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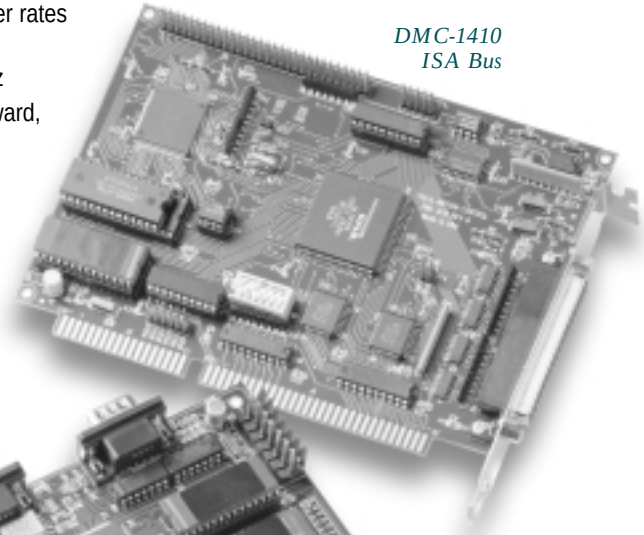
# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## FEATURES

### MOTION

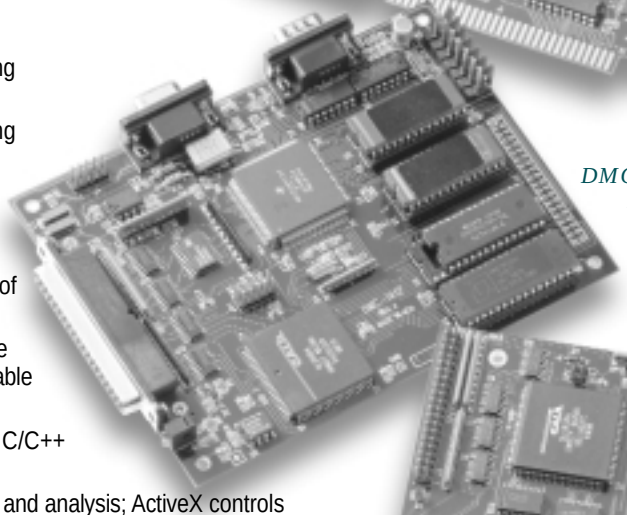
- Modes of motion include jogging, point-to-point positioning, contouring, electronic gearing and ECAM
- Dual-loop control and backlash compensation
- Servo loop update rates as low as 375 microseconds—faster rates available as an option
- Encoder frequencies up to 8 MHz; Step motors up to 2 MHz
- Software PID control with velocity and acceleration feedforward, offsets and integration limits



*DMC-1410*
*ISA Bus*

### INPUTS/OUTPUTS

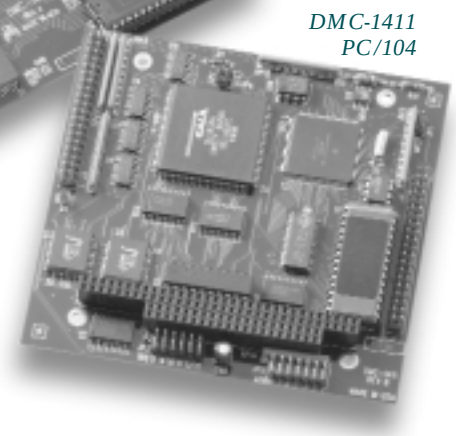
- Provides main and auxiliary encoder input
- 7 uncommitted TTL inputs and 3 TTL outputs
- Forward and Reverse limits and home input for each axis
- High-speed position capture



*DMC-1412*
*RS232*

### PROGRAMMING

- On-board, non-volatile memory for storing parameters
- DMC-1412: On-board memory for storing application programs, variables and arrays
- Programmable event triggers including At Time, At Position, At Input, At Speed
- Multitasking for simultaneous execution of two applications programs
- Intuitive, English-like command language with over 200 commands directly executable by controller
- Extensive DLLs and documentation for C/C++ programmers
- Software tools for automatic servo tuning and analysis; ActiveX controls for Visual Basic
- Drivers for QNX, DOS, Windows 3.1, 95, 98, 2000, NT and CE



*DMC-1411*
*PC/104*

### FORMATS

- 1½ axes
- ISA, PC/104, and RS232*
- DMC-1412 also available as packaged unit with internal power supply
- DMC-1414 packaged controller includes an internal servo amplifier and integrated screw terminals
- Controls step motors and servo motors
- On-board sinusoidal commutation for brushless motors available on DMC-1410 and DMC-1412

