How to do auto-time-synchronization and measure the local Longitude and Latitude by using the GPS-721 or I-87211W GPS I/O module in ISaGRAF PAC ?

by chun@icpdas.com

The WP-8xx7, iP-8xx7, uPAC-7186EG and future ViewPAC-25W7 support the I-87211W GPS I/O module to do time-synchronization and measure the local Longitude and Latitude since their driver version listed below. There is one another compact RS-485 remote GPS-721 module available, which supports the similar functions than the i-87211W does but can only be connectted by the PAC via RS-485 connection. (The I-87211W can plug in ISaGRAF PAC 's slot 0 to 7 or can be connected by PAC via RS-485 connection)

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WP-8xx7 / 8xx6 :	since ver. 1.07	iP-8xx7 :	since ver. 1.03
uPAC-7186EG :	since ver. 1.06	ViewPAC-25W7 :	since released.
XP-8xx7-CE6:	since released		

The following driver suppprts "GPS_721" .

WP-8xx7 / 8xx6 :	since ver. 1.15	iP-8xx7 :	since ver. 1.06
uPAC-7186EG :	since ver. 1.09	ViewPAC-25W7 :	since ver. 1.06
XP-8xx7-CE6:	since released		

I-87211W 與 GPS-721: http://www.icpdas.com/products/GSM_GPRS/wireless/solutions.htm#5
New released PAC driver : http://www.icpdas.com/products/PAC/i-8000/isagraf.htm > Driver
This document : www.icpdas.com > FAQ > Software > IsaGRAF > 107
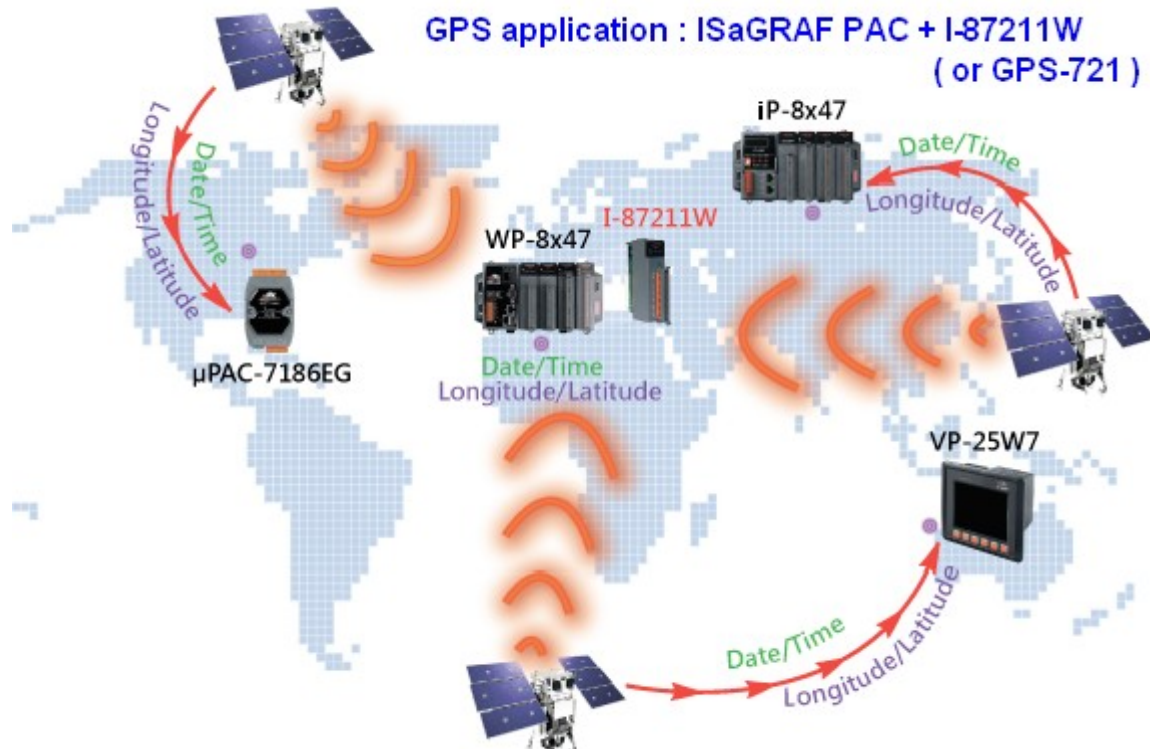
The I-87211W GPS module developed by ICP DAS can search up to 8 satellites to get the global UTC time and local Longitude and Latitude. The WP-8xx7, iP-8xx7, uPAC-7186EG and ViewPAC-25W7 PAC can connect one I-87211W to do auto-time-sychronization and measure the local Longitude and Latitude. In theory, one satellite found by the i-87211W can get the correct

