

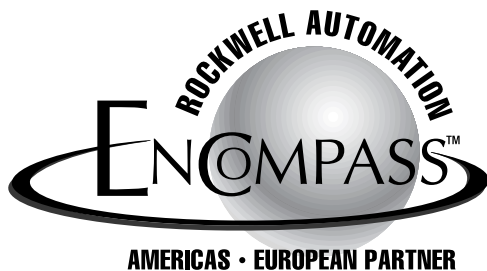
# KM-RIO Installation and Operation Manual

## CAUTION

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It is essential that all instructions in this manual be followed precisely to ensure proper operation of the equipment.

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# NOTICE

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This manual reflects KM-RIO software revision 'B.'  
If you have a previous revision(s), contact Kistler-Morse.

# ***Revision Description***

Following is a description of the major differences between Revision New and Revision A of this manual:

- References to the SVS 2000, which can now interface with the KM-RIO, were added to the manual.

Following is a description of the major differences between Revision A and Revision B of this manual:

Updated KM logo.

Following is a description of the major differences between Revision B and Revision C of this manual:

Updated to add *ultra-wave*<sup>™</sup> Ultrasonic Level System.



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# Chapter 1. Introduction

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## Introduction

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This manual covers the setup and program commands for interfacing Kistler-Morse's KM-RIO with Allen-Bradley's PLC network. The KM-RIO is a stand-alone product that transmits serial communications from the following Kistler-Morse (K-M) signal processors to Allen-Bradley's PLC network:

- STX Signal Transmitter
- Sonologic 5000 Sonologic Level Indicator
- Sonologic 5100 Sonologic Dual Level Indicator
- ITU Sonologic Intelligent Transceiver Unit
- SSU Sonologic Sensor Switching Unit (eight channel)
- 1000/1020 Weight Indicator
- Sonologic II® & ultra-wave™ Ultrasonic Signal Processors
- Weigh II Weight Indicator
- SVS 2000™ Weight Indicator

Installation, setup, and calibration of the signal processors and the sensors should be done before using this manual to set up the KM-RIO to interface with the PLC. Refer to the appropriate signal processor and sensor manuals.

### Note

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The KM-RIO cannot communicate serially with K-M's Multi-Vessel System™ (MVS).

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## KM-RIO

The KM-RIO was developed by K-M to provide an interface between K-M level and weight measurement systems and the Allen-Bradley (A-B) Remote I/O (RIO) network.

### Notes

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1. Rev. B of the KM-RIO supports all the above listed signal processors.
  2. This manual covers only the KM-RIO. K-M also produces the MVS-RIO, an A-B interface which installs into a card slot in an MVS. Contact K-M for more information on the MVS-RIO.
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Once interfaced in the A-B network, a programmer can use an A-B PLC and ladder

logic programming language to read and write data to and from signal processors that are serially connected to the KM-RIO. The KM-RIO can be programmed using block or discrete transfer of data. Selection between block and discrete transfer is made by jumper placement on the KM-RIO PCB.

The KM-RIO PCB plugs into a motherboard, where parameters such as rack address, data rate, starting quarter, rack size, and last rack are set with dipswitches. The KM-RIO operates on 110 volt or 220 volt AC power that is set at the factory.

There are three versions of the KM-RIO, with different capacities:

1. **KM1-RIO** interfaces with only one channel in one K-M signal processor. It requires  $\frac{1}{4}$  rack space in the A-B PLC for discrete or block transfer.
2. **KMM-RIO-1**
  - Block transfer — KMM-RIO-1 interfaces with up to a total of 32 channels from one or several K-M signal processors. It requires  $\frac{1}{4}$  rack space in the A-B PLC.
  - Discrete transfer — KMM-RIO-1 interfaces with up to a total of six channels from one or several K-M signal processors. It requires up to one full rack space in the A-B PLC.
3. **KMM-RIO-2**
  - Block transfer — KMM-RIO-2 interfaces with up to a total of 64 channels from one or several K-M signal processors. It requires  $\frac{1}{2}$  rack space in the A-B PLC.
  - Discrete transfer — KMM-RIO-2 interfaces with up to a total of 12 channels from one or several K-M signal processors. It requires up to two full rack spaces in the A-B PLC.

Figure 1-1 illustrates the discrete transfer rack space requirements.

Refer to Chapter 2, Hardware Setup, for KM-RIO hardware installation and setup procedures. Refer to Chapter 3, PLC Programming, for general programming instructions. Chapters 4 through 9 contain the programming instructions for each of the K-M signal processors supported by the KM-RIO.

# Manual Conventions

Three kinds of special explanations appear throughout the manual — **WARNING**, **CAUTION**, and *Note*. The format and significance of each is defined below:

## WARNING

**Possible danger to people. Injury may result if this information is ignored.**

## CAUTION

Possible risk to the product. The signal processor or other equipment may be damaged if this information is ignored.

## Note

Contains additional information about a step or feature critical to the installation or operation of the signal processor.

Maximum KM-RIO Channels Available and Required Rack Space			Illustration for KMM-RIO-1	
KM1-RIO	KMM-RIO-1	KMM-RIO-2		
1 channel 1/4 rack	1 channel 1/4 rack	—	17 0	Bit (octal) Word 0 Word 1
—	3 channels 1/2 rack	6 channels 1 rack	17 0	Bit (octal) Word 0 Word 1 Word 2 Word 3
—	4 channels 3/4 rack	8 channels 1 3/4 racks <sup>1</sup>	17 0	Bit (octal) Word 0 Word 1 Word 2 Word 3 Word 4 Word 5
—	6 channels 1 rack	12 channels 2 racks	17 0	Bit (octal) Word 0 Word 1 Word 2 Word 3 Word 4 Word 5 Word 6 Word 7

<sup>1</sup> Note: 3/4 rack each on selected rack and adjacent rack

Figure 1-1. KM-RIO Discrete Transfer Rack Space Requirements

# Chapter 2. Hardware Setup

## Introduction

This chapter describes how to set up the KM-RIO hardware to communicate with the A-B network and with K-M signal processors.

## Cable Connections

Refer to TI-MP.KMRIO-01 in Appendix B, Technical Drawings, to connect cables to the motherboard:

- Connect the AC power cable to TB1.
- Connect the cable from the slave signal processor(s) to TB2.
- Connect the A-B 'Blue Hose' from the PLC to TB3.

## Interface with A-B Remote I/O

This section describes how to set the dipswitches and jumper on the KM-RIO motherboard to interface with the A-B network. All of the serial communications settings must match for the KM-RIO to communicate with the A-B PLC. Refer to TI-MP.KMRIO-01 in Appendix B, Technical Drawings, to locate the dipswitches and jumper.

### Dipswitch S1

Dipswitch S1 on the KM-RIO motherboard sets the data rate, starting quarter, and rack size, and indicates whether the KM-RIO is the last rack. Use Table 2-1 to set the switches in S1 to match the operating parameters of your PLC.

### Jumper Placement on J3 Termination Resistor

If the KM-RIO is the last device in the RIO network, a termination resistor must be used. Jumper placement on the J3 connector on the KM-RIO motherboard determines termination resistance. Use Table 2-2 to set the jumper to provide the appropriate resistance.

Pos 2 B	Pos 1 A	Data Rate	
0	0	57.6K bits/sec	
0	1	115.2K bits/sec	
1	0	230.4K bits/sec	
1	1	230.4K bits/sec	
Pos 4 B	Pos 3 A	Starting Quarter	
0	0	First	
0	1	Second	
1	0	Third	
1	1	Fourth	
Pos 6 B	Pos 5 A	Rack Size <sup>1</sup>	
		KMM-RIO-1	KMM-RIO-2
0	0	1/4	—
0	1	1/2	1
1	0	3/4	1 <sup>3</sup> / <sub>4</sub>
1	1	1	2
Pos 8	Pos 7	Last Rack?	
N/U	0	No	
N/U	1	Yes	

Notes:

1. KM1-RIO always requires 1/4 rack.
2. Legend: 0=Off, 1=On, N/U=Not used

Table 2-1. S1 Dipswitch Settings





J3 Termination Resistor Jumper	
	No Termination
	150 ohms— 57.6K and 115.2K Baud Rate
	82 ohms— 230.4K Baud Rate
LEGEND:  =Jumper Placement	

Table 2-2. J3 Termination Resistor Jumper Placement

Rack	S2 Switch Settings					
	6	5	4	3	2	1
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
4	0	0	0	1	0	0
5	0	0	0	1	0	1
6	0	0	0	1	1	0
7	0	0	0	1	1	1
10	0	0	1	0	0	0
11	0	0	1	0	0	1
12	0	0	1	0	1	0
13	0	0	1	0	1	1
14	0	0	1	1	0	0
15	0	0	1	1	0	1
16	0	0	1	1	1	0
17	0	0	1	1	1	1
20	0	1	0	0	0	0
21	0	1	0	0	0	1
22	0	1	0	0	1	0
23	0	1	0	0	1	1
24	0	1	0	1	0	0
25	0	1	0	1	0	1
26	0	1	0	1	1	0
27	0	1	0	1	1	1
30	0	1	1	0	0	0
31	0	1	1	0	0	1
32	0	1	1	0	1	0
33	0	1	1	0	1	1
34	0	1	1	1	0	0
35	0	1	1	1	0	1
36	0	1	1	1	1	0
37	0	1	1	1	1	1

Rack	S2 Switch Positions					
	6	5	4	3	2	1
40	1	0	0	0	0	0
41	1	0	0	0	0	1
42	1	0	0	0	1	0
43	1	0	0	0	1	1
44	1	0	0	1	0	0
45	1	0	0	1	0	1
46	1	0	0	1	1	0
47	1	0	0	1	1	1
50	1	0	1	0	0	0
51	1	0	1	0	0	1
52	1	0	1	0	1	0
53	1	0	1	0	1	1
54	1	0	1	1	0	0
55	1	0	1	1	0	1
56	1	0	1	1	1	0
57	1	0	1	1	1	1
60	1	1	0	0	0	0
61	1	1	0	0	0	1
62	1	1	0	0	1	0
63	1	1	0	0	1	1
64	1	1	0	1	0	0
65	1	1	0	1	0	1
66	1	1	0	1	1	0
67	1	1	0	1	1	1
70	1	1	1	0	0	0
71	1	1	1	0	0	1
72	1	1	1	0	1	0
73	1	1	1	0	1	1
74	1	1	1	1	0	0
75	1	1	1	1	0	1
76	1	1	1	1	1	0

LEGEND: 0=Off, 1=On

Note: Refer to A-B documentation for the processor or communication module used for the maximum number of logical racks that can be assigned.

Table 2-3. S2 Dipswitch Settings for KM-RIO Rack Address

## Dipswitch S2: 1–6

Dipswitch S2 1–6 on the KM-RIO motherboard sets the rack address of the KM-RIO in the A-B data network. Use Table 2-3 to set the switch positions of 1-6 to a rack address compatible with your PLC.

### Note

The function of switch positions 7 and 8 is described in this chapter in *Interface with K-M Signal Processors*.

## Selection of Discrete or Block Transfer

Refer to TI-MP.KMRIO-01 in Appendix B, Technical Drawings. The J2 jumper on the KM-RIO PCB sets the KM-RIO for Discrete or Block Transfer programming:

- For Discrete Transfer, place the J2 jumper on pins 1 and 2.
- For Block Transfer, place the J2 jumper on pins 2 and 3.

## Interface with K-M Signal Processors

This section describes how to set the dipswitches on the KM-RIO motherboard to interface with K-M signal processors. All serial communications settings must match for the KM-RIO to communicate with the K-M signal processors. Refer to TI-MP.KMRIO-01 in Appendix B, Technical Drawings, to locate the dipswitches.

## Dipswitch S2: 7-8

### Note

The function of pins 1 through 6 is described in the previous section in *Interface with A-B Remote I/O*.