** Ethernet available on DMC-1415, DMC-1416, and DMC-1425 which are described in another section.*

# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## DESCRIPTION

Galil's DMC-1400 Econo Series of single-axis controllers have proven to be the best choice for those requiring minimum cost and space. Not only are these controllers roughly half the size of multiaxis controllers–they are also half the price. Even so, performance is not sacrificed in the least. In fact, the Econo Series handle the most demanding applications with such features as an extra encoder input which is ideal for electronic gearing, program memory with multitasking, uncommitted I/O for synchronizing motion with external events, and user-selectable stepper or servo motor control.

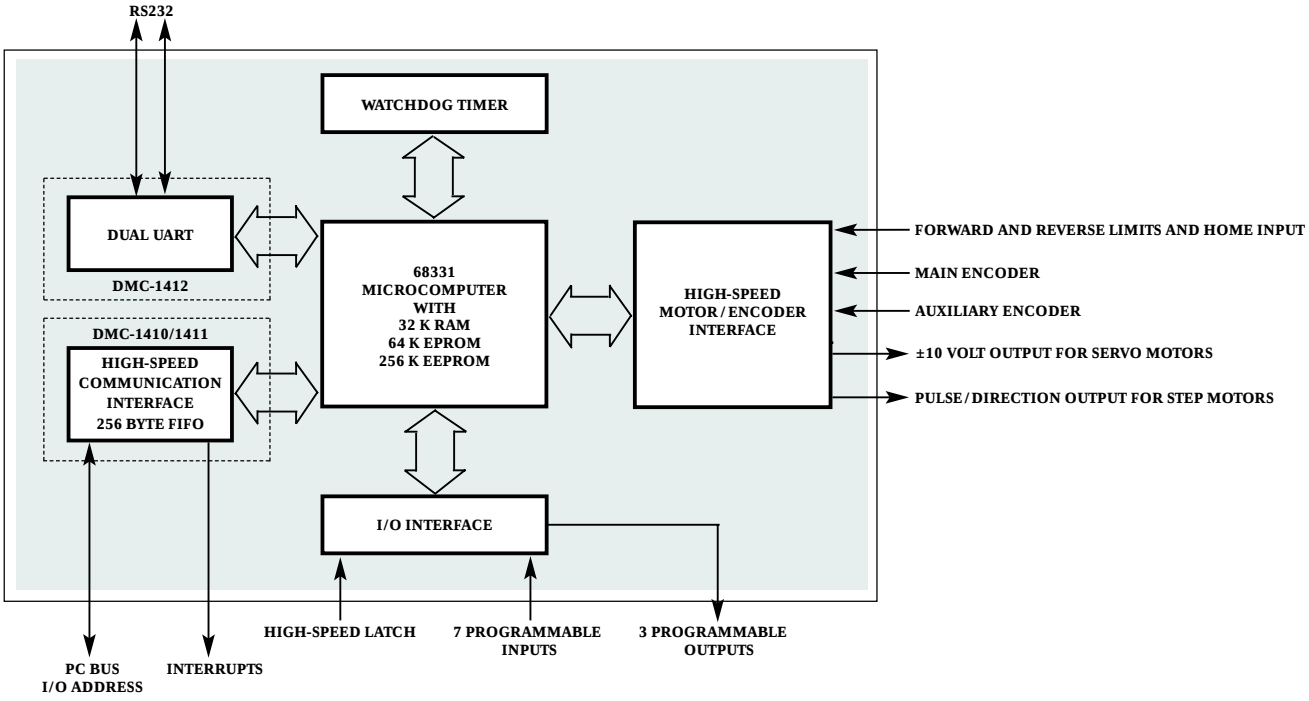
Best of all, the Econo Series remain–like all Galil products–very easy to use. For example, upgrading is painless since the two-letter commands maintain the same format as prior generations. System setup and programming is easier than ever with such enhanced software tools as WSDK for tuning and analysis, ActiveX Tool Kit for interface to Visual Basic, and a C-Programmers Tool Kit. Also, software is compatible with DOS, QNX, Windows 3.1, Windows 95, Windows NT, Windows 98, and Windows 2000.

