HI PERFORMANCE ELECTRIC VEHICLE SYSTEMS

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WIRING SCHEMATICS

ON-ROAD VEHICLE CONVERSION SINGLE AND DUAL MOTOR APPLICATION

FOR SOFTWARE VERSIONS 5.13 AND HIGHER

FOR CURTIS CONTROLLERS 1234/1236/1238

REVISION: D
Date: 5/28/14

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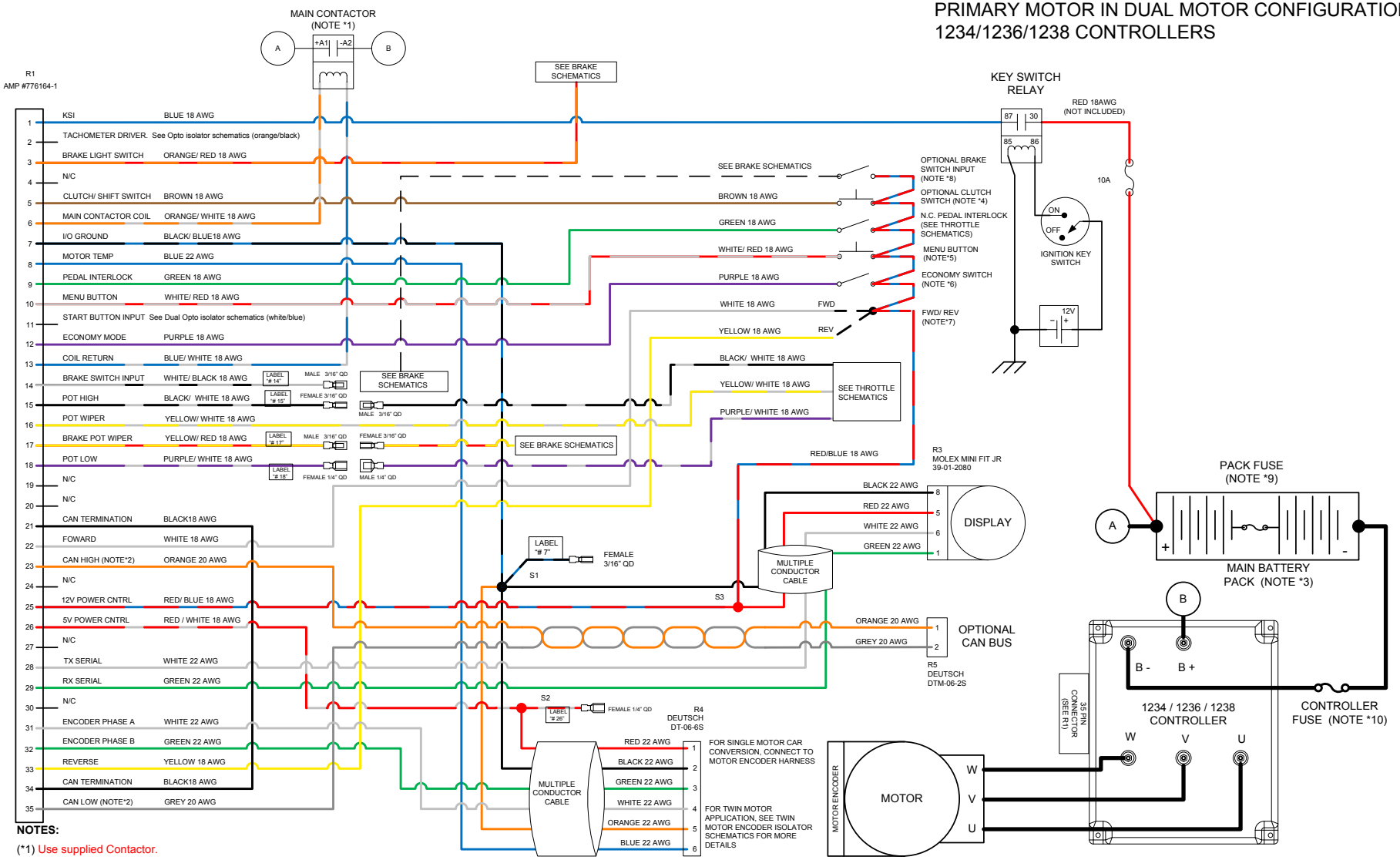
ELECTRICAL SCHEMATICS FOR SINGLE MOTOR OR PRIMARY MOTOR IN DUAL MOTOR CONFIGURATION 1234/1236/1238 CONTROLLERS



NOTES:

(*1) Use supplied Contactor.

(*2) The Controller CAN Communication needs to be isolated from other CAN based components. A CAN isolator may be needed.
Possible source of CAN isolator is CANOP from B&B Electronics (www.bb-elec.com)

(*3) A Battery Management System (BMS) is strongly recommended if Lithium Ion batteries are used. Possible source of BMS is Ewert Energy System's ORION BMS (www.orionbms.com)

(*4) Install the Clutch/ Shift Switch so that is ON when the clutch pedals is pressed. When clutch pedal is pressed the Regen setting is changed to Shift Neutral Braking Parameter to prevent the motor from stalling during gear shifting. In a Clutch-less system, this allows you to set the coast down rate of the motor so that the gears align properly See Instructions on SHIFT-NEUTRAL BRAKING PARAMETERS.

(*5) Gives access to Drive System information. Required to access Programming and Diagnostic modes. See Programming Instructions.

(*6) Allows the use of ECONO Mode Parameters. See Programming Instructions.

