CY550 Interactive Stepper System Controller
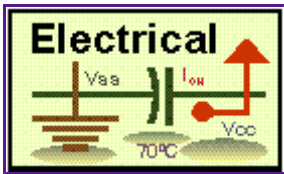
... Product Overview

... Command Summary

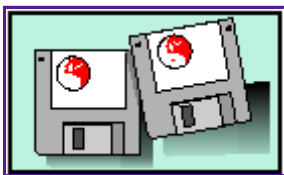...Pin Descriptions

... Electrical Specifications

...Proto Board

....Support Software

Standard Features

- Single 40 pin 5v CMOS IC
- 8 user I/O lines
- External Memory support
- Simple ASCII based commands
- Operate from Host or Stand Alone
- LED display interface
- Extended I/O
- 19,900 Steps/Sec!
- +/- 8 million step motions!
- Live Serial or Parallel interface
- Pulse & Direction Output

- Motor Status Register
- Error Status Register
- Enhanced acceleration performance

CY550 Overview

The CY550 Interactive Stepper System Controller is a single 5 volt, CMOS, 40 pin device designed to control a stepper motor and peripherals. The motor control signals include pulse and direction outputs, used by most high performance power drivers, along with power, status and motion controls. The CY550 will interface to any host computer through an 8-bit parallel TTL data bus, or through an RS-232 compatible serial port. These interfaces are live at all times including during stepping and/or during external memory execution, allowing on-the-fly control of CY550 features. The controller also supports up to 64K bytes of local external memory, which may be RAM, ROM, EPROM or EEPROM, allowing stand alone operation with no host computer at all. In addition to the CY550 command sequences, this external memory space may be used for extended I/O functions or logic flags, with up to 1/2 million bits of control! The CY550 features improved optimal acceleration curves and fast step rates, up to 19,900 steps/second, useful with motors running in half-step, quad-step, and micro-step modes.

General Command Functions and Special Features

- Live parallel command interface with two line handshake, compatible with CY233 network communications controller.
- Live serial command interface with fixed or adaptive baud rate selection, dedicated CTS/signal, optional DTR/signal, and optional XON/XOFF communication protocol.
- Support for up to 64K of optional external command memory implemented as RAM, ROM, EPROM or EEPROM.
- Selectable display for output messages from standard serial support for a parallel, or CY233 interfaces, plus special support for a parallel HP HDSP-211X LED display.
- Error Status register for error detection as well as indications of special actions undergoing.
- Extended I/O support through external memory space with up to 1/2 million bits.
- User controlled multi-purpose I/O lines, for:
    - set and clear bit functions
    - test bit and branch functions
    - wait for bit value functions
    - automatic home seek functions
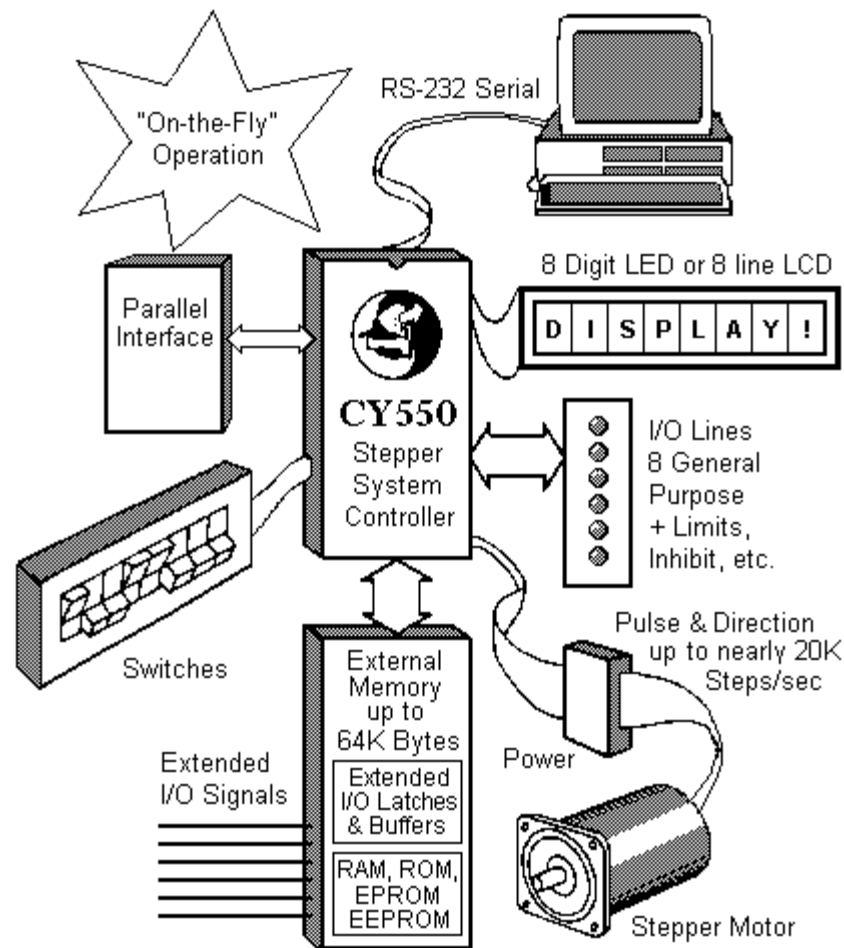
Live Command Interfaces