Various options are available for the DMC-1400 series including the DMC-1410 ISA controller, DMC-1411 PC/104 controller, and DMC-1412 stand-alone controller with RS232. The DMC-1414 includes an integrated PWM amplifier for driving brush-type motors. *Note:* The Ethernet interface is included with the DMC-1415, DMC-1416, and DMC-1425 Econo controllers which are described in another section.



*DMC-1412 Stand-alone Box*

## FUNCTIONAL ELEMENTS



# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

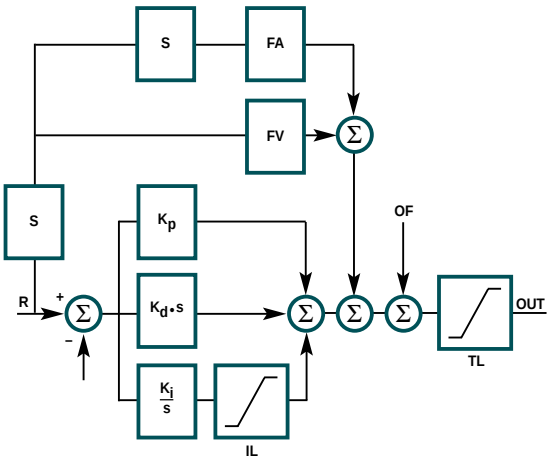
## COMMAND LANGUAGE

Galil's command language is comprised of intuitive, two-letter, English-like ASCII commands designed to make programming as quick and easy as possible. For example, the "BG" command begins motion while the "SP 2000" command sets the speed of the X-axis as "2000." Commands are included for system set-up, tuning, prescribing motion, error handling and applications programming. A complete set of commands is described in the following table. Custom commands can be created upon request.

## PID COMPENSATION

Galil controllers provide a compensation function which includes a PID (Proportional-Integral-Derivative) filter. The compensation also includes velocity and acceleration feedforward. All filter parameters are adjustable, allowing servo system tuning for best performance. Dual loop control is provided for reducing the effect of backlash.

*PID Block Diagram*



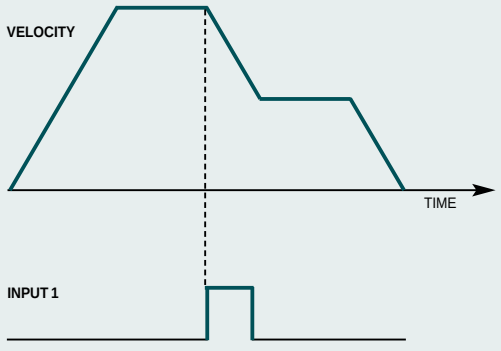

## APPLICATIONS PROGRAMMING

One of the more powerful features of all Galil controllers is their ability to store and execute complex application programs designed by the user. Such applications programs can be downloaded directly to the controller and executed without host intervention. The benefit of this is the freeing of the PC for system-level tasks. In fact, Galil controllers permit multitasking, which allows up to two programs to execute simultaneously. Also, special commands are available for application programming including event triggers, conditional jumps, subroutines, symbolic variables and arrays.

*Example–Change Speed on Input*

Move the x-axis forward a distance of 20000 counts at an initial speed of 50000 counts/sec and with an acceleration and deceleration of 1000000 counts/sec$^2$. As soon as the motor activates the sensor connected to input 1, reduce the speed to 25000 counts/sec.

| PROGRAM | INTERPRETATION |
|---|---|
| #A | *Label* |
| PR 20000 | *Distance* |
| SP 50000 | *Initial speed* |
| AC 1000000 | *Acceleration rate* |
| DC 1000000 | *Deceleration rate* |
| BGX | *Start the motion* |
| AI 1 | *Wait for the sensor input* |
| SP 25000 | *Reduce the speed* |
| EN | *End program* |



# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## MODES OF MOTION

### Point-to-Point Motion

The Point-to-Point Motion mode allows the target position (PA or PR), slew speed (SP), acceleration (AC) and deceleration (DC) to be specified. Upon begin (BG), the controller generates a trapezoidal velocity profile where the speed and acceleration can be changed anytime during motion. For applications that require smooth motion without abrupt velocity transitions, a motion smoothing function (IT) is provided. The position (TP) and position error (TE) may be interrogated at anytime.

