



# SA/STA SERIES

## User's Guide

### V7.0

This document contains all of the information you need to connect and use an SA or STA reader. If you have specific questions concerning the reader which are not found in this manual, please contact the dealer you purchased this product from.

If your dealer cannot supply you with the information you need, then feel free to contact IBC directly by phone, fax, or through e-mail.

Update information on all IBC products, as well as utility software can be found on our internet pages at <http://interbar.com>.

Thank you for purchasing an IBC product. In order to serve you better, we welcome all comments you may have concerning our products and manuals. Please send your comments to IBC using e-mail to [comments@interbar.com](mailto:comments@interbar.com).

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## New Features for Version 7.0

### ● *Multiple Schedules*

This version of the SA/STA firmware supports multiple schedules for employees. The multiple schedules are implemented by associating two or more schedules together, allowing all of the associated schedules to be checked during the card validation process. This implementation has been done to preserve the command set used in prior versions of the SA/STA readers. All of the commands used for the new schedule associations are additional commands and therefore any software which you may have that downloads schedules will still work with this version of the SA/STA. You will, of course, have to update your current software to take advantage of the multiple schedules.

### ● *Masking Support*

This version of the SA/STA firmware supports masking and concatenation for magnetic stripe tracks 1, 2, and 3.

### ● *Leading Zeroes*

A new command allows for the stripping of leading zeroes on barcodes and magnetic stripes, so that more employee id's can be added in the same amount of memory.

### ● *"J" Polling "?" Support*

This version supports the "J" mode polling command "?" while in "J" mode.

### ● *"V7.0 Availability*

This Version of firmware applies to all readers shipped starting January 12, 2001.

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## FUNCTIONALITY

The SA/STA readers are stand-alone readers used for access control and optionally (STA only) used for time and attendance.

Major features of the SA/STA products are:

- 64k bytes battery backed-up RAM storage for an access control list including scheduling information.
- 64k bytes battery backed-up RAM storage for saving transactional data (STA only).
- Automatic relay triggering on acceptable reads.
- Time and Date stamping for all transactions (STA only).
- Optional Time Display.
- RS232 (or RS422) serial port for downloading and uploading data.
- RS232 logging to a printer (SA).
- Easily programmed using serial commands, or by scanning barcodes (or magstripes).
- RS422/485 Networking capability.
- Barcode and magstripe masking.
- Logging of invalid cards (STA only).
- 10 year lithium battery backup for memory.
- Red and Green status leds.
- "J" series reader emulation.

The **SA** reader contains 64k of memory which contains an Access Control list of valid Employee ID numbers. When a card is scanned or swiped, and the number on that card matches an Employee ID number in the Access Control list, the internal relay is triggered to open a door.

In addition to containing the Access Control list, each employee in the list may also be restricted to entering only during specific times (or days). This is achieved by assigning the employee to a specific **schedule** (see page 8).

The **STA** reader, in addition to maintaining the access control list, also saves

each transaction in memory, so that the transactional information can be used later for time and attendance systems.

Both the SA and STA readers can operate in "J" reader emulation mode. In this mode, the reader will operate like a standard IBC "J" series reader, utilizing the same command sets and functionality as a standard "J" reader. This feature allows the SA/STA reader to be utilized either as a stand-alone reader or an on-line reader.

## ACCESS CONTROL

Both the SA and STA readers provide stand-alone access control for one door, utilizing a list of valid employee id numbers and allowable entrance times and days.

When a valid ID card is scanned through the reader (a card matching an ID in the Access Control list), the internal relay is triggered and the door is opened.

The Access Control List may be downloaded from a computer, or created by scanning in the cards which you want to grant access to (IDs may also be deleted the same way).

The **maximum** length of an ID stored in the reader Access Control list is 40 characters, and the minimum is 4 characters.

If you need to read cards which are longer than 40 characters, then you can **mask** the information on the card to make an ID which is 40 characters or less (see page 9).

In addition to validating the ID number, the reader also will validate the ID against an internal table of **schedules** which can be loaded into the reader. Up to 100 different schedules can be loaded into the reader. Schedules can be added by downloading only (you must be connected to a computer to download schedules).

Each schedule contains a start and finish time for all seven days of the week. If an ID in the list is associated to a schedule, then not only must the id match, but also

the time and day must be within the boundaries of the schedule.