- Real-time commands from parallel and serial interfaces are accepted and executed at all times, including during stepping and/or during external memory execution.
- Rate changes, position query, and Bit set/test, can be done on the fly.
- Real time commands can be suspended during stepping until end of stepping or until a given position has been reached.
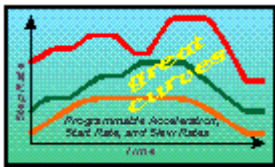
Motion Control Functions

- Programmable step rates from 15 steps/sec to 19,900 steps/sec provide extremely large (>1000:1) dynamic range. Improved optimal acceleration and fine increments result in unparalleled performance.
- Partial accelerations make short moves in the least time.
- Separate parameters for starting rate, final rate, and accelerations values allow totally programmable motions.
- Relative moves of +/- 16 Mega steps from current position. Absolute moves within +/- 8 Mega step range.
- Continuous moves with no specific number of steps, allow acceleration from the starting rate to final rate, followed by indefinite run length.
- Motions update internal step position, with position query possible at all but highest rates.

Motor Support Signals

- Step Pulse and Direction signals work with standard power driver modules.
- Internal or external direction control.
- Forced ramp-down-and-abort signal for emergency or externally controlled end of motion.
- Separate CW and CCW limit signals inhibit stepping beyond one limit, but allow stepping in opposite direction.
- Moving/Not Moving signal for use as Motion Complete or to switch stepper power driver between high and park power.
- Externally operated jog mode, with direction control and start/stop control from one signal, all at programmable, manually controllable step rates between 1 and 250 steps/sec.
- Automatic home sensor seek, with backlash compensation.
- All motor support signals are stored in an internal register accessible by the host via CY550 query command.

Command Interfaces

The CY550 support two basic command interfaces, a parallel interface and a serial interface. These signals are similar to functions on other CYxxx controllers from Cybernetic Micro Systems.

Parallel Interface

The parallel interface uses only two handshake lines, IO_REQUEST and BUSY/. When you wish to send a command character to the CY550, you first check that it is not busy; the BUSY/ signal should be high.


Serial Interface

The CY550 also provides a direct serial command interface, which may be connected to a host computer or terminal. Since the CY550 signals are all TTL voltage levels, external RS232 line drivers and receivers must be provided, to translate the RS-232 voltage levels to the CY550 TTL levels. The serial interface may be operated in one of two ways, with a fixed baud rate, selected at power up, or with an adaptive baud rate, selected by two carriage return characters from the host.