*Example—Point-to-Point Motion*

| COMMAND | INTERPRETATION |
|---|---|
| AC 1000000 | *Specify acceleration rate* |
| DC 1000000 | *Specify deceleration rate* |
| SP 20000 | *Specify slew speed* |
| PR 40000 | *Specify distance* |
| BG | *Begin motion* |

### Jogging

In the jog mode, each axis is given a jog speed and direction (JG), acceleration (AC), and deceleration (DC). Upon begin (BG), the controller ramps up to the jog speed at the prescribed acceleration following a trapezoidal profile. A smoothing function (IT) is provided to smooth abrupt velocity transitions. The stop command (ST) stops the motion at the prescribed deceleration rate. The jog speed and direction, acceleration and deceleration may be changed at anytime during motion. The average speed can be interrogated at any time using the Tell Velocity (TV) command.

*Example—Jogging*

| COMMAND | INTERPRETATION |
|---|---|
| JG 20000 | *Specify jog speed and direction* |
| AC 1000000 | *Specify acceleration* |
| DC 1000000 | *Specify deceleration* |
| BG | *Begin motion* |
| WT 5000 | *Wait 5 seconds* |
| JG 30000 | *Increase X speed* |
| WT10000 | *Wait 10 seconds* |
| ST | *Stop motion* |

### Electronic Gearing

The electronic gearing mode makes it easy for Galil controllers to simulate the motion of mechanical gears electronically. A slave axis can be geared to an external master at a prescribed gear ratio defined by the GR command. The gear ratio can be changed on-the-fly.

### Electronic CAM

In the electronic CAM mode, the motor's position can be linked to an external motor position, allowing simulation of a mechanical CAM. The CAM functions are specified by a table that allows complex profiles with varying gear ratios to be prescribed. The follower axis may be engaged or disengaged independently at specific points along a CAM cycle. This allows selecting the engagement and disengagement points as those where the speed change of the follower is minimal.

The electronic CAM is an ideal mode for periodic operation, especially those requiring varying gear ratio along the motion cycle. Such applications include flying shears, rotating knives, and packaging systems.

### Contouring

The contouring mode (CM) is extremely flexible and allows any arbitrary profile to be prescribed. Here, the user bypasses the controller profiler and inputs the position versus time trajectory directly. The trajectory is described as the position increment (CD) over a defined time period (DT). The controller performs linear interpolation between prescribed points. The contour mode is useful for following complex, computer-generated paths or for "teaching" position paths. An automatic data-recording feature allows the controller to "learn" a path and then follow it in the contour mode.

# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## OTHER FEATURES

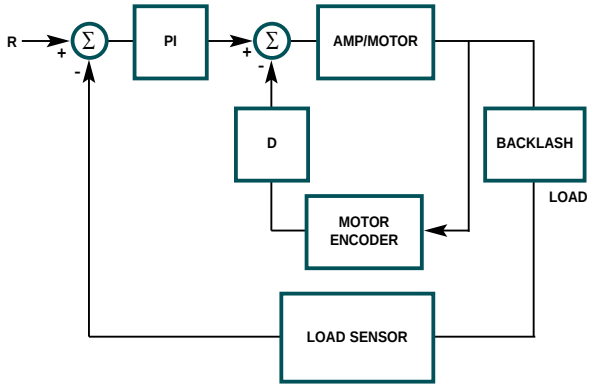
### Error Handling

Dedicated I/O is provided for safety controls: forward and reverse limit inputs, amplifier enable output, abort input and error output. In addition, the controller provides safety functions in software: upper and lower software travel limits, error limits, and automatic shut-off on excess error. In addition, program interrupts are provided for error and limit conditions. The program interrupts cause the program sequencer to automatically branch to an error handling subroutine. The error handling subroutine can be customized by the user to provide flexibility and system protection.

### Dual-Loop

The dual-loop (DV) feature enables the controller to compensate for mechanical backlash. Typically, dual-loop systems use a rotary encoder on the motor and a linear encoder on the load (Galil controllers accept inputs from two encoders per axis as a standard feature). Dual-loop control changes the standard PID control and closes the position loop with the load encoder ("PI") and derives the damping terms ("D") from the motor encoder. This method provides smooth and accurate control along the motion path regardless of backlash.

*Dual-loop Block Diagram*




### Sinusoidal Commutation

Sinusoidal commutation assures smooth motion and reduces torque ripple when using brushless motors. The DMC-1410, DMC-1412, and DMC-1414 stand-alone controller includes a sinusoidal commutation feature that allows designers to use lower-cost servo drives. Sinusoidally commutated motion requires two DAC outputs that are phase shifted by 120º. The third commutation signal is generated by the servo amplifier. The commutation can be initialized with or without hall sensors.

