

## TecNote 1202 – Setting up a controller to interface with an ATC Cabinet

The purpose of this TechNote is to assist the user in setting up a controller for use in an Advanced Transportation Controller (ATC) cabinet. This TechNote will specifically outline the steps to set up a Model 340 ITS cabinet with a 2070 ATC Controller with a 2070-1C Linux CPU.



Model 340 ITS Cabinet



ATC cabinet

## Controller initialization

The controller requires V80.x software to interface with an ATC cabinet. Below are the steps that one should follow to initialize the controller. It will be assumed that the cabinet is running a standard 8 Phase operation. Below is a table listing the Basic steps for initialization V80 software in the controller.

	Menu selection	Description
1	MM>1>7	Disable Run Timer
2	MM>8>4>1	Initialize Database to STD 8
3	MM>1>3>7	Set up ITS Devices
4	MM>1>9>4>3      or MM>1>8>9>3	Initialize User Map per cabinet
5	MM>1>9>1      or MM>1>8>6	Set Up Modes based on cabinet and User Mapping
6	MM>1>1>2	Phase Options
7	MM>1>1>1	Phase Timing
8	MM>5>1, MM>5>2, and MM>5>4	Vehicle & Ped Detection Programming
9	MM>1>8>1      and MM>1>8>2	Channel Mapping
10	MM>1>7	Enable Run Timer

Specifically we will describe steps 3,4 and 5 in the next sections.

## Cabinet Specific Programming Considerations

To set up communications with ATC cabinets the software communications must be programmed as discussed below.

## 2070 Binding (MM->6->6)

You must bind the synchronous communications ports to the ATC cabinet. The Binding menu associates the physical hardware ports of the 2070/ATC controller with the logical ports assigned through software.

For most applications, “Software Ports” SP1 and SP2 correspond with the 9-pin serial connectors, C21S and C22S on the 2070-7A card. Recall from the table in chapter 9 that the 2070-7A card must reside in slot A2 to support these two ports.

The FIO 20 interface supports the ATC cabinet and the 2070N expansion chassis. This interface requires that “Software Port” SP5 correspond with the FIO 20 interface. The hardware connector for FIO 20 is identified as the C12S connector on the 2070-2A and 2070-2B Field I/O Modules. These parameters are set by hardware and cannot be changed from their defaults: FIO20 = SYNC1 and TS2IO = SYNC2.

The user should power cycle the controller to ensure that the port changes have been bound.

Port Binding				
Async	Hdwr		Sync	Hdwr
Chan	Port	Echo/Mode	Chan	Port
Async1:	SP1	NONE 0	Sync1:	SP5S
Async2:	SP2	NONE 0	Sync2:	SP3S
Async3:	SP8	NONE 0		
Async4:	OFF	NONE 0		
Func	Chan			
TS2 CVM:	ASYNC3			
CMU/MMU:	NONE			
Opticom:	NONE			
LoopDet:	NONE			
GPS	: NONE			
SysUp	: NONE			
SysDown:	NONE			
Shell	: NONE			
FIO20	: SYNC1			
TS2IO	: SYNC2			

## ITS Devices (MM->1->3->7)

This screen is used to set up the various I/O bindings for all cabinets. Note that FIO 2 must be set for all cabinets except ITS Model Cabinets 340 and 344.

```
ITS Device: SIU Swpk/Inpt CMU FIO
Dev          1111 111 2
Addr : 134567 90123 567 0
DevActive : ..... .... ...
SIUCritical: XXXXXX XXXXX
FIO Type : 2070-2N
CMU FS Amp : 10.0 A
Local Conflict Check: ON
```

### FIO Type

The FIO Type parameter selects the built-in hardware interface to the cabinet that the controller uses. Selections include:

- 2070-2A** The cabinet I/O is connected to a 2070-2A
- 2070-8** The cabinet I/O is connected to a 2070-8
- 2070-2N** The cabinet I/O is connected to a 2070-2N
- 980-ATC** The cabinet I/O is connected to a 980-ATC
- 970-ATC** The cabinet I/O is connected to a 970-ATC

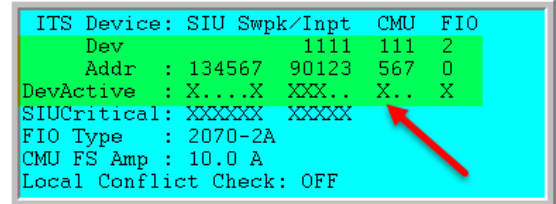
```
ITS Device: SIU Swpk/Inpt CMU FIO
Dev          1111 111 2
Addr : 134567 90123 567 0
DevActive : X...X XXX.. X..
SIUCritical: XXXXXX XXXXX
FIO Type : 2070-2A
CMU FS Amp : 10.0 A
Local Conflict Check: ON
```

Selecting this in association with the FIO Device described in the next section will bind the I/O in the controller and begin communications to the cabinet hardware.

