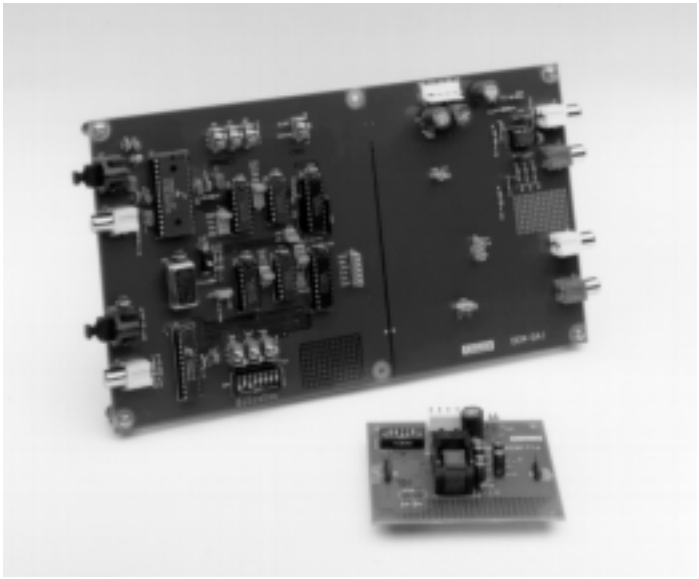
BURR - BROWN®

DEM-PCM1716
DEM-DAI1716
DEM-PCM1716-1
DEM-DAI1716-1
DEM-PCM1728
DEM-DAI1728



DESCRIPTION

The PCM-DEM1716 is a basic demonstration board for the PCM1716 24-bit, 96kHz stereo audio digital-to-analog converter. It includes single-row header connectors for digital audio data and clocks, power, and the left and right audio outputs. An on-board DIP switch is used to configure the PCM1716 device.

The DEM-DAI1716 includes both the DEM-PCM1716 demo board and the DEM-DAI mother board.

The DEM-DAI board includes digital audio receivers and transmitters for interfacing to audio and test equipment that supports the S/PDIF standard digital audio interface protocol. The DEM-DAI board also includes clock circuitry for stand-alone operation, power supply connectors, and DAC post filters for the left and right audio outputs.

The PCM-DEM1728 is a basic demonstration board for the PCM1728 24-bit, 96kHz stereo audio DAC. It includes single-row header connectors for digital audio data and clocks, power, and the left and right audio outputs. An on-board DIP switch is used to configure the PCM1728 device.

The DEM-DAI1728 includes both the DEM-PCM1728 demo board and the DEM-DAI mother board. Its features are otherwise identical to the DEM-DAI1716 kit.

Part numbers with the -1 suffix include a PC interface cable and demonstration software for programming the PCM1716 internal registers.

ORDERING INFORMATION

DEM-PCM1716	Basic Demo Board for the PCM1716.
DEM-PCM1716-1	Same as the DEM-PCM1716, plus PC interface cable and evaluation software.
DEM-DAI1716	Evaluation Kit, including the DEM-PCM1716 and the DEM-DAI board.
DEM-DAI1716-1	Same as the DEM-DAI1716, plus PC interface cable and evaluation software.
DEM-PCM1728	Basic Demo Board for the PCM1728.
DEM-DAI1728	Evaluation Kit, including the DEM-PCM1728 and the DEM-DAI board.

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DEM-PCM1716 AND DEM-PCM1728 HARDWARE

The following discussion applies to both the DEM-PCM1716 and DEM-PCM1728. Differences, where applicable, are appropriately noted and explained.

The demonstration boards operate from a single +5V power supply. The supply may be derived from the PC interface cable via header CN1,or from the DEM-DAI or a customer proto board via header CN2. The supply used should be a clean, regulated linear power source.

The system clock is provided by either a crystal oscillator or an external clock source. The board includes provisions for a crystal and it's associated capacitors. An external system clock, as well as the serial audio interface signals, are connected to header CN4.

The stereo audio output of the DAC is available at connector CN3. The Zero Flag output , which may be used in conjunction with an external mute circuit, is also available at CN3.

