

Tech Note 1017 – Setting up a GPS Interface with Controllers using V76.x or V80.x Software

The purpose of this TechNote is to assist the user in programming various GPS units in controllers that use V76.x or V80.x software. Units such as the Garmin GPS device can be connected externally to the controller serial ports or be connected internally via 2070-7T or 2070-7G card modules like the ASI, Intelight, and McCain GPS units. In particular, Trafficware has created software to support Garmin, Intelight, ASI (Adaptive Solutions, Inc), and McCain GPS devices. Please note that the agency will need versions V80_4B or V76_15K or later for third party module support.



Programming of an external GPS unit connected to a 2070-7A serial port

The user must map the GPS unit to the 2070 serial hardware settings. This example considers the programming of the Garmin® GPS connected to the 2070-7A module.

Although Garmin® manufactures various GPS devices, this section will apply to the interface with any of these devices.

The user can contact Trafficware to purchase the wiring interface for the 2070 7A port: NAZTEC PART # 10614-2000 or the AUX 232 P-C PORT of a 980 ATC controller.

The user should contact your Trafficware representative to purchase the wiring interface for the PC PRINT port of a 980 ATC controller: NAZTEC PART # 10614-2100.

Typically, agencies connect the external GPS unit to the 2070-7A. The software provides 4 hardware serial ports (SP1, SP2, SP3 and SP8) which may be assigned to the 4 logical ports (ASYNC 1-4) under the port binding menu. The default programming assumes that SP1 and SP2 located on the 2070-7A card are assigned to ASYNC1 and ASYNC2 respectively. SP8 is typically assigned to ASYNC3 and dedicated for the internal hardware of the controller. To see the binding, go to **MM->6->6**.

Port Binding					
Async	Hdwr			Sync	Hdwr
Chan	Port	Echo	Mode	Chan	Port
Async1:	SP1	NONE	0	Sync1:	SPBS
Async2:	SP2	NONE	0	Sync2:	SP5S
Async3:	SP8	NONE	0		
Async4:	OFF	NONE	0		

Port Binding	
Func	Chan
TS2 CVM:	ASYNC3
CMU/MMU:	NONE
Opticom:	NONE
LoopDet:	NONE
GPS :	NONE
SysUp :	NONE
SysDown:	NONE
Shell :	NONE
FIO20 :	SYNC1
TS2IO :	SYNC2

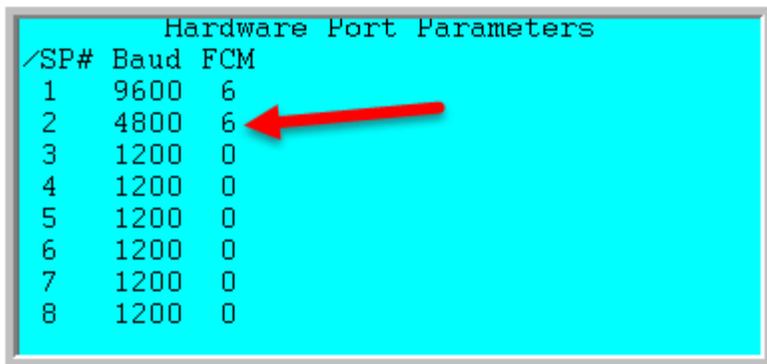
By accessing the Port Binding sub-menu at **MM->6->6**, the user can assign the GPS unit to interface to the bottom port of the 2070-7A (SP2 = ASYNC2) as shown on the screen shots below.

Port Binding	
Func	Chan
TS2 CVM:	ASYNC3
CMU/MMU:	NONE
Opticom:	NONE
LoopDet:	NONE
GPS :	ASYNC2
SysUp :	ASYNC1
SysDown:	#ONE
Shell :	NONE
FIO20 :	SYNC1
TS2IO :	SYNC2

In the example above, SP1 on a 2070-7A card is assigned to the system and SP2 is assigned to the GPS unit.

Note: Whenever the Agency modifies the hardware binding (MM->6->6) the unit has to be restarted via a physical power down/up.

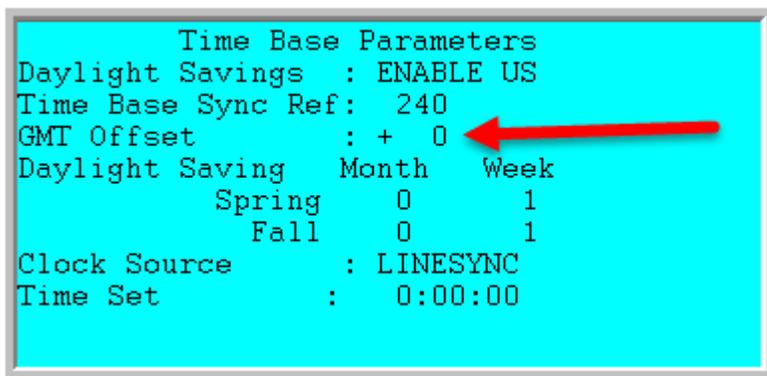
For a Garmin GPS external unit, the baud rate of SP2 must be set to 4800 under MM->6->2 as shown below.



