Dashboard Specification
Reference Guide

Innovation First
Dashboard Viewer   RC Data

From RC to OI

PWM 01	55	Port 1 Y	PWM 09	127	Port 1 Wheel
PWM 02	127	Port 2 Y	PWM 10	127	Port 2 Wheel
PWM 03	127	Port 3 Y	PWM 11	127	Port 3 Wheel
PWM 04	127	Port 4 Y	PWM 12	127	Port 4 Wheel
PWM 05	94	Port 1 X	PWM 13	22	Drive
PWM 06	127	Port 2 X	PWM 14	22	Mixed
PWM 07	127	Port 3 X	PWM 15	88	Drive
PWM 08	127	Port 4 X	PWM 16	88	Mixed

LED BYTE 01	2	PWM/Relay	USER BYTE 03	0	Redefinable
LED BYTE 02	0	Switch 1-3	USER BYTE 04	0	Redefinable
USER BYTE 01	0	Redefinable	USER BYTE 05	0	Redefinable
USER BYTE 02	0	Redefinable	USER BYTE 06	0	Redefinable
			USER CMD	0	Redefinable

BREAKER PANEL
Breakers Tripped   19

1		10		20	
2		11		21	
3		12		22	
4		13		40-1	
5		14		40-2	
6		15		40-3	
7		16		40-4	
8		17		40-5	
9		18		40-6	

PACKET NUMBER **151**   MASTER VERSION **7**

CHANNEL **13**   TEAM NUMBER **8**   BATTERY VOLTAGE   MAIN **12.7**   BACKUP **0.0**

Receiving Data   COM1   19200

Innovation First
Dashboard Viewer   OI Data

From OI to RC

PORT 1				PORT 3		
Y	58	Redefinable		Y	127	Redefinable
X	97	Redefinable		X	127	Redefinable
WHEEL	127	Redefinable		WHEEL	127	Redefinable
AUX	68	Redefinable		AUX	127	Redefinable
TRIG		Relay 1 REV		TRIG		Redefinable
TOP		Relay 1 FWD		TOP		Redefinable
AUX 1		Redefinable		AUX 1		Redefinable
AUX 2		Redefinable		AUX 2		Redefinable

PORT 2				PORT 4		
Y	127	Redefinable		Y	127	Redefinable
X	127	Redefinable		X	127	Redefinable
WHEEL	127	Redefinable		WHEEL	127	Redefinable
AUX	127	Redefinable		AUX	127	Redefinable
TRIG		Redefinable		TRIG		Redefinable
TOP		Redefinable		TOP		Redefinable
AUX 1		Redefinable		AUX 1		Redefinable
AUX 2		Redefinable		AUX 2		Redefinable

41
PACKET NUMBER

40
CHANNEL

8
TEAM NUMBER

Receiving Data   COM1   19200

Data Packet structure for the Dashboard Port.

Innovation First does not have the technical staff to answer questions about writing a program to use this data. We are supplying the following data spec as a courtesy to the teams involved in the FIRST competition. Code at your own risk.

The data sent out the Dashboard port is a stream of bytes. There are 26 bytes in a packet. The packets are transmitted approximately 40 times per second. The start of each packet is identified by a unique 0xff, 0xff (255, 255) marker. Data packets are sent out the Dashboard port exactly as they are received by the Radio Modem and may contain transmission errors. The data is, however, passed through a RS-232 driver chip to set it to proper levels for general use.

Notes:
1. The IFI Dashboard Viewer now interprets the incoming data and changes the display window depending on the OI/RC jumper setting (located on the OI).

2. The firmware in the Robot Controller (2004 or later) interlaces data packets.

3. RS-232 port settings: 19200 baud, No Parity, 8 data, 1 stop

4. Both CHECKSUM A and CHECKSUM B bytes are IFI proprietary

The following is the data specification for the packets from the OI to the RC:

Byte 1,2	0xFF, 0xFF	(ATTENTION, start of packet)
Byte3	PORT 2 X-AXIS	
Byte4	SWITCHES_A	
Byte5	PORT 1 X-AXIS	
Byte6	SWITCHES_B	
Byte7	PORT4 X-AXIS	
Byte8	CTRL_A	(see DETAILED BYTE DEFINITIONS section)
Byte9	PORT 3 X-AXIS	
Byte10	CTRL_B	(see DETAILED BYTE DEFINITIONS section)
Byte11	PORT 2 Y-AXIS	
Byte12	CTRL_C	(see DETAILED BYTE DEFINITIONS section)
Byte13	PORT1 Y-AXIS	
Byte14	PACKET NUMBER	
Byte15	PORT 4 Y-AXIS	
Byte16	CHECKSUM_A	
Byte17	PORT 3 Y-AXIS	
Byte18	CHECKSUM_B	
Byte19	PORT 2 WHEEL	
Byte20	PORT 1 WHEEL	
Byte21	PORT 4 WHEEL	
Byte22	PORT 3 WHEEL	
Byte23	PORT 2 AUX	
Byte24	PORT 1 AUX	
Byte25	PORT 4 AUX	
Byte26	PORT 3 AUX	

The following is the interlaced data specification for the packets from the RC to the OI:

Data Frame 1: (Legacy) [CTRL_C Bit 7= 0, CTRL_A Bit 4 = 0]

