bc530SBX TIME CODE GENERATOR

Operation and Technical Manual

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July 1994

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bc530SBX
TIME CODE GENERATOR

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CHAPTER 1
INTRODUCTION

1.0 GENERAL

The bc530SBX Time Code Generator Operation and Technical Manual provides the following information:

- Functional Description, Specifications, and Definition of Terms.
- Installation and Setup Instructions
- Operation and Software Interface Details
- I/O Signal Information
- Programming Examples
- Drawing Set

1.1 DEFINITION OF TERMS

A brief definition of terms used throughout this manual are provided below.

- 1PPS - One pulse per second:
  A pulse whose rising edge occurs at the time code ON TIME.

- CARRIER:
  The sinusoidal signal which, when amplitude modulated by a DC LEVEL SHIFT time code, becomes a MODULATED time code signal. a 1 kHz carrier.

- ON TIME:
  The point in the time code frame where the encoded time is true, usually at the beginning of the frame.

- DC LEVEL SHIFT:
  The modulation envelope of a MODULATED time code. This is often represented as a TTL compatible signal. Time information is encoded using different pulse widths to represent a binary ones and zeroes.

- MODULATED:
  A time code signal which consists of a constant-frequency CARRIER that is amplitude modulated by a DC LEVEL SHIFT time code signal. Modulated code is required in situations where the time code must be directly recorded onto magnetic tape, or where the time code must be sent over a medium which does not pass DC levels.

1.2 FUNCTIONAL DESCRIPTION

The bc530SBX Time Code Generator generates a modulated serial time code for use with SBX-compatible processor boards. Because of the simplicity of the SBX format, the bc530SBX can easily be adapted for use in non-SBX-compatible applications. The principal performance specifications are listed in section 1.3.

The bc530SBX Module is shown in Figure 1-1.

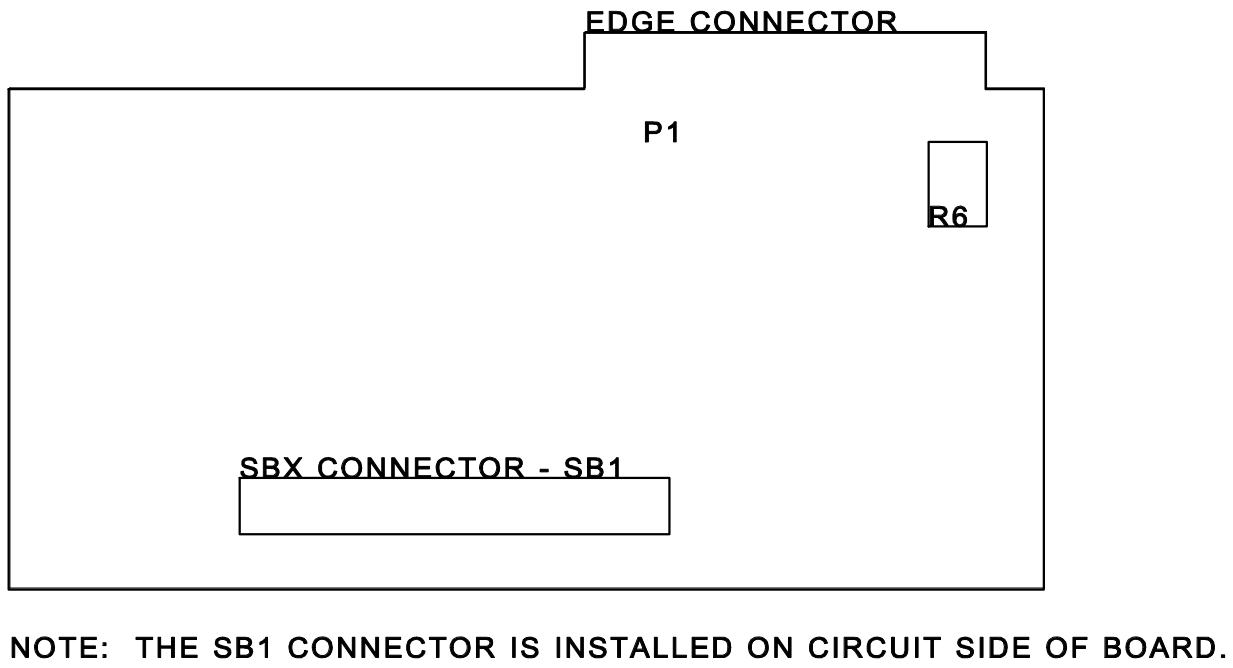

Figure 1-1: bc530SBX Time Code Generator Module

The bc530SBX provides the following capabilities:

