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User Manual

System 2811

Audio Data Acquisition Record and Playback System

Edition 1, Revision 1



Acquiring, Processing and Managing the World's Data.

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DSPCon

Receiver and Data Acquisition Systems





Since 1991, our staff of qualified and dedicated systems and software design engineers has been working at the forefront of technology by employing sophisticated, innovative designs and aggressive testing techniques that provide a diverse customer base with the data acquisition and analysis systems that help to keep them competitive.

DSP*Con* specializes in the development of DSP-based, high-tech systems for real-time data acquisition and analysis applications.

From digital receivers to sound and vibration systems, DSP*Con* has the experience to provide the appropriate products and services to meet both your budget and your product scheduling needs.



Hardware

In addition to data acquisition systems, we offer consulting services, systems design, DSP board manufacturing and complete standard and custom digital signal processing systems based on COTS technology. DSP*Con* also provides post-purchase training and technical support.



Software

Data Recorders



Whether you need a 1024-channel sound and vibration analysis system or a 32-channel receiver system, DSP*Con* works with you and your engineers to design a high-performance solution that meets your needs.

SYSTEM 2811 USER MANUAL
Edition 1.1—May 2002

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June 2000	——	——	First Edition

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Contents

CHAPTER ONE – OVERVIEW 2

Representative System Diagram 2
Figure 1.1 – Representative System Block Diagram 3
General Product Description 4
Conventions 4
Technical Support 4

CHAPTER TWO – SYSTEM DESIGN 6

How the System 2811 Works 6
DSPCon Model 9810 IP Module Specifications 7
Input channels 7
Output channels 7

CHAPTER THREE – HARDWARE INSTALLATION & CONFIGURATION 10

Introduction 10
Figure 3.1 – System Block Diagram 11
Inspection 12
Unpacking the Unit 12
Installing a Replacement VME Card 13
Removing a VME Card 14
Cabling 15
Connecting the Model DSP-C01011 to the Model 9245 15
Figure 3.1 – IP Connector Pin Numbering 15
Table 3.1 – IP to ConnBox Connections 16
Connecting the Model 9245 to the Ethernet 17
Table 3.2 – Ethernet Port Pins 17
Setting the IP Address on the Model 9245 18
Step-by-Step Instructions 18
Serial Port (UART) Connector 19
Table 3.3 – Serial Port Pins 19

CHAPTER FOUR – SOFTWARE 22

Software Installation 22
Model 9245 Board Software 22
API Software 22
Key Data Structures 22
ControlInfo Structure 23
StatusInfo Structure 23
DataInfo Structure 23
Structure Prototypes 24
Opening a Connection to the System 25

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Closing a Connection to the System 26
Controlling the System 26
Idle Mode 27
Record Mode 27
Replay Mode 27
Receiving Messages from the System 27
Sending D/A Data Messages to the System 28
Computing the Amount of System Memory Available for D/A Buffers 29
Pinging the System 30
Example Software 30

CHAPTER FIVE – TROUBLESHOOTING *32*

Philosophy 32
Procedures 33
Step One 33
Step Two 33
Step Three 33
Step Four 33

APPENDIX A – NETWORK INTERFACE DESCRIPTION *36*

Overview of Message Catalog 36
Messages Received by System 36
Messages Transmitted by System 36
Control Message 37
Table A.1 – Control Message *37*
D/A Data Message 38
Table A.2 – D/A Data Message *38*
Status Message 39
Table A.3 – Status Message *39*
A/D Data Message 40
Table A.4 – A/D Data Message *40*

APPENDIX B – RECOMMENDED SPARE PARTS & ORDERING INFORMATION *42*

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1

Overview

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This manual provides comprehensive information on the system architecture, specifications for, and operation of, the DSPCon System 2811 Audio Data Acquisition Record and Playback System.

The system characterized in this manual is a representative system★, and is designed for Analog-to-Digital, Digital-to-Analog audio signal conversion. It is but one of the multiple configurations possible using the System 2811's interchangeable component structure.

Representative System Diagram

The block diagram shown in Figure 1.1 is an illustration that provides a general overview of some of the ways in which the System 2811's commercial-off-the-shelf (COTS) components can be used to provide multiple system configuration possibilities.

★ All hardware & software components, interconnections, interfaces, system configuration, installation, etc. shown in this document are relevant to and describe the system as conceived for this document.

