

MODEL 8176

**WWVB SYNCHRONIZED WALL CLOCK
&
MASTER WALL CLOCK**

INSALLATION AND OPERATOR'S GUIDE

**SPECTRACOM CORPORATION
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JANUARY 1992

TIME OF DAY PRODUCT FIVE YEAR WARRANTY

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Spectracom Corporation
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(716) 381-4827

Dear Customer,

Spectracom occasionally contacts customers regarding our products. We must know to whom we should send manual updates, change notices, and new product information. Because people sometimes change job assignments, we request department, mail station, and title information to ensure that correspondence in future years will reach either the user of our products or his/her supervisor. In filling out the registration, please use the title/mail station/department of the supervisor most interested in keeping the equipment and its documentation up-to-date. Thank you.

Name _____ Title _____

Department _____ Mail Stop _____

Company _____ Model Number _____

Address _____ Serial No. _____

City _____ Date Installed _____

State _____ Zip _____

Telephone _____ Ext. _____

Remarks (problems, suggestions, etc.): _____

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SECTION I

GENERAL

- 1.0 INTRODUCTION**
- 1.1 UNPACKING AND RESHIPMENT**
- 1.2 SPECIFICATIONS**

SECTION I

GENERAL

1.0 INTRODUCTION

The Spectracom Model 8176 Wall Clock can be synchronized to the National Bureau of Standards time by an RS-422 time signal provided by a Spectracom Model 8170 or 8171 WWVB Synchronized Clock Remote Output.

The Model 8176 may also be manually set using the mode and set switches found at the rear of the unit.

Units equipped with Option 33, RS-232 Input, will synchronize to an incoming RS-232 timing signal.

The Model 8176 may also be used as a master to synchronize a system of 8176 clocks using an internal crystal oscillator or the 60- Hz power line as a time base.

Up to 32 clocks may be driven from any buffered output. The buffered outputs are:

1. Model 8170 or 8171 remote output
2. Model 8176 buffered output (J1)
3. Model 8176 master output (J2)
4. Model 8172 master output (J2)
5. Model 8172 buffered output (J1)

Clocks may be driven more than 1500 feet from a buffered output using telephone station cable, and up to 4000 feet using twisted pair.

1.1 UNPACKING & RESHIPMENT

The items listed below are shipped with each clock. Check to be sure all items have been received and unpacked.

<u>Quantity</u>	<u>Description</u>
1	Model 8176 Wall Clock
1	Modular Jack Assembly (Terminal Block)
1	Modular Cable Assembly
1	Set of Wall Fasteners
1	Installation & Operator's Guide
1	Fuse, 0.5A

In the event of damage in shipment, be sure to contact the carrier immediately. His representative will want to witness the damage. If you fail to report shipping damage immediately, you may forfeit any claim against the carrier. You should also notify Spectracom Corporation of shipping damages or shortages, so that we can help you obtain a replacement or repair damaged equipment.

If it is necessary to return the unit to the factory, the original shipping carton may be used. If it is not available, a carton of at least 250# test corrugated paper with at least two inches of polyethylene foam surrounding the unit should be used. The items should be sealed in a plastic bag for moisture protection. Call the factory to obtain a Return Authorization Number and include with the package a note stating the reason for the return.

1.2 SPECIFICATIONS

MECHANICAL AND INSTALLATION

SIZE: Housing is 17.25 x 6.5 inches (438 x 165 mm) and protrudes from wall 2.8 inches (71 mm).

WEIGHT: 5.3 lbs (2.4 Kg)

MOUNTING: Two keyhole mounting holes on rear of clock spaced 12 inches (30.48 mm) apart.

LINE POWER: 115 VAC $\pm 10\%$, 60 hz, 30 watts.

OPERATING TEMPERATURE: 0 to 50°C

SET UP SWITCHES: Selection switches at the rear of the clock set baud rate, 12 or 24 hour display, test or operating mode, crystal or 60 Hz time base, termination for last clock on buss, and slave or master mode.

SIGNAL CONNECTIONS

Connector Types: All signal connectors are Type RJ-12 Modular Telephone Jacks

Data Buss: Balanced pair, RS-422 interface. Data rate is selectable from 300 to 9600 baud to match the data rate from the master.

Clocks with Option 33 accept an RS-232 input.

Signal Outputs: RS-422 outputs are standard. Option 32 adds an RS-232 output.

TIME/DISPLAY

Display Digits: Yellow-green LED light bar

Clocks with Option 67 have red LED light bars.

Digit Size:

Hours, Minutes	3.6 in (91 mm)
Seconds	2.0 in (50 mm)
AM/PM	0.325 in (9 mm)

Time Format: Selectable 12 or 24 hour display with AM and PM indicators

Colons: Display colons will blink if input data stream is lost or invalid for a period of 24 hours. The colons also blink to indicate that the Model 8170 or 8171A is not synchronized to WWVB.

Manual Setting: Clock may be set manually if synchronization is not required by using the MODE/SET switches.

Automatic Setting: Slave clock will synchronize upon receiving three full seconds of data from the master clock.

Battery Backup: During power loss timekeeping functions continue without display. Battery backup has up to a 10-year life and an accuracy of better than ± 1 minute/month @ 25°C

SECTION II
INSTALLATION

- 2.0 CLOCK INTERCONNECTION
- 2.1 MOUNTING THE CLOCK TO THE WALL

SECTION II

INSTALLATION

2.0 CLOCK INTERCONNECTION

The items listed below may be used to interconnect the wall clocks and are available from Spectracom.

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>SPECTRACOM PART NUMBER</u>
1.	9-Pin series D plug, AMP Plug 205204-1 Pin 66507-8 Shell 206478-1	J03309 P04001 H52090
2.	4-Conductor Station Cable Phalo S4-0422	W40013
3.	Modular Jack Assembly Armiger & Assoc. 625 AGM-35	J01035
	Cable Assembly of items 1, 2, and 3 = CA04XXX (xxx = length in feet)	
4.	Modular Cable Assembly 6-conductor flat cable with modular phone jacks at each end.	CA05XXX (xxx = length in feet)

Refer to Figures 2-1, 2-2 and 2-3 for cable fabrication and identification.

Figures 2-4 thru 2-9 on the following pages illustrate several possible system configurations. The recommended configurations are Figure 2-4 or Figure 2-6.

The smaller Model 8172 Clock interface is the same as the Model 8176 Clock. The Model 8172 may be substituted for the Model 8176. There are two types of Model 8172 clocks; a Model 8172M Master Clock that can operate as a master or a slave; and a Model 8172 Slave Clock that operates only in the slave mode. The Model 8172 Slave does not have the time zone offset or battery back-up features of the Model 8176.

PLUGS MUST BE ON SAME SIDE OF CABLE
(REVERSE POLARITY)

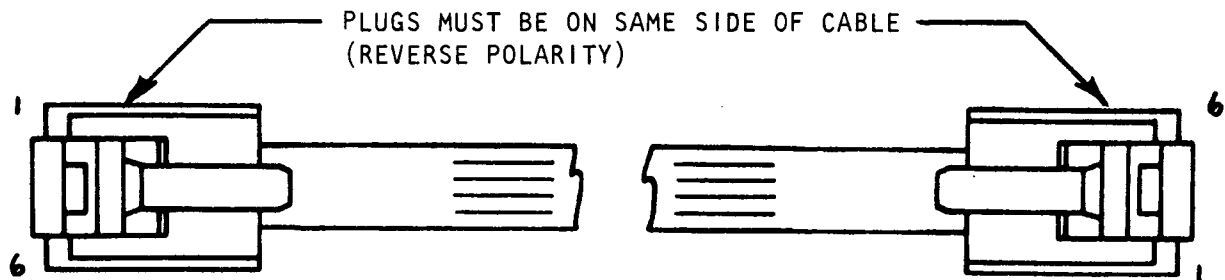


FIGURE 2-1: MODULAR CABLE ASSEMBLY, CA05XXX

The modular cable is used to interconnect the wall clock to a terminal block or to another wall clock using the "daisy-chain" configuration. Refer to the following interconnection diagrams for modular cable usage.