- Generates commonly used time code formats: IRIG A, IRIG B, 2137, NASA 36 (others on request).
- Provides a DC Level Shift output.
- Provides 1PPS reference output.
- Time code amplitude adjustable from 0 to 10V peak-to-peak.
- Can synchronize to an external 1PPS signal.
- Can synchronize to a bc330SBX time code translator for synchronous generator or time code translating applications.
- Small SBX form factor easily adapted to non-SBX busses.
- Serial port allows complete configuration from a computer RS-232 port.

1.3 SPECIFICATIONS

Size:	3.70" x 2.85", single width SBX module
Compatibility:	IEEE Std 959-1988. Compliance: D8, I (8 bit transfers, interlocked operation)
Output Amplitude:	0 - 10V pp (unloaded) 0 - 3V pp (50 ohm load)
Output Impedance:	150 ohms
Digital Outputs:	
1PPS OUT	TTL/CMOS, rising edge ON TIME
DC LEVEL SHIFT	TTL/CMOS
TX(-), TX(+)	TTL/CMOS, 9600 baud, 8 bits, 1 stop, no parity, TX(-) compatible with most RS-232 devices
Digital Inputs:	
1PPS IN	TTL/CMOS, positive edge ON TIME
RX(-)	TTL/CMOS, 9600 baud, 8 bits, 1 stop, no parity, compatible with most RS-232 devices

Modulation Ratio:	3:1 fixed

SPECIFICATIONS (Continued)

Time Code Formats:	IRIG A, IRIG B, 2137, and NASA 36
Temperature:	0 to 70 °C Operating 50 to 125 °C Storage
Relative Humidity:	
Operating:	10% to 80% (non-condensing)
Non-Operating:	5% to 95% (non-condensing)
Altitude:	-400 to 18,000 meters MSL
Power:	+5 V dc @ 30 mA +12 V dc @ 15 mA -12 V dc @ 10 mA
1PPS Synchronization Accuracy:	± 10 microseconds typical ± 50 microseconds maximum

1.4 TIME CODE FORMATS

The widespread use of coded timing signals to assist in the correlation of intercept and test data began in the early 1950's. These signals can be decoded in real time to indicate the current Time of Day (TOD) or recorded along with intercept/test data on magnetic tape recorders for post processing and time correlation.

Hundreds of time code formats were developed - one for each agency involved. During the early 1960's the Interrange Instrumentation Group (IRIG) promoted a series of "standard" time code formats now loosely referred to as "IRIG Time Codes". The bc530SBX generates two of these formats: IRIG A, and IRIG B.

Several other formats, 2137, and NASA 36 are also generated by the bc530SBX, and still enjoy relatively widespread use within their originating agencies.

More complete details on these and other time code formats is available free of charge, on request from either Bancomm Division or Datum Inc in the form of the Handbook of Time Code Formats. Figure 2-1: illustrates a frame of IRIG A, IRIG B, and IRIG G time codes.

Figure 1-2 illustrates a frame of IRIG A, B or G time code.

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CHAPTER 2
INSTALLATION AND SETUP

2.0 GENERAL

The bc530SBX Time Code Generator is a single width SBX module. This section details the steps required to setup and install the module in a Multibus or Multibus II computer.

2.1 SETUP

R6 is the only adjustable component on the bc530SBX. This potentiometer is used to adjust the time code output amplitude. The output level should normally be set to 3V peak-to-peak.

2.2 INSTALLATION

The bc530SBX is a single-width SBX module. It is normally shipped with a 1/2" nylon standoff installed on the board. Because of the wide variety of applications, the fabrication of a cable for the time code inputs and outputs is left to the user.

To install the bc530SBX in an SBX base board, follow these steps.

1) Connect the male SBX connector on the bc530SBX to the female SBX connector on the base board.

2) Attach the nylon standoff to the base board using the supplied nylon screw.

3) Connect a user-supplied cable to edge connector P1 of the bc530SBX.

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CHAPTER 3
OPERATION AND SOFTWARE INTERFACE

3.0 GENERAL

This chapter describes the operation and software interface for the bc530SBX Time Code Generator module. All data transfers between the SBX base board and the bc530SBX are byte-wide transfers.