A screenshot of a terminal window titled "Hardware Port Parameters". It displays a table with three columns: "/SP#", "Baud", and "FCM". The rows are numbered 1 through 8. A red arrow points to the "FCM" value of 6 in the second row (SP2).

/SP#	Baud	FCM
1	9600	6
2	4800	6
3	1200	0
4	1200	0
5	1200	0
6	1200	0
7	1200	0
8	1200	0

The user must now go to MM->4->6 to set the GMT offset for location based on time zone. (EST = -5, CST = -6, MST=-7, PST = -8). Be sure to select the proper +/- sign.



A screenshot of a terminal window titled "Time Base Parameters". It displays several configuration options. A red arrow points to the "GMT Offset" value of + 0.

Daylight Savings	: ENABLE US		
Time Base Sync Ref:	240		
GMT Offset	: + 0		
Daylight Saving	Month	Week	
Spring	0	1	
Fall	0	1	
Clock Source	: LINESYNC		
Time Set	: 0:00:00		

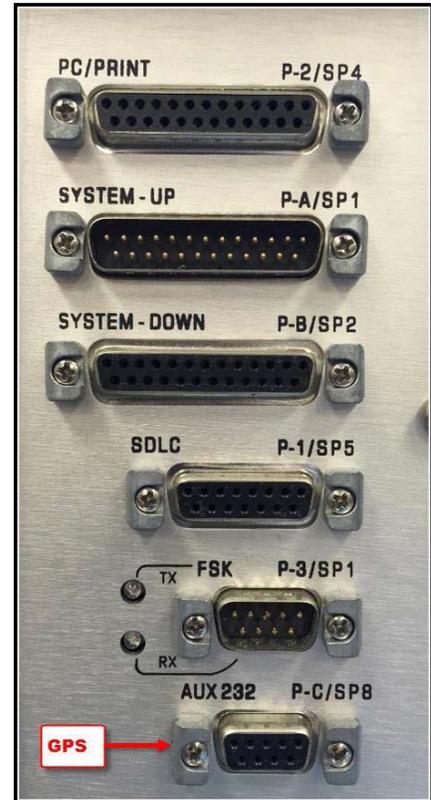
Using the Garmin external GPS, the controller will automatically resynchronize the time from the GPS unit twice per hour at approximately 13 and 43 minutes past the hour, every hour.

Programming of an external GPS unit connected to a ATC serial port

The user must map the GPS unit to the 2070 serial hardware settings. This example considers the programming of the Garmin® GPS connected to the 980 ATC Auxiliary serial port. The GPS interface for the ATC is identical to the operation for the 2070 discussed in the last section with the exception of the com port settings.

The ATC provides 4 hardware serial ports (SP1, SP2, SP3 and SP8) which may be assigned to the 4 logical ports (ASYNC 1-4) under the port binding menu. The default programming assumes that SP1 and SP2 are assigned to ASYNC1 and ASYNC2 respectively. SP8 is typically assigned to ASYNC3. This is the port that we will use.

By accessing the Port Binding sub-menu at **MM->6->6**, the user can assign the GPS unit to interface to the bottom port of the 2070-2A, as shown on the screen shots below.

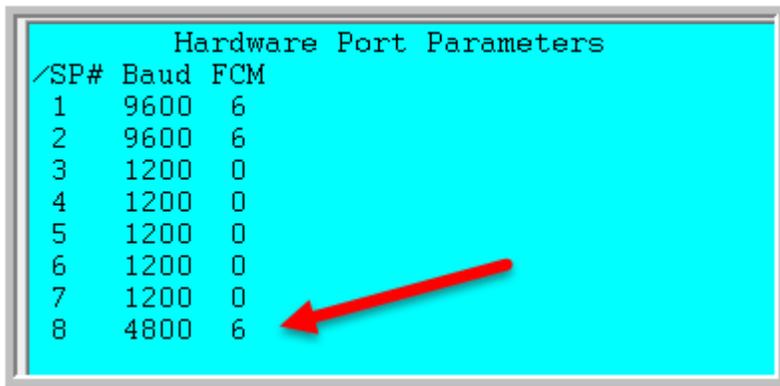


Port Binding					
Async	Hdwr		Sync	Hdwr	
Chan	Port	Echo/Mode	Chan	Port	
Async1:	SP1	NONE 0	Sync1:	SPBS	
Async2:	SP2	NONE 0	Sync2:	SP5S	
Async3:	SP8	NONE 0			
Async4:	OFF	NONE 0			

Port Binding	
Func	Chan
TS2 CVM:	NONE
CMU/MMU:	NONE
Opticom:	NONE
LoopDet:	NONE
GPS :	ASYNC3
SysUp :	ASYNC1
SysDown:	NONE
Shell :	NONE
FI020 :	SYNC1
TS2I0 :	SYNC2

Note: Whenever the Agency modifies the hardware binding (MM->6->6) the unit has to be restarted via a physical power down/up.