The supplied modular cable is 6 feet long. When fabricating or purchasing longer cables, be sure the cables are cross-pinned (reverse polarity). Refer to FIGURE 2-1, MODULAR CABLE ASSEMBLY, CA05XXX. Modular cables of any length may be purchased from Spectracom. The Spectracom Part Number is CA05XXX, where XXX equals the length in feet.

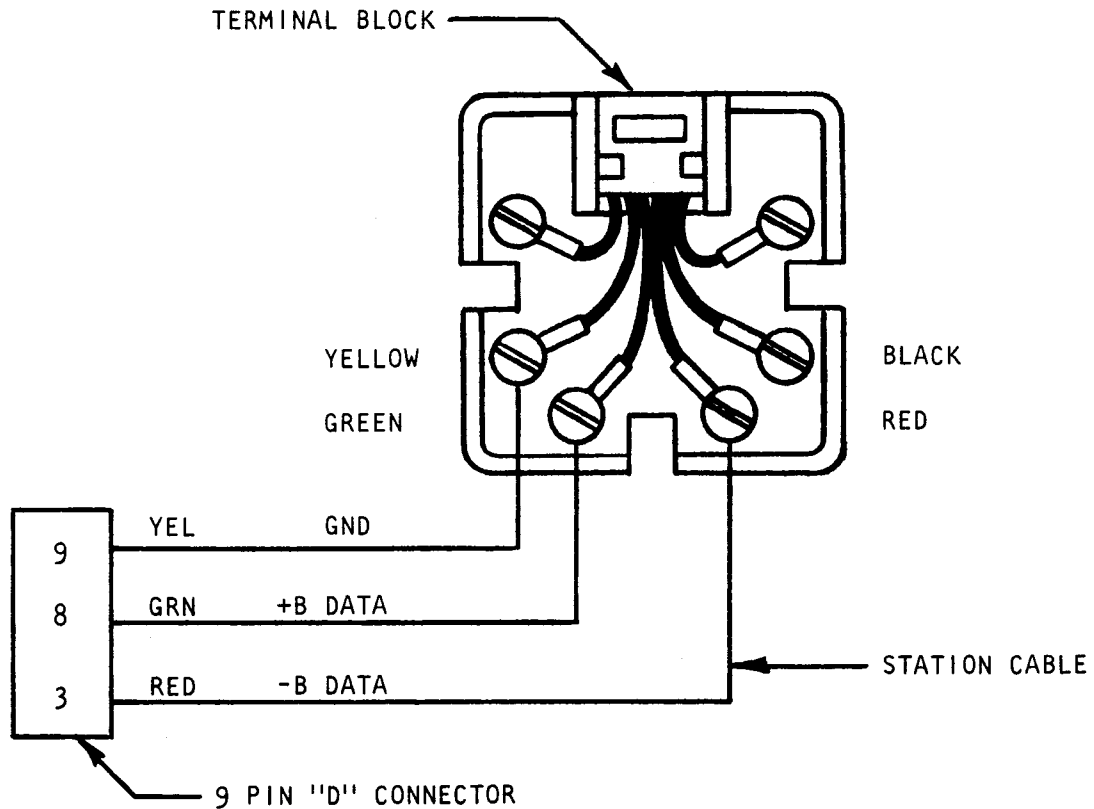


FIGURE 2-2: 8170 OR 8171 RS-422 REMOTE OUTPUT CABLE ASSEMBLY, CA04XXX

The cable that appears in Figure 2-2 connects the remote output from the Model 8170 or 8171A, WWVB Synchronized Clock, to the Model 8176. This cable assembly may be fabricated as shown or purchased from Spectracom. The Spectracom Part Number is CA04XXX, where XXX equals the cable length in feet.

The 9-pin series D plug connects to the 8170 or 8171A RS-422 remote output. A modular cable connects the terminal block to the wall clock input (J4) connector. Refer to the following interconnection diagrams for cable usage.

The supplied modular jack (terminal block) is prewired as shown in Figure 2-3.

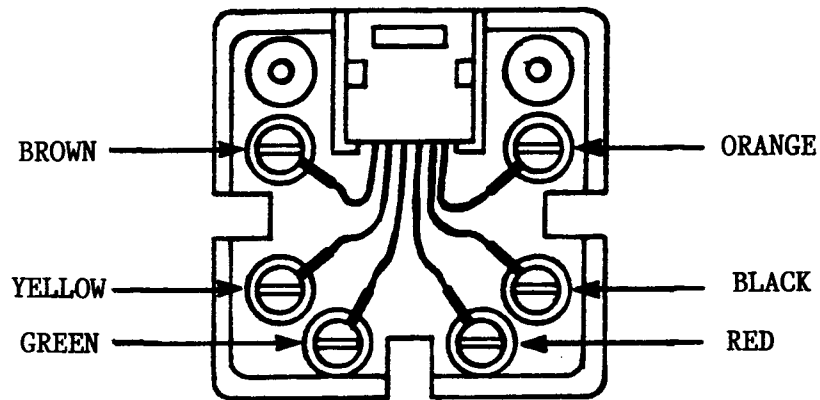


FIGURE 2-3: MODULAR JACK ASSEMBLY

Four conductor station cable is used to interconnect terminal blocks. Connect the yellow wire of the station cable to the yellow wire of the terminal block. Similarly, connect red to red and green to green.