### General Inputs and Outputs

The controller provides general purpose I/O for direct interface with PLC's, sensors, switches, and other devices. In addition, there are inputs and outputs dedicated for special features.

### Homing

The controller provides a home input and an encoder index input. These inputs combined with Galil's built-in homing commands, allow for quick and accurate homing.

### High-speed Position Capture

Galil controllers provide a high-speed position capture input for each axis. This feature latches the exact position within .1 microsecond of the occurrence of an input. Position capture is crucial for applications requiring precise synchronization of position to external events such as coordinate measurement machines.

### Customization

Contact Galil for any special hardware or software feature you need. We can create a custom mode of motion exactly to your specifications, design a circuit board with a special connector or design to fit space constraints. An experienced application engineer will help you develop a specification and provide you with a quotation for custom services.

# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## SPECIFICATIONS

### SYSTEM PROCESSOR

- Motorola 32-bit microcomputer

### COMMUNICATIONS INTERFACE

- *DMC-1410:* ISA with bi-directional, high speed FIFO buffer
- *DMC-1411:* PC/104 with bi-directional, high speed FIFO buffer
- *DMC-1412:* (2) daisy-chainable RS232 ports up to 38.4K baud
- *DMC-1414:* (2) daisy-chainable RS232/RS422 ports up to 38.4K baud; RS485 option

### MODES OF MOTION:

- Point-to-point positioning
- Jogging
- Electronic Gearing
- Electronic Cam
- Contouring

### MEMORY

- Program memory size–250 lines × 40 characters
- 126 variables
- 1000 array elements in up to 6 arrays

### FILTER

- PID (proportional-integral-derivative) with velocity and acceleration feedforward
- Dual-loop control for backlash compensation
- Velocity smoothing to minimize jerk
- Integration limits
- Torque limits
- Offset adjustment

### KINEMATIC RANGES

- *Position:* 32 bit (±2.15 billion counts per move; automatic rollover; no limit in jog or vector modes)
- *Velocity:* Up to 8 million counts/sec for servo motors
- *Acceleration:* Up to 67 million counts/sec$^2$

### UNCOMMITTED DIGITAL I/O

- 7 TTL inputs
- 3 TTL outputs

### HIGH SPEED POSITION LATCH

- Latches within .1 microsecond

### DEDICATED I/O

- Main encoder inputs–Channel A, A-, B,B-,I, I- (±12 V or TTL)
- Auxiliary encoder–Channel A, A-, B, B-
- Forward and reverse limit inputs
- Home input
- High-speed position latch input
- Analog motor command output with 16-bit DAC resolution
- Pulse and direction output for step motors
- Amplifier enable output
- Error output

### MINIMUM SERVO LOOP UPDATE RATE

- 375 microsecond

### MAXIMUM ENCODER FEEDBACK RATE

- 8 MHz

### MAXIMUM STEPPER RATE

- 2 MHz (Full, half or microstep)

### POWER REQUIREMENTS

- *DMC-1410, DMC-1411, DMC-1412, DMC-1415 card:*
  +5V 400mA
  -12V 40mA
  +12V 40mA
- *DMC-1412 Box:* plugs into 90–260 VAC
- *DMC-1414:* requires single 20–60 V DC supply

### ENVIRONMENTAL

- *Operating temperature:* 0–70° C
- *Humidity:* 20-95% RH, non-condensing

### MECHANICAL

- *DMC-1410:* 7" ISA
- *DMC-1411:* 4.4" × 4.15"
- *DMC-1412:* 6.4" × 4.7"
- *DMC-1412 Box-level:* 5.1" × 3.0" × 6.8"
- *DMC-1414 Box-level:* 6" × 8.5" × 2.9"

# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## INSTRUCTION SET

### MOTION

| | |
|---|---|
| AB | Abort motion |
| AC | Acceleration |
| BG | Begin motion |
| CD | Contour data |
| CM | Contour mode |
| DC | Deceleration |
| DT | Contour time interval |
| EB | Enable cam mode |
| EG | Start cam motion |
| EM | Modulus for cam |
| EP | Master counts per table entry |
| EQ | Stop cam motion |
| ET | Cam table entry |
| FE | Find edge |
| FI | Find index |
| GR | Gear ratio |
| HM | Home |
| IP | Increment position |
| IT | Smoothing time constant–independent |
| JG | Jog mode |
| KS | Stepper smoothing |
| PA | Position absolute |
| PR | Position relative |
| SP | Speed |
| ST | Stop |