## Time and Attendance

STA readers, besides maintaining the Access Control list, and opening a door, will log into memory all transactions with a date and time stamp. These transactions can then be uploaded at a later time (i.e. at the end of a day or week) to be put into a Time and Attendance system.

The STA readers contain 64K of memory which can be used for logging transactions.

Contained in the transactional log is the date and time of the transaction, the employee id, and also a status indicator which tells if the transaction was successful, or not allowed because of a bad time, or bad employee id number.

Once this memory is full, it must be uploaded, otherwise the reader will stop logging transactions at that point. The reader will still continue to function, however, and trigger the relay when a valid card is scanned, but will no longer log transactions into the memory. There are no visual indications which are triggered when the reader is full, so it is good practice to upload the reader on a scheduled basis (such as every day or week).

You can upload the transactional information in the STA reader into your computer easily by writing a simple program to upload the data. Also, you can utilize one of the IBC utility software programs found on our internet site, or use software provided by a third party. Writing your own software is an easy task if you are familiar with programming and if you wish you can download a copy of our source code for our utility program from the internet.

## Communications

All SA/STA readers contain a serial port which is either RS232 or RS422/485. Both

RS422 and 485 are listed because our RS422 interface meets the RS485 specifications. RS422/485 units utilize a 4-wire interface consisting of TX+, TX-, RX+, RX-.

If you need a conversion box (or board) for an RS422/485 interface for a PC we recommend contacting B&B electronics in Ottawa, Illinois USA @ 815-434-7094 (fax 815-434-7094). They provide many different interface units which can be used with the IBC RS422/485 readers. The models 422CON and 422COR are appropriate convertors.

If you are using an RS422/485 interface, multiple SA/STA units can be combined on the same bus (network), where each unit has a unique address and can be polled by a computer using IBC's polling protocol. This allows you to connect up to 127 readers together in a networked system - all being polled by the same computer. If you are not already familiar with the IBC polling protocol - consult the "J" User's Guide, which is available on our home page on the internet.

If you physically connect more than 32 units, however, on the same line - we recommend using an RS422/485 repeater for each set of 32 readers (over and above the initial 32 readers).

Please note that it is also possible to connect multiple readers together even if they are rs232. This is done using concentrator boxes (you can find information on this on our internet pages in the Application Notes area).

## Relay

The relay contained in the reader is a form C relay (one common contact, one normally open contact, and one normally closed contact). This relay is rated at 0.5A @ 30VDC. Do not attempt to pull more than 0.5A@30V of current through the relay or the relay may become blown. If you need to draw more current than our relay will support, then we recommend using a power relay, and triggering the power relay from our internal relay.

The relay is protected internally for backward voltage spikes by a MOV (metal oxide varistor). We also highly recommend that you install a MOV across the solenoid leads of your electric strike (or whatever door mechanism you are using) to avoid voltage spikes on the line causing a problem with the reader (see page 19).

## Wiring

All SA/STA readers come with 2 sets of wires - one wire for the communications and power - and another wire for the relay control.

The communications wire is usually a black wire containing the following:

For RS232:

Red	+5V or +12V or +24V (DC)
Blue	Ground
Green	Reader Transmit
Yellow	Reader Receive

Flow control is not implemented in the RS232 interface so you should therefore connect pins 4&5 together at your PC in order to provide adequate communications.

For RS422/485:

Red	+5V or +12V or +24V (DC)
Blue	Ground
Green	Reader Transmit +
White	Reader Transmit -
Yellow	Reader Receive +
Orange	Reader Receive -

The relay wire is a black wire (flat telephone style wire) containing the following:

Red	Common
Green	Normally Open
Yellow	Normally Closed

If your reader was supplied from IBC with a DB9 or DB25 connector, then the DB connector can be connected directly to a PC for communications. Usually, units supplied with a DB9 or DB25 connector

are also supplied with an AC adaptor (110V 60hz) for power. IBC supplies either a standard american 110/60 or european 220/50 ac adaptor. We do not supply power supplies for other voltage systems.

If you are not using the ac adaptor, then you must provide power to the reader using the appropriate voltage. If you reader model ends in a 5, then it is a 5VDC reader, and you must provide 5VDC +- 5% regulated voltage. If the model ends in a 2, then it is a 12VDC reader which can be powered with any DC voltage from 8VDC to 15VDC. If the reader model ends in a 4, then you can power it with any voltage between 15VDC and 30VDC.