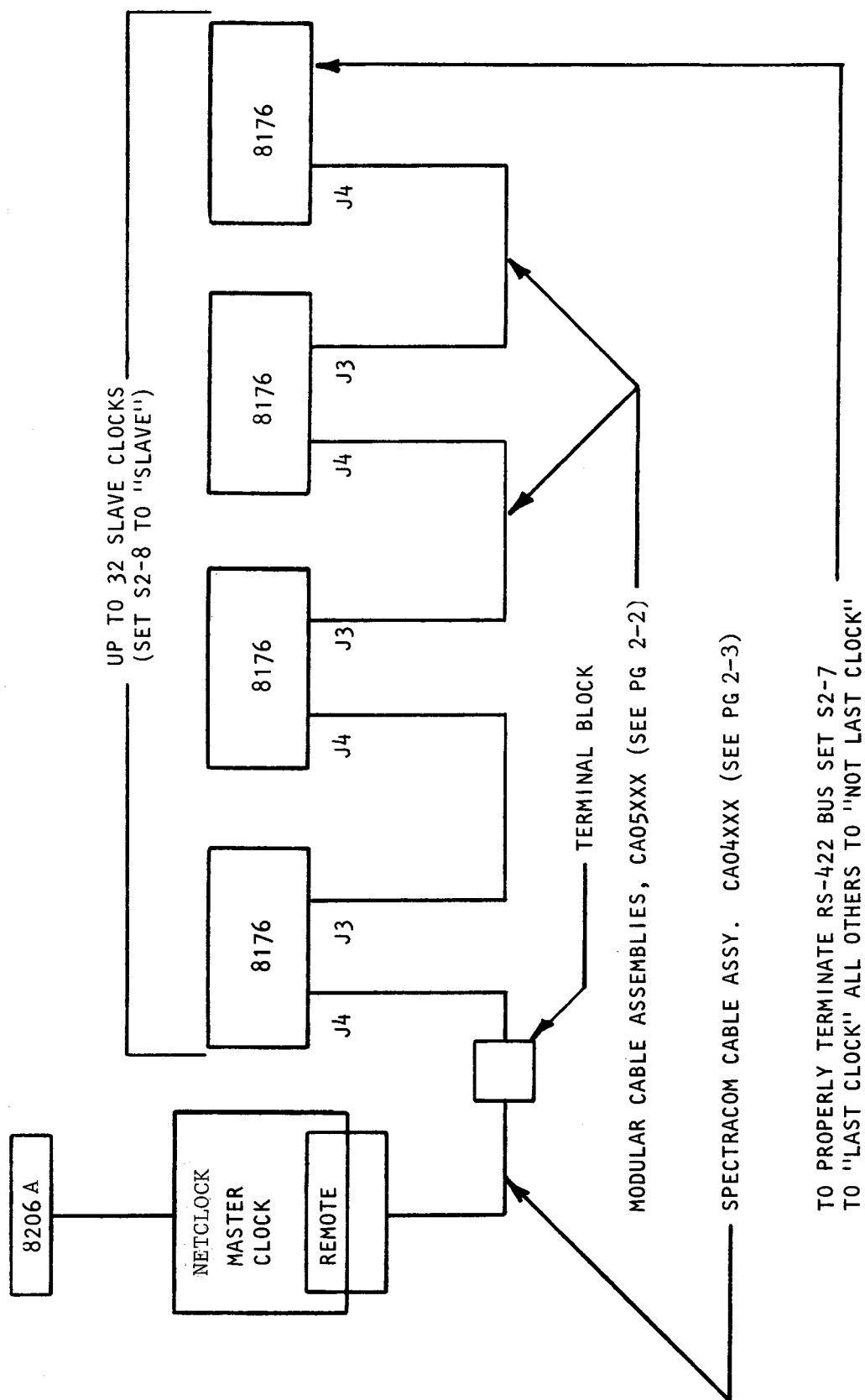


FIGURE 2-5: "DAISY-CHAIN" SYSTEM USING 8170 OR 8171 WWVB SYNCHRONIZED CLOCK AS A MASTER

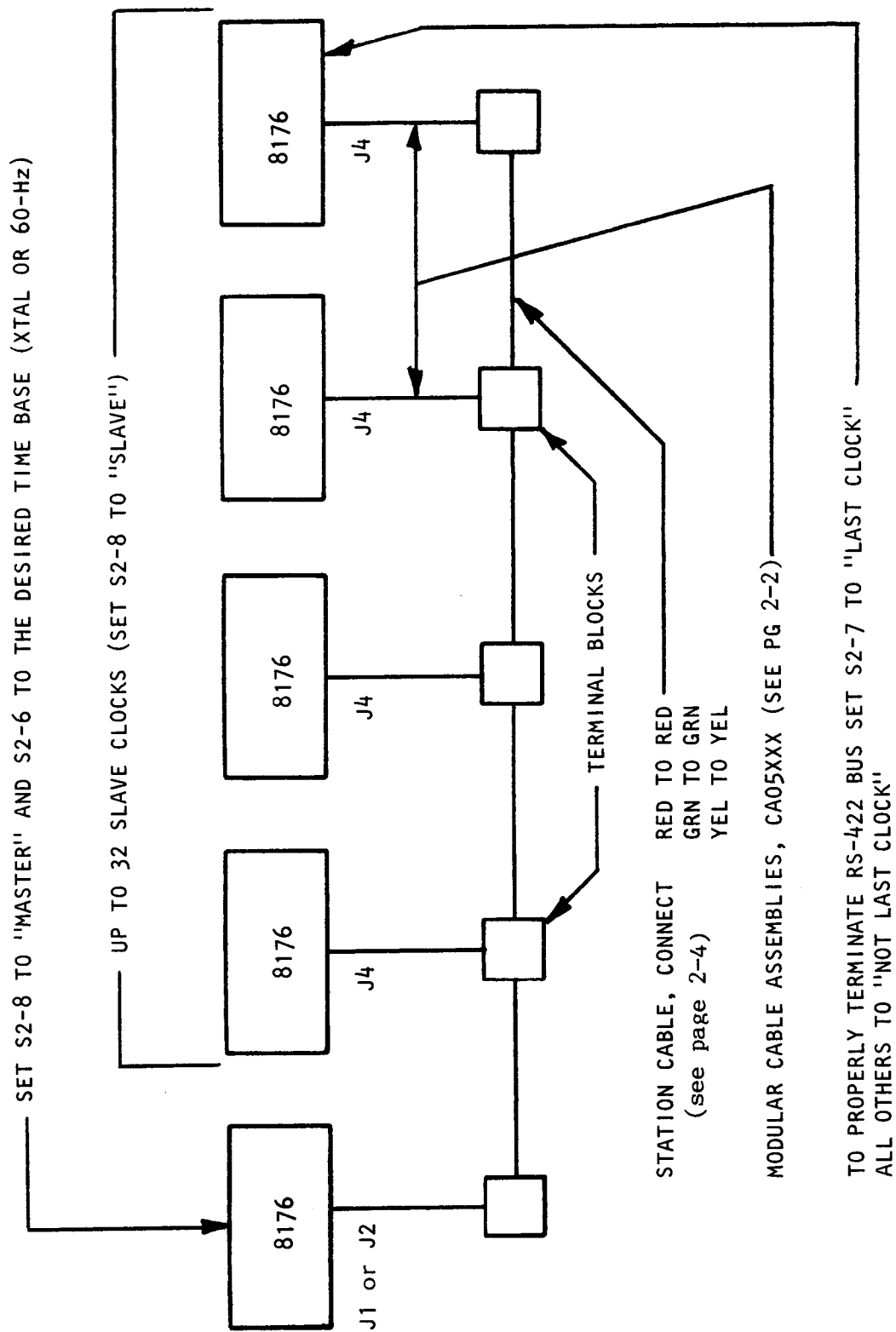


FIGURE 2-6 : TERMINAL BLOCK SYSTEM USING 8176 MASTER/SLAVE CLOCK
AS A MASTER

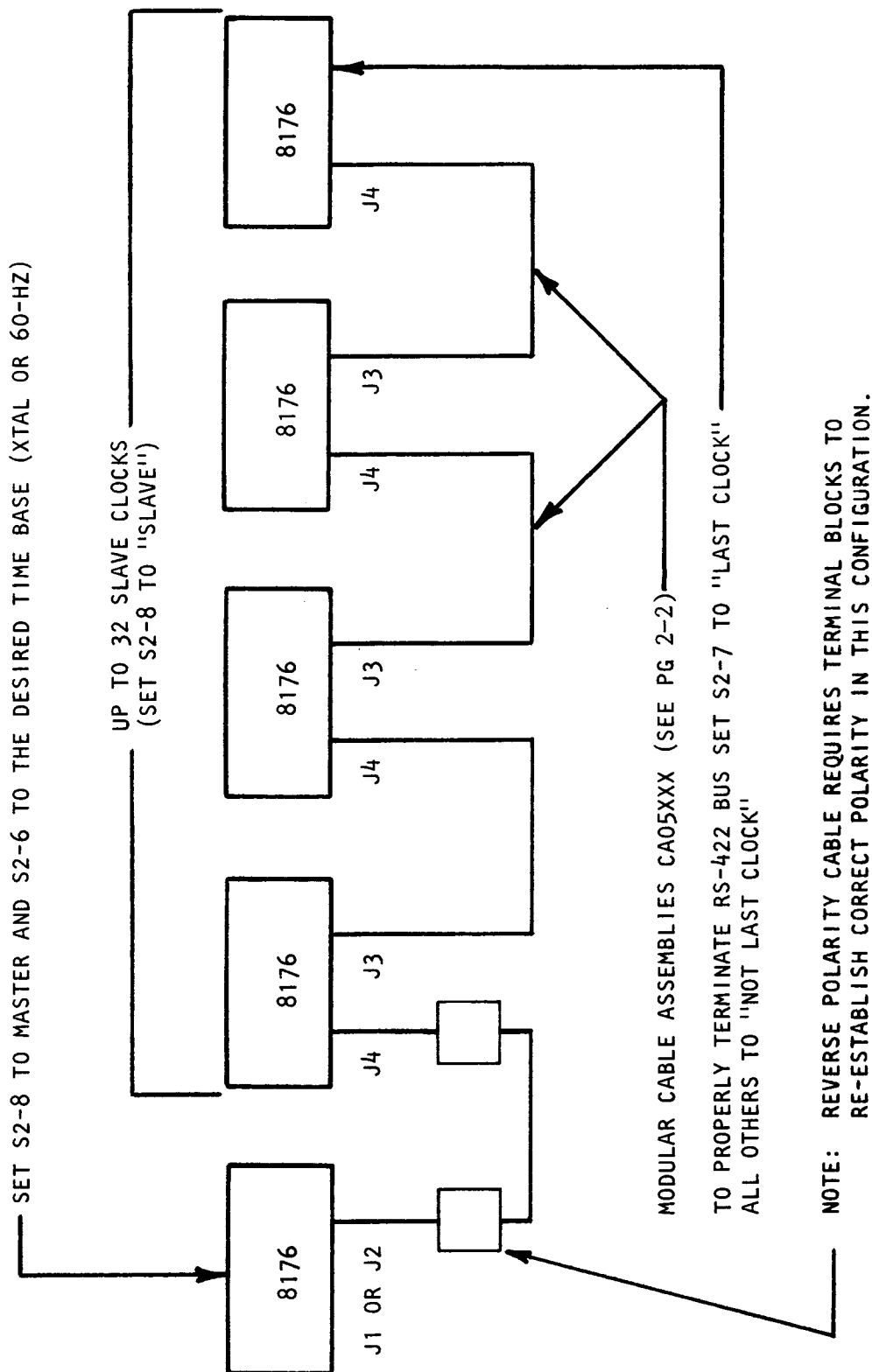
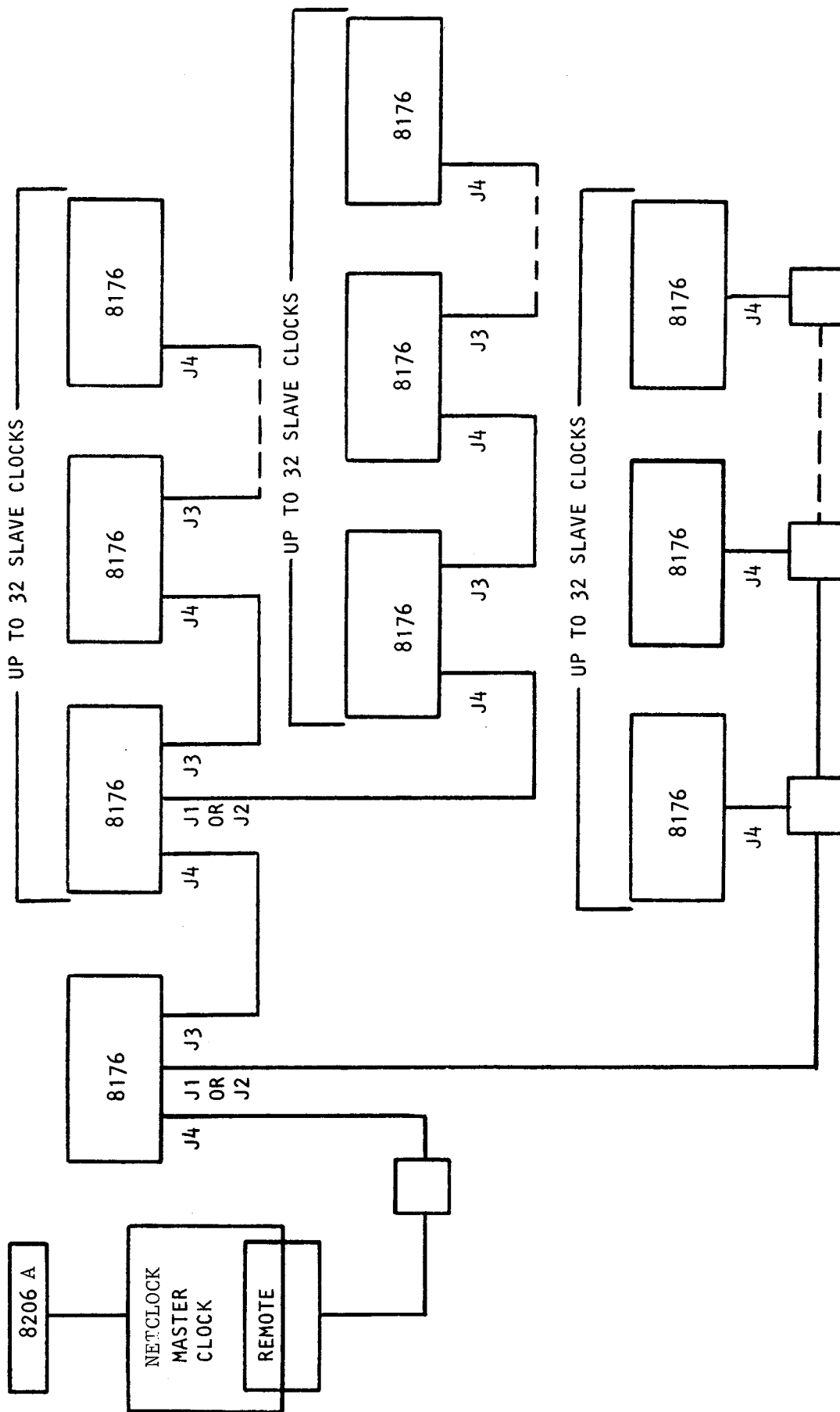


FIGURE 2-7: "DAISY-CHAIN" SYSTEM USING 8176 MASTER/SLAVE CLOCK
AS A MASTER



UP TO 32 SLAVE CLOCKS MAY BE DRIVEN FROM ANY J1 OR J2 IN THE SYSTEM. PROPER LAST CLOCK TERMINATIONS MUST BE OBSERVED. REFER TO FIG 2-4 THRU 2-7.

FIGURE 2-8: ADDING MORE CLOCKS TO A SYSTEM

2.1 MOUNTING THE CLOCK TO THE WALL

Included with each clock is a set of wall fasteners that may be used in any common construction material such as sheetrock, wood, concrete, or brick.

The clock is mounted using the two keyholes on the rear surface. The keyholes are 12 inches apart.

