GPS6400 Interface System
Master Time Control Systems
Installation and Customer Instructions

MC427A-406
Rev. F

S. Simplex

Cautions and Warnings

DO NOT INSTALL ANY SIMPLEX PRODUCT THAT APPEARS DAMAGED. Upon unpacking your Simplex product, inspect the contents of the carton for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify Simplex.

ELECTRICAL HAZARD - Disconnect electrical power when making any internal adjustments or repairs. Qualified Simplex Representatives should perform servicing. During installation, route field wiring away from sharp objects, and internal components. This product is intended for indoor use only.

STATIC HAZARD - Static electricity can damage components. Therefore, handle as follows:
1. Ground yourself before opening or installing components.
2. Keep uninstalled component wrapped in anti-static material at all times.

IMPORTANT - Use a cleaner that is nonabrasive and noncorrosive to plastics when cleaning the front of your clock.

SYSTEM MAINTENANCE - The GPS/6400 Interface System is manufactured for years of dependable, reliable use. However, to assure the reliability of this product, test the system at least every 6 months.

Copyright and Trademarks

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Introduction

The GPS6400 Interface System provides an accurate GPS time reference for the Simplex model 6400 and 6500 Master Clocks. There are two parts to the system: the GPS-427A Antenna/Receiver, and the GPS/6400 Interface Module. Offsets from Greenwich Mean Time (GMT) and seasonal changes are easily programmed for use in any world time zone.

The GPS-427A Antenna/Receiver provides accurate time by locking the GPS/6400 Interface Module to the NIST traceable time (atomic clock) sent by the GPS system.

The AUTO PROMPTING, alphanumeric display makes programming fast and simple.

The GPS/6400 Interface Module communicates with the 6400 and 6500 master clocks via its RS232 Interface.

GPS/6400 Interface Module

GPS-427A Antenna/Receiver

Specifications

PROGRAMMING CAPABILITIES

Auto Prompting Display – A back-lighted, two line, alphanumeric display provides information to guide the operator during programming. Each line has 16 characters. Displays GMT on the top line and LOCAL time on the bottom line.

Keypad – 16 clearly labeled keys for entering data.

Programmable Local Time Zone – Simple keyboard entry allows for programming the local time zone offset from GMT and any seasonal adjustments.

RS232 Interface – Provides an RS232 interface for sending local time updates to the 6400 when prompted by the 6400. If used with the 6500, local time and date updates are sent automatically at the 35th minute.

POWER FAIL BACKUP

The GPS/6400 Interface Module has a Non-Volatile Memory which keeps time and programs for indefinite power outages. Outputs and the display are disabled during backup. The GPS/6400 resumes normal operation when power returns.

ACCURACY

Time Keeping - Tracks the Atomic Clock for optimum accuracy. During a power failure it is quartz crystal controlled with an accuracy of +/- .005% throughout its full temperature range.

GPS LOCKED ON INDICATION

After accurate GPS time has been acquired and set, the GPS/6400 will indicate a "GPS Locked On" condition by changing the "Gmt" to a "GMT" (all capital letters) on the main time display.

<u>GENERAL</u>

Operating Temperature Range is from 0 to 50 degrees C

Enclosure - Anodized aluminum enclosure that measures 19"W X 3.5"H X 8"D. Rack mounts in a standard 19" equipment rack. Removable rack mounting brackets are included.

Weight: GPS-427A Antenna/Receiver   …. 1.0 lbs.
                 GPS/6400 Interface Module …. . . . . . .   2.5 lbs.

<u>ELECTRICAL</u>

Power required – 12VAC, 50/60 HZ (5VA Maximum)

A 120VAC to 12VAC, 1 Amp Power Module is provided.

The GPS-427A receives its power from the GPS-6400

The GPS-427A sends RS232 data to the GPS-6400.

Terminal blocks are provided on the back panel for connecting the GPS-427 Antenna/Receiver.

See the wiring diagram at the back of this manual.

Installation

There are two parts to the system: the GPS-427A Antenna/Receiver, and the GPS/6400 Interface Module.

<u>MOUNTING THE GPS ANTENNA/RECEIVER</u>

The GPS-427A Antenna/Receiver must be mounted with a clear, 120 degree view of the sky.
This can be on the side of a building or on a rooftop as required. Mounting holes and a short piece of conduit are provided. Refer to the GPS-427A drawing at the back of this manual for additional installation information.