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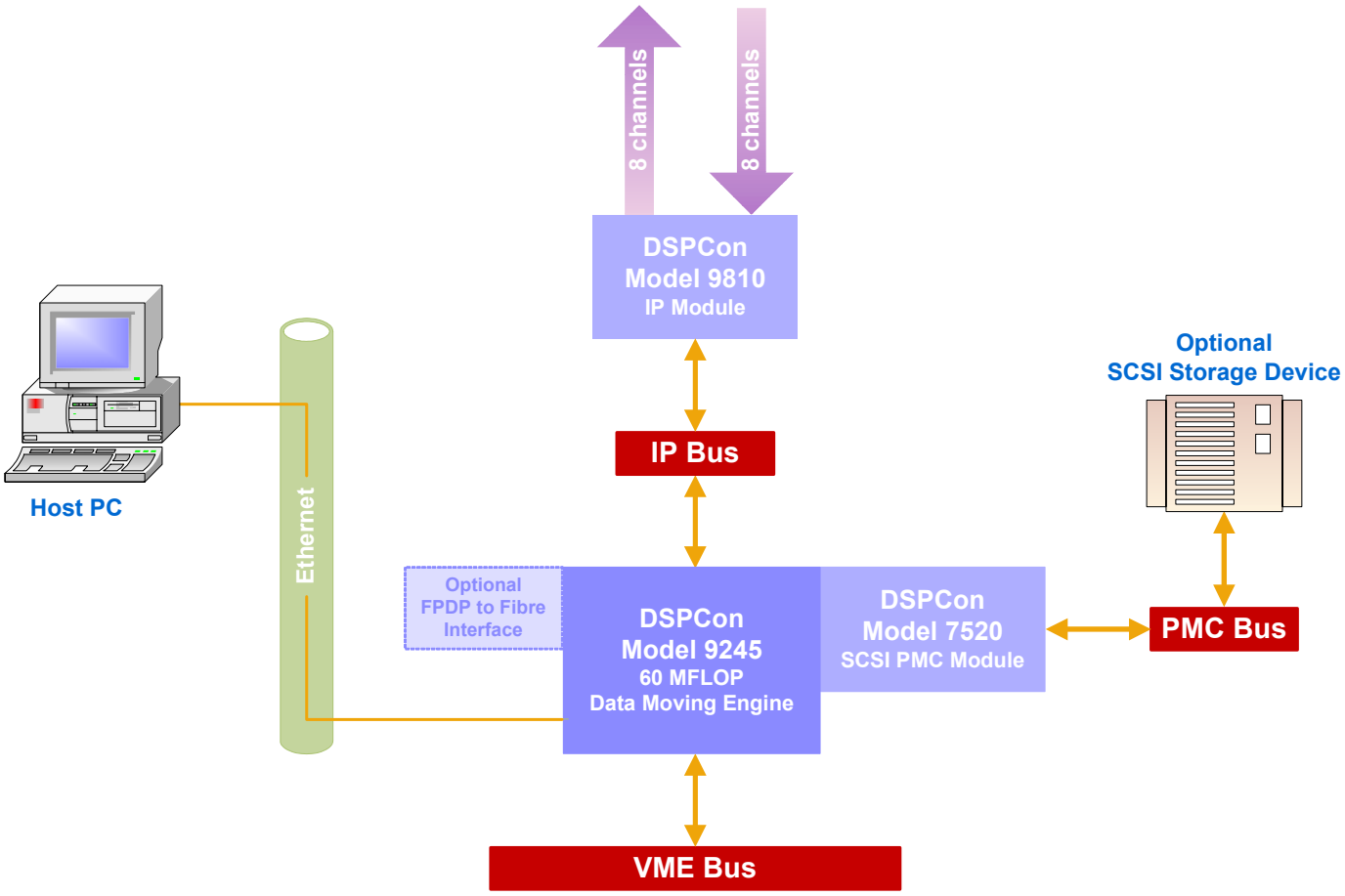


Figure 1.1—Representative System Block Diagram

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General Product Description

The DSP*Con* System 2811 is an Audio Record and Playback system that provides eight channels of Analog/Digital (A/D) or Digital/Analog (D/A) signal conversion. Data is transferred between the System 2811 and a host computer via a 100-Mbit Ethernet. A C-based API that runs on the host is provided for channel selection, 8-bit or 16-bit depth selection, and retrieving data from and sending data to the system. The API is based on UDP network protocol and is compatible with the QNX operating system.

During record operation, up to eight analog input channels are sampled simultaneously and transferred to the host. During playback, up to eight digital channels sent from the host are converted to analog. Sampling and reconstruction is performed at 8000 samples per second. The system is designed to allow the sampling rate to be changed in the future with minor factory modifications.

Conventions

The System 2811 is designed to run on the Microsoft Windows 2000 and WindowsNT operating systems.

Technical Support

Our engineering team is available to answer your questions from 8:30 a.m. to 5:00 p.m. EST Monday through Friday.

If you need technical assistance, contact Donna Babey at our toll-free number, **888-377-2668**, or via E-mail at **dmb@dspcon.com**

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2

System Design

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How the System 2811 Works

A DSP*Con* Model 9245 60 MHz TMS320C40 board acts as the data moving engine for the system. The DSP*Con* Model 9810 IndustryPack (IP) module provides A/D and D/A signal conversion.

The system allows a host computer to command and control the 9245 through an Ethernet interface. The Ethernet is also used to pass sampled data between the 9245 and the host.

A specialized connection box (ConnBox) is cabled to the 9245 to allow for eight channels of A/D—D/A signal input/output.

The API software is designed to provide interface for all of the record/playback functions for the system including:

- Selecting the channels that are to be active
- Selecting the sample bit-depth on each channel ★
- Starting record
- Stopping record
- Starting playback
- Stopping playback

★ The maximum bit value (8 or 16, depending on bit-depth selection) is mapped to the full-scale output of the D/A during REPLAY. On RECORD, the maximum bit value corresponds to the full-scale input of the A/D.

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DSPCon Model 9810 IP Module Specifications

The DSP*Con* Model 9810 is configured for Internal Sample Rate (ISR) generation at 8000 samples/second.

Input channels

Quantity	8
Type	Differential
Full Scale Voltage	8.5 Volts peak-to-peak
A/D bit depth	16 bits

Output channels

Quantity	8
Type	Single ended
Full Scale Voltage	4.0 Volts peak-to-peak
A/D bit depth	16 bits

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3

Hardware Installation and Configuration

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Introduction

The System 2811 is comprised of four hardware components:

- A DSP*Con* Model 9245 60 MFLOP Data Moving Engine
- A DSP*Con* Model 9810 IP Module
- A DSP*Con* Model DSP-C01011 connection box for analog signal input/output
- A DSP*Con* Model DSP-C01014 cable for re-programming the IP address

A block diagram of the system's hardware and interconnections is shown in Figure 3.1.