This dipswitch on the KM-RIO motherboard sets the KM-RIO for RS-422 or RS-485 serial communications. For K-M signal processors, set 7 and 8 for RS-422 communications, as shown in Table 2-4.

Pos 8	Pos 7	Protocol
0	0	RS-422
0	1	Undefined
1	0	Undefined
1	1	RS-485

Table 2-4. S2 7-8 Dipswitch Settings for Serial Communications Protocol

## Dipswitch S3: 7-8

Dipswitch S3 7-8 on the KM-RIO motherboard sets the baud rate of the communications between the KM-RIO and the signal processors. Use Table 2-5 to set the switch positions of 7-8 to a baud rate compatible with your signal processors.

Pos 8 B	Pos 7 A	Baud
0	0	1200 bits/sec
0	1	2400 bits/sec
1	0	9600 bits/sec
1	1	19,200 bits/sec

Table 2-5. S3 7-8 Dipswitch Settings for Baud Rate

1st Signal Processor — Sono II/u-w  
16 monitoring channels, 8 math channels  
Base Serial Address = 0

Sono II Channel	Serial Address	Channel Enabled?	KM-RIO Channel
1	0	Yes	0
2	1	No	—
3	2	Yes	2
4	3	Yes	3
5	4	Yes	4
6	5	No	—
7	6	Yes	6
8	7	Yes	7
9	8	Yes	8
10	9	Yes	9
11	10	Yes	10
12	11	Yes	11
13	12	Yes	12
14	13	Yes	13
15	14	Yes	14
16	15	Yes	15
17	16	Yes	16
18	17	No	—
19	18	Yes	18

2nd Signal Processor — Weigh II  
4 monitoring channels, 4 math channels  
Base Serial Address = 19

Weigh II Channel	Serial Address	Enabled? (Enab)	Serially Hidden? (HideS)	KM-RIO Channel
1	19	Yes	No	19
2	20	No	No	—
3	21	Yes	Yes	—
4	22	Yes	No	22
5	23	Yes	No	23
6	24	No	No	—
7	25	Yes	Yes	—
8	26	Yes	No	26

**Example: Efficient Setup of Serial Addresses for Use by the KMM-RIO-1**

1. Set Dipswitch S3:1-6 for a last address of 26.
2. Base serial address for 1st signal processor is set to 0 to take full advantage of available channels.
3. Base serial address for 2nd signal processor is set to 19 to provide 'tightest' spacing (last serial address polled from 1st signal processor is 18).
4. If you plan to enable additional math channels later (from channels 20-24 in 1st processor), set up the base serial address of 2nd processor so that it is higher than highest expected polled address from 1st processor.

1st Signal Processor — Sono II/u-w  
16 monitoring channels, 8 math channels  
Base Serial Address = 8

Sono II Channel	Serial Address	Channel Enabled?	KM-RIO Channel
1	8	Yes	8
2	9	No	—
3	10	Yes	10
4	11	Yes	11
5	12	Yes	12
6	13	No	—
7	14	Yes	14
8	15	Yes	15
9	16	Yes	16
10	17	Yes	17
11	18	Yes	18
12	19	Yes	19
13	20	Yes	20
14	21	Yes	21
15	22	Yes	22
16	23	Yes	23
17	24	Yes	24
18	25	No	—
19	26	Yes	26

2nd Signal Processor — Weigh II  
4 monitoring channels, 4 math channels  
Base Serial Address = 29

Weigh II Channel	Serial Address	Channel Enabled? (Enab)	Serially Hidden? (HideS)	KM-RIO Channel
1	29	Yes	No	29
2	30	No	No	—
3	31	Yes	Yes	—
4	31	Yes	No	31
5	32	Yes	No	↑
6	33	No	No	not enough space in KM-RIO for rest of channels from Weigh II
7	34	Yes	Yes	↓
8	35	Yes	No	↓

**Example: Less Efficient Setup of Serial Addresses for Use by the KMM-RIO-1**

1. Base serial address for 1st signal processor is set to 8, not taking advantage of available channels 0-7.
2. Base serial address for 2nd signal processor is set to 29. Does not provide 'tightest' spacing (last serial address polled from 1st signal processor is 26, so could have set 2nd processor to 27).
3. As a result of (1) and (2), channel space in KM-RIO is used up, not allowing it to communicate with channels 5 and 8 in Weigh II.

Table 2-6. Examples of KMM-RIO-1 Channel Assignments

## Dipswitch S3: 1-6

Dipswitch S3 1-6 on the KM-RIO motherboard sets the serial address of the last channel in the system. The serial address for the last channel tells the KM-RIO the highest address in the system, the point at which to stop searching for additional channels. The maximum allowable address is dependent on the KM-RIO model:

- KM1-RIO — highest address is 0 (maximum of 1 channel)
- KMM-RIO-1 — highest address is 31 (maximum of 32 channels)
- KMM-RIO-2 — highest address is 63 (maximum of 64 channels)

In setting up serial addresses for the signal processors and setting the serial address of the last channel in the system, it is important to understand how the KM-RIO sets aside channel space. Looking at the examples in Table 2-6, note the following:

- All channels, both enabled and disabled, are assigned serial addresses. Enabled channels take up channel space in the KM-RIO. The KM-RIO does not communicate with disabled or serially hidden channels. However, in assigning KM-RIO channel numbers, the KM-RIO 'skips' numbers for disabled or serially hidden channels until it comes to the last enabled channel from that signal processor. Disabled or serially hidden channels that are **after** the last enabled channel do not effect the assignment of KM-RIO channel numbers.
- For most efficient use of KM-RIO channel space, set the base serial address to 0 for one of the signal processors. Set the base serial address for the other signal processor(s) so that there are no unnecessary gaps in the channel serial addresses.

Use Table 2-7 to set the switch positions of dipswitch S3 1-6 to the serial address for the last channel in the system.

Switch Settings						Address	
6	5	4	3	2	1	Hex	Dec
0	0	0	0	0	0	0	0
0	0	0	0	0	1	01	01
0	0	0	0	1	0	02	02
0	0	0	0	1	1	03	03
0	0	0	1	0	0	04	04
0	0	0	1	0	1	05	05
0	0	0	1	1	0	06	06
0	0	0	1	1	1	07	07
0	0	1	0	0	0	08	08
0	0	1	0	0	1	09	09
0	0	1	0	1	0	0A	10
0	0	1	0	1	1	0B	11
0	0	1	1	0	0	0C	12
0	0	1	1	0	1	0D	13
0	0	1	1	1	0	0E	14
0	0	1	1	1	1	0F	15
0	1	0	0	0	0	10	16
0	1	0	0	0	1	11	17
0	1	0	0	1	0	12	18
0	1	0	0	1	1	13	19
0	1	0	1	0	0	14	20
0	1	0	1	0	1	15	21
0	1	0	1	1	0	16	22
0	1	0	1	1	1	17	23
0	1	1	0	0	0	18	24
0	1	1	0	0	1	19	25
0	1	1	0	1	0	1A	26
0	1	1	0	1	1	1B	27
0	1	1	1	0	0	1C	28
0	1	1	1	0	1	1D	29
0	1	1	1	1	0	1E	30
0	1	1	1	1	1	1F	31

Switch Settings						Address	
6	5	4	3	2	1	Hex	Dec
1	0	0	0	0	0	20	32
1	0	0	0	0	1	21	33
1	0	0	0	1	0	22	34
1	0	0	0	1	1	23	35
1	0	0	1	0	0	24	36
1	0	0	1	0	1	25	37
1	0	0	1	1	0	26	38
1	0	0	1	1	1	27	39
1	0	1	0	0	0	28	40
1	0	1	0	0	1	29	41
1	0	1	0	1	0	2A	42
1	0	1	0	1	1	2B	43
1	0	1	1	0	0	2C	44
1	0	1	1	0	1	2D	45
1	0	1	1	1	0	2E	46
1	0	1	1	1	1	2F	47
1	1	0	0	0	0	30	48
1	1	0	0	0	1	31	49
1	1	0	0	1	0	32	50
1	1	0	0	1	1	33	51
1	1	0	1	0	0	34	52
1	1	0	1	0	1	35	53
1	1	0	1	1	0	36	54
1	1	0	1	1	1	37	55
1	1	1	0	0	0	38	56
1	1	1	0	0	1	39	57
1	1	1	0	1	0	3A	58
1	1	1	0	1	1	3B	59
1	1	1	1	0	0	3C	60
1	1	1	1	0	1	3D	61
1	1	1	1	1	0	3E	62
1	1	1	1	1	1	3F	63

Table 2-7. S3 1-6 Dipswitch Settings for Serial Address for Last Channel Communicating with KM-RIO



# Chapter 3. PLC Programming

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## Introduction

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The chapter documents the format for K-M's program commands for interfacing with A-B's PLC network. This material is written for users who have experience with A-B's PLC programming and have A-B PLC programming documentation available for reference. Refer to the appropriate K-M manual(s) for your K-M product(s). These manuals provide complete installation, operation, and calibration procedures, and product specifications.

The KM-RIO provides an interface for weight, level, and flow systems into the A-B Remote I/O network. This chapter documents the format for the commands and contains the miscellaneous system commands for the KM-RIO. The actual commands for each K-M signal processor supported by the KM-RIO are in the following chapters:

- KM-RIO/Sonologic 5000 Series-ITU-SSU — Chapter 4
- KM-RIO/STX Signal Transmitter — Chapter 5
- KM-RIO/Models 1000 and 1020 — Chapter 6
- KM-RIO/Sonologic II & *ultra-wave*<sup>™</sup> — Chapter 7
- KM-RIO/Weigh II — Chapter 8
- KM-RIO/SVS 2000 — Chapter 9

The KM-RIO supports block or discrete transfer capability. For both block and discrete transfer, only one KM-RIO channel can be assigned to each signal processor channel. The three versions of the KM-RIO have the following capacities:

1. Block Transfer (refer to Figures 3-1A, 3-2, and 3-3)
  - KM1-RIO: two words, 16 bits per word, two words allocated for each KM-RIO channel, and a capacity of one channel.
  - KMM-RIO-1: 64 words, 16 bits per word, two words allocated for each KM-RIO channel, and a capacity of up to 32 channels.
  - KMM-RIO-2: 128 words, 16 bits per word, two words allocated for each KM-RIO channel, and a capacity of up to 64 channels.

2. Discrete Transfer (refer to Figures 3-1B and 1-1)
  - KM1-RIO: two words, 16 bits per word, and a capacity of one channel.
  - KMM-RIO-1: eight words, 16 bits per word, and a capacity of up to six channels.
  - KMM-RIO-2: 16 words, 16 bits per word, and a capacity of up to 12 channels.

Setting the jumpers for block or discrete transfer programming is described in Chapter 2, Hardware Setup.