**NOTE: Based on the Hardware type chosen, various functions may be enabled or disabled. For example the 170 watchdog output (Output Function 114) will only toggle (at a rate of 100ms on/off) when the FIO type is a 2070-2A or a 970-ATC.**

## DevActive

Each ITS Cabinet can be customized based on intersection and agency requirements. The controller must be able to communicate to each SIU, CMU or FIO device. The user can activate a particular SIU, CMU or FIO via this selection area. The first six SIUs support the terminal facility outputs (**Swpk**) followed by five SIUs for detection (**Inpt**) and three CMUs for monitoring purposes. The FIO 20 device binds the particular hardware interface to the cabinet as described above.



ITS Device	SIU Swpk/Inpt	CMU	FIO
Dev	1111	111	2
Addr	134567	90123	567
DevActive	X...X	XXX..	X.. X
SIUCritical	XXXXXX	XXXXX	
FIO Type	2070-2A		
CMU FS Amp	10.0 A		
Local Conflict Check	OFF		

The following Table is provided to assist the user in activating devices in the ITS Cabinet.

SIU Output Assembly	SIU Address	Cabinet Address Jumpers	SIU Input Assembly	SIU Address	Cab Address Jumpers
14 Pack Pos 1	1	1-2	Detector Rack 1	9	1-2; 7-8
14 Pack Pos 3	3	1-2; 3-4	Detector Rack 2	10	1-2; 5-6
6 Pack Pos 4	4	5-6	Detector Rack 3	11	1-2; 5-6; 7-8
6 Pack Pos 1	5	1-2; 5-6	Detector Rack 4	12	1-2; 3-4
6 Pack Pos 2	6	3-4; 5-6	Detector Rack 5	13	1-2; 3-4; 7-8
6 Pack Pos 3	7	1-2; 3-4; 5-6			

This selection selects the SIU's devices that will be monitored. Not all SDLC failures should put the cabinet into flash. For example, if an SIU that only has detectors assigned to it fails, the cabinet should not go into flash. Instead, the controller should recall on those detectors.

By default, all SIU's are treated as critical. Any related SDLC failure will result in the cabinet going into flash. In the ITS Devices menu (**MM->1->3->7**), there is an SIU Critical record listed under the Dev Active record. For each Dev Active field which corresponds to an SIU, there is a related SIU Critical field. Clearing out the "X" from this field indicates that the related SIU is not critical. If a failure occurs on an SIU that is configured as "not critical", the controller will not go into flash. The failure can be observed in the ITS Status screen (**MM->1->3->8**). Any failure detected on an input SIU (critical or not) will result in the controller issuing recall's on the connected detectors.

## CMU FS Amp

CMU amperage monitoring selection. The valid entries for the CMU FS Amp are: 10.0, 5.0, 3.3, and 2.5 amps. This value is used to calculate the channel amperage reported by the CMU (Monitor Status screen **MM->7->8->9**)

## Local Conflict Check

This parameter can be turned ON/OFF and is used to monitor conflicts. The ATC can provide redundant conflict monitoring which is independent of the CMU. This function helps protect against mechanical relay failure.

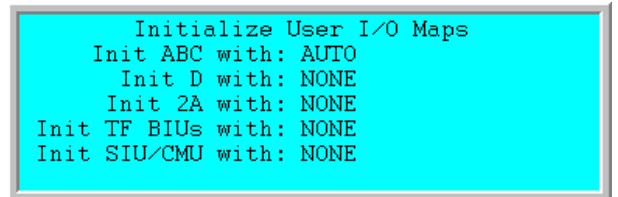
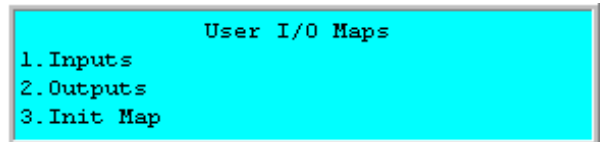
If the Local Conflict Check is enabled (**ON**), then the ATC will perform conflict monitoring. The same permissives, which apply to the CMU, will apply to this conflict monitoring. If a conflict is detected, then the ATC will go into flash. If selected, this conflict checking will happen on cabinets with the MMU or the CMU, whichever are present.

