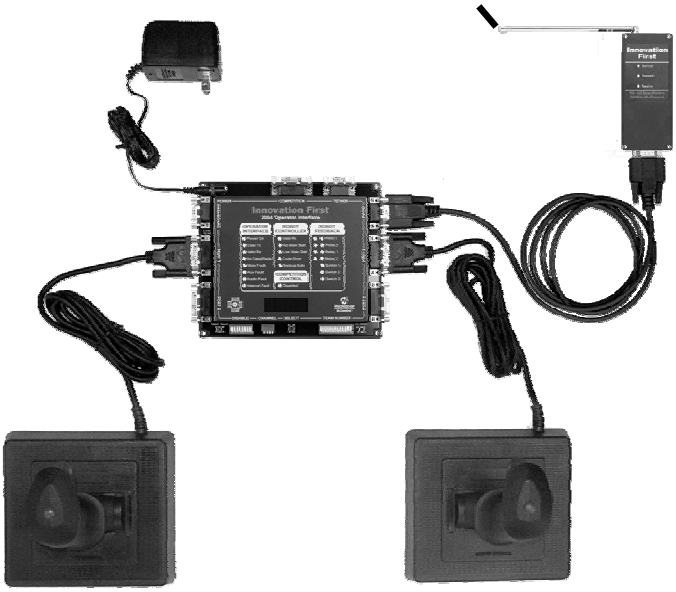
Innovation First, Inc.

2004 Control System Overview

Full Size Robot Controller With External Radio

Robot Controller and Operator Interface Linked by Tether



Operator Interface with External Radio, Joysticks, and AC Adaptor

1. Control System Overview

WARNING: Please read the following documents carefully.
Failure to configure your control system properly could result in personal injury, damage to the control system, or damage to your robot. Innovation First, Inc. will not provide free replacement of control system components damaged due to misuse or miswiring.

The documentation for the control system is divided into a System Overview, Reference Guides, and a Quick Start Guide. The System Overview (the document you are now reading) touches briefly on the overall system operation. The Quick Start Guide gives you brief diagrams and instructions to get your system functioning as quickly as possible. When you need detailed information on the Robot Controller, the Operator Interface, or programming, the Reference Guides listed below should answer all your questions. Additional specific questions are also answered in our FAQ section on our website. If, after reading all the corresponding documentation, you have problems configuring the control system or have other questions, please contact Innovation First at 903-454-1978. We will be happy to answer any questions you have.

Below is the list of documents that are associated with the Innovation First Control Systems. All of these documents are located on our web site at InnovationFirst.com.

Overview:
- Control System Overview

Quick Start Guide:
- Full-Size Control System Quick Start Guide

Reference Guides:
- Full-Size RC Reference Guide
- Operator Interface Reference Guide
- Programming Reference Guide

The heart of the Innovation First control system is the Operator Interface and the Robot Controller. The Operator Interface takes inputs from the human operator(s) and passes it to the Robot Controller. The Robot Controller takes this information, gathers additional information from sensors on-board the robot, determines how the robot should function based on C programming, and instructs the robot to perform these functions. The Robot Controller also sends data back to the Operator Interface, giving the human operator(s) feedback of critical information. Figure 1.1 shows a block diagram illustrating this concept.

The Operator Interface and Robot Controller have two ways to communicate with each other. One method requires the use of 900 MHz radios for wireless communication. The other way is called Tether. When using Tether, the communication between the Operator Interface and Robot Controller passes over a serial cable connecting the two units together. The same data is transmitted and received in both methods of communication.

The Robot Controller can also be configured to operate in Autonomous mode without requiring an Operator Interface. In this setup no user input is accepted and the Robot Controller behaves only as it is programmed.

The Innovation First control system uses a unique "Team Number" identification to ensure safe and reliable human to robot communication. Users enter their team number via dipswitches on the Operator Interface and then program this number into their Robot Controller one time by connecting the units via tether. Thereafter, both units will use this number as a unique identifier, ensuring that all communications received are actually theirs. Before a received data packet is used it must pass 1) team number check, 2) channel number check, and 3) checksum verification. Figures 1.2 and 1.3 show a block diagram of the Team Number concept in a radio and tether start up.

