Innovation First, Inc.

Default Code Reference Guide

For the 2004 Full-Size RC

```
/********************************************************************************
* FUNCTION NAME: Default_Routine
* PURPOSE:       Performs the default mappings of inputs to outputs for the
*                Robot Controller.
* CALLED FROM:   this file, Process_Data_From_Master_uP routine
* ARGUMENTS:     none
* RETURNS:       void
-------------------------------------------------------------------------------*/
void Default_Routine(void)
{

 /*---------- Analog Inputs (Joysticks) to PWM Outputs----------------------
  *-------------------------------------------------------------------------
  *   This maps the joystick axes to specific PWM outputs.
  */
 pwm01 = p1_y;
 pwm02 = p2_y;
 pwm03 = p3_y;
 pwm04 = p4_y;
 pwm05 = p1_x;
 pwm06 = p2_x;
 pwm07 = p3_x;
 pwm08 = p4_x;
 pwm09 = p1_wheel;
 pwm10 = p2_wheel;
 pwm11 = p3_wheel;
 pwm12 = p4_wheel;

 /*---------- 1 Joystick Drive ---------------------------------------------
  *-------------------------------------------------------------------------
  *  This code mixes the Y and X axis on Port 1 to allow one joystick drive.
  *  Joystick forward  = Robot forward
  *  Joystick backward = Robot backward
  *  Joystick right    = Robot rotates right
  *  Joystick left     = Robot rotates left
  *  Connect the right drive motors to PWM13 and/or PWM14 on the RC.
  *  Connect the left  drive motors to PWM15 and/or PWM16 on the RC.
  */
 pwm13 = pwm14 = Limit_Mix(2000 + p1_y + p1_x - 127);
 pwm15 = pwm16 = Limit_Mix(2000 + p1_y - p1_x + 127);

 /*---------- Buttons to Relays---------------------------------------------
  *-------------------------------------------------------------------------
  *  This default code maps the joystick buttons to specific relay outputs.
  *  Relays 1 and 2 use limit switches to stop the movement in one direction.
  *  The & used below is the C symbol for AND
  */
 relay1_fwd = p1_sw_trig & rc_dig_in01;  /* FWD only if switch1 is not closed. */
 relay1_rev = p1_sw_top  & rc_dig_in02;  /* REV only if switch2 is not closed. */
 relay2_fwd = p2_sw_trig & rc_dig_in03;  /* FWD only if switch3 is not closed. */
 relay2_rev = p2_sw_top  & rc_dig_in04;  /* REV only if switch4 is not closed. */
 relay3_fwd = p3_sw_trig;
 relay3_rev = p3_sw_top;
 relay4_fwd = p4_sw_trig;
 relay4_rev = p4_sw_top;
```

Table of Contents

1. Overview

The Full-Size Robot Controller comes pre-programmed to perform basic driving and control functions. The following tables describe the functions of the Default Code that is pre-programmed into the Full-Size Robot Controller, with one exception noted on page 8. This document is 100% applicable to all code dated 1-10-04 or later. If you need to restore the default program on the Robot Controller, you can download the Default Code at www.InnovationFirst.com.

This document is also useful for those who wish to modify the Default Code by quickly re-mapping different inputs to outputs. It shows the variable names used in the C program so that they can quickly be found and re-mapped in the code.