Note that the Model 9245 contains the DSP code for data acquisition and replay.

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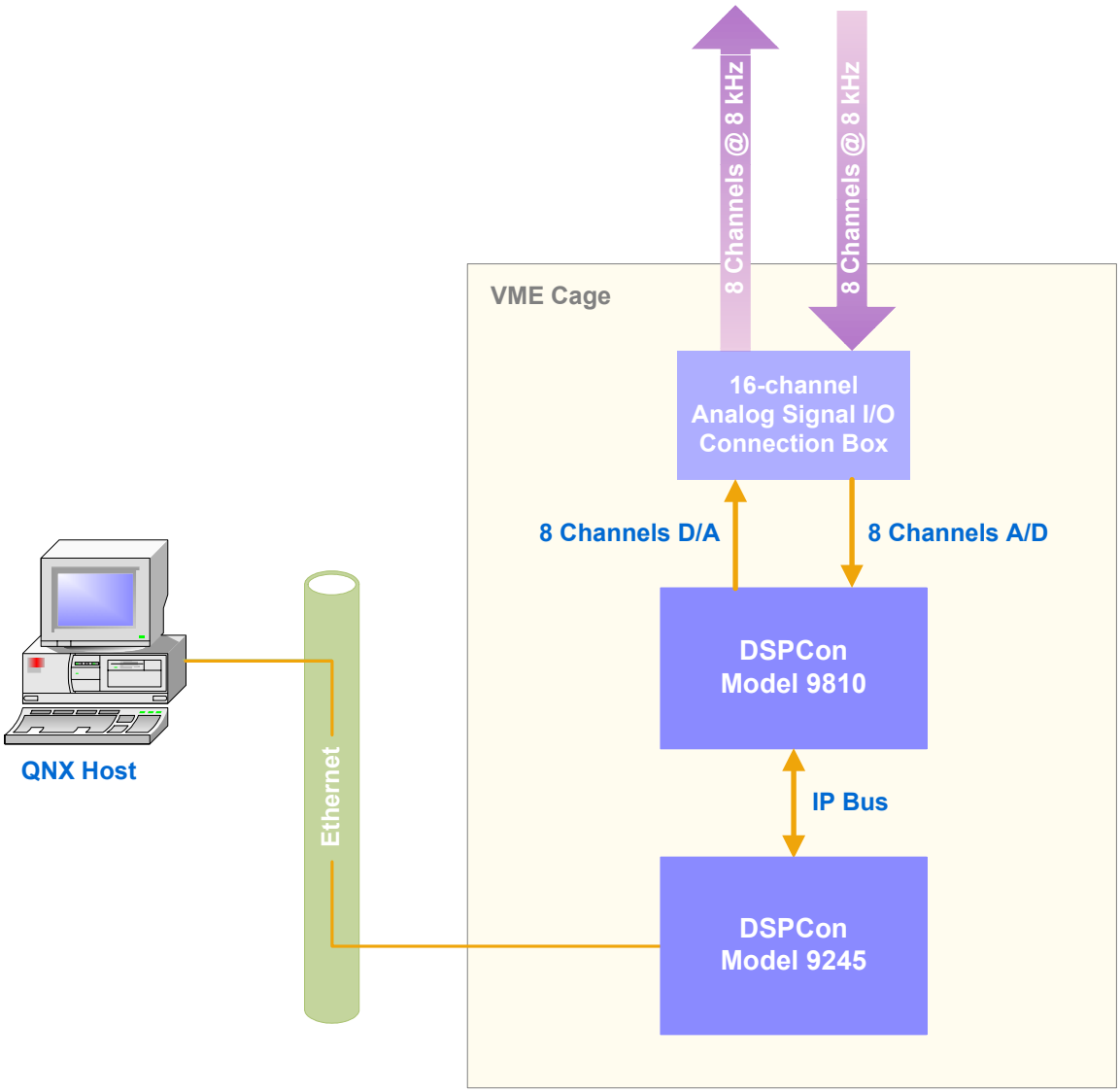


Figure 3.1 – System Block Diagram

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Inspection

The operator should conduct a thorough examination of the System 2811 unit before attempting to put it into use.

Unpacking the Unit

After unpacking the unit, inspect it carefully for any possible damage to connectors or components. Should you discover any damage, report it to DSP*Con* immediately. Full information for reaching DSP*Con* can be found on the first page of this manual.



It is important to save the original container and all packing material, in the event that return shipment is required.

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Installing a Replacement VME Card



Caution

It is important that the chassis be properly grounded in order to minimize any electrostatic discharge. Make certain that the VME cage power switch is in the "OFF" position before proceeding.

Should it become necessary to install or remove a card (e.g., when replacing a malfunctioning card) follow these guidelines:

- While handling the VME card, be sure to ***ground yourself*** to the VME chassis or other proper ground source with **an electrostatic wrist strap**.



Caution

Failure to ground yourself in the proper manner can result in electrostatic discharge and damage to sensitive electronics.

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- When exchanging a VME card, make certain to set all switches and jumpers on the replacement card to positions ***identical*** to those on the card that is being replaced.
- Be sure to align the upper and the lower card edge with the card cage guides for each of the card cage slots.
- Push evenly on the ejector handles at the top and bottom of the front panels until the panel seats flush against the cage's upper and lower mounting rails.
- Secure the unit by tightening the upper and lower captive retainer screws on the front panels.
- Connect a power cord to the VME chassis and plug the cord into a properly grounded electrical outlet.



Caution

Turn off all power to the card cage before making an attempt to insert or remove any board.