## Leds

SA/STA readers contain two leds on the front of the reader - one red and one green.

These leds have special meaning depending on the mode of operation the reader is in (SA readers can run in SA mode, or in "J" emulation mode, STA readers can run in STA mode, SA mode, or "J" emulation mode).

While in the "J" emulation mode, both leds are normally off, and operate according to the "J" programming defaults which you have programmed the reader to.

While in the SA/STA mode, the red led is normally on, and the green led is normally off. Whenever a card is scanned or swiped which matches a number in the Access Control list (access granted), the green led will blink. If a card is scanned or swiped and that card is not loaded in the Access Control list (or doesn't match the scheduling requirements), the red led will blink.

While in SA/STA mode, you cannot program the leds to do anything else other than the functions described above. The only exceptions to the above led descriptions is when the reader is in "hand input" mode (a mode in which cards are added

and deleted right at the reader). In this mode, the red led will blink continuously while you are adding cards, and the green led will blink continuously while you are deleting cards.

## Weatherproofing

Weatherproofed units are weather-resistant and not completely weatherproof. Avoid direct contact with continuous rain and/or ice/snow by providing some protection (such as a shroud) for outdoor installations.

## Schedules

You can load up to 100 different schedules into the reader. These schedules contain a start and end time for each day of the week for which an employee will have access.

For example, if you have an employee which can enter only between the hours of 7AM and 3 PM on Mondays, you would set up a schedule which contains 0700 thru 1500 for Mondays, and then associate that employee with this particular schedule.

By default, there are no preloaded schedules loaded into the system. You therefore must load each schedule by downloading into the reader using the serial port. You cannot load schedule information into the reader by hand (using cards).

Each employee which is entered into the reader must have a schedule # associated with it. If you wish to allow an employee to have access at all times, then you can use the schedule number of 0, which is a default schedule # set up to allow access at all times.

When schedules are loaded into the reader, you must enter in a start and end time for each of the seven days of the week. It is ok to cross midnight (i.e. starting Monday at 2000 and ending Tuesday at 0600).

Employees which are entered into the system by hand (by scanning in cards), are automatically assigned the schedule number of 0. There is no way to assign sched-

ule numbers to cards which are entered in by hand, other than sending a serial command.

Schedules may be associated together so that 2 or more schedules are used for authorization in tandem when validating the schedule for an employee. See the Schedule section of the programming commands for more information on this.

## Programming With Cards

ID cards may be entered into the reader by hand (without connecting to a computer). In this mode, cards may be added to the Access Control list, or deleted from the list.

In order to input your cards by hand, you must first scan in certain control cards which put the reader into the proper mode for entering in cards.

If you have a SSLOT or MAGBAR SA/STA, then you will have received control barcodes along with the reader which can be used for this purpose.

Also Included with your reader are instructions for making these special control cards which can be used to add or delete cards. You can make these control cards easily. Control cards can be either magstripe or barcode. To make magnetic stripe control cards, you will need a magnetic stripe encoder. Making the barcode cards is easier because you can use any standard code39 font on your computer for making the barcodes.

Please note that if you are making magnetic stripe control cards, the cards can be encoded either on track 1 or track 2. If you have an SA or STA with track 1 enabled, then the control cards can be on track 1. If you have an SA/STA with track 2 only, you can still encode the control cards on track 2 using the track 1 character set.

To add cards into the reader, first scan in the **add** card. Once you do this, the



red led should be flashing continuously to signify that you are in the add mode. You can then proceed to scan in cards which will be added into the reader with schedule # 0 (no time schedule restriction). As you are scanning in cards, you will hear either one beep which signifies that the card has been added, or 3 beeps which signifies that the card is already in the reader, or the reader is full.

To delete cards, simply scan in the **delete** control card, and then scan in the cards which are to be deleted. In the delete mode, the green led will be flashing continuously. For each card which is scanned, a single beep means that the reader has found the id to be deleted, and has deleted it from the memory. If you hear 3 beeps, then the reader has not found the card.

To end the hand-input programming mode, scan in the **end programming** card.