2.   Operator Interface – Port 1 Pinout and Function

Pin	Function	Variable type	Variable Name	Code Function	Dipswitch
3	X-Axis	Analog (byte)	p1_x	RC PWM5, (MIXED) PWM13-16	
6	Y-Axis	Analog (byte)	p1_y	RC PWM1, (MIXED) PWM13-16	
13	Wheel	Analog (byte)	p1_wheel	RC PWM9	
11	Aux Analog	Analog (byte)	p1_aux		
2	Joystick Trigger Switch	Digital (bit)	p1_sw_trig	RC Relay 1 Forward	SW01 [5]
7	Joystick Thumb Switch	Digital (bit)	p1_sw_top	RC Relay 1 Reverse	SW02 [5]
10	Aux Switch1	Digital (bit)	p1_sw_aux1	Relay 5 Forward	SW03 [5]
14	Aux Switch2	Digital (bit)	p1_sw_aux2	Relay 5 Reverse	SW04 [5]
15	Robot Feedback LED driver [2]	Output (bit)	pwm1_green	OI Feedback LED - PWM1 Green	
8	Robot Feedback LED driver [2]	Output (bit)	pwm1_red	OI Feedback LED - PWM1 Red	
9	Robot Feedback LED driver [2]	Output (bit)	pwm2_green	OI Feedback LED - PWM2 Green	
5	Robot Feedback LED driver [2]	Output (bit)	pwm2_red	OI Feedback LED - PWM2 Red	
1	+5V Aux [3,4]				
4	Ground				
12	Ground				

Notes:

[1]   Software functions listed are for Default Code only. These functions and variable names may be changed for user programs.

[2]   LED drivers provide 5V at 10mA

[3]   +5V Aux is to be used for potentiometers in Joysticks and custom I/O boxes.

[4]   Do not use +5V Aux for lamps or LEDs.

[5]   The DISABLE dipswitch on the Operator Interface

3.   Operator Interface – Port 2 Pinout and Function

Pin	Function	Variable type	Variable Name	Code Function
3	X-Axis	Analog (byte)	p2_x	RC PWM6
6	Y-Axis	Analog (byte)	p2_y	RC PWM2
13	Wheel	Analog (byte)	p2_wheel	RC PWM10
11	Aux Analog	Analog (byte)	p2_aux	
2	Joystick Trigger Switch	Digital (bit)	p2_sw_trig	RC Relay 2 Forward
7	Joystick Thumb Switch	Digital (bit)	p2_sw_top	RC Relay 2 Reverse
10	Aux Switch1	Digital (bit)	p2_sw_aux1	
14	Aux Switch2	Digital (bit)	p2_sw_aux2	
5	same as OI Port 3 Joystick Trigger Switch	Digital (bit)	p3_sw_trig	RC Relay 3 Forward
8	same as OI Port 3 Joystick Thumb Switch	Digital (bit)	p3_sw_top	RC Relay 3 Reverse
9	same as OI Port 3 Aux Switch1	Digital (bit)	p3_sw_aux1	RC Relay 6 Forward
15	same as OI Port 3 Aux Switch2	Digital (bit)	p3_sw_aux2	RC Relay 6 Reverse
1	+5V Aux [2,3]			
4	Ground			
12	Ground			

Notes:

[1]   Software functions listed are for Default Code only. These functions and variable names may be changed for user programs.

[2]   +5V Aux is to be used for potentiometers in Joysticks and custom I/O boxes.

[3]   Do not use +5V Aux for lamps or LEDs.

4. Operator Interface – Port 3 Pinout and Function

Pin	Function	Variable type	Variable Name	Code Function	Dipswitch
3	X-Axis	Analog (byte)	p3_x	RC PWM7	
6	Y-Axis	Analog (byte)	p3_y	RC PWM3	
13	Wheel	Analog (byte)	p3_wheel	RC PWM11	
11	Aux Analog	Analog (byte)	p3_aux		
2	Joystick Trigger Switch	Digital (bit)	p3_sw_trig	Relay 3 Forward	SW05 [5]
7	Joystick Thumb Switch	Digital (bit)	p3_sw_top	Relay 3 Reverse	SW06 [5]
10	Aux Switch1	Digital (bit)	p3_sw_aux1	Relay 6 Forward	SW07 [5]
14	Aux Switch2	Digital (bit)	p3_sw_aux2	Relay 6 Reverse	SW08 [5]
15	Robot Feedback LED driver [2]	Output (bit)	Relay1_green	OI Feedback LED - Relay1 Green	
8	Robot Feedback LED driver [2]	Output (bit)	Relay1_red	OI Feedback LED - Relay1 Red	
9	Robot Feedback LED driver [2]	Output (bit)	Relay2_green	OI Feedback LED - Relay2 Green	
5	Robot Feedback LED driver [2]	Output (bit)	Relay2_red	OI Feedback LED - Relay2 Red	
1	+5V Aux [3,4]				
4	Ground				
12	Ground				

