Quick Start Guide

CSD-5300 and GPS-3901

Overview

This application note describes the installation and system setup of the GPS-3901 Antenna and Receiver, along with offset and time change programming of the CSD-5300 Master Clock Driver.

See the *CSD-5300 Master Clock Driver Installation and Operation Manual* for CSD-5300 safety and certification information,

If you have any questions regarding the information included in this document, please contact your Leitch Customer Service Representative.

The following topics are found in this guide:

Product Descriptions

The CSD-5300 Master Clock Driver is a real time clock that maintains an entire clock system with minimal intervention. The timing is based on SMPTE/EBU time code that runs at real time.

The GPS-3901 Antenna and Receiver allows the CSD-5300 to output time code with great accuracy, and provides the CSD-5300 with the most accurate source of time used in the public domain. A system of 24 orbiting satellites provides complete coverage in any part of the world with information on time and position, making the CSD-5300 totally independent from telephone or radio receiver standards.

When fitted with the 5300RI Reference Interface module (a requirement for the GPS-3901), the CSD-5300 may be programmed to automatically request a time reference from the GPS-3901. Time update may be performed daily, weekly, or as desired.

Receiving and Unpacking

Immediately after unpacking the equipment, inspect it for missing parts and for transit damage. If any items are missing or damaged, please contact your Leitch representative or carrier respectively.

If possible, retain the original packing materials for re-use.

CSD-5300		
Part Number	**Description**	**Status**
CSD-5300 or CSD-5300-240	Master clock driver with detachable power cord	Required
5300MB	Modem board	Optional
5300CD	Impulse clock driver	Optional
5300RC	Radio time receiver	Optional
5300ME	Module extender	Optional
101ME	Module extender	Optional

GPS-3901		
Part Number	**Description**	**Status**
GPS-3901 (kit)	• Antenna • Receiver • 120/240 V AC adaptor • 75 ft./22.86 m RG-59 cable • 8 in./20.32 cm type-F adaptor cable • RS-232 cable	Required
5300RI	Reference interface	Required
CAB-GPS5500PC	Computer interface cable	Optional
CAB-GPS-2Y	Cable for two master clocks	Optional

CSD-5300 Panel Descriptions

Control Assembly

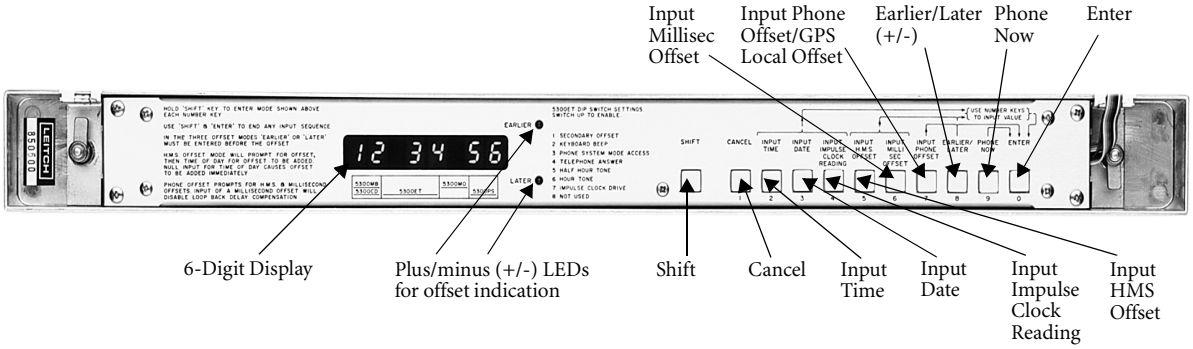

Figure 1. CSD-5300 Control Assembly Support (located behind the front panel)

Back Panel

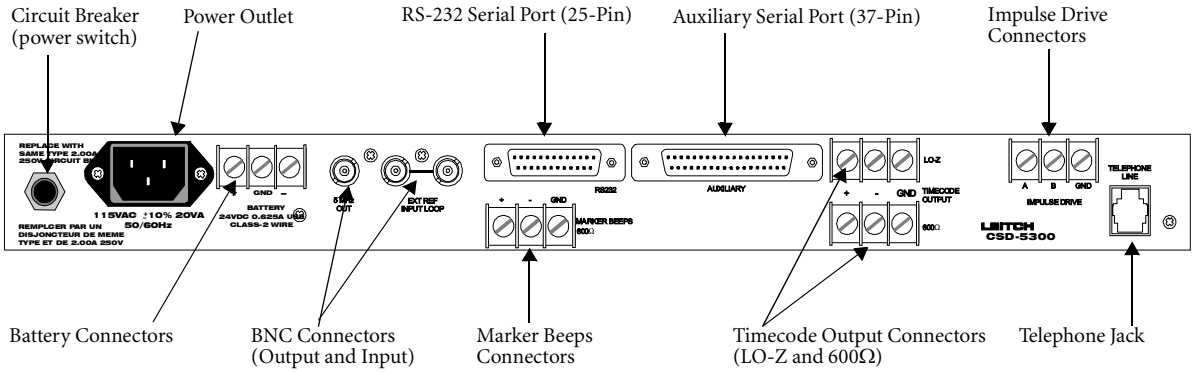

Figure 2. CSD-5300 Back Panel

Installation

Preparing the CSD-5300 for GPS-3901 Installation

To prepare the CSD-5300 for connection to the GPS-3901 Receiver, follow this procedure:

1. Turn the CSD-5300 power on by pushing in the circuit breaker on the rear panel.
2. Insert the 5300RI module into the upper left slot of the CSD-5300.
3. Set the first four DIP (Dual Inline Polarity) switches of the 5300RI as follows:
   - SW1 = DOWN
   - SW2 = UP
   - SW3 = DOWN
   - SW4 = UP

   Leave the other DIP switches as they are.