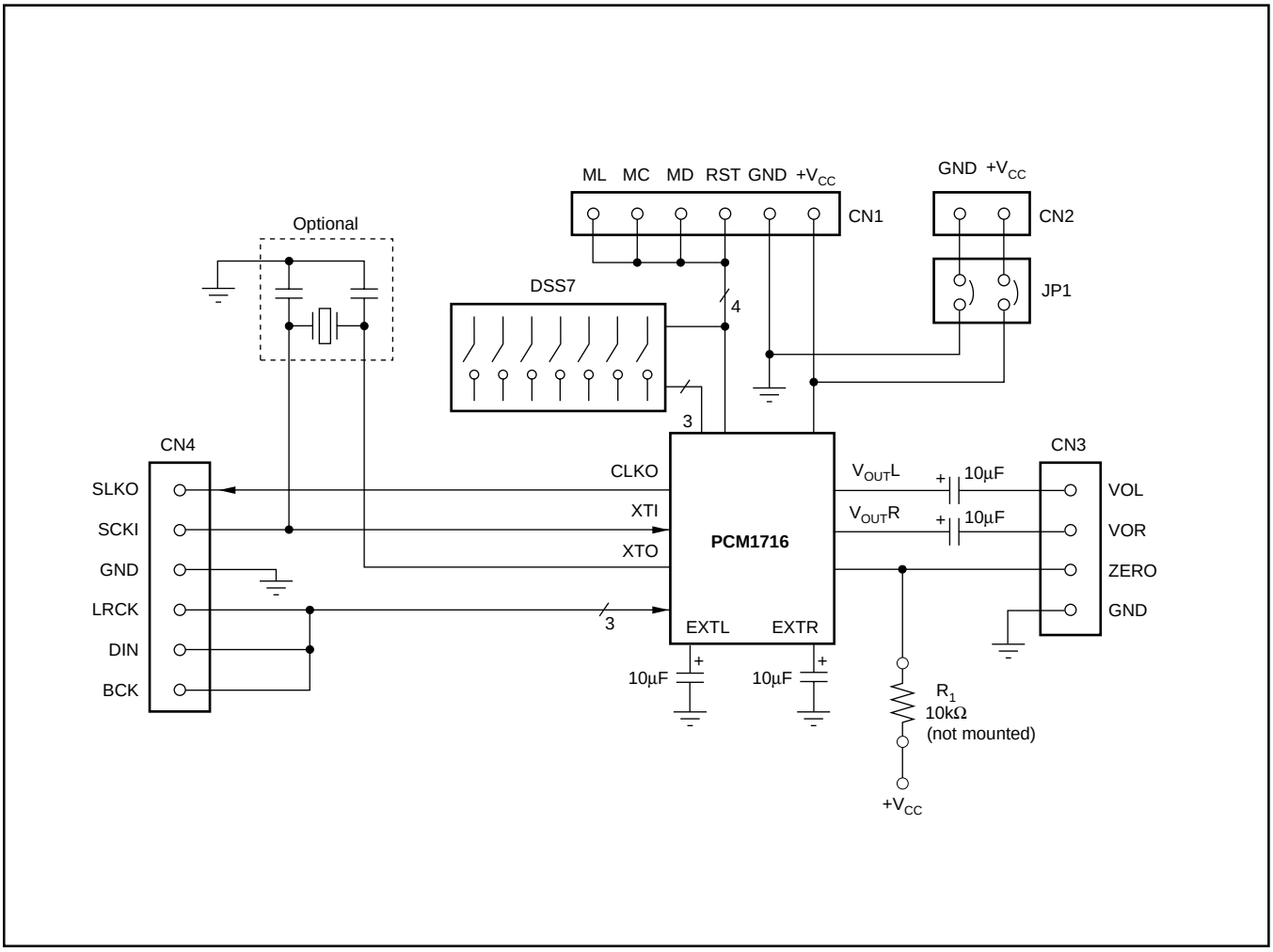


FIGURE 1. Functional Block Diagram.

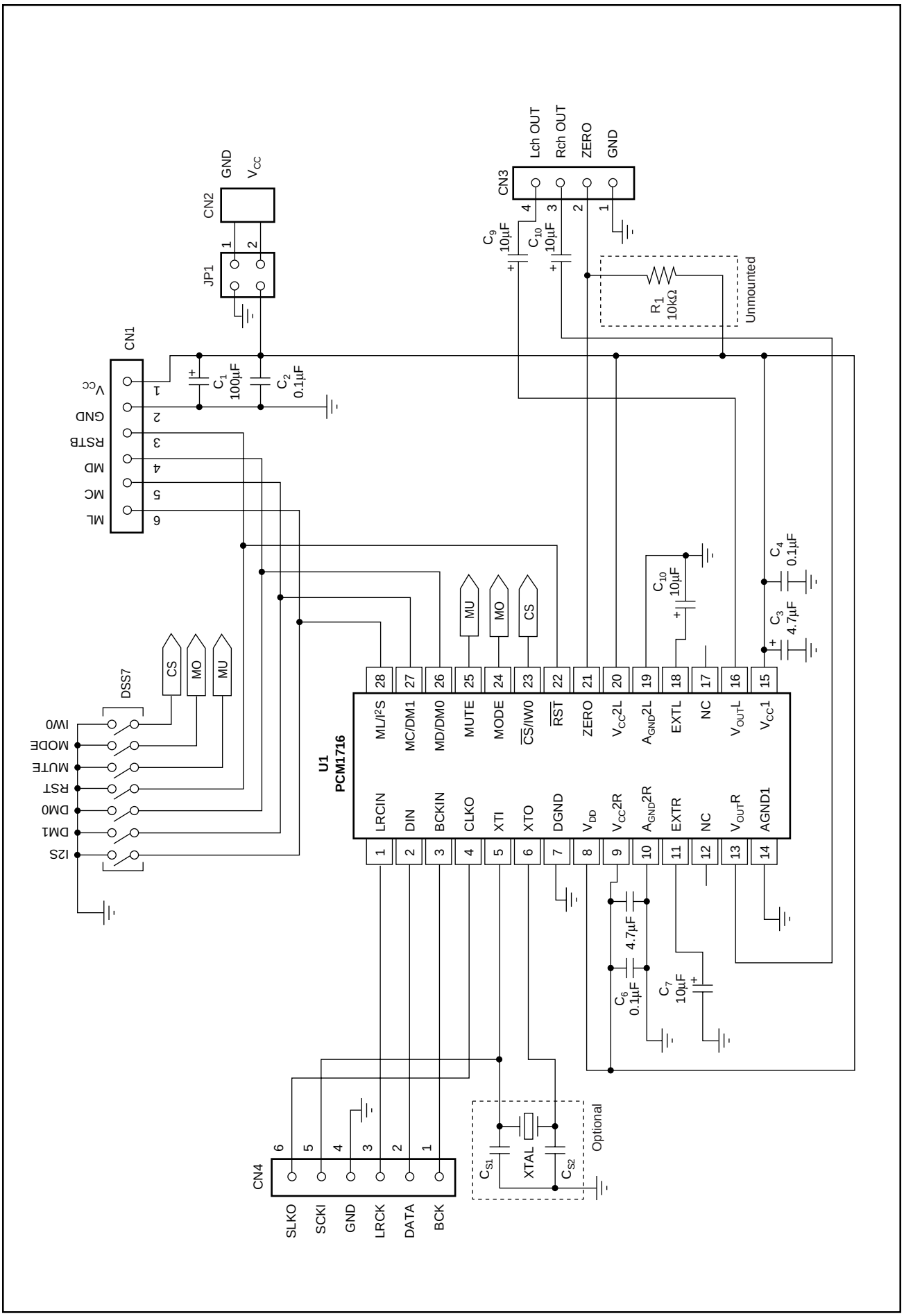


FIGURE 2. DEM-PCM1716 Schematic.