Notes:
- [1] Software functions listed are for Default Code only. These functions and variable names may be changed for user programs.
- [2] LED drivers provide 5V at 10mA
- [3] +5V Aux is to be used for potentiometers in Joysticks and custom I/O boxes.
- [4] Do not use +5V Aux for lamps or LEDs.
- [5] The DISABLE dipswitch on the Operator Interface

5.   Operator Interface – Port 4 Pinout and Function

Pin	Function	Variable type	Variable Name	Code Function
3	X-Axis	Analog (byte)	p4_x	RC PWM8
6	Y-Axis	Analog (byte)	p4_y	RC PWM4
13	Wheel	Analog (byte)	p4_wheel	RC PWM12
11	Aux Analog	Analog (byte)	p4_aux	
2	Joystick Trigger Switch	Digital (bit)	p4_sw_trig	Relay 4 Forward
7	Joystick Thumb Switch	Digital (bit)	p4_sw_top	Relay 4 Reverse
10	Aux Switch1	Digital (bit)	p4_sw_aux1	Relay 7 Forward
14	Aux Switch2	Digital (bit)	p4_sw_aux2	Relay 7 Reverse
5	same as OI Port 1 Joystick Trigger Switch	Digital (bit)	p1_sw_trig	RC Relay 1 Forward
8	same as OI Port 1 Joystick Thumb Switch	Digital (bit)	p1_sw_top	RC Relay 1 Reverse
9	same as OI Port 1 Aux Switch1	Digital (bit)	p1_sw_aux1	Relay 5 Forward
15	same as OI Port 1 Aux Switch2	Digital (bit)	p1_sw_aux2	Relay 5 Reverse
1	+5V Aux [2,3]			
4	Ground			
12	Ground			

Notes:

[1]   Software functions listed are for Default Code only. These functions and variable names may be changed for user programs.

[2]   +5V Aux is to be used for potentiometers in Joysticks and custom I/O boxes.

[3]   Do not use +5V Aux for lamps or LEDs.

6.   Robot Controller – "PWM OUTPUTS"

Code Function		Variable Name	Variable Type	Connector	Pin	Function
PWM 1		p1_y	Byte	OI Port 1	6	Y-Axis
PWM 2		p2_y	Byte	OI Port 2	6	Y-Axis
PWM 3		p3_y	Byte	OI Port 3	6	Y-Axis
PWM 3	Rev only if rc_dig_in05 is ON	rc_dig_in05	Bit	RC Digital Inputs	5	Switch 5
PWM 3	Fwd only if rc_dig_in06 is ON	rc_dig_in06	Bit	RC Digital Inputs	6	Switch 6
PWM 4		p4_y	Byte	OI Port 4	6	Y-Axis
PWM 4	Rev only if rc_dig_in07 is ON	rc_dig_in07	Bit	RC Digital Inputs	7	Switch 7
PWM 4	Fwd only if rc_dig_in08 is ON	rc_dig_in08	Bit	RC Digital Inputs	8	Switch 8
PWM 5		p1_x	Byte	OI Port 1	3	X-Axis
PWM 6		p2_x	Byte	OI Port 2	3	X-Axis
PWM 7		p3_x	Byte	OI Port 3	3	X-Axis
PWM 8		p4_x	Byte	OI Port 4	3	X-Axis
PWM 9		p1_wheel	Byte	OI Port 1	13	Wheel
PWM 9	Rev only if rc_dig_in09 is ON	rc_dig_in09	Bit	RC Digital Inputs	7	Switch 9
PWM 9	Fwd only if rc_dig_in10 is ON	rc_dig_in10	Bit	RC Digital Inputs	8	Switch 10
PWM 10		p2_wheel	Byte	OI Port 2	13	Wheel
PWM 10	Rev only if rc_dig_in11 is ON	rc_dig_in11	Bit	RC Digital Inputs	21	Switch 11
PWM 10	Fwd only if rc_dig_in12 is ON	rc_dig_in12	Bit	RC Digital Inputs	22	Switch 12
PWM 11		p3_wheel	Byte	OI Port 3	13	Wheel
PWM 11	Rev only if rc_dig_in13 is ON	rc_dig_in13	Bit	RC Digital Inputs	10	Switch 13
PWM 11	Fwd only if rc_dig_in14 is ON	rc_dig_in14	Bit	RC Digital Inputs	11	Switch 14
PWM 12		p4_wheel	Byte	OI Port 4	13	Wheel
PWM 12	Rev only if rc_dig_in15 is ON	rc_dig_in15	Bit	RC Digital Inputs	24	Switch 15
PWM 12	Fwd only if rc_dig_in16 is ON	rc_dig_in16	Bit	RC Digital Inputs	25	Switch 16
PWM 13		mixing function	Byte	OI Port 1 Mixed X,Y		
PWM 14		mixing function	Byte	OI Port 1 Mixed X,Y		
PWM 15		mixing function	Byte	OI Port 1 Mixed X,Y		
PWM 16		mixing function	Byte	OI Port 1 Mixed X,Y		

