

# THE 1999 FIRST ROBOTICS COMPETITION

## TEAM UPDATE #2

Date: January 20, 1999

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### IMPORTANT INFORMATION ON YAW RATE SENSOR

Figure 2.7 in the manual contains an incorrect wiring example for the Yaw Rate Sensor. Please refer to the updated figure below:

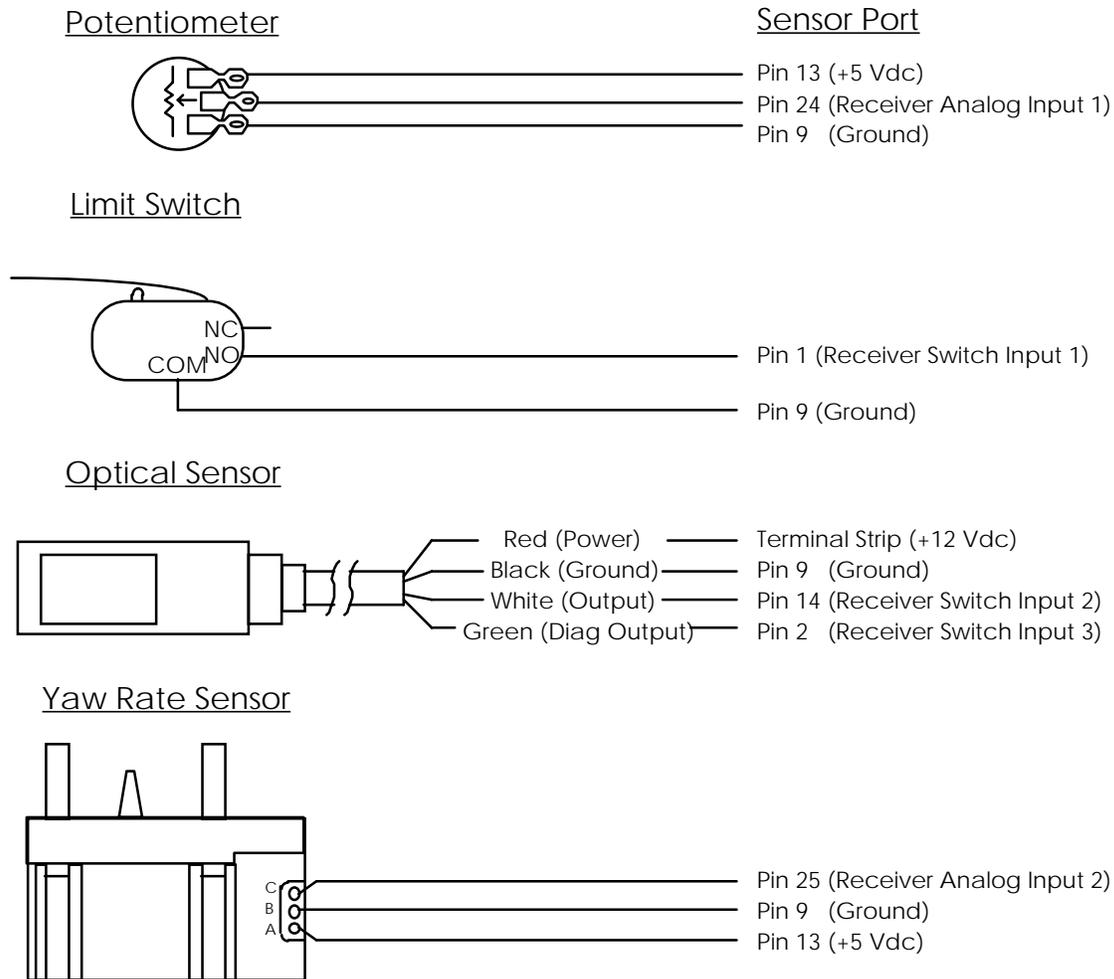


Figure 2.7: Connection Examples for Sensor Port

### RULES QUESTIONS & ANSWERS

- Q17. In reference to Rule K1, may we use uninsulated spade connectors but insulate them with tape? The rule specifies insulated spade connectors, but tape is listed below as an insulation material.
- A17. Yes, you may insulate uninsulated spade connectors with electrical tape and/or heat shrink tubing.