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## KM-RIO Block Transfer Commands

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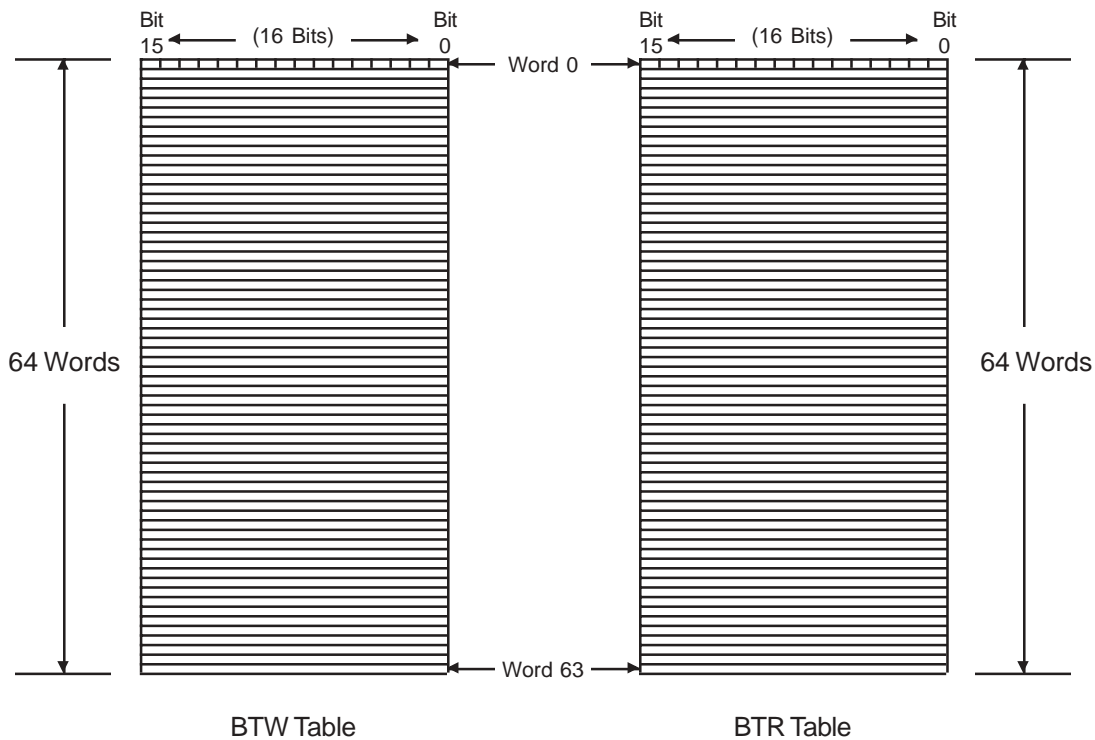
This section describes the table structures, commands, and channel status reports for block transfer. Follow the procedure in Chapter 2, Hardware Setup, to set the KM-RIO PCB for block transfer programming.

The PLC processor transfers data to and from the KM-RIO using BTW (Block Transfer Write) and BTR (Block Transfer Read) instructions in your ladder logic program.

The data obtained from the KM-RIO using BTR is set up by instructions sent by BTW commands. Figure 3-2 shows the BTW bit/word configuration. The first word of each channel is the data word. Data is placed here if the command is to send data from the PLC to the KM-RIO. The second word of each channel is the command word, which may include subcommands and additional data (if the data could not fit within the 16 bits of the first word). Bit 15 of the command word is called the Write Bit. Bit 15 is set to '1' when the command is to send data from the PLC to the KM-RIO. Bit 15 is set to '0' when the command is to send data from the KM-RIO to the PLC. After the BTW instruction has been completed, a BTR instruction is used.

Figure 3-3 shows the BTR bit/word configuration. The first word of each channel is the data word. Data is placed here if the command in the BTW table is to send data from the KM-RIO to the PLC. The second word of each channel is the command word. The command used in the BTW is echoed here to confirm the command has been processed. Bit 14 of the command word is the polarity bit ('0' = +, '1' = -). Bit 15 of the command word is the error bit. If bit 15 is set to '1,' use the Status Command ('7') to determine the error source. If the error condition is cleared, Bit 15 is reset to '0.'

**Figure 3-1A: Block Transfer**



**Figure 3-1B: Discrete Transfer**

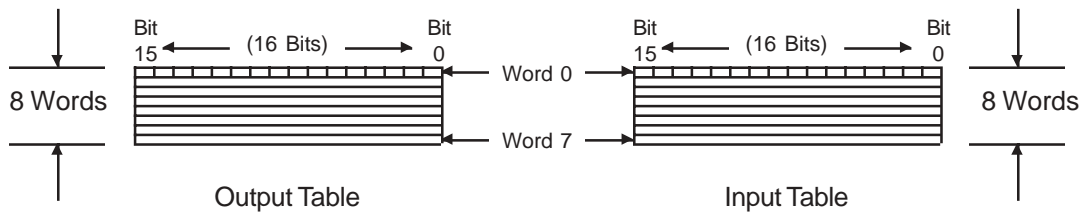
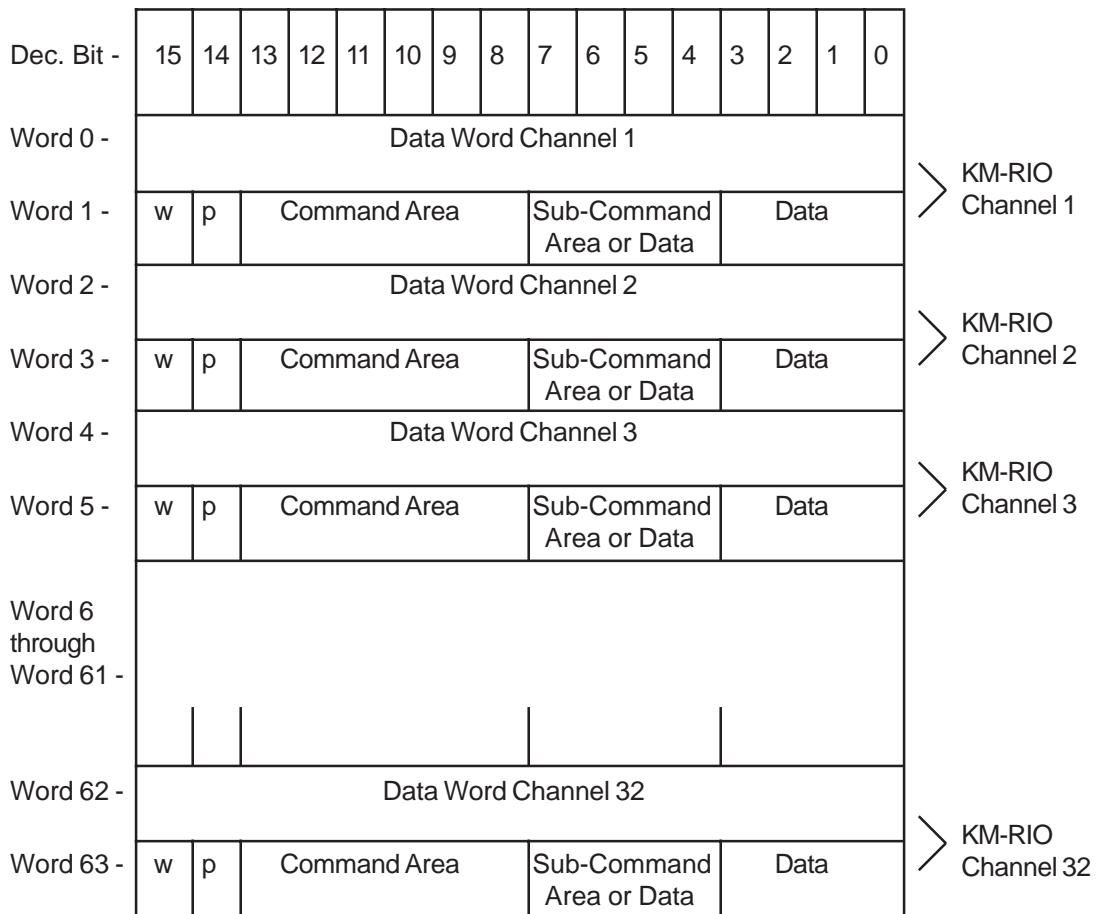


Figure 3-1. Illustration of Allen-Bradley and KM-RIO Card Memory Registers for KMM-RIO-1

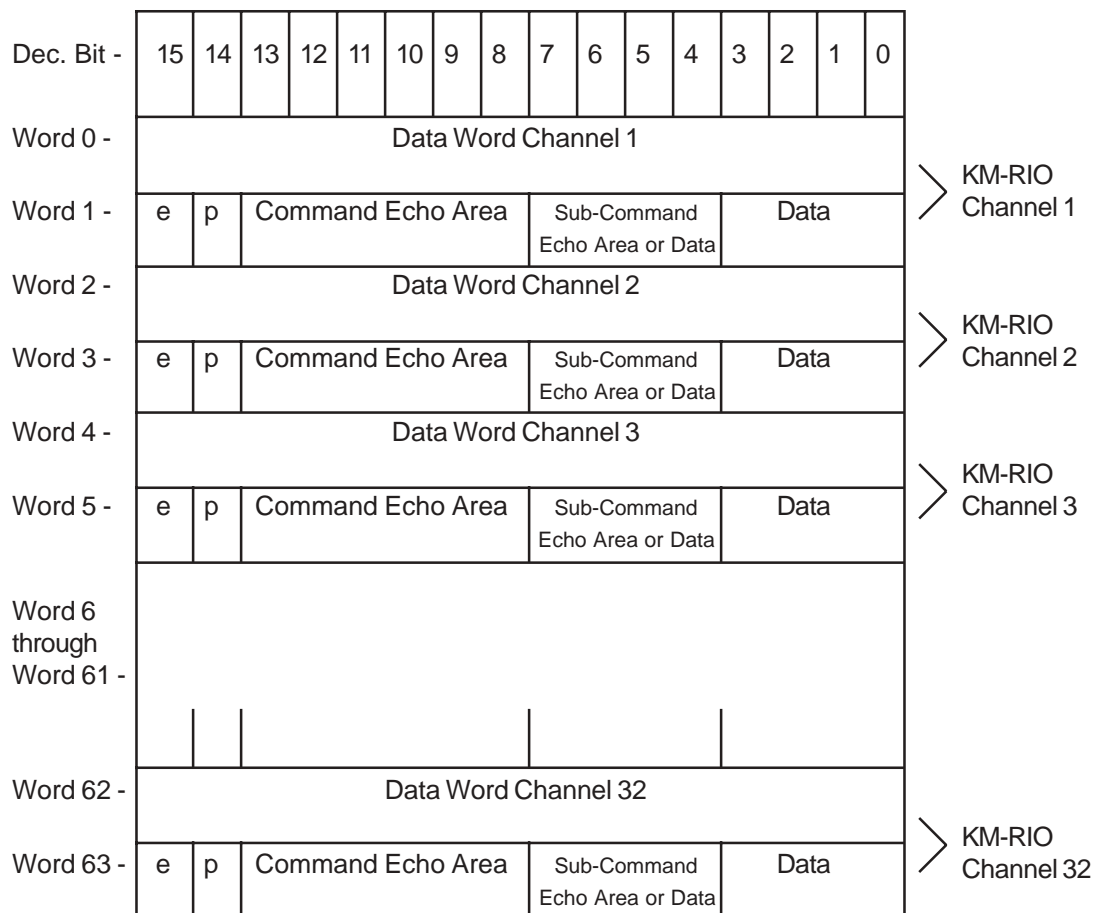


**Block Transfer Write Table**

*Notes:*

- Two words are used per KM-RIO channel. The first word is the Data Word and the second word is the Command Word.
- Description of the Data Word: Bits 0-15 is the data area, used when data is to be sent/received.
- Description of the Command Word:
  - Bits 0-7 is the data area. This area is used when data larger than 16 bit is to be sent/received (STX, Weigh II, and SVS 2000). Data Bits 0-15 are in the Data Word in the first word for the channel and the remaining data are in this area of the Command Word.
  - Bits 4-7 is the Sub-Command Area. This area is used (when not being used for data) to point to specific setpoints, current outputs, or entries in the linearization table for the KM-RIO channel.
  - Bits 8-13 is the Command Area.
  - Bit 14 is the Polarity bit (p): '0' = +, '1' = -
  - Bit 15 is the Write bit (w). Set this bit to '1' when sending data from the PLC to the KM-RIO. Set this bit to '0' when requesting that data be sent from the KM-RIO to the PLC.

