Using Starbus with Andover Controllers

ABOUT THIS BULLETIN

This material was prepared by Andover Controls. Part A contains settings for AC256 controllers and Nucleus, while Part B covers Infitinty (CX/CMX) and SX8000 applictions.

Part A: AC256 & Nucleus Applications

1. Introduction

StarBus can be used to connect S-Ports, C-Ports, Nucleus stations, telephone modems, printers, and dumb terminals under a single multiuser network. This section describes the methods for using StarBus with Andover controllers.

Nucleus and Andover controllers employ various modes of StarBus transmission: traditional (full-duplex) connections, QUEUE connections and DATAGRAMS. All modes use an ALTERNATE APPLICATION SEQUENCE which can be configured in one of two ways: by accepting the Andover default during setup, or with a utility, called APSEQ.EXE, which allows you to configure several dealer-configuration parameters. APSEQ is available free to Andover dealers.

For the latest tips and software, it's a good idea to become familiar with the StarBus web site:

http://StarBus.com/

To use APSEQ, attach StarBus stations one at a time to an IBM PC. Insert the diskette in a floppy drive, and type:

A:(or B:) ENTER then APSEQ ENTER

Andover Controls recommends that Nucleus stations be configured with two StarBus stations – one attached to each com port on the PC. Nucleus should be set up so that all outgoing communications occur on COM1 and all unsolicited database updates are received on COM2.

2. Local Interface Connections

The Andover Controller C-Port and the Nucleus communications port each mate directly with the RS-232 cables on their StarBus Busdrivers. Set their Busdriver panel switches to COMPUTER. However, the S-Port requires a male/male gender adapter (available from IMCO), and its Busdriver switch set to PERIPHERAL. Connection to the 25-pin connectors on Nucleus are compatible (set station to COMPUTER/TERMINAL).

RS-232 pin connections from Andover to StarBus and the StarBus switch setting

Nucleus	StarBus (computer)	C-Port	StarBus (computer)	S-Port	StarBus (peripheral)
1	1	1	1	1	1
2	2	2	2	2	1
3	3	3	3	3	1
4	4	4	4	7	1
5	5	5	5		
7	7	7	7		

If MASTERS are X-Bus connected, flag 347 (SMSWITCH) must be turned ON to disable X1 for C-Bus contention. Write a one-line program which continuously turns on SMSWITCH. This tells the controller to permit multi-party messages to pass through a single port. We can allow this because StarBus is managing contention by directing and separating all data onto a single pair of wires.

3. Pre-Configuring an Alternate Application Sequence

StarBus commands are composed of a pre-congifured ALTERNATE APPLICATION SEQUENCE followed by one or more command characters. This programming step is not required if you will be using the Apseq setting recommended by Andover Controls. Instead, it can be set by simply pressing <ctrl>A from within the INITIALIZE menu (section 7, step #2).

Use APSEQ.EXE to program the following sequence (enter "<ctrl>" characters by striking M and then J while holding down the control key). The recommended StarBus ALTERNATE APPLICATION SEQUENCE used for Andover Applications is:

```
\  <SPACE>  <ctrl>M  <ctrl>J  A  P  S  E  Q  \
```

4. Nucleus Connect and Disconnect

Nucleus makes a StarBus connection by issuing the ALTERNATE APPLICATION SEQUENCE followed by a CONNECT character, and the two digit station number. The following example contains several non-keystroke characters. In a Nucleus script, these

are represented as a vertical bar (|) followed by the three digit decimal equivalent of the desired character. For example, StarBus addess 1 is written as `|048|049`.

To Connect to StarBus Station #1

```
\|032|013|010APSEQ\|003|048|049|WAIT 1
```

A table of decimal equivalents appears in Appendix A of this manual. However, IMCO does not list each equivalent as a three digit number. Therefore, be certain to begin with zeros (after the vertical bar) – for one or two digit codes.

When you have finished communicating with a node, issue a DISCONNECT command to free the station. The DISCONNECT command is created by adding <ctrl>D (represented as |004) to the end of the ALTERNATE APPLICATION SEQUENCE.

Nucleus Disconnect Script

```
\|032|013|010APSEQ\|004|WAIT 1
```

Make certain that the Nucleus scripts are written on only one line each and check the Nucleus TalkThru timeout (TERMTIMEOUT) in the file WIN.INI. It must be set to at least 20 seconds less than the StarBus Automatic Timeout (reviewed later).