Drill two 5/16 inch holes 12 inches apart at the selected mounting location. Insert the wall fasteners per the instructions in Figure 3-1, MOUNTING INSTRUCTIONS. Tighten the screws, then back off 4 complete turns (approximately 0.4 inches). Mount the clock to the screws.

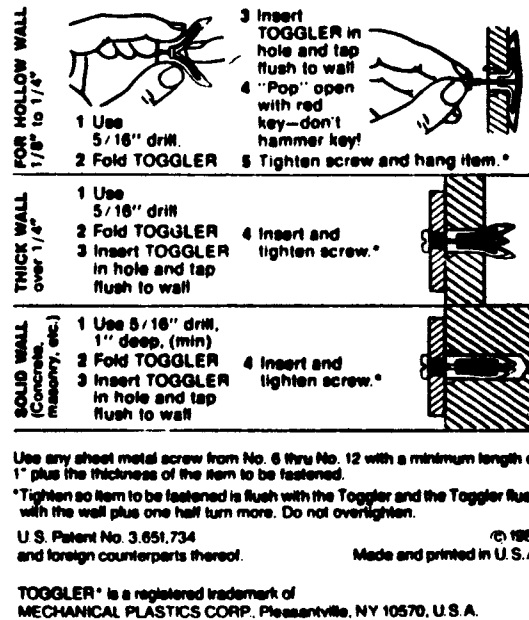


FIGURE 2-10: MOUNTING INSTRUCTIONS

SECTION III

OPERATION

- 3.0 SWITCH FUNCTIONS
- 3.1 I/O CONNECTORS
- 3.2 POWER CONNECTION
- 3.3 MANUALLY SETTING THE 8176 SLAVE CLOCK
- 3.4 TIME ZONE OFFSET
- 3.5 MANUALLY SETTING THE MASTER CLOCK
- 3.6 CONNECTING THE MODEL 8176 TO THE
MODEL 8170 OR MODEL 8171
- 3.7 BRIGHTNESS CONTROL

SECTION III

OPERATION

3.0 SWITCH FUNCTIONS

Switch SW2-1,2,3 are the baud rate switches. Units are factory set to 300 baud (100). Refer to Table 3-1 for other available baud rates.

BAUD RATE	SWITCH NUMBER		
	1	2	3
300	1	0	0
600	0	1	0
1200	1	1	0
2400	0	0	1
4800	1	0	1
9600	0	1	1

TABLE 3-1 BAUD RATES

12/24 HOUR FORMAT

Switch SW2-4 selects the 12 hour or 24 hour time format to be displayed. The 12 hour format display has AM/PM indicators. Units are factory-set for 12 hour format ("1"). The 24-hour format may be selected by placing SW2-4 in the OFF ("0") position.

TEST

Switch SW2-5 is a test switch. For normal operation, it must be in the ON position ("1").

TIME BASE SELECTION

The Model 8176 offers a user selectable time base. When switch SW2-6 is in the OFF ("0") position the internal quartz crystal is selected as the time base. When switch SW2-6 is in the ON ("1") position the recovered 60-Hz from the AC power line is the time base. A clock will switch over to the selected time base only when there is invalid or no incoming data stream.

The 60-Hz mode offers good long term accuracy. Power companies continuously monitor and correct for changes in line frequency. The internal crystal will age and is affected by temperature changes. Over a long period of time, the crystal error will accumulate.

The internal crystal may be calibrated. Refer to Section 5 of this manual for the calibration procedure.

TERMINATION

To match the line impedance of the RS-422 data bus, it is necessary to terminate the last clock in a chain. When switch SW2-7 is in the ON ("1") position, the RS-422 data bus is terminated with a 120 ohm resistor. All other clocks on the same RS-422 bus must have switch SW2-7 in the OFF (not last clock) position. Refer to Figures 2-4 through 2-9 for termination examples.

MASTER/SLAVE

Switch SW2-8 is used to configure the Model 8176 to be a master or a slave clock. The master clock generates time data used to synchronize other Spectracom clocks or interface to a computer. The master clock will not synchronize to an incoming data stream. The time data must be initially entered by the manual set function.

Placing SW2-8 in the slave position allows the clock to synchronize to an incoming data stream. The received time may be offset to display the desired time by using the time zone offset function. Refer to Section 3.4.

FACTORY SETTINGS

The unit is shipped from the factory with switch SW2 set to 10011100. This sets the baud rate to 300, 12 hour format, 60-Hz time base, not last clock, and slave mode.

To insure proper operation, restart the clock after changing switch SW2 settings.

MODE/SET

The **MODE** and **SET** switches are used in combination to enter data into the Model 8176. Refer to Sections 3.3 and 3.5 for manual clock setting procedures.

3.1 I/O CONNECTORS

The Model 8176 wall clock I/O connectors are:

- J1 RS-422 Buffered Output
- J2 Master Output
- J3 RS-422 Output
- J4 Input
- J5 RS-232C Output, See Option 32

All signal connectors are type RJ-12 modular telephone jacks, recessed within the back of the clock.

OUTPUT CONNECTORS J1 AND J2

SLAVE MODE

When the Model 8176 is in the slave mode, J1 and J2 will output a data stream equal to that found on input connector J4.

MASTER MODE

In the master mode, J1 and J2 output the master timing data. The output data structure is shown below:

(CR)(LF)I(SPACE)(SPACE)DDD(SPACE)HH:MM:SS(SPACE)(SPACE)TZ=XX(CR)(LF)

where:

I = space
DDD = day of year
HH:MM:SS = hours, minutes, seconds
XX = time zone

Each character consists of 1-start bit, 8-data bits, and 1-stop bit. The data stream is updated once per second. The beginning of the first character is on the time point. The data stream will always be output in 24-hour time format, regardless of switch setting SW2-4.

J1 AND J2 USAGE

Connectors J1 and J2 are each driven by an RS-422 line driver. Each connector may drive up to 32 wall clocks. Refer to Figures 2-8 and 2-9 for J1 and J2 usage.

OUTPUT CONNECTOR J3

This connector contains the same signals as J4, input connector. The signals are brought out on different pins. This allows clocks to be "daisy-chained" using modular cable only, eliminating the need for terminal blocks and station cable. Refer to Figure 2-5 for an example of "Daisy-Chain" clock interconnection.

INPUT CONNECTOR J4

Input connector J4 receives the time data from the RS-422 time bus. The clocks are connected to the time bus by terminal blocks. Alternatively, they may be "daisy-chained" by using the J4 and J3 input and output connectors. Refer to Section 2 for typical clock system configurations.

A clock will not synchronize to an incoming data stream when in the master mode.

The input data is repeated once per second and the beginning of the first character is on time point. The data structure is:

(CR)(LF)I(SPACE)(SPACE)DDD(SPACE)HH:MM:SS(SPACE)(SPACE)TZ=XX(CR)(LF)

where:

I = space when set to WWVB by Model 8170/8171A with time sync lamp on, or set by 8172M or Model 8176 in the master mode.

I = * if the Model 8170/8171A was manually set via RS232 port.

I = ? if the Model 8170/8171A has lost time sync.

DDD = day of year

HH:MM:SS = hours:minutes:seconds

XX = time zone

3.2 POWER CONNECTION

Plug the clock into 110 VAC 60 Hz. Observe that the clock displays 00:00:00. A few seconds later the time will be displayed. During power down an internal clock continues to run. It is powered by a battery with a life of 10 years.