For more information on installing and connecting your CSD-5300, refer to the *CSD-5300 Master Clock System Driver Instruction Manual*.

Note

The 5300RI replaces the 5300MB module within the CSD-5300. Hence the 5300MB must be removed first if it has been previously installed.

Mounting of the GPS-3901 Antenna

Note

The thread on the end of the pipe must be 3/4 inch NPT (National Pipe Thread) to properly screw into the bottom of the antenna.

Note

It is not necessary to mount the GPS-3901 Antenna in a sheltered or protected area, as it is a completely sealed and well constructed unit. However, it should be located where it is unobstructed by surrounding buildings.

Caution

To protect your equipment from damage due to lightning strikes, Leitch recommends that you attach an approved ground wire to the R-59 Cable.

To mount the GPS-3901 Antenna outside, follow this procedure:

1. Attach a short length of 3/4-inch standard plumbing pipe (not supplied in the GPS-3901 kit) to an outside surface or wall where it will not be disturbed.
2. Thread one end of the 75 ft./22.86 m RG-59 cable through the pipe.
3. Attach the female F-type connector on the RG-59 cable to the male connection under the antenna dome.
4. Thread the remainder of the RG-59 cable through an exterior wall and into the building.

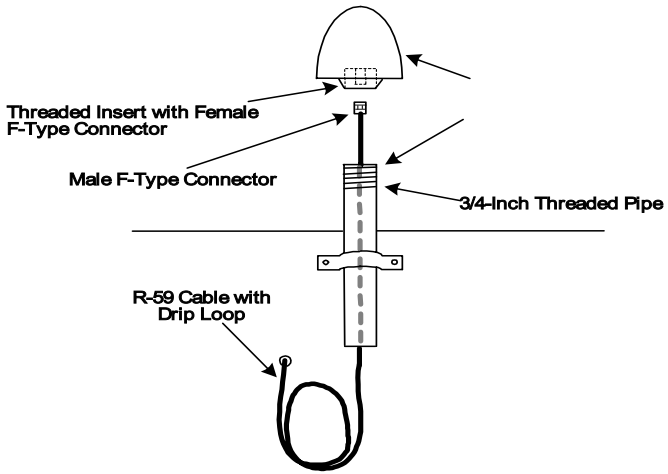

Figure 3. Typical Outdoor Installation of a GPS-3901 Antenna

Connecting the GPS-3901 Antenna to the Receiver

Once the antenna has been installed and connected, the other end of the RG-59 cable must be connected to the 8 in./20 cm Type-F adaptor cable. The other end of the adaptor cable is then plugged into the **Ant** port of the GPS-3901 Receiver.

See the section "Attaching Twist-On F-Plug Connectors to Cable Ends" on page 8 if your Type-F adaptor cable requires connector plug installation.

Attaching Twist-On F-Plug Connectors to Cable Ends

If your Type-F adaptor cable requires a connector plug to be attached to the cable end, follow the procedure outlined below, or refer to the Trimble Revision Sheet "Twist on F Plug Connector Installation Instructions For Use with AMP PN 221540" that accompanies the *Trimble SVeeEight Plus GPS System Designer Reference Manual*.

Stripping the Cable

The twist-on F-Plug connector (series type 221540) features a threaded assembly. Before you can attach this connector to the adaptor cable end, you will first need to strip the cable as illustrated in Figure 4.

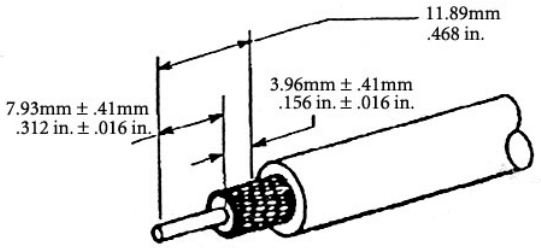

Figure 4. Cable Stripping Dimensions

Assembling the Connector and Cable

To attach the twist-on F-plug connector to the Type-F adaptor cable, follow this procedure, using Figure 5 as a visual reference:

1. Fold the braid back over the cable jacket.
2. Push the stripped cable into the opening in the rear of the connector which contains internal threads.
3. Press and tun the connector in a clockwise direction while holding the cable stationary.
4. Keep turning the connector until the center conductor of the cable protrudes past the end of the connector coupling nut approximately 3.18mm/0.125 in.

Note

While pressing and turning the connector, keep it properly aligned with respect to the cable.

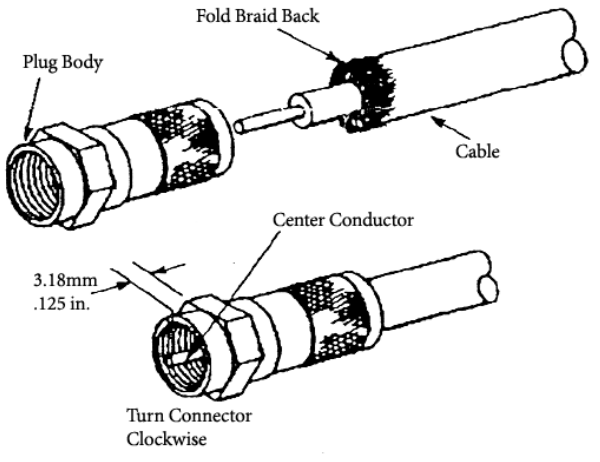

Figure 5. Attaching the Connector and Cable

Connecting the GPS-3901 to *One* CSD-5300 Unit

The following procedure describes how to connect your installed CSD-5300 to a GPS Receiver. *See* Figure 6 for a visual representation of a GPS-3901 installation.

