

# Communicating with RW 232 Products

## Overview

Rane's RW 232 products use an addressable RS-232 protocol. This allows multiple RW 232 products to operate from one serial connection. *When communicating with an RW 232 product, it is best to use a first-in first-out queue.* A queue allows multiple commands to be sent to a device without overrunning the input buffer of that device.

To address an RW 232 product the control device must first send out the address header. When an RW 232 product receives its address, it responds with its Device Type (DT) and Manufacture's ID (ID). The device then waits for an RW 232 command. Some RW 232 commands are broadcast commands which cause all connected RW 232 products to act. Broadcast commands, such as Memory Recall, Mute and Unmute, are performed by setting the address set to 0. Devices do not reply after receiving a broadcast command. For more information review the Raneware Operators Manual for you device.

## RW 232 Rules

1. When the value \$FB occurs anywhere except in an Address Header, it is repeated.
2. The data size is the number of bytes starting at the command code and ending at the checksum without counting the \$FB repetition.
3. The checksum applies to all bytes except the \$FB repetition starting at the data size and ending at the byte immediately before the checksum. The checksum is the two's complement negative of the LS byte of the arithmetic sum. Another method to calculate the checksum is  $(256 - \text{SUM}) \& \$\text{FF}$ .

## ECB 62 Port Input Select

The following tables exhibit the input configuration and its settings for each Port:

Port 1 Output Settings

Input	Description	Setting
1	Port 2	\$01
2	Port 3	\$02
3	Port 4	\$04
4	Port 5	\$08
5	Port 6	\$10

Port 2 Output Settings

Input	Description	Setting
1	Port 1	\$01
2	Port 3	\$02
3	Port 4	\$04
4	Port 5	\$08
5	Port 6	\$10

Port 3 Output Settings

Input	Description	Setting
1	Port 1	\$01
2	Port 2	\$02
3	Port 4	\$04
4	Port 5	\$08
5	Port 6	\$10

Port 4 Output Settings

Input	Description	Setting
1	Port 1	\$01
2	Port 2	\$02
3	Port 3	\$04
4	Port 5	\$08
5	Port 6	\$10

Port 5 Output Settings

Input	Description	Setting
1	Port 1	\$01
2	Port 2	\$02
3	Port 3	\$04
4	Port 4	\$08
5	Port 6	\$10
6	Port 5	\$20

Port 6 Output Settings

Input	Description	Setting
1	Port 1	\$01
2	Port 2	\$02
3	Port 3	\$04
4	Port 4	\$08
5	Port 5	\$10

**Fig. 1 Port Input Selects**

## Communicating with RW 232 Products

### Send Data to Channel (\$81)

This command allows you to send a command to the device using the Stored Parameter List (SPL).

#### Examples

In these examples the ECB 62 RW 232 Address is 2.

NOB - Number of Bytes to follow (Data Size, 2 byte message)

CM - Command \$81 = Send Data to Channel

CN - Channel Number (Don't Care for Command \$81)

MN - Memory Number (Always 0 for Command \$81)

SPL - SPL Index (2 byte message)

VAL - Value

CS - Checksum

#### Set Program Output Attenuation to 3 dB

(See dB Conversion Chart for Attenuators in the ECS RaneWare Manual)

CS = (\$100 - (\$07 + \$81 + \$19 + \$06)) & \$FF

CS = \$59

Address Header - \$FB/\$02/\$FB/\$02

**ëRW Address ù**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$19/\$06/\$59

**ëNOB ùCMùCN MNùSPL ùVALùCS**

#### Mix inputs to Outputs

Each Port output has five inputs that can be summed together. Note: Port 5 allows all inputs to be summed together. Setting a port is a Bitwise function where Input 1 is Bit 0, Input 2 is Bit 1,...and Input 5 is Bit 4 (See Fig. 1). To sum an input with a previous input setting is achieved by using a Bitwise OR function. For example: To sum Port 5's input with other ports already set to Port 1's output ( Port1 = Port1 OR \$08). To remove an input from other inputs that are summed to an output port is achieved by using the Bitwise AND function with the inverted Bits of the Port you want to remove. For example, to remove Port 5 from Port 1's output without removing any other inputs already set to Port 1 use the following: (Port1 = Port1 AND ~\$08)

#### Add input Port 4 to output Port 1

Input Port 2 is already connected to output Port 1 (Port 1 Input Select = \$01).

