Quick Start

Writing a Quick Start for the SR 3 is almost like writing a Quick Start for a Windows PC – it depends on what you want to do.

Architectural look. Since Decora plates come in different colors, each SR 3 is shipped with 4 different color inserts for installation behind the lens (we ship them without an insert installed). Colors included are white (w/ black logo), white (w/ almond logo), almond (w/ black logo) and black (w/ white logo) which accommodate most applications. If the architect or interior decorator requires a custom color, a template is available on the SR 3 page at *www.rane.com/sr3.html* allowing a custom insert to be printed and cut to the proper size. (No, you cannot return the unused inserts for credit. Please recycle them, keep them as backups or build a house of cards with them).

Address. Set the Device Address rotary switch on the side of the SR 3; addresses from 0 through 7 are valid. Each device connected to the same RS-485 bus *must have a unique address.*

Wiring. Use CAT 5 cable with a minimum of 2 twisted pairs to connect to the SR 3. (*The use of DOG 4 cable may cause random barking in high traffic areas.*) Connect one twisted pair of wires to the "-V" and "+V" terminals – "-V" must connect to the power supply ground and "+V" must connect to +8 to +15 volts. Connect the second twisted pair of wires to the "A" and "B" terminals; "A" connects to the RS-485 "data +" connection and "B" connects to the RS-485 "data –" connection. When shielded CAT 5 cable is used, a chassis terminal is provided for shield termination.

Setup software. The SR 3 is configured using Drag Net software included in the box or available at *www.rane.com/dragnet.html*. See "Working with Smart Remotes" on page Manual-3.

Fonts. Fonts are used to display strings on the LCD. The SR 3 contains two types of fonts: text and symbol. The text font characters are standard ASCII and come in three sizes: small, medium and large. The symbol font icons (graphic symbols) are mapped to standard ASCII characters and come in two sizes: medium and large. The simple icons can be used instead of, or in addition to text and graphics.

NOTE: All literature and software references say SR 3, though the chassis says SR 3a. Don't worry, you have the right remote.

WEAR PARTS: This product contains no wear parts. It also contains no wash and wear parts.

Front and Rear Panel Descriptions
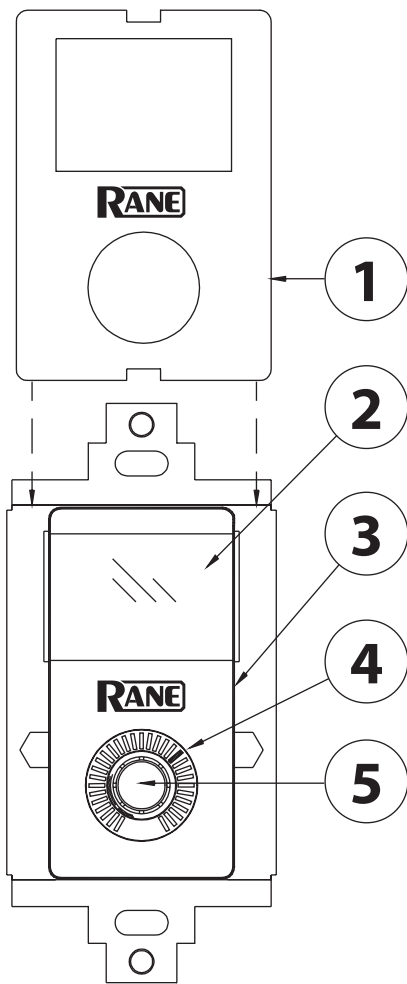
① **Colored insert:** 4 colors included: white (w/black logo), white (w/ almond logo), almond (w/black logo) and black (w/white logo).

② **98 x 64 pixel LCD display.**

③ **Clear lens** covers and protects the LCD display and helps support different color templates which mount behind the lens.

④ **LED indicators.** Indicate the current "level" of the linked parameter(s).

⑤ **Encoder Knob with momentary push switch** is the user input to the SR 3.

① **Device Address switch** assigns the device its RW 485 address. Addresses 0 through 7 are valid.

② **6-wire Euroblock connector.** Connects the SR 3 to a controller. **A** connects to RS-485 data +, **B** connects to RS-485 data –. **+V** is the positive side of the power supply rail. **–V** is the negative/ground side of the power supply rail. Ground is the connection point for the shield when shielded cable is used. When the Encoder Lock pin is grounded and Auto Lock is enabled, encoder input is ignored by the SR 3. This, for example, allows a keyed switch to be installed next to the SR 3 that allows the device to be "locked" so no one could change system volume.
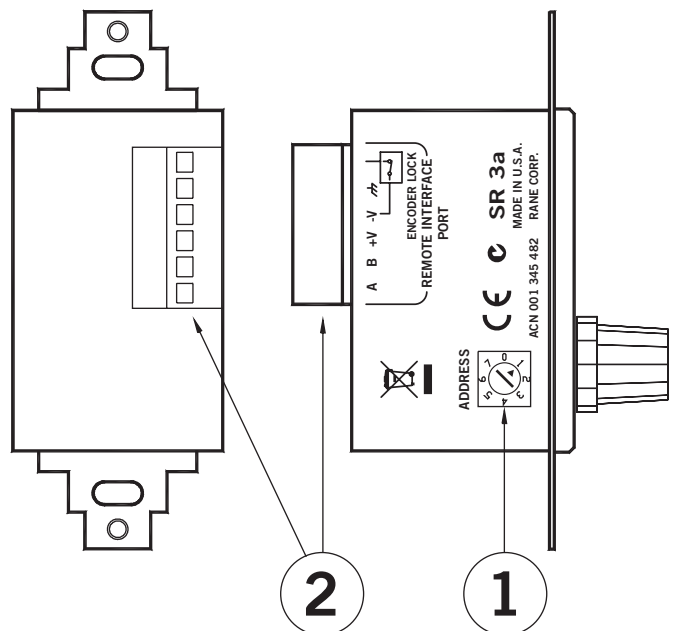
Working with Smart Remotes

Smart Remote Overview

Users familiar with Rane's SR Configurator program rejoice: Smart Remotes are now configured entirely within Drag Net 4.0! SR Configurator is no longer used and can be uninstalled, preferably with some kind of accompanying ritual or chant.

The following sections describe configuring the various parameters and modes for the remotes themselves. Details on assigning remotes to control parameters and functions with an RPM are found in Drag Net's included Help file (Help > Help Topics).

Creating a new Configuration

Smart Remote configurations can be created as offline Storage files, for subsequent transfer to a Live remote. To create a new Smart Remote Configuration:

1. Click the **File** menu, choose **New**, then select **Configuration** (CTRL + N).
   - or - Click the **New Configuration** button in the standard toolbar.
   - or - Right-click within the Project window and select **New**, then **Configuration** (CTRL + N).

2. Select the configuration source, either from an empty configuration, or from an existing Rane- or User-defined template. Select a device type from the **Configuration Type** list to filter the list of file options (to only show SR 3 files in the User Template directory, for example). Selecting the **Copy Settings** check box copies all parameters to the new configuration. This is a particularly useful feature when creating new configurations based on existing User Templates.

3. Select a configuration type (SR 2, SR 3, SR 4) from the list of choices.

4. Click **Next**

5. Enter a Name, storage location on your hard drive, and brief description of the configuration.

6. Click **Finish** and start configuring the remote!

File extensions for Smart Remote configurations follow the remote type – SR 3 configurations are stored as .sr3 files, for example.

Each remote has a number of configuration parameters which determine basic functions and user operation modes. These parameters are stored locally on each remote in non-volatile memory.

SR 3 Configuration Parameters

The SR 3 features a 31-position LED indicator, rotary data encoder with integrated push switch, and a 98 x 64 pixel monochrome LCD display with a programmable backlight. Up to 16 images (plus a Title Page) are stored locally in the SR 3 as bitmap pages and automatically recalled to correspond to different system modes.

Create your own bitmaps (**.bmp** files) using a graphics program such as Microsoft Paint™, or use any of the images installed automatically with Drag Net. The **RaneSR_3** truetype font contains a number of useful audio/visual symbols, and is automatically installed with Drag Net.

Auto Lock

Auto Lock is used in conjunction with the remote's Encoder Lock pin to disable the SR encoder. When the Encoder Lock pin is grounded and **Auto Lock** is enabled, changes in position of the encoder are ignored by the SR. For example, a keyed switch installed next to the SR allows the device to be locked temporarily so the system volume can not be adjusted.

Auto Title Page & Page Timer

When **Auto Title Page**** is enabled, the SR 3 automatically reverts to the Title Page (Page 0) after a user-defined time out. Any adjustment of the encoder causes the remote to exit Title Page mode and revert back to the most recently displayed page. Auto Title Page mode is operational even when Auto Lock is enabled.

The **Page Timer**** determines how long the remote waits after the most recent change before displaying the title page (Page 0). The valid range for the timer is 1 to 25 seconds.

Knob Turn

When Auto Level is enabled and the encoder is turned normally (without pushing it in) the LED moves clockwise or counterclockwise one position in the direction the knob was turned.

Always enable **Auto Level** when using a Smart Remote with a Rane RPM device.

Knob Push & Turn

When **Auto Page** is enabled and the encoder is held in and turned, the page stored in the next (or previous) position is automatically loaded into the SR 3 display.

When **Page Roll** is enabled the page selection wraps around from last page to first (or first page to last, depending on the direction the encoder was turned).

When **Update on Release**** is enabled, the SR updates its Page index when the encoder is released, rather than updating each time the encoder is turned. This feature allows users to scroll through and preview pages, select the Page they want, then release the encoder to trigger the action (for example, recall Preset on an RPM 88).

**This feature supported in SR 3 firmware version 2.1 or higher

Knob Bump

When **Auto Page**** is enabled and the encoder is pressed in and released (without turning), the next Page is automatically loaded into the SR 3 display; the Page index is updated after the Update Timer expires.

Note: Pages automatically roll from the last page to the first page while in Bump mode.

The **Update Timer** determines how long the SR 3 waits before updating its Page index once the encoder is released. Setting this value to 0 updates the Page index instantly, with every press/release combination of the encoder. Increasing this value allows users to scroll through and preview pages without updating the Page index on every press.

