

Innovation First, Inc.

Default Reference Guide

For the Full-Size RC

```
'----- Buttons to Relays-----  
'  
' This 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 PBASIC symbol for AND  
' The &~ used below is the PBASIC symbol for AND NOT  
  
relay1_fwd = p1_sw_trig &~ rc_sw1      'Port 1 Trigger = RLY1 Fwd, unless rc_sw1 is ON  
relay1_rev = p1_sw_top &~ rc_sw2      'Port 1 Thumb = RLY2 Rev, unless rc_sw2 is ON  
relay2_fwd = p2_sw_trig &~ rc_sw3      'Port 2 Trigger = RLY2 Fwd, unless rc_sw3 is ON  
relay2_rev = p2_sw_top &~ rc_sw4      'Port 2 Thumb = RLY2 Rev, unless rc_sw4 is ON  
  
relay3_fwd = p3_sw_trig  
relay3_rev = p3_sw_top  
relay4_fwd = p4_sw_trig  
relay4_rev = p4_sw_top  
  
relay5_fwd = p1_sw_aux1  
relay5_rev = p1_sw_aux2  
relay6_fwd = p3_sw_aux1  
relay6_rev = p3_sw_aux2  
relay7_fwd = p4_sw_aux1  
relay7_rev = p4_sw_aux2  
  
relay8_fwd = 1  
relay8_rev = 0  
  
'----- PWM Feedback lights-----  
'  
' This drives the "PWM1" and "PWM2" "Robot Feedback" lights on the Operator  
' Interface. The lights are green for joystick forward and red for joystick  
' reverse. Both red and green are on when the joystick is centered. Use the  
' trim tabs on the joystick to adjust the center.  
  
if user_display_mode = 1 then skip_this_code  
  if p1_y > 129 then p1_y_not_127  
    if p1_y < 125 then p1_y_not_127  
      Out8 = 1  
      Out9 = 1  
      goto exit_p1_y_test  
  p1_y_not_127:  
    Out8 = p1_y/216      'LED is ON when Port 1 Y is full Fwd  
    Out9 = ~(p1_y/56 max 1) 'LED is ON when Port 1 Y is full Rev  
  exit_p1_y_test:  
  
  if p1_x > 129 then p1_x_not_127  
    if p1_x < 125 then p1_x_not_127  
      Out10 = 1  
      Out11 = 1  
      goto exit_p1_x_test  
  p1_x_not_127:  
    Out10 = p1_x/216      'LED is ON when Port 1 X is full Fwd  
    Out11 = ~(p1_x/56 max 1) 'LED is ON when Port 1 X is full Rev  
  exit_p1_x_test:  
skip_this_code:
```

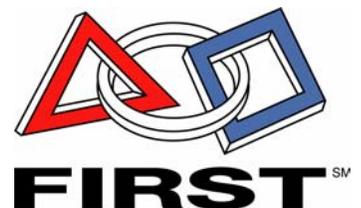


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1. Overview

The Full-Size Robot Controller comes pre-programmed to perform basic driving and control functions. There are two version of the pre-loaded default code. The default code (DEF) is for 2-Stick driver control. The default code (USER) is for 1-Stick driver control. The RC can be re-programmed to create almost any custom motion based on operator and sensor inputs.

The following tables describe the functions of the default code that is pre-programmed into the Full-Size Robot Controller. If you need to restore the default program on the Robot Controller, you can download the Default Code at www.InnovationFirst.com.

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, (USER)PWM13-16 [6]	
6	Y-Axis	Analog (byte)	p1_Y	RC PWM1, (USER)PWM13-16 [6]	
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)	out8	OI Feedback LED - PWM1 Green	
8	Robot Feedback LED driver [2]	Output (bit)	out9	OI Feedback LED - PWM1 Red	
9	Robot Feedback LED driver [2]	Output (bit)	out10	OI Feedback LED - PWM2 Green	
5	Robot Feedback LED driver [2]	Output (bit)	out11	OI Feedback LED - PWM2 Red	
1	+5V Aux (Fuse F2) [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
- [6] The USER code mixes Port 1 X-Axis and Y-Axis for 1-Stick driver control. The mixed controls are output on PWM 13, 14 for the Right Drive and PWM 15, 16 for the Left Drive.