The fixed baud rate mode is selected by tying the BUSY line low, so the CY550 will read it as zero value on power up. The CY550 IO_REQUEST line value will determine baud rate, based on an 11 MHz crystal, as follows:

```
F       9600
1       2400
0        300
```

The adaptive serial mode is chosen by default, when the BUSY signal is left floating, so the CY550 can drive it at power up. In this mode, the serial baud rate is not set until the CY550 receives two carriage return codes. Be sure to send these characters after power up or any reset (hardware or software). Once the two carriage returns are received, normal CY550 commands may be sent.
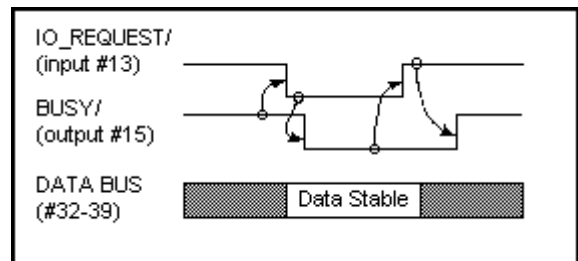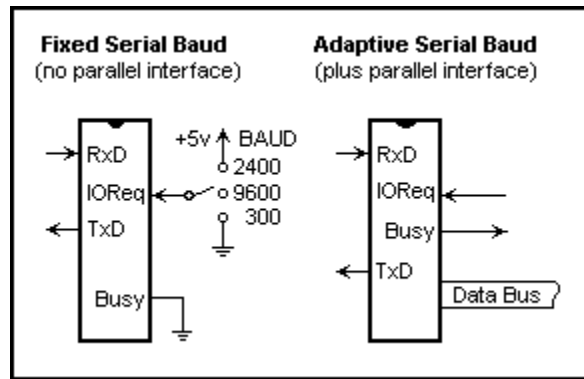
The CY233 Network control chip allows you to connect up to 255 devices to a single RS-232 serial communications line such as an IBM-PC COM1 or COM2 port, with unique addresses assigned to each device. THE CY233 Network is ideal for distributed systems where central control us required but very high speed communication is unnecessary.
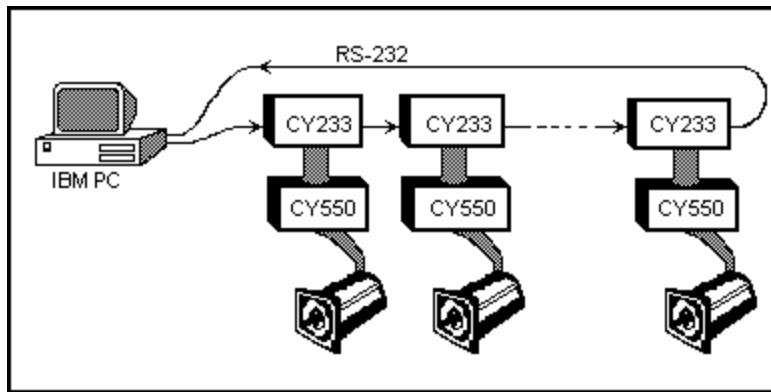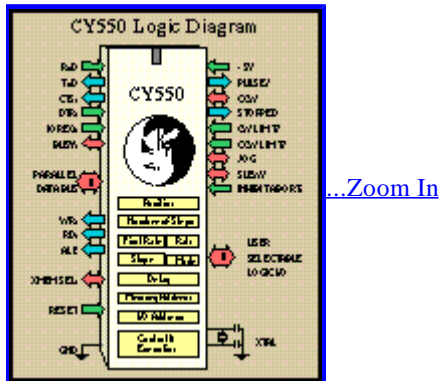
Timing & Control Signals

