MERRICK

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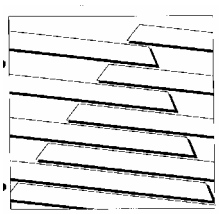

SUPERBRIDGE

Technical Reference
For Allen-Bradley PLCs

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Revision Notes

0.70	10/02/95;LTM	First complete issue
0.70A	11/08/95;LTM	Typos, 20.00.K, 30.00.D, 11.00.HP Registers
0.71	01/29/96;BPM,LTM	Upgraded for version 0.71
0.72	9/11/96;LTM	Upgraded for version 0.72
0.73	10/04/96;RWM	Upgraded for version 0.73
0.74	01/13/97;LTM	Upgraded for version 0.74
0.99	03/07/98;LTM	Upgraded for version 0.99
0.99	03/13/98;LTM	Upgraded for version 1.10
1.11	08/31/98:RSS	Added SB/MC Compatibility table
1.12	05/18/99:ldd	Update Table
1.16	05/18/01:ldd	Updated Table
1.18	01/23/04:ldd	Updated Table

PROPRIETARY NOTE

INTRODUCTION

SuperBridge (SB) is a software application that provides two-way communications between Merrick MC²/MC³ controllers (MCs) and the Allen-Bradley (A-B) communication networks Data Highway Plus (DH+) and Data Highway 485 (DH485). Serial communication (DF1) between SuperBridge and a PLC is also supported. Status and variables in MCs will appear on the A-B networks as integer and floating point files in a PLC-5 or SLC500.

SB will run on an industrially hardened personal computer compatible platform (PC), such as the Allen-Bradley 1771-DSX2 or 1771-EIP Information Processor, under MS-DOS. Connectivity to the DH+ network requires the addition of a DH+ communication adapter board or PC card. Up to 128 MC² controllers can be connected to one SB. On the DH+ network, SuperBridge will support PLC-2 and PLC-5 type DH+ unsolicited messages, such as Typed Read and Write, Word Range Read and Write, and Read-Modify-Write. In addition, MC data can be automatically exchanged with one or more PLC-5's and SLC5/04's on DH+ along with supporting multiple DH485 compatible SLC500's over the DH485 network.

This concept is far superior to the traditional method of Allen-Bradley connectivity (1771 Remote I/O), where the MCs have to mimic an existing Allen-Bradley I/O device, and an Allen-Bradley PLC has to be present.

PLC connectivity

The ladder programmer can access MC data in two different ways:

- **Copy data to PLC.** SuperBridge maintains MC data in one or more PLCs. This imposes minimal burden on the ladder programmer and PLC memory resources. Files are continuously updated in the PLCs by the SuperBridge with MC general status, status of digital inputs and outputs, feedrates, totals, alarms and other parameters. The ladder programmer can access an MC² keyboard and tag specific data items for monitoring and manipulation. The MCs are completely accessible to the PLC. This also means that the PLC can act as an advanced version of MasterSet and as a sophisticated sub-system to weighing controllers, all at the same time.
- **Unsolicited messages.** The PLC requests MC data from SB. This imposes minimal burden on the Data Highway communications bandwidth and on the PLC performance. The ladder programmer creates message rungs to read or write data to or from SB. This method gives the same level of control as does the copy method above, but the ladder logic programming effort is greater. For very large systems, this method has an advantage.

It is also possible to use a combination of the two methods.

Control Room software connectivity

Most modern control room or on-line QA monitoring software packages (MMIs) such as Rockwell Software's RSView, WinView and WinLinx, and Intellution's Fix Dmacs for Windows support A-B connectivity over DH+. This support is available regardless of the presence of an Allen-Bradley PLC system. The MMI accesses MC data just as any PLC data, normally using the "Unsolicited messages" method described above. This makes a MC/SB installation open to almost all modern, powerful control and QA systems. For older MMIs, SB can also impersonate a PLC-2.

MC Controllers connectivity

Up to 128 MC² or MC³ controllers can be connected to a SB, using up to four RS-485, four-wire connections. MC² controllers must be equipped with a serial port option. A serial port can easily be added to an existing controller. Some older software versions of the MC² controller must be

upgraded. See Model Specific Information (page 23). The system response time will improve with decreasing number of MCs connected. If very fast response times are required, more than one SB can be installed on a DH+ or DH485 network.

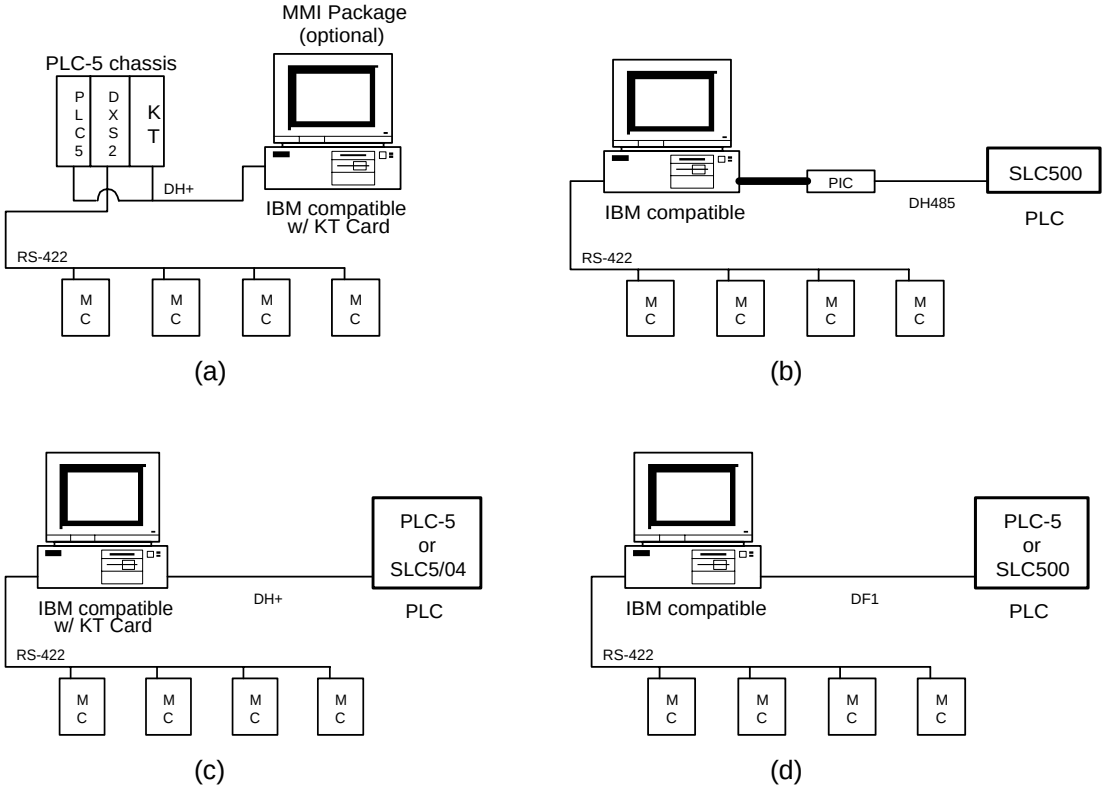
Hardware Requirements

If a PLC-5 is to be used, SB can run on an Allen-Bradley 1771-DXS2 Information Processor using a PC Flash EPROM card. If SB is to operate on the DH+ network, the 1771-DXS2 must be connected to a 1771-DXKT adapter, see figure 1 (a). The adapter includes an 1784-KT/B DH+ interface and a 1784-CP8 adapter for the DH+ cable. This hardware and software package can be supplied, configured and ready to go, from Merrick. To utilize the DH485 network, an Allen-Bradley 1747-PIC module must be purchased. This can also be supplied by Merrick.

SB also runs on the Allen-Bradley 1771-EIP, using two PC cards: a Flash EPROM card and a PCMK/B DH+/DH485 adapter. Also this hardware and software package can be supplied from Merrick. This configuration has the advantage of taking up only one slot in the PLC-5.

A general version is also available, which will run on a personal computer, at least 386/25, with 2 Mbytes of RAM, 5 Mbytes of Hard Disk space and two available serial ports. This is shown in figure 1 (d). One serial port must either be a RS-422 port, or an adapter must be used to convert RS-232C signal levels to RS-422. To operate on the DH+ network, the PC has to be equipped with an Allen-Bradley 1784-KT/B or 1771 KTX adapter, serving as an interface between the PC ISA bus and DH+, and an Allen-Bradley 1784-CP8/A adapter, connecting the DH+ cable to the 1784-KT/B. This configuration is demonstrated in figure 1 (c).The DH+ equipped computer only requires one serial port, COM1 or COM2. To operate on the DH485 network, a 1747-PIC module must be purchased, see figure 1 (b).

Some common arrangements can be seen below. Please note that these are not the only possible combinations.



SETTING UP A SYSTEM

Setting up a SB system includes the following steps:

1. Verify that existing MCs are equipped with a RS-485 Serial Ports and have software application versions listed in Model Specific Information (page 27). If not, complete and/or upgrade.
2. If an A-B 1771-DXS2 processor is used, locate a PLC-5 to serve as a host for the 1771-DXS2 Information Processor and 1771-DXKT adapter (if applicable). Two slots must be free, and the power supply must be able to handle an additional 5V load of 1.6 A, -12V load of 0.04 A, and a +12V load of 0.04A. Install according to instructions in [1], page 2-2.
3. If an A-B 1771-EIP processor is used, locate a PLC-5 to serve as a host for the 1771-EIP Information Processor. One slot must be free, and the power supply must be able to handle an additional 5V load of 2.2 A, -12V load of 0.04 A, and a +12V load of 0.04A. Install according to instructions in [8].
4. If a generic personal computer (PC) will be used, make sure all required hardware is installed. This may include a 1784-KT/B or 1784-KTX card, and a RS-422 adapter. See Install the KT Card (page 4), or Install the KTX Card, if used (page 4) and Install RS-422 converter or adapter, if needed (page 4).
5. Copy the SB software files to the PC hard disk and modify the PC configuration files if necessary. See Modify PC configuration (page 5).
6. Assign a DH+ or DH485 station number for SB. See Assign Station Numbers (page 9).
7. Verify that SB starts up properly in the PC. See Verify SB startup (page 9).
8. Connect all MCs to SB. See MC Physical Connection (page 10).
9. Set up communication parameters in all MCs connected. See Setting Up communications with the MCs (page 10).
10. Configure SB for the number of MCs connected. See SB Configuration for MCs (page 11).
11. Verify that communications with the MCs work properly. See Verify MC communication (page 11).
12. If data is to be copied from SB to one or more PLC, the file copy scheme must be set up and verified. Use the steps 13..16.
13. Allocate memory files in the PLC(s) to hold SB data. See Allocating A-B files (page 12).
14. Configure SB to read and write the A-B files. See SB Configuration for File Copy (page 12).
15. Connect SB to your DH+ or DH485 network. See Connecting SB to DH (page 13).
16. Verify that the file copy process works properly. See Verify A-B File Copy (page 13).
17. If SB is to service PLC-2 type Unsolicited Messages, that is, act as a PLC-2 with respect to a MMI or other PLCs on the DH+ network, some PLC-2 parameters have to be set-up. See Setting up PLC-2 Compatible parameters (page 13).
18. Verify that the Superbridge version is compatible with the MC application software version. See Superbridge /MC Software Version Compatibility Table in **Error! Reference source not found.** on page **Error! Bookmark not defined.**.

INSTALLING SB SOFTWARE AND HARDWARE

If SB hardware and software are purchased entirely from Merrick, it comes installed and configured along with a specification sheet. The configuration may have to be altered as the system changes. When an A-B 1771-DXS2 or A-B 1771-EIP Information Processor is used, the software and configuration files resides on a PCMCIA Flash EPROM card. Merrick has to do the installation for the 1771-DXS2, since a BIOS upgrade in the 1771-DXS2 Information Processor is necessary.

SB will run on a generic PC according to Hardware Requirements (page 2). If configuration data was available to Merrick before the time of shipment, the configuration file has already been prepared. In any case, a specification sheet is always shipped, indicating the current configuration.

Install the KT Card, if used

Configure and install the 1784-KT/B card in the SB host PC, according to instructions in [2]. Since SB normally is the only application running on the host PC, it is recommended that the default settings are used, that is,

- Memory address: D400 ([2], page 8)
- Interrupt Setting: IRQ 5. ([2], page 9)

This corresponds to an address switch setting of {Down, Up, Down, Up, Down, Down}, and the Interrupt jumper in the center position.

If there are other devices that may cause a conflict with these settings, other settings can be examined. The corresponding configuration files (CFG_KT.INI and CONFIG.SYS) must me altered accordingly. See Modify PC configuration (page 5).

Install the KTX Card, if used

Configure and install the 1784-KTX card in the SB host PC, according to instructions in [9]. Since SB normally is the only application running on the host PC, it is recommended that the default settings are used, that is,

- Memory address: D700 ([9], page 2-3)
- Interrupt Setting: IRQ 5. ([9], page 2-7)

If there are other devices that may cause a conflict with these settings, other settings can be examined. The corresponding configuration file (CFG_KT.INI) must me altered accordingly. See Modify PC configuration (page 5).

Install RS-422 converter or adapter, if needed

If the host PC does not have a RS-422 serial port, a converter between RS-232 and RS-422 must be used. Alternatively, an internal RS-422 adapter board may be used. Make sure to disable the corresponding RS-232 COM port!Merrick has successfully tested the ULTRA-485 serial port adapter from Industrial Computer Source, (619) 677 0877. Strappings for COM 1 for this board are:

- Port Adress to 3F8. SW1 = {On, On, On, Off}
- IRQ Jumper to IRQ4. E1 = {Jumper @ 4} Do not use IRQs higher than 7.
- Single Interrupt mode. E2 = {Jumper @ N}
- RS-422 mode. E5 = {Jumper @ 422}
- RS-422 mode. E3 = {Jumper @ 422}

- SIO-485 Mode. E4 = {Dip Shunt @ SIO-485}. This is not the default setting.
- Line terminations on. SW-2 = {(T,P,P,L,L) = (On, On, On, Off, Off)}.

