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# Yamaha RCX Series Master Driver

## Information Sheet for Crimson v2.0+

### Compatible Devices

Yamaha RCX Series

Note: Ethernet driver requires RCX Ethernet interface.

### Verified Device

Yamaha RCX144

### Accessing Data

NOTE: It is the programmers responsibility to protect data so that only valid values are sent to the RCX controller. In the event the RCX controller responds with an error, the error will be stored in the Latest Error Message data item provided in the driver.

The Latest Error Message is designed to be mapped to a string tag with the Packed High-to-Low encoding. The error message received from the controller will be displayed followed by the command request which caused the error condition.

Access to the parameters in the following table is provided for read/write operations.

Prefix	Description	Data Type	Range
DI	Parallel Inputs	Byte	0 – 177 (Octal)
DO	Parallel Outputs	Byte	0 – 127 (Octal)
MO	Internal Auxiliary Outputs	Byte	0 – 27 (Octal)
TO	Timer Outputs	Byte	1 Byte
LO	Arm Lock Outputs	Byte	1 Byte
SI	Serial Inputs	Byte	0 – 27 (Octal)
SO	Serial Outputs	Byte	0 – 27 (Octal)
SIW	Serial Word Input	Word	2 - 15
SOW	Serial Word Output	Word	2 - 15
SGI	SG Integer Variables	Long	0 - 7
SGR	SG Real Variables	Real	0 - 7
MSPEED	Manual Speed	Byte	1 - 100
ASPEED	Automatic Speed	Byte	1 - 100

The commands noted in the following table only allow write access. The write command is executed when the command bit is set. The command bit will need to be cleared before the system will see the next set of the bit. When using a Push Button operation, the Momentary setting should be used.

Prefix	Description	Notes
AUTO	Set AUTO Mode	
PROG	Set PROGRAM Mode	
MAN	Set MANUAL Mode	
SYS	Set SYSTEM Mode	
RESET	Reset Program	
RUN	Execute Program	
STEP	Execute Single Program Line	
SKIP	Skip Single Program Line	
NEXT	Execute to Next Program Line	
STOP	Stop Program	
EMGRST	Reset Emergency Stop Flag	
CHGTSK	Switch Execution Task	
ABSADJ	Move to Abs Reset Position	Axis, robot and direction must be specified.*
ABSRST	Absolute Reset	Axis and robot must be specified.*
ORGRTN	Return to Origin	Axis and robot must be specified.*
INCH	Manual Inching	Axis and direction must be specified.
JOG***	Manual Jog	Axis and direction must be specified.*
DATE	Sync Date	Writes current Red Lion date to the RCX.
TIME	Sync Time	Writes current Red Lion time to the RCX.

\*Communications may be suspended until this operation is completed.

\*\*\* It is extremely important to use the CTRLC command OnReleased action on a User Defined button action to prevent a "runaway" robot when using the JOG command. Favor UI Writes in Crimson's Device Settings should also be set.

The registers detailed below also allow write only access. Please review the applicable notes for each register.

Prefix	Description	Notes
UNIT	Set Coordinates and Units	0 = pulses, 1 = mm, 2 = mm or degrees
ACCESS	Set Access Level	0 - 3
EXELVL	Set Execution Level	0 - 8
SEQUENCE	Set Sequence Prog Exe. Flag	0 = disable, 1 = enable, 3 = enable(DO reset)
TEACH	Point Data Teaching	0 - 9999

The registers in the following table provide read only access. Please map to tags of the specified type for proper access.

Prefix	Description	Tag Type
WHERE	Current Position (pulse units)	Integer Tag
WHRXY	Current Position (XY cords)	Real Tag
LANGS	Display Language	String Tag
ACCESSL	Access Level	String Tag
ARM	Arm Status	String Tag
BREAKS	Break Point Status	String Tag
CONFIG	Configuration Status	String Tag
EXELVLL	Execution Level	String Tag
MODE	Mode Status	String Tag
ORIGIN	Return-To-Origin Status	String Tag

Prefix	Description	Tag Type
ABSRSTS	Absolute Reset Status	String Tag
SERVO	Servo Status	String Tag
SEQS	Sequence program Execution Status	String Tag
SPEED	Speed Status	String Tag
UNITS	Coordinates and Units	String Tag
VER	Version Info	String Tag
TASKS	Tasks in RUN or SUSPEND Status	String Tag
SHIFT	Shift Status	String Tag
HAND	Hand Status	String Tag
MEM	Remaining Memory Capacity	String Tag
PADDR	Program Execution Status	String Tag
EMG	Emergency Stop Status	Integer Tag

Break Point operation is performed with the use of the Break Point Number (BRKPT) and the Break Line Number (BRKLN) variables provided. Once these variables are set to the desired values, the Set Break Point command can be sent to the controller by setting the Set Break Point (BREAK) bit. Please note, this bit will need to be cleared before the system will send another break point set.