Sometimes, it may be difficult to delete cards in the reader, especially if you do not physically have the cards to scan them in. In this case, you can clear the memory in the reader using the **clear memory** card, and then re-enter all of the valid cards.

Note that for all SA/STA's, cards which are longer than 18 characters in length MUST be entered in by hand, they cannot be sent serially, because the serial buffers in the reader are not large enough to handle more than 18 characters.

## Time Display

The SA/STA series readers may be ordered with an 8-character alphanumeric display. This display will automatically show the time which is set in the reader and will change every minute. All scans which are stored in the reader will have a time stamp which matches the clock at the time of the scan.

## Masking

You can use the masking commands which are available in the "J" series readers for masking barcodes or magnetic stripes which are read in the reader.

Using these commands, you can select only certain substrings from a magstripe or barcode which is read in the reader.

Please refer to the "J" series manual for the masking commands.

## "J" Series Emulation and Commands

The SA/STA reader can emulate a "J" series reader. In the "J" series mode, all "J" commands will be accepted by the reader. In order to do masking, select symbologies or magnetic stripe tracks, you must send the proper "J" series commands to the reader.

The "J" series commands can be found in the "J" manual. All of the commands which are found in this manual are extensions to the "J" series commands which apply to the SA/STA reader only.

Please note that you can send SA/STA commands to the reader, even if the reader is in "J" mode.

## Accumulation Mode

STA readers can also work in an accumulation mode, in which all cards scanned will trigger the relay automatically (a lookup does not occur). The data is then logged into the memory for upload at a later time. This is the mode that you want to use if you are using the STA for time and attendance only.





## ● *Add Employee into List*

This command adds an employee into the reader, along with a schedule # for the employee. Unless an employee is added into the reader, he will not be able to gain access. Please note that if you are using an STA reader for Time and Attendance tracking only, that it is not necessary to add employee id's into the reader. What will happen then when a card is scanned - is that each employee id will be treated as a bad id, but still logged to the transactional memory (as long as you have the reader programmed to log bad id transactions).

To enter in an employee id with **no** schedule information, use a schedule number of **000**.

The format of the Add Employee command is:

<b>AC</b> sssiiiiiiiiiii...	where:	sss	=	schedule # (000 thru 099)
<b>AN</b> sssiiiiiiiiiii...		iiii...	=	Employee ID number

The AC command is the command which you will want to use always to add employees to the list. The "C" in the command means add with checking - in which case the reader will first check to see if the employee id entered is already in the reader (to avoid duplicate id numbers being in the reader). The AN command (add with no check) is provided solely for the purposes of downloading an empty reader (with a pre-screened file of employee id's). This allows for a faster download if the reader does not have to check each id.

The possible return values for this command are:

- A-id added
- N-id not added
- S-invalid schedule #

Please remember that the maximum id size which can be entered into the reader is 18, by default. Also, you can restrict the size even further if you like by using the reset command defined below. If your id size is less than 18, this will allow for more efficient use of memory and quicker search times when scanning cards.

## ● *Reset Record Size and Clear Memory*

This command resets the reader, clears the memory in the reader, and sets the id size for employee id's in the reader. The minimum allowable id size is 4, and the maximum is 40. By default, the reader id size is set to 18. The format of this command is:

<b>\</b> ss	where:	ss	=	id size (4-40)
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In a 128K STA reader, there is 64K of memory available for downloading, and an additional 64K of memory available for transactional logging. For downloaded information (id's), there is a 1-byte additional overhead, and for transactional information there is a 5-byte overhead. Therefore, for a 64K byte system with employee id's of 6 characters, the number of id's which can be loaded into the reader is 64000/7. Please note that for downloaded id's, there is approximately 3000 bytes of ram which is used for schedule information and other items - this makes the real available downloadable memory about 61K, not 64K.







## ● **Remove (delete) ID**

This command allows you to delete an ID from the reader. Once the id is deleted, access will no longer be granted to that id. The format of the command is:

**Riiiiiiiiiii...**                    where:        **iiiiiii...** = id number to remove

This command will return either:

N-not found  
D-deleted

## ● **Read Time**

This command returns the time which is stored in the reader. The format of the command is:

**t**

The command returns the date, time, and day of week in the format YYMMDDHHMMSSd (d=1 digit day of week).