For COM2, the following strappings would change to:

- Port Adress to 2F8. SW1 = {On, On, Off, On}
- IRQ Jumper to IRQ3. E1 = {Jumper @ 3}.

Install RS-422 multiport adapter, if needed

If more than 32 MCs are connected to the host PC serial port, or to increase performance, a multi-port RS-422 adapter must be used. Up to 4 serial ports, sharing a single interrupt (IRQ), are supported.

Merrick has successfully tested the FASTCOM422/4 serial multiport adapter from Industrial Computer Source, (619) 677 0877. Strappings tested for this board were:

- Port Adress Base to 280. SW1 = {On, On, Off, On, Off, On, On, On}
- IRQ 3, No IRQ Sharing. SW2 = {On, Off, On, Off, Off, Off, Off, Off}, SW3 = {Off, Off, Off, Off}. This is not the factory default setting. The factory default is IRQ5. In the test computer, IRQ5 was used by the A-B KT adapter. No COM2 port, which uses IRQ3, was installed in the test computer. Do not use IRQs higher than 7.
- CTS Handshaking disabled, No RTS Tx driver control. SW4 = {On, On, On, On, Off, Off, Off, Off}.

An example of the configuration file for this multiport adapter an be found in Sample SUPERB.INI, page 46.

Modify PC configuration

The SB software files are distributed as a complete directory structure, including all configuration files. If a 1771-DXS2 or 1771-EIP information processor is used, all files reside on a PCMCIA Flash EPROM card, drive C:. For a pre-configured system, the files are installed along with MS-DOS on the PC hard drive. In all other cases, the SB files are shipped on a 3½" floppy, and the files have to be copied onto the PC hard drive. MS-DOS, versions 5 or 6, must already be installed. To copy the SB files onto the hard drive insert the distribution diskette in the floppy drive (assumed to be drive A:), boot the PC, and at the C:\> prompt, type

```
XCOPY A:*.* /S /E /V
```

and hit return. The existing AUTOEXEC.BAT and CONFIG.SYS files will be overwritten and the following directories will be created:

\SUPERB	SB executable and configuration files
\ABIC\BIN	KT card executables and configuration files
\IPDS\SYMBOLS	A-B 6200 programming software symbol files for SB, if configured
\DOC	Specific release or configuration text files.

MS-DOS files are assumed to reside in \DOS.

Four files deals with the SB configuration and are referenced below as

CFG_KT.INI	\ABIC\BIN\CFG_KT.INI
SUPERB.INI	\SUPERB\SUPERB.INI
AUTOEXEC.BAT	\AUTOEXEC.BAT

CONFIG.SYS \CONFIG.SYS

They can all be edited with the MS-DOS editor ‘EDIT’.

The default CFG_KT.INI file is seen below. It is configured for DH+ communication using a KT Card.

```
;       CFG_KT.INI
;       SuperBridge Default KT Configuration
;       10/10/95/LTM
[DTL_KT.1]
DEVICE=KT
MEMORY=D400
IRQ=5
STATION=71
NAME=SUPERB
TERMINATION=OFF
```

Entries in CFG_KT.INI are

[DTL_p.n]	Device definition statement. Protocol designators (p) can be KT, 485, or DF1 depending on communication method used. Pushwheel numbers (n) may range from 1 to 8. Each communication interface module must have a unique pushwheel number.
DEVICE=KT	Must be present if KT Card is used to interface with DH+.
MEMORY=D400	Must correspond to the memory address DIP switch setting on the KT card. D400 is the default. See Install the KT Card (page 4).
IRQ=5	Must correspond to the position of the IRQ jumper on the KT card. 5 is the default. See Install the KT Card (page 4).
STATION=71	This is the station number for SB. See Assign Station Numbers (page 9)
NAME=SUPERB	This is the name that will appear on DH+ for SB. Running a DH+ interrogation software, such as A-B ‘WHO’ will show this name. If more than one SB is connected to DH+, it is a good idea to edit this name.
TERMINATION=OFF	If SB is connected at the end of the DH+ network and no terminating resistor in installed, set this entry to “YES”. See [3], page 11-1.

The following is an example of a CFG_KT.INI file that is configured for DH+ communication using a KTX Card.

```
;       CFG_KT.INI
;       SuperBridge Default KTX Configuration
;       03/07/98/LTM
[DTL_KT.1]
DEVICE=KTX
PROTOCOL=DHPLUS
MEMORY=D700
IRQ=5
STATION=71
NAME=SUPERB
TERMINATION=OFF
```

Entries in CFG_KT.INI are

[DTL_p.n]	Device definition statement. Protocol designators (p) can be KT, 485, or DF1 depending on communication method used. Pushwheel numbers (n) may range from 1 to 8. Each communication interface module must have a unique pushwheel number.

DEVICE=KTX	Must be present if KTX Card is used to interface with DH+.
MEMORY=D700	Must correspond to the memory address DIP switch setting on the KTX card. D700 is the default. See Install the KTX Card, if used (page 4).
IRQ=5	Must correspond to the position of the IRQ jumper on the KTX card. 5 is the default. Install the KTX Card, if used (page 4).
STATION=71	This is the station number for SB. See Assign Station Numbers (page 9)
NAME=SUPERB	This is the name that will appear on DH+ for SB. Running a DH+ interrogation software, such as A-B 'WHO' will show this name. If more than one SB is connected to DH+, it is a good idea to edit this name.
TERMINATION=OFF	If SB is connected at the end of the DH+ network and no terminating resistor in installed, set this entry to "YES". See [3], page 11-1.

The following is an example of a CFG_KT.INI file that is configured for DH485 communication using a PIC Module.

```
;       CFG_KT.INI
;       SuperBridge DH485 Configuration
;       11/30/95/BPM
[DTL_485.2]
DEVICE=PIC
BAUD=19200
IRQ=4
COM_PORT=1
STATION=22
MAXNADDR=037
NAME=SB_485
```

Entries in CFG_KT.INI are

[DTL_p.n]	Device definition statement. Protocol designators (p) can be KT, 485, or DF1 depending on communication method used. Pushwheel numbers (n) may range from 1 to 8. Each communication interface module must have a unique pushwheel number.
DEVICE=PIC	Must be present if DH485 network, which requires PIC Module, is to be used.
BAUD=19200	The transmission rate of the DH485 link. The choices available are: 300, 1200, 2400, 4800, 9600, and 19,200 bps.
IRQ=4	Must correspond to the COMM port being used for DH485 communication.
COM_PORT=1	COMM port to be used for DH485 communication.
STATION=22	This is the station number for SB. See Assign Station Numbers (page 9)
MAXNADDR=037	The maximum node address is the highest station number used on the DH485 link. The number can range from 000 to 037 octal.
NAME=SB_485	This is the name that will appear on DH485 for SB. Running a DH485 interrogation software, such as A-B 'WHO' will show this name. If more than one SB is connected to DH485, it is a good idea to edit this name.

The following is an example of a CFG_KT.INI file that is configured for DF1 communication.

```
;       CFG_KT.INI
```

```
;       SuperBridge DF1 Configuration
;       11/30/95/BPM
[DTL_DF1.3]
DEVICE=DF1
BAUD=19200
IRQ=4
COM_PORT=1
NAME=SB_DF1
ERROR=0
PARITY=0
DUPLEX=1
```

Entries in CFG_KT.INI are

[DTL_p.n]	Device definition statement. Protocol designators (p) can be KT, 485, or DF1 depending on communication method used. Pushwheel numbers (n) may range from 1 to 8. Each communication interface module must have a unique pushwheel number.
DEVICE=DF1	Must be present if DF1 communication is to be used.
BAUD=19200	The transmission rate of the DF1 link. The choices available are: 300, 1200, 2400, 4800, 9600, and 19,200 bps.
IRQ=4	Must correspond to the COMM port being used for DF1 communication.
COM_PORT=1	COMM port to be used for DF1 communication.
NAME=SB_DF1	The name of the communication interface module that appears in the active nodes list.
ERROR=0	Specifies the type of error detection used by the DF1 protocol. Choices are: 0 (BCC) and 1 (CRC).
PARITY=0	Specifies the parity for the DF1 protocol. Choices are: 0 (None) and 1 (Even).
DUPLEX=1	Specifies full duplex. Do not edit.

For more detailed information on the configuration of CFG_KT.INI, see [7], pages 3-3 & 3-4.

SUPERB.INI, with its many configuration entries, is described in detail in Configuration (page 41).

The default AUTOEXEC.BAT is shown below, it is configured for DH+ communication using a KT Card.

```
REM     AUTOEXEC.BAT
REM     SuperBridge Default KT Configuration
REM     10/10/95/LTM
PATH=C:\DOS;C:\ABIC\BIN;C:\SUPERB
SET ABIC_CONFIG=C:\ABIC\BIN
C:\ABIC\BIN\DTL_KT
C:\ABIC\BIN\CFG_KT
C:\ABIC\BIN\RNATSR
C:\ABIC\BIN\RNA -a8
CD SUPERB
ABDRV
```

There is normally no reason to alter this file if DH+ communication is to be used.

The following is an example of AUTOEXEC.BAT configured for DH485 communication.

```
REM     AUTOEXEC.BAT
REM     SuperBridge DH485 Configuration
REM     11/30/95/BPM
PATH=C:\DOS;C:\ABIC\BIN;C:\SUPERB
SET ABIC_CONFIG=C:\ABIC\BIN
C:\ABIC\BIN\DTL_485
```

```
C:\ABIC\BIN\CFG_485
C:\ABIC\BIN\RNATSR
C:\ABIC\BIN\RNA -a8
CD SUPERB
ABDRV
```

There is normally no reason to alter this file if DH485 communication is to be used.

The following is an example of AUTOEXEC.BAT configured for DF1 communication.

```
REM     AUTOEXEC.BAT
REM     SuperBridge DF1 Configuration
REM     11/30/95/BPM
PATH=C:\DOS;C:\ABIC\BIN;C:\SUPERB
SET ABIC_CONFIG=C:\ABIC\BIN
C:\ABIC\BIN\DTL_DF1
C:\ABIC\BIN\CFG_DF1
C:\ABIC\BIN\RNATSR
C:\ABIC\BIN\RNA -a8
CD SUPERB
ABDRV
```

There is normally no reason to alter this file if DF1 communication is to be used.

This is the default CONFIG.SYS

```
REM     CONFIG.SYS
REM     SuperBridge Default 0.99
REM     01/07/97/LTM
BUFFERS=15,0
FILES=8
DEVICE=C:\DOS\INTERLNK.EXE
```

The INTERLNK driver load (last line) is always attempted. It will fail if no Interlink server PC is connected to COM1 or COM2. This is for the benefit of PC card Flash EPROM disk installations. The intersvr/interlnk utilities is the only way to transfer files to and from the SB host PC.

SB will always start at boot, showing its home screen. To be able to edit configuration files, exit SB by pressing F10.

Assign Station Numbers

SB will act as a PLC-5 or SLC500 on Data Highway communication networks. As such, it must be assigned an A-B style octal station number. The station number is defined in CFG_KT.INI. Default is 71 (octal), which is for DH+ communication. The DH485 network is limited to address 37 octal. Check that there are no station number conflicts on the Data Highway network, and edit CFG_KT.INI if needed. If more than one SB resides on the Data Highway network, at least one if the station numbers have to be altered. See Modify PC configuration (page 5).

Verify SB startup

Connect a VGA monitor and PC keyboard to the SB host PC and reboot. Watch for error messages as the communication drivers load and SB starts up. The load process can be made to run step-by-step by holding down the F8 key immediately after boot. If SB starts successfully, the SB home screen will appear.

If possible, run “WHO” or “SUPER WHO” on another device on the DH+ network. With the default settings, SB should appear as a “TERM” device with Station Number 71, name SUPERB.

SETTING UP COMMUNICATIONS WITH THE MCS

The MC network is a four wire RS-485 Master-Slave polled communications loop. All MCs are slaves on the network, and are required to have a RS-485 serial port and a unique address, called “Controller Number” (CN). The CN is set up, along with other serial communications parameters, in each MC. SB is the master, and must have either a four wire RS-485 or a RS-422 serial port.

MC Physical Connection

Use a RS-422 type two pair shielded cable like Belden 9368. One pair is used to carry signals from the SB transmitter to all MC receivers. The other pair is used to carry signals from all MC transmitters to the SB receiver. The following table lists connections, using an A-B 1771 DXS2 Information Processor port, strapped for RS-422 communications. Other RS-422 adapters may have other pinouts.

SB Signal	SB 1771 DXS2 Pin # (DE-9 P)	ULTRA -485 Pin # (DB-25P)	FASTCOM 422/4 Pin # (DE-9 S)	MC³ Controller Terminal #	MC² Controller Pin # (DB-25S)	MC Signal
Tx+	1	24	4	3	22	Rx+
Tx-	9	25	5	4	23	Rx-
Rx+	2	12	8	1	24	Tx+
Rx-	6	13	9	2	25	Tx-
Shield	5	7	1	N.C.	11	Shield

Be careful when running the cable. Avoid power lines and other devices that might cause electrical disturbances. Maximum cable length is 1230 m (4000 ft). See also [1], pages 3-2 and D-1. SB does not have to be connected at one end of the cable. Remove all termination resistors in the MC² serial ports. Add a 150Ω terminating resistor between the + and - lines for each pair at each end of the cable.

If only one MC² is used, it is possible to use a RS-232 interface instead. This is useful for bench-testing SB, using a regular office PC, which normally has no RS-422 interface. The cable should have a DE-9S, for a 9 pin connector in the PC or a DB-25S, for a 25 pin connector in the PC in the PC end and a DB25P in the MC end. Use the following table for the pinout, and keep the cable length less than 25 feet at 19200 baud.