Removing a VME Card

Loosen all captive screws on the top and bottom of the front panel before attempting to remove the assembly. Then, push the ejector handles and any handles they may be linked to, up and away from the center of the panel. This disengages the assembly from the cage. Once the assembly is disengaged, pull outward on the ejector handles to remove it.

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Cabling

Connecting the Model DSP-C01011 to the Model 9245

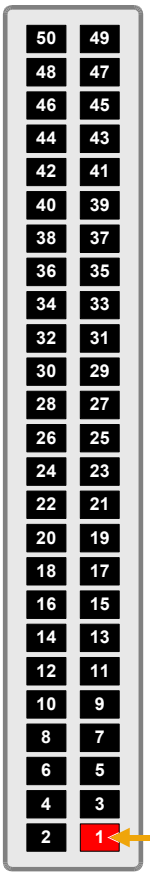
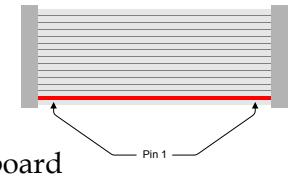


Figure 3.1 – IP Connector Pin Numbering

This is a simple and straightforward connection involving a flat-ribbon cable—one end of which is hard-wired to the Model DSP-C01011 ConnBox. Attach the 50-pin female IP connector at the free end of the cable to the male IP connection receptacle on the top-left corner of the Model 9245 board.

To locate the connector, the operator should place the board with the components facing **up** and the Ethernet receptacle to the **left**. The IP connection receptacle is on the upper left portion of the board between the Ethernet receptacle on the front panel and the connector into which the IP (Model 9810) daughter card plugs.



It is important to note that the cable must be installed into the header in such a way that Pin #1 (i.e., the red wire on the ribbon, see illustration at right) is toward the "bottom" of the Model 9245 card. Note that with the board positioned in front of the operator as described, the "bottom" of the board is closest to the operator.

Figure 3.1, at left, identifies the position of Pin #1.

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The mapping of ConnBox signals on the IP connector is defined in Table 3.1 for reference. "N/C" in this table indicates "No Connect".

Table 3.1 – IP to ConnBox Connections

IP Connector	ConnBox BNCs	IP Connector	ConnBox BNCs
Pin 1	GND	Pin 26	Input + (A/D) Chan 3
Pin 2	Output (D/A) Chan 1	Pin 27	Input – (A/D) Chan 4
Pin 3	GND	Pin 28	Input + (A/D) Chan 4
Pin 4	Output (D/A) Chan 2	Pin 29	Input – (A/D) Chan 5
Pin 5	GND	Pin 30	Input + (A/D) Chan 5
Pin 6	Output (D/A) Chan 3	Pin 31	Input – (A/D) Chan 6
Pin 7	GND	Pin 32	Input + (A/D) Chan 6
Pin 8	Output (D/A) Chan 4	Pin 33	Input – (A/D) Chan 7
Pin 9	GND	Pin 34	Input + (A/D) Chan 7
Pin 10	Output (D/A) Chan 5	Pin 35	Input – (A/D) Chan 8
Pin 11	GND	Pin 36	Input + (A/D) Chan 8
Pin 12	Output (D/A) Chan 6	Pin 37	GND
Pin 13	GND	Pin 38	GND
Pin 14	Output (D/A) Chan 7	Pin 39	N/C
Pin 15	GND	Pin 40	N/C
Pin 16	Output (D/A) Chan 8	Pin 41	N/C
Pin 17	N/C	Pin 42	N/C
Pin 18	N/C	Pin 43	N/C
Pin 19	N/C	Pin 44	N/C
Pin 20	N/C	Pin 45	N/C
Pin 21	Input – (A/D) Chan 1	Pin 46	N/C
Pin 22	Input + (A/D) Chan 1	Pin 47	N/C
Pin 23	Input – (A/D) Chan 2	Pin 48	N/C
Pin 24	Input + (A/D) Chan 2	Pin 49	GND
Pin 25	Input – (A/D) Chan 3	Pin 50	GND

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Connecting the Model 9245 to the Ethernet

Connect the 9245 to the Ethernet via the front panel RJ-45 receptacle labeled Ethernet. The following table lists the pins in this connector.

Table 3.2 – Ethernet Port Pins

RJ-45 Pin Number	Description
1	TX High
2	TX Low
3	RX High
4	75 ohm to ground
5	75 ohm to ground
6	RX Low
7	75 ohm to ground
8	75 ohm to ground

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Setting the IP Address on the Model 9245

Step-by-Step Instructions

The Model 9245 board comes preset from the factory with a default IP address. This default setting can be changed as necessary to conform to the operator's network.

Follow the instructions below to set the IP address on the Model 9245 board.

Step One	Using the DSP*Con* Model DSP-C01014 cable provided, connect the Serial Port on the Host PC to the Serial Port on the Model 9245.
Step Two	Start the Serial Terminal program on the Host PC using the following settings: 8 Data bits Parity = none 1 Stop bit Flow Control = none
Step Three	Power on the 9245 and press any key on the Host PC keyboard to stop the DSP from booting from flash.
Step Four	On the Host PC keyboard, press "C" to change the system parameters, then press the <Enter> key.
Step Five	Type in the new IP address, then press the <Enter> key.
Step Six	Type in the new subnet mask, then press the <Enter> key.
Step Seven	Press "Y" to boot from flash, then press the <Enter> key.
Step Eight	WAIT while the system programs the new network settings into flash.
Step Nine	Press the "Reset" button on the front panel of the 9245. The new network settings are now in effect.

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Serial Port (UART) Connector

The RS-232 Serial Port Connector on the front panel of the Model 9245 is of type RJ-45. The following table lists the pins in this connector.