UTC time, while getting correct Longitude and Latitude require at least 3 staelities found. The ISaGRAF PAC can convert the UTC time to the local time. If user enable the auto-time-sychronization function in the ISaGRAF program, the PAC will auto modify its RTC (Real-Time-Clock) to the correct local time when the controller's RTC date and time is different more than 2 seconds than the local time from satilites.

WP-8xx7, iP-8xx7 and ViewPAC-25W7 support one I-87211W plugged in their slot 0 to 7 (The VP-25W7 has only slot 0 to 2).
They also support the I-87211W as RS-485 remote I/O module (this RS-485 remote I-87211W need the expansion base :RU-87P1/2/4/8 or I-87K4/5/8/9).There will be one another compact RS-485 remote GPS-721 module available in the future, which supports the similar functions than the i-87211W (The GPS-721 doesn't need the expansion base) .
(http://www.icpdas.com/products/io_expansion_unit/IO_Expansion_Unit.htm)

Note: One ISaGRAF PAC can connect only one I-87211W or GPS-721.

Please make sure the "i_87211w" c-function block and I/O complex-equipment are well installed in your PC / ISaGRAF before programming the I-87211W. Please visit the following web site to download them. They are inside the zip file.(file name is "i_87211w.fia" and "i_87211w.xia" and "gps_721.fia")   www.icpdas.com > FAQ > Software > ISaGRAF > 107

Then follow below steps to restore them to your PC / ISaGRAF.