3.3 MANUALLY SETTING THE SLAVE CLOCK

The 8176 is a SLAVE clock when switch SW2-8 on the rear is in the SLAVE position. Manually set the clock using the MODE and SET switches that are located at the rear of the clock.

Depress the MODE switch. The hours position will blink. Depress the SET switch to advance the hours. Holding the SET switch depressed will continuously advance the hours.

Depress the MODE switch. The minutes position will blink. Depress the SET switch to advance the minutes.

Depress the MODE switch. The seconds position will blink. Each time you depress the SET switch the seconds will be reset to zero. If the seconds are greater than 30, then the minutes will be incremented in addition to the seconds being reset to zero.

Depress the MODE switch. The right hand two digits will blink. They will display the time zone offset value. Depress the SET switch to advance the offset. The display time is the received time data minus the time zone offset. The Eastern Standard Time zone is -5 hours. Eastern Daylight Saving Time is -4 hours.

Depress the MODE switch. The display will show the time set, minus the time zone entered, and the colons will blink. The blinking colons signify that the clock has been manually set.

3.4 TIME ZONE OFFSET

A Model 8176 in the slave mode can offset incoming data to display a selected time zone. A time zone may be entered as follows:

Depress the mode switch 4 times. The right hand two digits will blink. They will display the time zone offset value. Depress the SET switch to advance the offset. The display time is the received time data minus the time zone offset. The Eastern Standard Time Zone is -5 hours. Eastern Daylight Saving Time is -4 hours.

Depress the mode switch again and the clock will begin normal operation. The display will show the time as offset by the time zone entered.

3.5 MANUALLY SETTING THE 8176 MASTER CLOCK

The 8176 is a MASTER when switch SW2-8 on the rear is in the MASTER position. The master clock is set using the MODE and SET switches.

Depress the MODE switch. The hours position will blink. Depress the SET switch to advance the hours.

Depress the MODE switch. The minutes position will blink. Depress the SET switch to advance the minutes.

Depress the MODE switch. The seconds position will blink. Each time you depress the SET switch the seconds will be reset to zero. If the seconds are greater than 30, then the minutes will be incremented in addition to the seconds being reset to zero.

Depress the MODE switch. The display will show three 0's with the left one blinking. Enter the most significant digit of the day of the year by depressing the SET switch.

Depress the MODE switch. The display will show three 0's with the middle one blinking. Enter the ten's position of the current day of the year by depressing the SET switch.

Depress the MODE switch. The display will show three 0's with the right hand digit blinking. Enter the units position of the day of the year by depressing the SET switch.

Depress the MODE switch. The display will show two 0's with both blinking. Enter the Time Zone to be transmitted in the data stream by depressing the SET switch. If Daylight Saving Time (DST) is in effect, then subtract one from the time zone entry. For example, the east coast of the United States is in time zone 5. When DST is in effect, the time zone entry should be 4.

Depress the MODE switch. The display will show the time, and the clock will run.

3.6 CONNECTING THE MODEL 8176 TO THE MODEL 8170 OR 8171

Install the Model 8170 or 8171 per the instructions in their respective manuals. Obtain Time Sync with WWVB.

Connect the Model 8176 Wall Clock to the Model 8170 or 8171. Refer to Figures 2-4, 2-5 and 2-8 INTERCONNECTION DIAGRAMS. Within 3 seconds the 8176 Wall Clock display will be updated to the correct time.

After the wall clock has been set by the 8170 or 8171, if it does not receive the time data stream from the Model 8170 or 8171 then it will continue to operate on its own time base (60-Hz or crystal). After a period of 24 hours the colons will blink. The blinking colons are an indication of a malfunction, and corrective action should be taken. The possible problems are discussed below.

If the signal is not being received by the Model 8170 or 8171 then the red UNLOCK lamp will be lit on the front panel of the Model 8170 or 8171. Check that the antenna is installed properly.

If the antenna is installed correctly and all cables are properly installed, then the fault may be in the Model 8206 Loop Antenna or the Model 8170 or 8171, or the WWVB signal may be absent or corrupted by an interfering signal. If the problem cannot be identified and corrected, call the factory for technical assistance.

3.7 BRIGHTNESS CONTROL

The display brightness can be adjusted through a hole on the right front of the clock using a small flat blade screwdriver. The clock will be noticeably warm if operated at high brightness levels. This is a normal condition.

SECTION IV

OPTIONS

- 4.0 OPTION 32 RS-232 OUTPUT
- 4.1 OPTION 33 RS-232 INPUT
- 4.2 MODULAR TO RS-232 CONNECTOR ADAPTER KITS
- 4.3 OPTION 47 BACK-TO-BACK MOUNTING
- 4.4 OPTION 67 RED DISPLAY
- 4.5 OPTION 69 ONE PULSE-PER-SECOND

SECTION IV

OPTIONS

4.0 OPTION 32 RS-232 OUTPUT

Option 32 provides an RS-232 output to connector J5. The data stream is updated and output once per second at the baud rate for which the clock is set. The data stream is shown below:

(CR)(LF)I(SPACE)(SPACE)DDD(SPACE)HH:MM:SS(SPACE)(SPACE)TZ=XX(CR)(LF)

where:

I = space - if wall clock is set by a Model 8170 or 8171A WWVB Synchronized Clock with the time sync lamp on. See Figure 2-4 or 2-5

OR,

If a wall clock is synchronized by a master wall clock as shown in Figure 2-6 or 2-7

I = * - if the wall clock is synchronized to an 8170 or 8171A that has been set manually via RS-232 port

I = ? - if the wall clock has been set by an 8170 to 8171A that is not synchronized to WWVB (time sync lamp off).

DDD = day of the year

HH:SS:MM = hours:minutes:seconds

XX = time zone

Each character consists of 1 start bit, 8 data bits, and 1 stop bit. The beginning of the first character is the on time point.

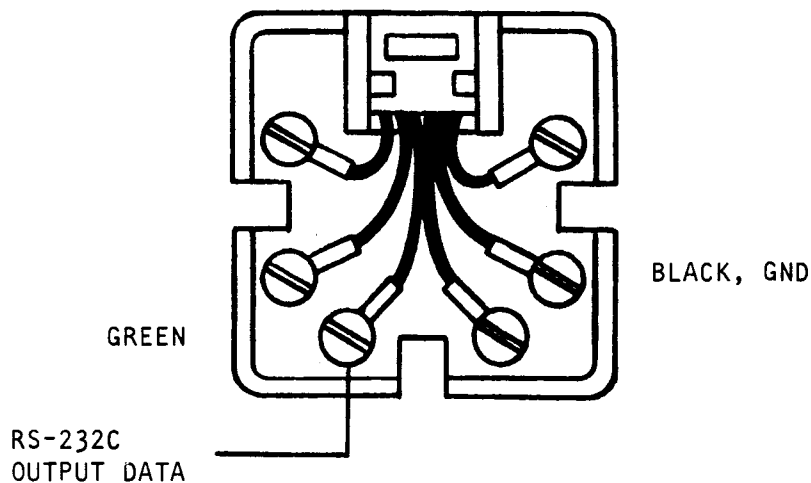


FIGURE 4-1: OPTION 32 TERMINAL BLOCK

To interface to the RS-232 output, a terminal block may be wired as shown in Figure 4-1.

4.1 OPTION 33 RS-232 INPUT

The standard Model 8176 Wall Clock is synchronized using an RS-422 timing signal. Option 33 enables the clock to accept an RS-232 input signal. This allows the clock to be driven by an RS-232 modem output used when a satellite or microwave data link is used to transmit time data from a master to a slave clock.