The GPS-427A Antenna/Receiver connects to three clearly marked terminals located on the back panel of the GPS/6400.
Use unshielded, 3-conductor cable (24 gauge minimum, twisted, solid or stranded), up to 1000 feet from the GPS/6400.

<u>MOUNTING THE GPS-6400 INTERFACE MODULE</u>

The GPS/6400 Interface Module should be securely mounted in a 19" equipment rack according to any local codes using the mounting ears provided. Be sure the equipment is properly grounded to the panel or the facilities ground connection.
The GPS/6400 can also be shelf mounted by removing the rack mount ears.

ELECTRICAL CONNECTIONS

A Power Module is required for the AC power (connects to a power jack located on the back panel).

All other wiring connections are made at the clearly marked terminal blocks located on the back panel of the GPS/6400 enclosure. Remove the terminal block cover plate on the back panel to gain access to the terminal blocks. Be sure to replace the terminal block cover plate after making wiring connections.

See the wiring diagrams at the back of this manual.

Ensure that the installation conforms to the National Electrical Code and local wiring codes.

INTERFACING TO THE SIMPLEX 6400 and 6500 TIME CONTROL CENTERS

GPS/6400's with version 5.03 or higher firmware are able to interface with both the Simplex 6400 and 6500 Time Control Centers.

See the Operation Section for details.

The 6400 Master Clock must have sales option 6400-9505 installed.

The GPS/6400 Module sends Time to the 6400 Series Master Clock. Terminal blocks are provided for all wiring. Use 3-conductor (24 gauge minimum), unshielded cable, up to 50 feet.

See the wiring diagram at the back of this manual.

6400 Series Dip Switch settings

Enable W W V Option and set for 2400 Baud. Set the Dip Switches on the W W V Interface Board as follows:

DIP SWITCH	#5	#6	#7	#8	DESCRIPTION
	ON	ON	ON	OFF	WWV Option Enabled

| DIP SWITCH	#9	#10		DESCRIPTION
	ON	OFF		Selects 2400 BAUD

Refer to the 6400 Series Master Clock installation instructions for setting the internal switches.

Interfacing to the 6500 Time Control Center.

The GPS/6400 must have the 8100-0103 CPU Controller Assembly version 5.03 or higher. This controller is standard on all GPS/6400's with serial number 1722-00431 or higher.

FRONT PANEL DESCRIPTION

DISPLAY, KEYBOARD AND LABELING
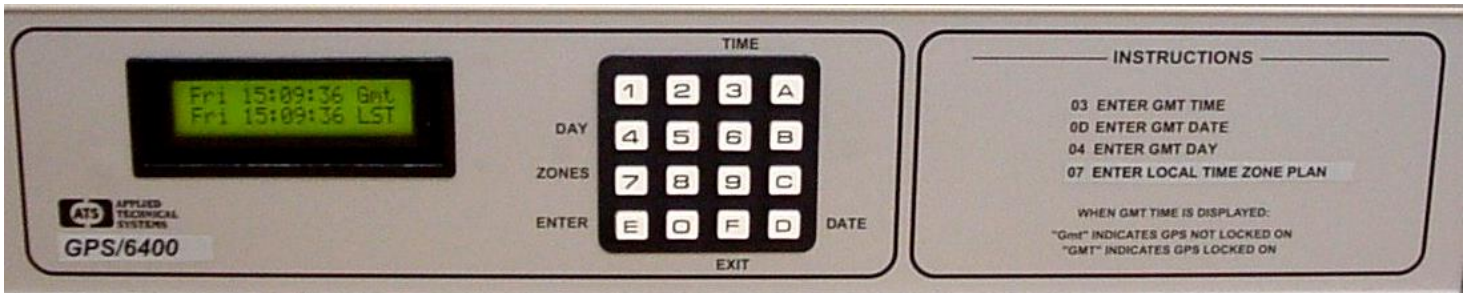
ALPHANUMERIC DISPLAY - Used for displaying GMT time, day, and date, and for displaying information during programming or reviewing stored programs.

KEYBOARD - Many keys serve multiple functions. Those keys are clearly labeled with their functions to the side and top of the key.

TIME KEY [3]   Used for entering the GMT Set Time Mode.

DATE KEY [D]   Used for entering the GMT Set Date mode.