5. CONTROLLER QUEUE CONNECTION
(for large blocks of data)

Later in this section, we discuss a transmission technique which permits a controller to send Nucleus alarms and small messages without connecting or waiting for a remote station to be free of other connections. Data automatically arrives at the desired station when it is able to receive. That technique – Datagrams – should be used only for small amounts of information.

However, if you want a controller to send more than 1K of data, you must first establish a clear connection to the desired station. For this we use the QUEUE CONNECT. The QUEUE CONNECT allows you to reserve a position with other devices awaiting the same connection. The command is comprised of the ALTERNATE APPLICATION SEQUENCE followed by vertical bar (|), the QUEUE CONNECT command (QC) and an address. A properly configured StarBus raises the CTS signal when the connection has been established.

Drum Sequence for a QUEUE Connect

```
Drum -- M    MESSAGE DRUM

M1 = \

M2 = APSEQ\|QC06
```



```
Drum -- 1    PRINT HISTORY PAGE ONE DRUM

LINE 1

      1A)  CDISPLAY   1
      2A)  CDISPLAY   2

      1X)  Exit to Line  2 If (CTS = ON)

LINE 2

      1A)  PRINT HISTORY 1
```

The ALTERNATE APPLICATION SEQUENCE and the QUEUE CONNECT command are represented by (M1) and (M2) together. Note that the ALTERNATE APPLICATION SEQUENCE has been broken into two lines. This permits printing the message drum without triggering the StarBus command sensor.

Use of the QUEUE CONNECT command is limited to the C-Port, because the S-Port does not use CTS/RTS control signals.

6. THE NUCLEUS DATAGRAM

Datagrams provide the ideal way for Nucleus to send alarms and small messages. With Datagrams, you needn't establish a connection. In fact, you can even send Datagrams to stations which are temporarily busy with their own connections. But use Datagrams only for alarms and small messages, not for reports. We explain why on the next page.

As before, the ALTERNATE APPLICATION SEQUENCE is separated into two lines. (M1) is the beginning of that sequence, while (M2) and (M3) represent its end with different commands:

Nucleus Usage of Datagrams

(M1) + (M2) is the Datagram SWITCH TARGET command

(M1) + (M3) is the Datagram END/SNOOZE command

(M4) is the alarm message

The SNOOZE feature prevents Datagrams from entering the target COM port at a rate which exceeds one every two seconds (from the same or from different controllers). The delay is specified in multiples of 12 milliseconds, which divides into a 2 second delay as 167.

Drum Sequences for DATAGRAM Transmit

```
Drum -- M    MESSAGE DRUM
M1 = \
M2 = APSEQ\|Qy060
M3 = APSEQ\|Qz167
M4 = _SET BUILDINGA

Drum -- 1    NUCLEUS ALARM DRUM
LINE 1
     1X)  Exit to Line  2 If ALMTEST>1
LINE 2
     1A)  CDISPLAY   1
     2A)  CDISPLAY   2
     3A)  CDISPLAY   4, ALMTEST
     4A)  CDISPLAY   1
     5A)  CDISPLAY   3
```

IMPORTANT NOTES:

When using the above method to send alarms to Andover Nucleus, make sure that each alarm drum is configured so that the alarms can be "turned off" for saving and reloading the controller. Although Nucleus can accept alarms while in ControlPanel, they will interfere with a Save Reload, should the process cross domains.

When a controller is engaged in a normal CONNECT, Busdrivers involved will not allow Datagrams directed at a 3rd node, unless the sending unit (typically, at the AC256) is a Series-C version Busdriver or higher. If you want to send an alarm to Nucleus at COM2 while already talking to it on COM1, send the alarm just as if there was no connection… If the sender is a Series B Busdriver, it will "eat" the APPLICATION SEQUENCE and the command (because it is engaged in a full connection, but it will pass the _SET to Nucleus (on COM1) because of the existing connection. If the sending Busdriver is Series C, it can send alarms to any Datagram-addressed target – without affecting the current Nucleus connection.

If you wish to transmit to a station other than Nucleus, be sure that the sending Busdriver has been upgraded to Series-C, or wait until Nucleus has logged off to send the Datagram. You can determine the logon status by examining the NUCLEUS flag. However, if the printing of an alarm message is imperative, and there is not time to wait for a Nucleus logoff, you can always use the StarBus connected to the S-Port and the SDISPLAY action.