The Operator Interface has a "Competition" connector designed specifically for connecting the system to the playing field at FIRST competitions. This connection sets the radio to one of 35 competition only channels, provides power, and even starts and stops the robot during matches.

Good luck! We hope you enjoy the new 2004 control system!

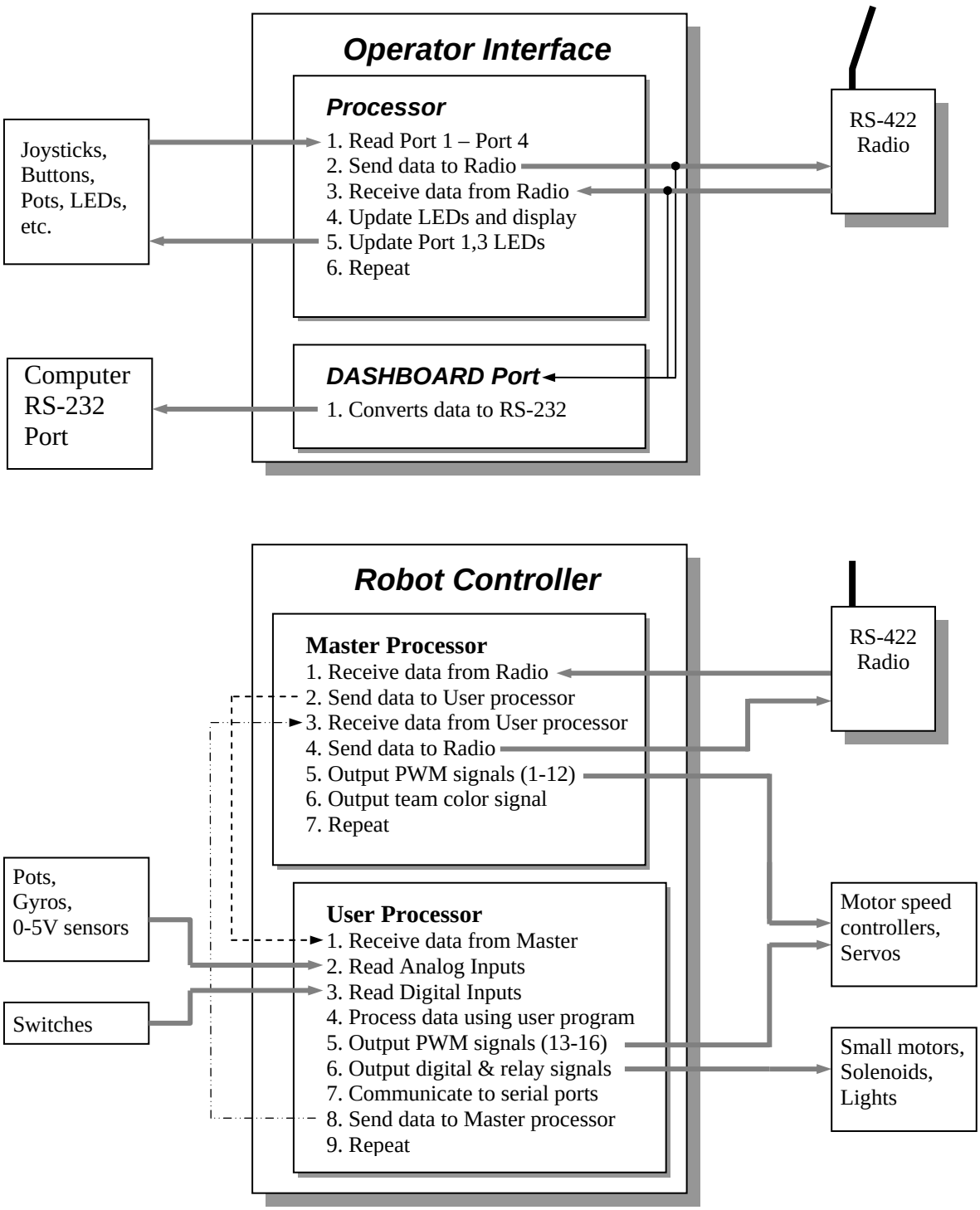


FIGURE 1.1: CONTROL SYSTEM OPERATION DIAGRAM