## IO User Maps (MM->1->8->9->3 or MM->1->9->4->3)

IO User Maps are used to customize the I/O pin assignments for the 2070 C1-C11, the NEMA A-B-C and ITS Cabinet connectors. Specifically they should be initialized prior to customization. For ITS cabinets, selecting **3.Init Map**, from the menu to the right will bring up the initialization screen.

Toggle the selection **Init SIU/CMU with:** to select the proper ATC cabinet mapping.

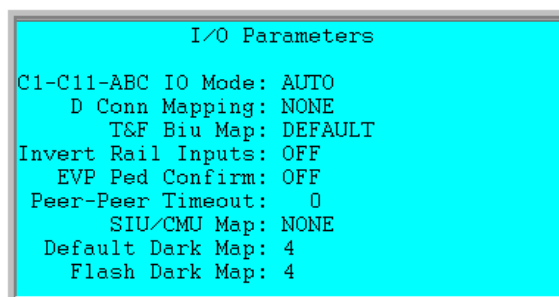
Below is a list of the selections for ATC cabinets.



- NONE:** No SIU/CMUs are used
- 28 CHAN:** The ITS Cabinet is set up using 28 Channel Outputs
- 20 CHAN:** The ITS Cabinet is set up using 20 Channel Outputs
- 28B CHAN:** The ITS Cabinet is set up using 28B Channel Outputs
- 18 CHAN:** The ITS Cabinet is set up using 18 Channel Outputs

## IO Parameters (MM->1->8->6) or (MM->1->9->1)

The *IO Parameters* screen allows the user to customize the IO Modes defined by NEMA for various cabinets select custom modes supported in the controller firmware. The user can customize the ITS cabinet mapping when programming the parameter **SIU/CMU Map** If **USER** is selected.



### SIU/CMU Map

This setting sets up the ITS cabinet Output SIUs with default Mapping.

- NONE** Disables the I/O for ITS cabinet controllers
- 28 Chan** Applies 28 Channel ITS Cabinet mapping
- 20 Chan** Applies 20 Channel ITS Cabinet mapping
- 28B Chan** Applies 28B Channel ITS Cabinet mapping
- 18 Chan** Applies 18 Channel ITS Cabinet mapping
- USER** Applies USER Channel ITS Cabinet mapping

### Dark Maps

In the CMU configuration, there are four Lack of Signal (LOS) Dark Maps. These are used for disabling the LOS monitor function on a real-time per channel basis. The ATC selects which of four maps the CMU should use. The CMU will override the LOS Enable programming with the Dark Map specified by the ATC.

**Default Dark Map** - this is the Dark Map the CMU should use under normal operations

**Flash Map** - this is the Dark Map the CMU should use when in flash

By convention, Dark Map 4 should be selected as the Flash Map. Both Dark Map selections can have the same value. If there are no special considerations, set both Dark Maps to 4.

The Dark Map selection can range from "**NO SEL**" or **1 - 4**. "**NO SEL**" means that No Selection has been made.



## Cabinet Status and Monitor Setup screens

### ITS Status (MM->1->3->8)

The *ITS Status Display* summarizes random frame errors for each SIU/CMU enabled under MM->1->3->7 and reports the status of each device. This display is useful to isolate failures in ITS cabinets after checking the *Overview Status Screen* discussed in Chapter 3. SIU's defined as non-critical will show a FAIL status even if the non-critical SIU has not put the cabinet in flash.

I/O Message Status (C or ALT-7 Clears)				
Device	Addr	Errors	Status	
FIO	20	0	OK	
CMU1	15	21545	FAIL	
CMU2	16	0	OK	
CMU3	17	0	OK	
OUT SIU1	1	21682	FAIL	
OUT SIU2	3	0	OK	
OUT SIU3	4	0	OK	
OUT SIU4	5	0	OK	
OUT SIU5	6	0	OK	
OUT SIU6	7	21662	FAIL	+

IN SIU1	9	21622	FAIL
IN SIU2	10	21614	FAIL
IN SIU3	11	21580	FAIL
IN SIU4	12	0	OK
IN SIU5	13	0	OK

### CMU Permissives (MM1->3->9)

*CMU Permissives* are only required in an ITS cabinet configuration. When a CMU is present, the values programmed in this table must reflect the jumper settings on the CMU programming card (Flash RAM) or the controller will declare a CMU Permissive fault and go to flash.