### PROGRAM FLOW

| | |
|---|---|
| AD | Wait for specified distance |
| AI | Wait for specified input |
| AM | Wait for motion complete |
| AP | Wait for absolute position |
| AR | Wait for relative distance |
| AS | Wait for “At Speed” |
| AT | Wait for elapsed time |
| EN | End program |
| HX | Halt task |
| IN | Input variable |
| II | Input interrupt |
| JP | Jump to program location |
| JS | Jump to subroutine |
| MG | Message |
| MC | Wait for “In Position” |
| MF | Forward motion past position |
| MR | Reverse motion past position |
| NO | No operation |
| RE | Return from error subroutine |
| RI | Return from interrupt |
| WC | Wait for contour data |
| WT | Wait for elapsed time |
| XQ | Execute program |
| ZS | Zero subroutine stack |
| TW | Timeout for “In Position” |

### CONFIGURATION

| | |
|---|---|
| AL | Arm latch |
| BN | Save parameters in EEPROM |
| BP | Burn program (1412, 1414) |
| BV | Burn variables and array (1412, 1414) |
| CB | Clear output bit |
| CC | Configure 2nd RS232 port (1412, 1414) |
| CE | Configure encoder type |
| CN | Configure switches |
| DA | Deallocate arrays |
| DE | Define dual encoder position |
| DL | Download program |
| DM | Dimension arrays |
| DP | Define position |
| ED | Edit mode |
| EI | Enable ISA interrupts (1410, 1411) |
| EO | Echo off |
| LS | List program |
| MO | Motor off |
| MT | Motor type |
| OB | Define output bit |
| OP | Output port |
| PF | Position format |
| QD | Download array |
| QU | Upload array |
| RA | Record array |
| RC | Record |
| RD | Record data |
| RS | Reset |
| SA | Set address (1412, 1414) |
| SB | Set output bit |
| UI | User interrupt (1410, 1411) |
| UL | Upload program |
| VF | Variable format |

### CONTROL FILTER SETTINGS

| | |
|---|---|
| DV | Damping for dual loop |
| FA | Acceleration feedforward |
| FV | Velocity feedforward |
| GN | Gain |
| IL | Integrator limit |
| KD | Derivative constant |
| KI | Integrator constant |
| KP | Proportional constant |
| OF | Offset |
| SH | Servo here |
| TL | Torque limit |
| TM | Sample time |
| ZR | Zero |

### STATUS

| | |
|---|---|
| RP | Report command position |
| RL | Report latched position |
| SC | Stop code |
| TB | Tell status |
| TC | Tell error code |
| TD | Tell dual encoder position |
| TE | Tell position error |
| TI | Tell input |
| TP | Tell position |
| TR | Trace program |
| TS | Tell switches |
| TT | Tell torque |
| TV | Tell velocity |

### ERROR AND LIMITS

| | |
|---|---|
| BL | Reverse software limit |
| ER | Position error limit |
| FL | Forward software limit |
| OE | Off on error |

### ARITHMETIC FUNCTIONS

| | |
|---|---|
| @SIN | Sine |
| @COS | Cosine |
| @ABS | Absolute value |
| @FRAC | Fraction portion |
| @INT | Integer portion |
| @RND | Round |
| @SQR | Square root |
| @IN | Return digital input |
| + | Add |
| - | Subtract |
| * | Multiply |
| / | Divide |
| & | And |
| \| | Or |
| ( ) | Parentheses |

### BRUSHLESS MOTOR COMMANDS

| | |
|---|---|
| BA | Brushless axis |
| BB | Brushless phase |
| BC | Brushless calibration |
| BD | Brushless degrees |
| BI | Brushless inputs |
| BM | Brushless modulo |
| BO | Brushless offset |
| BS | Brushless setup |

# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## CONNECTORS

**DMC-1410, DMC-1412** J3 Main 37-pin D-type

| | | | |
|---|---|---|---|
| 1 | Reset* (TTL) | 20 | Error |
| 2 | Amp enable | 21 | ACMD |
| 3 | Output 3 | 22 | Output 2 |
| 4 | Output 1 | 23 | Reserved |
| 5 | PWM or step out | 24 | Sign or direction |
| 6 | Input 7 | 25 | Input 6 |
| 7 | Input 5 | 26 | Input 4 |
| 8 | Input 3 | 27 | Input 2 |
| 9 | Input 1 (and latch) | 28 | Forward limit* |
| 10 | +5V | 29 | Reverse limit* |
| 11 | Ground | 30 | Home |
| 12 | +12V | 31 | -12V |
| 13 | Ground | 32 | A+ |
| 14 | A- | 33 | B+ |
| 15 | B- | 34 | I+ |
| 16 | I- | 35 | Auxiliary A+ |
| 17 | Auxiliary A- | 36 | Auxiliary B+ |
| 18 | Auxiliary B- | 37 | Abort* |
| 19 | ACMD Phase B | | |