1. Ensure the GPS-3901 Antenna is mounted outside of the building and connected to the Receiver. (*See* pages 6 and 7 for details.)
2. Connect the 9-pin male connector on the GPS RS-232 cable to **Port 2** on the GPS-3901 Receiver.
3. Connect the 25-pin female connector on the GPS RS-232 cable to a 25-pin male connector on a CAB-GPS5500PC cable.
4. Connect one of the 25-pin male connectors on the other end of the CAB-GPS5500PC cable to the **RS-232** port of the CSD-5300.
5. Insert the AC adaptor plug into a standard 120/240 V AC power outlet.
6. Allow the GPS-3901 Antenna and Receiver 15 minutes to lock on to an orbiting satellite signal before calling the satellite for time.

Note

There are a total of three 25-pin male connectors on a CAB-GPS5500PC cable. Only two are used in this installation setup.

The following diagram illustrates the most straightforward connection between a GPS-3901 Receiver and a CSD-5300 Master Clock Driver.

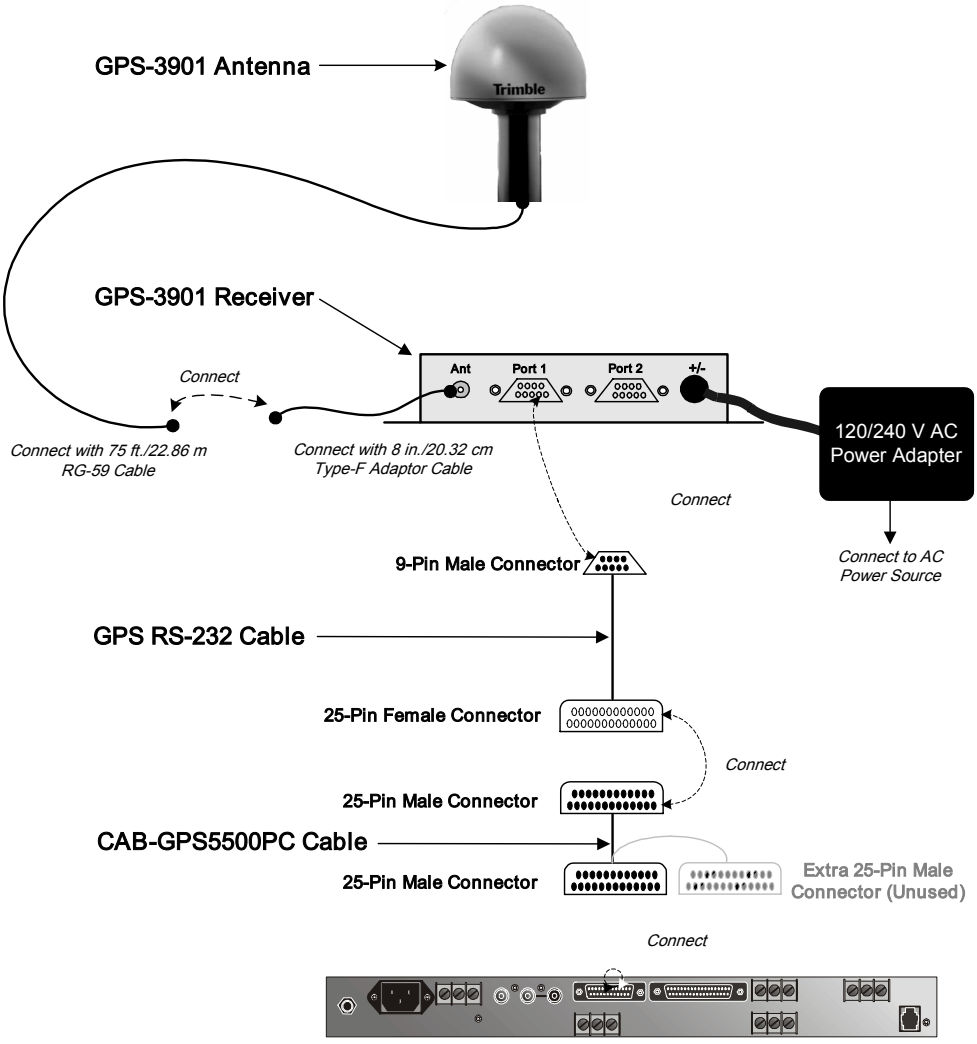

Figure 6. System Description: Connection to One CSD-5300

Connecting the GPS-3901 to *One* CSD-5300 Unit and a PC

Note

A PC connection is only required if you wish to view time code information on the PC screen.

The following procedure describes how to connect your installed CSD-5300 to a GPS Receiver and a PC. *See* Figure 7 for a visual representation of a GPS-3901 installation.