Port1 = Port 1 | \$04

Port1 = \$05

CS = (\$100 - (\$07 + \$81 + \$13 + \$05)) & \$FF

CS = \$60

Address Header - \$FB/\$02/\$FB/\$02

**ëRW Address ù**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

RW232 Command - \$00/\$07/\$81/\$00/\$00/\$00/\$13/\$05/\$60

**ëNOB ùCMùCN MNùSPL ùVALùCS**

## Communicating with RW 232 Products

### Remove Port 4 from Port 1 leaving Port 2 connected to Port 1

Port1 = Port 1 & ~\$04

(Port1 = \$01)

CS = (\$100 - (\$07 + \$81 + \$13 + \$01)) & \$FF

CS = \$64

Address Header - \$FB/\$02/\$FB/\$02

**ëRW Address ù**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

RW232 Command - \$00/\$07/\$81/\$00/\$00/\$00/\$13/\$01/\$64

**ëNOB ùCMùCN MNùSPL ùVALùCS**

### Program channel from memory (or Recall a Memory) (\$82)

Each RW232 product operates with 16 memories plus a working memory. Working memory consist of the parameters the unit is currently using. When the device is powered-up it initiates itself with working memory. When this command is sent all parameters stored within the chosen memory are placed within the working memory.

*Another method of selecting port routes is by the use of a special memory recall that only affects the port settings and none of their levels. This feature allows you to program the memories of the ECB 62 with the functions that are required for the routes. Port settings are indicated by the \* in the ECB 62 Stored Parameter List. Only these settings are changed during a Port Setting Memory Recall. To perform this type of memory recall set the CN (CHNUM) to \$01 in the Program Channel From Memory Command.*

The ECB 62 has three methods to recall a memory by the value of CN:

- Recall all stored parameters (CN = 0)
- Recall only the Port settings (CN = 1)
- Recall only the Mic settings (CN = 2)

### Recall all parameters of a memory

NOB – Number of bytes to follow (Data Size, 2 byte message)

CM - Command \$82 = Program channel from memory (Recall Memory)

CN - Channel Number (\$00 - recall all, \$01 - recall ports settings, \$02 - recall mic settings)

MN - Memory Number

CS - Checksum

### Recall Memory 2

CN = 0 (recall all)

CS = (\$100 - (\$04 + \$82 + \$02)) & \$FF

CS = \$78

Address Header - \$FB/\$02/\$FB/\$02

**ëRW Address ù**

Wait for two byte response before sending command.

Byte 1 2 3 4

RW232 Command - \$00/\$04/\$82/\$00/\$02/\$78

**ëNOB ùCMùCN MNùCS**

## Communicating with RW 232 Products

### Recall Memory 2 Port settings only

CN = 1 (recall port settings)

CS = (\$100 - (\$04 + \$82 + \$01 + \$02)) & \$FF

CS = \$77

Address Header - \$FB/\$02/\$FB/\$02

**ēRW Address ũ**

Wait for two byte response before sending command.

Byte 1 2 3 4

RW232 Command - \$00/\$04/\$82/\$01/\$02/\$77

**ēNOB ũECMũCN MNũCS**

### Recall Memory 2 Mic settings only

CN = 2 (recall Mic settings)

CS = (\$100 - (\$04 + \$82 + \$02 + \$02)) & \$FF

CS = \$76

Address Header - \$FB/\$02/\$FB/\$02

**ēRW Address ũ**

Wait for two byte response before sending command.

Byte 1 2 3 4

RW232 Command - \$00/\$04/\$82/\$02/\$02/\$76

**ēNOB ũECMũCN MNũCS**

### Send Data to Channel (\$81)

This command allows you to send a command to the device using the Stored Parameter List (SPL).

### Examples

In these examples the ECB 62 RW 232 Address is 2.

NOB - Number of Bytes to follow (Data Size, 2 byte message)

CM - Command \$81 = Send Data to Channel

CN - Channel Number (Don't Care for Command \$81)

MN - Memory Number (Always 0 for Command \$81)

SPL - SPL Index (2 byte message)

VAL - Value

CS - Checksum

## Communicating with RW 232 Products

### Turn on or off Port 1's input (Mutes Mics)

(See page 22 in the ECS RaneWare Manual)

Turn on:

CS = (\$100 - (\$07 + \$81 + \$12 + \$01)) & \$FF

CS = \$65

Using the windows calculator in hex mode:

Use only the first two digits on the right.

CS = (\$07 + \$81 + \$12 + \$01) +/- key

Address Header - \$FB/\$02/\$FB/\$02

**ēRW Address ũ**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$12/\$01/\$65

**ēNOB ēCMēCN MNē SPL ēVALēCS**

Turn off:

CS = (\$100 - (\$07 + \$81 + \$12 + \$00)) & \$FF

CS = \$66

Using the windows calculator in hex mode:

Use only the first two digits on the right.

