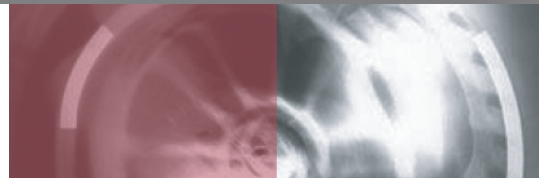


**White Paper**

**Technical**



**Software Development MAX3000  
and microMAX**

# Software Development MAX3000™ and microMAX™

November, 2005

## Overview

This documents was intended to outline the following

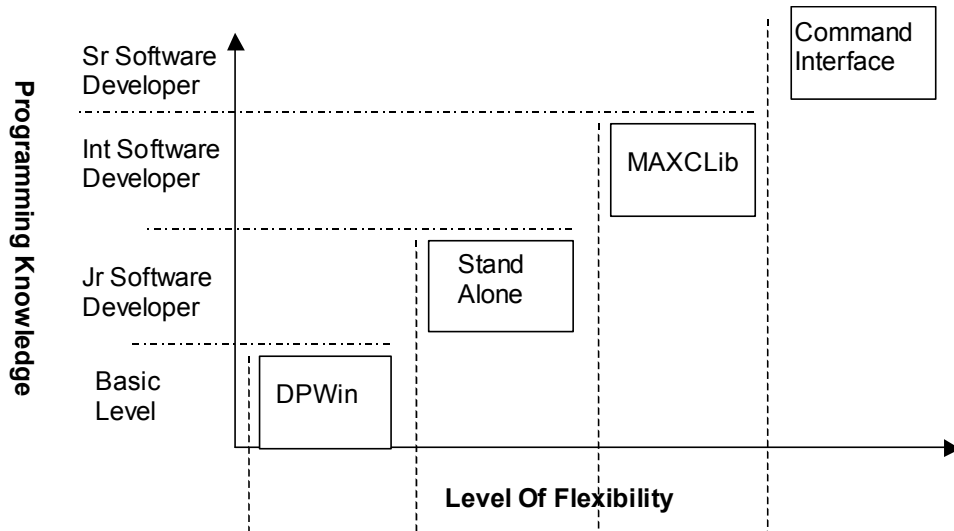
1. Different programming options available to the user.
2. Expected level of software expertise.

## Introduction

Agile has 4 packages available to help the user invoke functionality from the MAX3000™ and microMAX™ motion controllers.

1. Command Interface
2. MAXCLib
3. Agile Systems Standalone environment
4. DPWin

The following Table visually describes the packages flexibility and expected programming knowledge.



## Command Interface

The Command Interface is a specification to communicate with Agile Systems controllers. This specification opens up the communication protocol so packets can be created independently of a library or platform. The Command Interface specification includes commands and registers for total control of the controller.

Agile Systems has released the Command Interface specification to give customers complete flexibility with their development choices. In the past, customers had to use Agile Systems MAXCLib motion control library to send packets that the controller would understand. Now, a software license is no longer necessary. Customers have the design flexibility to choose the level of software support they require.

### **Key benefits of the Command Interface specification include:**

- Packet Standardization across Agile Systems line of motion control products
- Increased portability for software developers and software platforms
- Query-Response model with responses generated within one hundred microseconds
- Cyclic Redundancy Check (CRC) for error detection
- Mathematical instruction set
- Reduce system costs
- Rich instruction set that provides complete access to the controller.

**Programming Knowledge:** Senior programmer, with the experience of developing advanced software architectures and libraries from scratch. A software programmer with advanced understanding of programming concepts.

## **MAXCLib**

MAXCLib is a software translator that gives customers a universal, small size library for generating network packets on any hardware target for which an ANSI-C compiler exists. MAXCLib is a thread safe library that was developed with the Command Interface specification as the foundation.

ANSI-C means many options. The possibilities for a host in a distributed control system have been expanded from the traditional PC with Windows NT/2000/XP to a wide range of systems including PC's with Firewire, any operating system, and 8-bit microcontrollers with bit-banged serial port. Even traditional PC hosted systems enjoy greater flexibility in Operating System selection.