To use a synchronizing source other than a Spectracom clock, the following data structure must be used:

`(CR)(LF)I(SPACE)(SPACE)DDD(SPACE)HH:MM:SS(SPACE)(SPACE)TZ=XX(CR)(LF)`

where:

I = space
 DDD = day of year
 HH:MM:SS = hours:minutes:seconds
 XX = time zone

Each character consists of 1 start bit, 8 data bits and 1 stop bit. The data stream is updated once per second. The beginning of the first character is the on time point.

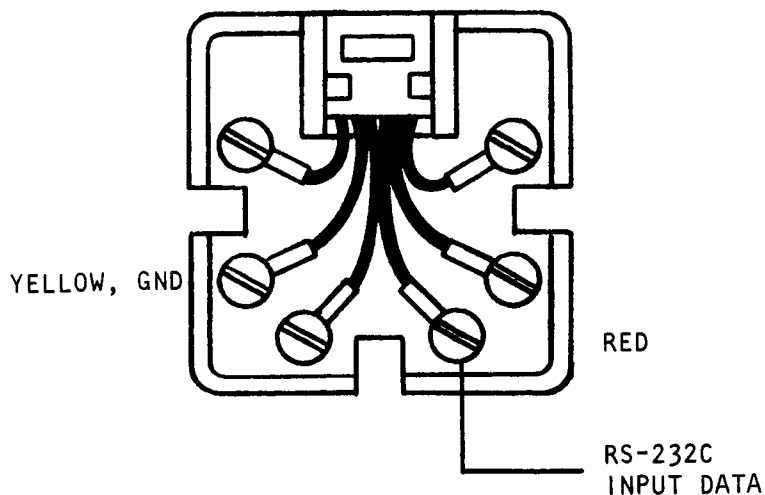


FIGURE 4-2: OPTION 33 TERMINAL BLOCK

Wire the supplied terminal block as shown in Figure 4-2 to interface the RS-232 input to the Model 8176. A modular cable connects the terminal block to the input (J4) connector.

4.2 MODULAR TO RS-232C CONNECTOR ADAPTER KITS

To convert from a modular connector to a 25-pin series D connector, an adapter with a modular connector and 25-pin male or female connector is available. The use of an adapter eliminates the need for the terminal blocks shown in Figures 4-1 and 4-2.

The part numbers are:

- J12000 Modular to 25-pin series D male connector
- J12001 Modular to 25-pin series D female connector

These may be purchased from Spectracom Corporation.

4.3 OPTION 47 BACK-TO-BACK MOUNTING

Option 47 allows two Model 8176 wall clocks to be mounted in a back-to-back configuration as shown in Figure 4-3. Option 47 includes the bracket, and the interconnecting cable.

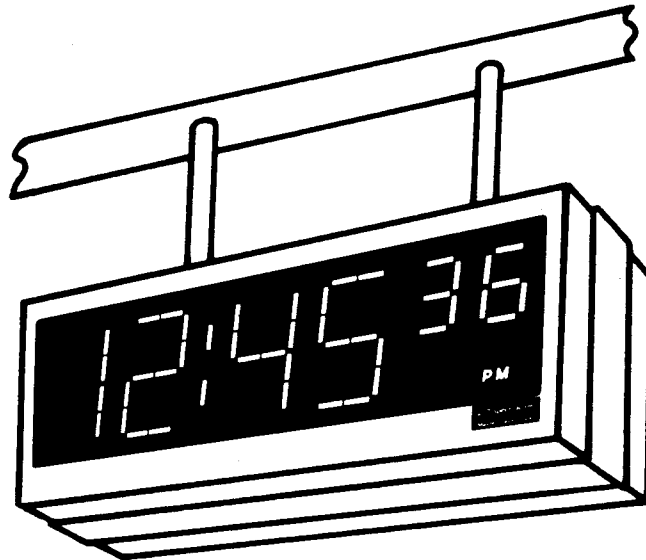


FIGURE 4-3: BACK-TO-BACK MOUNTING

INSTALLATION

Mount the frame to a suitable wall or column or hang from a ceiling using conduit as columns if desired.

Route the power and data lines into the frame through the holes in the top.

Install the four 10-32 screws to hang the clocks. The underside of the heads should be about .40 in. from the frame.

The standard clock is set up according to the installation and operator's guide, but do not apply power yet.

Connect the 6-wire cable from the Option 47 clock to J7 on the standard clock. Apply power to both clocks and hang on the frame. Both clocks will now display the same time. The brightness control operation remains unchanged.

4.4 OPTION 67 RED DISPLAY

Clocks ordered with Option 67 are equipped with a red LED display. This replaces the standard yellow-green display color.

4.5 OPTION 69 ONE PULSE-PER-SECOND INPUT

4.5.0 INTRODUCTION

Option 69 enables the Model 8176 Wall Clock to synchronize to a one pulse-per-second (1PPS) input. Time is initially entered into the clock in a manner similar to setting an alarm clock or digital watch. The 1PPS Model 8176 may be used to synchronize additional standard Spectracom wall clocks using the RS-422 time data Master Output. Whenever the 1PPS reference is removed or a power failure occurs, the display colons flash to indicate synchronization has been lost.

4.5.1 INPUT SIGNAL REQUIREMENTS

The 1PPS reference input signal requirements are:

Logical 0: Less than +0.5 volts into 50 ohms.

Logical 1: Greater than +1.4 volts but less than +15 volts into 50 ohms.

The falling edge of the pulse is the on time edge.

The input impedance is switch selectable between high impedance and 50 ohms. Refer to Section 4.5.2 for additional information on selectable input impedance.

The 1PPS is input on a BNC connector.

4.5.2 OPERATION

This section contains operational information for the Option 69 clock.

SWITCH FUNCTIONS

Baud - Switch SW2-1,2,3 are the switches that control the bit rate of the RS-422 and optional RS-232 time data outputs. Units are factory set for 300 baud, though any baud rate listed on the rear panel may be selected.

12/24 Format - Switch SW2-4 selects either 12- or 24-hour time format to be displayed. The time data outputs are in 24-hour format regardless of switch setting.

Test - Switch SW2-5 is a test switch and must be in the OPERATE position.

Time Base Selection - Switch SW2-6 selects the time base to be used whenever the synchronizing pulse is lost. This switch must be in the XTAL position for Option 69 operation. The 60 Hz alternate time base is not available for the 1PPS clock.

Termination - Switch SW2-7 terminates the 1PPS input into 50 ohms by placing this switch in the LAST CLOCK position. In the NOT LAST CLOCK position, the input impedance is 1K ohms.

Master/Slave Selection - This switch must be in the slave position for Option 69 clocks.

MODE/SET - These switches are used to enter data into the clock. The MODE switch selects the function to be set i.e., hours, minutes, seconds, day of the year, and time zone. The SET switch scrolls through the function variables until a selection is made. The MODE/SET switch operation is described in the section below.

SETTING THE CLOCK

Once the 1PPS reference is connected, the wall clock is set as follows:

Depress the MODE switch. The hours position will blink. Depress the SET switch to advance the hours.

Depress the MODE switch. The minutes position will blink. Depress the SET switch to advance the minutes.

Depress the MODE switch. The seconds position will blink. Each time you depress the SET switch the seconds will be reset to zero. If the seconds are greater than 30, then the minutes will be incremented in addition to the seconds being reset to zero.

Depress the MODE switch. The display will show three digits with the left one blinking. Enter the most significant digit of the day of the year by depressing the SET switch.