EXIT KEY [F]   Used for exiting any of the GMT Set Time, Set Date, or program modes.

ENTER KEY [E]   Used for entering all commands or for stepping through program data entry.

DAY KEY [4] -   Used for setting the GMT day of the week.

ZONE KEY [7]   Used for entering the Local Time Zone Plan

THE CURSOR

On many of the display messages you will see a flashing square character called the cursor.   The cursor indicates that you may now enter or change the data at that position of the display.

APPLYING POWER

Before power is applied, be sure all installation and wiring is completed to all local codes.

Upon first applying power the display will come up with a brief sign-on message showing the model and version numbers:

> GPS/6400 Module
> Version 5.XX

And then the default GMT time display showing GMT time on the top line and Local time on the bottom line:

> Mon 01:18:00 Gmt
> Mon 01:18:00 LST

ENTERING DATA

As data is entered, the master clock constantly checks for a valid entry. For example, you cannot enter 13 for a month when setting the date.   After entering valid data to a position on the display, the cursor will advance to the next position. If you have tried to enter invalid data, the cursor will remain at the same position, indicating you must re-enter the data. Simply re-enter the data on top of the existing data and press ENTER.   Generally data is entered two digits at a time.

SELECT THE REQUIRED INTERFACE 6400 OR 6500

GPS/6400's with version 5.03 or higher firmware are able to interface with both the Simplex 6400 and 6500 Time Control Centers.

This is a keyboard selectable feature.

Press [3][1] [ENTER] to select the 6400 or 6500 Master Clock. The display will show:

```
Clock Mode =
Simplex 6400
```

Press any key to toggle between Simplex 6400 and Simplex 6500.

```
Clock Mode =
Simplex 6500
```

Press [Enter] when the desired Clock Mode is showing.

Previous GPS/6400's (versions less than 5.00), will require an upgrade if used with the 6500 Time Control Center.

Contact Simplex Tech Support for details.

If the GPS/6400 is interfaced with the 6500 Time Control Center, you can force an immediate update to the 6500. Press [3] [2] [Enter]. GPS/6400 time, day and date will be sent to the 6500.

Operation

With the GPS-427A Antenna/Receiver connected to the GPS/6400 Interface Module, accurate time signals are automatically monitored, and adjustments are made to the 6400 Master Clock. Only the Local Time Zone Plan needs to be programmed into the GPS/6400. No other operator adjustments or inputs are required.

Every hour at the 35th minute, the 6400 Master Clock will request time from the GPS/6400 Interface Module.

The 6500 Master Clock does not request time from the GPS/6400.

Although only the Local Time Zone Plan needs to be programmed into the GPS/6400, the following instructions also include how to manually set the GMT time, day, and date. Manually setting the GMT time day and date is only required if the GPS-427A Antenna/Receiver is not connected.

PROGRAMMING THE GPS/6400 INTERFACE MODULE

This section explains how to manually set the GMT time, day, and date (if the GPS-427A Antenna/Receiver is not connected), and how to program the Local Time Zone Plan

If the GPS-427A Antenna/Receiver is connected and has a clear view of the sky, the GPS/6400 will "lock on" to the GPS satellites. This may take up to 15 minutes the first time it is powered on in its new location. When locked on the Gmt indication will change to GMT. See the following:

```
Mon 01:18:00 GMT
Mon 01:18:00 LST
```

Accurate GMT time, day, and date have now been automatically set.

You may now skip to the section titled "ENTERING OR EDITING THE LOCAL TIME ZONE PLAN [7] [ENTER]".

ENTERING OR EDITING GMT TIME   [3] [ENTER]

Manually setting the GMT TIME is only required if the GPS-427A Antenna/Receiver is not connected.
You must be in the default GMT Time display before you can enter time. Press the EXIT key to be sure.   The display should look similar to the following:

```
Mon 01:18:00 Gmt
Mon 01:18:00 LST
```

Both lines will read the same day and time until the local time zone plan is entered.

Press the TIME key [3]. The display will respond with:

```
Command? 03
Press ENTER
```

Press [ENTER]. The display will respond with:

```
Time? 12:34 GMT
Hrs. (HH), ENTER
```

It may be showing the correct time or some other incorrect time previously stored.

Be sure to enter GMT time.