1. Ensure the GPS-3901 Antenna is mounted outside of the building and connected to the Receiver. (*See* pages 6 and 7 for details.)
2. Connect the 9-pin male connector on the GPS RS-232 cable to **Port 2** on the GPS-3901 Receiver.
3. Connect the 25-pin female connector on the GPS RS-232 cable to a 25-pin male connector on a CAB-GPS5500PC cable.
4. Connect the CAB-GPS5500PC male cable connector labelled **To RS-232 of PC** to the PC **RS-232** port.
5. Connect the CAB-GPS5500PC male cable connector labelled **To CSD-5300** to the corresponding CSD-5300 **RS-232** port.
6. Insert the AC adaptor plug into a standard 120/240 V AC power outlet.
7. Allow the GPS-3901 Antenna and Receiver 15 minutes to lock on to an orbiting satellite signal before calling the satellite for time.

The following diagram illustrates the connection between a GPS-3901 Receiver, a CSD-5300 Master Clock Driver, and a PC.

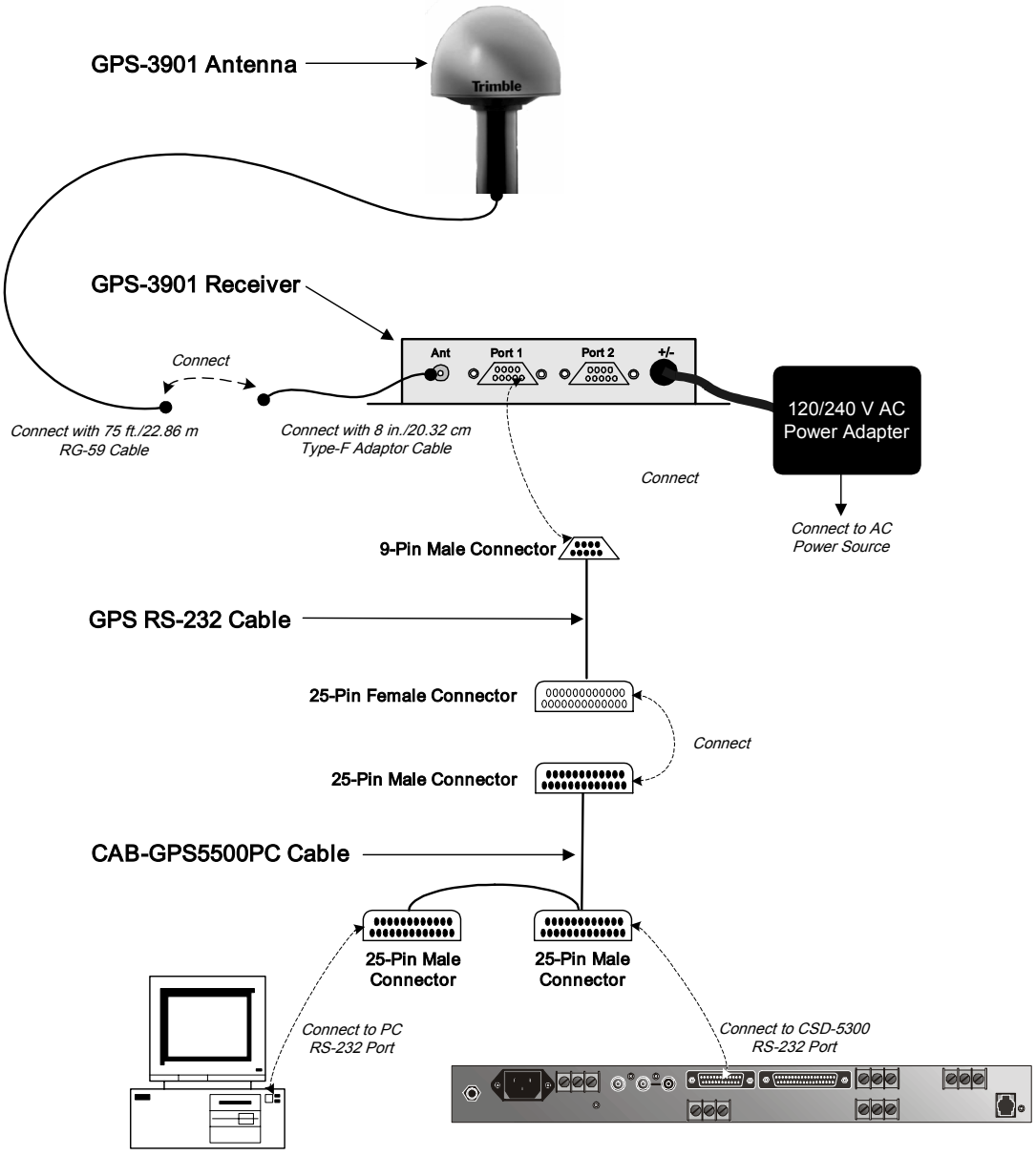

Figure 7. System Description: Connection to One CSD-5300 and a PC

Connecting the GPS-3901 to *Two* CSD-5300 Units

The following procedure describes how to connect two installed CSD-5300s to a GPS Receiver. *See* Figure 8 for a visual representation of these connections.

1. Ensure the GPS-3901 Antenna is mounted outside of the building and connected to the Receiver. (*See* pages 6 and 7 for details.)
2. Connect the 9-pin male connector on the GPS RS-232 cable to **Port 2** on the GPS-3901 Receiver.
3. Connect the 25-pin female connector of the GPS RS-232 cable to the corresponding male connector on the CAB-GPS-2Y cable.
4. Connect the two CAB-GPS-2Y female cable connectors to two separate CAB-GPS5500PC cables.
5. Connect one 25-pin male connector from the other end of each CAB-GPS5500PC cable to the CSD-5300 **RS-232** ports.
6. Insert the AC adaptor plug into a standard 120/240 V AC power outlet.
7. Allow the GPS-3901 Antenna and Receiver 15 minutes to lock on to an orbiting satellite signal before calling the satellite for time.