Signal, PC side.	PC COM port, 9 pin (DE-9P)	PC COM port, 25 pin (DB-25P)	MC² Serial port (DB-25S)
Rxd (PC Receiver)	2	3	15
Txd (PC Transmitter)	3	2	12
Ground	5	7	7
Shield	1	1	1

MC Communication Parameters

MC Communication parameters are set in the controllers themselves. They are:

1. Controller Number. Must be different for each controller. Start with 1 and continue up.
2. Baud Rate. Must be the same for all controllers. Set to the highest possible, normally 19200. Some older software versions only support up to 9600 baud. See Model Specific Information (page 23).

3. Parity. Must be set to “NO Par” in all MCs.
4. Data Bits. Must be set to 8 in all MCs.
5. Start character. Must be set to 10 in all MCs.
6. End character. Must be set to 13 in all MCs.

SB Configuration for MCs

SB configuration parameters are set in SUPERB.INI. See Configuration (page 41) At least Controllers in the [Sizes] Section (page 41) must be set. The rest of the parameters could normally be left at their default settings. Note that the CN is defaulted to Controller Index + 1. Controller Index always starts at zero and increments up by one per connected controller. CNs start at 1 and can have any numerical value up to 57.

See examples in [PortN] Sections (page 41) on how to use different COM ports and how to change the default baudrate from 19200. The default SUPERB.INI looks like this:

```
;       SUPERB.INI
;       SuperBridge for Allen-Bradley Default
;       09/11/96/LTM

[SIZES]
;       One serial port, five MCs, no file copy to PLC
ComPorts = 1
Controllers = 5
Segments = 0

[IRQ]
;       Settings for COM2
PortVector = 0B
PIDMask = 08

[PORT0]
;       COM2, 19200 Baud
UartBase = 2F8
DlabReg = 0006

[PLCDEFAULT]
DefaultStation = 60

[PLC2DATA]
PLC2ReverseFloat = 0
```

Verify MC communication

With all MCs connected and powered up, reboot SB and check The Home Screen (page 31). All MCs should be in “Run” mode and identified by model and version. An “Unknown” MC in the home screen has never been successfully contacted by SB. Let the system run for 15 minutes and check communications error statistics for each MC in the MC Data Screen (page 32). There should be no fatal errors and less than 100 communication errors. If the error rates are higher, check your cable and connections.

MC² controllers have indicators on the serial ports that can help troubleshoot communication problems. A yellow light blinks as telegrams are received by the MC². A green light blinks as telegrams are transmitted back to SB. Newer MC models also have serial communications diagnostic screens, usable for troubleshooting. Here is a checklist that can be used if there are problems:

1. If a regular PC COM port is used, it can be tested by disconnecting the cable and short pins 2 and 3 (for both 9 pin and 25 pin connectors), while looking at the MC Combined Diagnostic Screen (page 34). While the pins are shorted, the “CsumErrs” parameters in row 7 should increment rapidly. When the short is opened, the “Timeouts” parameter in row 7 should increment slowly.

2. Check all communication parameters in all MCs. All parameters must be equal except the “Controller Number”, which must be different for all MCs.
3. Check the corresponding line parameter settings in SUPERB.INI. See [PortN] Sections (page 41).
4. All MC²s should show a blinking yellow light on the serial port, indicating that they are receiving telegrams from SB. If it does not blink at all, there are problems with the cable, SB serial port or RS-422 converter.
5. The green light should also blink. If there are more than one MCs in the system, it should not blink as often as the yellow light. If it does not blink at all, there are problems with the line parameters or controller number.
6. A LastFatalErr of -13 in the MC Combined Diagnostic Screen (page 34) indicates that the MC actually is returning telegrams, but the model and/or version is not supported by SB. An upgrade of either SB or the MC software version may be necessary. See Supported functions (page 23).

SETTING UP PLC CONTROLLERS FOR FILE COPY

If MC data in SB files are to be used in PLC ladder logic, a file copy scheme can be enabled, where SB writes and reads files from one or more PLCs. See PLC File Specification (page 14). Typically, one PLC is the host for SB, holding master versions of the two control files that are red by SB (N13 and F15). The host PLC normally also holds copies of the two report files that are written by SB (N12 and F14). In some installations several PLCs serve as hosts for MCs, and the files are split between them. File copy is always attempted, solicited from SB, when the Segments entry in the [Sizes] Section (page 41) is greater than zero.

Allocating A-B files

For successful file copy to take place, files must be allocated in the host PLCs. Normally two integers (N) and two floating points (F) files are created. File sizes are dependent on the number of MCs connected, see Controllers entry in the [Sizes] Section (page 41). To allocate PLC files, See [4], page 10-1. File sizes (number of elements) should be at least

- For copies of Integer Report File, N12 (page 14), 8 times the number in Controllers entry in the [Sizes] Section (page 41).
- For master versions of Integer Control File, N13 (page 16), 7 times the number in Controllers entry in the [Sizes] Section (page 41).
- For copies of Floating Point Report File, F14 (page 18), 8 times the number in Controllers entry in the [Sizes] Section (page 41).
- For master versions of Floating Point Control File, F15* (page 19), 3 times the number in Controllers entry in the [Sizes] Section (page 41).

*Note: Only SLC5/03 and SLC5/04 versions support floating point files and data transfer.

The PLC host files do not have to be N12, N13, F14 and F15, but they have to be the same category (N and F files). It is a good idea to use the SB file names (N12, N13, F14 and F15) if they are free in the host PLC; it makes PLC programming easier, using this manual.

SB Configuration for File Copy

File copy is enabled by setting entries in SUPERB.INI. A Segments entry in the [Sizes] Section (page 41) greater than zero enables file copy. Normally, four segments per five MCs are used.

Using SB default segment parameters is highly recommended. See [PLCDefault] Section (page 43). At least the DefaultStation (page 43) needs to be set.

For complex installations with file copy to multiple PLCs, each segment can be specified in detail in the [SegmentN] Section (page 44).

Connecting SB to DH+

DH+ network design is explained in [5], chapter 5. To successfully maintain a system of PLCs, SBs and MMIs, a general knowledge in this area is required. Information about the physical installation of DH+ is covered in [3], chapter 11. To connect the SB 1784-KT card to a DH+ network, refer to [2], page 12.

Verify A-B File Copy

With all MCs connected and powered up, the DH+, DH485 or DF1 cable connected, the host PLCs powered up and configured, reboot SB and check The Home Screen (page 31). All MCs and segments should be in “Run” mode. Let the system run for 15 minutes and check rejects in the A-B File Copy Diagnostic Screen (page 37). There should be no rejects in any segments, and the Time parameter should stay less than 160.

SETTING UP PLC-2 COMPATIBLE PARAMETERS

For the benefit of older MMI systems, SB will respond to unsolicited telegrams originally designed for the A-B PLC-2 controller. Some parameters need to be set to cover compatibility issues, using this method. Especially handling floating point numbers is difficult, since the PLC-2 did not support floating point numbers at all. If PLC-2 telegrams are to be used, the two parameters described in PLC-2 Unprotected Messages (page 21) and the [PLC2DATA] Section (page 45) may have to be changed from their defaults.

PLC FILE SPECIFICATION

MC Data in SB is available in PLC style files. They are:

- N12, containing read-only bit or integer oriented data from the MCs, such as inputs, outputs, alarms and communication status. In N12, there are eight words per connected MC.
- N13, containing read-write bit or integer oriented data for the MCs, containing parameter tags and function requests. In N13, there are seven words in per connected MC.
- F14*, containing read-only floating point data from the MCs, such as tagged parameters, feedrates and totals. In F14, there are eight floats per connected MC.
- F15*, containing read-write floating point data for the MCs, such as setpoints. In F15, there are three floats per connected MC.

*Note: Only SLC5/03 and SLC5/04 versions support floating point files and data transfer.

Note: Italic names indicate recommended symbol names in A-B ladder logic. *x* is a representation of the controller index, starting with *A* for the MC with controller index 0, continuing with *B* for controller index 1 etc. Under certain circumstances, Merrick will supply a RxLogix programming software symbol table file with the distribution diskette.

Integer Report File, N12

SuperBridge will maintain a PLC type integer file, with 8 integers per connected MC. The purpose of this file is to make bit or integer data available to the PLC ladder or MMI programmer. The file is read only. The file name is N12.

The following is a specification of the 8 words belonging to a certain MC.

MC Status Word, N12:0,8,16..(*x_STATUS*)

The MC Status word indicates the operative status of the controller. Any bit set indicates a potential problem. The bits are mapped as follows:

Bit 0 (0001) (*x_OFFLINE*) Off-line. The MC is taken off-line by the Off-line bit in the MC Control Word. If the Off-line bit in the MC Control Word, N13:4,11,18.. (page 17) is cleared (by the PLC or Control Room Software) this bit is cleared and the MC Status will change to "Reviving".

Bit 1 (0002) (*x_COLDST*) Coldstart. The MC has been cold-started, and is in the process of being brought on-line for normal operation.

Bit 2 (0004) (x_*COMERR*) Communications failure. The MC fails to respond to communications. Attempts are made periodically to revive the MC. During the revival attempt time, this bit is cleared and the MC status changes to "Reviving".

Bit 3 (0008) (*x_REVIVE*) Reviving. An attempt is made to make the MC go on-line, either by a revival attempt from a communications failure or a change of state to 0 of the MC Control Word Off-line bit. When the revival attempt is concluded, this bit is cleared and the MC state changes to either "Coldstart", "Communications failure" or "On-line".

Bit 4 (0010) (*x_SETON*) Always on. This bit is set every time a file copy takes place. It coulb be periodically cleared by the ladder logic and then checked to see that it is set by SB. This would ensure that communication between SB and the PLC has not

failed.

Bit 5 (0020) (*x_INMENU*) In menu. The MC menu system is engaged. This means that the effect of any remote keycode requests are unpredictable.

Bit 6 (0040) (*x_STARVE*) Material starvation condition. The MC is in a state of low feedrate deviation alarm. Only MCs that supports feedrate can have this bit set. It can be used to take action on a feeder material starvation condition.

Bit 7 (0080) (*x_RECAL*) Recalibration. The MC has possibly been re-calibrated, since the rerate, calibrate or service menu has been accessed. This bit is set until the MC has been interrogated about scale factors and decimal point settings. When the interrogation is completed, the bit is cleared.

Bit 8 (0100) (*x_INTSP*) Internal Setpoint. The MC is not in communications setpoint mode. Setpoint values in SetPoint, F15:0,3,6.. (page 19) is ignored by the MC. This bit is never set for MCs that do not support external setpoint, such as the 11.00.HP. Instead, a “setpoint” setting us used for other purposes for these models. See Setpoint (page 24) for details.

Bit 9 (0200) (*x_TAGERR*) Tag Access problem. A register, tagged for continuous reporting, is either non-existent or read protected. Also, indication of difficulties downloading setpoints to the controller.

Bit 10 (0400) (*x_INTSEC*) Internal Secondary Setpoint. The MC is not in communications setpoint mode for the secondary setpoint. Secondary setpoint values in Secondary SetPoint, F15:2,5,8..(x_SECPT) (page 19) is ignored by the MC. This bit is never set for MCs that do not support external setpoint, such as the 11.00.HP. Instead, a “setpoint” setting us used for other purposes for these models. See Setpoint (page 24) for details.

Bit11 - 15 Reserved.

MC Internal State, N12:1,9,17..(*x_INTSTA*)

MCs with an internal state machine, such as 30.00.HP, 30.10.EX and 35.00.HP have an internal, numeric integer variable, describing its operational state. The value of this variable is available in this integer. For models that are continuous, such as 10.00.HP, 11.00.HP, 20.00.HP and 22.00, this value is always 0. The interrogation of this variable is a part of the fast loop. To find out about the internal state values, see Internal State, (page 27).

MC Digital I/O, N12:2,10,18..(*x_DIGIO*)

The states of the physical inputs and outputs of the MC are available in this integer. The interrogation is a part of the fast loop. To find out about digital input and output designations, see Digital I/O (page 25). The MC physical I/O is mapped to the following bits:

Bit 0 - 6 State of physical (relay) outputs 1..7 at backplane board #1. A "1" indicates a closed relay output.

Bit 7 Reserved. The state of this bit is unpredictable.

Bit 8 - 11 State of physical inputs 1..4 at backplane board #1. A "1" indicates a closed input circuit.

Bit 12 - 15 State of physical inputs 1..4 at backplane board #2. A "1" indicates a closed input circuit.

Note that MC² controllers only have one backplane board.

MC General Alarms or Warnings, N12:3,11,19..(*x_ALARMS*)

Any current general alarms or warnings in the MC is visible as a bit in this integer. MCs have a maximum of 16 general alarms or warnings. There is one bit per alarm. The interrogation is a part of the fast loop. To find out about MC general alarms and warnings, see General Alarms (page 24).

Request Done Bits, N12:4,12,20..(*x_REQDONE*)

This integer contains the "Done" bits for requests set by the user in the MC Request Word. The Done bits are always set when a request has been completed. If the request caused an error, the Request Error Bits, N12:5,13,21..(x_REQERR) will indicate what kind of errors that were encountered. The bits are mapped in the same way as the bits in the MC Control Word, N13:4,11,18.., (page 17). The done bits for Download Setpoint, and Download Secondary Setpoint are set at the first successful setpoint download, and remain set until the request bit is cleared, or a problem occurs. Setpoints are continuously downloaded, when they change.

Request Error Bits, N12:5,13,21..(*x_REQERR*)

This integer contains the "Error" bits for the last request executed in the MC Request Word. If no errors were encountered, all bits are cleared. The bits are mapped as follows:

Bit 0 (0001) (*x_RQEOFL*) MC is off-line or in communications failure. Request could not be performed.