7.   Robot Controller – "RELAY OUTPUTS"

RC Code Function	Variable Name Mapped	Variable Type	Connector	Pin	Function
Relay 1 Forward	p1_sw_trig	Bit	OI Port 1	2	Joystick Trigger Switch
Relay 1 Forward	p1_sw_trig	Bit	OI Port 4	5	Same as OI Port 1 Joystick Trigger
Relay 1 Rev only if rc_dig_in01 is ON	rc_dig_in01	Bit	RC Digital Input	1	Switch 1
Relay 1 Reverse	p1_sw_top	Bit	OI Port 1	7	Joystick Thumb Switch
Relay 1 Reverse	p1_sw_top	Bit	OI Port 4	8	Same as OI Port 1 Joystick Thumb
Relay 1 Fwd only if rc_dig_in02 is ON	rc_dig_in02	Bit	RC Digital Input	2	Switch 2
Relay 2 Forward	p2_sw_trig	Bit	OI Port 2	2	Joystick Trigger Switch
Relay 2 Rev only if rc_dig_in03 is ON	rc_dig_in03	Bit	RC Digital Input	3	Switch 3
Relay 2 Reverse	p2_sw_top	Bit	OI Port 2	7	Joystick Thumb Switch
Relay 2 Fwd only if rc_dig_in04 is ON	rc_dig_in04	Bit	RC Digital Input	4	Switch 4
Relay 3 Forward	p3_sw_trig	Bit	OI Port 3	2	Joystick Trigger Switch
Relay 3 Forward	p3_sw_trig	Bit	OI Port 2	5	Same as OI Port 3 Joystick Trigger
Relay 3 Reverse	p3_sw_top	Bit	OI Port 3	7	Joystick Thumb Switch
Relay 3 Reverse	p3_sw_top	Bit	OI Port 2	8	Same as OI Port 3 Joystick Thumb
Relay 4 Forward	p4_sw_trig	Bit	OI Port 4	2	Joystick Trigger Switch
Relay 4 Reverse	p4_sw_top	Bit	OI Port 4	7	Joystick Thumb Switch
Relay 5 Forward	p1_sw_aux1	Bit	OI Port 1	10	Aux Switch1
Relay 5 Forward	p1_sw_aux1	Bit	OI Port 4	9	Same as OI Port 1 Aux Switch1
Relay 5 Reverse	p1_sw_aux2	Bit	OI Port 1	14	Aux Switch2
Relay 5 Reverse	p1_sw_aux2	Bit	OI Port 4	15	Same as OI Port 1 Aux Switch2
Relay 6 Forward	p3_sw_aux1	Bit	OI Port 3	10	Aux Switch1
Relay 6 Forward	p3_sw_aux1	Bit	OI Port 2	9	Same as OI Port 3 Aux Switch1
Relay 6 Reverse	p3_sw_aux2	Bit	OI Port 3	14	Aux Switch2
Relay 6 Reverse	p3_sw_aux2	Bit	OI Port 2	15	Same as OI Port 3 Aux Switch2
Relay 7 Forward	p4_sw_aux1	Bit	OI Port 4	10	Aux Switch1
Relay 7 Reverse	p4_sw_aux2	Bit	OI Port 4	14	Aux Switch2
Relay 8 Forward	!rc_dig_in18	Bit	RC Digital Input	1	Pump power
Relay 8 Reverse	0	Bit	N/A		Never on

