



Product Description

The Turbo Clipper Drive combines the intelligence and capability of Delta Tau's "Clipper", a very powerful, compact, and cost-effective multi-axis controller, with a newly developed 4-axis low-voltage amplifier and convenient breakout system.

Delta Tau's Clipper controller board (Turbo PMAC2-Eth-Lite) has set new standards in price/performance ratio. Never before has such a capable controller been provided in such a compact, inexpensive package.

The breakout board, which joins the controller and amplifier, provides an easy way to connect the Clipper Drive to your machine using industry standard Molex™ connectors. These connectors can be field terminated with simple hand tools or integrated into your OEM factory wiring harness. Standard 9-pin D-sub connectors are provided for the encoders.

The amplifier interfaces high-performance MOSFET technology to the Turbo PMAC's advanced control algorithms. Each axis can be configured individually in software to drive a DC brush motor, a 3-phase brushless motor, or a 2-phase stepper motor (with or without encoder feedback). PWM switching frequencies can be set as high as 40 kHz. With reasonable air exposure on the heat sink, natural convection will provide sufficient cooling, so no dedicated fans are required.

The resulting Clipper Drive is an extremely powerful, cost effective, easy to integrate, embedded automation controller.

Controller Basic Specifications:

- Turbo PMAC DSP processor
- USB, Ethernet, and RS-232 communications
- Full 4-axis servo interface, each including:
 - Fully digital PWM generation
 - Quadrature encoders with Hall sensors
 - Home, limit, and "user" trigger input flags
 - "Compare" trigger output flag
- General-purpose sinking/sourcing isolated digital I/O:
 - 16 inputs at 12-24V
 - 15 outputs at 12-24V, 500mA each
 - "Multiplexer" port allows I/O expandability
- 2 channels auxiliary "handwheel" encoders
- 2 channels auxiliary pulse outputs (pulse and direction or PWM)
- CPU watchdog safety interface
- Built-in emergency stop safety circuitry
- CNC G-code compatibility

Amplifier Basic Specifications:

- Supports DC brush, brushless, and stepper motors (1, 2, and 3-phase)
- DC bus (input) voltage: 12 – 60 VDC
- Output current per axis: 5A cont., 15A peak (1 sec)
- Programmable PWM frequency: 2 – 40 kHz
- Protections: over/under voltage, over temperature, over current, short circuit
- Integrated 24VDC-input power supply for logic circuits

OPTIONS:

CPU and Memory Options:

- Opt 5C0: 80 MHz CPU, 256k x 24 SRAM, 1M x 8 Flash (Std.)
- Opt 5C3: 80 MHz CPU, 1M x 24 SRAM, 4M x 8 Flash
- Opt 5F3: 240 MHz CPU, 1M x 24 SRAM, 4M x 8 Flash

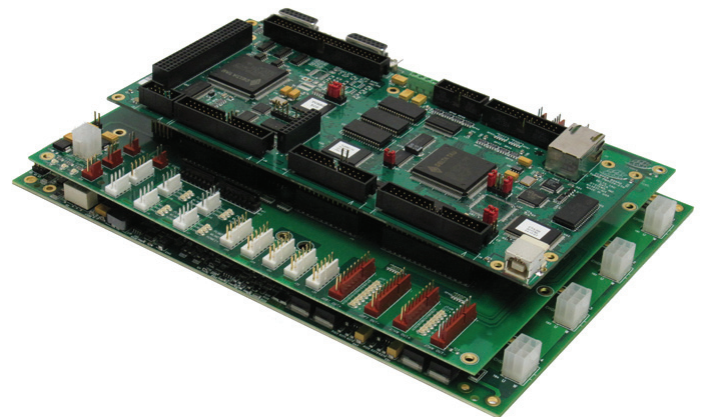
Interface Options:

- Opt 2: On-board 8k x 16 dual-ported RAM (required for NC)
- Opt 11: Programmable fast output circuitry (e.g. for laser modulation)
- Opt 15F: ModBus TCP interface

Accessory Boards:

- ACC-34AA: 32 inputs, 32 outputs, 12-24V, isolated
- ACC-34B: 32 inputs, 32 outputs, 5V, Opto-22™-compatible connectors
- ACC-65ETH: 24 inputs, 24 outputs, 12-24V, isolated, ModBus interface
- ACC-51S: 4-axis sinusoidal encoder interface

Turbo Clipper Drive
191mm x 266mm (7.5" x 10.5")



Specifications and Features

Controller Hardware Specifications

80 MHz DSP56303 Turbo PMAC CPU
 256k x 24 user SRAM
 1M x 8 flash memory for user backup & firmware
 Latest released firmware version
 RS-232 serial interface
 100 Mbps Ethernet interface
 480 Mbps USB 2.0 interface
 4 channel axis-interface circuitry, each including:
 3-channel differential/single-ended encoder input
 5 input flags, 2 output flags
 UVW TTL-level "hall" inputs
 PID/notch/feedforward servo algorithms
 16 Inputs (12-24VDC)
 16 Outputs (12-24VDC, 500 mA)
 2 Handwheel Ports
 2 Pulse/Direction Ports

Dual Ported Ram *

Amplifier Specifications

4 axes: 2 or 3 phase
 DC Bus (Input) Voltage: 12 VDC to 60 VDC
 Output Current: 5A continuous, 15A peak (1 sec.) each
 Power (per axis): 240W
 PWM Frequency: 2 KHz to 40 KHz
 Status display: 7 segment
 Protections: voltage (over/under), temperature (over),
 short circuit, current (over)
 Input Logic Power (req.): +24 VDC (2A, +/- 20%)
 Cooling: Fully rated cooling standard (none additional required)