The valid range for the timer is 0 to 5 seconds.

Min Backlight

Min Backlight sets the desired brightness when the SR 3 is in its default or resting state, after the backlight timer expires.

Max Backlight

Max Backlight sets the desired brightness when the SR 3 is in its active state.

Backlight Timer

The **Backlight Timer** determines how long the LCD backlight remains on after the last change was made. The timer is restarted whenever a change is made to the push switch or encoder. The valid range for the timer is 1 to 25 seconds.

Max Num Pages

Max Num Pages limits the number of user accessible pages. For example, if Max Num Pages is set to 4, the user is only able to view Pages 1 through 4, even though there are 12 other Pages (total of 16) stored on the device. The SR 3 always displays Page 1 through Max Num Pages unless a value of 0 is specified. If a value of 0 is specified the title page (Page 0) is displayed upon power up and the user is unable to change pages.

Max Num Pages only applies when an **Auto Page** mode is enabled.

Working with SR 3 Bitmaps and Pages

Creating Bitmaps

Bitmaps can be created using any third party graphics program, such as Microsoft Paint™ or Adobe Photoshop™. To get started, a number of useful images are installed in the Program Files\Rane Corporation\SR\Bitmap directory.

Images must be monochrome (1-bit), 98 pixels wide x 64 pixels high. It is possible to concatenate multiple images together to form a single, larger image. The concatenated image must be 98 pixels wide by (N * 64) pixels high, where N is the number of Pages (max 17, including Title Page).

Inserting Bitmaps Into Pages

To insert a bitmap into a Page:

1. Left-click to select the Page to be updated. The selected Page is highlighted.

2. Choose **Insert Bitmap** (CTRL + F) from the Edit menu.
- or -
Click on the **Insert Bitmap** icon on the SR 3 Bar.
- or -
Right-click on the Page and choose **Insert Bitmap**.

3. Browse and select the file (.bmp extension) to be inserted.

Bitmaps can also be inserted or moved using standard Windows clipboard Cut, Copy and Paste operations:

Copy (CTRL - C) - Copies the selected Page bitmap(s) to the Windows clipboard. These bitmaps can then be pasted back into the SR Configuration, or to a graphics program for editing.

Paste (CTRL - V) - Pastes the current contents of the Windows clipboard to the selected Page(s).

Copy and Paste operations support multiple Page selections. If a Copy operation is performed while multiple Pages are selected, a single bitmap is sent to the clipboard as a concatenation of the individually selected bitmaps in the order they appear from top to bottom in the Page list.

If a Paste operation is performed with a bitmap containing more than one Page, the Pages in the bitmap are inserted into the Page list one at a time in order from top to bottom within the selected Pages.

If the number of images in the clipboard doesn't match the number of selected Pages, the Paste operation matches the first image in the clipboard with the top-most selected item, continuing in this fashion until either all images in the clipboard are used or the last selected Page is reached.

Re-ordering Pages

To move bitmaps between adjacent Pages:
1. Select the Page to be moved.
2. Choose **Move Up** or **Move Down** from the **Edit menu**
- or -
Right-click on the Page and choose **Move Up** or **Move Down**.

Move Up (**CTRL - ↑**) swaps bitmaps with the Page immediately above the currently selected Page. **Move Down** (**CTRL - ↓**) swaps bitmaps with the Page immediately below the currently selected Page. Only one Page at a time can be selected and moved.

**This feature supported in SR 3 firmware version 2.1 or higher

Synchronizing Pages Between the PC and SR 3

By transferring from Storage to Live

Bitmaps on the remote are automatically updated in the destination (Live remote or Storage SR 3 configuration) when any of the methods described in the **Transferring Configurations to and from a Live Remote** section are used. This feature can be disabled as a user preference (Tools > Preferences > SR Devices).

When working with a Live remote

Double-clicking a remote listed under the Live folder of the Project window automatically opens the remote for parameter adjustment. The bitmap images currently in the remote are immediately loaded for viewing and editing within Drag Net.

Inserting a bitmap using any of the means described in the Inserting Bitmaps Into Pages section automatically overwrites the remote's current image with the new image.

You can also select any page or pages and choose Get Selected from Drag Net's SR 3 Toolbar (View > SR 3 Bar) or the right-click context menu.

Fonts

Since the SR 3 supports displaying strings on the LCD display, two types of fonts are stored in read-only memory. The two types of fonts are text and symbol. The text font allows the host controller to send ASCII character strings to the display in three different sizes. The symbol font allows the host controller to send ASCII characters to the SR 3 that are displayed as simple icons in two different sizes. The symbol font is useful when the end users of the SR 3 are better served by graphics rather then text such as bilingual applications. When needed, one can load bitmaps with foreign language characters using MS Paint and save them in the LCD pages.

A few notes about the built-in fonts. Small font characters are 1 line tall, medium font characters are 2 lines tall, and large font characters are 3 lines tall. This is true for the medium and large symbol font icons as well. The LCD display consists of 8 lines, therefore when using small characters, 8 total lines are displayable; when using medium characters or icons, 4 lines fit on the LCD display; and when using large characters or icons, 2 lines fit on the LCD display.

The protocol and communications details for the text and symbol fonts are found in the section on Communications. The ASCII character to symbol icon map is detailed to the right. A few hints: load a graphic image into the display, then use the STR, SL, SR, or SC commands to overlay the fonts on top of the graphic image.

Key	Char	Key	Char	Key	Char
!	🕐	"	🕐	#	🕐
$	🕐	%	🕐	&	🕐
'	🕐	(	🕐	)	🕐
*	🕐	+	🕐	,	🕐
-	🎥	.	🎥	/	🎥
0	0	1	1	2	2
3	3	4	4	5	5
6	6	7	7	8	8
9	9	:	📊	;	⌣
<	◑	=	▣	>	💡
?	💾	@	☏	A	■
B	⏸	C	⏩	D	⏪
E	⏭	F	⏮	G	●
H	▶	I	◀	J	▼
K	▲	L	⏸▶	M	◀❘
N	⏏	O	─	P	+
Q	⦿	R	🕐	S	▸
T	◣	U	◤	V	◢
W	▶	X	🔇	Y	▼
Z	▲	[	✦✦	\	⌖
]	⌖	^	🔔	_	🎧
`	🕐	a	🎤	b	💾
c	📼	d	📱	e	3/4
f	VHS	g	DV	h	Beta
i	📼	j	📼	k	🌐
l	💿	m	MiniDisc	n	💿
o	CD	p	LVD	q	DVD
r	DVD	s	SAT	t	TV
u	CABLE	v	ANT	w	AM
x	FM	y	☀	z	𝄞
{	𝄢	|	⌒	}	♫
~	♪				

Polling for Remotes
Ethernet versus Serial Communication

If Smart Remotes are connected to an RPM device, the RPM acts as a data bridge, allowing communication with the remote through the Ethernet connection to the RPM. Smart Remotes appear beneath the RPM device in the Live folder of the Project window.

Serial communication takes place through the PC's COM port, which is usually RS-232 and therefore must be connected to the SR using an RS-232 (unbalanced data) to RS-485 (balanced data) converter capable of supporting the desired baud rate. Rane makes a suitable device — namely the DSC 1. Select the COM port connected to the SR from the list of available ports when polling for Live devices.

Baud Rate

The Baud Rate can only be set when Serial Mode is selected during polling. When configuring Remotes used with Rane controllers (RPM 88/44/22), the RW 485 baud rate of 38400 bps is automatically set. Should you encounter communication problems, settings can be restored to 38400 baud, 10 ms delay by holding the encoder in while powering the remote. Release the encoder when its LED lights.

Transferring Configurations to and from a Live Remote

Remotes can be configured offline in Storage mode, then transferred to a Live remote when you get to the job site. Alternately, you can transfer the contents of a Live remote to an offline Storage configuration as a backup, or for editing when you're back in the comfy chair at the office.

Storage to Live

Live remotes are initialized by transferring a Storage configuration to a Live remote. This action replaces all settings on the remote. Once the transfer is complete, you can continue to work directly with the Live remote, adjusting mode parameters, inserting bitmaps (SR 3), and so on. *Hint*: You'll need to Poll for Live devices before transferring configurations. To transfer a Storage remote configuration to a Live device:

1. Toggle the Project Window on if it's not already visible (View > Project).
2a. Drag and drop the Storage configuration listed under the Storage folder onto a destination remote listed under the Live folder.
- or -
2b. Select the Storage configuration, click the **Transfer Config To** button, and then select a destination remote from the list.
- or -
2c. Right-click the Storage configuration and choose **Transfer To**, then select a destination remote from the list.

Live to Storage

Important: Transferring from a Live remote to an existing Storage configuration overwrites the Storage configuration.

To transfer from a Live remote to a Storage configuration:
1. Toggle the Project Window on if it's not already visible (View > Project).

2a. Drag and drop the Live remote onto an existing destination Storage configuration.
- or -
2b. Select the Live remote, click the Transfer Config To button, and then select a destination Storage configuration from the list, or choose to create a new configuration.
- or -
2c. Right-click the Live remote and choose Transfer To, then select the destination Storage configuration from the list, or choose to create a new configuration.

Editing a Live Remote

It is possible to edit any parameter on a Live remote directly, without first having to transfer a Storage configuration to it.

To view the current contents of a Live remote simply double-click the remote listed under the Live folder of the Project Window. Alternately, right-click the Live remote and choose **Open item**. The contents of the Live remote are then loaded into the Device Configuration window for viewing and/or editing.

Renaming a Remote

To rename a Smart Remote:
1. Right-click the Live remote in the Project window and choose **Properties**.
2. Enter a new name for the remote in the **Name** field.

Updating Smart Remote Firmware

It may be necessary to update a Smart Remote's firmware in order to add features or address one of those pesky glitches that only seem to appear after the product's been released.

Remotes with the following firmware versions can be upgraded as new firmware becomes available:

Remote	With Firmware Version
SR 2	2.0 and higher
SR 3	4.0 and higher
SR 4	1.0 and higher

Older remotes may not be updateable, or updateable only by Rane. Contact Rane Tech Support 425-355-6000 or visit *www.rane.com* for more information.

