Metadata	Stereo Film	Stereo Music	Surround Film	Surround Music
Time Stamp	Disabled	Disabled	Disabled	Disabled	Disabled
TS Delay Word	Disabled	Disabled	Disabled	Disabled	Disabled
Audio Bit	Non-Audio	Non-Audio	Non-Audio	Non-Audio	Non-Audio
Timecode Input	LTC	LTC	LTC	LTC	LTC
Mono Channel	Center	Center	Center	Center	Center
Multiplex Mode	Disabled	Disabled	Disabled	Disabled	Disabled
Coding Delay	This Parameter is not stored within the User Presets				
Bypass Mode	Disabled	Disabled	Disabled	Disabled	Disabled
Encoder Control	Encode	Encode	Encode	Encode	Encode
TC Start Time	00:00:00:00:0000	00:00:00:00:0000	00:00:00:00:0000	00:00:00:00:0000	00:00:00:00:0000
TC Stop Time	00:00:00:00:0000	00:00:00:00:0000	00:00:00:00:0000	00:00:00:00:0000	00:00:00:00:0000
Test Tone	Disabled	Disabled	Disabled	Disabled	Disabled
Metadata Source	Program 1	Internal	Internal	Internal	Internal
Override Params	None	None	None	None	None
Reversion Mode	Last Used	Last Used	Last Used	Last Used	Last Used
Reversion Preset	6	6	6	6	6

Appendix D
Error Messages

This appendix lists possible error messages that may be generated by the DP569. In each case a description of possible setup conflicts are given that may have caused the error. When a conflict occurs the parameter that caused the conflict will not be updated but returned to its original value once the error message has been displayed.

```
NOT VALID:  CHECK
    DATA RATE
```

- A new **Channel Mode** has been selected but is not supported for the current **Data Rate**.

- *Internal 32 kHz* has been selected as the **Clock Source,** the current **Output Mode** is *Pro 16-bit* and the current **Data Rate** is *448 kbps* or greater.

```
NOT VALID:  CHECK
  CHANNEL MODE
```

- A new **Data Rate** has been selected but is not supported for the current **Channel Mode** setting.

- **Main Srv Karaoke** has been selected as the **Bitstream Mode** and the current **Channel Mode** is **1+1 Dual Mono** or **1/0 Mono**; or **Assc Voice Over** has been selected and the current **Channel Mode** is not **1/0 Mono**.

- The **LFE Channel** has been **Enabled** and the current **Channel Mode** is **1+1 Dual Mono**, **1/0 Mono**, or **2/0 Stereo**.

```
NOT VALID:  CHECK
 BITSTREAM MODE
```

- Either **1+1 Dual Mono** or **1/0 Mono** has been selected as the **Channel Mode** and the current **Bitstream Mode** is **Main Srv Karaoke**. Or any selection other than **1/0 Mono** has been made and the current **Bitstream Mode** is **Assc Voice Over**.

```
NOT VALID:  CHECK
    LFE MODE
```

- **1+1 Dual Mono**, **1/0 Mono**, or **2/0 Stereo** has been selected as the **Channel Mode** and the **LFE Channel** is **Enabled**.

```
┌─────────────────────────┐
│   NOT VALID:  CHECK     │
│     INPUT FORMAT        │
└─────────────────────────┘
```

- **Ref In-SRC On** or an **Internal Clock Source** has been selected and the current **Input Format** is not **PCM**.

- **Time Code Ctrl** has been selected as the **Encoder State** and the current **Input Format** is not **PCM**.

```
┌─────────────────────────┐
│   NOT VALID:  CHECK     │
│    ENCODER STATE        │
└─────────────────────────┘
```

- **Time Code-based Recall** has been selected and **Encoder State** is currently set to **Time Code Ctrl**.

- **Pre-encoded** or **Autodetect** has been selected as the **Input Format** and the current **Encoder State** is set to **Time Code Ctrl**.

- **Multiplex Mode** has been set to **Enabled** and the current **Encoder State** is set to **Time Code Ctrl**.

```
┌─────────────────────────┐
│   NOT VALID:  CHECK     │
│    MULTIPLEX MODE       │
└─────────────────────────┘
```

- **Digital Input** or an **Internal Clock Source** has been selected, and **Multiplex Mode** is currently **Enabled**.

- **Pro 32-bit** or **Consumer** has been selected as the **Output Mode** and **Multiplex Mode** is currently **Enabled**.

- **Time Code Ctrl** has been selected as the **Encoder State** and **Multiplex Mode** is set to **Enabled**.

```
┌─────────────────────────┐
│   NOT VALID:  CHECK     │
│     CLOCK SOURCE        │
└─────────────────────────┘
```

- **Pre-encoded** or **Autodetect** has been selected as the **Input Format** and the current **Clock Source** is **Ref In-SRC On** or an **Internal** clock source.

- The **Multiplex Mode** has been **Enabled** and the current **Clock Source** is **Digital Input** or **Internal**.

- A **Coding Delay** value less than 204 ms has been selected and the current **Clock Source** is **Internal 44.1 kHz**, or a **Coding Delay** less than 280 ms has been selected and the current **Clock Source** is **Internal 32 kHz**.

```
┌─────────────────────────┐
│   NOT VALID:   CHECK    │
│      CODING DELAY       │
└─────────────────────────┘
```

- **Internal 44.1 kHz** has been selected as the **Clock Source** and the current **Coding Delay** is **Internal** with a delay value less than **204 ms**, or **Internal 32 kHz** has been selected and the current delay value less than **280 ms**.

```
┌─────────────────────────┐
│   NOT VALID:   CHECK    │
│      OUTPUT MODE        │
└─────────────────────────┘
```

- The **Multiplex Mode** has been **Enabled** and the current **Output Mode** is **Pro 32-bit** or **Consumer**.

```
┌─────────────────────────┐
│   NOT VALID:   CHECK    │
│      OUT OF RANGE       │
└─────────────────────────┘
```

- A new **Coding Delay** value has been selected and the new internal coding delay parameter is not in the range "187"–"450".

- The **Unit Address** is out of range.

```
┌─────────────────────────┐
│   NOT VALID:   CHECK    │
│      GPIO INPUTS        │
└─────────────────────────┘
```

- **Bypass Mode** has been **Disabled** and the bypass function is currently activated through the rear-panel GP I/O connection.

```
┌─────────────────────────┐
│   NOT VALID:   PRESET   │
│     RECALL PENDING      │
└─────────────────────────┘
```

- **Time Code Ctrl** has been selected as the **Encoder State** and a time code controlled preset recall is currently **Pending**.

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