- Q18. In the Additional Hardware List, does the up to...some number mean including what is given in the kit or in addition to what is given in the kit?  
A18. Quantities listed are in addition to what is in the kit.
- Q19. Will teams have a choice of field location (A/ B) or (C/D) within an alliance?  
A19. During the qualifying matches, the computer scoring system will assign field locations (A/B, C/D) and partners to teams. During the elimination matches, alliances may choose their field position (A/B) or (C/D) depending on the color assigned to the alliance by the computer scoring system.
- Q20. How will the 2 pipes be fastened to the Puck?  
A20. The pipes will be fastened by the flanges on top of the puck. FIRST may opt to add an extra bracket on the underside of the puck to reinforce the flange mounting, but this will not affect the outer dimensions of the puck.
- Q21. Please clarify rule P30. Does this rule mean that we cannot build a forklift for the purpose of extending below the puck and lifting to tilt the puck?  
A21. Yes, that is correct. Robots may not intentionally protrude underneath the puck.
- Q22. May we modify the CH Products Flightstick joysticks that are obtained from the Additional Hardware List? May we use the extra Flightsticks on the robot?  
A22. No. These joysticks are for use with the Transmitter only and should not be modified. The reason that only Flightstick joysticks (versus any PC compatible joystick) are used is that it keeps everything consistent and is easy to replace in the event of a failure. You may, however, customize your joystick adapter cable(s) to include or exclude the various signals from the joysticks. (See below in this team update.)
- Q23. With respect to the Additional Hardware List, is a Trantorque coupling considered a shaft coupling?  
A23. Yes.
- Q24. With respect to Rule SC4, is a robot considered "on the puck" if it is "riding piggy back" on another machine "with its pinkie finger touching the puck" and lowest part of the machine is more than 2" above the ground? What if the bottom machine is touching the puck, but not the top machine?  
A24. Yes for the first case. In the second case, the top robot is not considered "on the puck" because it is not touching the puck.
- Q25. If floppies were held halfway inside the human player's area, would it be considered half (meaning the human player could hold 6) or a whole (still only 3)?  
A25. Any floppy that is entirely or partly within the player station is considered "in" the player station. There are no "half" floppies counted. Also, floppies held by the human player are considered "in" the player station even if held in the airspace outside of the human player station boundaries.

- Q26. Between rounds, is there a limit to the number of people that can meet between the two different teams of an alliance?
- A26. Only 5 members per team will be allowed in the playing field area at any one time. See Rule P14. There is no limit to the number of people that may negotiate outside the playing field area. The “field area” includes the queuing areas for on-deck teams, access ways to the field, the field itself, exit ways from the field, etc.
- Q27. If floppies are stacked on the ground upward, do all the other floppies except the last one counted as a point?
- A27. Floppies that are within the bounds of the field and not touching the surface of the playing field will count. Thus, all floppies in a stack will count except the bottom floppy (assuming the stack is fairly straight).
- Q28. May we remote the gearbox from the Fisher-Price motors and use it with the drill motors?
- A28. Yes. However, this will put a larger than normal load on the gearbox and may result in premature gearbox failure.
- Q29. May we disassemble the Fisher-Price gearbox and use the gears elsewhere on the robot?
- A29. Yes.

## **CORRECTIONS AND UPDATES TO THE MANUAL**

The description of the swivel caster wheels in the Additional Hardware List is incomplete. Below is a corrected listing:

Kee Caster, Swivel	P/N: 311B-HR (up to 2)
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Rule V19 contains a typo and should read as follows:

- V19. During a match, no robot operator or coach may intentionally touch a floppy, except for reasons of personal safety ~~or to pass a floppy from one player station to the other player station on the same alliance~~. If a violation of this rule occurs, the alliance will be disqualified.