Firmware files for all remotes are installed as part of Drag Net and are located in the Program Files\Rane Corporation\Drag Net\Firmware\Smart Remotes directory.

To update firmware in a Smart Remote:
1. Ensure remotes are properly connected to the RPM device. Remotes must be connected before powering the RPM on.
2. Connect directly to the RPM device, using an Ethernet crossover cable.
3. **Poll** to find the Live device. Remotes are listed beneath the RPM device in the Project window.
4. Select the Remote to be updated.
5. Launch the **Update Device Firmware Wizard** (Tools > Update Device Firmware).
6. Follow the wizard's on-screen instructions to complete the operation. The device automatically resets itself once the update is complete.

Firmware updates performed using a COM Port (Serial) follow the exact same steps, beginning with Step 3.

SR 3 Wiring Guidelines

Restrictions

24 AWG CAT 5 cable resistance = 26 ohms per 1,000 feet. There are two wiring restrictions. First, RW 485 has a maximum of 1,000 feet. The total length may not exceed this limit in any combination of series or parallel runs.
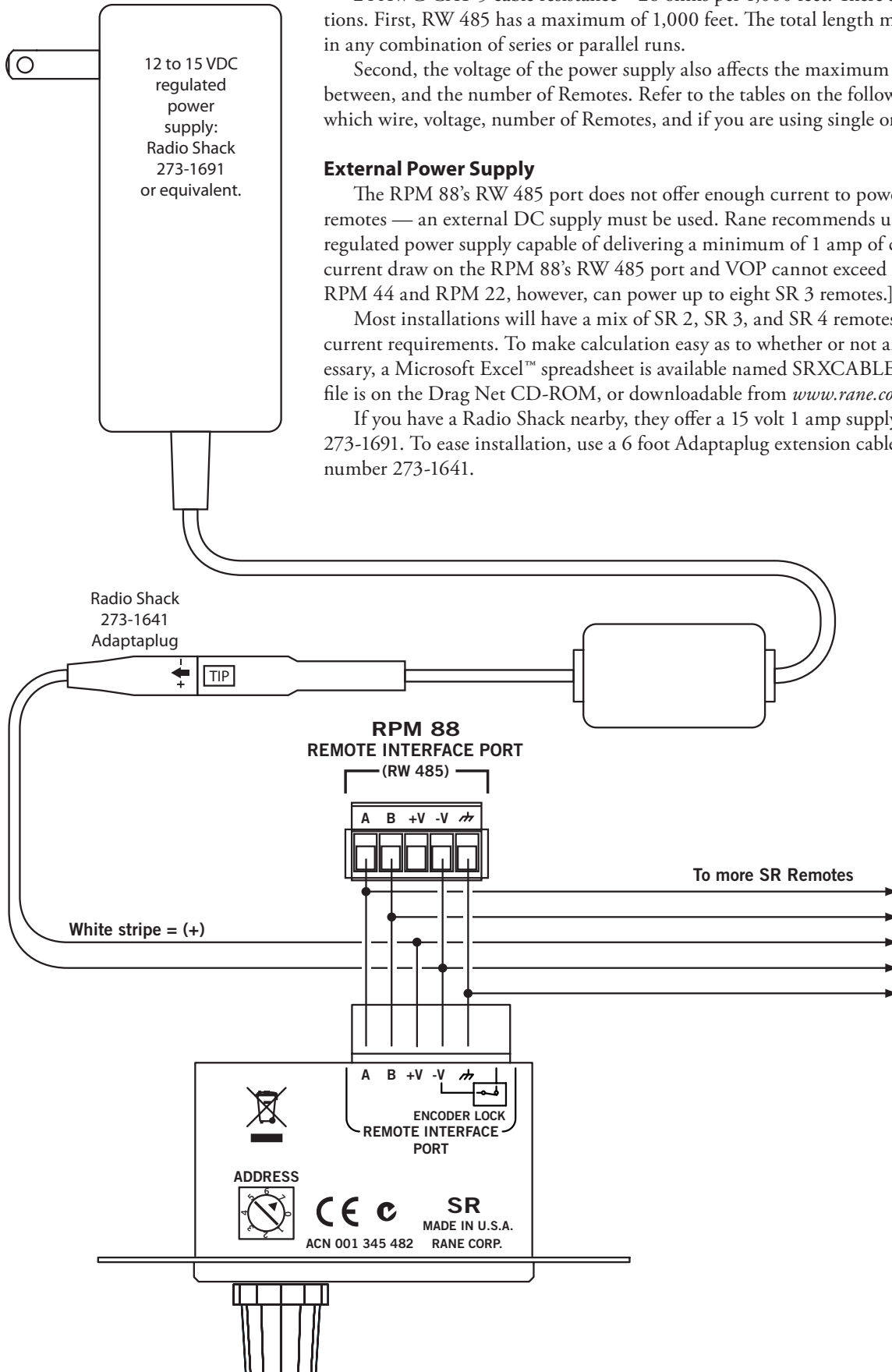
Second, the voltage of the power supply also affects the maximum distance of each length between, and the number of Remotes. Refer to the tables on the following pages depending on which wire, voltage, number of Remotes, and if you are using single or multiple runs.

External Power Supply

The RPM 88's RW 485 port does not offer enough current to power more than three SR 3 remotes — an external DC supply must be used. Rane recommends using a 12 to 15 volt DC regulated power supply capable of delivering a minimum of 1 amp of current. The combined current draw on the RPM 88's RW 485 port and VOP cannot exceed 375 milliamps. [The RPM 44 and RPM 22, however, can power up to eight SR 3 remotes.]

Most installations will have a mix of SR 2, SR 3, and SR 4 remotes each with their own current requirements. To make calculation easy as to whether or not an external supply is necessary, a Microsoft Excel™ spreadsheet is available named SRXCABLELENGTH.XLS. This file is on the Drag Net CD-ROM, or downloadable from *www.rane.com/sr3.html*.
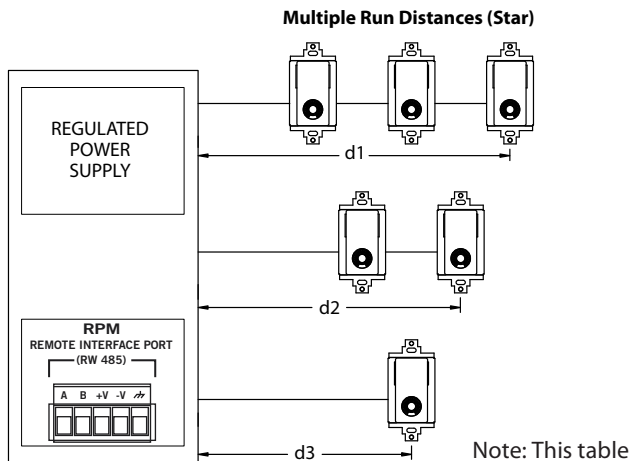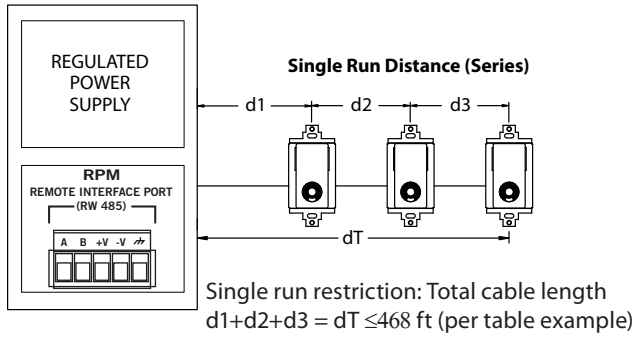
If you have a Radio Shack nearby, they offer a 15 volt 1 amp supply, catalog number: 273-1691. To ease installation, use a 6 foot Adaptaplug extension cable, Radio Shack catalog number 273-1641.

12 to 15 VDC regulated power supply: Radio Shack 273-1691 or equivalent.

Radio Shack 273-1641 Adaptaplug

TIP

RPM 88
REMOTE INTERFACE PORT

(RW 485)

A   B   +V   -V   ⏚

To more SR Remotes

White stripe = (+)

A   B   +V   -V   ⏚

ENCODER LOCK
REMOTE INTERFACE
PORT

ADDRESS

CE

SR
MADE IN U.S.A.
ACN 001 345 482   RANE CORP.

Cable Type 1

2 twisted pair unshielded CAT 5, Belden #1588(A,R)
2 twisted pair unshielded CAT 5, Belden #1590A

Single Run Distance (Series)

Single run restriction: Total cable length
d1+d2+d3 = dT ≤468 ft (per table example)

Multiple Run Distances (Star)

	Max Distance for Cable (feet)	Max Distance for Cable (meters)	Number of SR 3 Remotes
Vs = 15V **RPM 44** **RPM 22**	1000	305	1
	672	205	2
	468	143	3
	359	109	4
	291	89	5
	245	75	6
	211	64	7
	186	57	8

	Max Distance for Cable (feet)	Max Distance for Cable (meters)	Number of SR 3 Remotes
Vs = 12V **RPM 88**	745	227	1
	420	128	2
	292	89	3
	224	68	4
	182	55	5
Requires external supply	153	47	6
	132	40	7
	116	35	8

	Max Distance for Cable (feet)	Max Distance for Cable (meters)	Number of SR 3 Remotes
Vs = 8V	149	45	1
	84	26	2
	58	18	3
	45	14	4
	36	11	5
	31	9	6
	26	8	7
	23	7	8

Note: This table is *only* for systems using SR 3 remotes (all remotes on 485 bus are the same). For mix and match calculation of SR 2, SR 3 and SR 4 Remotes, use the SRCABLELENGTH.XLS Microsoft Excel™ spreadsheet on the Drag Net CD-ROM or at *www.rane.com/sr3.html*.