IO Complex-equipment - "i-87211w.xia"
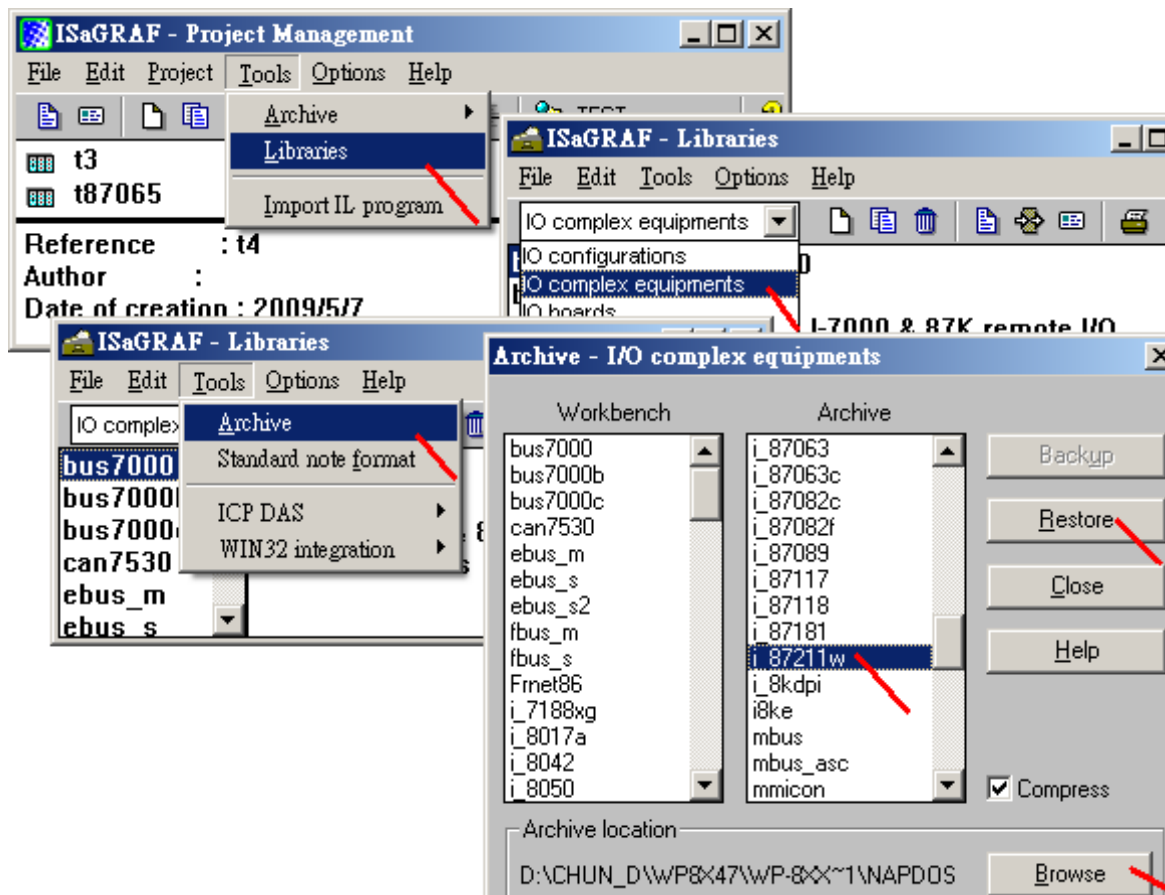
c-function block - "i_87211w.fia" (and "GPS_721.fia")
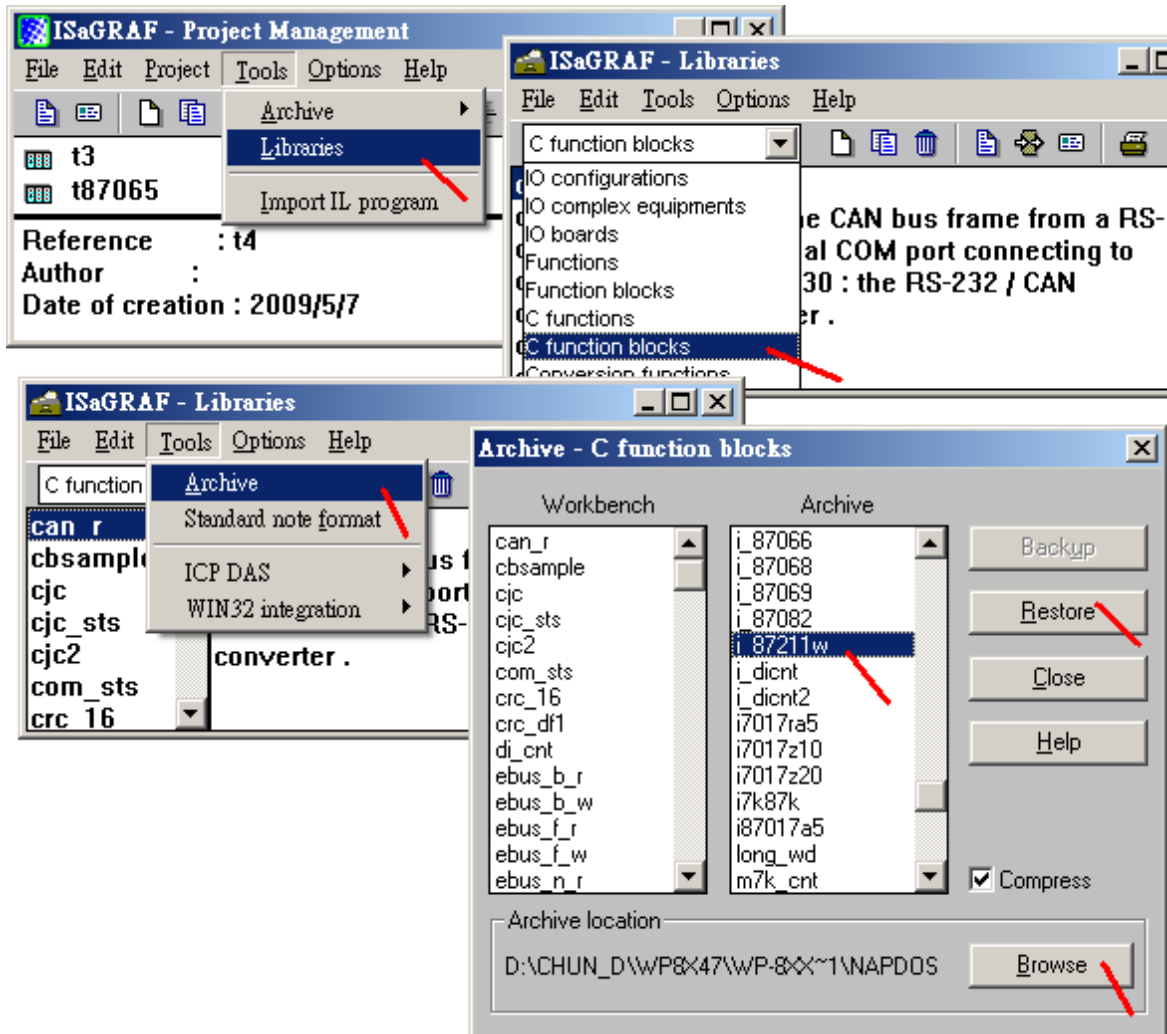
Please connect the IO complex-equipment "i_87211w" in the ISaGRAF IO connection window as below if using the i-87211W in WP-8xx7 / iP-8xx7 's slot 0 ~ 7 or in VP-25W7 's slot 0 ~ 2.

