

1551 S. Vineyard Avenue Ontario, CA 91761 (909) 923-1973

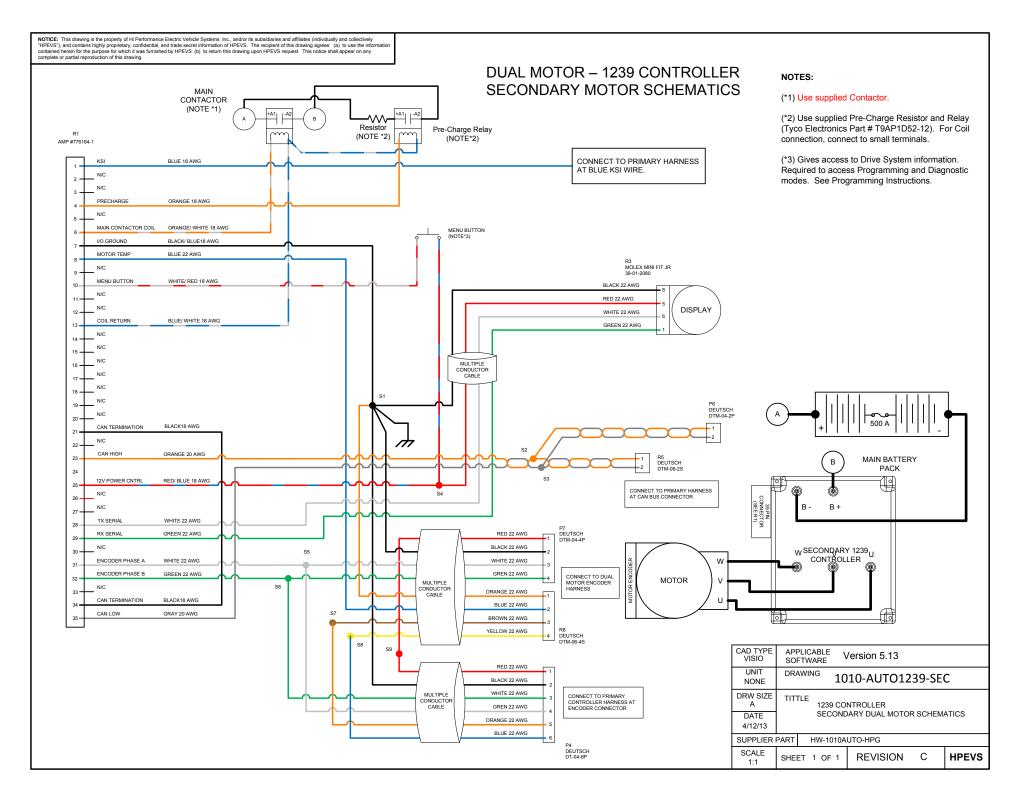
WIRING SCHEMATICS

FOR SOFTWARE VERSIONS 5.13 AND HIGHER

FOR CURTIS 1239 CONTROLLER ON-ROAD VEHICLE CONVERSION FOR SINGLE AND WITH DUAL MOTOR APPLICATIONS

REVISION: C Date 4/11/14

NOTICE: This drawing is the property of Hi Performance Electric Vehicle Systems Inc., and/or its subsidiaries and affiliates (individually and collectively "HPEVS"), and contains highly proprietary, confidential, and trade secret information of HPEVS. The recipient of this drawing agrees (a) to use the information contained herein for the purpose for which it was furnished by HPEVS (b) to return this drawing upon HPEVS request. This notice shall appear on any complete or partial reproduction of this draw Pre-Charge Relay (NOTE*2) NOTES: (*1) Use supplied Contactor. Main Contactor (NOTE *1) Resistor SEE BRAKE (*2) Use supplied Pre-Charge Resistor and R1 AMP #776164-1 OEM WIRING SCHEMATICS (NOTE *2) TACHOMETER Relay (Tyco Electronics Part # T9AP1D52-12). For Coil connection, connect to small terminals. BLUE 18 AWG Pull up Resistor Optional Start Switch (Note*5) (*3) Tachometers that are designed to work off TACHOMETER DRIVER. ORANGE / BLACK18 AWG ORANGE / BLACK18 AWG (Note *3) of an ignition coil may not function in this BRAKE LIGHT SWITCH WHITE / BLUE 18 AWG ORANGE/ RED 18 AWG application. Some Tachometers may need a BLUE 18 AWG ORANGE 18 AWG pull up resistor of 4.7K Ω CLUTCH/ SHIFT SWITCH LOCK (*4) A Battery Management System (BMS) is MAIN CONTACTOR COIL ORANGE/ WHITE 18 AWG SEE BRAKE SCHEMATICS OPTIONAL BRAKE SWITCH strongly recommended if Lithium Ion batteries NPUT (NOTE *10) I/O GROUND BLACK 18 AWG are used. Possible source of a BMS is Ewert BROWN 18 AWG OPTIONAL CLUTCH / SWITCH IGNITION KEY MOTOR TEMP BLUE 22 AWG Energy System's ORION BMS GREEN 18 AWG N.C. PEDAL INTERLOCK (www.orionbms.com) PEDAL INTERLOCK GREEN 18 AWG MENU BUTTON WHITE/ RED 18 AWG WHITE/ RED 18 AWG MENU BUTTON (NOTE *7) (*5) Start switch option is required if Idle or Creep Torque are ENABLED. See START BUTTON INPUT WHITE/ BLUE 18 AWG PURPLE 18 AWG OPTIONAL ECONOMY Programming Instructions. A start switch CAN ECONOMY MODE PURPLE 