3.1 SBX BUS INTERFACE

The bc530SBX uses a dual-port RAM for communication between the host computer and the bc530SBX on-board microprocessor. One port is connected to the host SBX connector and the other port is connected to the bc530SBX microprocessor. Sixteen bytes of the dual port RAM are used to pass control and status information between the host and the bc530SBX. The address of each data byte is designated by an offset from the base address.

3.2 COMMAND PROTOCOL

This section describes the command protocol used to control the operation of the bc530SBX. Section 3.3 provides the details on how to use the commands to achieve the desired functions.

3.2.1 Registers

Sixteen bytes are avaliable over the SBX bus. An SBX write to address 0xE will cause an interrupt to the bc530SBX. Addresses 0x0 through 0xC are used for passing data in both directions. Address 0xD is the Status register. It is used for handshaking with the host.

When the bc530SBX completes a command successfully, it will write a non-zero value to the Status register. Depending on the command, the contents of the Status register will contain error or other status information.

Address 0xE is the Command register. The host writes a command byte to this location, which causes the bc530SBX to act on the command. When the bc530SBX completes the command, it clears the Command register, signifying that it is ready to accept a new command.

3.2.2 Handshaking Protocol

The general procedure for the host to issue a command is:

1. Read the Command register (0xE). Wait for it to be zero.

If the Command register is non-zero, then the Supervisor is processing the previous command.

2. Write the parameters (if any) into addresses 0x0 through 0xC.

3. Write the command to the Command Register (0xE).

Any write to the Command register causes the bc530SBX to act on the command. When the bc530SBX completes the command, it clears the Command register, signifying that it is ready to accept a new command.

4. Wait for Command Register to become zero.

Depending on the command, the Status register may contain error or status information.

3.3 COMMANDS

The following sections give the detailed data formats for all commands. The value given for address 0xE (the Command register) is written by the host computer to initiate the command. The values given for address 0xF (the Status register) are the values which may be returned by the bc530SBX at the completion of the command.

3.3.1 Command Summary

Command Summary			
HEX	**ASCII**	**COMMAND**	**DESCRIPTION**
0x53	'S'	SET_TIME	Set time in ASCII
0x73	's'	SET_TIME_P	Set time in packed BCD
0x52	'R'	READ_TIME	Read time in ASCII
0x72	'r'	READ_TIME_P	Read time in packed BCD
0x49	'I'	INIT	Initialize
0x43	'C'	CALIBRATE	Calibrate to 1 PPS reference

3.3.2 Status Codes Summary

Status Codes Summary			
HEX	**ASCII**	**NAME**	**DESCRIPTION**
0x4F	'o'	OK	Command completed successfully
0x46	'F'	BAD_FORMAT	Unknown format code (not A, B, N, 2)

3.3.3 Set Time

The time bytes can be in ASCII or BCD. The upper four bits of each time byte are ignored. The bc530SBX does not check time data for validity. Time defaults to all zeroes on reset.

Set Time		
ADDRESS	**R/W**	**DATA**
0x0	W	Days Hundreds
0x1	W	Days Tens
0x2	W	Days Units
0x3	W	Hours Tens
0x4	W	Hours Units
0x5	W	Minutes Tens
0x6	W	Minutes Units
0x7	W	Seconds Tens
0x8	W	Seconds Units
0x9		
0xA		
0xB		
0xC		
0xD		
0xE	W	SET_TIME (0x53, 'S')
0xF	R	OK

3.3.4 Set Time Packed

Time bytes are packed BCD; two BCD digits per byte. The bc530SBX does not check time data for validity. Time defaults to all zeroes on reset.

Set Time Packed		
ADDRESS	**R/W**	**DATA**
0x0	W	0, Days Hundreds
0x1	W	Days Tens, Days Units
0x2	W	Hours Tens, Hours Units
0x3	W	Minutes Tens, Minutes Units
0x4	W	Seconds Tens, Seconds Units
0x5		
0x6		
0x7		
0x8		
0x9		
0xA		
0xB		
0xC		
0xD		
0xE	W	SET_TIME_P (0x73, 's')
0xF	R	OK

3.3.5 Read Time

Time bytes are in ASCII.