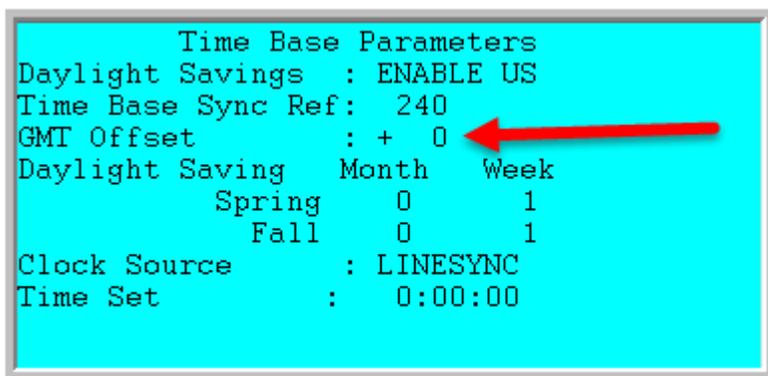
For a Garmin GPS external unit, using this port, the baud rate of SP8 must be set to 4800 under **MM->6->2** as shown below.



A screenshot of a terminal window showing the 'Hardware Port Parameters' menu. The menu lists eight serial ports (SP#) with their respective Baud rates and FCM values. A red arrow points to the entry for SP8, which has a Baud rate of 4800 and an FCM of 6.

SP#	Baud	FCM
1	9600	6
2	9600	6
3	1200	0
4	1200	0
5	1200	0
6	1200	0
7	1200	0
8	4800	6

The user must now go to **MM->4->6** to set the GMT offset for location based on time zone. (EST = -5, CST = -6, MST=-7, PST = -8). Be sure to select the proper +/- sign.



A screenshot of a terminal window showing the 'Time Base Parameters' menu. The menu includes options for Daylight Savings, Time Base Sync Ref, GMT Offset, Daylight Saving Month and Week, Clock Source, and Time Set. A red arrow points to the 'GMT Offset' field, which is currently set to '+ 0'.

Parameter	Value
Daylight Savings	ENABLE US
Time Base Sync Ref	240
GMT Offset	+ 0
Daylight Saving Month	0
Daylight Saving Week	1
Clock Source	LINESYNC
Time Set	0:00:00

Using the Garmin external GPS, the controller will automatically resynchronize the time from the GPS unit twice per hour at approximately 13 and 43 minutes past the hour, every hour.

Programming of an internal GPS unit such as a 2070-7T or 2070-7G

The internal GPS card (2070-7T or 2070-7G) can be installed in slot A1 or A2 of the 2070 chassis, but the example below demonstrates using slot A1. The default software provides 4 hardware serial ports (SP1, SP2, SP3 and SP8) which may be assigned to the 4 logical ports (ASYNC 1-4) under the port binding menu. The default programming assumes that SP1 and SP2 located on the 2070-7A card are assigned to ASYNC1 and ASYNC2 respectively. SP8 is typically assigned to ASYNC3 and dedicated for the internal hardware of the controller. To see the default binding, go to **MM->6->6**.

Port Binding					
Async	Hdwr			Sync	Hdwr
Chan	Port	Echo/Mode		Chan	Port
Async1:	SP1	NONE	0	Sync1:	SPBS
Async2:	SP2	NONE	0	Sync2:	SP5S
Async3:	SP8	NONE	0		
Async4:	OFF	NONE	0		

Port Binding	
Func	Chan
TS2 CVM:	ASYNC3
CMU/MMU:	NONE
Opticom:	NONE
LoopDet:	NONE
GPS :	NONE
SysUp :	NONE
SysDown:	NONE
Shell :	NONE
FI020 :	SYNC1
TS2I0 :	SYNC2

By accessing the Port Binding sub-menu at **MM->6->6**, the user can reassign the GPS interface to work with the 2070-7T and 2070-7G modules. Several configuration options are possible, but the example below shows mapping the GPS cards to SP3 and ASYNC4.

```

Port Binding
Async  Hdwr          Sync  Hdwr
Chan  Port   Echo/Mode   Chan  Port
Async1: SP1  NONE    0   Sync1: SPBS
Async2: SP2  NONE    0   Sync2: SP5S
Async3: SP8  NONE    0
Async4: SP3  NONE    0
    
```

```

Port Binding
Func    Chan
TS2 CVM: ASYNC3
CMU/MMU: NONE
Opticom: NONE
LoopDet: NONE
GPS    : ASYNC4
SysUp  : ASYNC1
SysDown: NONE
Shell  : NONE
FI020  : SYNC1
TS2IO  : SYNC2
    
```

In the example above, SP3 on a 2070-7T or 2070-7G card is assigned to the GPS unit.