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 (Fuse F2) [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)	out13	OI Feedback LED - Relay1 Green	
8	Robot Feedback LED driver [2]	Output (bit)	out12	OI Feedback LED - Relay1 Red	
9	Robot Feedback LED driver [2]	Output (bit)	out15	OI Feedback LED - Relay2 Green	
5	Robot Feedback LED driver [2]	Output (bit)	out14	OI Feedback LED - Relay2 Red	
1	+5V Aux (Fuse F2) [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 (Fuse F2) [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 Output Map

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_sw5 is ON	rc_sw5	Bit	RC Digital Inputs	4	Switch 5
PWM 3 Fwd only if rc_sw6 is ON	rc_sw6	Bit	RC Digital Inputs	5	Switch 6
PWM 4	p4_Y	Byte	OI Port 4	6	Y-Axis
PWM 4 Rev only if rc_sw7 is ON	rc_sw7	Bit	RC Digital Inputs	18	Switch 7
PWM 4 Fwd only if rc_sw8 is ON	rc_sw8	Bit	RC Digital Inputs	19	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_sw9 is ON	rc_sw9	Bit	RC Digital Inputs	7	Switch 9
PWM 9 Fwd only if rc_sw10 is ON	rc_sw10	Bit	RC Digital Inputs	8	Switch 10
PWM 10	p2_wheel	Byte	OI Port 2	13	Wheel
PWM 10 Rev only if rc_sw11 is ON	rc_sw11	Bit	RC Digital Inputs	21	Switch 11
PWM 10 Fwd only if rc_sw12 is ON	rc_sw12	Bit	RC Digital Inputs	22	Switch 12
PWM 11	p3_wheel	Byte	OI Port 3	13	Wheel
PWM 11 Rev only if rc_sw13 is ON	rc_sw13	Bit	RC Digital Inputs	10	Switch 13
PWM 11 Fwd only if rc_sw14 is ON	rc_sw14	Bit	RC Digital Inputs	11	Switch 14
PWM 12	p4_wheel	Byte	OI Port 4	13	Wheel
PWM 12 Rev only if rc_sw15 is ON	rc_sw15	Bit	RC Digital Inputs	24	Switch 15
PWM 12 Fwd only if rc_sw16 is ON	rc_sw16	Bit	RC Digital Inputs	25	Switch 16
PWM 13 USER code only	drive_R	Byte	OI Port 1 Mixed X,Y		
PWM 14 USER code only	drive_R	Byte	OI Port 1 Mixed X,Y		
PWM 15 USER code only	drive_L	Byte	OI Port 1 Mixed X,Y		
PWM 16 USER code only	drive_L	Byte	OI Port 1 Mixed X,Y		

7. Robot Controller Relay Output Map

Code Function	Variable Name	Variable Type	Connector	Pin	Function
Relay 1 Forward	p1_sw_trig	Bit	Port 1	2	Joystick Trigger Switch
Relay 1 Forward	p1_sw_trig	Bit	Port 4	5	Same as OI Port 1 Joystick Trigger
Relay 1 Rev only if rc_sw1 is ON	rc_sw1	Bit	RC Digital Inputs	1	Switch 1
Relay 1 Reverse	p1_sw_top	Bit	Port 1	7	Joystick Thumb Switch
Relay 1 Reverse	p1_sw_top	Bit	Port 4	8	Same as OI Port 1 Joystick Thumb
Relay 1 Fwd only if rc_sw2 is ON	rc_sw2	Bit	RC Digital Inputs	2	Switch 2
Relay 2 Forward	p2_sw_trig	Bit	Port 2	2	Joystick Trigger Switch
Relay 2 Rev only if rc_sw3 is ON	rc_sw3	Bit	RC Digital Inputs	15	Switch 3
Relay 2 Reverse	p2_sw_top	Bit	Port 2	7	Joystick Thumb Switch
Relay 2 Fwd only if rc_sw4 is ON	rc_sw4	Bit	RC Digital Inputs	16	Switch 4
Relay 3 Forward	p3_sw_trig	Bit	Port 3	2	Joystick Trigger Switch
Relay 3 Forward	p3_sw_trig	Bit	Port 2	5	Same as OI Port 3 Joystick Trigger
Relay 3 Reverse	p3_sw_top	Bit	Port 3	7	Joystick Thumb Switch
Relay 3 Reverse	p3_sw_top	Bit	Port 2	8	Same as OI Port 3 Joystick Thumb
Relay 4 Forward	p4_sw_trig	Bit	Port 4	2	Joystick Trigger Switch
Relay 4 Reverse	p4_sw_top	Bit	Port 4	7	Joystick Thumb Switch
Relay 5 Forward	p1_sw_aux1	Bit	Port 1	10	Aux Switch1
Relay 5 Forward	p1_sw_aux1	Bit	Port 4	9	Same as OI Port 1 Aux Switch1
Relay 5 Reverse	p1_sw_aux2	Bit	Port 1	14	Aux Switch2
Relay 5 Reverse	p1_sw_aux2	Bit	Port 4	15	Same as OI Port 1 Aux Switch2
Relay 6 Forward	p3_sw_aux1	Bit	Port 3	10	Aux Switch1
Relay 6 Forward	p3_sw_aux1	Bit	Port 2	9	Same as OI Port 3 Aux Switch1
Relay 6 Reverse	p3_sw_aux2	Bit	Port 3	14	Aux Switch2
Relay 6 Reverse	p3_sw_aux2	Bit	Port 2	15	Same as OI Port 3 Aux Switch2
Relay 7 Forward	p4_sw_aux1	Bit	Port 4	10	Aux Switch1
Relay 7 Reverse	p4_sw_aux2	Bit	Port 4	14	Aux Switch2