The CY550 provides a simple I/O interface to any 8-bit parallel port or serial port.
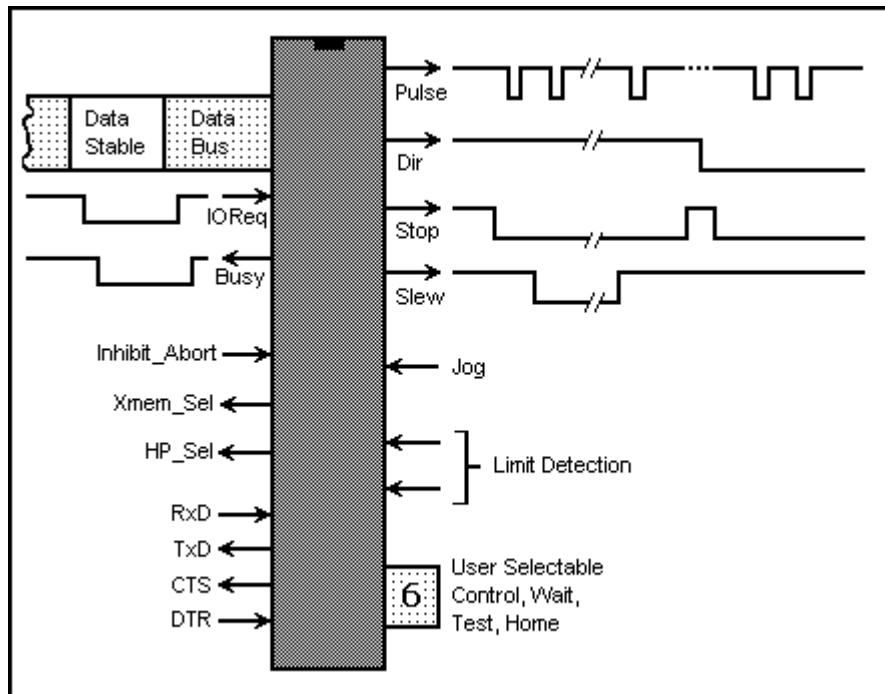
CY550 Logic Diagram

 ...Zoom In

CY550 Electrical Specifications

Absolute Maximum Ratings

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Ambient Temperature under bias .............. 0°C to +70°C
Storage Temperature ......................... -65°C to +150°C
Voltage on any pin with respect to ground ... -0.5V to Vcc+0.5V
Power dissipation ........................... 0.3 Watts
```

DC & Operating Characteristics

(TA = 0°C to +70°C, Vcc = +5V +/-10%)

SYM	PARAMETER	MIN	MAX	UNIT	REMARKS
I CC	pwr supply current		26	mA	
V IH	input high level	1.9	Vcc	V	(3.5V for XTAL, Reset)
V IL	input low level	-0.5	0.9	V	
I LO	data bus leakage		10	uA	high impedance state
V OH	output high level	2.4		V	I OH = -60 uA
V OL	output low level		0.45	V	I OL = 1.6 mA
F CY	crystal frequency	3.5	16	MHz	see clock circuits

CYB-550 Proto Board

 ... Zoom In

The versatile CYB-550 board supports most of the features of the CY550. In its minimum configuration, the CYB-550 will support motor control signals, limit switch detection, home seek sensor, jog, and power down signal. It also provides programming features such as jump, loop, and wait, with eight user-definable I/O lines. The board provides serial and parallel interfaces and will also support the CY545.

In the maximum configuration the board supports an 8-character LED display and up to 32K external memory. For multi-board or multi-axis control, a CY233 network chip is fully supported, and provides addressing for up to 255 boards on a single serial network.

The CYB-550 is provided in kit form and is a compact 100mm x 160mm(4" x 6.3") format. A 2" x 3.5" wire wrap area is available for custom circuits such as power drivers. The board requires +5volts and internally generates RS232 level signals for the serial interface. You must add your own external power drivers and pulse-to-phase translators for your motor.

CyberCom Software is available for keyboard control of the board.

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