18 AWG be used without using IDLE. See programming WHITE 18 AWG BI UE/ WHITE 18 AWG COIL RETURN SWITCH (NOTE*9) instructions for information. YELLOW 18 AWG BRAKE SWITCH INPUT WHITE/ BLACK 18 AWG POT HIGH BLACK/ WHITE 18 AWG LABEL BLACK/ WHITE 18 AWG (*6) Install the Optional Clutch/ Shift Switch so that is ON when the clutch pedal is pressed. POT WIPER YELLOW/ WHITE 18 AWG YELLOW/ WHITE 18 AWG SEE THROTTLE SCHEMATICS When the clutch pedal is pressed, the Regen FEMALE 3/16" QD YELLOW/ RED 18 AWG PURPLE/ WHITE 18 AWG SEE BRAKE SCHEMATICS setting is changed to Shift Neutral Braking PURPLE/ WHITE 18 AWG Parameter to prevent the motor from stalling NE 1/4" OD MALE 1/4" OD RED/BLUE 18 AWG during gear shifting. In a clutchless system, this N/C allows you to set the coast down rate of the N/C motor so that the gears align properly See CAN TERMINATION BLACK18 AWG RED 22 AWG Instructions on SHIFT-NEUTRAL BRAKING MUI TIPLE CABLE DISPLAY FOWARD WHITE 18 AWG WHITE 22 AWG PARAMETERS. 22 ORANGE 20 AWG CAN HIGH GREEN 22 AWG (*7) Gives access to Drive System information. N/C Required to access Programming and MOLEX MINI FIT JR 39-01-2080 OPTIONAL 12V POWER CNTRL RED/BLUE 18 AWG Diagnostic modes. See Programming CAN BUS Instructions. 5V POWER CNTRL RED / WHITE 18 AWG N/C MAIN BATTERY (*8) Allows the use of ECONO Mode PACK (NOTE *4) TX SERIAL WHITE 22 AWG Parameters. See Programming Instructions. 28 GREEN 22 AWG (*9) Forward is CLOCKWISE motor rotation N/C from Encoder end view. Depending on WHITE 22 AWG ENCODER PHASE A Transmission configuration, use either wire to ENCODER PHASE B GREEN 22 AWG obtain desired rotation. Use a FWD & REV REVERSE YELLOW 18 AWG Switch in direct drive applications. CAN TERMINATION BLACK18 AWO CANTOW GREY 20 AWG CAD TYPE APPLICABLE B + Version 5.13 VISIO SOFTWARE DEUTSCH DT-06-6S UNIT DRAWING 1010-AUTO1239-PRI 1239 CONTROLLER NONE DRW SIZE FOR SINGLE SCHEMATIC FOR SINGLE MOTOR OR 1239 CONTROLLER MOTOR CAR CONVERSION Α MUI TIPI F ON-ROAD VEHICLE CONVERSION / PRIMARY MOTOR IN A DUAL MOTOR ONDUCT CABLE CONNECT TO MOTOR DATE PRIMARY DUAL MOTOR SCHEMATICS MOTOR 4/12/13 ENCODER CONFIGURATION-1239 CONTROLLER SUPPLIER PART HW-1010AUTO1239-HPG SCALE REVISION С **HPEVS** SHEET 1 OF