*Figure 3-2. Basic Bit/Byte Word Configuration for Block Transfer Write Table*



**Block Transfer Read Table**

*Notes:*

1. Two words are used per KM-RIO channel. The first word is the Data Word and the second word is the Command Word.
2. Description of the Data Word: Bits 0-15 is the data area, used when data is to be sent/received.
3. Description of the Command Word:
  - Bits 0-7 is the data area. This area is used when data larger than 16 bit is to be sent/received (STX, Weigh II, and SVS 2000). Data Bits 0-15 are in the Data Word in the first word for the channel and the remaining data are in this area of the Command Word.
  - Bits 4-7 is the Sub-Command Echo Area. This area is used (when not being used for data) to point to specific setpoints, current outputs, or entries in the linearization table for the KM-RIO channel.
  - Bits 8-13 is the Command Echo Area.
  - Bit 14 is the Polarity bit (p): '0' = +, '1' = -
  - Bit 15 is the Error bit (e).

*Figure 3-3. Basic Bit/Byte Word Configuration for Block Transfer Read Table*

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## **Block Transfer Command Format Notes**

Three types of commands are used when interfacing between the PLC and the KM-RIO:

1. **Read only** commands are used to read a calculated parameter, such as a gross weight or net weight. This type of command is **always** used to send data from the **KM-RIO to the PLC**. The BTW and BTR tables for these commands reflect that the data can only go from the KM-RIO to the PLC. These commands are identified as “read only” in the Block Transfer Commands.
2. **Set only** commands are used to set a parameter, such as a command to tare a channel. This type of command is **always** used to send data from the **PLC to the KM-RIO**. The BTW and BTR tables for these commands reflect that the data can only go from the PLC to the KM-RIO. These commands are identified as “set only” in the Block Transfer Commands.
3. **Read or Set** commands are used to read a parameter value **or** set a parameter value, such as a command for Lo Span Calibration. This type of command can be used to send data from the KM-RIO to the PLC or from the PLC to the KM-RIO. Note that the BTW and BTR tables for these commands in the Block Transfer Commands are written for the case where the data is being sent from the KM-RIO to the PLC. However, these commands can also be used to set parameters.

## Quick Command Reference Table for KM-RIO Miscellaneous System Commands

System Parameters	Command Dec	Hex	Range	Comments	Page No.
Null Command	0	0	—	Returns zero in all data/command fields	3-7
KM-RIO Device & Revision Report	5	5	0-255 MSB 0-255 LSB	MSB KM-RIO firmware revision: 0-127=XNEW-XZZV, 128-255=NEW-ZZV. LSB Signal processor type: 1=Sono 5000 series-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8 = Weigh II, 14 = SVS 2000	3-7
Park Signal Processor	38	26	—	Set bit 15 of Command Word to 1 to park the communications at the selected channel. Set bit 15 of Command Word to 0 to release the park command. When parked on a channel, all other channels have error bit (bit 15) set to 1 and return command 38 in the command echo area.	3-7

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

## Block Transfer Commands: KM-RIO Miscellaneous System Commands

### Null Command (read only)

Dec: 0 Hex: 0 Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### KM-RIO Device and Revision Report (read only)

Dec: 5 Hex: 5 Range: 0-255 MSB, 0-255 LSB

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

*Notes:* MSB KM-RIO firmware revision: 0-127=XNEW-XZZV, 128-255=NEW-ZZV.  
 LSB Signal processor type: 1=Sono 5000 series-ITU-SSU, 2=STX, 10=1000, 11=1020,  
 7=Sono II/u-w, 8 = Weigh II, 14 = SVS 2000

### Park Signal Processor

Dec: 38 Hex: 26 Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	e	p	1	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

*Notes:* Set bit 15 of Command Word to 1 to park the communications at the selected channel. Set bit 15 of Command Word to 0 to release the park command. When parked on a channel, all other channels have error bit (bit 15) set to 1 and return command 38 in the command echo area.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## KM-RIO Discrete Transfer Commands

This section describes the table structures, commands, and channel status reports for discrete transfer. Follow the procedure in Chapter 2 to set the jumper on the KM-RIO PCB for discrete transfer programming.

In the full rack configuration, the KMM-RIO-1 PCB supports six channels using eight words of data. Those words are structured as shown in Figures 3-4 and 3-5.

Each command word (Word 0 and Word 4 in Figure 3-4) supports three channels. Bit 17 is not used. The desired command from the

Discrete Transfer Command Table is entered in the first three bits of each channel in the Output Table. The first three bits of each channel in the Input Table echo the command. Bits 3, 10, and 15 indicate polarity (0 = '+', 1 = '-') and bits 4, 11, and 16 indicate status. If a status bit contains '1,' status/error information can be found using Command 7.

Parameters, commands, and value ranges for discrete transfer are listed in the Discrete Transfer Command Tables in Chapters 4 through 9. Channel status and error information is given in the Channel Status Table. Use this information when entering commands in the Discrete Output Table and reading the requested information in the Discrete Input Table.

17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0	Octal Bits
N/U	N/U	N/U	Command CH3			N/U	N/U	Command CH2			N/U	N/U	Command CH1			Word 0
																Word 1
																Word 2
																Word 3
N/U	N/U	N/U	Command CH6			N/U	N/U	Command CH5			N/U	N/U	Command CH4			Word 4
																Word 5
																Word 6
																Word 7

Figure 3-4. Discrete Output Table

17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0	Octal Bits
N/U	s	p	Command CH3			s	p	Command CH2			s	p	Command CH1			Word 0
Return Data for Channel 1																Word 1
Return Data for Channel 2																Word 2
Return Data for Channel 3																Word 3
N/U	s	p	Command CH6			s	p	Command CH5			s	p	Command CH4			Word 4
Return Data for Channel 4																Word 5
Return Data for Channel 5																Word 6
Return Data for Channel 6																Word 7

Figure 3-5. Discrete Input Table

Legend: N/U = not used; s = status; p = polarity

**KM-RIO Miscellaneous System Command  
Discrete Transfer Command Table**

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
A-B Device & Revision Report	5	5	0-255 MSB  0-255 LSB	MSB (1st byte of the word) is KM-RIO card firmware revision: 0-127 (XNEW-XZZV), 128-255 (NEW-ZZV). LSB (2nd byte of the word) is signal processor type: 1=Sono 5000 series-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000

*Note:* The Command Number is echoed in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.



# **Chapter 4. Commands for KM-RIO/ Sonologic 5000 Series-ITU-SSU**

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## **Chapter Contents**

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KM-RIO Allen-Bradley Discrete Transfer Commands .....	4-13

*Note*

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Refer to Chapter 3 for general information on PLC programming.

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## KM-RIO Allen-Bradley Block Transfer Commands

### Quick Command Reference Table for KM-RIO with Sonologic 5000 Series-ITU-SSU

Sonologic Parameters	Command		Range	Comments	Page No.
	Dec	Hex			
Level	1	1	0-9999	Value in selected engineering units	4-3
Status (includes errors)	7	7	0-255		4-3
Full Point	8	8	0-240	'1' user mode	4-3
Operating Span	9	9	0-6000	'2' user mode	4-4
Standard Display Format	10	A	1-6	'3' user mode	4-4
Air/Material Mode	11	B	0-1	'4' user mode	4-4
Window	12	C	0-240	'D' user mode	4-5
Minimum Range	13	D	0-240	'E' user mode	4-5
Maximum Range	14	E	0-9000	'F' user mode	4-5
Special Display Units	15	F	0-9999	'H' user mode	4-6
Averaging Factor	16	10	1-50	'C' user mode	4-6
Transducer Period	17	11	100-450	'1' monitor mode	4-6
4 mA Value (ITU)	18	12	0-1000	'2' monitor mode	4-7
20 mA Value (ITU)	19	13	0-4095	'3' monitor mode	4-7
Echo Loss Timer	20	14	0-3400	'4' monitor mode	4-7
Osc. Control Voltage	21	15	0-1023	'5' monitor mode	4-8
Power	22	16	0-1023	'6' monitor mode	4-8
Near Gain	23	17	0-1023	'7' monitor mode	4-8
Qualify Comparator Level	24	18	0-1023	'8' monitor mode	4-9
Peak Comparator Level	25	19	0-1023	'9' monitor mode	4-9
TVG End	26	1A	0-1023	'A' monitor mode	4-9
Temperature Compensation	27	1B	0-1023	'B' monitor mode	4-10
5 Volt Out	28	1C	0-1023	'C' monitor mode	4-10
Transmit Cycles	29	1D	2-100	'D' monitor mode	4-10
Qualify Comparator Offset	30	1E	0-1023	'E' monitor mode	4-11
Peak Comparator Offset	31	1F	0-1023	'F' monitor mode	4-11
Max. TVG	32	20	0-2046	'H' monitor mode	4-11
Near Gain	33	21	0-1023	'J' monitor mode	4-12
Noise Offset	34	22	0-1023	'L' monitor mode	4-12
Raw Target in Inches (cm)	35	23	0-9999	'P' monitor mode	4-12

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Level (read only)

Dec: 1 Hex: 1 Range: 0-9999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Command Word

### Status (read only)

Dec: 7 Hex: 7 Range: 0-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	0	0	0	0	0	0	0	0	Data Word
Word 1 -	e	p	0	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

Notes: Description of status (bits 8-15 of data word)

Bit 8 -Net units negative

Bit 12 - COM error condition

Bit 9 - Echo Loss

Bit 13 - N/A

Bit 10 -N/A

Bit 14 - N/A

Bit 11 - Illegal average factor

Bit 15 - Gross units negative

### Full Point

Dec: 8 Hex: 8 Range: 0-240 max. (depends on system). See Sonologic Manual.

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Operating Span

Dec: 9 Hex: 9 Range: 0-6000 max. (depends on system). See Sonologic Manual.

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	0	0	1	0	0	1	0	0	0	0	0	0	0	0	Command Word

### Standard Display Format

Dec: 10 Hex: A Range: 1-6

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d	Data Word
Word 1 -	e	p	0	0	1	0	1	0	0	0	0	0	0	0	0	0	Command Word

Notes:

1. English units: 1=%, 2=.1%, 3=in., 4=.1 in, 5=ft, 6=.1 ft
2. Metric units: 1=%, 2=.1%, 3=cm, 4=.1 cm, 5=m, 6=.1 m

### Air/Material Mode

Dec: 11 Hex: B Range: 0-1

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	Data Word
Word 1 -	e	p	0	0	1	0	1	1	0	0	0	0	0	0	0	0	Command Word

Note: 0=air space mode, 1=material mode

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Window

Dec: 12 Hex: C Range: 0-240

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Minimum Range

Dec: 13 Hex: D Range: 0-240 max. (depends on system). See Sonologic Manual.

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Maximum Range

Dec: 14 Hex: E Range: 0-9000 (depends on system). See Sonologic Manual.