Note

There are a total of three 25-pin male connectors on each CAB-GPS5500PC cable. Only two connectors on each cable are used in this installation setup.

The following diagram illustrates the connection between a GPS-3901 Receiver and two CSD-5300 Master Clock Drivers.

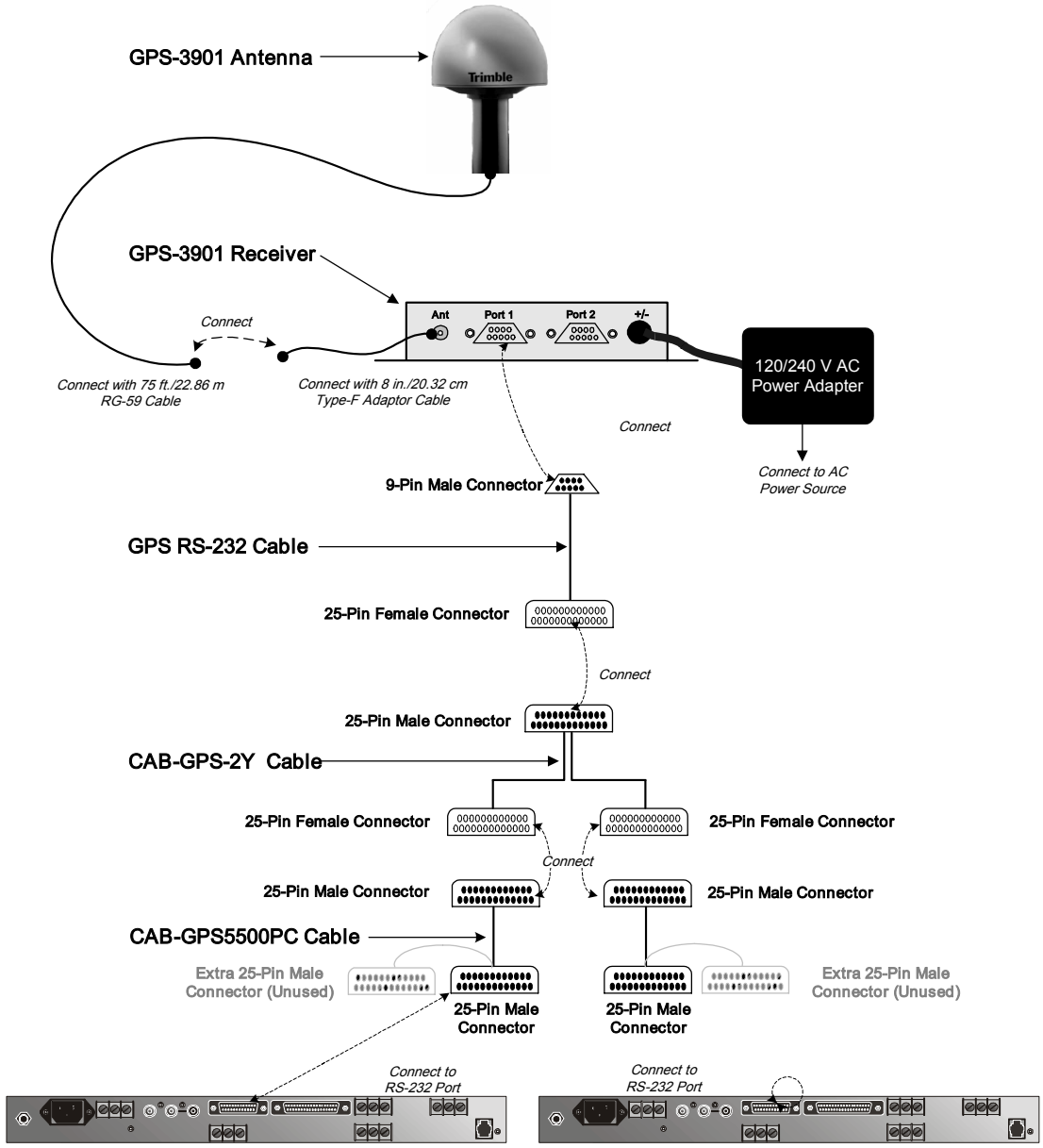

Figure 8. System Description: Connection to Two CSD-5300s

Connecting the GPS-5300 to *Two* CSD-5300 Units and *Two* PCs

Note

PC connections are only required if you wish to view time code information on them.

The following procedure describes how to connect two installed CSD-5300 units to a GPS Receiver and two PCs. *See* Figure 9 for a visual representation of these connections.

1. Ensure the GPS-3901 Antenna is mounted outside of the building and connected to the Receiver. (*See* pages 6 and 7 for details.)
2. Connect the 9-pin male connector on the GPS RS-232 cable to **Port 2** on the GPS-3901 Receiver.
3. Connect the 25-pin female connector on the GPS RS-232 cable to the corresponding male connector on the CAB-GPS-2Y cable.
4. Connect both CAB-GPS-2Y female cable connectors to the CAB-GPS5500PC male cable connectors (one on each cable) labelled **To CAB-GPS-Y2 cable**.
5. Connect the remaining CAB-GPS5500PC male cable connectors to the corresponding **RS-232** ports of the CSD-5300s and the **RS-232** ports of the PCs (or the CDA-5500s).
6. Insert the AC adaptor plug into a standard 120/240 V AC power outlet.
7. Allow the GPS-3901 Antenna and Receiver 15 minutes to lock on to an orbiting satellite signal before calling the satellite for time.