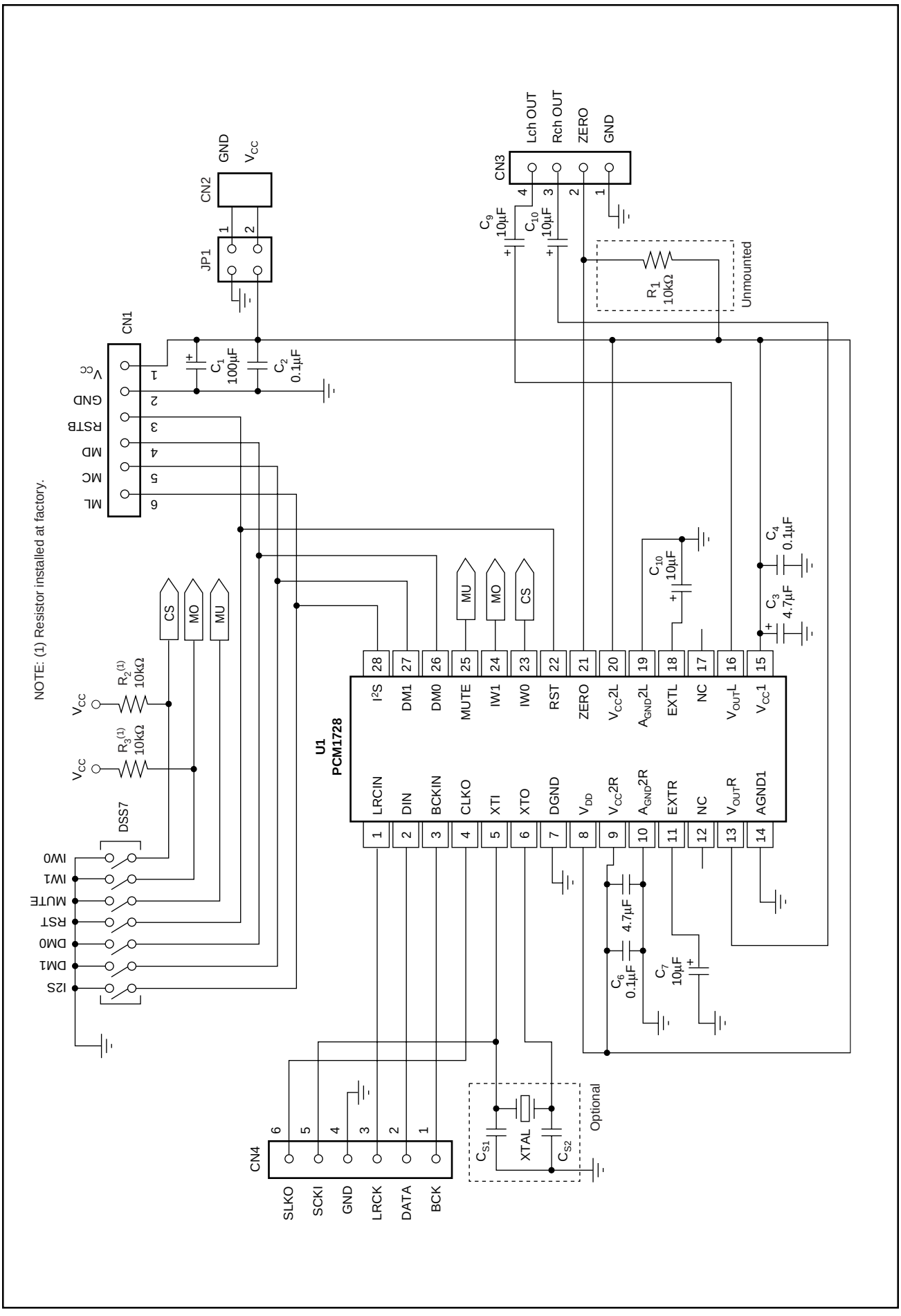
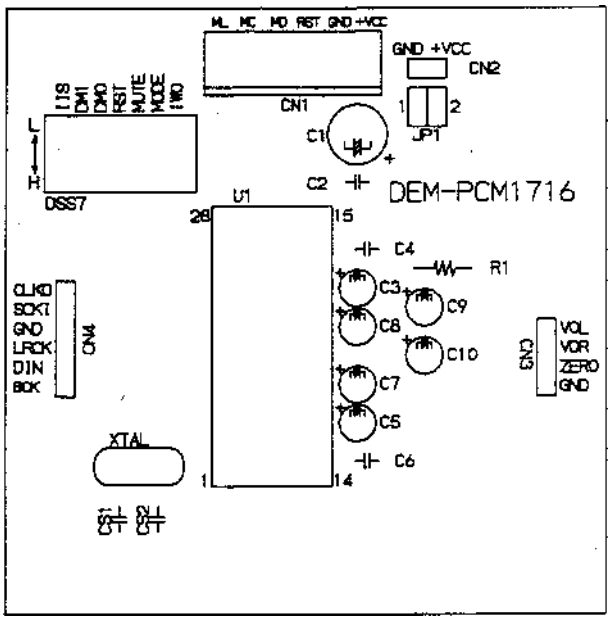
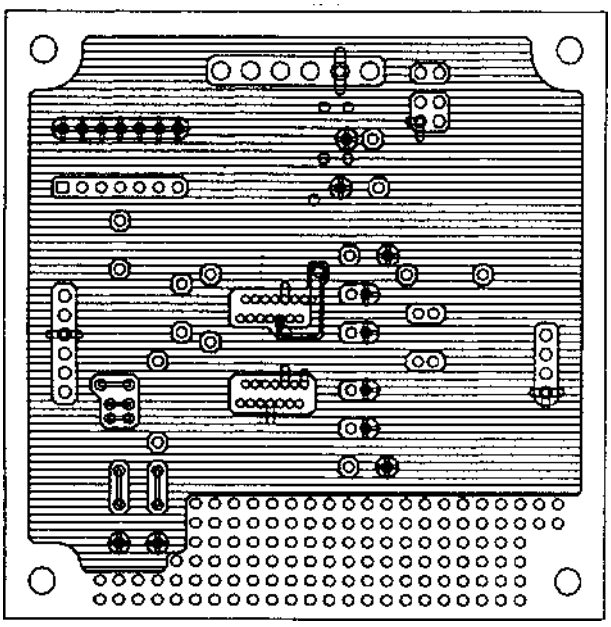