Team Update #1 originally contained an incorrect telephone number for Martin’s House of Cloth. The correct number is 603-669-4127.

The following bullet item is added to Rule M13:

- The Gast pump may be used to generate compressed air or vacuum

The following Rule is added to Appendix A of The Robot:

- M17. The motors and pump in the kit may not be modified except as follows: It is acceptable to modify the mounting brackets and/or other structural parts of the motors (output shaft, housing, etc.) as long as the electrical system is not modified and the integral mechanical system of the moving parts (pump head,

bearings, bushings, worm gear output stages, etc.) is not changed or removed. The gearboxes for the Fisher-Price and Drill motors are not considered “integral” and may be separated from the motors. FIRST will not provide replacement for parts which fail due to modification.

Section 1.3 of The Game contains some incorrect descriptions of materials used to build the playing field. All references to 4x6 lumber or the 4x6 border should be 4x4. Also, the 2x8 boards mentioned in the Puck Description should be 2x6.

### **FISHER-PRICE MOTOR INFORMATION**

The following are approximate performance data for the Fisher-Price motor/gearbox sets supplied in the kits. The motor used is a Mabuchi model RS-550PF-6534.

Motor no-load speed	15,000 RPM
Motor stall current	57 A
Motor stall torque	0.363 N-m
Gearbox ratio	147:1
No-load speed w/gearbox	100 RPM (estimated)
Stall torque w/gearbox	34.7 N-m (estimated)

Teams wishing to obtain spare Fisher-Price motors, gearboxes, and switches should purchase the Xtreme Machine model of Fisher-Price Powerwheels vehicles and remove the motors, gearboxes, and switches.

### **TIAGENE VAN DOOR MOTOR INFORMATION**

As noted in Appendix H of The Robot, the spare Tiagene van door motors can be purchased from automotive parts dealers as part of a power sliding door unit for GM Minivans. When ordering the units, there are two possible models; one for the extended cab vans, and one for regular vans. Both types of units contain the same motor, so either will do.

### **ADDITIONAL HARDWARE LIST INFORMATION**

As noted in the Additional Hardware List, teams are allowed to purchase up to 2 additional CH Products Flightstick joysticks, 4 DB15 female connectors, 2 DB15 male connectors, and 6 plastic hoods for DB15 connectors. These items are for use with the Transmitter Box and joysticks included in the kit, and are not for use on the robot.

For information on where to purchase additional Flightstick joysticks, visit the CH Products website at <http://www.chproducts.com/>.

### **ADDITIONAL JOYSTICK WIRING INFORMATION**

The additional joysticks, 15 pin connectors and plastic hoods are included on the Additional Hardware List in order to give teams more flexibility in designing the control system interface for the robot operators. In order to do this, custom joystick interface cables must be constructed with the allowed 15 pin connectors, plastic hoods,

and wire supplied by the team. Below is the information necessary to construct a cable that can interface more than 2 joysticks with the Transmitter Box provided by FIRST.

### Joystick and Transmitter Pin Descriptions

Pin #	Flightstick	Joystick Port 1	Joystick Port 2	Auxiliary Input Port
1	+5 Vdc	+5 Vdc	+5 Vdc	+5Vdc
2	Trigger Switch	Switch Input 1	Switch Input 3	Switch Input 6
3	X Axis Potentiometer	Potentiometer Input (X1)	Potentiometer Input (X2)	Switch Input 2
4	Ground	Ground	Ground	Potentiometer Input 1 (tx_pot1)
5		Ground	Ground	Switch Input 7
6	Y Axis Potentiometer	Potentiometer Input (Y1)	Potentiometer Input (Y2)	Switch Input 3
7	Top Button Switch	Switch Input 2	Switch Input 4	Ground
8		+5 Vdc	+5 Vdc	Ground
9		+5 Vdc	+5 Vdc	Switch Input 15
10		Switch Input 5	Switch Input 7	Switch Input 13
11		Potentiometer Input 1 (tx_pot1)	Potentiometer Input 2 (tx_pot2)	Switch Input 11
12	Shield	Ground	Ground	Switch Input 9
13	Thumbwheel potentiometer	Potentiometer Input (wheel1)	Potentiometer Input (wheel2)	+5Vdc
14		Switch Input 6	Switch Input 8	+5Vdc
15		+5 Vdc	+5 Vdc	Switch Input 5
16				Switch Input 1
17				Switch Input 8
18				Switch Input 4
19				Potentiometer Input 2 (tx_pot2)
20				Ground
21				Switch Input 16
22				Switch Input 14
23				Switch Input 12
24				Switch Input 10
25				+5Vdc