The following diagram illustrates the connection between a GPS-3901 Receiver, two CSD-5300 Master Clock Drivers, and two PCs.

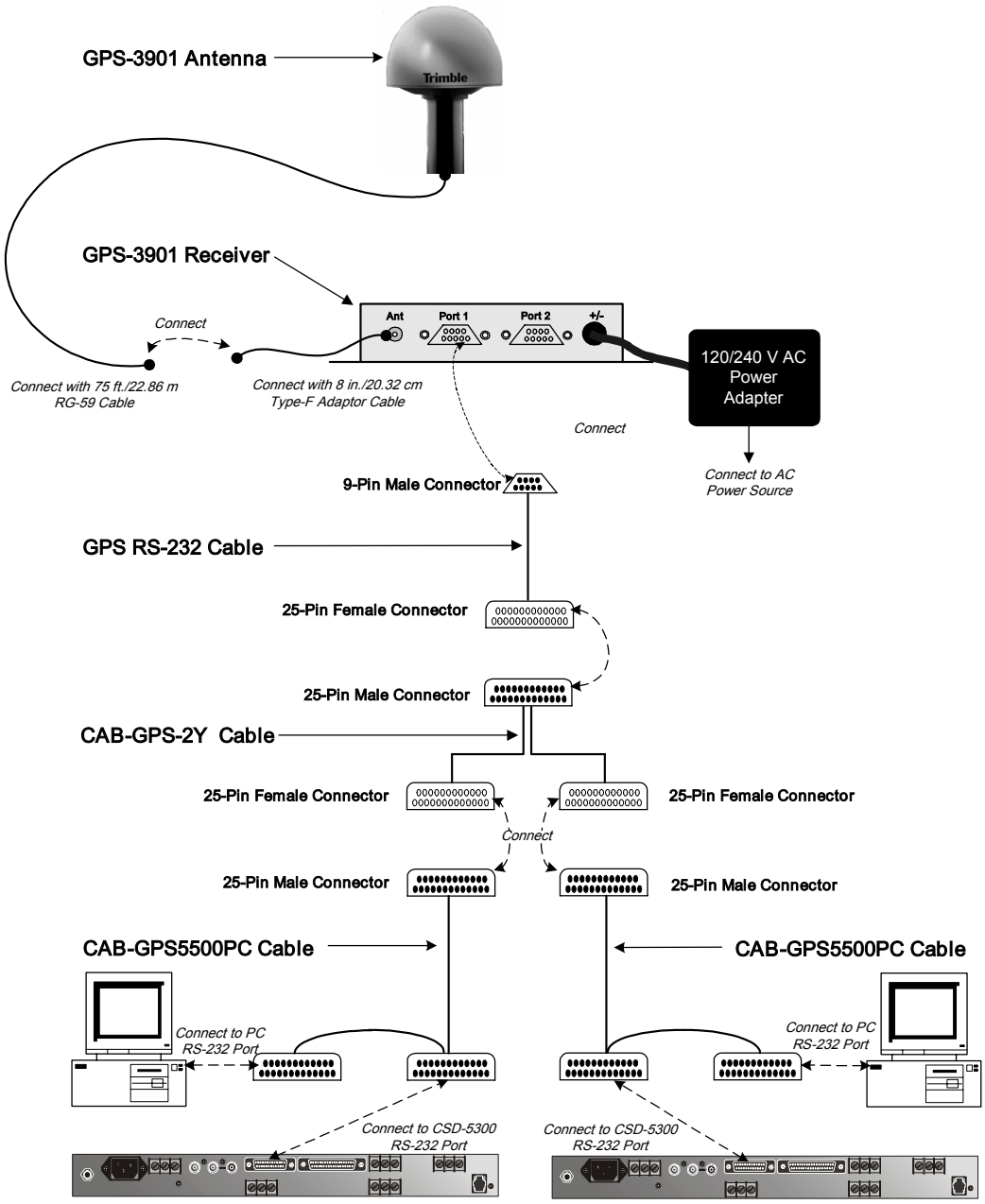

Figure 9. System Description: Connection to Two CSD-5300s and Two PCs

Calling the Satellite for Time

To use the GPS-3901 Antenna and Receiver (via the CSD-5300) to call the satellite, follow this procedure:

1. Unscrew and pull out the left and right front panel screws of the CSD-5300.
2. Fold down and partially slide out the front panel cover in order to expose the Control Assembly Support (CAS) panel.
3. Press the **Shift** and **Phone Now** buttons on the right side of the CAS panel simultaneously.
4. Press the **Shift** and **Enter** buttons on the CAS panel simultaneously.
   - The 5300RI Online LED will light to indicate there is power to the module.
   - The 5300RI RCV Data LED will flash to indicate the CSD-5300 is successfully *receiving* data from the GPS-3901.
   - The time display will flash if a communication problem is encountered.

     To troubleshoot a communication problem, do the following: Make sure the GPS-3901 has had time to lock on to a satellite signal (15 minutes), check all connections and DIP switch settings, and then begin the sequence again.
5. View the UTC time on the CSD-5300 front panel display when complete. (Local time will only be displayed if the phone offset has been programmed.)
6. Close the front panel of the CSD-5300.

CSD-5300 Offset Descriptions

Auxiliary Offset

The auxiliary offset is used to show the time of a given time zone on one set of clocks, and the time reference on another set of clocks. This offset is encoded in 30 minute increments, to be added to the main time information contained in the time code. A clock connected to the time code can be set to read this signal. The maximum offset allowed is 12 hours.