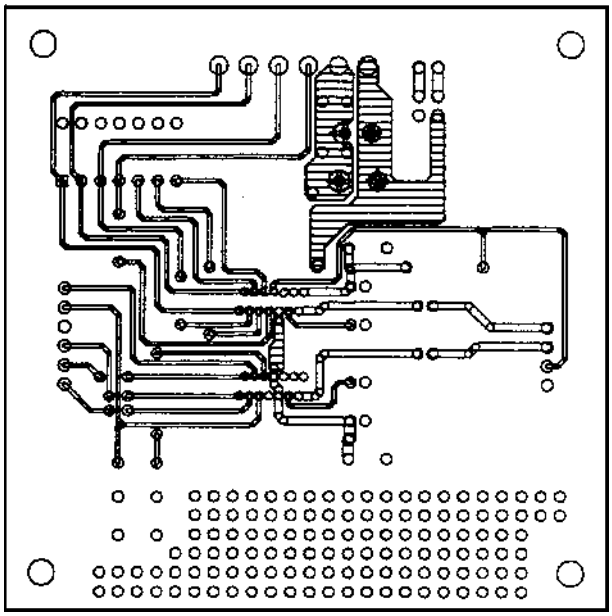
FIGURE 3. DEM-PCM1728 Schematic.



Silkscreen



Top View



Bottom View

FIGURE 4. DEM-PCM1716 and DEM-PCM1728 Parts Layout.

CONFIGURATION CONTROLS

Configuration of the demo boards is done using the on-board DIP switch. This section describes the function of each of the switches.

Mode Control

The MODE switch is used to determine whether the PCM1716 operates in Hardware or Software control mode.

MODE = L = Hardware control

MODE = H = Software control

Soft Mute

The Soft Mute function may be controlled by the MUTE switch.

MUTE = L = Mute ON

MUTE = H = Mute OFF (Normal Operation)

Manual Reset

The RST switch may be used to force a manual reset of the PCM1716. See Figure 6 in the PCM1716 data sheet for proper timing for the external forced reset.

RST = L = Force Reset

RST = H = Normal Operation

Digital De-Emphasis

The Digital De-Emphasis function may be programmed using the DM0 and DM1 switches in **Hardware Mode only**. In Software Mode, these functions revert to MD (for DM0) and MC (for DM1). Table I shows the de-emphasis switch settings and their corresponding selections.

DM1	DM0	DE-EMPHASIS
L	L	OFF
L	H	48kHz
H	L	44.1kHz
H	H	32kHz

TABLE I. De-Emphasis Controls (hardware mode only).

Data Format Controls

For the DEM-PCM1716, the IIS and IW0 switches are used to select serial interface data format in **Hardware Mode only**. In Software Mode, these functions revert to ML (for I^2S) and $\overline{CS}$ (for IW0).

Table II shows the I^2S and IW0 switch settings and their corresponding data format selections.

I^2S	IW0	DATA FORMAT SELECTION
L	L	16-Bit Data, Normal, Right-Justified
L	H	20-Bit Data, Normal, RIght-Justified
H	L	16-Bit Data, I^2S Format
H	H	24-Bit Data, I^2S Format

TABLE II. DEM-PCM1716 Data Format Selection for Hardware Control Mode.

For the DEM-PCM1728, format is selected with the IW0, IW1 (MODE), and I^2S switches. Table III shows the available settings.

IW1	IW0	I^2S	DATA FORMAT SELECTION
L	L	L	16-Bit Standard, Right-Justified
L	H	L	20-Bit Standard, Right-Justified
H	L	L	24-Bit Standard, Right-Justified
H	H	L	24-Bit Left-Justified, MSB-First
L	L	H	16-Bit I^2S
L	H	H	24-Bit I^2S
H	L	H	Reserved
H	H	H	Reserved

TABLE III. DEM-PCM1728 Data Format Selection.

Power Supply Selection

The demo boards allow the user to supply power at either CN1 or CN2.

When powering the boards from header CN1, remove the JP1-1 and JP1-2 jumpers.