Do not send or receive Datagrams with the StarBus station which is configured as POLLER or POLLER/1. In the event that every station will be sending and/or receiving Datagrams, you must establish a Busdriver as a dedicated poller. However, that station may always be connected to any device which does not send or receive Datagrams at a future time.

For the Curious: Datagrams, Buffering, and Message Size

You've probably noticed that StarBus allows the RS-232 port on each device to be set at its own top speed. If you send data to a receiver that is set to a slower speed or needs frequent pauses, StarBus automatically buffers the data within the sending and receiving Busdrivers.

Because of this action, even the fastest senders may never have to be flow controlled by their Busdriver, unless the data is bigger than the StarBus buffers at both ends of the connection (about 4.5 Kbytes).

In a normal controller connection, this buffering occurs mostly at the receiving StarBus. Of course, if lots of data backs up (e.g. data sent to a slow printer), the controller responds to flow control, when the buffer at its own Busdriver begins fill.

But when using Datagrams, there is no full-duplex connection with the remote device. If the device is busy, your Busdriver is only reserving a place in line, and gathering your data for delayed transmission. In fact, with Datagrams, StarBus does not inform the sender that a connection has been made. It simply sends the data as soon as it can.

Since the controller is not informed of a connection, it is not prepared to respond to flow control. Also, flow control is likely to occur earlier than it does in a traditional connection if the remote device is busy. This is because the local Busdriver must hold data in the small buffer it uses for outgoing messages.

Because this buffer is small, and because we wish to avoid flow control when using Datagrams, we use Datagrams for alarms and small messages – but not for reports.

7. RECOMMENDED STARBUS STATION PARAMETERS

Many StarBus features including all of the extended handshake options were developed specifically for use with Andover Controllers and Nucleus. Parameters shown on the following pages have been field tested for optimum performance.

IMCO has provided Andover dealers with an easy way to establish our recommendations:

7.1. Enter StarBus menu; INITIALIZE PRIMARY PARAMETERS

If a Busdriver is new or if you have forgotten it's BAUD RATE power-up while holding the spacebar. *If it is not new, avoid this technique,* because it erases all previously configured settings, including the Application Sequence, which is hidden from user menus. To change settings in an existing application, awaken the unit by pressing the DISCONNECT CHARACTER three times, and press [I] INITIALIZE or [I/S] INIT SECONDARY PARAMETERS.

7.2 Press <ctrl>A (from within either Initialize menu)

This feature pre-configures all fields to settings recommend by Andover Controls, including the APPLICATION SEQUENCE (not seen in menu listing). Station number, name, and baud rate are not affected. Settings are not yet permanent…

7.3 Verify Settings

You can change any setting in the normal way. Use ENTER to select a field, and use <SPACE> to set the option. You must do this for "Station No." and "User Name". Additionally, you may need to change one or two fields if the Busdriver will be used on Nucleus or with a printer. Check the following pages for the most current information.

7.4 Press <ctrl>E to leave the menu.

The new settings are now in effect. If the new speed does not match your PC or terminal, you may see gibberish. This is not a malfunction. The Busdriver is ready to be moved onto its intended equipment.

It will remember its new parameters until you change them.

Additional Notes About Parameters

When a new Busdriver is first powered on or if you don't know its current settings, use the technique of holding down the space bar (directions printed on top cover). When you do this, it matches the speed of your PC, and enters the CHANGE PARAMETERS MENU. Your last chance to return to the old settings is to press ESC from this menu.

Except for "STATION NO.", each parameters may be reconfigured from any keyboard on the network even by calling into a modem (although the modem station can also be set to prevent this). To insure that each station receives a unique address, "STATION NO." must be initialized from a directly attached PC or terminal. However, this operation needs to be performed only once (for a newly acquired Busdriver).

When a Busdriver is initialized to POLLER or POLLER/1, the menu automatically presents two additional fields: "MAX POLL ADDRESS" and "POLLING"…

MAX POLL ADDRESS offers settings from 10 to 50. Choose the lowest setting that is *equal to or higher* than the highest station number on the network (stations needn't be numbered consecutively – in fact, they may be added or removed, even while the network is operating).

Set POLLING to FAST for most applications. Exceptions are (a) If the network has an older repeater (in the same plastic case as a Busdriver), or (b) if you plan to send Datagrams (_SET) to a GROUP ADDRESS, from a sender that is pre–*Next Generation* (s/n < 910000). In these rare cases, set POLLING to 1R or higher. For more information, see 'StarBus Repeater'.