**Note:** Most inputs on the Auxiliary Input Port are also available on either Joystick Port 1 or Joystick Port 2. **Do not hookup potentiometers on both ends of a shared input, because it could cause the Transmitter to fail.** It is ok to hookup switches on both ends of a switch input.

Using the above table as a guide, it is possible to create a custom joystick interface cable that merges the switch and potentiometer outputs from multiple joysticks into the switch and potentiometer inputs of a single Joystick Port on the Transmitter Box. This means, for example, that the Y axis outputs of two joysticks could be connected to Joystick Port 1 for easier control of a robot with tank-style steering, while allowing the use of one or two additional joysticks on Joystick Port 2 as input devices for a second robot operator.

The potentiometer and switch inputs on the Joystick Ports work in the same manner as the inputs on the Auxiliary Input Port. In other words, Ground must be connected to the Joysticks in order for the switch outputs to function, and +5 Vdc must be connected to the Joysticks in order for the potentiometer outputs to function.

Below is an example of how to wire a custom joystick interface cable that connects two joysticks to Joystick Port 1, such that the X axes and thumbwheels on both joysticks are ignored, while the Y axes and switch inputs are connected.

Flightstick #1 pin (DB15 F)	Joystick Port 1 pin (DB15 M)	Flightstick #2 pin (DB15 F)
1 (+5 Vdc)	1 (+5 Vdc)	1 (+5 Vdc)
4 (Ground)	4 (Ground)	4 (Ground)
2 (Trigger)	2 (Switch Input 1)	
6 (Y axis)	6 (y1)	
7 (Top Button)	7 (Switch Input 2)	
	10 (Switch Input 5)	2 (Trigger)
	13 (wheel1)	6 (Y axis)
	14 (Switch Input 6)	7 (Top Button)
<b>Note:</b> Connections are made along the table rows (pin 1 is tied together on all connectors, etc.)		

After hooking up the above cable, the X axis and thumbwheel of Flightstick #1 will be disconnected, while the Y axis and switch inputs will function normally. Also, the X axis and thumbwheel of Flightstick #2 will be disconnected, while the Y axis will be seen by the Transmitter as wheel1 (normally the thumbwheel of the single joystick on Joystick Port 1), and the switch inputs will be seen as Switch Input 5 and Switch Input 6 (normally only used on the Auxiliary Input Port).

Below is an update to Table 2.3 from section 2.4 of The Robot. The updated table shows the complete list of DIP switch settings which can be used to selectively disable the Joystick port switch inputs.

Table 2.3: Transmitter DIP Switch Settings (SW2)

Input to disable	DIP Switch
Switch Input 6	1
Switch Input 5	2
Switch Input 2	3
Switch Input 1	4
Switch Input 8	5
Switch Input 7	6
Switch Input 4	7
Switch Input 3	8

## VICTOR 883 SPEED CONTROLLER INFORMATION

The PWM input connector on the Victor 883 speed controllers is labeled W R B, which stands for White, Red, Black, the wire colors common on many PWM cables. This marking is meant to inform users of the correct cable orientation when hooking up the speed controllers. The PWM cables supplied by FIRST have a yellow wire in place of the white wire, but are fully compatible with the speed controllers.