8. Robot Controller Analog Inputs

Pin	Function	Pbasic Variable
2	Analog 1	sensor1
16	Analog 2	sensor2
5	Analog 3	sensor3
19	Analog 4	sensor4
8	Analog 5	sensor5
22	Analog 6	sensor6
11	Analog 7	sensor7
3	+5V for Potentiometers (50mA max)	
6	+5V for Potentiometers (50mA max)	
9	+5V for Potentiometers (50mA max)	
12	+5V for Potentiometers (50mA max)	
14	+5V for Potentiometers (50mA max)	
17	+5V for Potentiometers (50mA max)	
20	+5V for Potentiometers (50mA max)	
23	+5V for Potentiometers (50mA max)	
4	Ground	
7	Ground	
10	Ground	
13	Ground	
15	Ground	
18	Ground	
21	Ground	
24	Ground	
1	+5V Aux (Fuse F3) for Gyro power only	
25	Unused	

9. Robot Controller Digital Inputs

Pin	Function	Pbasic Variable	Pbasic Default Code Function
1	Switch 1	rc_sw1	Relay 1 wont go Forward if rc_sw1 is ON
2	Switch 2	rc_sw2	Relay 1 wont go Reverse if rc_sw2 is ON
15	Switch 3	rc_sw3	Relay 2 wont go Forward if rc_sw3 is ON
16	Switch 4	rc_sw4	Relay 2 wont go Reverse if rc_sw4 is ON
4	Switch 5	rc_sw5	PWM 3 wont go Forward if rc_sw5 is ON
5	Switch 6	rc_sw6	PWM 3 wont go Reverse if rc_sw6 is ON
18	Switch 7	rc_sw7	PWM 4 wont go Forward if rc_sw7 is ON
19	Switch 8	rc_sw8	PWM 4 wont go Reverse if rc_sw8 is ON
7	Switch 9	rc_sw9	PWM 9 wont go Forward if rc_sw9 is ON
8	Switch 10	rc_sw10	PWM 9 wont go Reverse if rc_sw10 is ON
21	Switch 11	rc_sw11	PWM 10 wont go Forward if rc_sw11 is ON
22	Switch 12	rc_sw12	PWM 10 wont go Reverse if rc_sw12 is ON
10	Switch 13	rc_sw13	PWM 11 wont go Forward if rc_sw13 is ON
11	Switch 14	rc_sw14	PWM 11 wont go Reverse if rc_sw14 is ON
24	Switch 15	rc_sw15	PWM 12 wont go Forward if rc_sw15 is ON
25	Switch 16	rc_sw16	PWM 12 wont go Reverse if rc_sw16 is ON
3	Ground		
6	Ground		
9	Ground		
12	Ground		
13	Ground		
14	Ground		
17	Ground		
20	Ground		
23	Ground		

10. RC to OI Feedback LEDs

Code Function	Variable Name	Variable Type
OI Feedback LED - PWM1 Green	out8	Bit
OI Feedback LED - PWM1 Red	out9	Bit
OI Feedback LED - PWM2 Green	out10	Bit
OI Feedback LED - PWM2 Red	out11	Bit
OI Feedback LED - Relay1 Red	out12	Bit
OI Feedback LED - Relay1 Green	out13	Bit
OI Feedback LED - Relay2 Red	out14	Bit
OI Feedback LED - Relay2 Green	out15	Bit