Busdriver PARAMETER settings

StarBus Parameters for Nucleus

```
STARBUS STATION PARAMETERS     SECONDARY STATION PARAMETERS
---------------------------    ----------------------------
Terminal Type  VIDEO           Station   No.  06
Echo Commands  YES                 User Name  NUKCOM1
Station   No.  06                  Level      1
Group  Member  NONE                Pkt Lngth  253  [1-253]
                                   Home Base  NONE
    User Name  NUKCOM1
    Level      1               Queue Enabled  YES
    Baud Rate  9600            Queue Timeout  30 seconds
    Handshake  X+C             Queue Connect  NONE
    Parity     NONE (8 bit)
    Stop Bits  1               L-Del Affects  COMMANDS only
    LocalEcho  DISABLED        Modem Spd Det  NO
    LineDelay  25 millisec     Drop DTR Disc  2 seconds
    CharDelay  NONE            Ignore S/XOFF  YES

Disconnect Ch  TILDE (~, 7E HEX)
Special Funct  <ctrl>B  (02 HEX)
Auto  Timeout  5 minutes
Max Buf Delay  HOST MODE
```

Station Parameters for AC 256, AC 8 Plus, AC 4 Plus 4 [C-Port]

```
STARBUS STATION PARAMETERS     SECONDARY STATION PARAMETERS
---------------------------    ----------------------------
Terminal Type  VIDEO           Station   No.  03
Echo Commands  YES                 User Name  MAST1C
Station   No.  02                  Level      1
Group  Member  NONE                Pkt Lngth  253  [1-253]
                                   Home Base  NONE
    User Name  MAST1C
    Level      1               Queue Enabled  YES
    Baud Rate  9600            Queue Timeout  30 seconds
    Handshake  X+C             Queue Connect  NONE
    Parity     NONE (8 bit)
    Stop Bits  1               L-Del Affects  COMMANDS only
    LocalEcho  DISABLED        Modem Spd Det  NO
    LineDelay  25 millisec     Drop DTR Disc  2 seconds
 →  CharDelay  NONE ← (note #1) Ignore S/XOFF  YES

Disconnect Ch  TILDE (~, 7E HEX)
Special Funct  <ctrl>B  (02 HEX)
Auto  Timeout  5 minutes
Max Buf Delay  38 milliseconds
```

StarBus Station Parameters for AC 256 Plus [S-Port]

STARBUS STATION PARAMETERS		SECONDARY STATION PARAMETERS	
Terminal Type	VIDEO	Station No.	03
Echo Commands	YES	User Name	MAST1S
Station No.	03	Level	1
Group Member	NONE	Pkt Lngth	253 [1-253]
		→ Home Base	NONE ← *(note #2)*
User Name	MAST1S		
Level	1	Queue Enabled	YES
Baud Rate	9600	Queue Timeout	30 seconds
Handshake	X+C	Queue Connect	NONE
Parity	NONE (8 bit)zzzzzzz		
Stop Bits	1	L-Del Affects	COMMANDS only
LocalEcho	DISABLED	Modem Spd Det	NO
LineDelay	25 millisec	Drop DTR Disc	2 seconds
CharDelay	NONE	Ignore S/XOFF	YES
Disconnect Ch	TILDE (~, 7E HEX)		
Special Funct	<ctrl>B (02 HEX)		
Auto Timeout	5 minutes		
Max Buf Delay	38 milliseconds		