Read Time		
ADDRESS	**R/W**	**DATA**
0x0	R	Days Hundreds
0x1	R	Days Tens
0x2	R	Days Units
0x3	R	Hours Tens
0x4	R	Hours Units
0x5	R	Minutes Tens
0x6	R	Minutes Units
0x7	R	Seconds Tens
0x8	R	Seconds Units
0x9		
0xA		
0xB		
0xC		
0xD		
0xE	W	READ_TIME (0x52, 'r\R')
0xF	R	OK

3.3.6 Read Time Packed

This command returns the time in packed BCD format; two BCD digits per byte.

Read Time Packed		
ADDRESS	**R/W**	**DATA**
0x0	R	0, Days Hundreds
0x1	R	Days Tens, Days Units
0x2	R	Hours Tens, Hours Units
0x3	R	Minutes Tens, Minutes Units
0x4	R	Seconds Tens, Seconds Units
0x5		
0x6		
0x7		
0x8		
0x9		
0xA		
0xB		
0xC		
0xD		
0xE	W	READ_TIME_P (0x72. 'r')
0xF	R	OK

3.3.7 Initialize

Initialize		
ADDRESS	**R/W**	**DATA**
0x0	W	Time Code Format (see table below)
0x1		
0x2		
0x3		
0x4		
0x5		
0x6		
0x7		
0x8		
0x9		
0xA		
0xB		
0xC		
0xD		
0xE	W	INIT (0x49, 'I')
0xF	R	OK

Time Code Format Codes (ASCII)	
'A'	IRIG A
'B'	IRIG B (Default)
'2'	2137
'N'	NASA36

3.3.8 Calibrate

The Calibrate command is used to adjust the generating rate of the bc530SBX to a precision 1PPS reference. To calibrate the bc530SBX, first allow the module to run with a 1PPS input signal for at least 15 seconds to allow the bc530SBX to acquire and lock to the input. Then issue a Calibrate command over the SBX bus. The bc530SBX will store the current measurement of a one-second period in its nonvolatile memory. The Calibrate command takes approximately 10 milliseconds to process. The three bytes returned by the Calibrate command are the number of bc530SBX clock cycles in one second. Since the nominal clock rate of the bc530SBX is 2 MHz, the number returned should be very close to 2,000,000.

If this command is issued with no 1PPS input, the number returned will simply be the last Calibrate value.

NOTE: The nonvolatile memory of the bc530SBX has a limited lifetime of approximately 10,000 writes. Therefore, care should be taken to insure that the Calibrate procedure is not done repeatedly. In the case of a nonvolatile memory failure, the bc530SBX will continue to function correctly, but it will not retain the calibration value when power is removed.

Calibrate		
ADDRESS	**R/W**	**DATA**
0x0	R	Count MSB
0x1	R	Count NSB
0x2	R	Count LSB
0x3		
0x4		
0x5		
0x6		
0x7		
0x8		
0x9		
0xA		
0xB		
0xC		
0xD		
0xE	W	CALIBRATE (0x43, 'C')
0xF	R	OK, BAD_CAL

3.4 SERIAL INPUT COMMANDS

The bc530SBX has a serial input port which can be used to program the generator by serial commands. The serial port is fixed at 9600 baud, using 8 data bits, one stop bit and no parity.

The following sections describe the serial port commands that the bc530SBX will recognize. In all commands, line feed characters (0x0A) are ignored. The commands have been designed to be compatible with the output from the bc330SBX time code translator.

The bc530SBX considers the first character after a carriage return to be the beginning of a command. If any other serial data is sent over the serial line (as in a multi-drop configuration), any bc530SBX command must be immediately preceded by a carriage return.

3.4.1 Set Time

The time input message must be received by the bc530SBX in the first 990 milliseconds of the time code frame or it will be ignored. This command will not cause any interruption of the time code output. The format is:

```
b####ddd#hh:mm:ss<CR>
```

Where

b	is the ASCII lower case b
#	is any ASCII character except carriage return or line feed
ddd	is three ASCII digits, each between '0' and '9' inclusive, representing days.
hh	is two ASCII digits, representing hours, from 00 to 23
mm	is two ASCII digits, representing seconds, from 00 to 59
ss	is two ASCII digits, representing minutes from 00 to 59
:	is the ASCII colon character
<CR>	is a the ASCII carriage return character, 0x0D hexidecimal.

3.4.2 Change Format

When the bc530SBX receives a change format command, it immediately restarts the time code frame and sets the time to all zeroes. The format is:

```
g####f<CR>
```

where:

g	is the ASCII lower case g
#	is any ASCII character except carriage return or line feed
f	is a single ASCII character specifying the time code format.
<CR>	is a the ASCII carriage return character, 0x0D hexidecimal.

