DELTA TAU

Turbo Clipper Drive

4 - Axis Complete Solution – Easily Integrated Controller, Breakout Board and Amplifier

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 MolexTM 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:
  - o Fully digital PWM generation
  - o Quadrature encoders with Hall sensors
  - o Home, limit, and "user" trigger input flags
  - o "Compare" trigger output flag
- General-purpose sinking/sourcing isolated digital I/O:
  - o 16 inputs at 12-24V
  - o 15 outputs at 12-24V, 500mA each
  - o "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

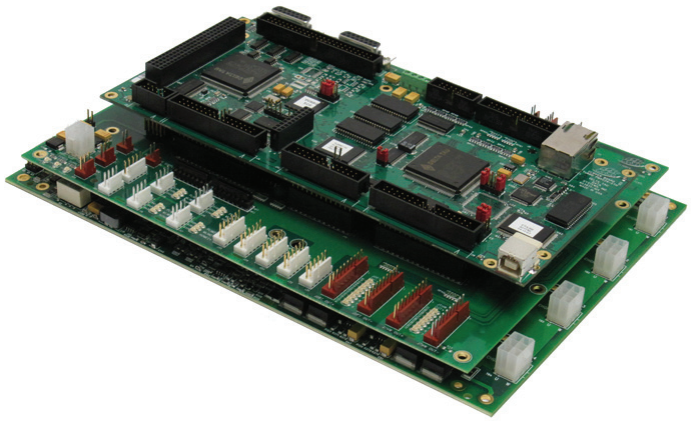
Interface Options:

- 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-22TM-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")



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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

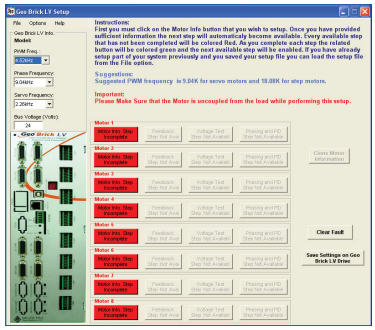
Supported Motor types include

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

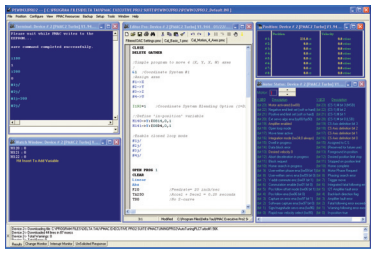
** Option or Accessory Required*

Warranty: 1-year from date of shipment

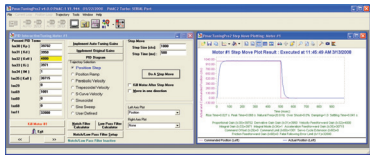
Tools and Software



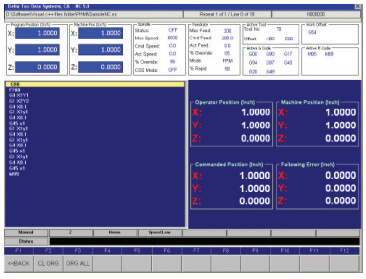
LV Setup Software
Allows you to easily setup your 'LV' controller /amplifier & motors.



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

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