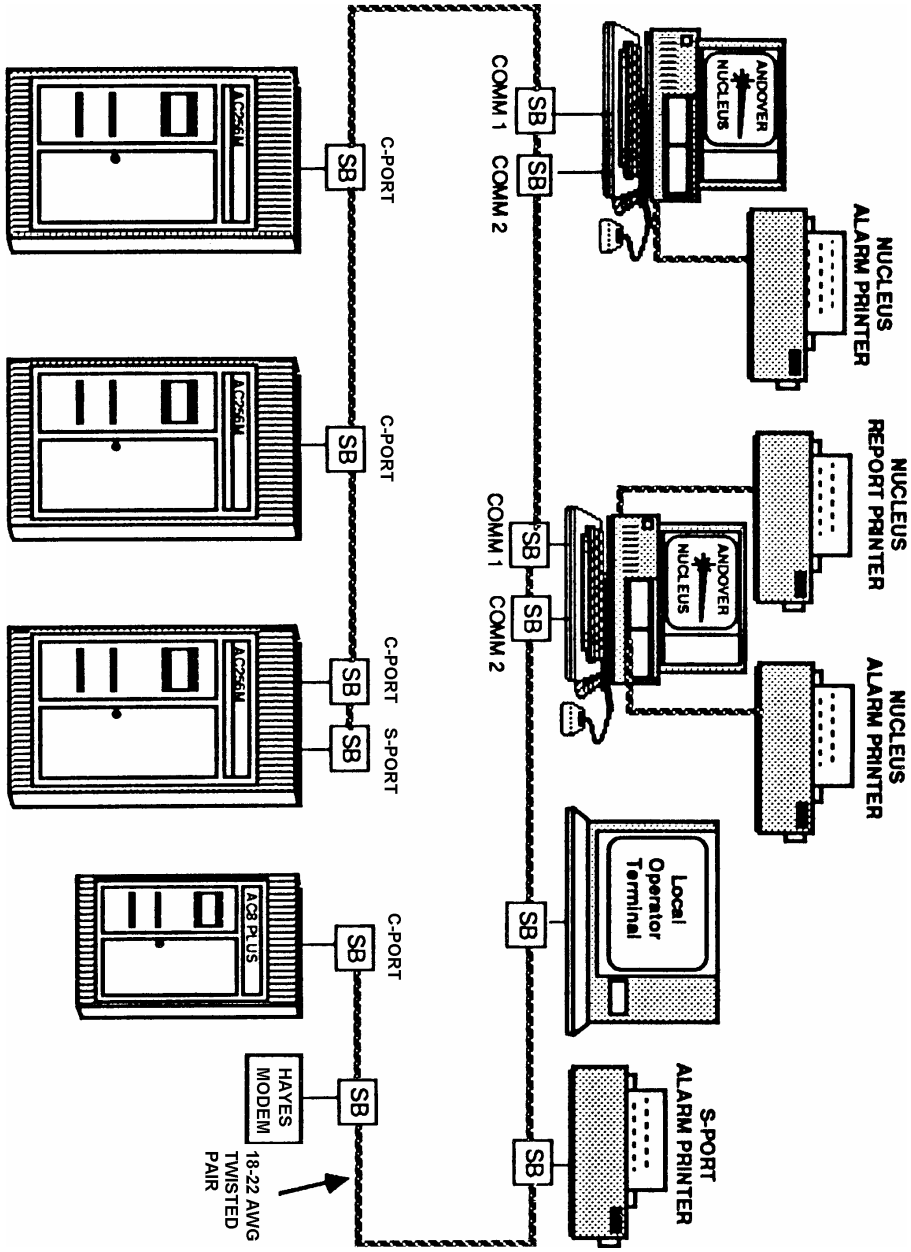
StarBus Station Parameters for Most Printers

STARBUS STATION PARAMETERS		SECONDARY STATION PARAMETERS	
Terminal Type	VIDEO	Station No.	10
Echo Commands	YES	User Name	LASERJET
Station No.	10	Level	2
Group Member	NONE	Pkt Lngth	253 [1-253]
		Home Base	NONE
User Name	LASERJET		
Level	2	Queue Enabled	YES
Baud Rate	19,200	Queue Timeout	30 seconds
Handshake	BOTH	Queue Connect	NONE
Parity	NONE (8 bit)		
Stop Bits	1	L-Del Affects	COMMANDS only
LocalEcho	DISABLED	Modem Spd Det	NO
LineDelay	25 millisec	Drop DTR Disc	2 seconds
CharDelay	NONE	Ignore S/XOFF	YES
Disconnect Ch	TILDE (~, 7E HEX)		
Special Funct	<ctrl>B (02 HEX)		
Auto Timeout	5 minutes		
Max Buf Delay	38 milliseconds		

1. Nucleus & SX8000 use ACP packet protocol, which does not require delays at the AC256. When using Escort, Monitor, or straight ASCII communications, set CHAR DELAY to 25ms.

2. If controller-initiated data will be sent to only one target port (e.g. alarms going to Nucleus COM2), you can set a HOME BASE address and avoid controller programming, altogether! See Advanced StarBus Features: Programming your Series-C Network.