When powering the boards from header CN2, both JP1-1 and JP1-2 should have jumpers installed. This is the default setting when using the demo boards with the DEM-DAI Mother Board. In this scenario, +VCC and GND are derived from the DEM-DAI Mother Board.

DEM-DAI1716, DEM-DAI1716-1, and DEM-DAI1728

These part numbers include the DEM-PCM1716 or DEM-PCM1728 demo board, and the DEM-DAI mother board.

When mounting the demo board to the DEM-DAI mother board, observe the connector alignment shown in Table IV.

Please refer to the DEM-DAI data sheet for details concerning mother board configuration and operation.

DEMO BOARD CONNECTOR		DEM-DAI CONNECTOR
CN2	to	CN5
CN3	to	CN3
CN4	to	CN2

TABLE IV. Demo Board to DEM-DAI Connector Alignment.

PCM1716 DEMONSTRATION SOFTWARE

The DEM-PCM1716-1 and DEM-DAI1716-1 include demonstration software. The -1 boards include a PC interface cable, which is connects to CN1 on the DEM-PCM1716 demo board, and software which is used to program the PCM1716's internal registers.

Software Mode DIP Switch Settings

Before using the DEM-PCM1716 with the demonstration software kit, take a moment to set the DIP switch to the following settings:

MODE = H

MUTE = H

RST = H

DM0 = H

DM1 = H

I^2S = H

IW0 = L (Chip Select Enabled)

DEMONSTRATION SOFTWARE KIT

The demonstration software kit is designed to allow evaluation of the PCM1716's special features using a PC. It consists of a 3.5" floppy disk and interface cable/connector for a PC printer port. Install the demonstration software on a PC and connect the mode control signals to the PCM1716 using the PC's printer port. This connection is made by attaching the included cable/connector to a printer cable connected to the PC's printer port as shown in Figure 5.

The demonstration software allows for selection and control of PCM1716 functions while displaying them on the PC screen. Note the demonstration software does not include audio signal generation or analysis and it is necessary to evalute the basic characteristics in conjunction with another system that provides the three-wire digital audio signal, such as a digital audio receiver and audio signal processor.

SYSTEM REQUIREMENTS

In order to operate the demonstration software, the following computer requirements must be met:

• IBM-compatible PC with a 386/25MHz processor or better (equipped with printer port for I/O)

• Microsoft Windows 3.1 (or better) operating system

DEMONSTRATION SOFTWARE DESCRIPTION

The demonstration software can control the following mode registers of the PCM1716:

FUNCTION	PCM1716 MODE REGISTER
RST (RESET)	RST (Pin 22)
Digital Attenuation	LDL (R), AL (R) 7 ~ 0:MODE0,1
Soft Mute	MUT/MODE2
De-Emphasis	DEM/MODE2, SF1 ~ 0/MODE3
DAC Operation	OPE/MODE2
Input Audio Data Format Selection	IW1 ~ 0/MODE2/I^2S/MODE3
Input L/R Clock Polarity	LPR/MODE3
Attenuator Individual Control	ATC/MODE3
Slow Roll-Off Connection	SRO/MODE3
Output Phase Selection	REV/MODE3
CLKO Selection	CKO/MODE3

TABLE V.

Installation

The demonstration software includes a total of five files on the floppy disk. Insert the disk into drive A: and confirm that the following files are included in the DEM1716 directory:

inpout.dll

Vbrjp200.dll

dem1716.exe

dem1716.ini

ver.dll

Copy these five files onto the hard disk drive C:\DEM1716.

Printer Port Set-Up

The demonstration software controls the software mode of the PCM1716 via the PC printer port. To ensure the printer port is functioning properly, establish the address of printer port in the "dem1716.ini" file in the directory where the files were copied.

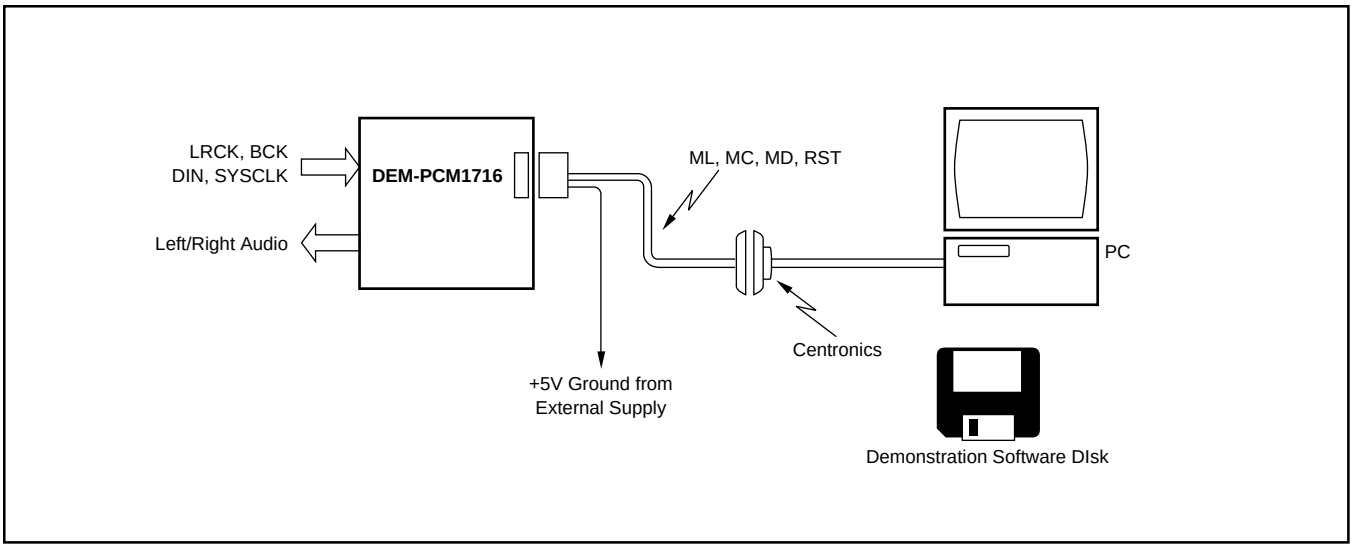


FIGURE 5. DEM-PCM/DAI1716 Interface Connection.