Bit 1 (0002) (*x_RQENOS*) The request is not supported for this MC model.

Bit 2 (0004) (*x_RQEACC*) No access. The requested function could not be performed because of access restrictions.

Bit 3 (0008) (*x_RQEKEY*) Keyboard problems. A remote keyboard request was issued when the MC was not in root node. No remote keystroke was sent.

Bit 4 (0010) (*x_RQEREG*) A register number is addressed that does not exist in the MC model.

Bit 5 (0020) (*x_RQEVAL*) The value used for updating a register is too large to fit in the actual register type.

Bit 6 - 15 Reserved.

Request Integer Result, N12:6,14,22..(*x_INTRES*)

This integer contains the result of a request for integer data. Data is valid when the corresponding Request Done bit is set and all Request Error Bits are cleared. Interpretation is dependent on which request was posted. See MC Control Word, N13:4,11,18.. (page 17), for details.

External Outputs, N12:7,15,23..

Logical outputs in some MC³ controllers can be mapped to up to 16 external outputs. They appear as bits in this word. External output 1 corresponds to bit 0 etc. This is useful when a physical output is not needed at the MC location, but must be monitored by the PLC.

Integer Control File, N13

SuperBridge will maintain another PLC type integer file, with 7 integers per connected MC. The purpose of this file is to make it possible for the PLC ladder or MMI programmer to control the SuperBridge or MC operation. The file has read and write access. The file name is N13.

The following is a specification of the 7 words belonging to a certain MC.

Fast Tag Register Number, N13:0,7,14..(*x_FTAG*)

This is a numerical value of a register number in the MC. To find out about MC register numbers, see Useful Registers (page 29). If the value of this integer is not zero, the corresponding register will be polled in the fast loop. The value of the register will be available in the Fast tagged value, F14:0,8,16.. (page 19), as long as the MC is on-line and the Tag Access Problems bit in the MC Status Word, N12:0,8,16.. (page 14) is not set.

Slow Tag Register Number 1 - 3 N,13:1-3,8-10,15-17..(*x_STAG1, x_STAG2, x_STAG3*)

These integers work just like the Fast Tag Register Number, but the corresponding registers will be polled in the slow loop. The value of the register will be available in Slow tagged values 1 - 3, F14:1-3,9-11,17-19.. (page 19), respectively.

MC Control Word, N13:4,11,18..(*x_CONTROL)*

The bits in this integer are used to control status and issue function requests to SuperBridge. There is one function per bit. Requests may be accompanied by request parameters located in MC Request Integer Parameter N13:5,12,19.. (page 18) and/or MC Request Float Parameter, F15:1,4,7.. (page 19). Setting a Request bit (Bit 4 - 15) will result in the corresponding bit in Request Done Bits, N12:4,12,20.. (page 16) being set, when the request either has completed or caused an error. Only one request should be run at a time, in order not to confuse done bits and parameters. The following control status and requests are supported:

Bit 0 (0001) (*x_ROFFL*) MC Off-line. Setting this bit will take the corresponding MC off-line. When done, the MC Status Word, N12:0,8,16.. (page 14), Bit 0, Off-line, will be set. Clearing this bit bill bring the MC on-line again. It is a good idea to set a MC that is currently not used off-line, since this speeds up the polling loops.

Bit 1 (0002) (*x_RDLSET*) Download setpoints. This bit will cause any value (including zero) in SetPoint, F15:0,3,6.. (page 19) to be continuously downloaded as a setpoint to the MC.

Bit 2-3 Reserved.

Bit 4 (0010) (*x_RKEY*) Send remote keyboard keycode. The code for the key must be present in the MC Request Integer Parameter N13:5,12,19.., (page 18). Multiple keycodes can be "added" together, having the effect of pressing multiple keys on the MC² keyboard simultaneously. The keyboard mapping is

Bit	MC² keyboard key	Hex Code	Binary Code
0	"1"	0001	0000 0000 0000 0001
1	"2"	0002	0000 0000 0000 0010
2	"3"	0004	0000 0000 0000 0100
3	"4"	0008	0000 0000 0000 1000
4	"5"	0010	0000 0000 0001 0000
5	"6"	0020	0000 0000 0010 0000
6	"7"	0040	0000 0000 0100 0000
7	"8	0080	0000 0000 1000 0000
8	"9"	0100	0000 0001 0000 0000
9	"0"	0200	0000 0010 0000 0000
10	"↑"	0400	0000 0100 0000 0000
11	"←"	0800	0000 1000 0000 0000
12	"→"	1000	0001 0000 0000 0000
13	"↓"	2000	0010 0000 0000 0000

Bit	MC² keyboard key	Hex Code	Binary Code
14	"X"	4000	0100 0000 0000 0000
15	"ENT"	8000	1000 0000 0000 0000

Possible errors bits are 0 and 3. See Request Error Bits, N12:5,13,21.. (page 16)

Bit 5 (0020) (*x_RGETREG*) Request register contents. The numerical value of the register number must be present in the MC Request Integer Parameter N13:5,12,19.. (page 18). Upon completion, bit 5 of Request Done Bits, N12:4,12,20.. (page 16), will be set. If no errors occurred, the content of (value in) the register will be present in Request Float Result F14:6,14,22.. (page 19). Possible errors bits are 0 and 2. See Request Error Bits, N12:5,13,21.. (page 16).

Note. An easier and more efficient method of getting the content of a MC register is to tag it. See Fast Tag Register Number, N13:0,7,14.. (page 17) and Slow Tag Register Number 1 - 3 N,13:1-3,8-10,15-17.. (page 17)

Bit 6 (0040) (*x_RPUTREG*) Update register contents. The numerical value of the register number to update must be present in the MC Request Integer Parameter N13:5,12,19.. (page 18). The numerical value of new register content must be present in MC Request Float Parameter, F15:1,4,7.. (page 19) Upon completion, bit 6 of the Request Done Bits, N12:4,12,20.. (page 16), will be set. Possible errors bits are 0 and 2. See Request Error Bits, N12:5,13,21.. (page 16)

Bit 7 (0080) (*x_RCLRLRM*) Clear all general alarms or warnings. This has the same effect as pressing the 'Clear General Alarms' button on the MC² or the 'ACK ALL' touchpad on the MC³. The MC General alarm or warning output will go to OFF state, and the MC general alarm or warning indicator will go off. Note that Fault indicators, existing in the MC³ models 30.10.EX and 24.10.EX will not be cleared, using this request bit.

Bit 8 (0100) (*x_RCLRSUB*) Clear the subtotal. This has the same effect as pressing the 'Clear Subtotal' button on the MC. Possible error bit is 2. See Request Error Bits, N12:5,13,21.. (page 16)

Bit 9 (0200) (*x_RDLSEC*) Download secondary (batch) setpoints. This bit will cause any value (including zero) in Secondary SetPoint, F15:2,5,8..(x_SECPT) (page 19) to be continuously downloaded as a secondary (batch) setpoint to the MC.

Bit 10..15 Reserved

MC Request Integer Parameter N13:5,12,19..(*x_RINTPAR*)

This integer is used to hold request parameters. See MC Control Word, N13:4,11,18.. (page 17).

External Inputs, N13:6,13,20..

Logical inputs in some MC³ controllers can be mapped to up to 16 external inputs. They appear as bits in this word. External input 1 corresponds to bit 0 etc. This is useful when the PLC controls the MC inputs directly.

Floating Point Report File, F14

SuperBridge will maintain a PLC type floating point file, with 8 floats per connected MC. The purpose of this file is to make floating point data available to the PLC ladder or MMI programmer. The file is read only. The file name is F14.

The following is a specification of the 8 floats belonging to a certain MC.

Fast tagged value, F14:0,8,16..(*x_FTAGV*)

This float contains the value of the register tagged in Fast Tag Register Number, N13:0,7,14.. (page 17). The value is updated in the fast loop.

Slow tagged values 1 - 3, F14:1-3,9-11,17-19..(*x_STAG1V, x_STAG2v, x_STAG3V*)

These float contains the values of the registers tagged in Slow Tag Register Number 1 - 3 N,13:1-3,8-10,15-17.. (page 17) The values are updated in the slow loop.

Process Value, F14:4,12,20..(*x_PROCV*)

The value in this float depends on the MC model. It is normally the feedrate. See Process Value (page 24). The value is updated in the fast loop.

Total, F14:5,13,21..(*x_TOTAL*)

All MC applications support a totalizer. The current total is available in this float. The value is updated in the fast loop.

Request Float Result F14:6,14,22..(*x_FLTRES*)

This float contains the value resulting from a request. See MC Control Word, N13:4,11,18.., page 17

Reserved, F14:7,15,23..

This float is reserved for future expansion.

Floating Point Control File, F15

SuperBridge will maintain another PLC type floating point file, with 3 floats per connected MC. The purpose of this file is to make it possible for the PLC ladder or MMI programmer. The file is read and write. The file name is F15.

The following is a specification of the three floats belonging to a certain MC.

SetPoint, F15:0,3,6..(*x_SETPT*)

The value in this float will be downloaded to the MC as the current setpoint, if bit 1 in the MC Control Word, N13:4,11,18.., page 17 is set. See also Bit 8 of MC Status Word, N12:0,8,16.., page 14

MC Request Float Parameter, F15:1,4,7..(*x_FLTPAR*)

The value in this float is used to hold request parameters. See MC Control Word, N13:4,11,18.., page 17.

Secondary SetPoint, F15:2,5,8..(*x_SECPT*)

The value in this float will be downloaded to the MC as the current secondary setpoint, if bit 9 in the MC Control Word, N13:4,11,18.., page 17 is set. See also Bit 10 of MC Status Word, N12:0,8,16.., page 14 Only MC³ 24.96.EX.D or later or 30.20.EX.Beta or later supports secondary (batch) setpoints.

UNSOLICITED MESSAGES SPECIFICATION

SB will act as a PLC when receiving unsolicited messages that request reading and writing data to and from the four data files. Control files (N13 and F15) can be read from and written to. Report file (N12 and F14) can only be read. Some PLC-2 unsolicited messages are also supported for backwards compatibility. A-B DH+ and DH485 messages are specified in [6]. Issuing messages that are not supported by SB will generate an extended error return message 0xF00E.

PLC TYPED MESSAGES

These messages are typically generated by a PLC message rung, that is, in a PLC to PLC or PLC to SB conversation, where the PLC solicits the message.

PLC Typed Read

See [6], page 3.6-11. With A-B terminology, this is command 0x0F, function 0x68. Data will be returned if any element of N12, N13, F14 or F15 is requested, and the last element requested is within the SB file range for the requested file. If other files are requested, extended error code 0xF006 is returned. If the last element requested is beyond the last element in the requested SB file, extended error code 0xF00A is returned. If too many (more than 100 for N12 and N13, 50 for F14 and F15) elements are requested, extended error code 0xF009 is returned.

PLC Typed Write

See [6], page 3.6-12. With A-B terminology, this is command 0x0F, function 0x67. Data will be accepted to any N13 or F15 element if the last element requested is within the SB file range for the requested file. If other files are requested, extended error code 0xF006 is returned. If the last element requested is beyond the last element in the SB requested file, extended error code 0xF00A is returned. If too many (more than 100 for N13, 50 for F15) elements are requested, extended error code 0xF009 is returned.

PLC WORD RANGE MESSAGES

These messages are typically generated by a MMI software packages, such as WinView and FIX DMACS for Windows, that is, in a MMI to PLC or MMI to SB conversation, where the MMI solicits the message.

PLC Word Range Read

See [6], page 3.6-15. With A-B terminology, this is command 0x0F, function 0x01. Data will be returned if any element of N12, N13, F14 or F15 is requested, and the last element requested is within the SB file range for the requested file. If other files are requested, extended error code 0xF006 is returned. If the last element requested is beyond the last element in the requested SB file, extended error code 0xF00A is returned. If too many (more than 100 for N12 and N13, 50 for F14 and F15) elements are requested, extended error code 0xF009 is returned.

PLC Word Range Write

See [6], page 3.6-16. With A-B terminology, this is command 0x0F, function 0x00. Data will be accepted to any N13 or F15 element, if the last element requested is within the SB file range for the requested file. If other files are requested, extended error code 0xF006 is returned. If the last

element requested is beyond the last element in the SB requested file, extended error code 0xF00A is returned. If too many (more than 100 for N13, 50 for F15) elements are requested, extended error code 0xF009 is returned.

PLC Read-Modify-Write

See [6], page 3.6-5. With A-B terminology, this is command 0x0F, function 0x26. Data in N13 (only) will be modified if the last element requested to be modified is within the SB file range for N13. If other files are requested, extended error code 0xF006 is returned. If the last element requested is beyond the last element in N13, extended error code 0xF00A is returned.

PLC-2 UNPROTECTED MESSAGES

A PLC-2 is, from a data message standpoint, a contiguous block of memory. One element of memory is one byte long. Address notation is typically octal. The SB files are mapped into a virtual PLC-2 memory with an associated start address, settable in SUPERB.INI, see [PLC2DATA] Section, PLC2Base entry (page 45). The mapping order is N12, N13, F14, F15. There are two bytes per element in N files, and four bytes per elements in F files. There are no spaces between the files. Since the smallest element in SB are integers (two consecutive bytes), requests to odd addresses are rejected.

To calculate an PLC-2 address for a SB PLC-5 file element, use the following formulas, where A is the PLC-2 address, O is the PLC2Base entry in SUPERB.INI (page 45), converted to a decimal value, E is the element number and M is the Controllers entry in SUPERB.INI (page 41):

For N12: $A = O + E$
For N13: $A = O + M \cdot 8 + E$
For F14: $A = O + M \cdot 15 + E \cdot 2$
For F15: $A = O + M \cdot 31 + E \cdot 2$

Most MMI applications, as well as message rungs, take an octal value for the PLC-2 address, so A normally has to be converted to octal.