Layout of AC256 / AC8 using StarBus



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Using Starbus with Andover Controllers

ABOUT THIS SECTION

Part B is reprinted from the SX 8000 Applications manual (originally section 4.2).

Part B: Using INFINITY and StarBus

1. Why Use StarBus with Infinity

While the EnergyNet (ARCNet and Ethernet) has reduced the need for Andover products to be networked with StarBus, there are still some system architectures where the StarBus is an excellent solution. Figure 2 below shows a simple INFINITY system with a single user SX 8000 tied to 3 CMX 240s. This system will work fine until it needs to be expanded.

Serial communications with INFINITY is point-to-point. One SX 8000 com port is connected to one CX/CMX com port. If this system was expanded from a single user system to a LAN system (See figure 1), the additional workstations would not have any available com ports at the remote controllers. Also, even if there was only one SX 8000, it would not be possible to add a 4th CMX 240 because the SX 8000 only sypports 3 com ports.

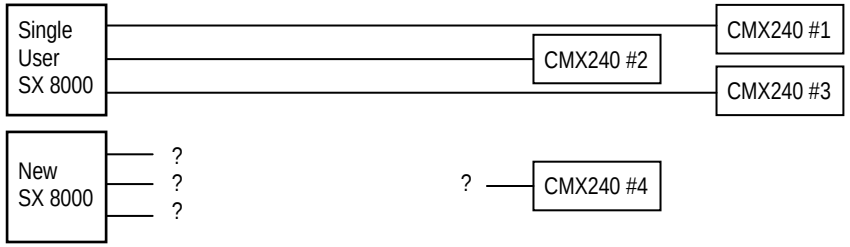


Figure 2. Single User Being Expanded to a LAN

Connecting the system with StarBus offers a way to expand both the number of workstations and the number of remote controllers. Figure 3 below illustrates the same system as shown in Figure 2, but here the additional SX 8000 and CMX 240 are connected through StarBus.

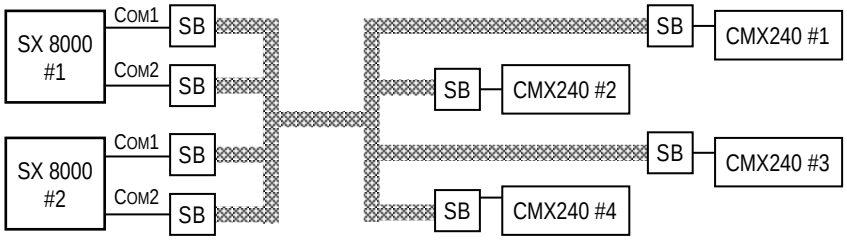


Figure 3. An Expanded System Using StarBus

Similar to the configuration shown in Figure 2, each user could access every CMX. However, the communications are still point-to-point — if SX 8000 #1 is connected to CMX #1, but not simultaneous access. To get simultaneous access, you must have EnergyNet.

2. Setting up the StarBus for Use with INFINITY

To set up the StarBus for use with INFINITY, connect each Busdriver to a PC running dumb terminal software such as CrossTalk or HyperAccess (or HotKey pop-up communications – a program that IMCO offers to Andover dealers at their web site). Make sure that the PC is communicating at the baud rate that will be used later at the SX 8000. Set the Busdriver front panel switch to COMPUTER/TERMINAL; Attach it to the PC com port; hold down the space bar; and plug in the StarBus front-panel power connector. When you see the greeting, press <Return> to enter menu, INITIALIZE PRIMARY PARAMETERS.

This technique – pressing spacebar during powerup – tells the Busdriver two things: (1) that you wish to enter directly into the configuration menu (even if you don't know the BAUD-RATE setting) – and (2) that the station is either brand new, or is being relocated to a new application. Either way, the initialization technique differs from the method that will be used throughout the life of the unit (waking it up and pressing 'I' = Initialize). The difference is that the spacebar method not only tells the Busdriver to match the Baud Rate of the PC, but it also wipes clean all configuration fields and pre-sets them to the factory default settings.

IMCO has engineered a nifty feature for Andover dealers that lets you pre-set all of these fields to our own set of Andover-recommended parameters. When you see the INITIALIZE PRIMARY PARAMETERS menu, press <Ctrl+A>. Answer any questions, and then verify all the other settings as shown on the next page. For example, you will enter a STATION NUMBER and NAME. Use the spacebar to scroll each entry forward, <Backspace> to reverse, and <Enter> to accept. All these settings become permanent when you press <Ctrl+E> to save them.