Please note that Pins 2, 3, 4, 5, 7 and 8 are fixed, while Pins 1 and 6 are functions of Jumper #8.

Table 3.3 – Serial Port Pins

RJ-45 Pin Number	Description
1	J17 1-2 Selects Ring Indicator
	J17 3-4 Selects Data Carrier Detect ★
2	Request to send
3	9245 to Ground
4	Transmit Data
5	Receive Data
6	J19 1-2 Selects Data Set Ready
	J19 3-4 Selects Ground ★
7	Clear to Send
8	Data Terminal Ready

★ Factory settings

Note that it is not important to connect handshake signals to this interface. Pins 3, 4 and 5 are all that are required.

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4

Software

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Software Installation

The C-based API software must be installed on the host computer and compiled. "Makefiles" are provided for building the API software and for the example programs. A "Read Me" file that contains instructions for building the software is provided with the software distribution.

Model 9245 Board Software

The DSP*Con* Model 9245 board contains flash memory that executes immediately upon power-up and waits for a connection from the host computer.

API Software

The interface to the system is through a C-language Application Program Interface (API). The API consists of six routines that are used for connecting to the 9245 board, for configuring the operational mode and channel settings, and for performing data acquisition and playback.

Key Data Structures

The API provides a host interface to communicating with the system hardware. Three key data structures are employed in the API—"ControlInfo", "StatusInfo", and "DataInfo". These structures correspond directly to System 2811 application-specific UDP messages sent to and received from the System 2811 hardware.

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The C-language API data structures are provided at the end of this section. The specific definition of the elements contained within these structures and the valid range of inputs is described in Appendix A, which provides a complete definition of the content and format of the underlying UDP messages used in the application.

ControlInfo Structure

This structure is to be loaded by the host application in order to configure and control the operational mode of the system. The elements of the Control structure are sent as part of a Control message to the hardware.

StatusInfo Structure

This structure is loaded by the API code running on the host when the System 2811 sends a Status message to the host. The system sends a Status message:

- in response to a Control message from the host
- during REPLAY operation at approximately every 100 msec
- in response to any unknown message sent from the host.

The Status message contains system status information including mode, active channels, sample size, and data packet size.

The Status message also contains information required by the host application to ***throttle*** the amount of data sent to the system in REPLAY mode. The so-called D/A sequence number contains the sample index—relative to the beginning of the REPLAY run—beyond which the host application must not write. It is essential that this information be used by the host application to limit the amount of data sent to the system in order to prevent an overrun of data in system memory waiting to be sent to the D/A.

DataInfo Structure

In RECORD mode, this structure is loaded by the API code running on the host when the system sends an A/D Data message to the host. In REPLAY mode, this structure is to be loaded by the host application in order to prepare a D/A Data message to be sent to the system.

The DataInfo structure contains an element referred to as the sample sequence number. This element is simply the sample index—relative to the start of a

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RECORD or REPLAY run—of the first sample in the data buffer being transferred.

In RECORD mode, the sequence number can be used by the host application to detect the loss of UDP Packets caused by network congestion or other factors. In REPLAY mode the sequence number is used by the system to time align channels for output; this protects against the time alignment problems in the event a UDP packet is lost.

Note that the sample count element in the DataInfo structure is not contained in the Data messages specifically. It is derived from the size of the UDP message and the number of bytes required used for the other pieces of information (magic number, message ID, sample size, sequence number) in the Data message.

Structure Prototypes

The following C code prototypes define the ControlInfo, StatusInfo, and DataInfo structures.

```
/*============================================================================
 *
 *                  DATA STRUCTURE DEFINITIONS
 *
============================================================================*/

#define NETDATA_IDLE          (0)
#define NETDATA_RECORD        (1)
#define NETDATA_REPLAY        (2)


#define NETDATA_MSG_NONE      (0)
#define NETDATA_MSG_STATUS    (1)
#define NETDATA_MSG_DATA      (2)


#define NETDATA_NCHANS (8)


typedef struct NETDATA_ControlInfo
{ /*-------------------------------------------------------------------------*/
  unsigned char mode;         /*-- subsystem mode ------------------------*/

  unsigned char chanMask;     /*-- active channel selection mask ---------*/
  unsigned char sizeMask;     /*-- sample size selection mask ------------*/

  unsigned short pktSize;     /*-- data packet size in bytes -------------*/
} /*-------------------------------------------------------------------------*/
NETDATA_ControlInfo;


typedef struct NETDATA_StatusInfo
{ /*-------------------------------------------------------------------------*/
  unsigned char mode;         /*-- subsystem mode ------------------------*/
```


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```
  unsigned char chanMask;     /*-- active channel selection mask --------*/
  unsigned char sizeMask;     /*-- sample size selection mask -----------*/

  unsigned short pktSize;     /*-- data packet size in bytes ------------*/

  unsigned short seqNmbrDA [NETDATA_NCHANS]; /*-- D/A buffer avail ------*/
} /*-------------------------------------------------------------------*/
NETDATA_StatusInfo;


typedef struct NETDATA_DataInfo
{ /*-------------------------------------------------------------------*/
  unsigned char chanId;       /*-- channel identifer ---------------------*/
  unsigned char sampSize;     /*-- sample size ---------------------------*/
  unsigned short sampCnt;     /*-- sample count --------------------------*/
  unsigned long seqNmbr;      /*-- sample sequence number ----------------*/
} /*-------------------------------------------------------------------*/
NETDATA_DataInfo;
```

Opening a Connection to the System

The **NETDATA_open** routine establishes a socket connection with the system. A connection must be established prior to any other communication. This function requires as input, the IP address of the DSP*Con* Model 9245 board. It returns a socket file descriptor. See *Chapter Three* for a full discussion of factory default IP address and changing the IP address of the 9245. The C-prototype for this function is:

```
/*=====================================================================
  NETDATA_open

  Open a socket connection to subsystem at specified IP address.