Determining the Address of the Printer Port

For PC-ATs (IBM PCs), the following three printer port addresses are used: 3BC (Hex), 378 (Hex), and 278 (Hex).

Determine the address of the printer port you are using. If the address is unclear, you can find it with the following steps in Windows 3.1:

• Switch from Windows to DOS mode

• Type "msd" at the DOS prompt

A set of address information, including the printer port, will be displayed on the screen to make it possible to determine the correct address. In Windows 95, you can view System Properties in control panel and determine printer port properties (resources).

Registering the Printer Port Address

Register the address of the printer port in the file "dem1716.ini". For example, if the printer port address is 3BC (Hex), use the following method:

Open a text editor, such as the Notepad accessory in Windows. Select "OPEN" from the File menu and open "dem1716.ini" in the directory. The following text is displayed:

[DEM1716]

PCMIFADR=&h378

Rewrite the above text file's second line from &h378 to &H3BC. The rewritten text file content should appear as:

[DEM1716]

PCMIFADR=&h3BC

Select "SAVE" from the File menu and exit.

RUNNING/EXECUTING THE DEMONSTRATION SOFTWARE

Double-click the "dem1716.exe" file in the C:\DEM1716 directory. The main menu for the PCM1716 is displayed on the screen. This menu shows the contents of each mode register and opens each of the submenu windows (see Figure 6).

Under the Main menu, select Execute (E) or Window (W) and the submenu will be displayed. Under Execute (E) and Window (W), the following submenus can be selected:

Execute (E)

Initialize (I):	Initialize all mode registers
Reset (R):	Resets PCM1716 and sends new register data to the device
Exit (X):	Exit program

Window (W)

Attenuate (A):	Digital attenuator control
Function (F):	Function control
DataForm(D):	Data control

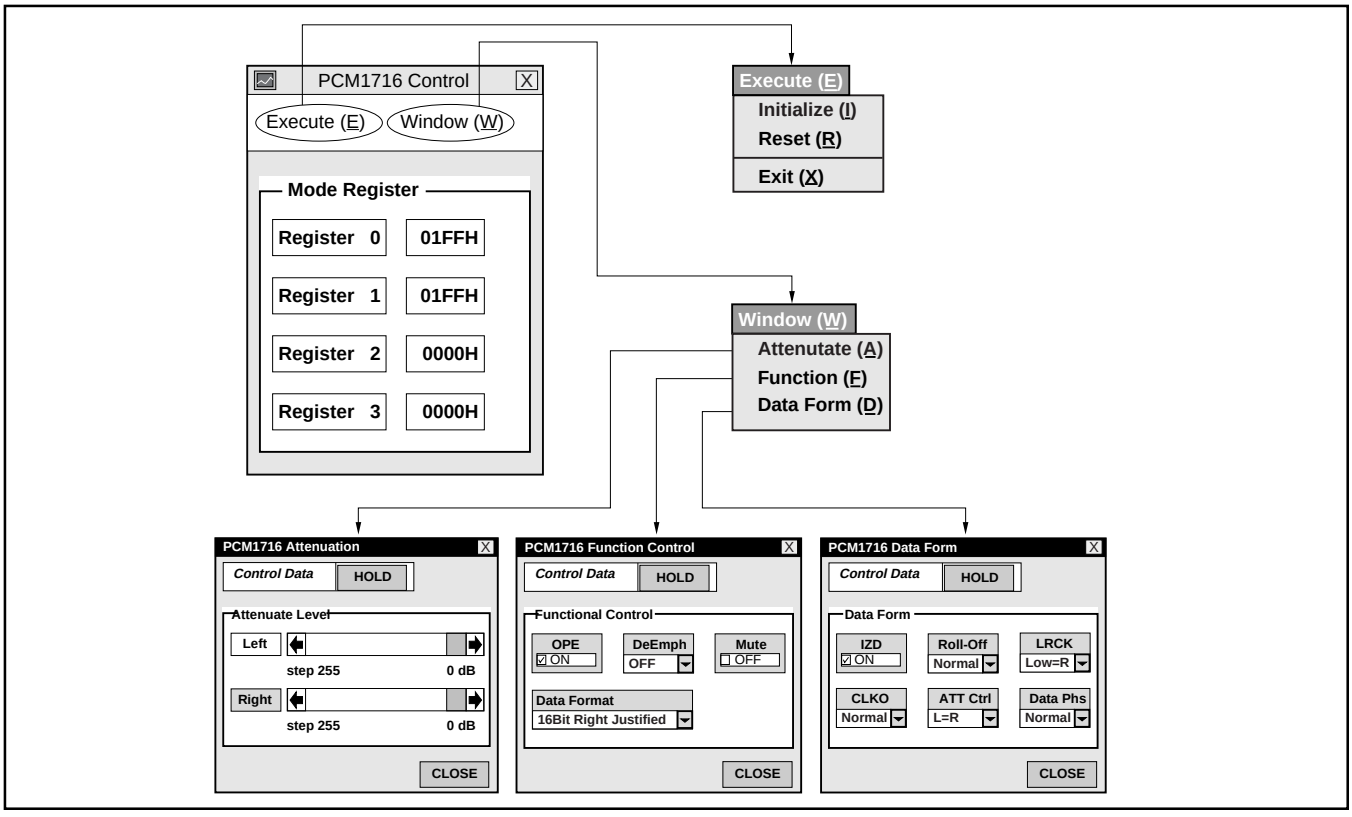


FIGURE 6. Demonstration Software Main Menu.