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Special Display Units (maximum value)

Dec: 15 Hex: F Range: 0-9999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Averaging Factor

Dec: 16 Hex: 10 Range: 1-50

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Transducer Period (read only)

Dec: 17 Hex: 11 Range: 100-450

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### 4 mA Value (ITU)

Dec: 18 Hex: 12 Range: 0-1000

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### 20 mA Value (ITU)

Dec: 19 Hex: 13 Range: 0-4095

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Echo Loss Timer

Dec: 20 Hex: 14 Range: 0-3400

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Osc. Control Voltage (read only)

Dec: 21 Hex: 15 Range: 0-1023

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Power (read only)

Dec: 22 Hex: 16 Range: 0-1023

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Near Gain (read only)

Dec: 23 Hex: 17 Range: 0-1023

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Qualify Comparator Level (read only)

Dec: 24 Hex: 18 Range: 0-1023

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Peak Comparator Level (read only)

Dec: 25 Hex: 19 Range: 0-1023

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### TVG End (read only)

Dec: 26 Hex: 1A Range: 0-1023

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Temperature Compensation (read only)

Dec: 27 Hex: 1B Range: 0-1023

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### 5 Volt Out (read only)

Dec: 28 Hex: 1C Range: 0-1023

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Transmit Cycles

Dec: 29 Hex: 1D Range: 2-100

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Qualify Comparator Offset

Dec: 30 Hex: 1E Range: 0-1023

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Peak Comparator Offset

Dec: 31 Hex: 1F Range: 0-1023

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Maximum TVG

Dec: 32 Hex: 20 Range: 0-2046

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sonologic 5000 Series-ITU-SSU

### Near Gain

Dec: 33 Hex: 21 Range: 0-1023

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Noise Offset

Dec: 34 Hex: 22 Range: 0-1023

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Raw Target in Inches (cm) (read only)

Dec: 35 Hex: 23 Range: 0-9999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**Notes:**

1. If English units were selected: value to nearest whole inch.
2. If Metric units were selected: value in whole centimeters is only approximate, because it is converted from inches with a conversion factor of 3 cm/inch. To get a more accurate value, divide the value by 3 and multiply by 2.54.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## KM-RIO Allen-Bradley Discrete Transfer Commands

**KM-RIO/Sonologic 5000 Series-ITU-SSU Discrete Transfer Command Table**

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
Level (eng. units)	1	1	0-65535	
Reserved	2	2		
Reserved	3	3		
Reserved	4	4		
A-B Device & Revision Report	5	5	0-255 MSB  0-255 LSB	MSB (1st byte of the word) is KM-RIO card firmware revision: 0-127 (XNEW-XZZV), 128-255 (NEW-ZZV). LSB (2nd byte of the word) is signal processor type: 1=Sono 5000 Series-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000
Reserved	6	6	—	
Status (includes errors)	7	7	0-255	Channel status (errors included) is reported as shown in the Channel Status Table.

*Note:* The Command Number is echoed in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.

**Channel Status Table (for bit set to '1')**

Bit 17	Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10
—	—	Analog input overranging A/D converter	Com error	—	—	Echo loss	Net units negative

Legend: Dec = # in decimal form; Hex = # in hexadecimal form



# **Chapter 5. Commands for KM-RIO/ STX Signal Transmitter**

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*Note*

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Refer to Chapter 3 for general information on PLC programming.

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# KM-RIO Allen-Bradley Block Transfer Commands

## Quick Command Reference Table for KM-RIO/STX Signal Transmitter

STX Parameters	Command		Range	Comments	Page No.
	Dec	Hex			
Gross Weight	1	1	0-999999	Value in selected engineering units	5-3
Net Weight	2	2	0-±999999	Value in selected engineering units	5-3
Tare	6	6	—		5-3
Status (includes errors)	7	7	0-255		5-4
Zero Cal (Auto)	8	8	0-999999	Value in selected engineering units	5-4
Lo Span Cal (Auto)	9	9	0-999999	Value in selected engineering units	5-5
Hi Span Cal (Auto)	10	A	0-999999	Value in selected engineering units	5-5
Scale Factor Cts (Manual)	11	B	0-2097151		5-5
Scale Factor Wt (Manual)	12	C	0-999999	Value in selected engineering units	5-6
Zero Counts (Manual)	13	D	0-2097151		5-6
Excitation	14	E	0-255		5-6
Analog/Digital Mode	15	F	0-1	1=analog mode, 0=digital mode	5-7
Averaging Factor	16	10	1-255		5-7
0/4 Mode	17	11	0-1	1=4/20 mode, 0=0/20 mode	5-7
Lo mA Value <sup>1</sup>	18	12	0-±999999	Value in selected engineering units	5-8
Hi mA Value <sup>1</sup>	19	13	0-±999999	Value in selected engineering units	5-8
Net/Gross Mode for Current Output	20	14	0-1	1=Net, 0=Gross	5-8
Failsafe for Current Output	21	15	0-2	0=Lo, 1=Hi, 2=No Change	5-9
0 mA Factory Cal (local)	22	16	0-16383		5-9
4 mA Factory Cal (local)	23	17	0-16383		5-9
20 mA Factory Cal (local)	24	18	0-16383		5-10
Raw Input Counts	30	1E	0-2097151	For linearization table. Bits 5, 6, & 7 of Command Word is Linear Table Entry Number (0=1st, 1=2nd, 2=3rd, 3=4th, 4=5th).	5-10
Corrected Output Counts	31	1F	0-2097151	For linearization table. Bits 5, 6, & 7 of Command Word is Linear Table Entry Number (0=1st, 1=2nd, 2=3rd, 3=4th, 4=5th).	5-10
Linearization Enable	32	20	0-1	0=linearization off, 1=linearization on	5-11
Raw A/D Counts	33	21	0-2097151		5-11

*Note:*

1. When Net Mode is selected, Bit 4 of Command Word is polarity for the Lo mA and Hi mA values.

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

## Block Transfer Commands: KM-RIO/STX

### Gross Weight (read only)

Dec: 1 Hex: 1 Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	0	1	0	0	0	0	d	d	d	d

Data Word  
Command Word

### Net Weight (read only)

Dec: 2 Hex: 2 Range: 0-±999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	1	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

### Tare (set only)

Dec: 6 Hex: 6 Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Word 1 -	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: To set tare, set bit 0 of Data Word to 1 and use the Write bit.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Status (read only)

Dec: 7 Hex: 7 Range: 0-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	0	0	0	0	0	0	0	0	Data Word
Word 1 -	e	p	0	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

Notes: Description of status (bits 8-15 of data word)

Bit 8 - Net units negative

Bit 9 - N/A

Bit 10 - During Auto Cal "Warning: Move More Material"

Bit 11 - During Auto Cal: "Ambiguous Error"

lo\_cnt>hi\_cnt. Other: Illegal average factor

Bit 12 - COM error condition

Bit 13 - Analog input overrange

Bit 14 - Engineering unit overflow

Bit 15 - Gross units negative

### Zero Cal (Auto Calibration)

Dec: 8 Hex: 8 Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	0	0	1	0	0	0	0	0	0	0	d	d	d	d	Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Lo Span Cal (Auto Calibration)

Dec: 9 Hex: 9 Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	1	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *STX Installation and Operation Manual*.

### Hi Span Cal (Auto Calibration)

Dec: 10 Hex: A Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *STX Installation and Operation Manual*.

### Scale Factor Counts (Manual Calibration)

Dec: 11 Hex: B Range: 0-2097151

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Scale Factor Weight (Manual Calibration)

Dec: 12 Hex: C Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

### Zero Counts (Manual Calibration)

Dec: 13 Hex: D Range: 0-2097151

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

### Excitation

Dec: 14 Hex: E Range: 0-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Analog/Digital Mode

Dec: 15 Hex: F Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	0	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: 0=digital mode, 1=analog mode

### Averaging Factor

Dec: 16 Hex: 10 Range: 1-255

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: 0=illegal

### 0/4 mA Mode

Dec: 17 Hex: 11 Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	0	1	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: 1=4/20 mode, 0=0/20 mode

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Lo mA Value

Dec: 18 Hex: 12 Range: 0-±999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	0	0	1	0	0	1	0	0	0	0	p	d	d	d	d

Data Word  
Command Word

Note: When Net Mode is selected, Bit 4 of Command Word is polarity for the Lo mA value.

### Hi mA Value

Dec: 19 Hex: 13 Range: 0-±999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	0	0	1	0	0	1	1	0	0	0	p	d	d	d	d

Data Word  
Command Word

Note: When Net Mode is selected, Bit 4 of Command Word is polarity for the Hi mA value.

### Net/Gross Mode for Current Output

Dec: 20 Hex: 14 Range: 0-1

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	0	1	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: Bit 0 of data word: 0=gross, 1=net

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Failsafe for Current Output

Dec: 21 Hex: 15 Range: 0-2

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d
Word 1 -	e	p	0	1	0	1	0	1	0	0	0	0	0	0	0	0

Data Word

Command Word

Note: 0=Lo, 1=Hi, 2=No Change

### 0 mA Factory Calibration (local)

Dec: 22 Hex: 16 Range: 0-16383

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	1	0	0	0	0	0	0	0	0	0

Data Word

Command Word

### 4 mA Factory Calibration (local)

Dec: 23 Hex: 17 Range: 0-16383

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	1	1	0	0	0	0	0	0	0	0

Data Word

Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### 20 mA Factory Calibration (local)

Dec: 24 Hex: 18 Range: 0-16383

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Raw Input Counts (Linearization Table)

Dec: 30 Hex: 1E Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	0	D	D	D	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	0	0	0	0	d	d	d	d	d

Data Word  
Command Word

Note: Command Word Bits 5, 6, and 7 are the Linear Table entry number  
(0=1st, 1=2nd, 2=3rd, 3=4th, and 4=5th)

### Corrected Output Counts (Linearization Table)

Dec: 31 Hex: 1F Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	1	D	D	D	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

Note: Command Word Bits 5, 6, and 7 are the Linear Table entry number  
(0=1st, 1=2nd, 2=3rd, 3=4th, and 4=5th)

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/STX

### Linearization Enable

Dec: 32 Hex: 20 Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: Bit 0 of data word: 0=disable, 1=enable

### Raw A/D Counts (read only)

Dec: 33 Hex: 21 Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	0	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

# KM-RIO Allen-Bradley

## Discrete Transfer Commands

**KM-RIO/STX Signal Transmitter  
Discrete Transfer Command Table**

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
Gross Weight (eng. units)	1	1	0-65535 <sup>1</sup>	
Net Weight (eng. units)	2	2	0-65535 <sup>1</sup>	
Reserved	3	3		
Reserved	4	4		
A-B Device & Revision Report	5	5	0-255 MSB  0-255 LSB	MSB (1st byte of the word) is KM-RIO card firmware revision: 0-127 (XNEW-XZZV), 128-255 (NEW-ZZV). LSB (2nd byte of the word) is signal processor type: 1=Sono 5000 series-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000
Tare	6	6	—	Tare command. Weight and level channels are tared.
Status (includes errors)	7	7	0-255	Channel status (errors included) is reported as shown in the Channel Status Table.

<sup>1</sup> Note: The STX supports engineering units up to 999999, but the discrete transfer command is limited to 16 bits (65535). Values larger than 65535 will be transmitted as 65535.

Note: The Command Number is echoed in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.

**Channel Status Table (for bit set to '1')**

Bit 17	Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10
Gross units negative	Engineering unit overflow error	Analog input overranging A/D converter	Com error	—	—	—	Net units negative

Legend: Dec = # in decimal form; Hex = # in hexadecimal form

# **Chapter 6. Commands for KM-RIO/Models 1000 and 1020**

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*Note*

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Refer to Chapter 3 for general information on PLC programming.

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## KM-RIO Allen-Bradley Block Transfer Commands

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### *Quick Command Reference Table for KM-RIO/Models 1000 and 1020*

1000 & 1020 Parameters	Command		Range	Comments	Page No.
	Dec	Hex			
Gross Weight	1	1	0-9999	Value in selected engineering units	6-3
Net Weight	2	2	0-±9999	Model 1020 only; value in selected eng units	6-3
Tare	6	6	—	Model 1020 only	6-3
Status (includes errors)	7	7	0-255		6-4

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

## Block Transfer Commands: KM-RIO/Models 1000 and 1020

### Gross Weight (read only)

Dec: 1 Hex: 1 Range: 0-9999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Net Weight (read only) — Model 1020 only

Dec: 2 Hex: 2 Range: 0-±9999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Tare (set only) — Model 1020 only

Dec: 6 Hex: 6 Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Word 1 -	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

*Note:* To set tare, set bit 0 of Data Word to 1 and use the Write bit.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Models 1000 and 1020

### Status (read only)

Dec: 7 Hex: 7 Range: 0-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	0	0	0	0	0	0	0	0	Data Word
Word 1 -	e	p	0	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

Notes: Description of status (bits 8-15 of data word)

Bit 8 - Net units negative

Bit 9 - N/A

Bit 10 - N/A

Bit 11 - N/A

Bit 12 - COM error condition

Bit 13 - Analog input overrange

Bit 14 - Engineering unit overflow

Bit 15 - Gross units negative

# KM-RIO Allen-Bradley

## Discrete Transfer Commands

**KM-RIO/Models 1000 and 1020  
Discrete Transfer Command Table**

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
Gross Weight (eng. units)	1	1	0-9999	
Net Weight (eng. units)	2	2	0-±9999	
Reserved	3	3		
Reserved	4	4		
A-B Device & Revision Report	5	5	0-255 MSB  0-255 LSB	MSB (1st byte of the word) is KM-RIO card firmware revision: 0-127 (XNEW-XZZV), 128-255 (NEW-ZZV). LSB (2nd byte of the word) is signal processor type: 1=Sono 5000 series-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000
Tare	6	6	—	Tare command — 1020 only. Weight and level channels are tared.
Status (includes errors)	7	7	0-255	Channel status (errors included) is reported as shown in the Channel Status Table.