Do the same for the INITIALIZE SECONDARY PARAMETERS menu (press 'I/S').

StarBus Primary Parameters for SX 8000

```
STARBUS STATION PARAMETERS    SECONDARY STATION PARAMETERS
---------------------------   ----------------------------
Terminal Type  VIDEO          Station   No.
Echo Commands  YES                User Name  SX8000
Station   No.  1~50               Level      1
Group  Member  NONE               Pkt Lngth  253  [1-253]
                                  Home Base  NONE
    User Name  SX8000
    Level      1              Queue Enabled  YES
    Baud Rate  9600           Queue Timeout  30 seconds
    Handshake  CONNECT        Queue Connect  NONE
    Parity     NONE (8 bit)
    Stop Bits  1              L-Del Affects  COMMANDS only
    LocalEcho  DISABLED       Modem Spd Det  NO
    LineDelay  25 millisec    Drop DTR Disc  2 seconds
    CharDelay  NONE           Ignore S/XOFF  YES

Disconnect Ch  TILDE (~, 7E HEX)
Special Funct  NONE (Feature Disabled)
Auto  Timeout  5 minutes
Max Buf Delay  ACK2
```

3. Connecting From the SX 8000 to the Remote CX/CMX

When the SX 8000 wants to connect to a remote controller through the StarBus, it sends out a command to the local Busdriver StarBus to connect with a remote Busdriver. If the connection is made, the StarBus will raise Pin 5, CTS. Since INFINITY products have a feature that cleans up the port on carrier drop (CXD), it is preferable for INFINITY to use Pin 8 for a hardware handshake line. StarBus Pin 5 should be connected to the INFINITY com port Pin 8 as seen below with an RS-232 jumper box:

SX 8000	StarBus
1	1
2	2
3	3
7	7
8	5

With this pin configuration, the SX 8000 can tell whether the connection request was successful. If the TrackCXD attribute of the com port is true, the SX 8000 can clean up possible port problems.

After the correct pinouts are made, edit every com port under every SX 8000 where a StarBus is connected. Make sure that the Baud, Parity, etc., is set up properly. Also, make sure the port Default mode is set to AUTOSET for both the SX 8000 and the remote controllers.

The StarBus CONNECT command is site specific. The DISCONNECT is not. Below is a very simple connect and disconnect program. Note that the connect program is connecting to StarBus node #12. For the most part, the program is straightforward. The only slight curve is the use of Object, CommX…

> ***What is CommX and why use it?***
>
> Since it is possible for the SX 8000 to talk to the remote controller through any comm port, the connect program must take this into account. If ConnectProgram was set to print the Connect command to Comm1, and the SX 8000 tried to connect via Comm2, the program would not work. This problem can be avoided by asking the program through which com port the SX 8000 will attempt a connection. Thus, we can assign the DefaultPort to an object variable called CommX and reference it in the program.

Sample Connect Program

```
'Name:  Connect CMX1
'Attributes: Program, Looping, Run on any SX

Object CommX
Init:
     CommX = DefaultPort
     Goto PrintConnect

PrintConnect:
     Print "\|032|013|010APSEQ\C12"; to CommX
     StarBus Appl. Seq ## = Target StarBus Number
     Goto WaitaSec

WaitaSec:
     If CommX Printdone and TS > 1 then
            Goto CheckCXD
     Endif

Check CXD:
     If CommX CXD then
            Goto DoneOK
     Else
            Goto DoneFail
     Endif

DoneOK:
     Set CommX ConnectState = Connected
     Stop
```

```
Donefail:
     Set CommX Connect State = Disconnected
     Stop
```

Sample Disconnect Program

```
'Name: DisconnectProg
'Attributes:  Program, Looping, Run on any SX

Object CommX

Init:
     CommX = DefaultPort
     Goto PrintDisconnect

PrintDisconnect:
     Print "\|032|013|010APSEQ\D"; to CommX
            Goto PrintWait

PrintWait:
     If CommX ConnectState <> Disconnected then
            Set CommX ConnectState = Disconnected
     Endif
     Stop
Endif
```

The above two programs are Plain English programs within the SX 8000 workstation itself. Obviously, on a single user station, the programs are located on the object tree under the workstation. On a LAN system, simply pick one workstation where all the connect and disconnect programs will be located. Once you create the programs, they are attached in the Details Windows of the Site Configuration form. Also, verify that the baud rate on the Site Configuration form matches the StarBus baud rate.