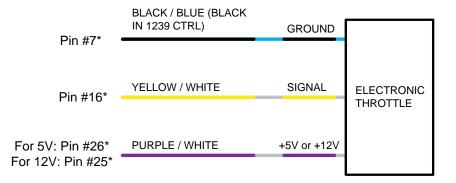


THROTTLE CONFIGURATION

Depending on the type of throttle used for the application, the different types of throttle configurations are listed in the table below. Electrical schematics are also included within the following pages.

THROTTLE CONFIGURATION	TYPE
ELECTRONIC without SWITCH	TYPE 1
2 WIRE with SWITCH 0-5k Ω	TYPE 2
3 WIRE with SWITCH 0-5k Ω	TYPE 3
CURTIS PB8 THROTTLE ASSEMBLY	TYPE 3

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Α	INITIAL RELEASE	1/22/2013



TYPE 1
ELECTRONIC
THROTTLE**

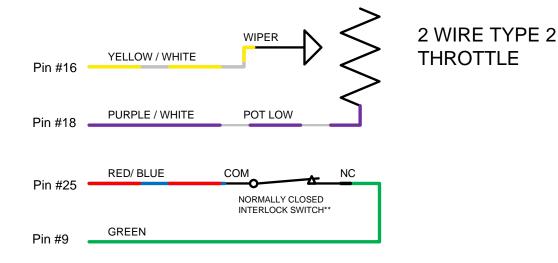
* Typical connection, verify correct voltage and connection in throttle documents or instructions.

Not all Electronic Throttles supported

** When an electronic throttle is used, the GREEN wire from the pedal interlock does not need to be connected.

CAD TYPE VISIO		PLICABL FTWARE	_			
UNIT NONE	DRA	AWING	101	0-THROTTLE-	001	
DRW SIZE A	TIT		. ОТГ	ONIO TUD	OTTI	٦
DATE 1/22/13 ELECTRONIC THROTTLE			E			
SUPPLIER	PART					
SCALE NONE	SHE	ET 4 C	OF 4	REVISION	В	HPEVS

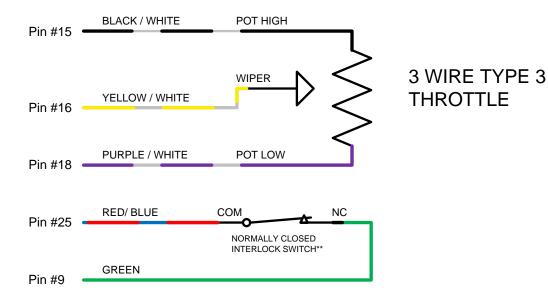
REV	DESCRIPTION	APPROVED
А	INITIAL RELEASE	1/22/2013



** When the accelerator pedal <u>IS PRESSED</u> the interlock switch is released to its <u>NORMAL</u> position (switch not activated) thus completing the circuit since its green wire is connected to the normally closed (NC) connection.

CAD TYPE VISIO	CAD LOC.	CAD FILE		DRW SIZE A
OPER. NO.	UNIT	DRAWING	1010-THROTTLE-001	
DESIGN	DETAIL	TITTLE	2 WIRE TYPE 2	
CHECKED	SAFETY		THROTTLE	
SCALE NONE	DATE 1/22/13	REVISION SHEET 1	A OF 3	HPEVS

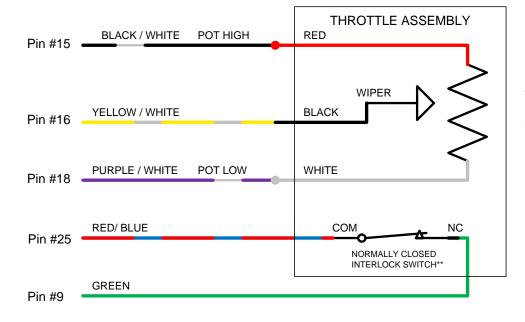
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REV	REV DESCRIPTION				
Α	INITIAL RELEASE	1/22/2013			



** When the accelerator pedal <u>IS PRESSED</u> the interlock switch is released to its <u>NORMAL</u> position (switch not activated) thus completing the circuit since its green wire is connected to the normally closed (NC) connection.