Navigate to **MM->6->2** (Port Parameters). If using Intelight or ASI GPS with the 2070-7T card, the baud rate of SP3 must be set to 4800 and FCM should be set to 6. If using a McCain 2070-7G card, the baud rate should be set to 38.4K and FCM should be set to 6.

```

Hardware Port Parameters
/SP# Baud FCM
1    9600 6
2    9600 6
3    4800 6
4    1200 0
5    1200 0
6    1200 0
7    1200 0
8    1200 0
    
```

Note: Whenever the Agency modifies the hardware binding (MM->6->6) the unit has to be restarted via a physical power down/up.

The user must now go to **MM->4->6** to set the GMT offset for location based on time zone. (EST = -5, CST = -6, MST=-7, PST = -8). Be sure to select the proper +/- sign.

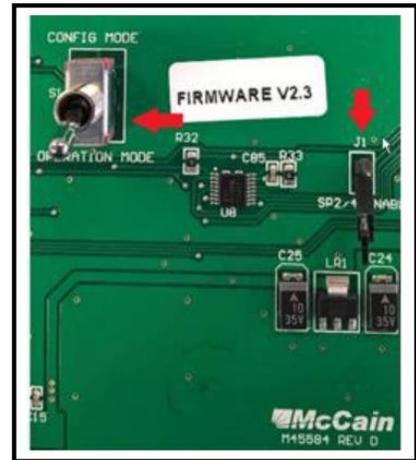
```
Time Base Parameters
Daylight Savings : ENABLE US
Time Base Sync Ref: 240
GMT Offset      : + 0
Daylight Saving Month Week
   Spring      0 1
   Fall        0 1
Clock Source    : LINESYNC
Time Set        : 0:00:00
```



Based on the Manufacturer, the internal GPS will periodically resynchronize the time.

GPS Card Specific Hardware Considerations

The McCain GPS requires configuration on the GPS card itself. For correct operation, the “SW” shown below must have a jumper in the GPS position. The “S1” switch must also be set in the “OPERATION MODE” and “J1” must be open (no jumper) as shown to the right.

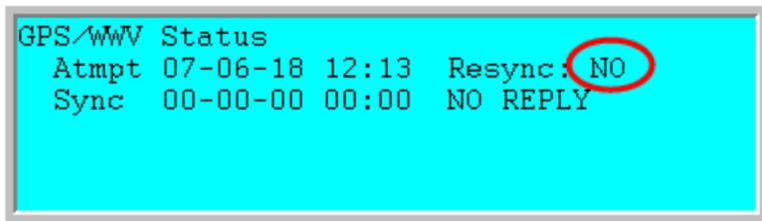


The Intelight GPS switch “S1” must be set with switch 1 in the down position and switch 2 in the up position as shown to the right. Switch 2 is set to establish the internal async connection when mounted inside the controller.



Monitoring the GPS Communications

The **MM->4->9->3** screen provides the last date/time stamp when the controller attempted to communicate with the GPS device. The status also shows the time returned by the GPS and a message indicating if the attempt was successful. The menu also allows the user to manually force the controller to re-sync the GPS.



```
GPS/WWV Status
  Atmpt 07-06-18 12:13  Resync: NO
  Sync  00-00-00 00:00  NO REPLY
```

Toggle the Re-sync setting to "YES" and press <ENTR> under **MM->4->9->3**. This will update the date and time on the menu and provide one of the following status displays:

- a) **OK Reply** – system clock update is successful
- b) **No Port** – the Async channel and or port settings have not been configured correctly
- c) **No Reply** – the channel and port settings are configured but the GPS card did not respond
- d) **Bad Reply** – the GPS card responded but the required GPS message was not present or the message was garbled (checksum error)
- e) **No Signal** – the GPS card may respond indicating an antenna signal fault

You can also use the communications status menu (**MM->6->7**) to monitor the Data Flow. Keep in mind you need to know your mapping between the physical serial port and the Async port (i.e., know what Async port is mapped to the GPS unit.) However, this status does not indicate if the baud rate is set correctly or if the GPS messages received are valid. Therefore, the user is advised to perform a Resync under GPS Status menu (**MM->4->9->3**) to confirm that the GPS is setting the system clock correctly.

Summary

Various GPS devices can be interfaced to controllers that use V76.x or V80.x software.