It is not advisable to simply set up each StarBus, attach them to INFINITY and try to make it work. Before attempting to connect through the SX through StarBus, use a dumb terminal to verify that the network has been properly wired and configured for communications:

1. From the dumb terminal communications package, type three tildes: ~ ~ ~ (or whichever character you have configured for DISCONNECT/WAKE UP).

2. At the SCI> prompt, type C # # —where # # is the StarBus STATION NO.

3. Logon to each INFINITY controller as if you were direct connected.

4. Logon to each SX comm port by typing COMMAND followed by your UserName and Password.

4. CONNECTING FROM THE REMOTE CONTROLLER TO THE SX 8000

The next step in setting up INFINITY and StarBus is to program the remote controller to call into SX 8000 with unsolicited alarm updates. The method is similar to that used by SX 8000.

Sample CX/CMX Alarm Dial Out Program

```
'DialSX
Numeric OpenResult
WaitFor Alarm:
     If NewAlarmCount then
            If comm3 Mode = AutoSet or comm3 Mode = Raw then
     Goto OpenPort
     Endif
Endif

OpenPort
            Open(comm3)

BeginDial:
     If TS > 1 then
            Print "\|032|013|010APSEQ\C11"; to comm3
            Goto ConnectWait
     Endif

ConnectWait:
     If comm3 printdone and TS > 2 then
            Goto SendUpdate
     Endif

SendUpdate:
     Print "UPDATE"; to comm3
     Goto ReadResponse_1

ReadResponse_1:
     If comm3 PrintDone then Goro SendSite

SendSite:
     Print "Site1 A 3" to comm3

ClosePort:
     If comm3 PrintDone then
            Clost (comm3)
     Endif

WaitFor Update:
     If (NewAlarmCount) = 0) then
            Goto WaitForAlarm
     Endif
```

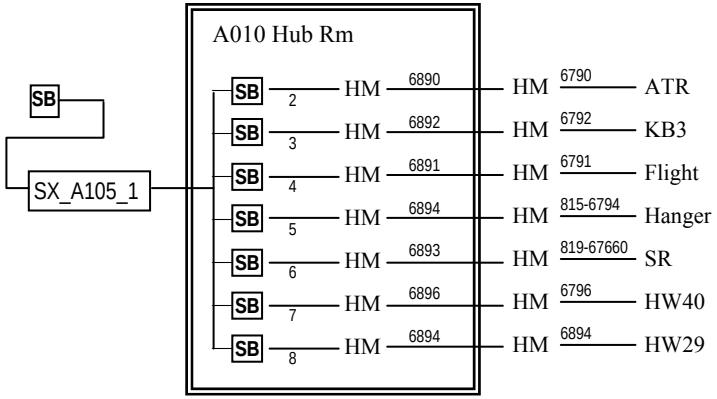
The program on the previous page is primarily for illustrative purposes, because it does not do any error checking. It does however, show the basic flow of what happens:

1. Something happens to increment NewAlarmCount.
2. The controller opens its comm port.
3. The controller Prints the StarBus CONNECT command.
4. The controller prints the string UPDATE.
5. The controller prints its site name, that it has an alarm, and the number of seconds in delay needed to be ready for the SX 8000 to login (`"Site1 A 3"`).
6. The controller closes the port and waits for the login. Note that it does not disconnect from the StarBus. The connection established by the controller will be used by the SX 8000. When the SX 8000 is finished, it will disconnect from the StarBus.

Additional error checking might involve looking at the string returned by the StarBus after the connect attempt to see why the connect failed. It should also involve reading the response given by the SX 8000 to the UPDATE request (ACK or NAK).

5. ALARMING FROM CX AND CMX TO SX 8000 WORKSTATIONS

StarBus/Remote Site One Line Diagram
(sample INFINITY program on next page)



Busdrivers are generally distributed (up to 4500 feet per thread). Alternatively, they may be centrally located and linked to remote buildings by shorthaul modems – as shown here.

5. CONCLUSION

While the need for a StarBus has diminished, it has not disappeared. There are still times when the best way to connect to a controller is with an RS-232 smart switch. StarBus is still the smart switch of choice when connecting Andover products.