CAD TYPE VISIO	CAD LOC.	CAD FILE		DRW SIZE A
OPER. NO.	UNIT	DRAWING	1010-THROTTLE-001	
DESIGN	DETAIL	TITTLE	3 WIRE TYPE 3	
CHECKED	SAFETY		THROTTLE	
SCALE	DATE	REVISION	A	HPEVS
NONE	1/22/13	SHEET 2	OF 3	vo

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Α	INITIAL RELEASE	11/27/2013				



CURTIS PB8 THROTTLE ASSEMBLY

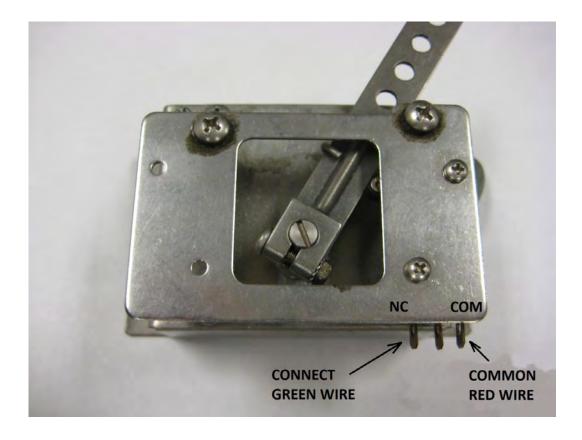
** When the accelerator pedal <u>IS PRESSED</u> the interlock switch is released to its <u>NORMAL</u> position (switch not activated) thus completing the circuit since its green wire is connected to the normally closed (NC) connection.

CAD TYPE APPLICABLE VISIO UNIT DRAWING 1010-THROTTLE-001 NONE DRW SIZE TITTLE **CURTIS PB8** DATE THROTTLE ASSEMBLY 1/22/13 SUPPLIER PART SCALE NONE SHEET 3 OF 4 REVISION A **HPEVS**

PEDAL INTERLOCK CONNECTION

The pedal interlock connection is required for both 2 and 3 wire throttle pot assemblies. The Green wire is connected to the Normally Closed tab. The red/blue wire is connected to the common tab. See picture below.

NOTE: when the accelerator pedal <u>IS PRESSED</u> the interlock switch is released to its <u>NORMAL</u> position (switch not activated) thus completing the circuit since its green wire is connected to the normally closed (NC) connection.

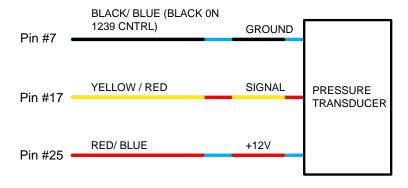


BRAKE INPUT CONFIGURATION

Depending on the type of brake input used for the application, the different types of brake input configurations are listed in the table below. Electrical schematics are also included within the following pages.

BRAKE INPUT CONFIGURATION	ТҮРЕ
NO BRAKE INPUT USED	TYPE 0
PRESSURE TRANSDUCER/ ELECTRONIC 0-5V INPUT	TYPE 1
2 WIRE 0-5k Ω POT	TYPE 2
SWITCH	TYPE 3

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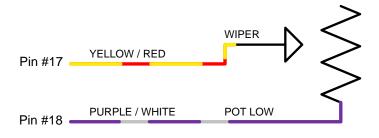


TYPE 1 PRESSURE TRANSDUCER

** Typical Pressure Transducer Ratings 8-30 Volt Input 1-5 Volt Output 2500 PSI

CAD TYPE VISIO	CAD LOC.	CAD FILE		DRW SIZE A
OPER. NO.	UNIT	DRAWING	1010-BRAKE	
DESIGN	DETAIL	TITTLE		
CHECKED	SAFETY		PRESSURE TRANSDI	JCER
SCALE	DATE	REVISION	A	HPEVS
NONE	2/19/13	SHEET 2	OF 2	HELVS

