Haydon SWITCH & INSTRUMENT, INC.
A Tritex Corporation Company

P/N 40105
Bipolar Chopper
Drive Manual

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Bipolar Chopper Drive Manual
Model 40105

Introduction

The bipolar chopper drive has been designed for easy set-up and use. It is ideal for development projects, just connect a single power supply and a motor and the drive is ready to run. Motor current is set using an on-board potentiometer. No external current setting resistors are required. This feature-packed drive provides all basic motor controls, including full or half stepping of bipolar steppers and direction control. An oscillator circuit is standard on the drive with an on-board speed control potentiometer. In addition, external input/output signals allow complete remote control of all drive functions.

Specifications

Input Voltage	+24 to +40 Vdc
Motor Direction	Selected via on-board switch or external control via input/output (I/O) connector
Motor Enable	Enabled/disabled via on-board switch or external control via I/O connector
Step Rate	*Single step operation:* via on-board push-button switch or external pushbutton switch via I/O connector. *Continuous operation:* via on board potentiometer controlled oscillator (10 Hz to 2 KHz) *External Control:* via I/O connector
Motor Current	Continuously adjustable from ~66 mA/Ø to ~3 A/Ø (2A/Ø continuous duty rating
Stepping Modes	Full step – 2 phases ON Half stepping
Bipolar Drive	Dual full bridge motor driver based on SGS Thompson part numbers L297 and L298N
Power Supply	24 Vdc minimum 40 Vdc maximum (reduce supply to 36 Vdc maximum if drive heatsink temperature exceeds 55°C) Current up to 4 Amps depending on stepper motor used

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Power Supply Connections

1. Connect the “positive” (+) lead to connector T2-2
2. Connect the “negative” (-) lead to connector T2-1

This supply powers the stepper motor and electronics (via an on board 5 v regulator).

This drive is intended to operate a low power bipolar stepping motor.

The 4 lead wires from the motor are connected to T1-1 through T1-4, (see “Connector Pin Allocation” for the proper wiring sequence).

To prevent damage to motor driver turn off power supply or disable motor outputs before connecting or disconnecting motor leads.

Setting Motor Current

Ensure that the motor leads are connected to T1 and that power is applied at T2 pins 1 and 2. Turn switch SW1-3 to the ON position. Connect a high impedance (DVM) type voltmeter to the VREF + and – terminals. Adjust potentiometer P2, while monitoring the voltmeter, to set the motor current per the following formula:

Motor current (Amps) = 2 x V ref (Volts).

Example: To set the motor current of 0.75 A/Ø, adjust P2 until V Ref reads 0.375 Volts.

Remove voltmeter.

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Switch Settings – Local Control

Step Rate

	SW1-1	**SW1-2**
Single step	ON	ON
Continuous step	ON	OFF

Motor Enable

	SW1-3
Enable	OFF
Disable	ON

Motor Direction

	SW1-4
Clockwise	ON
Counter clockwise	OFF

Step Mode

	SW1-5
Full step (2 phases on)	ON
Half step	OFF

Step Rate Adjustment: The step rate can be varied between 10 steps/sec and 2000 steps/sec by adjusting the on-board potentiometer P1.

External I/O Control

External clock:

An external clock or pulse source can be substituted for the on-board oscillator as follows:

1. Open jumper J1
2. Connect an external oscillator to T2-3
3. Signal amplitude must remain within the limits of 0 to + 5V

External Direction Control:

1. Turn the on-board direction switch (Sw1-4 to the off position.
2. Connect external direction control to T2-10. Low for CW, High for CCW.
3. Signal amplitude must remain within the limits of 0 to +5V.

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External Enable Control:

1. Turn the on-board enable switch (SW1-3 to the off position.
2. Connect external enable control to T2-11. Low for disabled, high for enabled.
3. Signal amplitude must remain within the limits of 0 to +5V.

External Step Rate Control: Provisions have been made to control the on-board oscillator with an external fixed or variable resistor.

1. Open jumper J3 to disable the on-board potentiometer P1.
2. Connect a fixed or variable resistor between terminals T2-6 and T2-7. Connect 270 ohm or larger resistor in series with the variable resistor.
3. The step rate can be changed by varying the value of the external resistance as specified on 555 timer data sheets.

External Half/Full Step Control:

1. Turn the on-board half-full step switch (SW1-5) to the off position.
2. Connect external control to T2-8 (control can even be a switch to GND T2-1). Low for full step, high for half step.
3. Signal amplitude must remain within the limits of 0 to +5V.

External Single Step Switch Control

1. Turn the on-board Switches (SW1-1) and (SW1-2) to the on position.
2. Connect a normally-open momentary switch between terminals T2-12 and T2-1 (GND). Note: The on-board single step pushbutton switch will remain active in this mode.
3. The external switch can remain connected even when switching back to the continuous step mode.

External Reset Control

1. Connect external reset control to T2-9. Low for reset (translator at “home” state, i.e. L297 I.C. outputs ABCD = 0101), High (or floating) for normal position.
2. Signal amplitude must remain within the limits of 0 to +5V.