  The IP address, 'ipAddr', is expressed as an unsigned long integer in
  standard network byte order.

  Returns a socket file descriptor on success.  On error, returns (-1).
=====================================================================*/

int NETDATA_open (unsigned long ipAddr);
```


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Closing a Connection to the System

The **NETDATA_close** routine is used to close an existing socket connection. This function requires as input a valid socket file descriptor. The C-prototype for this function is:

```
/*=========================================================================
 *
 *                      ROUTINE PROTOTYPES
 *
=========================================================================*/


/*=========================================================================
  NETDATA_close

  Close an existing socket connection.

  Returns zero on success.  On error, returns (-1).
=========================================================================*/

int NETDATA_close (int sockFd);
```

Controlling the System

The **NETDATA_sendControl** routine is used to control the operational mode of the acquisition system and to configure channels. Input arguments are as indicated in the C-prototype below.

```
/*=========================================================================
  NETDATA_sendControl

  Send a CONTROL message to the subsystem.

  The socket file descriptor, 'sockFd', must be a valid socket returned
  from NETDATA_open.

  The NETDATA control info structure, pointed to by 'ctrl', shall be
  formatted into a valid CONTROL message and sent.

  Returns zero on success.  On error, returns (-1).
=========================================================================*/

int NETDATA_sendControl (int sockFd, NETDATA_ControlInfo* ctrl);
```

There are three modes of operation: IDLE, RECORD, and REPLAY.

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Idle Mode

This mode is used to disable the RECORD and REPLAY modes. When commanding the DSP into IDLE, none of the other elements of the CONTROL message are required.

Record Mode

This mode is used to start data acquisition. The RECORD mode can be entered only from the **IDLE state** (it cannot be entered directly from the PLAY mode). All elements of the CONTROL message must be loaded and the mode is to be set to RECORD.

Replay Mode

This mode is used to start data playback through the D/A converters. The PLAY mode can only be entered from IDLE (it cannot be entered directly from the RECORD mode). All elements of the CONTROL message structure must be loaded and the mode is to be set to REPLAY.

Receiving Messages from the System

The **NETDATA_recvMsg** routine receives a message from the system and loads the appropriate structures and buffers. Each call to this routine receives a single system message, which can be either a Status message or an A/D Data message, but not both. The value returned from the routine indicates which type of message has been received.

Upon receipt of a Status message, the StatusInfo structure is loaded. Upon receipt of a A/D Data message, the message buffer contains the A/D Data message and the DataInfo structure is loaded from it; the first sample of the time series data starts at an offset of 8 bytes from the message buffer pointer. This buffer contains the time series data corresponding to a single channel of data.

Input arguments and return values are as indicated in the C-prototype below.

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```
/*=========================================================================
  NETDATA_recvMsg

  Receive next message from subsystem, waiting no more than the amount
  of time specified.

  The socket file descriptor, 'sockFd', must be a valid socket returned
  from NETDATA_open.

  The message buffer, 'msgbuf', should be large enough to receive the
  largest expected message.  Normally, this buffer should be at least
  1032 bytes.

  The NETDATA status info structure, pointed to by 'stat', shall be
  updated if a STATUS message is received.

  The NETDATA data info structure, pointer to by 'info', shall be
  updated if a DATA message is received.

  The timeout, 'timo', is expressed in milliseconds.  If set to zero,
  recvMsg shall check for an available message and return immediately.
  If set less than zero, recvMsg shall wait forever.

  Returns a message type identifer upon success; the these identifiers
  are NETDATA_MSG_NONE, NETDATA_MSG_STATUS, and NETDATA_MSG_DATA.  On
  error, returns (-1).
=========================================================================*/

int  NETDATA_recvMsg  (int  sockFd,  char*  msgbuf,  NETDATA_StatusInfo*  stat,
NETDATA_DataInfo* info, int timo);
```

Sending D/A Data Messages to the System

The **NETDATA_sendData** routine sends a D/A Data message to the system. The system only accepts D/A Data messages in REPLAY mode.

The DataInfo structure must be loaded by the host application. As described in the preceding section describing the StatusInfo structure, it is essential that the host application throttle the amount of data sent to the system in order to prevent an overrun of data in system memory waiting to be sent to the D/A.

Note that the message buffer is used to render the D/A Data message sent to the system (the first 8 bytes are for the header information). Thus the first sample of the time series data is to be placed at an offset of 8 bytes from the message buffer pointer.

Input arguments and return values are as indicated in the C-prototype below.

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```
/*=========================================================================
  NETDATA_sendData

  Send a DATA message to the subsystem.

  The socket file descriptor, 'sockFd', must be a valid socket returned
  from NETDATA_open.

  The NETDATA data info structure, pointed to by 'info', shall be
  formatted into a valid DATA message and sent.

  The message buffer, 'msgbuf', shall be used to render the message; it
  must already contain the sample data.

  Returns zero on success.  On error, returns (-1).
=========================================================================*/

int NETDATA_sendData (int sockFd, NETDATA_DataInfo* info, char* msgbuf);
```

Computing the Amount of System Memory Available for D/A Buffers

The **NETDATA_seqnDiff** routine computes the difference in samples between two sequence numbers taking into account that the system D/A output buffers are circular. This routine is useful in determining the amount of system memory available to be loaded by the host so that the host application can throttle the amount of data sent to the system in REPLAY mode.