The cursor will be flashing in the hour's position. The bottom line will give you additional information on how to enter the data.   Enter the desired two-digit number for hours in 24 hour format and press [ENTER]. If the hours are correct simply press [ENTER].   The cursor will move to the minute's position. Do not press [EXIT] part way through editing the time, date or any program steps unless you want to abort the editing.   If you exit part way through, any changes made prior to the current position will be ignored. Enter the desired two digits for the minutes and press [ENTER]. Before pressing [ENTER], you may wish to synchronize this master clock to some other reference clock. The instant you press [ENTER], the time keeping will begin. Therefore to synchronize with another reference clock, wait until it is ready to change to the desired time and press [ENTER] at that instant.

ENTERING OR REVIEWING THE GMT DATE   [D] [ENTER]

Manually setting the GMT DATE is only required if the GPS-427A Antenna/Receiver is not connected.

You must be in the time display in order to enter the date. Press the DATE key [D]. The display will respond with:

```
Command? 0D
Press ENTER
```

Press [ENTER]. The display will respond with:

```
Date? 12-29-17
Month (MM), ENTER
```

It may be showing the correct date or some other date stored previously.

Be sure to enter the GMT date.

The cursor will be flashing in the month's position. The bottom line will give you additional information on how to enter the data.   Enter the desired two digit number for the month and press [ENTER]. If the correct two digits are already there, simply press [ENTER].   The cursor will move to the day position.   Enter the desired two digits for the day and press [ENTER].   The cursor will move to the year position. Enter the desired two digits for the year and press [ENTER].   The master clock will go back to the time display.   To review your entry press the DATE key [D] and [ENTER]. The date display will appear. You can edit the date again if you wish or press [EXIT] to return to the time display.   Remember that if you edit any part of the time, date or any program steps, you must not exit.   Press [ENTER] until all positions of the display have been edited or you have accepted the default information in each display.

ENTERING OR EDITING THE GMT DAY   [4] [ENTER]

Manually setting the GMT DAY is only required if the GPS-427A Antenna/Receiver is not connected.

Be sure to enter the GMT day.

You must be in the time display. Press the DAY key [4]. The display will respond with:

```
Command? 04
Press ENTER
```

Press [ENTER]. The display will respond with:

```
Day?  Sun
DAY key, ENTER
```

It may be showing the correct day or some other day stored previously.   Press the DAY key [4] until the desired day is shown on the display and then press [ENTER]. The display will return to the time display.

ENTERING OR EDITING THE LOCAL TIME ZONE PLAN [7] [ENTER]

For your Local Time Zone, you will need to program the specific offset from GMT and any seasonal changes required (DST).

Refer to the local laws for your specific Time Zone settings.

You must be in the time display. Press the ZONE key [7]. The display will respond with:

```
Command? 07
Press ENTER
```

Press [ENTER]. The display will respond with:

```
 Offset From
GMT = +00.0 Hrs
```

The cursor will be on the "+" sign, prompting for an Offset from GMT.

If the desired offset is a "-" (minus) from GMT, press any key (except ENTER or EXIT) to change the sign from "+" to "-" and vice versa, then press ENTER. The cursor will move to the 00.0. Enter the desired Hours (two digits) of Offset, the press ENTER. Valid entries are from –12 to +12 Hours, including 00. The cursor will move to the tenths of Hours for the Offset. Valid entries are 0 or .5. Press any key (except ENTER or EXIT) to change the fractional offset from 0 to .5 and visa versa. Then press ENTER.

The display will respond with:

```
Format = 12 Hour
```

Press any key (except ENTER or EXIT) to change the Format from 12 Hour to 24 Hour and vice versa. Press ENTER. The display will respond with:

```
S DST M=00 SUN=L
E DST M=00 SUN=L
```

The top line is for the Start (S) of DST and the bottom line is for the End (E) of DST. The cursor will be flashing in the month position. Enter the desired two digits for the month you wish the Start of the DST adjustment to be made (03 for current US law) and then press [ENTER]. Enter 00 for the month if there is no DST requirement for this zone.   After a valid month is entered, the cursor will advance to the L in the Sunday position. Enter the desired Sunday for this change to occur. Valid entries are 1 to 5. 1 for the first Sunday, 2 for the second (current US law), 3 for the third, 4 for the fourth or 5 (L) for the last Sunday). L is the same as key 5.   The change will be made at 02:00 AM on the Sunday you choose.