“Home” State output:

1. This is an open collector output that indicates when the L297 I.C. is in the “home” state (outputs ABCD-0101).
2. Connect a “pull-up” resistor (value of 1K ohm through 5K ohm) between this output (T2-5) and +5V (T2-6). Low output is inactive state, high output is active “home” position state.

Internal Chopper Sync Output:

1. This special output is only used in configurations of multiple 40105 drivers that require the chopper oscillators to be synchronized.
2. This sync terminal would be connected together on all drivers. The on board oscillator components (C5 and R5) are to be omitted and pin 16 of IC2 grounded on all but one “master” driver.

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Connector Pin Allocation

Pin # T1	Pin # T2	Description – Can Stack Motors	Hybrid Motors
1		Bipolar drive output, RED (Phase A)	RED
2		Bipolar drive output, BLACK (Phase A)	RED/WHITE
3		Bipolar drive output, BLUE (Phase B)	GREEN/WHITE
4		Bipolar drive output, GREEN (Phase B)	GREEN
	1	Common negative (-) connection (GND)	
	2	External power input, positive (+) 24 to 40 Vdc.	
	3	External clock input	
	4	Internal chopper sync output	
	5	"Home" state output	
	6	+5V output – also optional external potentiometer connection (+)	
	7	Optional external potentiometer connection (-)	
	8	External half step/full step control	
	9	External reset control	
	10	External direction control	
	11	External enable control	
	12	Optional external single step switch connection	

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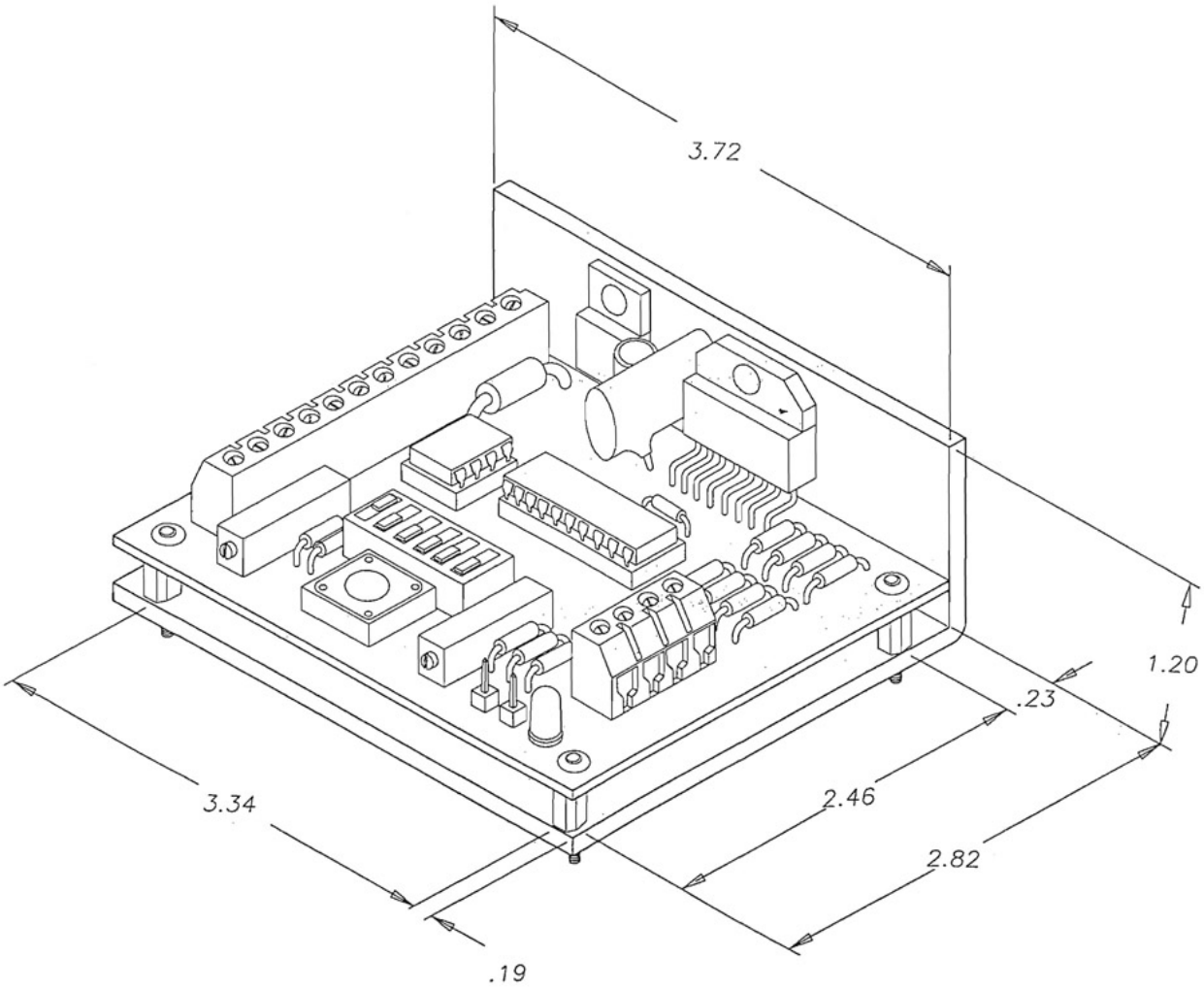
Drawing



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