The time code format character ('f' above) can be one of the following:

'A' for IRIG A
'B' for IRIG B
'2' for 2137
'N' for NASA 36

The time code character is case-sensitive; you must use a capital 'A', 'B' or 'N'. Any illegal format code will cause the bc530SBX to default to IRIG B.

3.5 FUNCTIONAL DESCRIPTION

The following sections describe the functional description of the bc530SBX Time Code Generator module.

3.5.1 Initialization

When the bc530SBX receives a power-on reset or an INIT command from the host, it goes through a brief initialization sequence, then begins generating IRIG B time code with a time value of all zeroes; 000 days, 00 hours, 00 minutes and 00 seconds. The frequency of the carrier is controlled by a phase locked loop which takes approximately ten seconds to settle to an accurate frequency.

3.5.2 External 1PPS Synchronization

The bc530SBX provides a means of synchronizing its ON TIME mark to the rising edge of an external 1PPS signal. When a 1 Hz signal is detected at 1PPS IN (pin 8 of P1), the bc530SBX will align the generated time code to the rising edge of the 1 Hz signal. Inputs which deviate from 1 Hz by more than 1.6% will be rejected. The bc530SBX maintains synchronization by comparing the time that it receives the 1PPS IN pulse with the time that it begins generating a new time code frame. For differences of less than 32 milliseconds, the bc530SBX adjusts the frequency of the carrier to compensate for the difference. For differences greater than 32 milliseconds, the bc530SBX restarts the time code frame to align the output to the input. The restart discontinuity will probably cause a temporary error in a time code reader.

The bc530SBX will continue to generate timecode even if the input reference is lost. The period of the generated time code at that point will be equal to the time between the last two pulses detected.

The synchronization of the time code is maintained within +/- 10 microseconds typical and +/- 50 microseconds worst case, assuming a perfect 1PPS input signal.

3.5.3 Using the bc530SBX with bc330SBX

The bc530SBX serial input format is compatible with Bancomm's bc330SBX time code processor, so that the pair of boards can be used to build a time code format translator or a synchronized generator to condition noisy time code. In this mode of operation, all programming can be done through the bc330SBX, which will in turn configure the bc530SBX over the serial port.

The necessary connecting cable for this mode of operation is shown in Figure 3.1

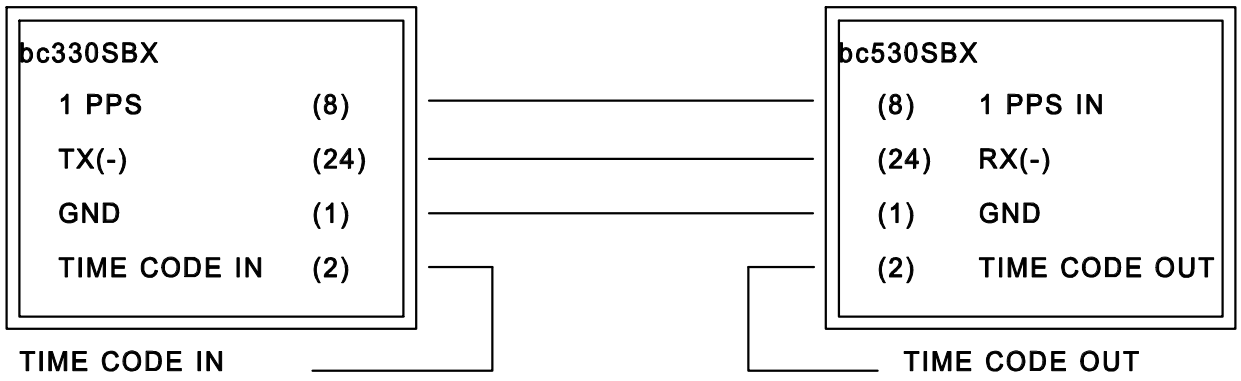

Figure 3.1 bc330SBX to bc530SBX Cable

3.5.4 Serial Output Messages

The bc530SBX has a serial output which reports status information and the current time. It is a TTL-compatible signal (0-5V levels) but can be connected directly to the RS-232 port of most computers and terminals. The output format is the same as the input format: 9600 baud, 8 data bits, one stop bit and no parity.