CS = (\$07 + \$81 + \$12) +/- key

Address Header - \$FB/\$02/\$FB/\$02

**ēRW Address ũ**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$12/\$00/\$66

**ēNOB ēCMēCN MNē SPL ēVALēCS**

### Turn on or off Port 2's input

Turn on:

CS = (\$07 + \$81 + \$1A + \$01) +/- key

CS = 5D

Address Header - \$FB/\$02/\$FB/\$02

**ēRW Address ũ**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$1A/\$01/\$5D

**ēNOB ēCMēCN MNē SPL ēVALēCS**

Turn off:

CS = (\$07 + \$81 + \$1A + \$00) +/- key

CS = 5E

Address Header - \$FB/\$02/\$FB/\$02

**ēRW Address ũ**

Wait for two byte response before sending command.

Byte 1 2 3 4 5 6 7

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$1A/\$00/\$5E

**ēNOB ēCMēCN MNē SPL ēVALēCS**

### Turn on or off Port 3's input

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$22/\$01/\$55

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$22/\$00/\$56

## Communicating with RW 232 Products

### Turn on or off Port 4's input

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$2A/\$01/\$4D

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$2A/\$00/\$4E

### Turn on or off Port 5's input

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$32/\$01/\$45

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$32/\$00/\$46

### Turn on or off Port 6's input

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$3A/\$01/\$3D

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$3A/\$00/\$3E

### Turn on or off Port 1's output

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$18/\$01/\$5F

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$18/\$00/\$60

### Turn on or off Port 2's output

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$20/\$01/\$57

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$20/\$00/\$58

### Turn on or off Port 3's output

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$28/\$01/\$4F

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$28/\$00/\$50

### Turn on or off Port 4's output

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$30/\$01/\$47

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$30/\$00/\$48

### Turn on or off Port 5's output

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$38/\$01/\$3F

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$38/\$00/\$40

### Turn on or off Port 6's output

Turn on:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$40/\$01/\$37

Turn off:

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$40/\$00/\$38

## Communicating with RW 232 Products

### SPL Offsets for the RPM 26V

The following chart is used to create the SPL index for a DSP program and its output:

Trim Parameter Indexes for RPM26 Programs

rpmtrim.xls

PGM:	Output1	Output2	Output3	Output4	Output5	Output6
1	\$89 137	\$C1 193				
2	\$8F 143	\$C7 199	\$FE 255			
3	\$6D 109	\$87 135	\$AB 171	\$CF 207	\$F3 243	\$10D 269
4	\$6F 111	\$8E 142	\$A8 168	\$C7 199	\$E6 230	\$FF 256
5	\$A1 161	\$B6 182	\$CB 203	\$E0 224	\$F5 245	\$10A 266
6	\$6A 106	\$85 133	\$A0 160	\$BB 187	\$D6 214	\$F1 241
7	\$B0 176	\$D9 217			\$102 258	\$12B 299
8	\$6C 108	\$8B 139	\$A5 165	\$C4 196	\$E3 227	\$FD 253
9	\$B3 179	\$DC 220			\$105 261	\$12E 302
10	\$A1 161	\$BB 187	\$D5 213	\$EF 239	\$109 265	\$123 291
11	\$4B 75	\$74 116	\$9D 157	\$C6 198	\$EF 239	\$118 280
12	\$4C 76	\$6B 107	\$8A 138	\$A9 169	\$C8 200	\$E7 231
13	\$65 101	\$E3 127	\$99 153	\$B3 179	\$CD 205	\$E7 231
14	\$E2 226	\$ED 237	\$F8 248	\$103 259	\$10E 270	\$119 281

Trim Parameters Bytes:

link            link group or 0 for no linking            (use the index given above)  
level           0 = 0dB, FF = -0.5dB, FE = -1dB, etc            (add 1 to index)  
mute            1 = muted            (add 2 to index)  
invert           1 = inverted            (add 3 to index)

### Mute Output 1 using DSP Program 12

CS = (\$07 + \$81 + \$89 + \$01) +/- key

CS = EE

Address Header - \$FB/\$02/\$FB/\$02

**RW Address**

Wait for two byte response before sending command.

Byte    1   2   3   4   5   6   7

Command - \$00/\$07/\$81/\$00/\$00/\$00/\$89/\$01/\$EE

**NOB ECM CN MNE SPL EVALCS**

Mike Slattery

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RW232.doc