*Note:* The Command Number is echoed in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.

**Channel Status Table (for bit set to '1')**

Bit 17	Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10
Gross units negative	Engineering unit overflow error	Analog input overranging A/D converter	COM error	—	—	—	Net units negative (1020 only)

Legend: Dec = # in decimal form; Hex = # in hexadecimal form



# **Chapter 7. Commands for KM-RIO/Sonologic II & ultra-wave™**

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## **Chapter Contents**

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*Note*

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Refer to Chapter 3 for general information on PLC programming.

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# KM-RIO Allen-Bradley Block Transfer Commands

## Quick Command Reference Table for KM-RIO with Sonologic II & ultra-wave™

Sono II Parameters	Command		Range	Comments	Page No.
	Dec	Hex			
Level Data	1	1	0-65535	Material mode: level/head (flow apps.) Air Space mode: air space	7-3
Flow Data	2	2	0-65535	For flow applications only	7-3
Main Totalizer Low Word	3	3	0-65535	For flow applications only	7-3
Main Totalizer High Word	4	4	0-65535	For flow applications only	7-4
Status (includes errors)	7	7	0-255		7-4
Full Point	8	8	0-9999	If polarity bit is 1, value is negative	7-4
Operating Span	9	9	0-65535		7-5
Standard Display Format	10	A	0-14	0=ft, 1=0.1ft, 2=0.01ft, 4=in, 5=0.1in, 6=0.01in, 8=m, 9=0.1m, 10=0.01m, 11=0.001m, 12=cm, 13=0.1cm, 14=0.01cm	7-5
Air/Material Mode	11	B	0-1	0=air space mode, 1=material mode	7-5
Window	12	C	0-65535	In standard display units/format	7-6
Minimum Range	13	D	0-65535	In standard display units/format	7-6
Maximum Range	14	E	0-65535	In standard display units/format	7-6
Special Display Units	15	F	0-65535	Maximum value of special display unit	7-7
Averaging Factor	16	10	1-255		7-7
Echo Loss Timer	20	14	0-65535		7-7
Power	22	16	0-1000	0 to 100.0%	7-8
Near Gain	23	17	0-10000	0 to 100.00%	7-8
Echo Detection Threshold	24	18	0-1000	0 to 100.0%	7-8
Peak Detection Threshold	25	19	0-1000	0 to 100.0%	7-9
Active TVG	26	1A	0-10000	0 to 100.00%	7-9
TVG High Limit	27	1B	0-10000	0 to 100.00%	7-9
TVG Low Limit	28	1C	0-10000	0 to 100.00%	7-10
Transmit Cycles	29	1D	0-100	Transmit burst in cycles	7-10
Raw Target in Inches (cm)	35	23	0-65535	To .01 inches or .01 cm (format xxx.xx)	7-10
Application Type	39	27	0-99	0=level, 1=flow, 3=differential level detection, 99=math channel	7-11
Force Setpoint Mode <sup>1,2,3</sup>	45	2D	0-2		7-11

### Notes:

- Bits 4, 5, and 6 of Command Word is the setpoint number (000=Setpoint 1 through 111=Setpoint 8).
- To activate the Force Mode, set bit 1 of Data Word to 1 and set the Write bit to 1. To deactivate the Force Mode, set bit 1 of the Data Word to 0 and set the Write bit to 1.
- Bit 0 of Data Word represents the state of the setpoint (1=On, 0=Off) when the Force Mode is active. When the Force Mode is inactive, the setpoint is controlled by the Sono II microprocessor card.

### CAUTION

The Force Setpoint Mode command removes control of the setpoint from the Sono II/u-w and gives it to the PLC. The Sono II/u-w will not update the setpoint when this mode is active.

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

**Block Transfer Commands: KM-RIO/Sono II & ultra-wave™****Level Data (read only)**

Dec: 1 Hex: 1 Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**Flow Data (read only) — flow applications only**

Dec: 2 Hex: 2 Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**Main Totalizer Low Word (read only) — flow applications only**

Dec: 3 Hex: 3 Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sono II & ultra-wave™

### Main Totalizer High Word (read only) — flow applications only

Dec: 4 Hex: 4 Range: 0-65535

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Status (read only)

Dec: 7 Hex: 7 Range: 0-255

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Notes: Description of status (bits 8-15 of data word)

- |   |  |
|---|--|
| Bit 8 - N/A   | Bit 12 - COM error condition                               |
| Bit 9 - Echo Loss   | Bit 13 - Requested setpoint or current output not assigned |
| Bit 10 - Math computation error or over-temperature condition | Bit 14 - Eng. unit overflow                                |
| Bit 11 - Illegal average factor                               | Bit 15 - N/A   |

### Full Point

Dec: 8 Hex: 8 Range: 0-9999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

**Block Transfer Commands: KM-RIO/Sono II & ultra-wave™****Operating Span**

Dec: 9 Hex: 9 Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**Standard Display Format**

Dec: 10 Hex: A Range: 0-14

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: 0=ft, 1=0.1 ft, 2=0.01 ft, 4=in, 5=0.1 in, 6=0.01 in, 8=m, 9=0.1 m, 10=0.01m, 11=0.001m, 12=cm, 13=0.1 cm, 14=0.01 cm

**Air/Material Mode**

Dec: 11 Hex: B Range: 0-1

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	0	0	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: 0 = air space mode, 1 = material mode

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

**Block Transfer Commands: KM-RIO/Sono II & ultra-wave™****Window**

Dec: 12 Hex: C Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**Minimum Range**

Dec: 13 Hex: D Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**Maximum Range**

Dec: 14 Hex: E Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sono II & ultra-wave™

### Special Display Units (maximum value)

Dec: 15 Hex: F Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Averaging Factor

Dec: 16 Hex: 10 Range: 1-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Echo Loss Timer

Dec: 20 Hex: 14 Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sono II & ultra-wave™

### Power

Dec: 22 Hex: 16 Range: 0-1000 (100.0%)

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Near Gain

Dec: 23 Hex: 17 Range: 0-10000 (100.00%)

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Echo Detection Threshold

Dec: 24 Hex: 18 Range: 0-1000 (100.0%)

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sono II & ultra-wave™

### Peak Detection Threshold

Dec: 25 Hex: 19 Range: 0-1000 (100.0%)

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Active TVG (read only)

Dec: 26 Hex: 1A Range: 0-10000 (100.00%)

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### TVG High Limit

Dec: 27 Hex: 1B Range: 0-10000 (100.00%)

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Sono II & ultra-wave™

### TVG Low Limit

Dec: 28 Hex: 1C Range: 0-10000 (100.00%)

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Transmit Cycles

Dec: 29 Hex: 1D Range: 0-100

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Raw Target in Inches (centimeters) (read only)

Dec: 35 Hex: 23 Range: 0-65535

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: To .01 inches or .01 cm (format xxx.xx)

**Block Transfer Commands: KM-RIO/Sono II & ultra-wave™****Application Type (read only)**

Dec: 39 Hex: 27 Range: 0-99

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	1	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

Notes: 0 = level, 1 = flow, 3 = differential level detection, 99 = math channel

**Force Setpoint Mode (set only)**

Dec: 45 Hex: 2D Range: 0-2

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	d	Data Word
Word 1 -	1	0	1	0	1	1	0	1	0	D	D	D	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	Command Word

**Notes:**

- Bits 4, 5, and 6 are the setpoint number (000=Setpoint 1 through 111=Setpoint 8).
- To activate the Force Mode, set bit 1 of the Data Word to 1 and set the write bit (bit 15 of Command Word) to 1. To deactivate the Force Mode, set bit 1 of the Data Word to 0 and set the write bit to 1.
- Bit 0 of the Data Word represents the state of the setpoint (1=On, 0=Off) when the Force Mode is active. When the force mode is inactive, the setpoint is controlled by the Sono II microprocessor card.

**CAUTION**


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The Force Setpoint Mode command removes control of the indicated setpoint from the Sono II and gives it to the PLC. The Sono II does not activate the setpoints based on the input value (for example: level, head, flow, etc.) when the Force Setpoint Mode is active.

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# KM-RIO Allen-Bradley Discrete Transfer Commands

**KM-RIO/Sonologic II & ultra-wave™ Discrete Transfer Command Table**

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
Level	1	1	0-65535	Level/head
Flow	2	2	0-65535	Valid for flow applications only
Main Totalizer Low Word	3	3	0-65535	Valid for flow applications only
Main Totalizer High Word	4	4	0-65535	Valid for flow applications only
A-B Revision Report	5	5	0-255 MSB 0-255 LSB	MSB (1st byte of the word) is KM-RIO card firmware revision: 0-127 = XNEW-XZZV, 128-255 = NEW-ZZV. LSB (2nd byte of the word) is signal processor type: 1=Sono series 5000-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000
Reserved	6	6		
Status (includes errors)	7	7	0-255	Channel status (errors included) is reported as shown in the Channel Status Table.

*Note:* The Command Number is echoed in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.

**Channel Status Table (Bit set to 1)**

Bit 17	Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10
—	Engineering unit overflow error	—	COM error	Illegal averaging factor	Over-temperature condition	Echo loss	—

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

# **Chapter 8. Commands for KM-RIO/Weigh II**

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## **Chapter Contents**

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*Note*

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Refer to Chapter 3 for general information on PLC programming.

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## KM-RIO Allen-Bradley Block Transfer Commands

### Quick Command Reference Table for KM-RIO/Weigh II

Weigh II Parameters	Command		Range	Comments	Page No.
	Dec	Hex			
Gross Weight	1	1	0-999999	Value in selected engineering units	8-3
Net Weight	2	2	0-±999999	Value in selected engineering units	8-3
Tare	6	6	—		8-3
Status (includes errors)	7	7	0-255		8-4
Zero Cal (Auto)	8	8	0-999999	Value in selected engineering units	8-4
Lo Span Cal (Auto)	9	9	0-999999	Value in selected engineering units	8-4
Hi Span Cal (Auto)	10	A	0-999999	Value in selected engineering units	8-5
Scale Factor Cnts (Manual)	11	B	0-2097151		8-5
Scale Factor Wt (Manual)	12	C	0-999999	Value in selected engineering units	8-5
Zero Counts (Manual)	13	D	0-2097151		8-6
Excitation	14	E	0-255		8-6
Averaging Factor	16	10	1-255		8-6
Raw Input Counts	30	1E	0-2097151	For linearization table. Bits 5, 6, & 7 of Command Word is Linear Table Entry Number: 0=1st, 1=2nd, 2=3rd, 3=4th, 4=5th	8-7
Corrected Output Counts	31	1F	0-2097151	For linearization table. Bits 5, 6, & 7 of Command Word is Linear Table Entry Number: 0=1st, 1=2nd, 2=3rd, 3=4th, 4=5th	8-7
Linearization Enable	32	20	0-1	0=linearization off, 1=linearization on	8-7
Raw A/D Counts	33	21	0-2097151		8-8
Application Type	39	27	0-99	0=weight device, 99=math channel	8-8

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form

## Block Transfer Commands: KM-RIO/Weigh II

### Gross Weight (read only)

Dec: 1 Hex: 1 Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	0	1	0	0	0	0	d	d	d	d

Data Word  
Command Word

### Net Weight (read only)

Dec: 2 Hex: 2 Range: 0-±999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	1	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

### Tare (set only)

Dec: 6 Hex: 6 Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Word 1 -	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: To set tare, set bit 0 of Data Word to 1 and use the Write bit.