Multiple run restriction (per table entries): d1 ≤468 ft, d2 ≤672 ft, d3 ≤1,000 ft
Total cable length must be under 1,000 ft: d1 + d2 + d3 = dT ≤1,000 ft

Examples:
So if
d1=400 ft (<468 ft, OK)
d2=300 ft (<672 ft, OK)
d3=200 ft (<1,000 ft, OK)
d1+d2+d3=900 ft, then it's all OK!

but if
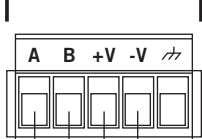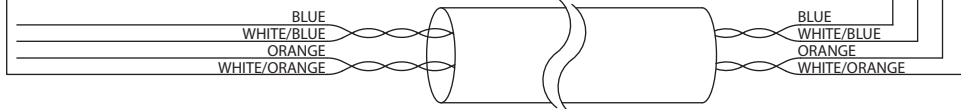d1=400 ft (<468 ft, OK)
d2=500 ft (<672 ft, OK)
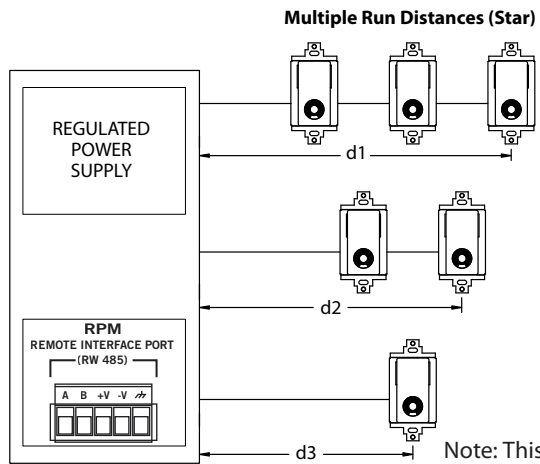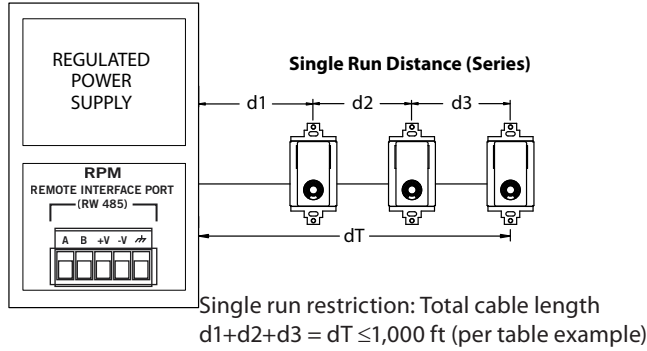d3=300 ft (<1,000 ft, OK)
d1+d2+d3=1,200 ft, then it's NOT OK!

Cable Type 2

4 twisted pair unshielded CAT 5, Belden #1583(A, B, E, ENH, R)
4 twisted pair shielded CAT 5, Belden #1624 (P, R)
4 twisted pair unsheilded CAT 5, Belden #1700 (A, R)

Single Run Distance (Series)

Single run restriction: Total cable length
d1+d2+d3 = dT ≤1,000 ft (per table example)

Multiple Run Distances (Star)

	Max Distance for Cable (feet)	Max Distance for Cable (meters)	Number of SR 3 Remotes
Vs = 15V **RPM 44** **RPM 22**	1000	305	1
	1000	305	2
	1000	305	3
	1000	305	4
	872	266	5
	734	224	6
	633	193	7
	557	170	8
Vs = 12V **RPM 88**	1000	305	1
	1000	305	2
	877	267	3
	672	205	4
	545	166	5
Requires external supply	459	140	6
	396	121	7
	348	106	8
Vs = 8V	447	136	1
	252	77	2
	175	53	3
	134	41	4
	109	33	5
	92	28	6
	79	24	7
	70	21	8

Note: This table is *only* for systems using just SR 3 remotes (all remotes on 485 bus are the same). For mix and match calculation of SR 2, SR 3 and SR 4 Remotes, use the SRCABLELENGTH. XLS Microsoft Excel™ spreadsheet on the Drag Net CD-ROM or at *www.rane.com/sr3.html*.

More conductors mean greater operating distance.
Multiple run restriction (per table entries): d1 ≤1,000 ft, d2 ≤1,000 ft, d3 ≤1,000 ft
Total cable length must be under 1,000 ft: d1 + d2 + d3 = dT ≤1,000 ft

Examples:
So if
d1=400 ft (<1,000 ft, OK)
d2=200 ft (<1,000 ft, OK)
d3=300 ft (<1,000 ft, OK)
d1+d2+d3=900 ft, then it's all OK!

but if
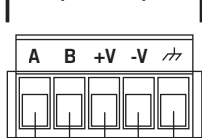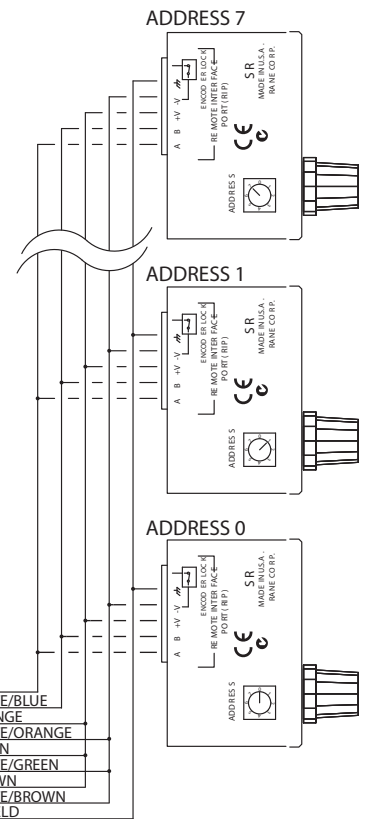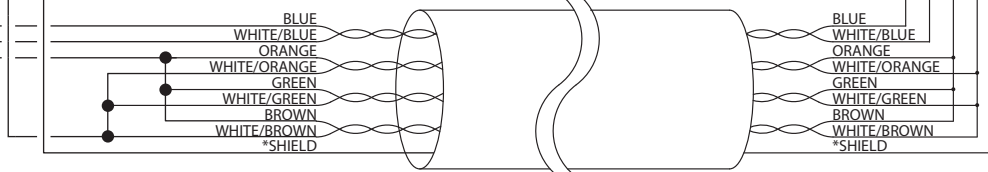d1=700 ft (<1,000 ft, OK)
d2=300 ft (<1,000 ft, OK)
d3=200 ft (<1,000 ft, OK)
d1+d2+d3=1,200 ft, then it's NOT OK!

RPM
REMOTE INTERFACE PORT
(RW 485)

A   B   +V   -V

BELDEN #1583 (A, B, E, ENH, R)
BELDEN #1624 (P, R) *Shielded
BELDEN #1700 (A, R)

BLUE
WHITE/BLUE
ORANGE
WHITE/ORANGE
GREEN
WHITE/GREEN
BROWN
WHITE/BROWN
*SHIELD

ADDRESS 7

ADDRESS 1

ADDRESS 0

DSC 1

This page illustrates connection of a computer running Drag Net or a controller to SR 3(s) via RS-232 using the Rane DSC 1 (plus external power).

Note, earlier versions of the DSC 1 do not support the faster baud rates of the SR 3. DSC 1's with date codes later than 4/2001 should be used to guarantee carefree communications. The date code is found on the bottom of the DSC 1.

2=RED	RED=2
3=BLACK	BLACK=3
5=SHIELD	SHIELD=5

DSC 1

DB-9 male to DB-9 female

2=RED	RED=3
3=BLACK	BLACK=2
7=SHIELD	SHIELD=5

DSC 1
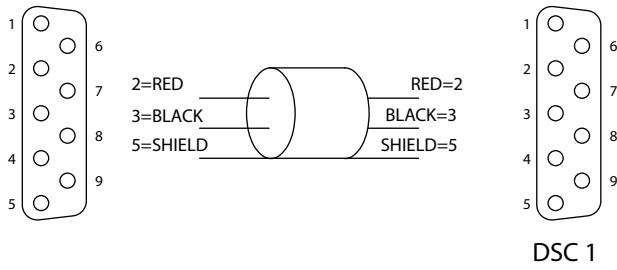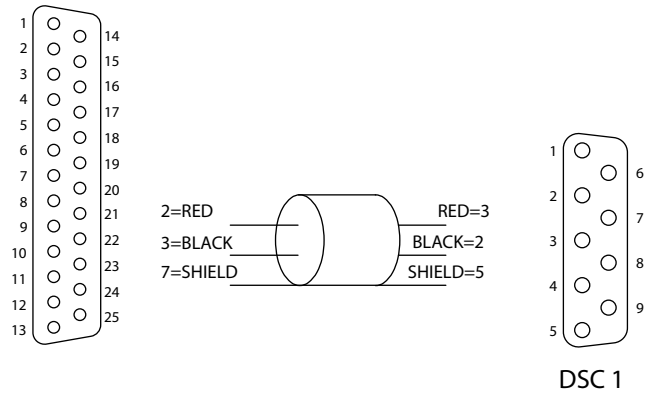
DB-25 male to DB-9 female
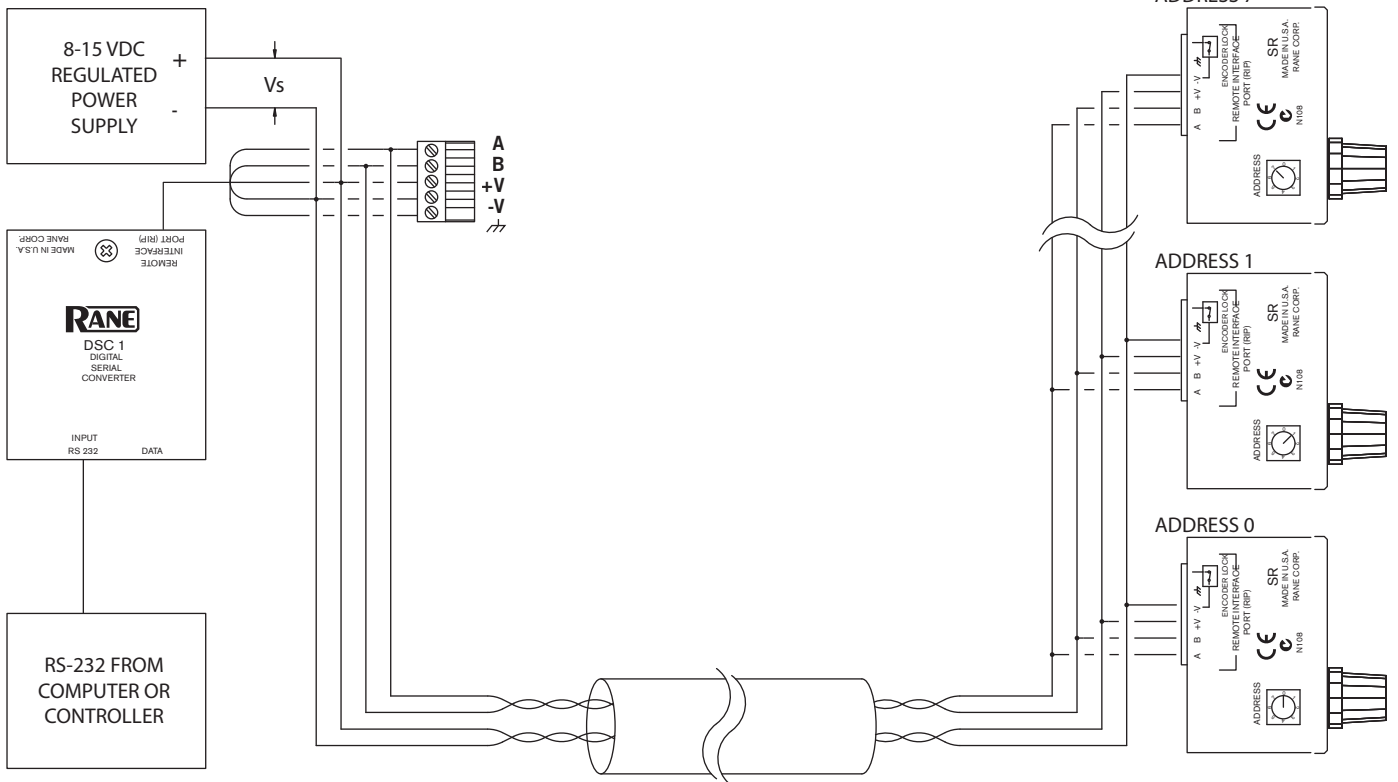
SR 3 Communication Protocol