Note: Some Robot Controllers shipped with code that mapped Port 4 Auxiliary Switch Inputs 1 & 2 to Relay 8. If you desire pump functionality as described in the table above, you must load the code dated 1-10-04 or later from Innovation First's web site.

8.   Robot Controller – "DIGITAL IN/OUT"

Pin	Function	C User Variable	Default Code Function
1	Limit Switch 1	rc_dig_in01	Relay 1 wont go Forward if rc_dig_in01 is ON
2	Limit Switch 2	rc_dig_in02	Relay 1 wont go Reverse if rc_dig_in02 is ON
3	Limit Switch 3	rc_dig_in03	Relay 2 wont go Forward if rc_dig_in03 is ON
4	Limit Switch 4	rc_dig_in04	Relay 2 wont go Reverse if rc_dig_in04 is ON
5	Limit Switch 5	rc_dig_in05	PWM 3 wont go Forward if rc_dig_in05 is ON
6	Limit Switch 6	rc_dig_in06	PWM 3 wont go Reverse if rc_dig_in06 is ON
7	Limit Switch 7	rc_dig_in07	PWM 4 wont go Forward if rc_dig_in07 is ON
8	Limit Switch 8	rc_dig_in08	PWM 4 wont go Reverse if rc_dig_in08 is ON
9	Limit Switch 9	rc_dig_in09	PWM 9 wont go Forward if rc_dig_in09 is ON
10	Limit Switch 10	rc_dig_in10	PWM 9 wont go Reverse if rc_dig_in10 is ON
11	Limit Switch 11	rc_dig_in11	PWM 10 wont go Forward if rc_dig_in11 is ON
12	Limit Switch 12	rc_dig_in12	PWM 10 wont go Reverse if rc_dig_in12 is ON
13	Limit Switch 13	rc_dig_in13	PWM 11 wont go Forward if rc_dig_in13 is ON
14	Limit Switch 14	rc_dig_in14	PWM 11 wont go Reverse if rc_dig_in14 is ON
15	Limit Switch 15	rc_dig_in15	PWM 12 wont go Forward if rc_dig_in15 is ON
16	Limit Switch 16	rc_dig_in16	PWM 12 wont go Reverse if rc_dig_in16 is ON
17	OUTPUT	rc_dig_out17	Not used.
18	Pressure sensor switch	rc_dig_in18	Relay 8 forward (drives pump) only if pressure is low

9.   Robot Controller – "ANALOG INPUTS"

There is no function associated with any of the ANALOG INPUTS in the Default Code.

10. RC to OI – "ROBOT FEEDBACK" LEDs

Code Function	Variable Name	Variable Type	Represents
OI Feedback LED - PWM1 Green	Pwm1_green	Bit	p1_y > 215
OI Feedback LED - PWM1 Red	Pwm1_red	Bit	p1_y < 57
OI Feedback LED - PWM2 Green	Pwm2_green	Bit	p2_y > 215
OI Feedback LED - PWM2 Red	Pwm2_red	Bit	p2_y < 57
OI Feedback LED - Relay1 Red	Relay1_red	Bit	Relay 1 REV
OI Feedback LED - Relay1 Green	Relay1_green	Bit	Relay 1 FWD
OI Feedback LED - Relay2 Red	Relay2_red	Bit	Relay 2 REV
OI Feedback LED - Relay2 Green	Relay2_green	Bit	Relay 2 FWD
OI Feedback LED – Switch 1	Switch1_LED	Bit	rc_dig_in01 LOW
OI Feedback LED – Switch 2	Switch2_LED	Bit	rc_dig_in02 LOW
OI Feedback LED – Switch 3	Switch3_LED	Bit	rc_dig_in03 LOW