PLC-2 did not support floating point numbers. Most MMIs do, however, so when data in F14 or F15 is manipulated, measures has to be taken to re-create the floating point numbers properly in the MMI. Floats are accepted or transmitted as IEEE 32 bit format (4 bytes), with the least significant byte sent or accepted first. The IEEE 32 bit floating point format looks like this:

Bit:	31	30...	23	22...	0
Content:	S	E7...	E0	M1...	M23

S: sign bit (1 = negative number, 0 = positive number)

E7-E0 8-bit exponent (bias 127)

M1-M23 23-bit mantissa with implied M0 = 1

In some instances, the word order for the floating point number has to be reversed, most notably when using a message rung in a PLC-5. This can be done by setting the PLC2ReverseFloat entry in the [PLC2DATA] Section (page 45) in SUPERB.INI to 1.

For older MMI system, that does not support floating point numbers, an alternate encoding is available. The first of the two words contains the integer part of the number, maximized to 32767 and minimized to -32767. The second number contains the fractional part represented by an positive integer, with an implied four decimal places. This encoding is enabled by setting the PLC2ReverseFloat entry in the [PLC2DATA] Section (page 45) in SUPERB.INI to 2.

PLC-2 Unprotected Read

See [6], page 3.2-8. With A-B terminology, this is command 0x01. Data will be returned if the last element requested is within the SB file range for F15, mapped into a PLC-2 memory image, as described above. If other elements are requested, or the length in bytes of the requested data table is greater than 244, error code 0x50 is returned. Note that it is possible to request data that passes mapped PLC-5 file boundaries, i.e. the element following the last N13 element is F14:0.

PLC-2 Unprotected Write

See [6], page 3.2-9. With A-B terminology, this is command 0x08. The start element and the number of elements must be entirely within the PLC-2 mapped image of N13 or F15 in order to be accepted. If other elements are requested, or the length in bytes of the transmitted data table is greater than 244, error code 0x50 is returned. It is not possible to write to N13 and F15 with one message, since F14, which is read only, is mapped between the two.

ERROR CODES RETURNED

The following error codes are returned if there is a problem with an unsolicited message:

0xF006	“Address doesn’t point to something usable” (Not N12, N13 F14 or F15).
0xF009	“Data file is too large” (more than 100 N12 or N13 elements requested or more than 50 F14 or F15 elements requested).
0xF00A	“Transaction size plus word address is too large” (Element beyond the last element requested).
0xF00E	“Command cannot be executed” (message not supported by SB).
0x50	“Addressing problem or memory protect rungs” (PLC-2 addressing problem)

See also [6], pages 4.1-3..5

MODEL SPECIFIC INFORMATION

SuperBridge was released years after the MC² weighing controller. For some older versions of the controller software applications, full support is not available. This chapter explains limitations and application specific information that relates to specific MC² models.

SUPPORTED FUNCTIONS

The following table lists any limitations of SuperBridge operation in relation to different MC² models and versions. Models not listed here are not supported at all.

MC² Models	External I/O	Set Points	Pacing	Req. Reg	Update register	Max Baud	Notes
20.00.K	No	One	Yes	Yes	Yes	9600	
22.00.B	No	One	Yes	Yes	Yes	19200	
30.00.D	No	One	Yes	Yes	Yes	9600	Note 1
10.00.HP.O,A,B	No	No	No	No	No	9600	Note 2
10.00.HP.C, D	No	Note 3	No	Yes	Yes	19200	
11.00.HP.A	No	Note 3	No	Yes	Yes	19200	
20.00.HP.O,A,B	No	Note 4	Yes	Note 5	Note 5	9600	Note 2
20.00.HP.C	No	One	Yes	Yes	Yes	19200	
30.00.HP.O,A-D	No	One	Yes	Yes	Yes	19200	
35.00.HP.O,A	No	One	Yes	Yes	Yes	19200	
MC³ Models							
20.00.EX.Beta O,A	Yes	One	Yes	Yes	Yes	19200	
20.10.O,A-F	Yes	One	Yes	Yes	Yes	19200	
20.20.EX.O,A	Yes	Two	Yes	Yes	Yes	19200	
24.10.EX.Beta	Yes	One	Yes	Yes	Yes	19200	
24.10.EX.O,A-I	Yes	One	Yes	Yes	Yes	19200	
24.96.EX.O,A	No	One	Yes	Yes	Yes	19200	
24.96.EX.B-C	Yes	One	Yes	Yes	Yes	19200	
24.95.EX.D-G	Yes	Two	Yes	Yes	Yes	19200	
30.00.EX.O-E	Yes	One	Yes	Yes	Yes	19200	
30.10.EX.Beta	Yes	One	Yes	Yes	Yes	19200	
30.10.X.O-E	Yes	One	Yes	Yes	Yes	19200	
30.20.EX.Beta	Yes	Two	Yes	Yes	Yes	19200	
31.51.EX.Beta	Yes	Note 3	Yes	Yes	Yes	19200	
35.00.EX.O,A-B	Yes	Note 3	Yes	Yes	Yes	19200	
40.10.EX.O,A	Yes	One	Yes	Yes	Yes	19200	Note 2

Note 1: An error in the 30.00.D application makes it impossible for SuperBridge to detect the fact that the scale is rerated, calibrated or altered in the diagnostics menu.

Note 2: This application should be updated to the latest version when used with SuperBridge.

Note 3: See Setpoint (page 24).

Note 4: An error in the 20.00.HP.O, A and B applications makes it impossible for SuperBridge to detect the fact that the controller is taken out of “Comm Setpoint Mode”.

Note 5: Some scaling problems exist for some registers. If bit 6 or 7 in the register property word is set, unpredictable results can occur. See Useful Registers, page 29.

PROCESS VALUE

The process value is, with the following exceptions, the feedrate, as displayed in the root node or main screen of the controller. The exceptions are:

11.00.HP Current Gross Weight, with high resolution.

35.00.HP Actual Batch Total for last batch weighed out.

SETPOINT

The setpoint value is, with the following exceptions, used as the feedrate setpoint, when the controller is in “Comm Setpoint” or “Remote Serial” mode. The exceptions are:

10.00.HP The setpoint value is transferred to the High Feedrate alarm limit.

11.00.HP The setpoint value is transferred to the weight value for limit switch number 3.

35.00.HP The setpoint value is used as the batch setpoint when the controller is in “Comm Setpoint” mode.

Secondary setpoints, normally used for MCs that has a feedrate and a batch setpoint, are used for the batch setpoint. The batch setpoint mode has to be “Remote Serial”. Currently, secondary setpoint is only supported by MC³ 24.96.EX.D and 30.20.EX.Beta.

GENERAL ALARMS AND WARNINGS

The General Alarm bits are mapped out according to the following table. Detailed information about the meaning of the alarms is available in the operations manual for the controllers. Warnings mapped in all MC³ models except 24.96.EX depend on which inputs or outputs are qualified for warning. The bit order can be found by displaying the warning screen in the controller, when it has been configured

Controller	Bit	Meaning
20.00.K	1	Overflow
	2	A/D Overrange
	3	Auto-Tare Reject
	4	Master Comm Lost
	6	Display Failure
	7	Display Failure
30.00.D	0	A/D Overrange
	1	Hopper Empty
	2	Slow Fill
	3	Over Fill
	4	Master Comm Lost

Controller	Bit	Meaning
	6	Display Failure
	7	Display Failure
22.00	4	Master Comm Lost
	6	Display Failure
	7	Display Failure
10.00.HP	1	A/D Overrange
	2	Auto-Tare Reject
	3	Master Comm Lost
	4	A/D Underrange
	5	Display Failure
	6	Display Failure

Controller	Bit	Meaning
	7	HPAD Not Set-Up
	8	Test OverFlow
11.00.HP	1	Scale Overload
	2	Scale Underload
	3	A/D Underrange
	4	A/D Overrange
	5	Bad Tare
	7	HPAD Not Set
	8	Bad Low Display
	9	Comm Lost
20.00.HP	1	A/D Overrange
	2	Auto-Tare Reject
	3	Master Comm Lost
	4	A/D Underrange
	5	Display Failure
	6	Display Failure
	7	HPAD Not Set-Up
	8	Test OverFlow
30.00.HP	1	Scale Overload
	2	Scale Underload
	3	A/D Underrange
	4	A/D Overrange
	5	Slow Fill
	6	Hopper Empty
	7	HPAD Not Set
	8	Bad Low Display
	9	Comm Lost
	11	Overfill
	14	No HPAD Data
35.00.HP	1	Scale Overload
	2	Scale Underload
	3	A/D Underrange
	4	A/D Overrange
	5	Stable Timeout

Controller	Bit	Meaning
	6	Batch Timeout
	7	HPAD Not Set
	8	Bad Low Display
	9	Comm Lost
	10	Slow Fill
	11	Fill When Batch
	14	No HPAD Data
24.96.EX	1	Belt Load Over Limit
	2	Belt Load Under Limit
	3	PCAD Near Zero
	4	PCAD Near Full
	5	Zero Tracking off Limits
	6	PCAD discrepancy, load cells do not agree
	7	PCAD not setup
	8	Tachos do not comply
	9	Comm Lost
	10	Remote Setpoint Out Of Range
	11	No Speed Detected
	12	Analog input out of range.
	13	MC³ Display Not Responding
	14	No Data from PCAD

DIGITAL I/O

The Digital I/O bits are mapped out according to the following table. Detailed information is available in the operations manual for the controllers. MC³ controllers are capable of mapping logical inputs and outputs to physical I/O points. The actual mapping must be examined using the 'Digital Inputs' and 'Digital Outputs' mapping screens on the controller.

Controller	I/O	Bit	Meaning
20.00.K	O	0	High Alarm

Controller	I/O	Bit	Meaning
	O	1	Low Alarm

Controller	I/O	Bit	Meaning
	O	2	Low Speed Cut off
	O	4	In Control
	O	6	General Alarm
	I	8	Soft Start
	I	9	Control Master Reset
30.00.D	O	0	High Alarm
	O	1	Low Alarm
	O	2	Filling
	O	3	Slow Fill
	O	4	In Control
	O	5	Feeder Running
	O	6	General Alarm
	I	8	Soft Start
	I	9	Control Master Reset
	I	10	Remote Fill
22.00	O	0	High Alarm
	O	1	Low Alarm
	O	4	In Control
	O	6	General Alarm
	I	8	Soft Start
	I	9	Control Master Reset
10.00.HP	O	0	High Alarm
	O	1	Low Alarm
	O	2	Low Speed Cut off
	O	4	Calibration
	O	6	General Alarm
11.00.HP	O	0	In Center Zero
	O	1	Scale Stable
	O	2	Print Complete
	O	3	Limit Switch 1
	O	4	Limit Switch 2
	O	5	Limit Switch 3
	O	6	General Alarm
	I	8	Print String A
	I	9	Print String B
	I	10	Clear Sub-Total
	I	11	Tare
20.00.HP	O	0	High Alarm
	O	1	Low Alarm
	O	2	Low Speed Cut off
	O	4	In Control

Controller	I/O	Bit	Meaning
	O	6	General Alarm
	I	8	Soft Start
	I	9	Control Master Reset
30.00.HP	O	0	High Alarm
	O	1	Low Alarm
	O	2	Filling
	O	3	Slow Fill
	O	4	In Control
	O	5	Feeder Running
	O	6	General Alarm
	I	8	Soft Start
	I	9	Control Master Reset
	I	10	Remote Fill
35.00.HP	O	0	Fast Feed
	O	1	Fine Feed
	O	2	Fill valve open
	O	3	Batch Out Of Tolerance
	O	4	Ready For Start
	O	5	Batch Complete
	O	6	General Alarm
	I	8	Remote Print
	I	9	Start Batch
	I	10	Stop / Reset Batch
MC³	O	0	Rack 1 Output 1
	O	1	Rack 1 Output 2
	O	2	Rack 1 Output 3
	O	3	Rack 1 Output 4
	O	4	Rack 1 Output 5
	O	5	Rack 1 Output 6
	O	6	Rack 1 Output 7
	O	7	Rack 1 Output 8
	I	8	Rack 1 Input 1
	I	9	Rack 1 Input 2
	I	10	Rack 1 Input 3
	I	11	Rack 1 Input 4
	I	12	Rack 2 Input 1
	I	13	Rack 2 Input 2
	I	14	Rack 2 Input 3
	I	15	Rack 2 Input 4

Note that the status of unused digital inputs in MCs are reported to the MC Digital I/O, N12:2,10,18.. (page 15), even if they are not used by he MC application. They can be used as remote inputs for the ladder logic.

INTERNAL STATE

Some cyclic controller applications have an internal state variable, useful for indication of what's going on in. The state variable is numerical, and can not be used for bit monitoring.