**DMC-1411** J3 Main 40-pin IDC

| | | | |
|---|---|---|---|
| 1 | Reset* | 2 | Error |
| 3 | Amp enable | 4 | Amp command for servo |
| 5 | Output 3 | 6 | Output 2 |
| 7 | Output1 | 8 | Reserved |
| 9 | PWM or step out | 10 | Sign or direction |
| 11 | Input 7 | 12 | Input 6 |
| 13 | Input 5 | 14 | Input 4 |
| 15 | Input 3 | 16 | Input 2 |
| 17 | Input 1 (and latch) | 18 | Forward limit* |
| 19 | +5V | 20 | Reverse limit* |
| 21 | Ground | 22 | Home |
| 23 | +12V | 24 | -12V |
| 25 | Ground | 26 | A+ |
| 27 | A- | 28 | B+ |
| 29 | B- | 30 | I+ |
| 31 | I- | 32 | Auxiliary A+ |
| 33 | Auxiliary A- | 34 | Auxiliary B+ |
| 35 | Auxiliary B- | 36 | Abort* |
| 37 | Reserved | 38 | NC |
| 39 | NC | 40 | NC |

**Active low input*

**DMC-1412** J5 Power 7-pin Molex

| | |
|---|---|
| 1 | -12V |
| 2 | Ground |
| 3 | Ground |
| 4 | +5V |
| 5 | +5V |
| 6 | +12V |
| 7 | Earth |

**DMC-1412, DMC-1414**

RS232 Main port 9-pin male

| | | | |
|---|---|---|---|
| 1 | CTS—output | 6 | CTS—output |
| 2 | Transmit data—output | 7 | RTS—input |
| 3 | Receive data—input | 8 | CTS—output |
| 4 | RTS—input | 9 | NC |
| 5 | Ground | | |

RS232 Auxiliary port 9-pin female

| | | | |
|---|---|---|---|
| 1 | CTS—input | 6 | CTS—input |
| 2 | Transmit data—input | 7 | RTS—output |
| 3 | Receive data—output | 8 | CTS—input |
| 4 | RTS—output | 9 | NC |
| 5 | Ground | | |

*Note: DMC-1414 provides screw terminals*

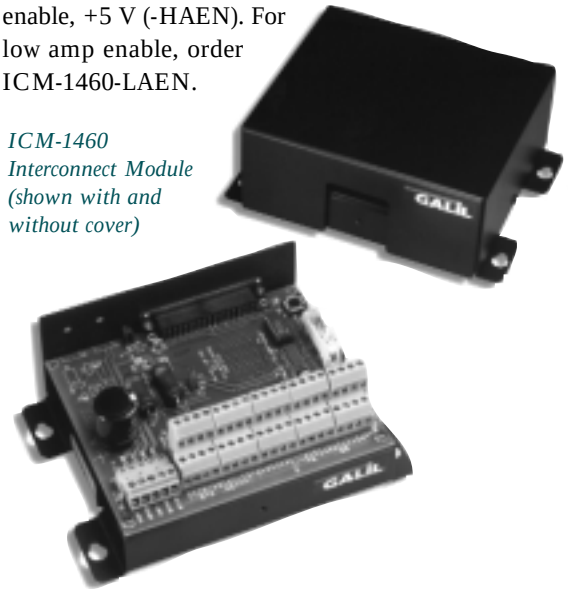
# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## HARDWARE ACCESSORIES

### ICM-1460

The ICM-1460 Interconnect Module provides screw terminals for the 37-pin D-type cable from the DMC-1410 or DMC-1412, for quick connection of system hardware. A 40-pin to 37-pin cable allows the ICM-1460 to be used with the DMC-1411. The ICM-1460 is contained in a metal enclosure with dimensions of 6.9" x 4.9" x 2.6" and .2" diameter keyholes for mounting. The ICM is normally shipped configured for high amp enable, +5 V (-HAEN). For low amp enable, order ICM-1460-LAEN.