Depress the MODE switch. The display will show three digits with the middle one blinking. Enter the ten's position of the current day of the year by depressing the SET switch.

Depress the MODE switch. The display will show three digits with the right hand digit blinking. Enter the units position of the day of the year by depressing the SET switch.

Depress the MODE switch. The display will show two digits with both blinking. Enter the time zone to be transmitted in the data stream by depressing the SET switch. If Daylight Saving Time (DST) is in effect, then subtract one from the time zone entry. For example, the east coast of the United States is in time zone 5. When DST is in effect, the time zone entry should be 4. The time zone entry may be left as zero if this function is not used.

Depress the MODE switch. The display will show the time, and the clock will run.

LOSS OF SYNCHRONIZATION

If the synchronization 1PPS signal is lost or interrupted the display colons will flash. The display colons will also flash if the Model 8176 has experienced a power failure. In addition to flashing the display colons, the sync status character is changed from a space to an asterisk. The asterisk in the output data stream will cause the slave wall clocks to flash their colons. The output data stream is shown in the section below. The flashing colons indicate that the displayed time could be in error and the master clock may have to be reset. To clear the flashing colons, it is necessary to step through the clock setting procedures making changes as required. If no changes are needed, push the MODE selection switch eight times to return the clock to normal operation.

TIME DATA OUTPUTS

The Option 69 clock outputs a time data stream that is updated and output once-per-second. The complete output data stream appears below:

(CR)(LF)I(SPACE)(SPACE)DDD(SPACE)HH:MM:SS(SPACE)(SPACE)TZ=XX(CR)(LF)

where: I = space when synchronized to 1PPS input

* when loss of synchronization has occurred

DDD = day of year

HH:MM:SS = hours:minutes:seconds

XX = time zone

Each character consists of 1 start bit, 8 data bits and 1 stop bit. The data stream is updated once per second. The beginning of the first character is the on time point. This data stream appears on the RS-422 Master Output, J2 and the optional RS-232 output, connector J5.

Output J2 can be used to synchronize additional wall clocks as shown on page 2-7 of this manual.

SECTION V
CALIBRATION

SECTION V
CALIBRATION

5.0 CALIBRATION

Crystal time base calibration for units with serial numbers 8176-0478 and above.

Periodic crystal alignment is not required when using the 60-Hz time base.

TEST EQUIPMENT

A frequency counter with an accuracy of $\pm 1 \times 10^{-7}$ is required.

PROCEDURE

1. Record dip switch settings.
2. Move all switches to the OFF ("0") position.
3. Connect a counter to TP1, located above the Mode switch. Connect the counter ground to the metal chassis of the clock.
4. Frequency at TP1 should be 1,228,800 ± 1 Hz. The frequency can be adjusted by variable capacitor C8. Capacitor C8 can be accessed through a small hole located next to TP1 in the back panel.
5. Calibration is complete, return dip switches to their original position.

MODEL 8176 MANUAL ERRATA

E.0 INTRODUCTION

E.1 SYNCHRONIZATION SOURCES

E.2 TRANSIENT VOLTAGE SUPPRESSORS

MODEL 8176 MANUAL ERRATA

E.0 INTRODUCTION

This section contains information on equipment changes made after the printing of this manual. Please review these changes prior to installing the Model 8176 TimeView 360.

E.1 SYNCHRONIZATION SOURCES

Spectracom now offers the Model 8182 NETCLOCK/2 and the Model 8183, NETCLOCK/GPS as synchronized time providers. These clocks utilize RS-485 line drivers on the Remote Output. RS-485 is downward compatible with the RS-422 interface the Model 8176 uses.

The Model 8182 NETCLOCK/2 is a WWVB Synchronized Master Clock. The NETCLOCK/2 directly replaces the Spectracom Model 8170 and Model 8171A WWVB Synchronized Clocks. The NETCLOCK/2 Remote port is a DB9 female and has the same pin-out configuration as the Model 8170 and Model 8171A. When connecting the Model 8176 Wall Display to a NETCLOCK/2 receiver, follow the interconnection information found in this manual. Substitute NETCLOCK/2 for all occurrences of Model 8170 or Model 8171A. Information about the NETCLOCK/2 baud rate and data format switches is printed on the bottom cover of the receiver.

The GPS Synchronized Clock, Model 8183 NETCLOCK/GPS, has a 3-position terminal block Remote Output connector. Each NETCLOCK/GPS has two Remote Output ports. Output baud rate, data format, UTC time offset and DST rule set are selectable. Commands to configure the Remote Outputs are issued through the Serial Setup Interface port. The Model 8176 requires Data Format 0 or Format 1 to synchronize.

Connect the modular jack to a NETCLOCK/GPS Remote Output as shown in Figure E-1.

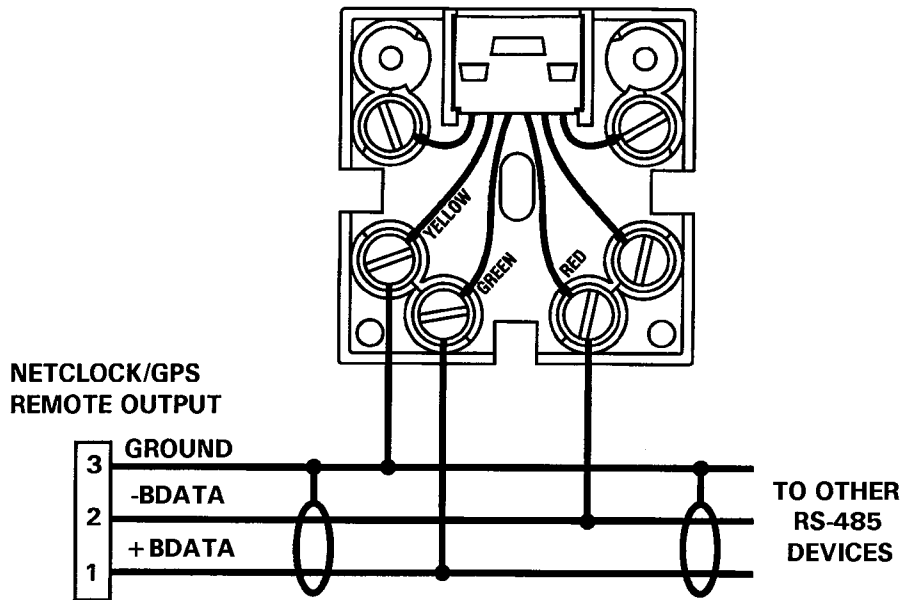


FIGURE E-1 MODULAR JACK INTERFACE

Connect the modular jack green wire to the RS-485 noninverted (+DATA) wire. The red wire is connected to the RS-485 inverted (-DATA) wire. The yellow wire is connected to the RS-485 cable shield.

E.2 TRANSIENT VOLTAGE SUPPRESSORS

Surges conducted through the AC power, ground or data lines can destroy an RS-422/RS-485 interface. Often these surges are caused by a nearby lightning strike.

The Model 8176 now includes Transient Voltage Suppressors (TVS) on the input data lines. The TVS protects the input circuit by shunting potentially damaging voltages to ground. For maximum protection, the Model 8176 must be plugged into a properly-grounded outlet.

The TVS's are installed in location J3 due to ground and data line connections. Connector J3 was a pass-through output of the input signal applied to connector J4. Removal of the J3 output prevents daisy chain connection, J3 to J4, as shown in Figures 2-7, 2-8 and 2-9.