The following are transmitted messages:

3.5.4.1 Reset Message

On power up, and whenever the time code is changed, this message,

```
restart.<CR><LF>
```

will be transmitted. <LF> is an ASCII line feed character (0x0A).

3.5.4.2 Code Message

Each second, one of the following messages will be transmitted.

```
code irig_a<CR><LF>    - OR -
code irig_b<CR><LF>    - OR -
code 2137<CR><LF>      - OR -
code nasa <CR><LF>
```

This message identifies the time code being generated.

3.5.4.3 Time Message

Immediately following the code message, the following message will be sent:

```
time  000  00:00:00<CR><LF>
```

The zeroes will be replaced by the current time. This is the time value read from the current time code frame. The time message is sent just before the beginning of the time code frame.

3.5.4.4 Time Loaded Message

If the bc530SBX receives a valid time update message, as described in section 3.4.1, it will send the following message:

```
update time.<CR><LF>
```

3.5.4.5 Flywheeling message

When the bc530SBX is used with the bc330SBX time code translator, as described in section 3.5.3, the following message may be sent:

```
Flywheeling!<CR><LF>
```

This indicates that the time code input to the bc330SBX is unreadable and the bc330SBX is maintaining time using its internal time reference. See the bc330SBX manual for details of its operation.

3.5.5 Time Code Amplitude Adjustment

Potentiometer R6 adjusts the amplitude of the time code output signal from 0V to 10V pp (no load) or 0V to 3V pp (50 ohm load).

The modulation ratio (ratio of the amplitude of high cycles to low cycles) is fixed at 3:1. Attempting to drive a 50 ohm load at amplitudes greater than 3V will result in distorted time code and damage to the bc530SBX output driver.

3.5.6 Calibration

The accuracy of the time code generated by the bc530SBX is based on crystal Y1. The bc530SBX can be calibrated to compensate for crystal aging effects . To calibrate, a high-precision 1 PPS signal is introduced to the 1PPS IN pin, and a CALIBRATE command is sent over the SBX bus (reference section 3.3.8 for details).

CHAPTER 4

INPUT/OUTPUT CONNECTORS

4.0 GENERAL

All bc530SBX Generator I/O signals are available on card edge connector P1.

4.1 P1 SIGNAL I/O CONNECTOR

The pin assignments for the P1 connector are shown in Table 4-1. A description of each of these signals follows:

- Time Code Output:
  Modulated sine wave time code signal output.

- SCK:
  Serial clock for future use (leave SCK unconnected).

- 1PPS Output:
  1 pulse per second TTL output.

- 1PPS IN:
  TTL input used to synchronize the generator ON TIME mark to an external 1PPS signal.

- TX(+),TX(-):
  9600 Baud serial output. TX(-) is compatible with most computer serial ports. TX(+) and TX(-) are complementary signals

- DC Level Shift Output:
  TTL time code signal without the carrier.

- RX(-):
  9600 Baud serial input. Used with bc330SBX time code processor. Can be used with computer serial port with external circuitry.

- MOSI:
  serial data line for future use (leave MOSI unconnected).

- MISO:
  serial data line for future use (leave MISO unconnected).

4.2 SBX CONNECTOR SB1

SB1 is used to connect the bc530SBX to the base board. The pin assignments for SB1 are given in Table 4-2. The following signals are not used by the bc530SBX: MCLK, MINTR0, MINTR1, TDMA, OPT1, OPT0, MDACK*, and MDRQT.

Table 4-1: P1 I/O Connector Pin Assignments

P1 PIN	SIGNAL DESCRIPTION
2	Time Code Output (Modulated)
4	1 PPS Output
6	SCK
8	1 PPS In
10	TX (+)
12	TX (-)
14	DC Level Shift Output
16	5 VDC
18	
20	MOSI
22	
24	RX (-)
26	MISO
ALL ODD PINS	Ground