```
/*=========================================================================
  NETDATA_seqnDiff

  Compute signed difference between sample sequence numbers.

  Both sequence numbers, 'seqnA' and 'seqnB', must be valid sample
  sequence numbers.  The sequence numbers are further qualified by
  the NETDATA_SEQN macro.

  Returns signed sequence number difference, A-B.
=========================================================================*/

int NETDATA_seqnDiff (unsigned long seqnA, unsigned long seqnB)
{
```


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Pinging the System

The **NETDATA_sendPing** routine sends a ping message to the system. It takes a valid socked file descriptor as input and returns 0 upon success, –1 upon failure.

```
/*=========================================================================
  NETDATA_sendPing

  Send a PING message to the subsystem.

  The socket file descriptor, 'sockFd', must be a valid socket returned
  from NETDATA_open.

  Returns zero on success.  On error, returns (-1).
=========================================================================*/

int NETDATA_sendPing (int sockFd);
```

Example Software

Two example C-language host application programs are provided with the system to help in developing applications around the System 2811. They are **replay.c** and **record.c**.

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5

Troubleshooting

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Philosophy

This chapter serves as a guide for actions to take should the system not behave as expected.

The following strategy is employed in this section:

Reset and restart the system. If the problem goes away, it is most likely software-related. If the problem recurs, it is probably hardware-related.

If the problem appears to be hardware-related, follow the diagnostic procedure below. This should allow the operator to isolate the problem down to the board level. If it does, contact DSP*Con* for a replacement board (or boards).

If the system is not working because it was moved or reconfigured, check all connections carefully in order to ensure that the system is properly installed. Refer to Chapter Three for installation information.

If, after running the diagnostic procedure and checking the configuration, you are unable to determine which board or boards are faulty, call DSP*Con* for help. Please have the system configuration available.



Complete information for contacting DSPCon can be found on the back cover of this manual.

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Procedures

The following are the steps that an operator or a technician should take to isolate a failure.

Step One

Check all cables and make sure that no connectors have come loose and that power is being applied to all equipment.

Step Two

Check that the power switches on the major system components are in the "**ON**" position.

Step Three

Reset all major system components:

- Exit the user interface at the host computer.
- Power the system down.
- Wait for 5 seconds
- Power the system up.

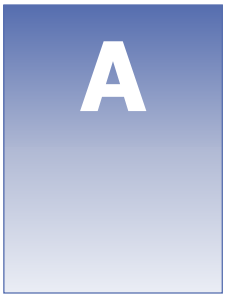
Step Four

Restart the software on the host computer, observing any status boxes and/or LEDs on the hardware for obvious indications of error. Follow the procedures outlined in this document for restarting the host application.

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Network Interface Description

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Overview of Message Catalog

The system communicates with control applications using the UDP network protocol.

The IP address of the subsystem is configured by the standard DSP*Con* 9245 Boot Monitor firmware (see *Chapter Three* of this manual for details). The subsystem receives UDP datagrams at port 8000.

All two-byte and four-byte integer quantities contained within network messages are transferred in standard network byte order (big-endian) unless otherwise noted.

Messages Received by System

- Control Message
- D/A Data Message

Messages Transmitted by System

- Status Message
- A/D Data Message

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Control Message

The Control Message conveys control information to the system, including operational mode selection and configuration. The format of this message is shown in Table A.1.

Table A.1 – Control Message

Byte Offset	Data Type	Description
0	INT*2	Message Magic Number, 0x55AA
2	INT*1	Message Identifier, 0xFF
3	INT*1	Mode Selection, one of 0 – IDLE Mode 1 – RECORD Mode 2 – REPLAY Mode
4	INT*1	Active Channel Selection Mask, a bit-mask bit=0 – channel not active bit=1 – channel active
5	INT*1	Sample Size Selection Mask, a bit-mask bit=0 – sample size is 8 bits bit=1 – sample size is 16 bits
6	INT*2	Data Packet Size, the size in bytes of all data packets Restricted to values between 4 and 1024 Restricted to multiples of 4

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D/A Data Message

The D/A Data Message conveys a D/A data packet to the system. The format of this message is shown in Table A.2.

Table A.2 – D/A Data Message

Byte Offset	Data Type	Description
0	INT*2	Message Magic Number, 0x55AA
2	INT*1	Message Identifier, the channel number Restricted to values between 0 and 7
3	INT*1	Sample Size, in bytes 1 – sample size is 8 bits 2 – sample size is 16 bits
4	INT*4	Sample Sequence Number, the sequence number of the first sample contained in this data packet
8	INT*1 or INT*2	Sample Data Vector, the data samples

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Status Message

The Status Message conveys status information from the system. The format of this message is shown in Table A.3.

Table A.3 – Status Message

Byte Offset	Data Type	Description
0	INT*2	Message Magic Number, 0x55AA
2	INT*1	Message Identifier, 0xFF
3	INT*1	Active Mode, one of 0 – IDLE Mode 1 – RECORD Mode 2 – REPLAY Mode
4	INT*1	Active Channel Selection Mask, a bit-mask bit=0 – channel not active bit=1 – channel active
5	INT*1	Sample Size Selection Mask, a bit-mask bit=0 – sample size is 8 bits bit=1 – sample size is 16 bits
6	INT*2	Data Packet Size, the size in bytes of all data packets
8	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 0, in samples
10	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 1, in samples
12	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 2, in samples
14	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 3, in samples
16	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 4, in samples
18	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 5, in samples
20	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 6, in samples
22	INT*2	Maximum Sequence Number allowed to be written to D/A Buffer, Channel 7, in samples