The internal timing of the CSD-5300 is not affected by the auxiliary offset.

Millisecond Offset

The millisecond offset is used to synchronize the CSD-5300 to the beep tones of an external time transmission. For instance, if the CSD-5300 has an offset of half a second, diminishing offsets can be selected until it becomes synchronized with the time signal.

This is an offset that is applied once.

HMS Offset

Note

An HMS offset change is not automatically applied to incoming reference time data.

The HMS (hours, minutes, seconds) offset is an arithmetic change to the current displayed time, and used to input a daylight saving time or leap second change. The maximum offset is 23 hours, 59 minutes, 59 seconds. Phone offsets must also be changed if the reference that the CSD-5300 is using is not on the same time zone and daylight saving time condition as the local unit.

This is an offset that is applied, and only effective, once.

Phone Offset

The phone offset is used when the CSD-5300 is located in a time zone other than that of the reference standard from which its time is updated. This offset is stored in EEPROM and applied to incoming time data.

The phone offset must be changed for daylight saving time changes but not leap second changes. This offset will be applied at every phone call (or radio receiver update) at the time of the update.

Use the HMS offset to apply a known arithmetic change at a specific time.

Impulse Clock Reading Description

This input data tells the CSD-5300 what time the stopped impulse clocks are displaying. The CSD-5300 automatically corrects the impulse clocks by either operating the impulse clocks at twice their normal speed or stopping them until the time discrepancy is eliminated.

HMS and phone offset changes will be automatically applied to the impulse clocks to make the clocks read the same time as the CSD-5300 front panel.

Programming CSD-5300 Offsets

Note

A customer supplied 25-pin female-to-female extension cable may be required to reach between the CAB-GPS5500PC cable and the RS-232 port of the PC.

Before you begin programming offsets, ensure that the CAB-GPS5500PC cable labelled **To RS-232 of PC or CDA-5500** is connected to the RS-232 PC port.

This application note only describes offset programming using the PC Windows 95 Hyperterminal program. Refer to the *CSD-5300 Master Clock System Driver Instruction Manual* for other programming methods.

To quickly program CSD-5300 offsets through the Windows 95 Hyperterminal program, complete the following three procedures outlined below.

Procedure 1: Opening System Mode

1. Open the Hyperterminal program on your PC and ensure the communication settings are entered as follows:
   - 300bps
   - 1 stop bit
   - non parity
   - 8 data bits
   - data control Xon/Xoff or None
2. Type `Leitch`, and then press ENTER.
3. Type the CSD-5300 serial number, found on the inside front lip of the unit where the modules are located, and then press ENTER.

   This will open the system mode of the CSD-5300.
4. When prompted whether to open the Line Feed, type `Y` (for yes), and then press ENTER.

Note

You will not see `Leitch` appear on the screen as you type it.

Procedure 2: Setting Phone Calling Options

1. Type `PHONE#`, and then press ENTER to adjust the Call Day, Call Time, or Phone Number programming.
2. Set the Call Day as `07` (for an update every 7 days) and then press ENTER, or enter a different Call Day number as desired.
3. Set the Call Time as `12:00:00` (factory set call time) and then press ENTER, or enter a different Call Time number that includes the hour, minute, and second.

Note

Be aware that a 24 hour clock is used.

4. Set the Phone Number to any number, as long as it begins with `T` (for touch tone style) or `P` (for pulse style), and then press ENTER.

   You can also leave the phone number as the factory set number. Two examples are `T1d2416d24459408` (this is the factory-set phone number), and `T4459408`.

Procedure 3: Setting CSD-5300 Offsets

1. Set the HMS offset:

   a. Type `M5` then press ENTER to adjust the HMS (hours, minutes, seconds) offset.

   b. Type `P` for Plus offset (if the local time is X-hours ahead of the UTC), or `M` for Minus offset (if the local time is X-hours behind the UTC), and then press ENTER.

      If you accidently enter the wrong offset code (`P/M`), simply hit ENTER twice to go back to Step "a".

   c. Type the offset time in 24 hour format (maximum 23 hours, 59 minutes, 59 seconds).

      - Press ENTER to implement the changes immediately, or
      - Select the time when the change is to occur, then press ENTER.

2. Set the millisecond offset:

   a. Type `M6`, then press ENTER to adjust the millisecond offset.

   b. Type `P` for Plus offset (if the local time is X-hours ahead of the UTC), or `M` for Minus offset (if the local time is X-hours behind the UTC), and then press ENTER.

   c. Type the desired offset (maximum 999 ms), and then press ENTER.

3. Set the phone offset:

   a. Type `M7`, and then press ENTER to adjust the phone offset.

      The phone offset is also used to set the local time for the GPS and modems. Refer also to the section "Daylight Saving/Eastern Standard Time Change Procedures" on page 24.

   b. Type `P` for Plus offset (if the local time is X-hours ahead of the UTC), or `M` for Minus offset (if the local time is X-hours behind the UTC), and then press ENTER.

c. Type the offset time in 24 hour format, and then press ENTER.

An entry of `00 00 00` will display the UTC, while any other hour/minute/second entry will force the UTC +/- *the offset time* to be displayed.

d. Type the millisecond offset (optional), or `000`, and then press ENTER.

4. Set the auxiliary offset:

a. Type `AUX`, and then press ENTER to adjust the auxiliary offset.

b. Type `P` for Plus offset (if the local time is X-hours ahead of the UTC), or `M` for Minus offset (if the local time is X-hours behind the UTC), and then press ENTER.

c. Type the offset time in 30 minute increments (maximum 12 hours), and then press ENTER.