Controlling the Mode Registers

To set the mode registers, double-click on Attenuate (A), Function (F), or DataForm (D) from the main menu. Each register will appear and have a "HOLD" or "PASS" selection for Control Data (see Figure 7). In "HOLD", only the data displayed on the screen changes until "OK" is selected or "HOLD" is changed to "PASS". If "CANCEL" is selected, register data remains unchanged. In "PASS" mode, you can simultaneously change data on the screen and the control register data for the PCM1716. Select "CLOSE" to exit this menu.

Attenuate Control

By selecting Attenuate (A), the user can control the L/R attenuators independently (Figure 8a).

When the L/R simultaneous control is selected in DataForm (D), only the left channel is displayed (Figure 8b).

Function Control

When Function (F) is selected from the menu, the function control screen is displayed (Figure 9).

DataForm Control

When DataForm (D) is selected from the menu, the function control screen is displayed (Figure 10).

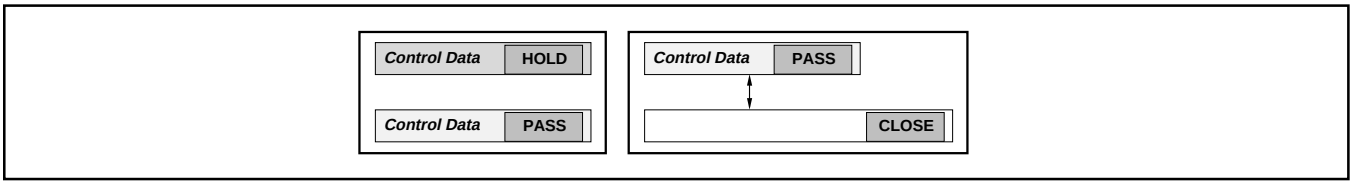


FIGURE 7. Control Data Status.

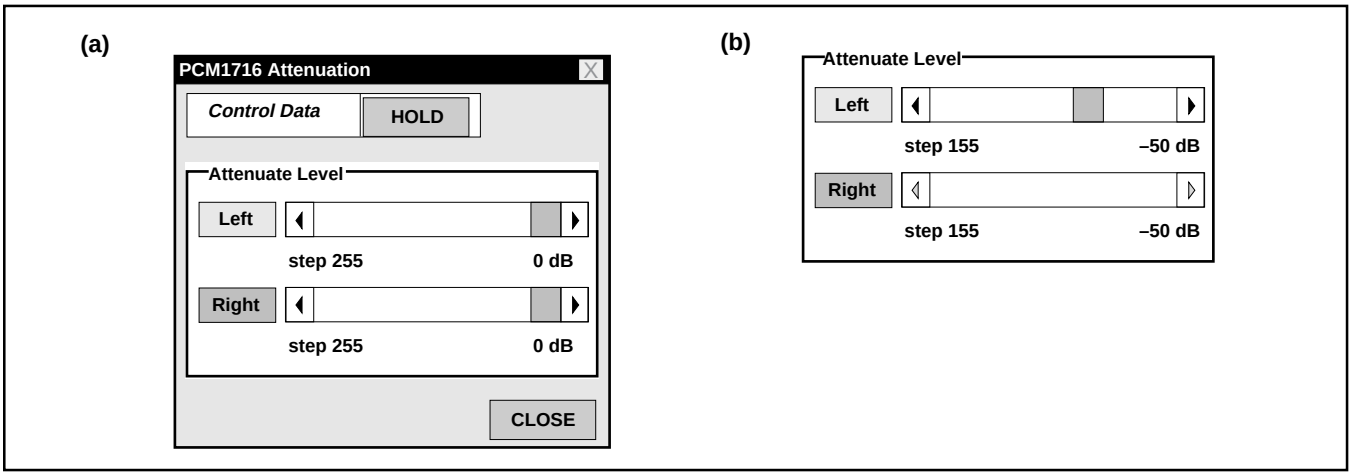


FIGURE 8(a). Attenuation Control for Individual Channels (defaults). (b). Attenuation Control for Simultaneous Channels.