Motion Features

Trajectory Generation
 Linear interpolation mode with S-curve accel/decel
 Circular interpolation mode with S-curve accel/decel
 Rapid point-to-point move mode
 Cubic B-spline interpolation mode
 Cubic Hermite-spline (PVT) interpolation mode
 Automatic move-until-trigger functions with hardware capture
 Altered destination on the fly
 Interactive jog moves
 Multi-move lookahead for velocity and acceleration limiting
 Servo Loop
 Standard digital PID feedback filter
 Velocity, acceleration, and friction feedforward
 2nd-order notch/low-pass filter
 Gains changeable at any time
 Programmable input, integrator, and output limits
 Alternate 35-term "pole-placement" servo filter
 Alternate user-written high-level "Open Servo" algorithms
 Commutation
 Sinusoidal commutation of AC servo motors
 Field oriented vector control of AC induction motors
 Digital current-loop closure with direct PWM output
 Compensation
 Position compensation tables (1D & 2D)
 Torque compensation tables
 Backlash compensation
 Tool radius compensation

* Option or Accessory Required

Motion Features (continued)

Safety
 Hardware and software overtravel limits
 Amplifier enable/fault handshaking
 Following error limits
 Integrated current limit
 Watchdog timer
 Program and communications checksums
 Computational
 Real-time multi-tasking operating system
 48-bit floating-point math for user programs
 Trigonometric and transcendental functions
 Automatic type-matching of different variable types
 User-defined pointer variables to any registers
 Coordination and Master/Slave
 User-defined coordinate systems for auto coordination of axes
 Separate coordinate systems for independent motion of axes
 Multi-motor axis support (e.g. gantries)
 Dynamic axis transformations (e.g. offsets, rotations, mirroring)
 User-written forward and inverse-kinematic algorithms for non-Cartesian geometries
 Electronic gearing (no programming required)
 Electronic cams with programmable profiles
 Motion Program
 High-level programming language for up to 32 axes of control
 Automatic sequenced execution of moves
 Calculations and I/O synchronous to motion
 Axes programmed in user engineering units
 Motion values as constants or expressions
 Automatic coordination of multiple axes
 Ability to execute G-code programs

PLC Features

Execution asynchronous to programmed motion
 I/O control as in hardware PLC
 Executive functions for standalone applications
 Safety and status monitoring
 Servo gain scheduling
 Data reporting functions
 Access to all registers in controller
 ModBus I/O control *

Supported Feedback types / devices

Digital quadrature encoders
 Sinusoidal encoders*
 MLDT's

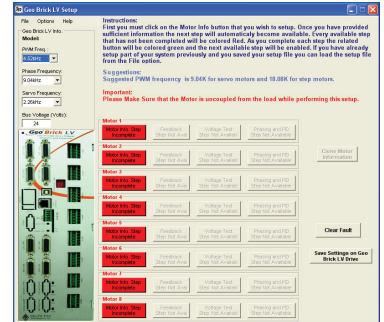
Supported Motor types include

Brushless (AC/DC)
 DC Brush
 Stepper
 Induction
 Voice Coil

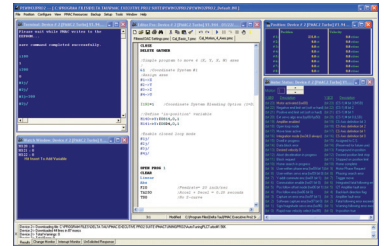
* Option or Accessory Required

Warranty: 1-year from date of shipment

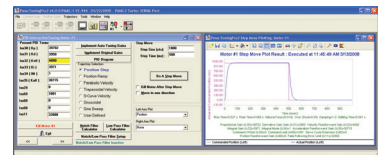
Tools and Software



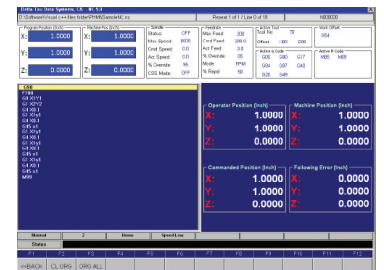
LV Setup Software
 Allows you to easily setup your 'LV' controller /amplifier & motors.



PMAC Executive (PEWIN)
 Use to: jog motors, issue commands, monitor status & positions, download motion & PLC programs.



Tuning Pro2
 Use the Auto-Tuner to quickly get servo motors moving. Then use the Interactive Tuning tool to 'fine tune' servo performance and generate response plots.



PMAC-NC Pro2
 A Windows-based customizable GUI for PC based CNC control.

Turbo Clipper Drive Ordering Information

C **P** **S** **4** - **B** **B** - **4** **0** **0** - **0** **0** **1** - **0** **0** **0**

BB CPU & Memory Options

CO - 80 MHz, 8Kx24, 256Kx24SRAM, 1MB Flash
 C3 - 80 MHz, 8Kx24, 1Mx24SRAM, 4MB Flash
 F3 - 240MHz, 192Kx24, 1Mx24SRAM, 4MB Flash

G Communication Options

0 - No Options
 D - (Clipper OPT-2) DPRAM option, size 8Kx16-bit wide
 M - (Clipper Opt-15M) Modbus Ethernet Comm, Protocol

J Other Options

0 - No Options (Default)
 1 - Opt. 11A HI-Speed Dig. Out PWM Laser Control

KL Factory Assigned Options

00 - No Additional* Options
 Xx - Factory assigned digits for Additional* Options
 * Additional options available, contact distributor / factory for complete listing