When you are finished programming the CSD-5300 offsets, type `Quit` to exit the system mode.

Daylight Saving/Eastern Standard Time Change Procedures

Note

Calling the UTC reference requires entering the phone offset.

The GPS Receiver derives its time from an atomic standard providing UTC (Universal Coordinated Time), and then passes on the updated time information to the CSD-5300. Because the UTC does not follow Daylight Saving/Eastern Standard time changes in the spring and fall, the correct +/- 1 hour changes must be set by the local operator.

Setting Local Time (Via Modem or GPS Reference) and Phone Offset

Spring Change— Standard Time to Daylight Saving Time

To set the Daylight Saving Time using the Control Assembly Support (CAS) of the CSD-5300, follow this procedure:

1. Press the **Shift** and **Input Phone Offset** buttons simultaneously to enter phone offset mode.
2. Press the **Shift** and **Plus/Minus** buttons simultaneously to toggle the Plus/Minus LEDs to the "Minus" position.
3. Press the **Shift** and **Enter** buttons simultaneously.
4. Enter the desired offset (for example, `04 00 00` for EDT). Then press the **Shift** and **Enter** buttons simultaneously when you are finished.

Your Time Zone	Hours Added to UTC
Eastern Daylight Time (EDT)	-4
Central Daylight Time (CDT)	-5
Mountain Daylight Time (MDT)	-6
Pacific Daylight Time (PDT)	-7

5. Press the **Shift** and **Enter** buttons simultaneously to accept the default 0 millisecond offset.

Fall Change— Daylight Saving Time to Standard Time

To set the Standard Time using the CAS of the CSD-5300, follow this procedure:

1. Press the **Shift** and **Input Phone Offset** buttons simultaneously to enter phone offset mode.
2. Press the **Shift** and **Plus/Minus** buttons simultaneously to toggle the Plus/Minus LEDs to the "Minus" position.
3. Press the **Shift** and **Enter** buttons simultaneously.
4. Enter the desired offset (for example, `05 00 00` for EST). Press the **Shift** and **Enter** buttons simultaneously when you are finished.

Your Time Zone	Hours Added to UTC
Eastern Standard Time (EST)	-5
Central Standard Time (CST)	-6
Mountain Standard Time (MST)	-7
Pacific Standard Time (PST)	-8

5. Press the **Shift** and **Enter** buttons simultaneously to accept the default 0 millisecond offset.

Setting HMS (Hour/Minute/Second) in the Spring and Fall

Adjusting the HMS offset changes the current displayed time by the offset amount entered, and is used to input a daylight saving time or leap second change.

To change to Daylight Saving Time using the CAS of the CSD-5300, follow this procedure:

1. Ensure that DIP switch 1 on the 5300ET module is in the UP position.
2. Press the **Shift** and **HMS Offset** buttons simultaneously.
3. Press the **Shift** and **Plus/Minus** buttons simultaneously to toggle the Plus/Minus LEDs to the "Plus" position.
4. Press the **Shift** and **Enter** buttons simultaneously.
5. Enter an offset amount (for example, `01 00 00` for a one hour offset), and then press the **Shift** and **Enter** buttons when you are finished.

   At this point you can either

   - Press the **Shift** and **Enter** buttons again to immediately implement the change, or
   - Enter the offset activation time (for example, `02 00 00` for 2:00 a.m.), and then press the **Shift** and **Enter** buttons.

Note

The HMS offset can be programmed up to 24 hours in advance. For example, if the time change occurs at 2:00 a.m. Sunday morning, you can program the change anytime from 2:00 a.m. Saturday until 2:00 a.m. Sunday.

Impulse Clocks Running off the CSD-5300

Correcting Time on the Impulse Clocks

When an HMS offset time is programmed into the CSD-5300 unit, the impulse output from the CSD-5300 will either automatically advance at twice the speed or stop the pulses (whichever is quicker) to correct the time on the impulse clocks. If there is any difference afterwards that needs correcting, then the customer can use the Impulse Clock Reading mode to make adjustments.

Note

When this mode is selected, the CSD-5300 stops the impulse drive, and thus, all impulse clocks.

To adjust time on the impulse clocks after programming an HMS offset time into the CSD-5300, follow this procedure:

1. Press the **Shift** and **Input Impulse Clock Reading** buttons simultaneously.
2. Enter the stopped time of the impulse clock, and then press the **Shift** and **Enter** buttons simultaneously to accept the time.

TCC-1302 Time Change Information

Note

A color black reference is required for correct operation of the TCC-1302.

If you are using the Leitch TCC-1302 module with the CSD-5300, note that the TCC-1302 will not automatically update the time difference when the HMS offset is changed on the CSD-5300.

To manually or automatically Jam Sync the TCC-1302 after an HMS Offset time change, perform *one* of the following two procedures:

Manual Jam Sync	**Automatic Jam Sync** (Based on Programmed Correction Time)
1. Set the rotary switch SW1 in position 0. 2. Set the piano switch SW3 #1 to the UP position. 3. Adjust the toggle switch SW2 once to UP in order to Jam Sync to the input real time. 4. Set the piano switch SW3 #1 to the DOWN position to disable the local control.	1. Set Correction Hour/Minute/Second by using the combination of SW1 and SW2. 2. Ensure the piano switch SW3 #2 is set to the OPEN position to enable the automatic Jam Sync based on the Correction time.