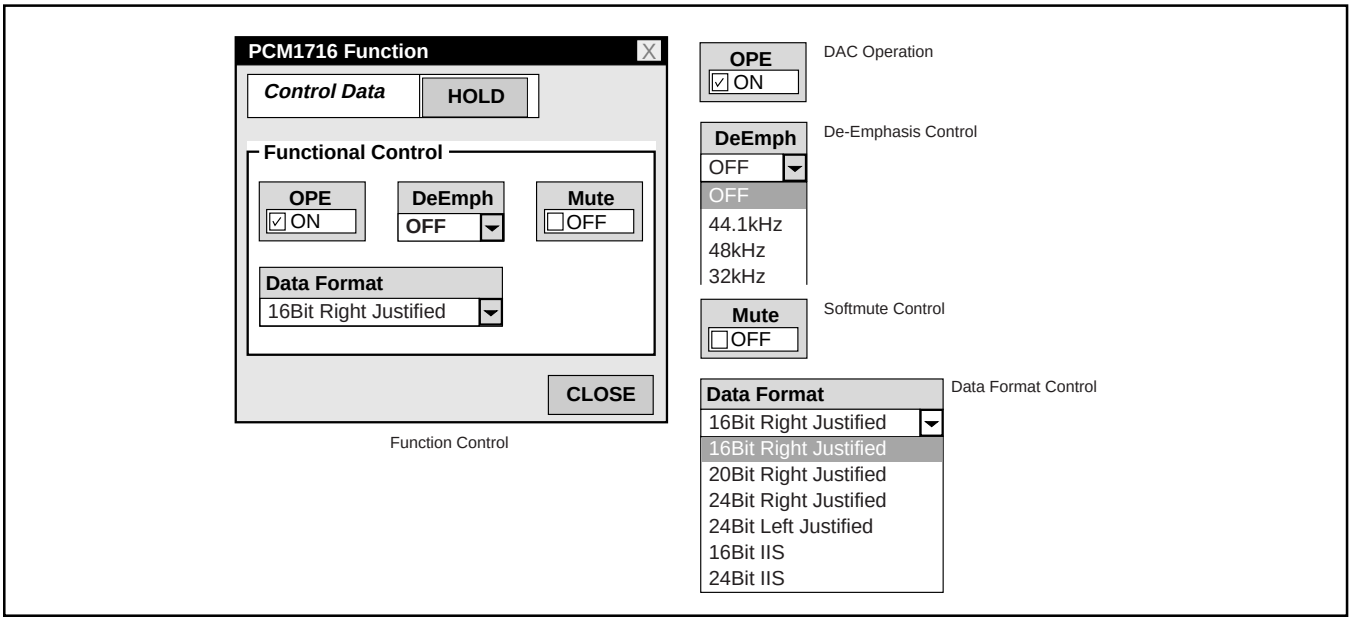


FIGURE 9. Function Control.

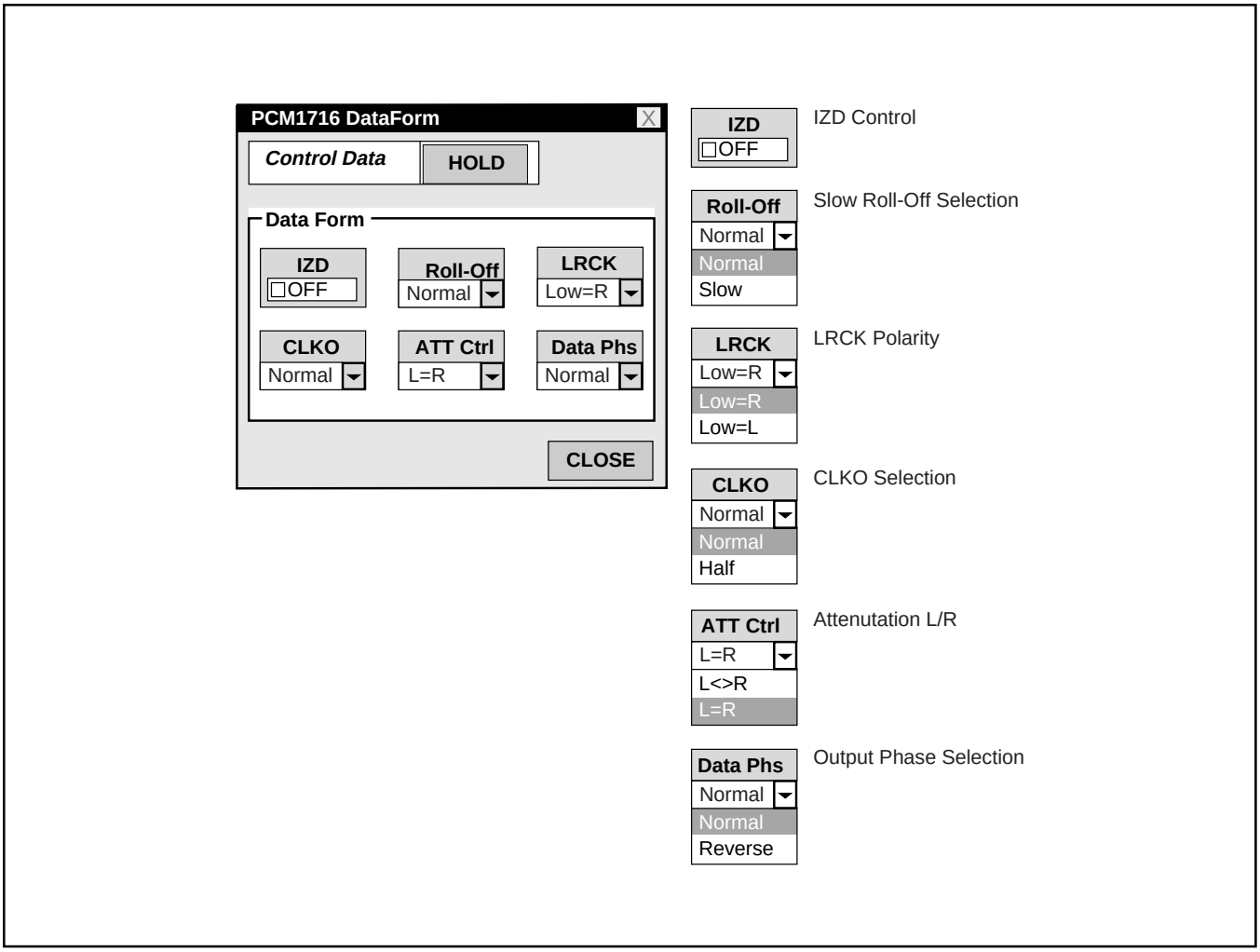


FIGURE 10. Format Control.

FIGURE 11. PCM3000 Format Control.

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