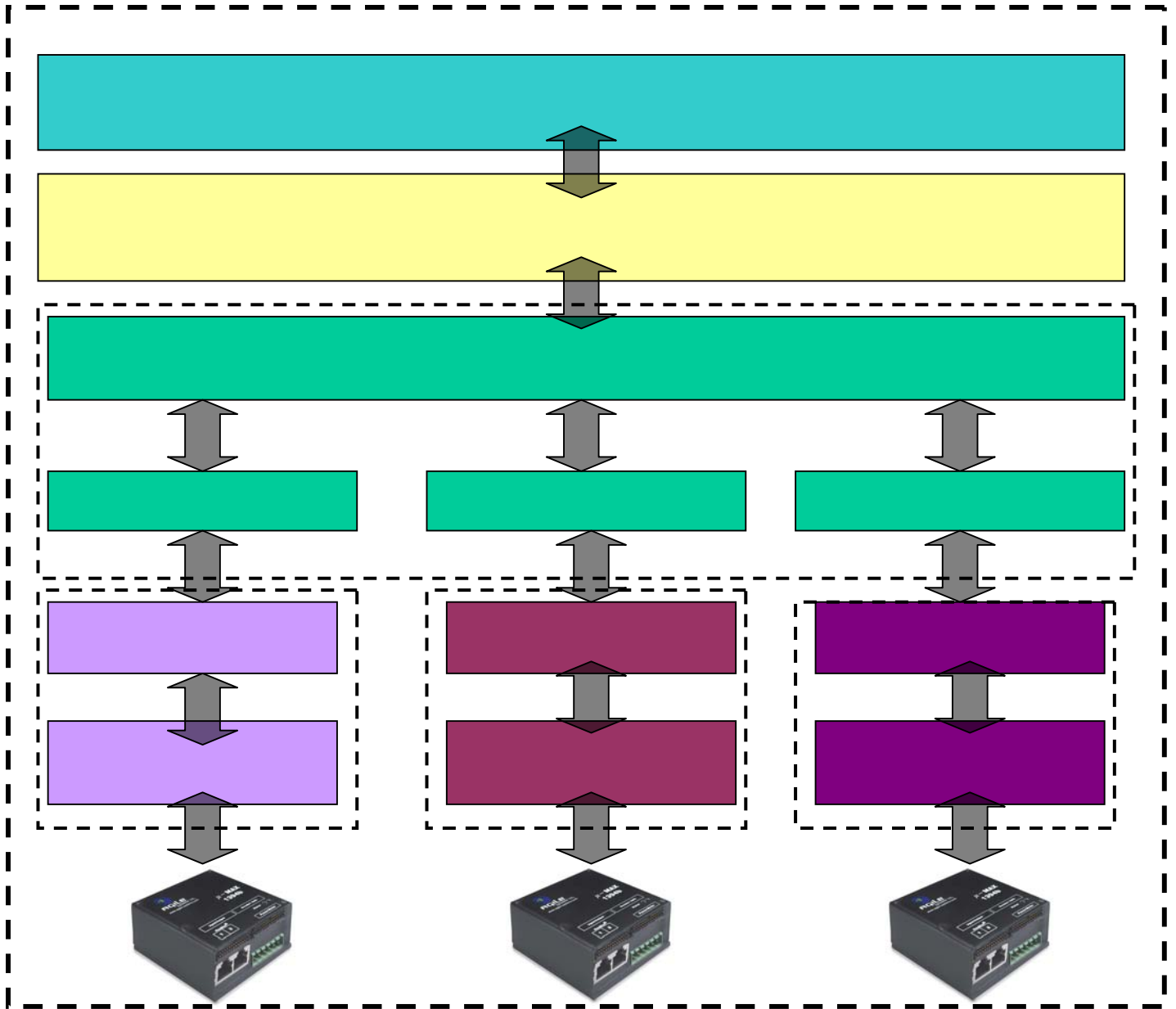
Each MAXCLib function produces one packet that can be sent over a network to the controller. The application code for interfacing with the network is written by the user. Application examples that use MAXCLib are provided with the MAXCLib source files.

Key benefits of the MAXCLib library include:

- Decreases system development Time
- User can use industry standard C development and Debugging environments.
- Fast application execution.
- Rich instruction set that provides complete access to the controller.
- Build with the Command Interface specification as it's foundation

**Programming Knowledge:** Intermediate programmer, with understanding of ANSI C language, and a broad understanding of programming concepts.

# Typical Software Architecture



## Stand-Alone Environment

Agile Systems has responded to the need for increasing speed, precision and sophistication by introducing a stand-alone environment for its line of Distributed Motion Control products. Now, customers can develop custom applications and motion routines and store them locally to non-volatile memory. Plus, the stand-alone editor application can be executed without host interaction giving even more flexibility and ease-of-use for system developers.

Developing stand-alone applications is easy using the new Command Editor in DP·Win™ – Agile Systems Windows based configuration and setup software tool. The Command Editor gives customers a user-friendly, graphical programming interface to configure and control all aspects of the motion control hardware. Custom applications can be saved, loaded, downloaded, and executed for easy development and debugging. Customers can use a variety of instructions that include conditional jumps, event triggers and subroutines. User-defined registers are available along with a variety of mathematical operations.

The Editor provides an intuitive point-and-click approach to create, debug and execute custom applications. Many features of the Editor are described later in this section. The Editor has the look and feel of a spreadsheet application and consist of cells divided into four columns. Column one is an automatically generated line number. Column two contains a space to declare any subroutine labels. Column three contains the commands of the program. Column four contains optional comments. The keyboard cursor keys and/or mouse can be used to navigate through the workspace.

Utilizing Agile Systems Distributed Motion Controllers in the stand-alone environment frees the host computer to handle other concurrent operations or independent tasks. Host commands can be issued to the controller at the same time as a program is being executed from non-volatile memory. Plus, a host controlled application can initiate stand-alone code whenever necessary. One of the biggest advantages of the stand-alone editor is the ability to perform advanced motion control without the need of a host system altogether.