All channels in the "Dat_Time" and "Location" are Integer input type, while are Boolean output type in the "DO2" .

Time_Sync: value 1 means enable the auto-time-synchronization function. Value 0 disable it.

UTC_diffirence: The time difference between the UTC Time and local time. Value can be -1200 to +1200 , for ex., 800 means +8 hour, +230 means +2 hour and 30 minutes, -700 means -7 hour.

Ch.1 means the Date / Time from satellite is correct or not. Value 1 means correct (Ch.2 to 9 are all correct). However value 0 means incorrect (then Ch.2 to 9 data can not be used). (Ch1 val is auto-modified by the satellite state)

Ch.2 : Year , Ch.3 : Month , Ch.4 : Day

Ch.5 : Hour , Ch.6 : Minute , Ch.7 : Second

Ch.8 : Satellite amount found, can be 0 to 8

Ch.9 : Reserved (GPS working state, normal is 1)

Ch.1 means the Longitude and Latitude correct or not. Value 1 means correct (Ch.2 and 3 are correct) . However value 0 means incorrect (then Ch.2 and 3 data can not be used)

(Ch1 val is auto-modified by the satellite state)

Ch.2 : Longitude, unit is 0.00001 degree.

Positive val means East , negative means West. Value can be -17999999 (-179.99999 degree) to +18000000 (+180.00000 degree)

Ch.2 : Latitude, unit is 0.00001 degree.

Positive val means North, negative means South. Value can be -9000000 (-90.00000) to +9000000 (+90.00000 degree)

The "DO2" is two Boolean output channels in the I-87211W modules.