## Block Transfer Commands: KM-RIO/Weigh II

### Status (read only)

Dec: 7 Hex: 7 Range: 0-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Notes: Description of status (bits 8-15 of data word)

Bit 8 -Net units negative

Bit 9 - N/A

Bit 10 - During Auto Cal "Warning: Move More Material"

Bit 11 - During Auto Cal: "Ambiguous Error"

lo\_cnt>hi\_cnt. Other: Illegal average factor

Bit 12 - COM error condition

Bit 13 - Analog input overrange

Bit 14 - Engineering unit overflow

Bit 15 - Gross units negative

### Zero Cal (Auto Calibration)

Dec: 8 Hex: 8 Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *Weigh II Installation and Operation Manual*.

### Lo Span Cal (Auto Calibration)

Dec: 9 Hex: 9 Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	1	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *Weigh II Installation and Operation Manual*.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Weigh II

### Hi Span Cal (Auto Calibration)

Dec: 10 Hex: A Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *Weigh II Installation and Operation Manual*.

### Scale Factor Counts (Manual Calibration)

Dec: 11 Hex: B Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

### Scale Factor Weight (Manual Calibration)

Dec: 12 Hex: C Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex =# in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Weigh II

### Zero Counts (Manual Calibration)

Dec: 13 Hex: D Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

### Excitation

Dec: 14 Hex: E Range: 0-255

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Averaging Factor

Dec: 16 Hex: 10 Range: 1-255

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Weigh II

### Raw Input Counts (Linearization Table)

Dec: 30 Hex: 1E Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	0	D	D	D	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	0	0	0	0	d	d	d	d	d

Data Word  
Command Word

Note: Bits 5, 6, & 7 of Command Word is Linear Table Entry Number (0=1st, 1=2nd, 2=3rd, 3=4th, 4=5th)

### Corrected Output Counts (Linearization Table)

Dec: 31 Hex: 1F Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	1	D	D	D	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

Note: Bits 5, 6, & 7 of Command Word is Linear Table Entry Number (0=1st, 1=2nd, 2=3rd, 3=4th, 4=5th)

### Linearization Enable

Dec: 32 Hex: 20 Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: 0 = linearization off, 1 = linearization on

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/Weigh II

### Raw A/D Counts (read only)

Dec: 33 Hex: 21 Range: 0-2097151

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	1	0	0	0	0	1	0	0	0	d	d	d	d	d	Command Word

### Application Type (read only)

Dec: 39 Hex: 27 Range: 0-99

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	1	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

Note: 0 = weight device, 99 = math channel

# KM-RIO Allen-Bradley

## Discrete Transfer Commands

Discrete Transfer Command Table

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
Gross Weight	1	1	0-65535 <sup>1</sup>	
Net Weight	2	2	0-±65535 <sup>1</sup>	
Reserved	3	3		
Reserved	4	4		
A-B Revision Report	5	5	0-255 MSB 0-255 LSB	MSB (1st byte of the word) is KM-RIO card firmware revision: 0-127 (XNEW-XZZV), 128-255 (NEW-ZZV). LSB (2nd byte of the word) is signal processor type: 1=Sono 5000 series-ITU-SSU, 2=STX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000
Tare	6	6		Weigh II channel is tared
Status (includes errors)	7	7	0-255	Channel status (errors included) is reported as shown in the Channel Status Table

<sup>1</sup> Note: The Weigh II supports engineering units up to 999999, but the discrete transfer command is limited to 16 bits (65535). Values larger than 65535 will be transmitted as 65535.

Note: The Command Number is echoed in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.

Channel Status Table (Bit set to 1)

Bit 17	Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10
Gross units negative	Engineering unit overflow error	Analog input overranging A/D converter	COM error	—	—	—	Net units negative

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form



# **Chapter 9. Commands for KM-RIO/SVS 2000**

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## **Chapter Contents**

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*Note*

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Refer to Chapter 3 for general information on PLC programming.

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# KM-RIO Allen-Bradley Block Transfer Commands

## Quick Command Reference Table for KM-RIO/SVS 2000

SVS 2000 Parameters	Command		Range	Comments	Page No.
	Dec	Hex			
Gross Weight	1	1	0-9999999	Value in selected engineering units	9-3
Net Weight	2	2	0-±9999999	Value in selected engineering units	9-3
Tare	6	6	—		9-3
Status (includes errors)	7	7	0-255		9-4
Display Value Correction (Auto)	8	8	0-999999	Value in selected engineering units	9-4
Lo Span Cal (Auto)	9	9	0-999999	Value in selected engineering units	9-4
Hi Span Cal (Auto)	10	A	0-999999	Value in selected engineering units	9-5
Scale Factor Counts (Manual)	11	B	0-2097151		9-5
Scale Factor Weight (Manual)	12	C	0-999999	Value in selected engineering units	9-5
Zero Counts (Manual)	13	D	0-2097151		9-6
Averaging	16	10	1-255		9-6
Linearize Set — Raw Input Weight <sup>1</sup>	30	1E	0-999999		9-6
Linearize Set — Corrected Output Weight <sup>1</sup>	31	1F	0-999999		9-7
Linearize Enable	32	20	0-1	0=linearization off, 1=linearization on	9-7
Raw A/D Counts	33	21	0-2097151		9-7
Filtered A/D Counts	35	23	0-2097151		9-8
Setpoint Preact <sup>2</sup>	39	27	0-65535	Value in selected engineering units	9-8
Setpoint Value <sup>2,3</sup>	40	28	0-±999999	Value in selected engineering units	9-8
Setpoint Deadband <sup>2</sup>	41	29	0-65535	Value in selected engineering units	9-9
Setpoint Hi/Lo <sup>2</sup>	42	2A	0-1	0=Lo, 1=Hi	9-9
Setpoint Track <sup>2</sup>	43	2B	0-3	0=Gross, 1=Net, 2=Total, 3=Fault	9-9
Setpoint Failsafe <sup>2</sup>	44	2C	0-2	0=Off, 1=No Change, 2=On	9-10
Setpoint Force Mode <sup>2,4</sup>	45	2D	—		9-10
IOut Range	46	2E	0-1	0=0-20mA, 1=4-20mA	9-11
IOut 4/0mA Value <sup>5</sup>	47	2F	0-±999999	Value in selected engineering units	9-11
IOut 20mA Value <sup>5</sup>	48	30	0-±999999	Value in selected engineering units	9-11
IOut Track	49	31	0-1	0=Gross, 1=Net	9-12
IOut Failsafe	50	32	0-2	0=Lo, 1=Hi, 2=No Change	9-12
Current Force Mode <sup>6</sup>	51	33	0-16383		9-12

### Notes:

- Bits 5-7 of Command Word is linearization table entry number (0=1st entry through 4=5th entry).
- Bits 4-6 of Command Word is setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).
- When Net is selected for Setpoint Track, Bit 7 of Command Word is polarity for Setpoint Value.
- To activate Setpoint Force Mode, set bit 1 of Data Word to 1 and set Write bit to 1. To deactivate Setpoint Force Mode, set bit 1 of Data Word to 0 and set Write bit to 1. Bit 0 of Data Word represents setpoint state (1=On, 0=Off) when Force Mode is active. When Force Mode is inactive, setpoint is controlled by SVS 2000.
- When Net is selected for IOut Track, Bit 7 of Command Word is polarity for 4/0 and 20 mA Values.
- To activate Current Force Mode, set bit 0 of Command Word to 1 and set Write bit to 1. To deactivate Current Force Mode, set bit 0 of Command Word to 0 and set Write bit to 1. Data in bits 0-13 of Data Word is value loaded into Current Output PCB of SVS 2000. When Force Mode is inactive, current output is controlled by SVS 2000.

### CAUTION

The Setpoint and Current Force Mode commands remove control of the selected setpoint(s) and current output from the SVS 2000 and give control to the PLC. The SVS 2000 will not update the setpoint(s) or current output when the respective Force Mode is active.

## Block Transfer Commands: KM-RIO/SVS 2000

### Gross Weight (read only)

Dec: 1 Hex: 1 Range: 0-9999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	0	1	d	d	d	d	d	d	d	d

Data Word  
Command Word

### Net Weight (read only)

Dec: 2 Hex: 2 Range: 0-±9999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	0	0	1	0	d	d	d	d	d	d	d	d

Data Word  
Command Word

### Tare (set only)

Dec: 6 Hex: 6 Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Word 1 -	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

Note: To set tare, set bit 0 of Data Word to 1 and use the Write bit.

## Block Transfer Commands: KM-RIO/SVS 2000

### Status (read only)

Dec: 7 Hex: 7 Range: 0-255

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	0	0	0	0	0	0	0	0
Word 1 -	e	p	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

Notes: Description of status (bits 8-15 of data word)

Bit 8 - Net units negative

Bit 12 - N/A

Bit 9 - N/A

Bit 13 - Analog input overrange

Bit 10 - During Auto Cal "Warning: Move More Material"

Bit 14 - Engineering unit overflow

Bit 11 - During Auto Cal: "Ambiguous Error"

Bit 15 - Gross units negative

lo\_cnt &gt; hi\_cnt. Other: Illegal average factor

### Display Value Correction (Auto Calibration)

Dec: 8 Hex: 8 Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

### Lo Span Cal (Auto Calibration)

Dec: 9 Hex: 9 Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	0	1	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *SVS 2000 Installation and Operation Manual*.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/SVS 2000

### Hi Span Cal (Auto Calibration)

Dec: 10 Hex: A Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: You must move material when performing Auto Cal. See *SVS 2000 Installation and Operation Manual*.

### Scale Factor Counts (Manual Calibration)

Dec: 11 Hex: B Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	0	1	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

### Scale Factor Weight (Manual Calibration)

Dec: 12 Hex: C Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Legend: Dec = # in decimal form; Hex =# in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/SVS 2000

### Zero Counts (Manual Calibration)

Dec: 13 Hex: D Range: 0-2097151

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	0	1	1	0	1	0	0	0	d	d	d	d	d

Data Word  
Command Word

### Averaging

Dec: 16 Hex: 10 Range: 1-255

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word  
Command Word

### Linearize Set — Raw Input Weight

Dec: 30 Hex: 1E Range: 0-999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	0	D	D	D	0	0	0	0	0

Data Word  
Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	0	0	0	0	0	d	d	d	d

Data Word  
Command Word

Note: Bits 5, 6, and 7 of Command Word is Linear Table Entry Number (0=1st through 4=5th)

## Block Transfer Commands: KM-RIO/SVS 2000

### Linearize Set — Corrected Output Weight

Dec: 31 Hex: 1F Range: 0-999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	0	1	1	1	1	1	D	D	D	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	0	1	1	1	1	1	0	0	0	0	d	d	d	d

Data Word

Command Word

Note: Bits 5, 6, and 7 of Command Word is Linear Table Entry Number (0=1st through 4=5th)

### Linearize Enable

Dec: 32 Hex: 20 Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Word

Command Word

Note: 0 = linearization off, 1 = linearization on

### Raw A/D Counts (read only)

Dec: 33 Hex: 21 Range: 0-2097151

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	0	0	0	1	0	0	0	d	d	d	d	d

Data Word

Command Word

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/SVS 2000

### Filtered A/D Counts (read only)

Dec: 35 Hex: 23 Range: 0-2097151

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	1	0	0	0	1	1	0	0	0	d	d	d	d	d	Command Word

### Setpoint Preact

Dec: 39 Hex: 27 Range: 0-65535

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	0	1	1	1	0	D	D	D	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	p	1	0	0	1	1	1	0	0	0	0	0	0	0	0	Command Word

Note: Bits 4, 5, and 6 of Command Word is the setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).