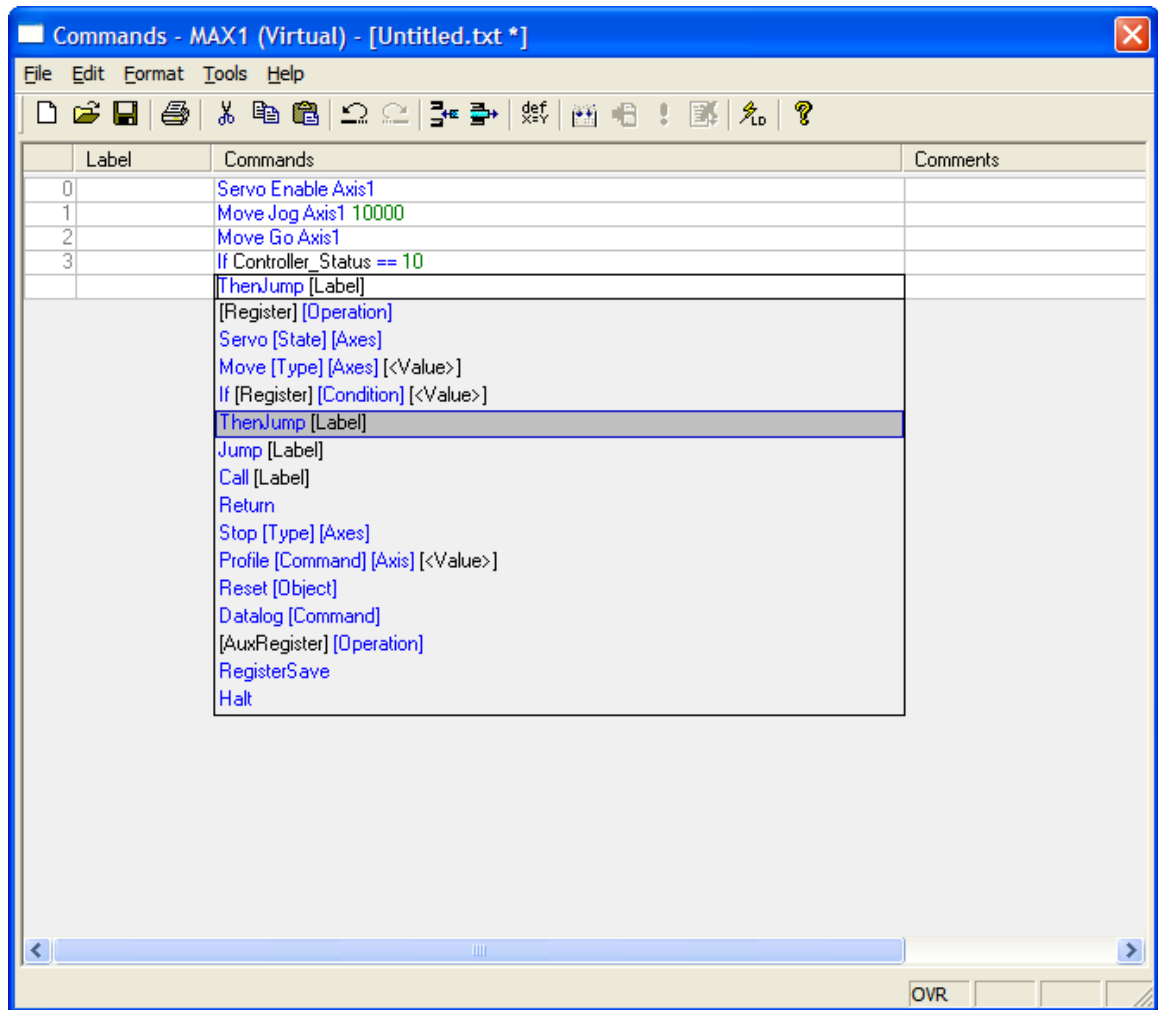
Interaction with the stored routines is primarily accomplished through the digital and analog IO. Another feature is the ability to group native MAX commands in a routine and store them on the controller for later execution. The host system can issue a 'jump' packet to initiate the routine at any moment.

### **Key benefits of the Stand Alone Environment include:**

- Decreases system development Time
- User is required to have only basic programming skills
- Eliminates need for a host PC.
- Simplifies application programs.
- Build with the Command Interface Specification as it's foundation

**Programming Knowledge:** Junior programmer, with the understanding of basic programming concepts

Example of the Stand-alone development environment



## **DP·Win™**

DP·Win™ is a Windows 2000/XP graphical environment, which is universal across Agile Systems digital power products.

### **The following list describes the key features:**

- Allows quick set up, tune and program the controller.
- Provides an oscilloscope tool to data log system registers
- Auto-calculates the optimum current loop settings, which allows easy configuration of motor types.
- Perform cyclic motion to exercise the axes
- Advanced filter toolkit.
- Easy view and setup inputs and outputs
- Provides a frequency analysis toolkit
- Contains a programming editor for the Stand-Alone Environment

### **Key benefits of DP·Win™ include:**

- Decreases system development Time
- Invoke advanced features without any programming skills
- Build from MAXCLib library as it's foundation

## Examples of DPWin