Byte01,02	0xFF, 0xFF	(ATTENTION, start of packet)
Byte03	PWM 1	
Byte04	LED BYTE 2	
Byte05	PWM 2	
Byte06	USER BYTE 2	
Byte07	PWM 3	
Byte08	CTRL_A	(see DETAILED BYTE DEFINITIONS section)
Byte09	PWM 4	
Byte10	CTRL_B	(see DETAILED BYTE DEFINITIONS section)
Byte11	PWM 5	
Byte12	CTRL_C	(see DETAILED BYTE DEFINITIONS section)
Byte13	PWM 6	
Byte14	PACKET NUMBER	
Byte15	PWM 7	
Byte16	CHECKSUM_A	
Byte17	PWM 8	
Byte18	CHECKSUM_B	
Byte19	PWM 9	
Byte20	LED BYTE 1	
Byte21	PWM 10	
Byte22	PWM 11	
Byte23	PWM 12	
Byte24	PWM 13	
Byte25	PWM 14	
Byte26	AUX_BYTE	(see DETAILED BYTE DEFINITIONS section)

Data Frame 2: (Extended) [CTRL_C Bit 7= 0, CTRL_A Bit 4 = 1]

Byte	Value	Description
Byte01,02	0xFF, 0xFF	(ATTENTION, start of packet)
Byte03	PWM 15	
Byte04	LED BYTE 2	
Byte05	PWM 16	
Byte06	USER BYTE 2	
Byte07	ZERO	
Byte08	CTRL_A	(see DETAILED BYTE DEFINITIONS section)
Byte09	USER BYTE 3	(see NOTES below)
Byte10	CTRL_B	(see DETAILED BYTE DEFINITIONS section)
Byte11	USER BYTE 4	(see NOTES below)
Byte12	CTRL_C	(see DETAILED BYTE DEFINITIONS section)
Byte13	USER BYTE 5	(see NOTES below)
Byte14	PACKET NUMBER	
Byte15	USER BYTE 6	(see NOTES below)
Byte16	CHECKSUM_A	
Byte17	USER BYTE 1	
Byte18	CHECKSUM_B	
Byte19	ZERO	
Byte20	LED BYTE 1	
Byte21	ZERO	
Byte22	RESERVED	
Byte23	CONFIG BYTE 1	
Byte24	USER CMD	
Byte25	CONFIG BYTE 2	
Byte26	AUX_BYTE	(see DETAILED BYTE DEFINITIONS section)

NOTES:

USER BYTE 3-6 ("Breaker Panel Feedback" indicators for the Dashboard):

USER BYTE 3 = Breaker Panel byte 3
USER BYTE 4 = Breaker Panel byte 4
USER BYTE 5 = Breaker Panel byte 5
USER BYTE 6 = Breaker Panel byte 6

A detailed description for these user bytes are found in the "breaker-panel-packet-definitions.pdf" file.

Data Frame 3: (Status Frame) [CTRL_C Bit 7= 1, CTRL_A Bit 4 = 1]

Byte01,02	0xFF, 0xFF	(ATTENTION, start of packet)
Byte03	RESERVED	
Byte04	LED BYTE 2	
Byte05	RESERVED	
Byte06	USER BYTE 2	
Byte07	RC VERSION NUMBER	
Byte08	CTRL_A	(see DETAILED BYTE DEFINITIONS section)
Byte09	RESERVED	
Byte10	CTRL_B	(see DETAILED BYTE DEFINITIONS section)
Byte11	ZERO	
Byte12	CTRL_C	(see DETAILED BYTE DEFINITIONS section)
Byte13	RESERVED	
Byte14	PACKET NUMBER	
Byte15	RESERVED	
Byte16	CHECKSUM_A	
Byte17	MAIN BAT VOLTAGE	
Byte18	CHECKSUM_B	
Byte19	BACKUP BAT VOLTAGE	
Byte20	LED BYTE 1	
Byte21	RESERVED	
Byte22	RESERVED	
Byte23	MASTER ERROR CODE	
Byte24	USER ERROR CODE	
Byte25	USER WARNING CODE	
Byte26	AUX_BYTE	(see DETAILED BYTE DEFINITIONS section)

DETAILED BYTE DEFINITIONS:

AUX_BYTE ("Robot Controller" indicators on the Operator Interface):

Bit 0   Reserved for future use
Bit 1   Dead Main Battery
Bit 2   Valid RX on Robot
Bit 3   Reserved for future use
Bit 4   Low Main Battery
Bit 5   Code Violation
Bit 6   Reserved for future use
Bit 7   Low/No Backup Battery

LED BYTE 1 ("Robot Feedback" indicators on Operator Interface):

Bit 0   PWM1_ Forward   (Green)
Bit 1   PWM1_ Reverse   (Red)
Bit 2   PWM2_ Forward   (Green)
Bit 3   PWM2_ Reverse   (Red)
Bit 4   RLY1_Reverse   (Red)

Bit 5   RLY1_Forward   (Green)
Bit 6   RLY2_Reverse   (Red)
Bit 7   RLY2_Forward   (Green)

LED BYTE 2 ("Robot Feedback" indicators on Operator Interface):

Bit 0   Switch 1   (Green)
Bit 1   Switch 2   (Green)
Bit 2   Switch 3   (Green)

The TEAM number, Channel Number and Moding bits are contained in the following bytes:

CTRL_A= Bits 7,6,5,4 – Moding bits
CTRL_A= Bits 3,2,1,0 - 4 upper bits of TEAM number

CTRL_B= 8 lower bits of TEAM number

CTRL_C= Bits 7,6 – Moding bits
CTRL_C= Bits 5,4,3,2,1,0 - Channel Number