30.00.HP

State	Meaning
0	Check for fill requirement at startup
1	Prepare for normal feed
2	Wait for filter values to stabilize
3	Norma LIW feed
4	Prepare for a fill cycle
5	Filling
6	Ceck for auto-fill condition
7	Preparations after fill cycle

State	Meaning
8	Stabilization time after filling
9	Prepare for normal feed after filling
10	Prepare for cleanout cycle
11	Run cleanout cycle to low weight
12	Run Cleanout cycle (time) after low weight
12	Waiting for fill after cleanout complete

35.00.HP

State	Meaning
0	Test for autofill
1	Stopped by button 7, "STOP BATCH"
2	Ready for start of new batch
3	Preparing for a batch
4	Prepare for mandatory wait before stable
5	Wait before stable, before batching
6	Stable check before batching
7	Check if fast feed needed
8	Start fast feed
9	Fast feeding
10	Check if skip fine feed
11	Start fine feed
12	Fine feeding
13	Init wait after feed

State	Meaning
14	Wait before stable after batching
15	Wait for stable after batching
16	Calc weight batched out so far
17	Calculate new preact
18	Prepare for filling
19	Arm timer before filling
20	Wait before fill
21	Wait for stability for filling
22	Start filling
23	Filling, check for overfill, done
24	Stop filling

30.00.EX

State	Meaning
0	Prepare for normal feed

State	Meaning
1	Wait for filter values to stabilize

State	Meaning
2	Normal LIW feed
3	Filling
4	Stabilization time after filling
5	Run cleanout cycle to low weight
6	Run Cleanout cycle (time) after low

State	Meaning
	weight
7	Feeder Stopped
8	A Blocking condition occurred

31.51.EX

State	Meaning
0	Waiting for next Batch
1	Preparing for a batch
2	Wait to become stable
3	Zero scale
4	Fill bucket
5	Wait to become stable and check weight
6	Open batch gate

State	Meaning
7	Wait to empty
8	Close Batch Gate
9	Aborted Batch
10	A Blocking Condition occured
11	A Fault Occurred
12	Restart batching

35.00.EX

State	Meaning
0	Test for autofill
1	Stopped by button 7, "STOP BATCH"
2	ready for start of new batch,waiting for "START BATCH" or LOIN)
3	Batchout starts here
4	Prep for mandatory wait before stable, before batching
5	Wait before stable, before batching
6	Stable check before batching
7	Check if coase feeding or skip to finefeed
8	Start coarse feed
9	Coarse feeding, check for empty, coarse done, pause, net increasing
10	Check if skip fine feed, anr set dirty = NO
11	Start fine feed
12	Fine feeding, check for empty, fine done, pause, increasing net

State	Meaning
13	Arm timer for mandatory wait
14	Wait before stable after batching
15	Wait for stable after batching
16	Calc weight batched out so far
17	Calculate new preact
18	Prepare for filling
19	Arm timer before filling
20	Wait before fill
21	Wait for stability for filling
22	start filling
23	Filling, check for overfill, done
24	Stop filling
25	Initialize for Cleanout
26	Run cleanout
27	Run cleanout for empty time
28	hopper weight past empty weight
29	check for rerun or return

State	Meaning
30	Clearing the current Batch

USEFUL REGISTERS

All MC² applications contains a numbered table of parameters, called registers. They are useful in a SuperBridge environment for monitoring and control purposes. In the following sections, the content of the registers for the different applications are listed, along with the property word. The property word describes access rules, decimal places and scaling of the registers.

The property word has the following layout:

Bit 15..14 Internal storage format, according to the following table:

Bit 15	Bit 14	Storage format
0	0	long (32 bit integer)
0	1	char (8 bit integer)
1	0	int (16 bit integer)
1	1	float (32 bit IEEE floating point)

Bit 13..10 Not used

Bit 9 Set if the register is initialized to zero at controller cold start.

Bit 8 Set if the register is included in the register checksum, that is, is safely retained when the controller is powered down.

Bit 7..6 At least one of the bits are set if the register is scaled. SuperBrigde will unscale the register and convert it into a float.

Bit 5..4 Access mask. 00: Read and write permitted. 01: Read permitted. Write permitted if dip switch 1 is open on the MC² display board, or the 'Extended Access' logical input is ON in the MC³. 10: Read access only. 11: No access.

Bit 3..0 Decimal place codes.
0..4: 0..4 decimal places, respectively.
5..9 according to the values in registers 005..009, respectively, with the exception of models 20.00.K and 22.00, where the number of decimal places for code 009 is found in register 170, and 30.00.D, where the number of decimal places for code 009 is found in register 134.

Contact Merrick for a list of registers used by the controllers in your application.

DIAGNOSTIC SCREENS

If a VGA compatible monitor and a PC keyboard is connected to the SB host PC, several diagnostic screens are available. They are usable for verification, troubleshooting, checking ladder and MMI programming, and for editing data in N13 and F15. Note that with the exception of the Home Screen, there is a SB performance penalty associated with the diagnostic display. For all screens in this section, the following SUPERB.INI was used:

```
;       SUPERB.INI
;       09-29-95/LTM Manual Example Setup

[SIZES]
;       Only one port supported
ComPorts = 1
Controllers = 5
Segments = 6

[IRQ]
;       Settings for COM1
PortVector = 0C
PIDMask = 10

[PORT0]
;       COM1, 19200 Baud
UartBase = 3F8
DlabReg = 0006

[PLCDEFAULT]
DefaultStation = 60

[PLC2DATA]
PLC2ReverseFloat = 1;

[SEGMENT4]
SourceAddress = N12:16
DestAddress = N12:0
Elements = 24
Station = 1
Access = MODIFY
Processor = SLC500

[SEGMENT5]
SourceAddress = F14:16
DestAddress = F14:0
Elements = 24
Station = 1
DataTypes = RAW
Access = MODIFY
Processor = SLC500
```

- COM1 is used for communications, instead of COM2, which is default.
- There are five MCs in this system; one of them, MC Index 3, is set off-line.
- SB reports to and is being controlled by a PLC-5, station number 60. In this PLC, bit N13:25/0 is set, taking controller index 3 offline. See MC Control Word, N13:4,11,18.. (page 17).
- Data in the report files N12 and F14 for the last three controllers are also reported to a SLC-500/04 with station number 1.
- A WinView MMI with station number 41 is constantly interrogating SB for floating point data for the first four MCs, maintaining a graph.
- Some message rungs exist in the PLC-5, station number 60, one of which causes an error return.

THE HOME SCREEN

```
1                              SuperBridge Home Screen
2
3  Merrick - Allen-Bradley SuperBridge     Time:     Thu May 14 14:08:26 1998
4  Copyright (C) 1996 Merrick Industries   Started:  Thu Ma4 14 14:05:24 1998
5  All Rights Reserved                     MCs:      5
6  Ver 0.99  Built May 13 1998, 16:15:52   Segments: 6
7
8                                  MC Status map
9    0: Run/30.00.HP.A    Run/20.00.HP.C    Run/30.00.HP.A    Ofl/Unknown
10   4: Run/11.00.HP.A
11                               A-B Segments map
12   0: Run/N12:0         Run/N13:0         Run/F14:0         Run/F15:0
13   4: Run/N12:16        Run/F14:16
14
15
16
17
18
19
20
21
22
23
24                  F2        F3                                        F10
25               MC Data   A-B Msgs                                     Exit
```

This screen show overview status for SB. It is also the default and preferred screen during normal operations, since the SB performance penalty is minimal.

Displayed information:

Line	Keyword	Explanation
3..6 Left		Revision, copyright and build data for the SB software application.
3	Time:	Current time in the SB host PC.
4	Started:	The time in SB host PC at which SB was booted.
5	MCs:	Number of configured MCs.
6	Segments:	Number of configured A-B file copy segments.
8f	MC Status map	Communication status and application models/versions for all configured MCs. Possible status are Run (running, no communication problems), Ofl (taken off-line), Not Used, Rev (communications reviving attempt in progress) and Err (Communication problems). Four MCs are shown per screen line.
11f	A-B Segments map	Communication status and first source element for all configured A-B File Copy segments. Possible status are Run (running, no communication problems) and Err (Communication problems). Four segments are shown per screen line.

Function keys:

F2 Switch to MC Data Screen (page 32)

F3 Switch to A-B Unsolicited Messages Diagnostic Screen (page 39)

F10 Stop SB and return to the DOS prompt

MC DATA SCREEN

```
1                        MC Data, Controller Index 2
2
3  Number of MCs configured      5              Comm Errors logged  0
4  MC in use (1 = YES, 0 = NO)   1              Fatal Comm Errors   0
5  MC WatchDog (0.1 s ticks)     200            State Machine Index 19
6  MC Revive Time (ms)           20000          MC Model/Version    30.00.HP.A
7  MC Controller Number          3              MC Current Status   Running
8
9  WI Elems N12:016  Stat  MCSt  DI/O  LRMS  RDON  RERR  RRES  XOUT
10 Pending:          0120  0003  0730  0000  0000  0000  0000  0000
11 Completed:        0120  0003  0730  0000  0000  0000  0000  0000
12 RI Elems N13:014  FTag  Stg1  Stg2  Stg3  MCCT  RINT  EXIN
13 Pending:          002C  0090  0093  00D9  0002  00CD  0000
14 Completed:        0000  0000  0000  0000  0000  0000  0000
15 Edit Ints (hex): [    ][    ][    ][    ][    ][    ][    ]
16 WF Elems F14:016          FTag          Stg1          Stg2          Stg3
17 Pending:                 7.863         0.000        15.000         2.180
18 WF Elems F14:020    ProcessVal         Total    ReqFResult          RSRV
19 Pending:               10.500       885.600         0.000         0.000
20 RF Elems F15:006      SetPoint     ReqFParam  Sec SetPoint
21 Pending:                 6.395      7000.000         0.000
22 Edit Floats:     [            ][            ][            ]
23
24     F1           F2        F3                              F6      F7    F10
25  Home Screen  MC Diags  A-B Msgs                        Next MC Prev MC  Exit
```

The MC Data Screen shows status information and current A-B file data for one MC. It is also possible to edit the local SB content of the two control files N13 and F15. If A-B file copy is enabled for these files, editing is meaningless, since the edited data item will be overwritten by the next A-B file read.

Line	Keyword	Explanation
1		MC Controller index for data currently displayed
3	Number of MCs configured	Number of configured MCs.
4	In Use	A 0 indicates the data for the MC is allocated, but never used. There is normally no controller at all with this index.
5	MC WatchDog:	The value of the local MC watchdog timer in 0.1 s. See WatchDog (page 42)
6	MC Revive Time	How often (in ms) SB will attempt to re-establish communication with a MC that has had a fatal (non-recoverable) communication error. See ReviveTime (page 42)
7	MC Controller Number	The local MC controller Number setting. See MC Communication Parameters (page 10) and ControllerNumber (page 41)
3	Comm Errors logged	How many recoverable (non-fatal) communication errors that have occurred for this MC since SB was started.
4	Fatal Comm Errors	How many fatal (non-recoverable) communication errors that have occurred for this MC since SB was started.
5	State Machine index	Used for telephone support. This value rapidly scans through a seemingly random number of values.
6	MC Model/Version	MC application program model and version. “Unknown” if the no successful communication has taken place with the MC or if the model

Line	Keyword	Explanation
		and version is unknown to SB (not supported)
7	MC Current Status	Possible status are Running (running, no communication problems), OffLine (taken off-line), NotUsed, Reviving (communications reviving attempt in progress) and CommErr (Communication problems).
9-11	IR Elems	Integer Report data from N12. Integer Report File, N12 (page 14). Hexadecimal representation. “Pending” means actual current data in SB. Completed means the last data successfully copied to a PLC.
12-15	IC Elems	Integer Control data from N13. See Integer Control File, N13 (page 16). Hexadecimal representation. “Pending” means actual current data in SB. Completed means that the action required by the data has been initiated. It is possible to edit N13, using tab/backtab to move the cursor to the field to edit, enter digits (Hex) and hit return.
16-19	FR Elems	Floating Point Report data from F14. See Floating Point Report File, F14 (page 18). “Pending” means actual current data in SB.
12-15	FC Elems	Floating Point Control data from F15. See Floating Point Control File, F15 (page 19). “Pending” means actual current data in SB. It is possible to edit F15, using tab/backtab to move the cursor to the field to edit, enter digits (including minus sign and decimal point) and hit return.

Function keys:

F1	Switch to The Home Screen (page 31)
F2	Switch to MC Combined Diagnostic Screen (page 34)
F3	Switch to A-B Unsolicited Messages Diagnostic Screen (page 39)
F6	Switch to the MC with the next controller index
F7	Switch to the MC with the previous controller index
F10	Stop SB and return to the DOS prompt

MC Combined Diagnostic Screen

```
1                MC Combined Diagnostic Port 0 Controller Index 0
2
3  RxPtr:   0  RxData: 3000000000000000006d
4  TxPtr:   6  TxData: 2d6a
5  Used          1¦State         3¦LastErr       0¦FatalErrs     1¦LastFatErr   -7
6  ParErrs       0¦OvrErrs       1¦FrameErrs     0¦BreakErrs     0¦BufOverrs     0
7  Timeouts      6¦CsumErrs      0¦BusyErrs      0¦AccessErrs    0¦BadFncErrs    0
8  BadataErrs    0¦FormatErrs    0¦RFrmErrs      0¦RLimErrs      0¦NotSupErrs    0
9  ErrErrs       0¦CurrSlave     1¦CurrTelegram  7¦TimerTicks    0¦RetryCount    0
10 MaxRetries    2¦PortIndex     0¦ActiveMC      1¦UART IIR      1¦UART LSR      0
11
12 Used          1¦State         0¦TgmState     26¦SlowState    29¦TagIndex      1
13 LastAck       0¦AccessNakOK   0¦Rescaled      0¦TimeOut       6¦WatchDog    200
14 IdNum        38¦VerNum       67¦ModelIdx     17¦Pacing        0¦RegProp    0000
15 RegNum      150¦Port          0¦StartChar     A¦EndChar       D¦ControllerNr  1
16 Errors        3¦LastErr      -7¦FatalErrs     0¦LastFatalErr  0¦DownTime      0
17 RevTime      20¦InPuts     0003¦OutPuts    0078¦Alarms     0260¦NumRegs     313
18 RQRobin       3¦SetDlsa       1¦SetDlsc       1¦LastSp    6.395¦KeyLocked      0
19 Decimal Points 2 2 3 0 0       ¦RegValue                     3¦Scalef    21885
20 Total                1119.3000¦ProcV                 994.0000¦
21 Bezel [      994] [Feedrate g/min  ] Yled:40 Gled:FD
22
23
24     F1           F2        F3        F4         F5         F6      F7    F10
25  Home Screen  A-B Copy  MC Data   Next Port  Prev Port  Next MC Prev MC  Exit
```