After the Start (S) DST data is entered, the cursor will advance to the End (E) DST line.   If you have entered a Start (S) DST, you must enter an End (E) DST as well. Failure to do so will erase the Start DST and then there will be no DST compensation for this zone.

In the same manner as the Start DST, enter the desired month and Sunday you wish the adjustment to be made.   Current US law for Fall DST is the first Sunday in November.   Example: enter 11 for the month and 1 for the Sunday. The change will also be made at 02:00 AM on the Sunday you choose.

For example, the DST settings for the current U.S. law will read:

```
S DST M=03 SUN=2
E DST M=11 SUN=1
```

LST or LDT TIME DISPLAY

Local time will be followed by LST for Local Standard Time.

Local time will be followed by LDT for Local Daylight Savings Time.

```
Mon 01:18:00 Gmt
Mon 06:18:00 LST
```

When locked on the Gmt indication will change to GMT.

```
Mon 01:18:00 GMT
Mon 06:18:00 LDT
```

If the 6400 keypad active LED blinks – it is on for 7/8 second, and off for 1/8 second, there is no communication between the 6400 GPS and the 6400 Master Clock. Verify wiring between both units. See if the 6400 GPS is locked on to a signal, or has the time set on it.

SPECIAL FUNCTIONS

SOFTWARE VERSION

To check the version of the software installed in your GPS/6400, press [9] [9] [ENTER]. The display will read:

```
GPS/6400 Module
Version 5.XX
```

After 5 seconds the display will return to the time display.

PROGRAMMING SUMMARY

Read the sections on Programming Instructions before using the PROGRAMMING SUMMARY.

SET TIME - Press TIME [3] key then [ENTER].   Enter GMT Time in 24-Hour Format. Enter the hours, press [ENTER]. Enter the minutes, press [ENTER]. Timing begins the instant you press [ENTER] after entering the minutes.

SET DATE - Press DATE [D] key then [ENTER].   Enter month, press [ENTER]. Enter day, press [ENTER]. Enter year, press [ENTER].

SET DAY - Press the DAY [4] key then [ENTER].   Press the DAY [4] key until desired day is displayed, then press [ENTER].
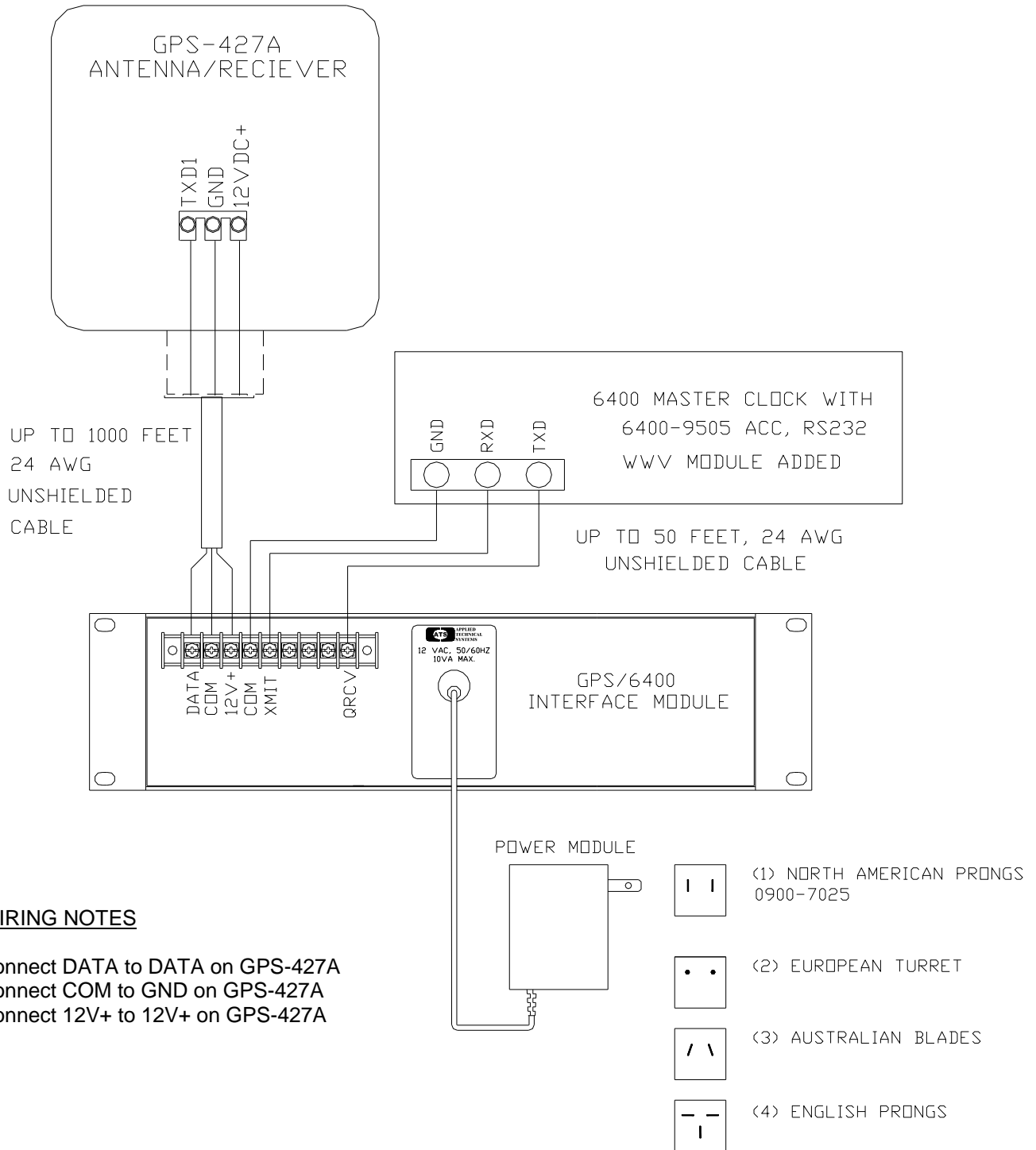
PROGRAMMING THE LOCAL TIME ZONE PLAN - Press ZONE [7] key then [ENTER].
Select "+" or "-" (using any key except ENTER or EXIT) for the sign of the Offset, then press ENTER.