*ICM-1460 Interconnect Module (shown with and without cover)*

### ICM-1460 OPTO INPUT

For applications requiring optoisolated inputs, the ICM-1460 option “OPTO INPUT” provides 5–24 V and 25 mA optoisolation on all general inputs, home inputs, and limits.

### ICM-1460-20W

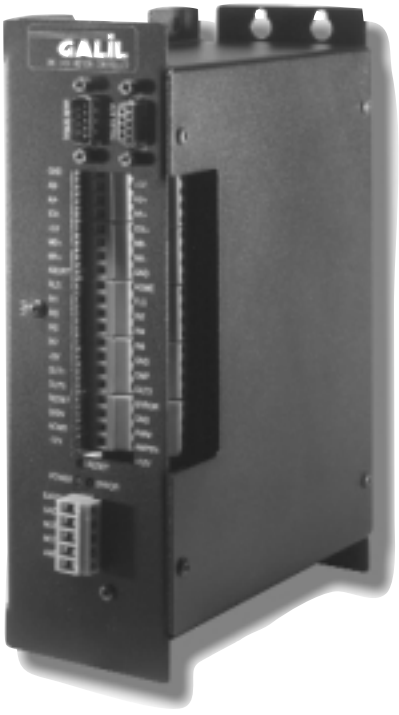
The ICM-1460-20W provides an internal 20-watt linear amplifier suitable for driving small servo motors or hydraulic valves. The ICM-1460-20W requires an external supply of ±10 V to ±30 V (for 200 mA or less, no additional supply is required). Care should be taken to ensure the average power dissipation across the amplifier is less than 20 watts.

### AMP-1460

The AMP-1460 series is an ICM module above with a PWM amplifier for a brush-type servo motor. The amplifier provides 6 amps continuous, 10 amps peak at up to 80 Volts. The gain of the amplifier is 1 A/V and requires an external DC supply from 20 to 80 Volts. The minimum motor inductance is 1 mH and the PWM frequency is 30 KHz.

### DMC-1414

The DMC-1414 is a DMC-1412 controller packaged with a PWM amplifier for driving a brush-type servo motor. The amplifier provides 6 amps continuous at up to 60 volts and requires a single, external DC supply from 20 to 60 volts. The minimum motor inductance is 1 mH and the PWM frequency is 30 KHz. Screw terminals provide easy connection to external devices.




*DMC-1414*

# ECONO SERIES

## DMC-1410, 1411, 1412, 1414

## ORDERING INFORMATION

| PART NUMBER | DESCRIPTION | QUANTITY 1 | QUANTITY 100 |
|---|---|---|---|
| **DMC-1410** | 1-axis ISA | $ 595 | $ 395 |
| **DMC-1411** | 1-axis PC/104 | $ 595 | $ 395 |
| **DMC-1412** | 1-axis stand-alone with RS232 | $ 595 | $ 395 |
| **DMC-1415** | 1-axis stand-alone with Ethernet & RS232 | $ 595 | $ 395 |
| **DMC-1412-box** | 1-axis stand-alone in enclosure with power supply | $ 795 | $ 545 |
| **DMC-1414-box** | DMC-1412 with internal brush servo amplifier and screw terminals | $ 995 | $ 795 |
| **CABLE 37-pin D** | 37-pin cable for DMC-1410, DMC-1412, DMC-1415 | $ 25 | |
| **CABLE 40-pin IDC** | 40-pin to 37-pin cable for DMC-1411 | $ 25 | |
| **CABLE 9-pin D** | 9-pin RS232 cable for DMC-1412 | $ 10 | |
| **ICM-1460** | Interconnect Module for DMC-1400 series. Specify -HAEN for high amp enable or -LAEN for low amp enable | $ 145 | $ 95 |
| **ICM-1460-OPTO INPUTS** | ICM with optoisolated inputs | $ 195 | $ 145 |
| **ICM-1460-20W** | ICM-1460 with 20-watt amplifier | $ 220 | $ 145 |
| **AMP-1460** | ICM with on-board, PWM amplifier for 1 brush-type servo | $ 495 | $ 345 |
| **Galil Utilities** | Communication drivers, terminal, DMCWIN software | $ 20 | |
| **CTOOLKIT** | DMCWIN with C/C++ documentation and examples | **Included with Utilities** | |
| **WSDK** | Set-up, tuning and analysis software | $ 195 | |
| **ActiveX Tool kit** | Custom controls for ActiveX software such as Visual Basic | $ 595 | |

*Galil offers additional quantity discounts for purchases between 1 and 100. Consult Galil for a quotation.*

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