Table 4-2: SB1 SBX Connector Pin Assignments

PIN	Mnemonic	Description	PIN	Mnemonic	Description
1	+12V	+12V	2	-12V	-12V
3	GND	Signal Ground	4	+5V	+5V
5	RESET	Reset	6	MCLK	Module Clock
7	MA2	Address 2	8	MPST*	Module Present
9	MA1	Address 1	10	-----	Reserved
11	MA0	Address 0	12	MINTR1	Interrupt 1
13	IOWRT*	I/O Write Command	14	MINTR0	Interrupt 2
15	IORD*	I/O Read Command	16	MWAIT*	Module Wait
17	GND	Signal Ground	18	+5V	+5V
19	MD7	Data bit 7	20	MCS1*	chip select 1
21	MD6	Data bit 6	22	MCS0*	chip select 0
23	MD5	Data bit 5	24	-----	Reserved
25	MD4	Data bit 4	26	TDMA	Terminate DMA
27	MD3	Data bit 3	28	OPT1	option 1
29	MD2	Data bit 2	30	OPT0	option 0
31	MD1	Data bit 1	32	MDACK*	DMA Acknledge
33	MD0	Data bit 0	34	MDRQT	DMA Request
35	GND	Signal Ground	36	+5V	+5V

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CHAPTER 5
PROGRAMMING EXAMPLES

5.0 GENERAL

This chapter provides programming examples which illustrate the software interface to the bc530SBX time code generator. The examples are written in the C programming language. Hexidecimal constants are specified in C by using the prefix "0x." In these examples, the functions read_byte() and write_byte() are used to indicate a direct access to an SBX address. The implementation of read_byte() and write_byte() are system-specific. In most programming environments, read_byte() and write_byte() can be defined as macros:

```
#define write_byte( a, d )   * ( (char *) a ) = d

#define read_byte( a )           ( * (char *) a )
```

Section 5.4 is a listing of bc530sbx.h, a C header file which can be included into a C program to provide useful functions and constants. It is recommended that you use the definitions in bc530sbx.h rather than accessing the bc530SBX directly from your program.

5.1 TIME CODE FORMAT SELECTION

This example shows how to select time code format that will be generated by the bc530SBX. The constants in capital letters are as defined in section 5.4, bc530sbx.h.

```
#include bc530sbx.h

fmt_exmpl()
{
   write_byte( BASE + 0, IRIG_A );          /* select IRIG A      */
   while( read_byte( BASE + COMMAND ) != 0 );/* wait for any previous command*/
   write_byte( BASE + COMMAND, INIT );      /* process command    */
}
```

5.2 SET TIME

This example shows how to preset a generator time. The time will be preset to 123 days, 11:22:33.

```
set_time_exmpl()
{
   char t_string[] = "123112233";
   int i;
   while( read_byte( BASE + COMMAND ) != 0 );/* wait for any previous command */
   for ( i=0; i<=8; i++ )
   write_byte( BASE + i, t_string[i] );
   write_byte( BASE + COMMAND, SET_TIME );
}
```

5.3 READ TIME

This example shows how to read the currently generated time.

```
read_time_exmpl()
{
      while( read_byte( BASE + COMMAND ) != 0 ) ; /* wait for any
                                                     revious command */
      write_byte( BASE + COMMAND, READ_TIME );        /* request time    */

      while( read_byte( COMMAND ) != 0 )  ; /* wait for time to be available */

      for ( i=0; i<=8; i++ )
            t_string[i] = read_byte( TOUTTIME + i );
}
```

5.4 LISTING OF "bc530sbx.h"

```
/* bc530sbx.h */
/* C header for Bancomm bc530SBX time code generator */
/* 10/5/90 */
/* gcl */

/* This value is system dependent */
#define BASE 0x0100


/* code types */
#define irig_b       'B'
#define irig_a       'A'
#define nasa_36      'N'
#define _2137        '2'

/* commands from host */
#define SET_TIME     'S'            /* set time w/ ASCII/unpacked BCD   */
#define SET_TIME_P   's'            /* set time using packed BCD        */
#define READ_TIME    'R'            /* read time in ASCII format        */
#define READ_TIME_P 'r'       /* read time in packed BCD format   */
#define INIT         'I'            /* initialize                       */
#define CALIBRATE    'C'            /* Calibrate to 1 PPS reference     */

/* status to host */
#define OK            1             /* generator has completed last
                                                 command successfully     */

#define BAD_FORMAT   'F'            /* unknown format selected, format
                                                      forced to IRIG B  */

/*addresses (offset from BASE) */
#define  COMMAND    0x0E
#define  STATUS     0x0F
```

CHAPTER 6
DRAWING SET

6.0 GENERAL

This section contains the schematic diagrams, assembly drawings, and parts lists for the bc530SBX Time Code Generator.

Schematic Diagram, bc530SBX Time Code Generator, Drawing No. 11430
Assembly Diagram, bc503SBX Time Code Generator, Drawing No. 11433

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