Enter the desired Hours of Offset from GMT (-12 to +12, or 00), then press ENTER. Enter the desired tenths of Hours of Offset from GMT (0 or .5), then press ENTER.

Select 12 or 24 Hour Format (using any key except ENTER or EXIT), then press ENTER.

Enter 00 for the month if no DST adjustments are required for this Zone. Otherwise, enter the month for Start (S) DST, press [ENTER]. Enter the desired Sunday for the Start (S) DST, press [ENTER]. Enter month for End (E) DST, press [ENTER]. Enter the desired Sunday for End (E) DST, press [ENTER].

GPS-427A
ANTENNA/RECIEVER

TXD1 GND 12VDC+

UP TO 1000 FEET
24 AWG
UNSHIELDED
CABLE

6400 MASTER CLOCK WITH
6400-9505 ACC, RS232
WWV MODULE ADDED

GND RXD TXD

UP TO 50 FEET, 24 AWG
UNSHIELDED CABLE

ATS APPLIED
TECHNICAL
SYSTEMS

12 VAC, 50/60HZ
10VA MAX.

DATA COM 12V+ COM XMIT QRCV

GPS/6400
INTERFACE MODULE

POWER MODULE

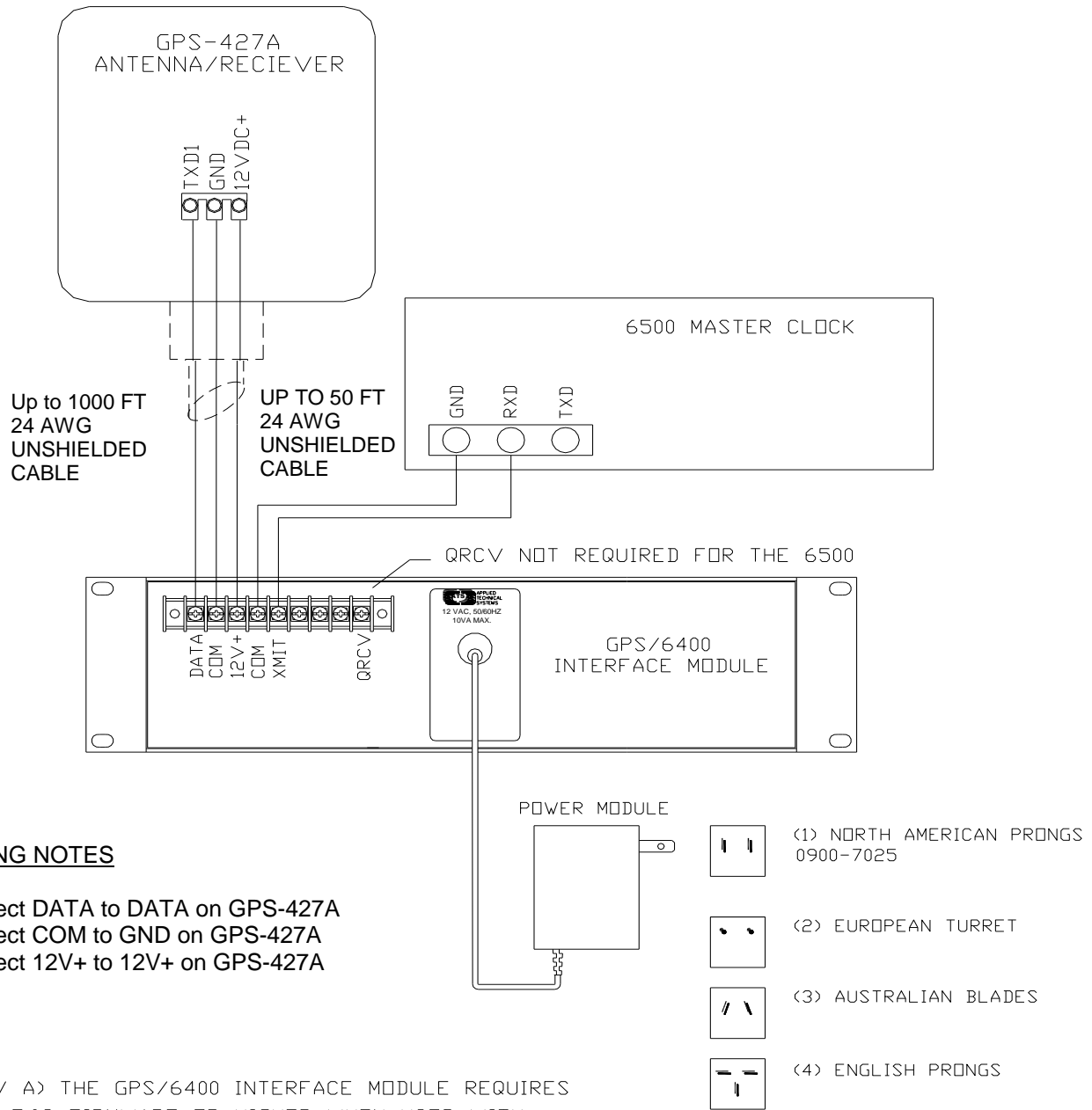**WIRING NOTES**

Connect DATA to DATA on GPS-427A