Program Switching (SWI) has also included by setting the mapped string tag to the new program name.

User Command (USER) and User Response (RESP) has been provided so that any command can be constructed and sent to the controller as well as capturing the controllers response. It is recommended that string tags are used to perform these operations.

New Data Access for Driver Version 1.02+ :

Prefix	Description	Access	Type	Data Definition
SERVO	Servo Command	Write Only	Integer	** 1 = ON, 2 = OFF, 3 = FREE
MOVE	Abs Move Cmd	Write Only	Integer	Point Table Index
DRIVEI	Robot Rel. Move	Write Only	Real	Drive Distance mm only
PMOVE	Pallet Movement	Write Only	Integer	Pallet Position

\*\* Command will only be sent when a non-zero change in value is detected.

New Data Access for Driver Version 1.03+ :

Prefix	Description	Access	Type	Data Definition
Pn	Cur Point Table Pos	Read Only	Real	
PnSet	Set Point Table Pos	Write Only	Real	
PnHStat	Point Table Hand Stat	Read Only	Integer	
PnHSet	Point Table Hand Set	Write Only	Integer	
PnCmd	Send Pn Cmd	Write Only	Flag	** Send PnSet and PnHSet Values.
CTRLC	Exe. Language Int.	Write Only	Flag	***

\*\* Command will only be sent when a non-zero change in value is detected.

\*\*\* It is extremely important to use the CTRLC command OnReleased action on a User Defined button action to prevent a "runaway" robot when using the JOG command. Favor UI Writes in Crimson's Device Settings should also be set.

## New Data Access for Driver Version 1.04+ :

Prefix	Description	Access	Type	Data Definition
SERVOC_A	Servo Command All Axis	Write Only	Integer	** 1 = ON, 2 = OFF, 3 = FREE
ABSRST_A	Absolute Reset All Axis	Write Only	Flag	*

\* Communications may be suspended until this operation is completed.

\*\* Command will only be sent when a non-zero change in value is detected.

## New Data Access for Driver Version 1.05+ :

Prefix	Description	Access	Type	Data Definition
LOGON	Login to Server	Read/Write	Flag	* Ethernet driver only
LOGOFF	Logoff of Server	Write Only	Flag	Ethernet driver only

\* Automatically logs on at power up.

## Ethernet Specific Notes:

For more efficient communications, it is recommended to change the RCX port to a non-Telnet port. The RCX Ethernet Echo should be set to "Invalid". The Crimson default user credentials is User Name: USER, Password: PASSWORD. When using commands ABSADJ, ABSRESET, ORGRTN or JOG, please ensure that the Ethernet Connection and Transaction Timeouts are set to a value of at least 1/10th of the duration of the command.

## Cable Information

### Serial:

G3 RS232 Port	RCX RS-232 Port
2 - RX	3
3 - COMM	5
4 - COMM	5
5 - TX	2

\* Please note pins 7 & 8 on the RCX side should be connected.

## Ethernet: Standard 10-Base-T Ethernet Cable

## Revision History

- 01/13/10- Created
- 06/08/10- Increased DI and DO ranges.
- 06/08/10- Added read access to MSPEED commands.
- 06/08/10- Added ASPEED commands.
- 06/08/10- Added New Data Access for driver version 1.02+
- 06/15/10— Updated New Data Access area.
- 07/12/10- Added New Data Access for driver version 1.03+
- 07/12/10- Added CTRLC notes.
- 07/22/10- Updated CTRLC notes.
- 07/29/10- Updated New Data Access for driver version 1.04+
- 09/17/10- Revised DRIVEI notes.
- 09/17/10- Added New Data Access for driver version 1.05+