The SR 3 communication protocol follows Rane's RW 485 specification. The following describes the SR 3 implementation.

Physical

The baud rate is 38,400 bps with No parity, 8 Data Bits, 1 Stop Bit (N81) format. The SR 3 also supports 9600, 19200, 57600, and 115200 bps. When configuring Remotes used with Rane controllers (RPM 22, 44, 88), the RW 485 baud rate of 38400 bps is required. At the end of a command message, the Master must release the bus within 10 ms. The SR 3 waits this length of time before transmitting its response. To restore the SR 4 communication settings to 38400 baud 10 ms delay, apply power while pushing the encoder *in* for several seconds until "COMM RESTORED" is displayed on the LCD.

Master/Slave

RW 485 is a master/slave bus network, with only one master in charge, which we define as the Protocol Master (controller). When the Protocol Master expects a response from a slave, it relinquishes control of the bus, allowing the slave to drive the RS-485 bus. The slave must then release the bus back to the Protocol Master, and we start again. The SR 3 is always a slave.

Value Encoding

All numeric values are represented in ASCII decimal format separated by commas, except LCD data which are represented in ASCII hex (2 characters per byte, no commas). Values with the MSB set ($80 or larger) are interpreted as potential device addresses.

Syntax

Command messages are sent from the Protocol Master to the SR 3. Response messages are returned to the Protocol Master from the SR 3. The SR 3 always responds to the Protocol Master upon receiving a complete command message at the correct baud rate.

Command and response messages have the same format:
message = <addr> <msgtype> <devtype> <checksum> <command/data> <CR>

<addr> Each device has a unique address in the range [0, 7]. The encoding is one byte with the MSB set.

For example, if the SR 3's address switch is set to 5, the controller would send 10000101.
The SR 3 always returns its address switch setting plus $80.
Note: Upon power-up of the SR 3, a status screen is displayed on the LCD display that reports the switch setting. In firmware version >2.1, the status screen also displays the firmware version and can be displayed any time by holding the encoder in for six seconds. The status screen is displayed until the encoder is released. This feature is not affected by the hardware lock, although it can be defeated by the software lock. See **ILK** command in the **SR 3 Command Set** for details.

<msgtype> The msgtype is a one byte set of flags indicating options, bit 7=MSB:
- bit 0)   set = checksum is valid
- bit 1)   set = there has been an error (response only)
- bit 2-5)   reserved, cleared to 0
- bit 6)   always 1
- bit 7)   always 0

If the controller wants the SR 3 to verify the checksum, it would send a value of $41, or an ASCII 'A'. If the controller wants the SR 3 to ignore the checksum, it would send a value of $40, or an ASCII '@'. The SR 3 echoes back the **<msgtype>** it was sent. In the case of an error, the SR 3 sets bit 1.

<devtype> The SR 3 device type value is $31, or an ASCII '1'. The SR 3 also accepts a value of $30, or an ASCII '0', the universal device type used for polling. The SR 3 always returns its device type of $31.

<checksum> The checksum is defined as the sum of the ASCII encoded values of the **<command/data>** section. The sum is then masked with $007F to produce one byte with the MSB set to zero.

The controller would send a valid checksum as defined above if it sent a value of $41 for the **<msgtype>**. The SR 3 then verifies the sent checksum by calculating the checksum from the data it received in the **<command/data>** section of the sent message. On the other hand, if the controller sent a value of $40 for the **<msgtype>** the SR 3 ignores the sent checksum. The controller must always send a checksum less than or equal to $7F, even if it intends for the SR 3 to ignore it.

The SR 3 **<checksum>** response is based on the **<msgtype>** it was sent. If the SR 3 received a **<msgtype>** of $41, it returns a valid checksum (as defined) calculated from it's response data. If the SR 3 received a **<msgtype>** of $40, it returns zero.

<**command/data**> The general format is <cmd1,arg1,arg2,…,cmd2,arg1,…>. The commas are part of the <command/data> structure and act as delimiters between the ASCII encoded commands and data. Text string arguments are delimited with quotes ("String"). If the string argument contains quotes, an accent character (') placed in the string argument will be interpreted by the SR 3 as a double quote character ("). The ASCII value for the accent char is $60, not to be confused with a single quote character ('), ASCII value $27. For example: string argument: "A string that contains 'quotes'" is interpreted as: A string that contains "quotes".

The controller sends commands/arguments for the SR 3 to process. This section of the message is limited to 250 characters for the SR 3. See the SR 3 Command Set section for details of valid commands.

The SR 3 responds with response data based on the commands/arguments it was sent. The SR 3 limits its response data to 250 characters. In the case of an error, the response data is: n,"ERROR" where n is an error code defined below:

Hex	ASCII	Error Code Meaning
$31	'1'	Sent <**devtype**> invalid.
$32	'2'	Sent <**checksum**> did not verify.
$33	'3'	Sent <**command/data**> parse error.
$34	'4'	Sent <**command/data**> greater than 250 characters.
$35	'5'	Response <**command/data**> greater than 250 characters.

See the **SR 3 Command Set** section below for details of valid SR 3 responses.

<**CR**> A carriage return ($0D) terminates every message.

SR 3 Command Set

This section details the <**command/data**> portion of a complete RW 485 message. The SR 3 supports 25 commands. Below is a table of commands and associated responses, followed by descriptions.

Configuration Commands

Cmd	Arg(s)*	Description	Response**
V		Get Firmware, Hardware Version	n1,n2,"OK"
N	["ccc…"]	Read/Write Device's Name	"ccc…","OK"
SPL	n1[,n2]	Read/Write Stored Parameter	n,"OK"
Display Commands			
BL	n1	Backlight Off/On	"OK"
BMP	n1	Display ROM based Bitmap	"OK"
CLS		Clear Screen	"OK"
CLL	n1	Clear Line	"OK"
RVL	n1	Reverse Line	"OK"
FNT	n1	Select Font	"OK"
MC	n1,n2	Move Cursor	"OK"
XDR	n1	Read Hex Data from LCD	xxxx,"OK"
XDS	n1,xxxx…	Send Hex Data to LCD	"OK"
STR	"ccc…"	String	"OK"
SL	n1,"ccc…"	String Left	"OK"
SC	n1,"ccc…"	String Center	"OK"
SR	n1,"ccc…"	String Right	"OK"
PS	n1	Page Select	"OK"
PW	n1	Page Write	"OK"
Input Commands			
ILD	[n1]	Get/Set LED	n1,"OK"
ILK	[n1]	Read/Write Input Lock	n1,"OK"
IQ		Input Query	n1,n2,"OK"
IR		Input Raw	n1,n2,n3,n4,"OK"
IS	n1,n2	Input Suggest	n1,n2,"OK"
ISR	n1,n2	Input Suggest Raw	n1,n2,n3,n4,"OK"
IF	n1,n2	Input Force	"OK"

* [ ] denotes optional Command Argument
** Responses from concatenated commands produce only one "OK"

Configuration Commands

V

Get Firmware, Hardware Version
  Send: V
  Response: n1,n2,"OK"
        Where: n1 is a two digit ASCII encoded decimal value representation of the firmware version. The first digit is the major
                firmware version and the second digit is the minor firmware version.
                n2 is a one digit ASCII encoded decimal value representation of the hardware version.
        Example: 13,2,"OK" means firmware version 1.3, hardware version 2.

N

Read/Write Device's Name
The device's name is limited to 32 characters and is stored in non-volatile memory. The default name is SR 3.

To read the device's name:
  Send: N
  Response: "ccc","OK"
        Where: ccc is the device's name.
        Example: "SR 3","OK" means the device's name is SR 3

To write a new name to the device:
  Send: N,"ccc"
        Where: ccc is the new name.
        Example: N,"Conference Room 101" will rename the device to Conference Room 101
  Response: "OK"

SPL

Read/Write Stored Parameter
Various configuration parameters are stored in non-volatile memory. This command reads and writes these parameters. For details of each param-
eter, see the **Stored Parameter List** section following the **Command Set** section.