Connect COM to GND on GPS-427A
Connect 12V+ to 12V+ on GPS-427A

(1) NORTH AMERICAN PRONGS
0900-7025

(2) EUROPEAN TURRET

(3) AUSTRALIAN BLADES

(4) ENGLISH PRONGS

All Power Modules must have a 12 VAC, 1 Amp
secondary rating

6500 Master Clock
Wiring Diagram

GPS-427A
ANTENNA/RECIEVER

TXD1 GND 12VDC+

Up to 1000 FT
24 AWG
UNSHIELDED
CABLE

UP TO 50 FT
24 AWG
UNSHIELDED
CABLE

6500 MASTER CLOCK

GND RXD TXD

QRCV NOT REQUIRED FOR THE 6500

DATA COM 12V+ COM XMIT QRCV

APPLIED TECHNICAL SYSTEMS
12 VAC, 50/60HZ
10VA MAX.

GPS/6400
INTERFACE MODULE

POWER MODULE

(1) NORTH AMERICAN PRONGS
0900-7025

(2) EUROPEAN TURRET

(3) AUSTRALIAN BLADES

(4) ENGLISH PRONGS

WIRING NOTES

Connect DATA to DATA on GPS-427A
Connect COM to GND on GPS-427A
Connect 12V+ to 12V+ on GPS-427A

(REV A) THE GPS/6400 INTERFACE MODULE REQUIRES
VER 5.03 FIRMWARE OR HIGHER WHEN USED WITH
THE 6500 MASTER CLCOK.

All Power Modules must have a 12 VAC, 1 Amp
secondary rating

MC427A-406
Rev. F