If the i-87211W (or using GPS-721) is connected by the WP-8xx7, iP-8xx7, uPAC-7186EG or VP-25W7 PAC via RS-485, please run DCON utility (at least version 5.0.5, can be download at below web site, ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/setup/) to do initial setting for the I-87211W . Setting well its Addr and BaudRate and Checksum (Disable / Enable, default is Disable).
Then connect the IO complex-equipment "bus7000b" in the ISaGRAF IO connection window.

(Please refer to the Chapter 6 of the ISaGRAF User's manual for using RS-485 remote I/O modules)

The following figure is using PAC 's COM2 , BaudRate as 9600 bps, No checksum to connect remote I/O modules.
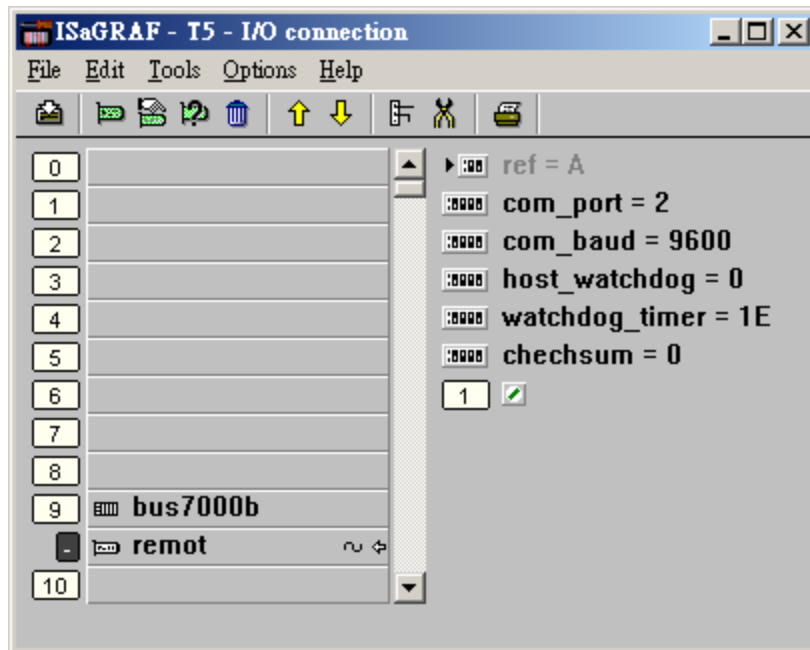
Then write an similar Ladder program as the next page to control the remote I-87211W (or GPS-721).

Writing one Ladder prgram as below to control remote I-87211W:

Please uses "GPS_721" for the GPS-721 module.

If using "GPS_721", setting False to "B2_" (left side). That is because the GPS-721 modules has only one D/O .

```
                    ┌─────────────┐
                    │  I_87211W   │         COMM_ok1
                  ──┤en        Q_ ├───────────( )─────────────
               1 ──┤ADR_    Tok_ ├─ Date_Time_OK
               1 ──┤Sync_   Year_├─ U_Year
             800 ──┤Diff_    Mon_├─ U_Month
            OUT1 ──┤B1_      Day_├─ U_Day
            OUT2 ──┤B2_     Hour_├─ U_Hour
                    │       Minu_├─ U_Minute
                    │        Sec_├─ U_Second
                    │        Sat_├─ Satelite_num
                    │       Stat_├─ GPS_State
                    │        Lok_├─ Longi_Lati_OK
                    │       Long_├─ Longitude
                    │        Lati_├─ Latitude
                    └─────────────┘
```

Parameters on left:

ADR_ :   Remote IO module 's Addr. 1 ~ 255 . (must be constant value)
Sync_ :   1 means enable the auto-time-synchronization function, 0: disable it
                (must be constant value)
Diff_ :   The time difference between the UTC Time and local time. Value can be -1200 to
                +1200 , for ex., 800 means +8 hour, +230 means +2 hour and 30 minutes,
                -700 means -7 hour.   (must be constant value)
B1_ :   Digital output Ch.1   (Internal Boolean)
B2_ :   Digital output Ch.2   (Internal Boolean), Setting False if using "GPS_721"