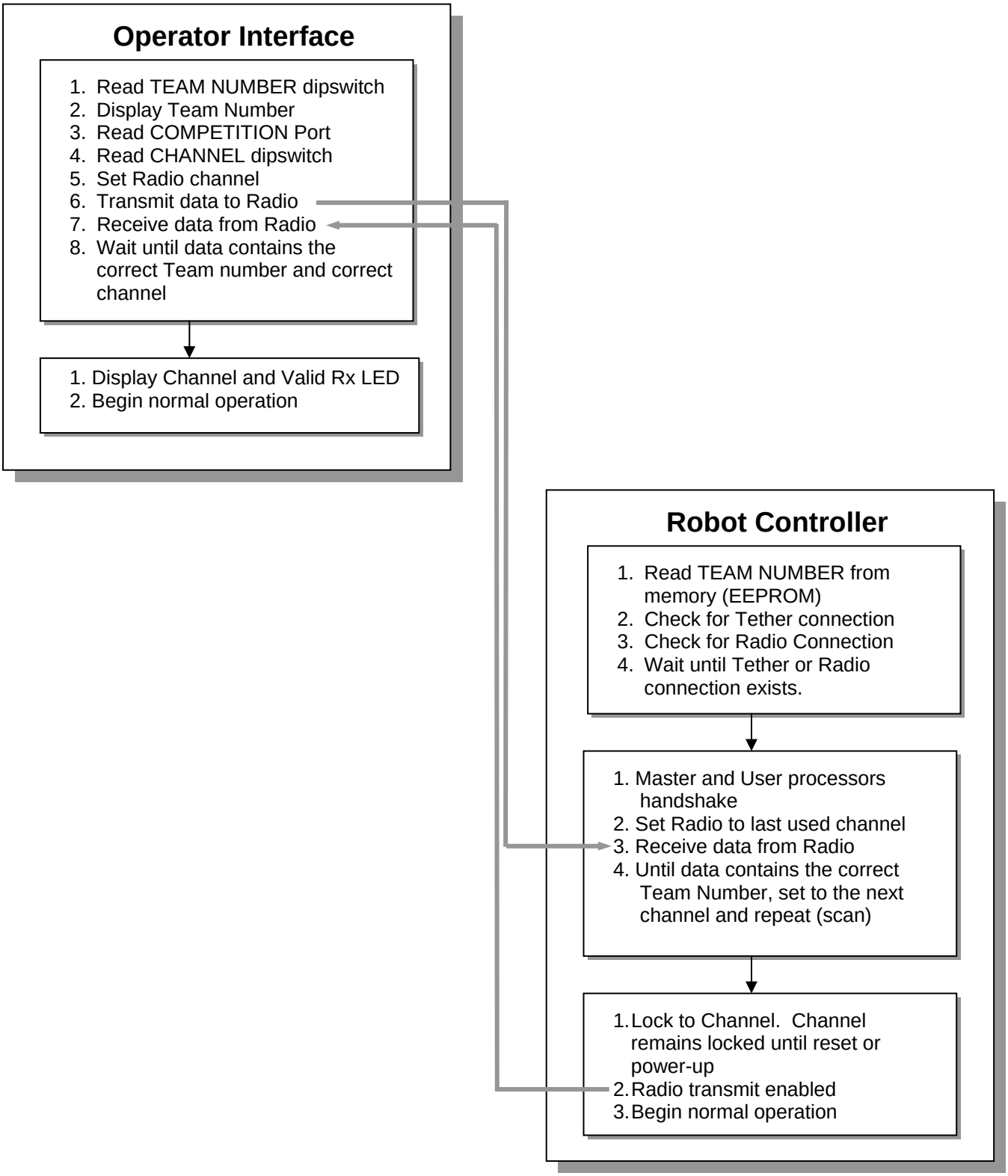


FIGURE 1.2: CONTROL SYSTEM RADIO STARTUP DIAGRAM

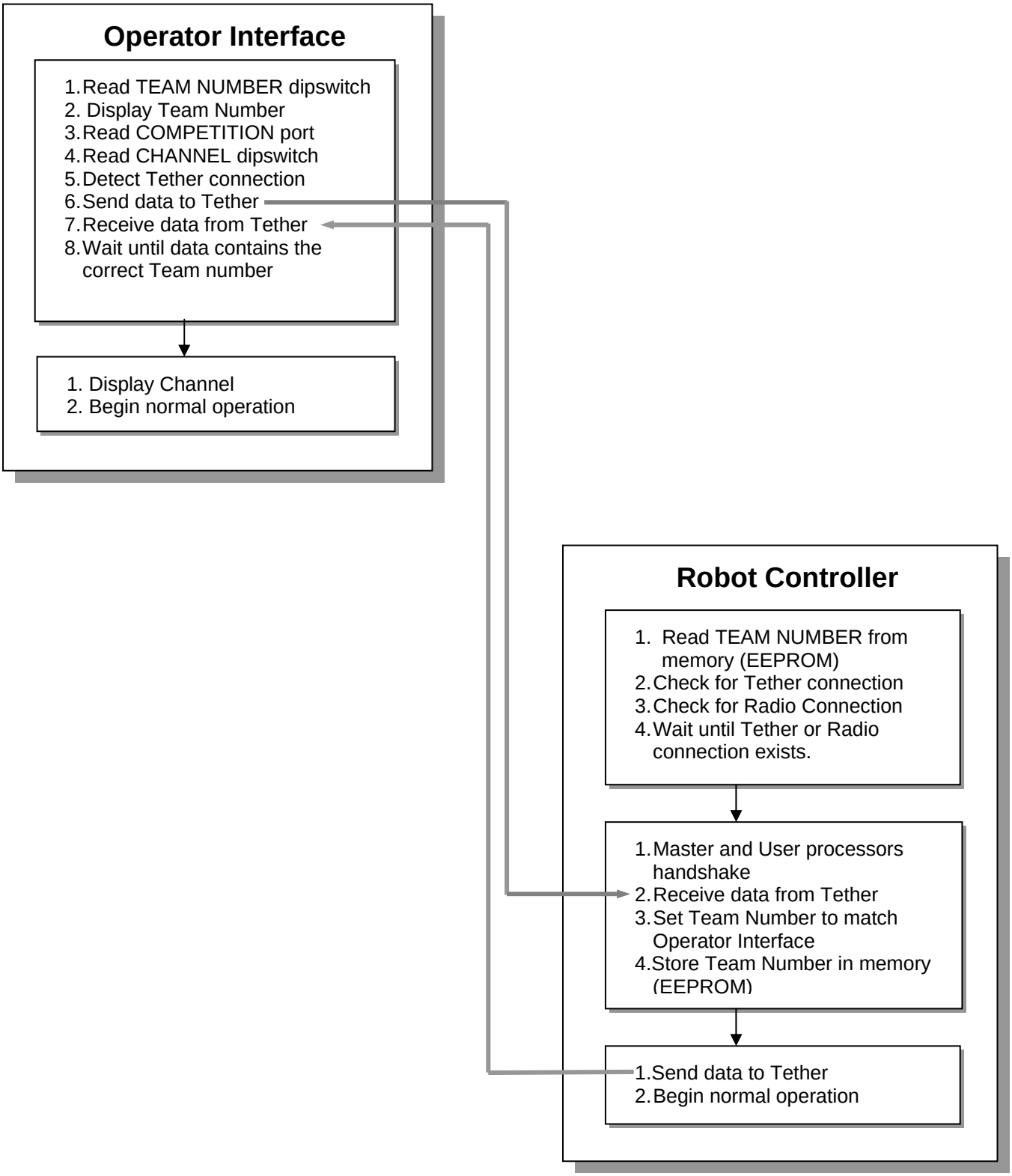


FIGURE 1.3: CONTROL SYSTEM TETHER STARTUP DIAGRAM