This screen shows communications related data for one communications port (Serial port in the SB host PC) and for one MC. The upper part of the screen shows port data, the lower MC data. The port index is related to the serial port 0..3. It is mostly used by Merrick for telephone support and for SB internal trouble-shooting. Some entries are useful for general trouble-shooting. They are listed here:

Line	Keyword	Explanation
5	Used	A 0 indicates the data for the port is allocated, but never used.
5	Last Err	Last communication error encountered on this port. See Numerical Error Values (page 36)
5	FatalErrs	How many fatal (non-recoverable) communication errors that have occurred for this port since SB was started.
5	LastFatErr	Last fatal (non-recoverable) communication errors encountered on this port. See Numerical Error Values (page 36)
6-8		Individual statistics for each possible communication error on the port. See Numerical Error Values (page 36)
10	ActiveMC	There is at least one MC on this port that is active, that is, not Offline or Not Used.
12	Used	A 0 indicates the data for the MC is allocated, but never used. There is normally no controller at all with this index.
12	State	Communication status. The numerical value of “MC Current Status” in MC Data Screen (page 32)
12	TgmState	Used for telephone support. This value rapidly scans through a seemingly random number of values. See also MC Data Screen (page 32)
13	WatchDog	The value of the local MC watchdog timer in 0.1 s. See WatchDog (page 42)
14	IDNum	The numerical value of the application model. Displayed if retrieved, even if the specific application is not supported by SB.
14	VerNum	The numerical value of the application version. Displayed if retrieved,

Line	Keyword	Explanation
		even if the specific version is not supported by SB.
14	ModelIdx	A 0 here indicates that there is no support for this application/version combination.
14	Pacing	The controller is in pace mode. See also Bit 6 in MC Status Word, N12:0,8,16.. (page 14).
15	UnitAddress	The local MC controller Number setting in ASCII format. Subtract 48 to get the Controller Number. See MC Communication Parameters (page 10) and ControllerNumber (page 42)
16	Errors	How many recoverable (non-fatal) communication error that have occurred for this MC since SB was started. Same as “Comm Errors logged” in MC Data Screen (page 32)
16	LastErr	Last communication error encountered on this MC. See Numerical Error Values (page 36)
16	FatalErrs	How many fatal (non-recoverable) communication errors that have occurred for this port since SB was started.
16	LastFatalErr	Last fatal (non-recoverable) communication errors encountered on this MC. See Numerical Error Values (page 36)
16	DownTime	How many ms this MC has waited for revival attempt after a fatal communication error.
17	RevTime	How often (in ms) SB will attempt to re-establish communication with a MC that has had a fatal (non-recoverable) communication error. See ReviveTime (page 42)
17	InPuts	Hexadecimal representation of the MC physical inputs. See Digital I/O (page 25)
17	OutPuts	Hexadecimal representation of the MC physical outputs. See Digital I/O (page 25)
17	Alarms	Hexadecimal representation of the MC Alarm bits. See General Alarms (page 24)
17	NumRegs	The highest possible register number in this MCs model/version. See Useful Registers (page 29)
18	SetDlsa	Number of attempts to download a setpoint to an MC
18	SetDlsc	Number of successful downloads of a setpoint to an MC
18	LastSp	Value of the last downloaded setpoint to the MC
18	Leylocked	1 if keyboard/touchpad is locked, else 0
19	DecimalPoints	Current values of the five MC decimal point settings.
20	Total	Current value of the MC Total. See Total, F14:5,13,21.. (page 19)
20	ProcV	Current value of the MC Process Value. See Process Value, F14:4,12,20.. (page 19)
21	Bezel	For a MC², First field is a copy of what is displayed in the upper (seven segment) display. Second field is a copy of what is displayed in the lower (alphanumeric) display.
21	YLed	Hexadecimal representation of the state of the yellow LEDs in the MC² front panel.
21	GLed	Hexadecimal representation of the state of the green LEDs and square red light in the MC² front panel.

Function keys:

F1 Switch to The Home Screen (page 31)

F2 Switch to A-B File Copy Diagnostic Screen (page 37)

F3 Switch to MC Data Screen (page 32)

F4 Switch to port data for the next serial port

F4 Switch to port data for the previous serial port

F6 Switch to the MC with the next controller index

F7 Switch to the MC with the previous controller index

F10 Stop SB and return to the DOS prompt

Numerical Error Values

This is a list of the numerical values that can appear in a communication error field:

Value	Name	Explanation
2	OvrErr	Serial communications Overrun error
4	ParErr	Serial communications parity error
8	FrameErrs	Serial communications framing error
16	BreakErr	Serial communications break condition detected
-1	FormatErr	The MC detected an telegram with a bad format
-2	BusyErr	The MC can't perform the service requested in the telegram at this time
-3	AccessErr	The MC can't perform the service requested in the telegram because of access restrictions
-4	BadataErr	The MC can't perform the service requested in the telegram because parameter(s) are out of the legal limit
-6	BadFncErr	The requested function is unknown by this MC
-5	PowUp	The controller has been rebooted and needs comm re-initialization
-7	TimeOuts	SB timed out waiting for a MC response
-11	RFrmErr	Bad format in MC return telegram
-12	RLimErr	Parameter(s) in MC return telegram are out of the legal limit
-13	NotSupErr	The MC Model/Version combination is not supported by SB.

A-B FILE COPY DIAGNOSTIC SCREEN

```
1                              A-B File Copy Diagnostics
2
3  ErrCall:
4  ErrMsg:   DTL_I_SUCCESS, Operation Successful
5  Events        1|Wtrs        922|LastState    66|LastError     0|Status       18
6  ExitFlag      0|WMask  00000002|RMask  00000000|MaskBits      0|
7
8  Seg SrcAddr DesAddr El DType Access St Proc   IoS Attempt Rejects LastBad Time
9    0   N12:0   N12:0 40  WORD MODIFY 60   PLC5   0       8        0       0   60
10   1   N13:0   N13:0 35  WORD   READ 60   PLC5   0      38        0       0   60
11   2   F14:0   F14:0 40 FLOAT MODIFY 60   PLC5   0      34        0       0   60
12   3   F15:0   F15:0 15 FLOAT   READ 60   PLC5   0      38        0       0   50
13   4  N12:16   N12:0 24  WORD MODIFY  1 SLC500   0       5        0       0    0
14   5  F14:16   F14:0 24   RAW MODIFY  1 SLC500   0      32        0       0   60
15
16
17
18
19
20
21
22
23
24     F1           F2        F3        F4         F5                      F10
25  Home Screen  A-B Msgs  MC Diags  Next Page  Prev Page                  Exit
```

This screen shows status for some central A-B communication registers and for each segment defined for A-B file copy. See SB Configuration for File Copy (page 12) The ErrCall field in line 3 gives a textual representation of the last error encountered while attempting to communicate over the DH+ network. Parameters in the segment list are:

Parameter	Explanation
Seg	Segment number. “N” in [SegmentN] Section (page 44)
SrcAddr	A-B data file source address. The first element in the SB PLC-5 file involved in file copy. See SourceAddress (page 44). This address must be an element of N12, N13, F14 or F15.
DesAddr	A-B data file destination address. The first element in the target PLC-5 file involved in file copy. The file type (N or F) must match the file type in “SrcAddr” above. See DestAddress (page 44)
El	Number of elements in the segment. Must be less than 100 for an N file and less than 50 for an F file. See Elements (page 45)
DType	Data type for the file transfer. DataTypes (page 45). Note that for floating point files copied to or from a SLC-500/04, the Data Type must be “RAW”.
Access	See Access (page 45) must be “MODIFY”, for copy to the PLC, or “READ” for copy from the PLC.
St	Station number for the target PLC, octal representation. See Station (page 45)
Proc	Processor type for the target PLC. Legal values are PLC5 or SLC500. See Processor (page 45)
IoS	Current I/O Status for the copy transaction. Should be either 1, indication transfer in progress, or 0, indicating success. Other values indicate error conditions. The ErrCall field in line 3 gives more information of the nature of the error.
Attempt	How many file transfer attempts that has been made since SB was started.

Parameter	Explanation
Rejects	How many file transfer attempts that has been rejected since SB was started.
LastBad	I/O status for the latest rejected file transfer attempt.
Time	Transfer time in ms for the last file transfer

Function keys:

F1	Switch to The Home Screen (page 31)
F2	Switch to A-B Unsolicited Messages Diagnostic Screen (page 39)
F3	Switch to MC Combined Diagnostic Screen (page 34)
F4	Switch to next page of segment information. No effect if all segment lines fit on one page.
F5	Switch to previous page of segment information. No effect if all segment lines fit on one page.
F10	Stop SB and return to the DOS prompt

A-B UNSOLICITED MESSAGES DIAGNOSTIC SCREEN

```
1                     A-B Unsolicited Messages Diagnostics
2
3  Telegrams   Off|ErrorMsgs    On|Unsols      200|BadUnsols     1|LastRetCode    0
4  ExitFlag      0|WMask         2|RMask          0|MaskBits      0|
5
6
7  Stn 041. PLC-5 Range Read  F14:0, 29 elements
8  Stn 041. PLC-5 Range Read  F14:0, 29 elements
9  Stn 041. PLC-5 Range Read  F14:0, 29 elements
10 Stn 041. PLC-5 Range Read  F14:0, 29 elements
11 Stn 041. PLC-5 Range Read  F14:0, 29 elements
12 Stn 041. PLC-5 Range Read  F14:0, 29 elements
13 Stn 041. PLC-5 Range Read  F14:0, 29 elements
14 Stn 041. PLC-5 Range Read  F14:0, 29 elements
15 Stn 041. PLC-5 Range Read  F14:0, 29 elements
16 Stn 060. PLC-5 Typed Read  N12:0, 24 elements
17 Stn 041. PLC-5 Range Read  F14:0, 29 elements
18 Stn 060. PLC-5 Typed Write N13:0, 21 elements
19 Stn 041. PLC-5 Range Read  F14:0, 29 elements
20 Stn 060. Len = 54, Ret = 0050 {08 00 41 07 F8 01 A0 41 00 00 A0 41 7B 14 A0 }
21 Stn 041. PLC-5 Range Read  F14:0, 29 elements
22 Stn 041. PLC-5 Range Read  F14:0, 29 elements
23
24     F1           F2        F3        F4         F5         F6      F7    F10
25  Home Screen  MC Data   A-B Copy  Stop Tgm   Start Tgm  Stop Er Start Er Exit
```

This screen shows status for some central A-B communication registers and for the last 16 unsolicited messaged received by SB. See Secondary SetPoint, F15:2,5,8..(x_SECPT)

The value in this float will be downloaded to the MC as the current secondary setpoint, if bit 9 in the MC Control Word, N13:4,11,18.., page 17 is set. See also Bit 10 of MC Status Word, N12:0,8,16.., page 14 Only MC³ 24.96.EX.D or later or 30.20.EX.Beta or later supports secondary (batch) setpoints.

Unsolicited Messages Specification (page 19). The upper part of the screen contains some status information:

Parameter	Explanation
Telegrams	“Off” or “On” Indicates if good messages are logged to the lower part of the screen or not. See F4 and F5 below.
ErrorMsgs	“Off” or “On” Indicates if invalid messages are logged to the lower part of the screen or not. See F6 and F7 below.
Unsols	How many good unsolicited messages that have been processed by SB since it was started.
BadUnsols	How many invalid unsolicited messages that have been processed by SB since it was started.
LastRetCode	The last return code generated by SB for an unsolicited message. See Error Codes Returned (page 22)

The lower part of the screen shows data for the last 16 received unsolicited messages. The row beneath the last message in blank. The screen does not scroll. A row for a good message contains requesting station number in octal representation, what kind of message received, see Secondary SetPoint, F15:2,5,8..(x_SECPT)

The value in this float will be downloaded to the MC as the current secondary setpoint, if bit 9 in the MC Control Word, N13:4,11,18.., page 17 is set. See also Bit 10 of MC Status Word, N12:0,8,16.., page 14 Only MC³ 24.96.EX.D or later or 30.20.EX.Beta or later supports secondary (batch) setpoints.

Unsolicited Messages Specification (page 19), which A-B data file was requested and the number of elements. A row for a bad message contains requesting station number in octal representation, the length (in bytes) of the message, the error return code issued, see Error Codes Returned (page 22), and the message body itself, starting with the A-B command in hex.

In this example (Row 20), function 0x08 was requested (PLC-2 unprotected write), the address requested was 01F8 (hex bytes), corresponding to word address 374 (Octal), indicating an offset of 248 (decimal bytes) in the SB PLC-2 virtual memory map, since the PLC-2 base address in this example is set to 200 (octal). Using the information in PLC-2 Unprotected Messages (page 21) to convert the PLC-2 address to a PLC-5 file element, this would be F14:24, which is a read-only file, that can not be written to.

Function keys:

F1 Switch to The Home Screen (page 31)

F2 Switch to MC Data Screen (page 32)

F3 Switch to A-B File Copy Diagnostic Screen (page 37)

F4 Stop logging good messages

F5 Start logging good messages

F6 Stop logging error messages

F7 Start logging error messages

F10 Stop SB and return to the DOS prompt

CONFIGURATION

SB is completely configurable via the configuration file, SUPERB.INI. The file can be edited using a text editor. It is loaded every time the SB application is started up. The file is divided into sections with a format similar to Windows initializations files.

[SIZES] SECTION

The sizes section deals with the size of the SB application, such as number of connected MCs.

ComPorts

Depending on how many MCs are connected, one or more RS-422 serial ports are used for the MC connections. If more than one port is used, a multiport adapter is installed in the SB host PC. This entry specifies the number of ports used. Default is 1.

Controllers

This entry specifies the number of connected MCs. Default is 5.