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A/D Data Message

The A/D Data Message conveys a A/D data packets from the system. The format of this message is shown in Table A.4.

Table A.4 – A/D Data Message

Byte Offset	Data Type	Description
0	INT*2	Message Magic Number, 0x55AA
2	INT*1	Message Identifier, the channel number Restricted to values between 0 and 7
3	INT*1	Sample Size, in bytes 1 – sample size is 8 bits 2 – sample size is 16 bits
4	INT*4	Sample Sequence Number, the sequence number of the first sample contained in this data packet
8	INT*1 or INT*2	Sample Data Vector, the data samples

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B

Recommended Spare Parts and Ordering Information

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The Importance of Spare Parts

❖-❖-❖-❖-❖

Although all DSP*Con* systems arrive fully outfitted and ready to run, as a **cost-cutting measure** we STRONGLY RECOMMEND that spare parts for your system be purchased early in the system's life.

Essentially, there are four reasons for this.

I. Changing Technology

Often, by the time a component (a JBOD or RAID, for example) needs replacement, there is every likelihood that the technology has been discontinued because of advances in the field. Not only does the system hardware then need to be reconfigured, but a further investment for software modifications must be made.

II. Delivery Time

Many components (core processor boards and A/Ds, for example) require long lead times (up to 4-8 weeks) for re-order. This can create major problems for critical systems, because, in most cases, the project will be shut down until spares can be delivered.

III. Repairs

Without a reliable backup supply, when repairs become necessary, schedules slip. Because critical programs can never be down, and because some repairs can often take up to a month, it becomes very important to have a complete inventory of spare parts. With spares on hand, no repair is necessary. As a result, the minimum down time realizes considerable savings in schedules and dollars.

IV. Price Increases

Many companies that supply the components with which DSPCon builds your system increase their prices annually, even on equipment that is not obsolete.

UPFRONT ORDERING RESULTS IN SIGNIFICANT SAVINGS

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Please reference the Item Number(s), Description(s) and Part Number(s) listed below when ordering spare parts for the system as configured in this manual.

Spare Parts List			
Item #	**Description**	**Part #**	**Qty.**
1	DSP board	9245	1
2	A/D-D/A IndustryPack Module	9810	1
3	16-channel analog signal input/output connection box	DSP-C01010	1

TO PLACE AN ORDER

Contact DSP*Con* by mail, phone, fax or E-mail

(See the back cover of this manual for information)

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Warranty

DSP*Con*, Inc. warrants that all products manufactured by DSP*Con*, Inc. conform to published DSP*Con* specifications and are free from defects in materials and workmanship for a period of six (6) months from the date of delivery when used under normal conditions and within the service conditions for which they were furnished.

The obligation upon DSP*Con*, Inc. arising from a warranty claim shall be limited to repairing, or, at its option, replacing without charge, any product which, in DSP*Con*, Inc.'s sole opinion, proves to be defective within the scope of this warranty.

DSP*Con*, Inc. must be notified in writing of the defect or nonconformity within the warranty period, and the affected product must be returned to DSP*Con*, Inc. within thirty (30) days after discovery of such defect or nonconformity.

The buyer shall prepay shipping charges, taxes, duties and insurance for products returned to DSP*Con*, Inc. for warranty service. DSP*Con*, Inc. shall pay for the return of products to buyer except for products returned to another country or from outside the forty-eight contiguous United States.

DSP*Con*, Inc. shall have no responsibility for any defect or damage caused by improper installation, unauthorized modification, misuse, neglect, inadequate maintenance, accident or for any product that has been repaired or altered by anyone other than DSP*Con*, Inc. or its authorized representatives.

The warranty described above is the buyer's sole and exclusive remedy and no other warranty, whether oral or written, is expressed or implied. DSP*Con*, Inc. specifically disclaims fitness for a particular purpose. Under no circumstances shall DSP*Con*, Inc. be liable for any direct, indirect, special, incidental or consequential damages, expenses, losses or delays (including loss of profits) based on contract, tort, or any legal theory.

This warranty is valid for a period of six (6) months from the date of shipment. DSP*Con*, Inc. extends this warranty to the party that first purchases a new unit from the distributor, and extends the validity of the warranty to six months from the date of sale by distributor, as evidenced by the distributor's invoice. However, this limited extended warranty period shall not be more than one (1) year from the date of shipment from DSP*Con*'s factory.

Upon warranty expiration, all services on DSP*Con* hardware, software and systems are subject to a current hourly rate, plus travel expenses. As an option, DSP*Con*, Inc. offers extended warranties when purchased within ten (10) days of receipt of product.

Extended Warranties

HARDWARE

DSP*Con*, Inc. offers an extended warranty on its hardware at a cost of 4% of the list price per month of coverage, or 20% of the current list price per year of coverage.

This coverage is available for DSP*Con* hardware only. All third-party hardware is covered by the manufacturer's warranty.

SOFTWARE

DSP*Con*, Inc. offers an extended warranty on its software for one, two and three year periods, at a cost of 15%, 28% and 40%, respectively, of the current list price.

This coverage is available for DSP*Con* software only. All third party software is covered by the manufacturer's warranty.

SYSTEMS

DSP*Con*, Inc. offers an extended warranty on its systems at a cost of 20% of the current list price, per year of coverage.

This coverage includes all hardware and software used in system integration.

Service & Repair

Before returning a product for service and repair, please contact DSP*Con*'s corporate offices at (908) 722-5656 to obtain a Return Material Authorization (RMA) number. Have available the Model and Serial numbers of the item, a description of the problem, your company name, and the name and address of the person returning the product.

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