### Setpoint Value

Dec: 40 Hex: 28 Range: 0-±999999

**BTW Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	1	0	0	0	0	D	D	D	0	0	0	0	Command Word

**BTR Table**

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -	e	0	1	0	1	0	0	0	p	0	0	0	d	d	d	d	Command Word

Notes:

1. Bits 4, 5, and 6 of Command Word is the setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).
2. When Net is selected for Setpoint Track, Bit 7 of Command Word is polarity for the Setpoint Value.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/SVS 2000

### Setpoint Deadband

Dec: 41 Hex: 29 Range: 0-65535

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	1	0	0	1	0	D	D	D	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	p	1	0	1	0	0	1	0	0	0	0	0	0	0	0

Data Word

Command Word

Note: Bits 4, 5, and 6 of Command Word is the setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).

### Setpoint Hi/Lo

Dec: 42 Hex: 2A Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	1	0	1	0	0	D	D	D	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	1	0	1	0	1	0	0	0	0	0	0	0	0	0

Data Word

Command Word

#### Notes:

- Bits 4, 5, and 6 of Command Word is the setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).
- Bit 0 of Data Word: 0=Lo, 1=Hi

### Setpoint Track

Dec: 43 Hex: 2B Range: 0-3

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	1	0	1	1	0	D	D	D	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d
Word 1 -	e	p	1	0	1	0	1	1	0	0	0	0	0	0	0	0

Data Word

Command Word

#### Notes:

- Bits 4, 5, and 6 of Command Word is the setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).
- Bit 0 and 1 of Data Word: 0=Gross, 1=Net, 2=Total, 3=Fault

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/SVS 2000

### Setpoint Failsafe

Dec: 44 Hex: 2C Range: 0-2

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	1	1	0	0	0	D	D	D	0	0	0	0	Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	Data Word
Word 1 -	e	p	1	0	1	1	0	0	0	0	0	0	0	0	0	0	Command Word

#### Notes:

- Bits 4, 5, and 6 of Command Word is the setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).
- Bits 0 and 1 of Data Word: 0=Off, 1=No Change, 2=On

### Setpoint Force Mode (set only)

Dec: 45 Hex: 2D Range: N/A

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	d	Data Word
Word 1 -	1	0	1	0	1	1	0	1	0	D	D	D	0	0	0	0	Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	Command Word

#### Notes:

- Bits 4, 5, and 6 of Command Word is setpoint number (0=Relay1, 1=Relay2, 2=Digital Output1, through 7=Digital Output6).
- To activate Force Mode, set bit 1 of Data Word to 1 and set Write bit (bit 15 of Command Word) to 1.  
To deactivate Force Mode, set bit 1 of Data Word to 0 and set Write bit to 1.
- Bit 0 of Data Word represents state of setpoint (1=On, 0=Off) when Force Mode active.  
When Force Mode inactive, setpoint controlled by SVS 2000.

#### CAUTION

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Setpoint Force Mode command removes control of setpoint from the SVS 2000 and gives it to the PLC. SVS 2000 will not update setpoint when Force Mode is active.

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## Block Transfer Commands: KM-RIO/SVS 2000

### IOut Range

Dec: 46 Hex: 2E Range: 0-1

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d
Word 1 -	e	p	1	0	1	1	1	0	0	0	0	0	0	0	0	0

Data Word

Command Word

Note: Bit 0 of Data Word: 0=0-20 mA, 1=4-20 mA

### IOut 4/0 mA Value

Dec: 47 Hex: 2F Range: 0-±999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	0	1	0	1	1	1	1	p	0	0	0	d	d	d	d

Data Word

Command Word

Note: When Net is selected for IOut Track, Bit 7 of Command Word is polarity of 4/0 mA value.

### IOut 20 mA Value

Dec: 48 Hex: 30 Range: 0-±999999

BTW Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1 -	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0

Data Word

Command Word

BTR Table

Dec. Bit -	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0 -	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Word 1 -	e	0	1	1	0	0	0	0	p	0	0	0	d	d	d	d

Data Word

Command Word

Note: When Net is selected for IOut Track, Bit 7 of Command Word is polarity of 20 mA value.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

## Block Transfer Commands: KM-RIO/SVS 2000

### IOut Track

Dec: 49 Hex: 31 Range: 0-1

		BTW Table																
Dec. Bit -		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -		0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	Command Word

		BTR Table																
Dec. Bit -		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	Data Word
Word 1 -		e	p	1	1	0	0	0	1	0	0	0	0	0	0	0	0	Command Word

Note: Bit 0 of Data Word: 0=Gross, 1=Net

### IOut Failsafe

Dec: 50 Hex: 32 Range: 0-2

		BTW Table																
Dec. Bit -		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -		0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	Command Word

		BTR Table																
Dec. Bit -		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -		0	0	0	0	0	0	0	0	0	0	0	0	0	0	d	d	Data Word
Word 1 -		e	p	1	1	0	0	1	0	0	0	0	0	0	0	0	0	Command Word

Note: Bits 0 and 1 of Data Word: 0=Lo, 1=Hi, 2=No Change

### Current Force Mode (set only)

Dec: 51 Hex: 33 Range: 0-16383

		BTW Table																
Dec. Bit -		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -		0	0	d	d	d	d	d	d	d	d	d	d	d	d	d	d	Data Word
Word 1 -		1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	1	Command Word

		BTR Table																
Dec. Bit -		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Word 0 -		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Data Word
Word 1 -		0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	Command Word

#### Notes:

- To activate Force Mode, set bit 0 of Command Word to 1 and set Write bit (bit 15) to 1.  
To deactivate Force Mode, set bit 0 of Command Word to 0 and set Write bit to 1.
- Data in bits 0-13 of Data Word is value loaded into Current Output PCB of SVS 2000. 0 is associated with 0/4 mA (dependent on what was selected for IOut Range) and 16383 is associated with 20 mA. A-B RIO does a linear interpolation between those two currents to calculate value of the forced current.
- When Force Mode inactive (bit 0 of Command Word set to 0), current output is controlled by SVS 2000.

#### CAUTION

Current Force Mode command removes control of current output from the SVS 2000 and gives it to the PLC. SVS 2000 will not update current output when Force Mode is active.

Legend: Dec = # in decimal form; Hex = # in hexadecimal form; e = error; p = polarity; ddd... = data; D... = subcommand

# KM-RIO Allen-Bradley

## Discrete Transfer Commands

Discrete Transfer Command Table

Parameter	Command		Range	Comments
	Dec	Hex		
Null Command	0	0	—	Returns zero in all data/command fields (including error and polarity bits)
Gross Weight	1	1	0-65535 <sup>1</sup>	
Net Weight	2	2	0-±65535 <sup>1</sup>	
Reserved	3	3		
Reserved	4	4		
A-B Revision Report	5	5	0-255 MSB 0-255 LSB	MSB (1st byte of the word) is A-B RIO PCB firmware revision: 0-127 (XNEW-XZZV), 128-255 (NEW-ZZV). LSB (2nd byte of the word) is signal processor type: 0=MVS, 1=Sono 5000 series-ITU-SSU, 2=STX, 5=ITX, 10=1000, 11=1020, 7=Sono II/u-w, 8=Weigh II, 14=SVS 2000
Tare	6	6		SVS 2000 channel is tared
Status (includes errors)	7	7	0-255	Channel status (errors included) is reported as shown in the Channel Status Table.

<sup>1</sup> Note: The SVS 2000 supports engineering units up to 999999, but the discrete transfer command is limited to 16 bits (65535). Values larger than 65535 will be transmitted as 65535.

Note: The Command Number is echoed back in the Discrete Input Table when complete. Polarity and error status are also updated in the Discrete Input Table.

Channel Status Table (Bit set to 1)

Bit 17	Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10
Gross units negative	Engineering unit overflow error	Analog input overranging A/D converter	COM error	—	—	—	Net units negative

Legend: Dec = numbers in decimal form; Hex = numbers in hexadecimal form



# Appendix A. Kistler-Morse Service and Warranty

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## Product Warranty

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A complete, unabridged copy of our product warranty is available upon request from Kistler-Morse. A summary of the warranty, *subject to the terms and conditions listed fully in the warranty*, follows:

Kistler-Morse warrants equipment of its own manufacture to be free from defects in material and workmanship for one year from date of shipment to original user. Kistler-Morse will replace or repair, at our option, any part found to be defective. Buyer must return any part claimed defective to Kistler-Morse, transportation prepaid.

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## Service

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K-M maintains a fully trained staff of field service personnel who are capable of providing you with complete product assistance. Our field service staff is based in Bothell, Washington USA (corporate headquarters) and Antwerp, Belgium (European office).

### Phone Consultation

Our Field Service staff provides the following services by telephone, via our regular and toll free number (toll free in USA and Canada only):

- Technical, application, and troubleshooting assistance
- Spare parts assistance
- Warranty (replacement) assistance

### On-Site Consultation

K-M's Field Service staff can provide additional services at your request. Contact K-M at the closest office for rate and scheduling information for the following services:

- Technical, application, startup, and troubleshooting assistance on-site
- Training on-site or at our corporate office
- Service calls
- Equipment updates to our latest configuration

General descriptions of some of these standard services follow. Of course, if your service needs vary from those described, we are available to discuss them with you.

### Installation, Startup Assistance, and On-Site Training

#### Notes

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1. For vessels to be instrumented with Microcells™, L-Cells®, or Sonocells, the customer may contract to have K-M install the sensors/transducers. For all other types of sensors and transducers, installation must be performed by the customer.
  2. Field wiring, conduit installation, junction box mounting, and signal processor mounting must be performed by the customer. The AC power must be connected to the signal processor, but not energized, prior to K-M beginning work.
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All field wiring will be checked for errors. The system will be powered up and checked for proper electrical operation. For best results, K-M requires moving a known amount of material, such as a truckload, for Live Load calibration. Live load calibration will be performed if actual material or weight devices can be moved. If it is not possible to move material, a Manual calibration will be performed. Recommendations for the optimal performance of the system will be provided.

On-site training will include simulation of the Live Load calibration process (if Live Load calibration can not be performed while K-M is on site) and instruction covering operation and maintenance of the system.

### **Troubleshooting**

K-M will troubleshoot systems for mechanical, electrical, calibration, and wiring errors. Normal component repairs will be made and wiring errors will be corrected, including replacement of non-repairable printed circuit boards.

### **Service Calls**

K-M will perform on-site repair/ replacement services.

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## **Return Material Authorization**

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If a part needs to be sent to the factory for repair, contact K-M's corporate office and ask for a Return Material Authorization (RMA) number. The RMA number identifies the part and its owner and must be included with the part when it is shipped to the factory.

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## **Address and Telephone Numbers**

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### **Corporate Office**

**Kistler-Morse Corporation**  
19021 120th Avenue NE Suite 101  
Bothell, WA 98011-9511 USA

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[www.kistlermorse.com](http://www.kistlermorse.com)

[sales@kistlermorse.com](mailto:sales@kistlermorse.com)

### **European Office**

**Kistler-Morse Corporation**  
Rucaplein 531  
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# ***Appendix B. Technical Drawings***

This appendix contains the following technical drawings for the KM-RIO:

<b>Drawing No.</b>	<b>Drawing Title</b>
TI-MP.KMRIO-01	KM-RIO Interconnect Diagram