Parameters on right: (Q_ is internal Boolean, others are all internal Integer)

Q_ :   The communication state between the PAC and I-87211W, True: Ok , False: broken
Tok_ :   means the Date / Time from satellite is correct or not. Value 1 means correct
                (then Year_, Mon_, Day_, Hour_, Minu_, Sec_, Sat_, Stat_ are all correct).
                However value 0 means incorrect (then all the above data can not be used).
                (Tok_ valus is auto-modified by the satellite state)
Year_ : year , Mon_ : month , Day_ : day , Hour_ : hour , Minu_ : minute , Sec_ : second
Sat_ :   Satellite amount found, can be 0 to 8
Stat_ :   Reserved (GPS working state, normal is 1)
Lok_ :   means the Longitude and Latitude correct or not. Value 1 means correct (then Long_
                and Lati_ are correct) .
                However value 0 means incorrect (then Long_ and Lati_ data can not be used)
                (Lok value is auto-modified by the satellite state)
Long_ :   Longitude, unit is 0.00001 degree. Positive val means East , negative means West.
                Value can be -17999999 (-179.99999 degree) to   +18000000 (+180.00000 degree)
Lati_ :   Latitude, unit is 0.00001 degree. Positive val means North, negative means South.
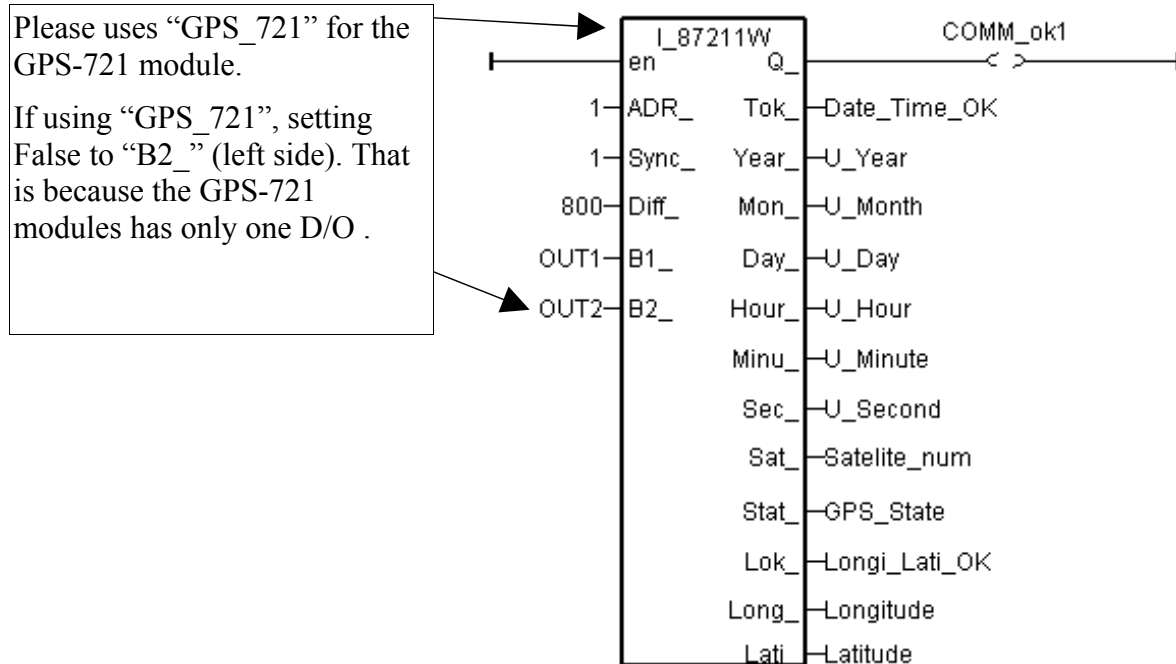   Value can be -9000000 (-90.00000) to   +9000000 (+90.00000 degree)