To read a stored parameter value:
  Send: SPL,n1
        Where: n1 is the stored parameter index.
        Example: SPL,7 indexes the seventh parameter in the list which is the Auto Level parameter.
  Response: n1,"OK"
        Where: n1 is the value of the indexed parameter.
        Example: 1,"OK" means that Auto Level is enabled.

To write a stored parameter value:
  Send: SPL,n1,n2
        Where: n1 is the stored parameter index.
                n2 is the value to be stored.
        Example: SPL,7,0 sets Auto Level parameter to 0, disabling the Auto Level function.
  Response: "OK"

LCD Display Commands

BL

Back light Off/On

Toggles the LCD back light from maximum brightness setting to minimum brightness setting and vice-versa. See the Stored Parameter List section for further details on back light configuration.

Send: BL,n1

Where: n1 is the back light flag

Example: BL,1 sets the back light brightness to the maximum brightness specified by the back light maximum configuration and starts the back light timer. After the timer expires, the back light brightness fades to the minimum brightness specified by the back light minimum configuration and the back light flag is cleared. BL,0 clears the back light flag and causes the back light brightness to immediately fade to the minimum brightness specified by the back light minimum configuration.

Response: "OK"

BMP

Display ROM based Bitmap

Displays the specified read-only bitmap. See Appendix B for room combining images.

Send: BMP,n1

Where: n1 is the bitmap index. Bitmap image 0 is the Rane splash screen and bitmap images 1-17 are the default images used to initialize pages 0-16. Bitmap images 18 – 41 are the room combining images.

Example: BMP,1 transfers the ROM based image 1 to the LCD.

Response: "OK"

CLS

Clear Screen

Clears the LCD image data and resets the cursor position to (0, 0).

Send: CLS

Response: "OK"

CLL

Clear Line

Clears the LCD image data on the specified line.

Send: CLL,n1

Where: n1 is the line number to be cleared. n1 ranges from 0 to 7. Line 0 is the bottom line.

Example: CLL,1 clears the second line from the bottom.

Response: "OK"

RVL

Reverse Line

Reverses the LCD black/white image data on the specified line.

Send: RVL,n1

Where: n1 is the line number to be reversed. n1 ranges from 0 to 7. Line 0 is the bottom line.

Example: RVL,0 reverses the black/white image data of the bottom line.

Response: "OK"

FNT

Select Font

Selects the font used by string commands. Small fonts are one line tall, medium fonts are two lines tall, large fonts are three lines tall. Font 0 is the small alphanumeric font, font 1 is the medium alphanumeric font, font 2 is the large alphanumeric font, font 3 is the medium symbol font, and font 4 is the large symbol font.

Send: FNT,n1

Where: n1 is the font index. n1 ranges from 0 to 4.

Example: FNT,2 selects the large alphanumeric font.

Response: "OK"

MC

Move Cursor

Moves the cursor to (x, y) location, where x is the x-axis location ranging from 0 through 97 (one pixel width) and y is the y-axis location ranging from 0 through 7 (eight pixel height). Cursor position (0, 0) is the lower left corner of the display. For a visual description, see Appendix A at the end of this document.

Send: MC,n1,n2

Where: n1 is x-location ranging from 0 through 97

n2 is the y-location (or line number) ranging from 0 through 7

Example: MC,8,5 moves the cursor to x-location 8 (9 pixels from the left), y-location 5 (6 lines from the bottom).

Response: "OK"

Manual-14

XDR
Hex Data Read

Reads Hex Data from the LCD starting from the current cursor location and proceeding left to right. Bytes are represented in two ASCII characters per byte. Since the width is known, no commas are used for delimiting values. The format of the data bytes is shown in Appendix A at the end of this document.

> Send: XDR,n1
>> Where: n1 is the number of bytes to read. The range is [1, 98].
>> Example: XDR,4 will read four bytes of LCD data starting at the current cursor location.
> Response: xxxx,"OK"
>> Where: xxxx is the ASCII Hex representation of the LCD data. The range is [00, FF].
>> Example: 03693F2B,"OK" means that the four bytes requested starting from the current cursor position and proceeding from left to right are
>>> 03 or 0000 0011
>>> 69 or 0110 1001
>>> 3F or 0011 1111
>>> 2B or 0010 1011
>> For byte to pixel interpretation, see Appendix A at the end of this document.

XDS
Hex Data Send

Sends Hex Data to the LCD starting from the current cursor location and proceeding left to right. Bytes are represented in two ASCII characters per byte. Since the width is known, no commas are used for delimiting values. The format of the data bytes is shown in Appendix A at the end of this document.

> Send: XDS,n1,xxxx
>> Where: n1 is the number of bytes to send. The range is [1, 98].
>>> xxxx is a list two ASCII character per byte representation of the bytes to send.
>> Example: XDR,4,03693F2B will send four bytes of LCD data to the display starting at the current cursor location. The four bytes are:
>>> 03 or 0000 0011
>>> 69 or 0110 1001
>>> 3F or 0011 1111
>>> 2B or 0010 1011
>> For byte to pixel interpretation, see Appendix A at the end of this document.
> Response: "OK"

STR
String

Displays a string using the current font starting at the current cursor location.

> Send: STR,"ccccc"
>> Where: ccccc is the string of characters to be displayed
>> Example: STR,"Hello World" displays the string: Hello World.
> Response: "OK"

SL
String Left

Displays a left justified string using the current font on the specified line.

> Send: SL,n1,"ccccc"
>> Where: n1 is the line number for the string to be displayed on. n1 ranges from 0 (bottom line) to 7 (top line).
>> ccccc is the string of characters to be displayed
>> Example: SL,3,"Hello World" displays the left-justified string: Hello World
> Response: "OK"

SC
String Center

Displays a center justified string using the current font on the specified line.

> Send: SC,n1,"ccccc"
>> Where: n1 is the line number for the string to be displayed on. n1 ranges from 0 (bottom line) to 7 (top line).
>> ccccc is the string of characters to be displayed
>> Example: SC,3,"Hello World" displays the center-justified string: Hello World
> Response: "OK"

SR

String Right

Displays a right justified string using the current font on the specified line.

> Send: SR,n1,"ccccc"
>> Where: n1 is the line number for the string to be displayed on. n1 ranges from 0 (bottom line) to 7 (top line).
>> ccccc is the string of characters to be displayed
>> Example: SR,3,"Hello World" displays the right-justified string: Hello World
>
> Response: "OK"

PS

Page Select

Displays the associated bitmap image on the LCD display. If either Auto Page is enabled ("Knob Push & Turn" or "Knob Bump"), the page index is updated as well. Page 0 is the user title page which is not accessible from encoder input. Pages 1-16 are accessible from encoder input.

> Send: PS,n1
>> Where: n1 is the requested page index. n1 ranges from 0 through 16.
>> Example: PS,3 displays the page 3 bitmap image. If either Auto Page is enabled, the page index is updated to 3.
>
> Response: "OK"

PW

Page Write

Writes the current LCD bitmap image to the indexed page memory.

> Send: PW,n1
>> Where: n1 is the page index. n1 ranges from 0 through 16.
>> Example: PW,0 stores the current LCD image data to page 0 (the title page).
>
> Response: "OK"

Encoder Input Commands

ILD

Get/Set LED

Gets or sets the LED indicator status.

To get the LED indicator status:

> Send: ILD
>
> Response: n1,"OK"
>> Where: n1 is the LED status. The status range is [0, 1].
>> Example: 1,"OK" means that the LED is on.

To set the LED indicator status:

> Send: ILD,n1
>> Where: n1 is the LED status. The status range is [0, 1].
>> Example: ILD,0 turns the LED off.
>
> Response: "OK"

ILK

Read/Write Software Input Lock

Reads or writes the input encoder software lock byte.

The software lock is used to lock out separate encoder actions and other features. The format of the lock byte is bit wise where bit set (1) locks the corresponding action, bit clear (0) unlocks the corresponding action. The lock byte is volatile and is cleared to zero on power up.

The bit definitions are as follows: bit 0 (LSB) controls the resulting action of turning the encoder, bit 1 controls the resulting action of turning the encoder while it is pushed in, bit 2 controls the resulting action of pushing and releasing the encoder (bump), bit 3 controls the Auto Title Page feature, bit 4 controls the Rane splash screen feature, bits 5 and 6 are don't cares, bit 7 (MSB) is always zero. The acceptable range of the Software Input Lock byte is firmware version specific. For version 2.1 and later the range is 0 through 127. For version 2.0 and 1.1, the range is 0 through 7. For version 1.0, the range is 0 through 3.

To read the Software Input Lock byte:

> Send: ILK
>
> Response: n1,"OK"
>> Where: n1 is the Software Input Lock byte.
>> Example: 3, "OK" means that bit 0 and bit 1 are set so the resulting actions of turning the encoder and of turning the encoder while it is pushed in are locked.

To write the Software Input Lock byte:

> Send: ILK,n1
>> Where: n1 is the Software Input Lock byte.
>> Example: ILK,2 locks the resulting action of turning the encoder while it is pushed in.
>
> Response: "OK"

IQ

Input Query

Returns the current level and page index. Resets the command state byte to No Operation.

        Send: IQ

        Response: n1,n2,"OK"

                Where: n1 is the current level. The level range is [1, 31].

                            n2 is the current page index. The page index range is [0, 16].

                Example: 15,4,"OK" means that the current level is 15 and the current page index is 4.

IR

Input Raw

Returns the current level, page index, command state byte, and the length of time the encoder button has been pressed. Resets the command state to No Operation.

        Send: IR

        Response: n1,n2,n3,n4,"OK"

                Where: n1 is the current level. The level range is [1, 31].

                            n2 is the current page index. The page index range is [0, 16].

                            n3 is the current command state byte. The command state byte represents the state of the encoder.