## ● **Clear log (STA only)**

This command clears all of the log (transaction) entries in the reader, and is usually issued after you have completed uploading all of the transactional data. The format of the command is:

**cl**

## ● **Clear Downloaded List**

This command clears all of the employee id's in the reader and is usually done prior to a complete download of the reader. The format of the command is:

**cd**



## ● *Downloaded List Upload Reset*

This command resets the position for uploading employee id's and schedule information from the Access Control List in the reader, so that when you start uploading, you upload from the beginning of the list.

Since many readers may be connected together in a network, it is possible that you may be uploading from one reader while you are downloading to another. For this reason, whenever you are uploading from a reader, the reader will remember the last item it uploaded so that every time you ask for another item, you get the next one.

During an upload process, you can of course reset at any time using this command, so that you start back at the beginning.

The format of the command is:

**ur**

## ● *Transactional Log Upload Reset (STA only)*

This command resets the position for uploading transactional information, similar to resetting the upload of the employee list, and should be issued every time you start a full upload of the log.

The format of the command is:

**lr**

## ● *Upload Access Control List Item*

This command uploads one employee id from the Access Control List in the reader. Each time this command is sent to a reader - one id is returned along with the schedule number associated with the id. When all id's have been uploaded, this command returns "END".

The format of the command is:

**u**

The command returns:

**iiiiiiiiiii.....s**            where iiiiiiiii is the id, s is the schedule #  
**or END**

Please note that the schedule # returned is a one byte character, which can contain any number from 0 (null) through 99 (d). After all items have been uploaded, this command returns END.

## ● *Upload Transactional Log Item (STA only)*

This command uploads one transaction from the Transactional Log in the reader. Each time this command is sent to a reader - the next transaction is returned. After all transactions have been uploaded, this command returns "END".

The format of the command is:

**I** (lowercase L)

The command returns:

**sYYMMDDHHMMSSiiiiiiiiiii...** where **s** is the status  
YYMMDDHHMMSS is the date/time  
iiiiiiii... is the id

**or END**

The status which is returned can be any of the following:

- 0=transaction ok (access granted)
- 1=bad employee id
- 2=employee id ok, but not within scheduled time (outside of time setup in schedule)

After all items have been uploaded, this command returns END.

To upload all information in the log - first issue the **lr** command for a reset to the beginning of the log, and then continue to issue **I** commands, reading the data, until you receive the last record which will be **END**. Once you are sure that you have received all of the data, then clear the log with the **cl** command. Please note that during the time that you have uploaded data, another transaction could have occurred in the reader - so therefore it is a good idea to, just before you clear the log, issue another **I** command to make sure that there is no new data in the reader. If there is not, then you will get the **END** again, otherwise you will get the new data.

## ● *Enable/Disable Leading Zeroes*

You can strip leading zeroes from barcodes in order to save memory space in the reader. The commands to do this are:

- null 21** strip leading zeroes
- null 20** don't strip leading zeroes

The **null** above is the null character (decimal 0, hexadecimal 00)

## **INSTALLATION NOTES**

### ● **Mounting**

The reader mounts from the rear. There are two screw inserts located in the back of the reader. These inserts require mounting with either a #6 (USA size) or 3mm screw.

The screw inserts are 3.54" center-to-center. When mounting, please ensure that you do not screw farther into the reader than the inserts support (approximately 1/4"). If you screw in too far, it is possible to screw through the back cover of the reader. If this is done, it is possible for water to enter the reader through this area. If readers are installed outdoors or in areas where they will get wet, please make sure you do not screw too far into the backplate.

IBC provides mounting plates in both aluminum and plastic. Using these plates, you can mount the reader onto the plate, and then front-screw the plates onto the wall. Photos and specifications for these mounting plates are available on our internet site.

### ● **MOV's**

When electric strikes open and close, they normally produce what is called "backward voltage" which is a voltage spike on the line. These spikes can become quite large in some cases and can damage the relay in the reader and possibly the reader itself. To protect the reader from these voltage spikes, it is suggested that you insert a MOV (metal oxide varistor) or other appropriate voltage dampening device to protect the reader from this voltage. The SA/STA reader contains an MOV internally, but it is still recommended that you install a MOV externally to the reader. The supplier or manufacturer of your magnetic strike can recommend the proper protection to use for their strike.