The screen is laid out to form a diagonal matrix with channels 1-32 assigned to the rows and columns as shown to the right. This configuration is very similar to the layout of the jumper settings of MMU programming card. Compatible (or permissive) channels are indicated by a 'X' at the intersection of each channel number within the matrix. Compatible channels may display simultaneous green, yellow and/or walk indications without generating a CMU conflict fault. In addition, some users use this screen to automatically program the permissive typing a C or ALT 7 on the keyboard.

ALT7 or C CpyPrm from CMU				
Chn	32<-->25	24<-->17	16<-->9	8<-->2
1	.....	.....	.....	.....
2	.....	.....	.....	.....
3	.....	.....	.....	.....
4	.....	.....	.....	.....
5	.....	.....	.....	.....
6	.....	.....	.....	.....
7	.....	.....	.....	.....
8	.....	.....	.....	.....
9	.....	.....	.....	.....
10	+	.....	.....	.....

## Model 340 ITS Cabinet Specific Programming Example

Trafficware's 340 Cabinet features three 24-channel input files, a 6 pack, and a 14 pack output file assembly (20 Channels) . Each of these assemblies contains a Serial Interface Unit socket for an SIU card. This card makes system expansion easier with a 614K baud rate. Along with the Serial Interface Unit, the output files also contain an Auxiliary Monitor Unit socket. The 340 Cabinet provides a facility for configurations by conveniently placing a variety of power buses and serial connectors throughout. Each cabinet contains a standard Power Distribution Assembly, and rack mount 12/24VDC switch power supply unit.

The following screen shots show the required programming for the Model 340 ITS cabinet

Step 1: MM>1>7      Disable the Run Timer

```
Run-Enable Control

Run-Enable Status: OFF
Change to: OFF
```

Step 2: MM>8>4>1    Initialize Database to STD 8

```
Initialize Database

Selection: FULL-STD8
```

Step 3: MM>1>3>7    Set up ITS Devices

```
ITS Device: SIU Swpk/Inpt  CMU  FIO
Dev          1111  111  2
Addr   : 134567  90123  567  0
DevActive  : X....X  XXX..  X..  .
SIUCritical: XXXXXX  .....
FIO Type   : 2070-2A
CMU FS Amp : 10.0
Local Conflict Check: ON
```

Step 4: MM>1>9>4>3 or MM>1>8>9>3      Initialize User Map per cabinet

```
Initialize User I/O Maps
Init ABC with: VIRCTL
Init D with: NONE
Init 2A with: NONE
Init TF BIUs with: NONE
Init SIU/CMU with: 20 CHAN
```



Step5: MM>1>9>1 or MM>1>8>6

Set Up Modes based on cabinet and User Mapping

```

I/O Parameters

C1-C11-ABC IO Mode: AUTO
  D Conn Mapping: NONE
    T&F Biu Map: DEFAULT
Invert Rail Inputs: OFF
  EVP Ped Confirm: OFF
Peer-Peer Timeout:  0
  SIU/CMU Map: USER
Default Dark Map: 4
Flash Dark Map: 4
  
```

Step6: MM>1>9>1 or MM>1>8>6

Set up 2070 Port Bindings

```

Port Binding

Async  Hdwr      Sync  Hdwr
Chan   Port   Echo/Mode  Chan   Port
Async1: #P1    NONE    0    Sync1: SP5S
Async2: SP2    NONE    0    Sync2: SP3S
Async3: SP8    NONE    0
Async4: OFF    NONE    0

Func    Chan
TS2 CVM: ASYNC3
CMU/MMU: NONE
Opticom: NONE
LoopDet: NONE      +

GPS      : NONE
SysUp    : NONE
SysDown  : NONE
Shell    : NONE
FIO20    : SYNC1
TS2IO    : SYNC2
  
```

## Summary

The setup of the ATC cabinet requires the above initialization procedure. Keep in mind that all I/O mapping can be modified by the user to truly customize the cabinet as per field requirements.