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TYPE 2 2 WIRE BRAKE POT

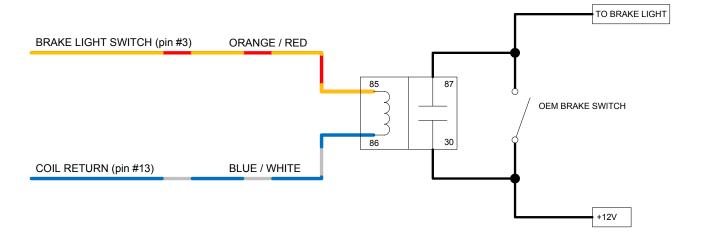
CAD TYPE VISIO	CAD LOC.	CAD FILE	DRW SIZE A
OPER. NO.	UNIT	DRAWING 1010-BRAKE	•
DESIGN	DETAIL	TITTLE 2 WIRE	
CHECKED	SAFETY	BRAKE PO	Γ
SCALE NONE	DATE 2/19/13	REVISION A SHEET 1 OF 2	HPEVS

OPTIONAL ACTIVE BRAKE LIGHT CONFIGURATIONS

These optional active brake light configurations are used to activate the brake lights during regenerative braking or when the vehicle brakes are being applied. Based on the brake type configuration that is being used in the application use one of the following wiring configurations.

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ACTIVE BRAKE LIGHT CONFIGURATION OPTION 1 FOR BRAKE TYPE 0, 1 OR 2 CONFIGURATIONS

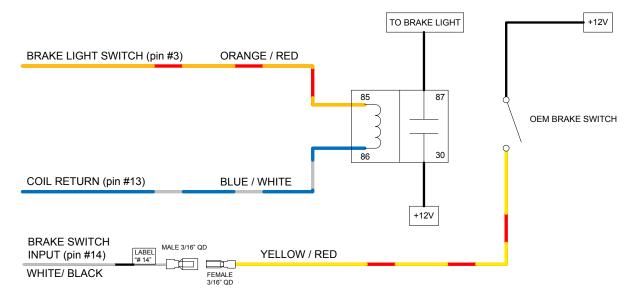


** This option turns the brake lights ON during REGEN. Brake TYPE 0 does not allow for BOOSTED BRAKE while pressing the brake pedal. Brake TYPE 1 & 2 uses a variable input for BOOSTED REGEN.

CAD TYPE VISIO	CAD LOC.	CAD FILE		DRW SIZE A
OPER. NO.	UNIT	DRAWING 1010-BRAKE		
DESIGN	DETAIL	TITTLE	PTION 1	
CHECKED	SAFETY	BRAKE LIGHT SWITCH		
SCALE	DATE	REVISION A		HPEVS
NONE	12/5/13	SHEET 3 OF 4		III-LV3

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ACTIVE BRAKE LIGHT CONFIGURATION OPTION 2 FOR BRAKE TYPE 3 1239 CONTROLLER

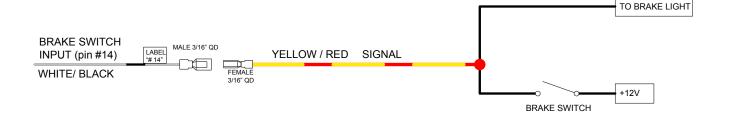


- ** This option will turn ON the brake lights when either of two conditions are satisfied:
- 1. The users foot is OFF of the accelerator pedal and REGEN is active.
- 2. Brake pressure is applied and the OEM brake switch is active.

CAD TYPE VISIO	CAD LOC.	CAD FILE DRW SIZE	ΕA
OPER. NO.	UNIT	DRAWING 1010-BRAKE	
DESIGN	DETAIL	OPTION 2	
CHECKED	SAFETY	BRAKE LIGHT SWITCH 1239 CONTROLLER	
SCALE	DATE	REVISION A HPEV	9
NONE	12/5/13	SHEET 3 OF 4	.

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Α	INITIAL RELEASE	2/19/2013

BRAKE SWITCH INPUT LIGHT CONFIGURATION OPTION 3 FOR BRAKE TYPE 3 CONFIGURATION 1239 CONTROLLER



- ** This option will provide single level BOOSTED REGEN when brake pedal pressure is applied.
- ** Brake lights will not turn on during ACCELERATOR PEDAL UP/ REGEN.

CAD TYPE VISIO	CAD LOC.	CAD FILE	DRW SIZE A
OPER. NO.	UNIT	DRAWING 1010-BRAKE	
DESIGN	DETAIL	TITTLE OPTION 3 BRAKE SWITCH INPUT 12	220
CHECKED	SAFETY	CONTROLLER	239
SCALE NONE	DATE 2/19/13	REVISION A SHEET 4 OF 4	HPEVS