                            The possible states follow:

0	No Operation	The encoder has not changed.
1	Encoder Left	The encoder has been turned counter clockwise.
2	Encoder Right	The encoder has been turned clockwise.
16	Page Left	The encoder has been pushed in and turned counter clockwise.
32	Page Right	The encoder has been pushed in and turned clockwise.
64	Enter	The encoder has been pushed in and released without being turned.

                        n4 is the length of time the encoder button has been pressed. The time the button has been pressed is in units of .01 seconds and the range is [0, 255] or 0 to 2.55 seconds. The button timer starts at the press of the button and is reset to zero when the button is released.

                        Example: 1,2,32,100,"OK" means the current level is 1, the current page index is 2, the encoder has been pushed in and turned clockwise, and the button has been held in for 1 second.

IS

Input Suggest

Suggests new level and page index. Resets the command state byte to No Operation.

If Auto Level is enabled, the level is updated and indicated by the LED only if the device's level has not changed by someone turning the encoder. Otherwise, if Auto Level is disabled, the level is updated and indicated by the LED regardless of encoder input. If either Auto Page is enabled ("Knob Push & Turn" or "Knob Bump"), the page index is updated and the associated bitmap is displayed only if the device's page index has not changed by local encoder action. Otherwise, if neither Auto Page is enabled, the page index is updated but the associated bitmap is not displayed, regardless of local encoder action.

        Send: IS,n1,n2

                Where: n1 is the suggested new level. The level range is [0, 31]. If n1 is [0], the level remains unchanged.

                n2 is the suggested new page index. The page index range is [0, 16]. If n2 is [0], the page remains unchanged.

                Use the **PS** command to force page [0].

                Example: IS,3,5 suggests a new level of 3 and a new page index of 5.

        Response: n1,n2,"OK"

                Where: n1 is the current level. The level range is [1, 31].

                n2 is the current page index. The page index range is [0, 16].

                Example: 3,5,"OK" means the current level is 3 and the current page index is 5. This means the suggested level and page index were updated. A response of 10,5,"OK" means the current level is 10 and was last changed by someone turning the encoder and the current page index was updated to 5.

ISR

Input Suggest Raw

Same operation as **IS** Input Suggest, except **ISR** returns the command state byte and button time.

> Send: ISR,n1,n2
>> Where: n1 is the suggested new level. The level range is [0, 31]. If n1 is [0], the level remains unchanged.
>>
>> n2 is the suggested new page index. The page index range is [0, 16]. If n2 is [0], the page remains unchanged.
>>
>> Use the **PS** command to force page [0].
>>
>> Example: ISR,3,5 suggests a new level of 3 and a new page index of 5.
>
> Response: n1,n2,n3,n4,"OK"
>> Where: n1 is the current level. The level range is [1, 31].
>>
>> n2 is the current page index. The page index range is [0, 16].
>>
>> n3 is the current command state byte. The command state byte represents the state of the encoder. The possible states follow:

0	No Operation	The encoder has not changed.
1	Encoder Left	The encoder has been turned counter clockwise.
2	Encoder Right	The encoder has been turned clockwise.
16	Page Left	The encoder has been pushed in and turned counter clockwise.
32	Page Right	The encoder has been pushed in and turned clockwise.
64	Enter	The encoder has been pushed in and released without being turned.

>> n4 is the length of time the encoder button has been pressed. The time the button has been pressed is in units of .01 seconds and the range is [0, 255] or 0 to 2.55 seconds. The button timer starts at the press of the button and is reset to zero when the button is released. Example: 3,5,0,0,"OK" means the current level is 3, the current page index is 5, the current command state byte is a No Operation and the button is not pushed in. This means the suggested level and page index were updated. A response of 3,7,32,100,"OK" means the current level was updated to 3, the current page index is 7 and was last changed by someone pushing in and turning the encoder, the current command state byte is a Page Right, and a non-zero button time means someone is still holding the button *in*.

IF

Input Force

Forces new level and page index. Resets the command state byte to No Operation.

The level is updated and indicated by the LED regardless of Auto Level configuration.

If either Auto Page is enabled ("Knob Push & Turn" or "Knob Bump"), the page index is updated and the associated bitmap is displayed. Otherwise, if neither Auto Page is enabled, the page index is updated but the associated bitmap is not displayed.

> Send: IF,n1,n2
>> Where: n1 is the new level. The level range is [0, 31]. If n1 is [0], the level remains unchanged.
>>
>> n2 is the new page index. The page index range is [0, 16]. If n2 is [0], the page remains unchanged.
>>
>> Use the **PS** command to force page [0].
>>
>> Example: IF,3,5 sets a new level of 3 and a new page index of 5.
>
> Response: "OK"

Stored Parameter List (SPL)

Below is a table of stored parameters followed by descriptions of each parameter.

Index	Description	Value Range	Setting	Meaning
1	Back light Maximum Brightness	1 - 255	190	0.4 - 100 %
2	Back light Minimum Brightness	1 - 255	1	0.4 - 100 %
3	Back light Timer (.1 sec)	1 - 255	150	0.1 - 25.5 seconds, ignored if SPL 2 >= SPL 1.
4	Auto Page - Knob Push & Turn	0 - 1	1	disabled - enabled
5	Maximum Number of Pages	0 - 16	16	0 - 16 Pages, ignored if SPL 4 & 12 disabled.
6	Knob Push & Turn Page Roll	0 - 1	0	disabled - enabled, ignored if SPL 4 disabled.
7	Auto Level - Knob Turn	0 - 1	1	disabled - enabled
8	Auto Lock - Hardware	0 - 1	1	disabled - enabled
9	Baud Rate	0 - 4	2	0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 115200
10	RW 485 Transmit Delay (ms)	2 - 200	10	2 - 200 milliseconds
11	Knob Push & Turn Update on Release	0 – 1	1	disabled - enabled, ignored if SPL 4 disabled.
12	Auto Page - Knob Bump	0 – 1	0	disabled - enabled
13	Knob Bump Update Timer (sec)	0 – 5	3	0 - 5 seconds, ignored if SPL 12 disabled. Knob Push & Turn updates take priority over time out.
14	Auto Title Page	0 – 1	0	disabled - enabled
15	Title Page Timer (sec)	1-25	5	1 - 25 seconds, ignored if SPL 14 disabled.

Parameter Descriptions

1. Back light maximum brightness ranges from 1 through 255 and controls the maximum brightness of the LCD light.

2. Back light minimum brightness ranges from 1 through 255 and controls the minimum brightness of the LCD back light. If the minimum brightness is configured to a value greater than the maximum brightness, the back light timer is defeated and the brightness is set to the maximum value.

3. Back light timer configuration ranges from 1 through 255 which corresponds to a time interval of 0.1 through 25.5 seconds. The back light is illuminated to maximum brightness when the device is powered up or when the encoder is activated. The back light stays illuminated at the maximum brightness until the back light time has expired, then the back light fades to the minimum brightness.

4. Auto Page - Knob Push & Turn configuration affects the result of turning the encoder while it is pushed in. If this parameter is enabled (a value of 1), the next page bitmap is displayed based on the configuration of parameters 5 and 6. The page index is updated based on the configuration of parameter 11. The configuration of this parameter also affects the commands **PS**, **IS**, **ISR**, and **IF**. See **SR 3 Command Set** section for details of how these commands are affected.

5. Maximum Number of Pages configures the number of pages that can be accessed by the encoder (Knob Push & Turn and/or Knob Bump). This parameter is ignored if both parameters 4 and 12 are disabled. For example, if this value is 3, then only pages 1 through 3 will be selected by encoder action.

6. Knob Push & Turn Page Roll configures the action taken when the last page is displayed and the encoder is pushed an turned. This parameter is ignored if parameter 4 is disabled. For example, if this parameter is not ignored and enabled (a value of 1), parameter 5 is 16, and the device is currently displaying page 16, the operation of turning the encoder clockwise while it is pushed in will cause page 1 to be displayed, the page index is updated based on the configuration of parameter 11. If this parameter is disabled (a value of 0), then the operation of turning the encoder clockwise while it is pushed in will have no affect in the above example.

7. Auto Level configuration affects the result of turning the encoder. If this parameter is enabled (a value of 1), the level is updated and indicated by the LED as well. The Auto Level configuration also affects the commands **IS** and **ISR**. See **SR 3 Command Set** section for details of how these commands are affected.

8. Auto Lock configuration affects the operation of the device when the lock input is shorted to –V (hardware lock). If Auto Lock is enabled (a value of 1) and the Lock input is shorted to -V, encoder action is locked out regardless of the software lock status. If Auto Lock is disabled (a value of 0), the Lock input is ignored and the encoder's lock state is defined by the software lock status. The Auto Title Page and Rane splash screen features are not effected by a hardware lock. The Auto Title Page feature can defeated by disabling it (see parameter 14) or can be temporarily defeated by the software lock. The only way to defeat the Rane splash screen feature is by the software lock. See the **ILK** command in the **SR 3 Command Set** section for details.

9. This parameter sets the baud rate of the device. When this parameter is changed via a RW 485 message, the response is sent at the current baud rate, then the baud rate is updated to the new baud rate specified by the value sent. The default setting of 38400 is required for use with Rane controllers (i.e., RPM 88/44/22). It can be restored by holding the encoder in during power-up for several seconds until "COMM RESTORED" is displayed on the LCD.

10. This parameter sets the minimum time in milliseconds the remote waits after receiving a RW 485 message before it transmits a response. It is recommended that this value not be changed. The default setting can be restored by holding the encoder in during power-up for several seconds until "COMM RESTORED" is displayed on the LCD.

11. Knob Push & Turn Update on Release configures when the page index is updated after the encoder is pushed in and turned. This parameter is ignored if parameter 4 is disabled. For example, if this parameter is not ignored and enabled (a value of 1), the page index is updated to the last page displayed upon the release of the encoder. Otherwise, if this parameter is not ignored and disabled, the page index is immediately updated upon turning the encoder while it is pushed in.