Segments

If automatic file transfers is desired, this entry must have a non-zero value. It describes how many file transfer segments that are to be active. In the default case of five MCs or less, this value is normally four, since four different files are involved: N12, N13, F14 and F15. If more than five MCs are connected each individual file must be divided up in segments, normally one segment per five MCs. Default is calculated as

$$\text{Segments} = 4 \cdot \text{INT}\left[\left(\text{Controllers} + 4\right) / 5\right],$$

where INT is the integer part of the argument. See also SB Configuration for File Copy (page 12). Default is 0, that is, no file transfer is enabled.

[IRQ] SECTION

This section deals with hardware and interrupt properties of the serial ports used for MC communications. The ports are assumed to share one interrupt.

PortVector

This is the interrupt vector number for the port in hex. Use 0B for COM2 (default) or 0C for COM1.

PIDMask

This is the mask word used for the Priority Interrupt Decoder interrupt request mask bit. Use 08 for COM2 (default) and 10 for COM1.

[PORT*N*] SECTIONS

SB communicates with MCs using a single COM port (COM 1..4) or using a multiport adapter. The multiport adapter can have up to four serial ports, on different I/O addresses, and must share a common IRQ line. This section specifies properties for the communication ports used for each port. *N* can be 0, 1, 2 or 3, but must be less than the ComPorts entry in the [Sizes] Section, page 41.

UartBase

Base address for the UART, port *N*, hexadecimal. Default is 2F8 for section [Port0], which is the base address for COM2 in a normal PC. COM1 has normally base address 3F8. Sections [Port1]..[Port3] does not have a default; the base address for those ports have to be specified when a multiport adapter is used.

DLABReg

This entry indirectly specifies the baud rate used for each port. It is possible to run different ports with different baud rates. Old MC² applications supports baud rates up to 9,600, newer up to 19,200, and MC³ can communicate up to 38,400 baud. The entry is in hexadecimal format. Default is 06 for 19,200 baud. Use the following table:

Baud Rate	DLABReg value
4,800	0018
9,600	000C
19,200	0006
38,400	0003

Retries

This is the number of times SB will try to recover from a MC communication error. Default is 2. Increase this number if the communication lines are very long and noise is present. There is a performance penalty associated with high values.

[MC*N*] SECTIONS

These sections define properties associated with a particular MC. *N* is the controller index, which start at 0 and end at Controllers (page 41) minus one.

Used

Valid entries are 0 and 1. 1 is default. A 0 means the controller with index N is never to be used. This is useful when data must be allocated for a growing number of controllers, and the A-B file elements must remain the same.

Timeout

This is the time in PC ticks (Approx. 52 ms) that SB waits for responses from MCs. Default is 6.

WatchDog

An MC can be set to generate a general alarm if SB communication becomes silent for a set time. This time (in 0.1 s increments) is set here. Default is 200, corresponding to 20s. If this value is set to zero, the MC will never generate a general alarm for lost SB communication.

ReviveTime

If a fatal communication error occurs for a MC, SB will ignore it (to avoid performance degradation), and later attempt to re-establish communications. This is the time (in ms) that SB will wait. Default is 20000, corresponding to 20s.

ControllerNumber

The controller number is set in the MC. MCs on the same port may not have the same controller number. Default is the controller index (*N*) plus one.

Port

The index of the serial port to which the controller in connected. If a single serial port is used, do add a port entry. Valid entries are 0..ComPorts - 1.

[ABDATA] SECTION

For applications where there is no PLC-based control file, initial data can be set for every element in N13 and F15. This is typically done for register tags, setpoints and other control information. Default is that all elements of N13 and F15 are initialized to zero. Entries in the section have the format

Element = Value

Element must be a valid element of N13 or F14. Values are hexadecimal for N13 and floating point numbers (including decimal points and minus signs) for F15. Example:

```
[ABDATA]
N13:0 = C8                    ; Actual weight fast tagged in controller index 0
F14:0 = 12.33                 ; Setpoint for controller index 0
N13:4 = 2                     ; Set “download setpoint” bit for controller index 0
```

If A-B file copy is configured for N13 and F15, the data that are initialized will probably be overwritten.

[PLCDEFAULT] SECTION

In this section, global defaults can be set for all A-B file copy segments. It is to avoid having to specify every parameter for every segment. Normally, this is the only place that segment parameters have to be specified.

DefaultStation

The default PLC station number for the target PLC. if no

Station entry exist in the [SegmentN] Section (page 44), this station number will be used. Default is 60 (octal).

MCPerSegment

This in the number of MCs that is associated with a set of file copy segments. Default (and maximum) is 5. For a 12 MC installation, the segments will be arranged as follows with a MCPerSegment setting of 3 and 5, respectively:

MCPerSegment = 3			MCPerSegment = 5		
Segment	First Element	Elements	Segment	First Element	Elements
0	N12:0	24	0	N12:0	40
1	N13:0	21	1	N13:0	35
2	F14:0	24	2	F14:0	40
3	F15:0	9	3	F15:0	15
4	N12:24	24	4	N12:40	40
5	N13:21	21	5	N13:35	35
6	F14:24	24	6	F14:40	40
7	F15:9	9	7	F15:15	15
8	N12:48	24	8	N12:80	16
9	N13:42	21	9	N13:70	14

MCPerSegment = 3			MCPerSegment = 5		
Segment	First Element	Elements	Segment	First Element	Elements
10	F14:48	24	10	F14:80	16
11	F15:18	9	11	F15:30	6
12	N12:72	24			
13	N13:63	21			
14	F14:72	24			
15	F15:27	9			

DefaultProcessor

The default PLC type for the target PLC. Valid entries are PLC5 and SLC500. If no Processor entry exist in the [SegmentN] Section (page 44), this processor type is assumed. Default is PLC5.

[SEGMENT*N*] SECTION

This section contains entries for the A-B file copy map. *N* is the segment index. A default table of segment information is established when SB starts up. The segment composition can be completely overwritten in this section. Some parameters in the default segment layout are settable with entries in the [PLCDefault] Section (page 43) The following rules apply for the default segment table:

SourceAddress	First element associated with the first controller in this segment. See MCPerSegment (page 43). There are four segments per set of MCs
DestAddress	Same as SourceAddress
Elements	Depends on the MCPerSegment setting. Using the default (5), 40 for N12, 35 for N13, 40 for F14 and 15 for F15.
DataTypes	WORD for N files, FLOAT for F files. If the target PLC is a SLC500/04, this default must be overridden with RAW for F files in the DataTypes entry in the [SegmentN] Section (page 44)
Access	READ for N13 and F15, MODIFY for N12 and F14.
PortID	Default is 1KT:0.
Station	According to the entry in DefaultStation in the [PLCDefault] Section (page 43).
Processor	According to the entry in DefaultProcessor in the [PLCDefault] Section (page 43).
TimePeriod	1000, corresponding to 1 s.

SourceAddress

This is the file address in SB of the first element for segment *N*. It must be an existing element in N12, N13, F14 or F15.

DestAddress

This is the file address in the target PLC of the first element for segment *N*. It must be an existing element in an allocated file, not necessarily N12, N13, F14 and F15. See Allocating A-B files (page 12). The destination PLC file should be the same type as the source file.

Elements

Number of elements for segment *N*. Max 100 for N files, 50 for F files.

DataTypes

Valid entries are FLOAT, WORD and RAW. Use WORD for N files. If the target PLC is a PLC-5, use FLOAT for F files. If the target PLC is a SLC500, use RAW for F files.

Access

Use MODIFY for source files N12 and F14. Use READ for source files N13 and F15.

PortID

This identifies the port through which the server communicates across the network. It is in the form of:

nmm:c

-n is the pushwheel number assigned to the interface module in the CFG_KT.INI file.

-mm identifies the module containing the port. The correct entry for this parameter is KT and should not be changed.

-c is the channel number of the port. The correct entry for this parameter is 0 and should not be changed

The default entry for PortID is 1KT:0.

Station

Station number for the target PLC for segment *N*. Different segments may have different target PLCs. Normally the target PLC carrying the control files (N13 and F15) is set up as DefaultStation is the [PLCDefault] Section (page 43). Other PLCs have their a station number settings defined here.

Processor

The PLC type for the target PLC for segment *N*. Valid entries are PLC5 and SLC500.

TimePeriod

Minimum time between file copy attempts. The report files (N12 and F14) are subject to a file transfer whenever the content changes. Since data in F14 is highly dynamic, a lot of network traffic can be generated if the frequency of copy attempts are not limited. This entry is the minimum time, in ms, between file copy attempts. Control files (N13 and F15) are read periodically, using a time period according to this entry.

AlwaysReport

The report files (N12 and F14) are normally only copied when the contents have changed. To force file copying regardless of the content of the report files, set this entry to 1.

[PLC2DATA] Section

This section deals with PLC-2 compatibility parameters. See PLC-2 Unprotected Messages (page 21).

PLC2Base

This is the PLC-2 address, in octal format, where the first SB file element (N12:0) is located. Default is 200 (oct). To calculate the PLC-2 address for other elements, see PLC-2 Unprotected Messages (page 21). Use the A-B Unsolicited Messages Diagnostic Screen (page 40) to verify that the PLC-2 address used returns the data intended.

PLC2ReverseFloat

This parameter determins the encoding of a PLC-2 representation of a floating point number. Possible values are:

0	Default. IEEE 32 bit encoding, most significant word first.
1	IEEE 32 bit encoding, least significant word first. A message rung in a PLC-5, using “PLC-2 unprotected read” or “PLC-2 unprotected write” requires a 1 in this entry for correct floating point representation.
2	Integer/Fraction split. Integer part in the first word, fraction in the second, with four decimal places implied

See also PLC-2 Unprotected Messages, page 21

SAMPLE SUPERB.INI

The following is a sample SUPERB.INI with comments that helps explain especially the entries needed to use a multiport adapter. The adapter used was a FASTCOM422/4. See also Install RS-422 multiport adapter, if needed, page 5.

```
;       SUPERB.INI
;       SuperBridge for Fastcom422/4 test
;       09/10/96/LTM

[SIZES]
ComPorts = 4                    ; 4 serial ports used
Controllers = 8                 ; 8 MCs in this application
Segments = 0                    ; No file copy to any PLC

[IRQ]
;       Settings for Multiport Adapter. COM2 must be disabled
PortVector = 0B                 ; IRQ3 Interrupt vector
PIDMask = 08

[PORT0]
;       First adapter port, 19200 Baud
UartBase = 280                  ; Default base address for first UART
DlabReg = 0006                  ; 19200 Baud

[PORT1]
;       Second adapter port, 19200 Baud
UartBase = 288                  ; Base address for second UART
DlabReg = 0006

[PORT2]
;       Third adapter port, 19200 Baud
UartBase = 290                  ; Base address for third UART
DlabReg = 0006

[PORT3]
;       Forth adapter port, 19200 Baud
UartBase = 298                  ; Base address for fourth UART
DlabReg = 0006

;       MC0 and MC1 are connented to the first port. No entries necessary

;       MC2 and MC3 are connented to the second port.
[MC2]
Port = 1
```

```
[MC3]
Port = 1

;       MC4 and MC5 are connented to the third port.
[MC4]
Port = 2

[MC5]
Port = 2

;       MC6 and MC7 are connented to the fourth port.
Port = 3

[MC7]
Port = 3

[ABDATA]
;Controller index 0
N13:0 = AD                  ;Fast Tagged Value    = Belt Load
N13:1 = 100                 ;Slow Tagged Value #1 = Belt Speed
N13:2 = B5                  ;Slow Tagged Value #2 = Subtotal
N13:4 = 02                  ;MC Control Word      = Download Setpoints

;Controller index 1
N13:7 = AD                  ;Fast Tagged Value    = Belt Load
N13:8 = 100                 ;Slow Tagged Value #1 = Belt Speed
N13:9 = B5                  ;Slow Tagged Value #2 = Subtotal
N13:11 = 02                 ;MC Control Word      = Download Setpoints

;Controller index 2
N13:14 = AD                 ;Fast Tagged Value    = Belt Load
N13:15 = 100                ;Slow Tagged Value #1 = Belt Speed
N13:16 = B5                 ;Slow Tagged Value #2 = Subtotal
N13:18 = 02                 ;MC Control Word      = Download Setpoints

;Controller index 3
N13:21 = AD                 ;Fast Tagged Value    = Belt Load
N13:22 = 100                ;Slow Tagged Value #1 = Belt Speed
N13:23 = B5                 ;Slow Tagged Value #2 = Subtotal
N13:25 = 02                 ;MC Control Word      = Download Setpoints

;Controller index 4
N13:28 = AD                 ;Fast Tagged Value    = Belt Load
N13:29 = 100                ;Slow Tagged Value #1 = Belt Speed
N13:30 = B5                 ;Slow Tagged Value #2 = Subtotal
N13:32 = 02                 ;MC Control Word      = Download Setpoints

;Controller index 5
N13:35 = AD                 ;Fast Tagged Value    = Belt Load
N13:36 = 100                ;Slow Tagged Value #1 = Belt Speed
N13:37 = B5                 ;Slow Tagged Value #2 = Subtotal
N13:39 = 02                 ;MC Control Word      = Download Setpoints

;Controller index 6
N13:42 = AD                 ;Fast Tagged Value    = Belt Load
N13:43 = 100                ;Slow Tagged Value #1 = Belt Speed
N13:44 = B5                 ;Slow Tagged Value #2 = Subtotal
N13:46 = 02                 ;MC Control Word      = Download Setpoints

;Controller index 7
N13:49 = AD                 ;Fast Tagged Value    = Belt Load
N13:50 = 100                ;Slow Tagged Value #1 = Belt Speed
N13:51 = B5                 ;Slow Tagged Value #2 = Subtotal
N13:53 = 02                 ;MC Control Word      = Download Setpoints
```

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[8] 1771-EIP users manual. Not released from Allen-Bradley yet.

[9] 1784-KTx Communication Interface Card
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Most manuals are available from Allen-Bradleys web page at http://www.ab.com/manuals