12. Auto Page - Knob Bump configuration affects the result of pushing and releasing the encoder within 2 seconds. If this parameter is enabled (a value of 1), the next page bitmap is displayed based on the configuration of parameter 5. The page index is updated based on the configuration of parameter 13. The configuration of this parameter also affects the commands **PS**, **IS**, **ISR**, and **IF**. See **SR 3 Command Set** section for details of how these commands are affected.

13. Knob Bump Update Timer configures when the page index is updated after the encoder is pushed and released. This parameter is ignored if parameter 12 is disabled. For example, if this parameter is not ignored and set to 0, the page index is immediately updated for each bump. Another example, if this parameter is not ignored and set to 3 the page index is updated to the last page displayed after a 3 second time out. Each bump restarts the time out period. Page index updates based on parameter 4 and its associated parameters take priority over this timeout.

14. Auto Title Page configuration affects the display of Page 0, the user title page. If this parameter is enabled, (a value of 1), the page 0 image is automatically displayed after a timeout defined by parameter 15. This has no effect on the page index. Any encoder activity displays the current page and restarts the Title Page Timer.

15. Title Page Timer configures the time interval after encoder activity stops and the display of the title page. This parameter is ignored if parameter 14 is disabled.

Get LCD Image Example

This example first selects page 0 to display the target image to upload. The SR 3 limits its <**command/data**> size to 250 characters, so image data must be requested a line at a time. The Move Cursor and Hex Data Read commands are concatenated. The image data is represented in ASCII hex so there is a two character representation for each byte of data. The encoder is locked out before the data requests to prevent someone changing the display during an upload. See the **ILK** command in the **SR 3 Command Set** section for details. The encoder is then unlocked after the upload to restore normal encoder operation.

1. Temporarily lock the encoder.
Send: ILK,127
Response: "OK"

2. Select Page 0 to display target image.
Send: PS,0
Response: "OK"

3. Get line 0 image data
Send: MC,0,0,XDR,98
Response: xxxxxx…,"OK"

4. Repeat for lines 1-7
Send: MC,0,1,XDR,98
Response: xxxxxx…,"OK"

Send: MC,0,2,XDR,98
Response: xxxxxx…,"OK"

Send: MC,0,3,XDR,98
Response: xxxxxx…,"OK"

Send: MC,0,4,XDR,98
Response: xxxxxx…,"OK"

Send: MC,0,5,XDR,98
Response: xxxxxx…,"OK"

Send: MC,0,6,XDR,98
Response: xxxxxx…,"OK"

Send: MC,0,7,XDR,98
Response: xxxxxx…,"OK"

5. Unlock the encoder.
Send: ILK,0
Response: "OK"

Send LCD Image Example

The SR 3 limits its <**command/data**> size to 250 characters, so image data must be sent a line at a time. The Move Cursor and Hex Data Send commands are concatenated. The image data is represented in ASCII hex so there is a two character representation for each byte of data. This example writes the image to page 0 after the download. The encoder is locked out before data transmissions to prevent someone changing the display during a download. See the **ILK** command in the **SR 3 Command Set** section for details. The encoder is then unlocked after the download/page write to restore normal encoder operation.

1. Temporarily lock the encoder.
Send: ILK,127
Response: "OK"

2. Send line 0 image data
Send: MC,0,0,XDS,98,xxxxxxxx…
Response: "OK"

3. Repeat for lines 1-7
Send: MC,0,1,XDS,98,xxxxxxxx…
Response: "OK"

Send: MC,0,2,XDS,98,xxxxxxxx…
Response: "OK"

Send: MC,0,3,XDS,98,xxxxxxxx…
Response: "OK"

Send: MC,0,4,XDS,98,xxxxxxxx…
Response: "OK"

Send: MC,0,5,XDS,98,xxxxxxxx…
Response: "OK"

Send: MC,0,6,XDS,98,xxxxxxxx…
Response: "OK"

Send: MC,0,7,XDS,98,xxxxxxxx…
Response: "OK"

4. Write image to page 0
Send: PW,0
Response: "OK"

5. Unlock the encoder.
Send: ILK,0
Response: "OK"

Appendix A - SR 3 LCD Format

The SR 3 display is a 98 by 64 pixel LCD. The display is divided into 98 columns by 8 lines of bytes. The cursor X-position is in the range [0,97] and the Y-position is in the range of [0,7] which is denoted below. The byte format is MSB = top, 1 = black, 0 = gray. For example, the byte at cursor position (0,0) is $55 = 01010101, see the figure below.
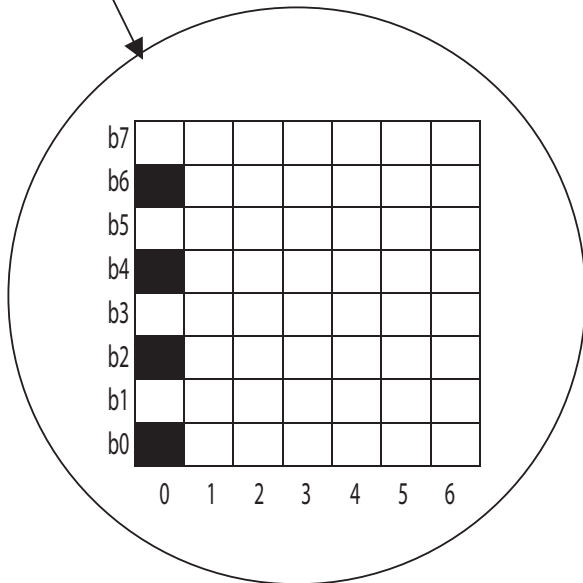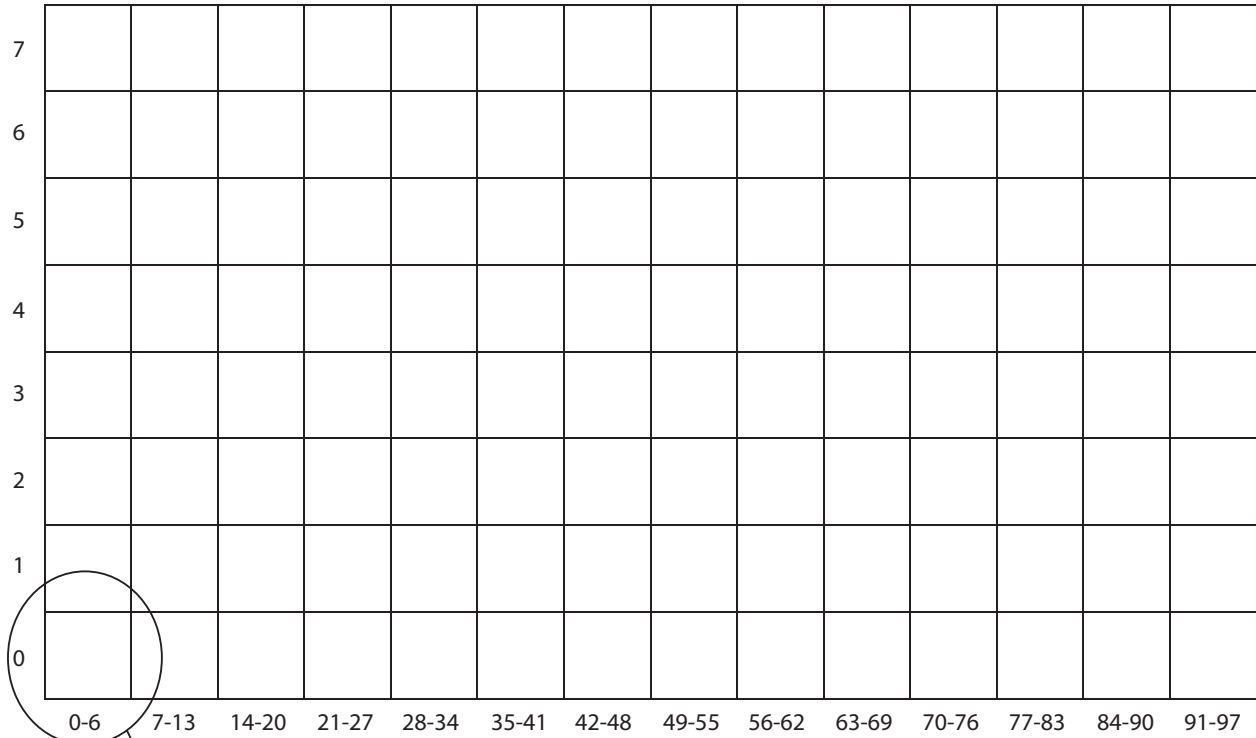
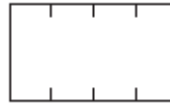# Appendix B - Room Combining Images

Image 18 - 2 Individual Rooms

Image 19 - 2 Rooms Combined

Image 20 - 3 Individual Rooms

Image 21 - 3 Rooms; Rooms 1,2 combined

Image 22 - 3 Rooms; Rooms 2,3 combined

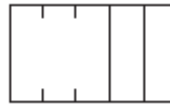Image 23 - 3 Rooms; All combined

Image 24 - 4 Individual Rooms

Image 25 - 4 Rooms; Rooms 1,2 combined

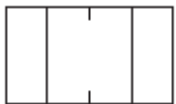Image 26 - 4 Rooms; Rooms 2,3 combined

Image 27 - 4 Rooms; Rooms 3,4 combined

Image 28 - 4 Rooms; Rooms 1,2,3 combined

Image 29 - 4 Rooms; Rooms 2,3,4 combined

Image 30 - 4 Rooms; All combined

Image 31 - 5 Individual Rooms

Image 32 - 5 Rooms; Rooms 1,2 combined

Image 33 - 5 Rooms; Rooms 2,3 combined

Image 34 - 5 Rooms; Rooms 3,4 combined

Image 35 - 5 Rooms; Rooms 4,5 combined

Image 36 - 5 Rooms; Rooms 1,2,3 combined

Image 37 - 5 Rooms; Rooms 2,3,4 combined

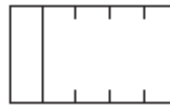Image 38 - 5 Rooms; Rooms 3,4,5 combined

Image 39 - 5 Rooms; Rooms 1,2,3,4 combined

Image 40 - 5 Rooms; Rooms 2,3,4,5 combined

Image 41 - 5 Rooms; All combined