(*7) Forward is CLOCKWISE motor rotation from Encoder end view. Depending on Transmission configuration, use either wire to obtain desired rotation. Use FWD & REV Switch in direct drive applications.

(*8) See Brake Schematics.

(*9) Use Pack Fuse rated at 500A for Single controller applications. For Dual controller use 800A Pack Fuse.

(*10) Only for Dual motor application. Use Controller Fuse rated at 500A for each controller.

CAD TYPE VISIO	APPLICABLE SOFTWARE	VERSION 5.13	
UNIT NONE	DRAWING	1010-AUTO-CONVERSION	
DRW SIZE A	TITLE	ON-ROAD VEHICLE CONVERSION / PRIMARY DUAL MOTOR SCHEMATICS	
DATE 2/12/13			
SUPPLIER PART	HW-AUTOCONVERSION-HPG		
SCALE NONE	SHEET 1 OF 1	REVISION D	**HPEVS**

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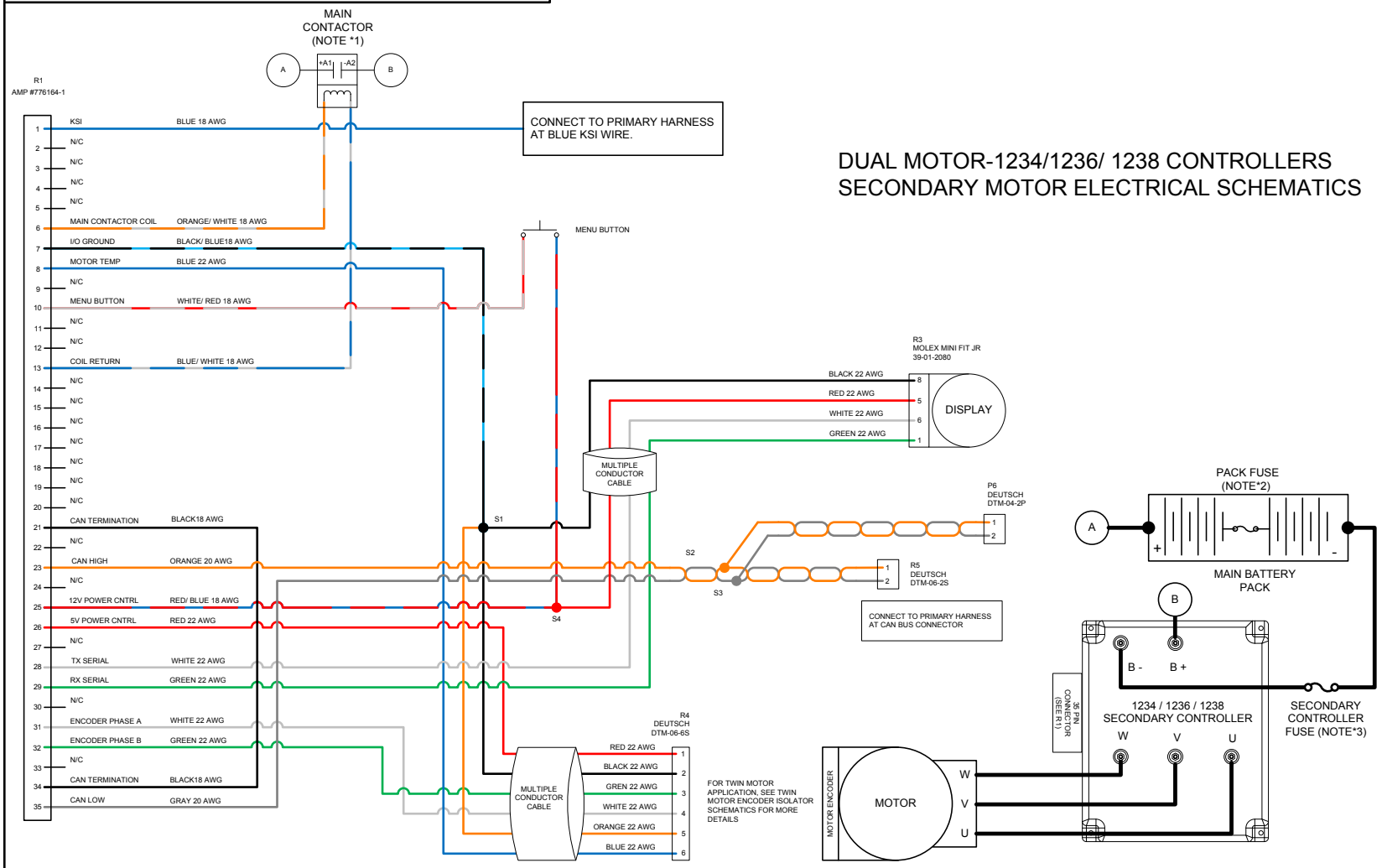
DUAL MOTOR-1234/1236/ 1238 CONTROLLERS SECONDARY MOTOR ELECTRICAL SCHEMATICS



NOTES:

(*1) USE SUPPLIED CONTACTOR

(*2) Use Pack Fuse rated at 500A for Single controller applications. For Dual controller use 800A Pack fuse.

(*3) Only for Dual motor application. Use Controller Fuse rated at 500A for each controller.

CAD TYPE VISIO	APPLICABLE SOFTWARE	VERSION 5.13	
UNIT NONE	DRAWING	1010-AUTO-CONVERSION-TWIN MOTOR	
DRW SIZE A	TITLE	SECONDARY DUAL MOTOR SCHEMATICS	
DATE 4/2/13			
SCALE 1:1	SHEET 1 OF 1	REVISION B	**HPEVS**

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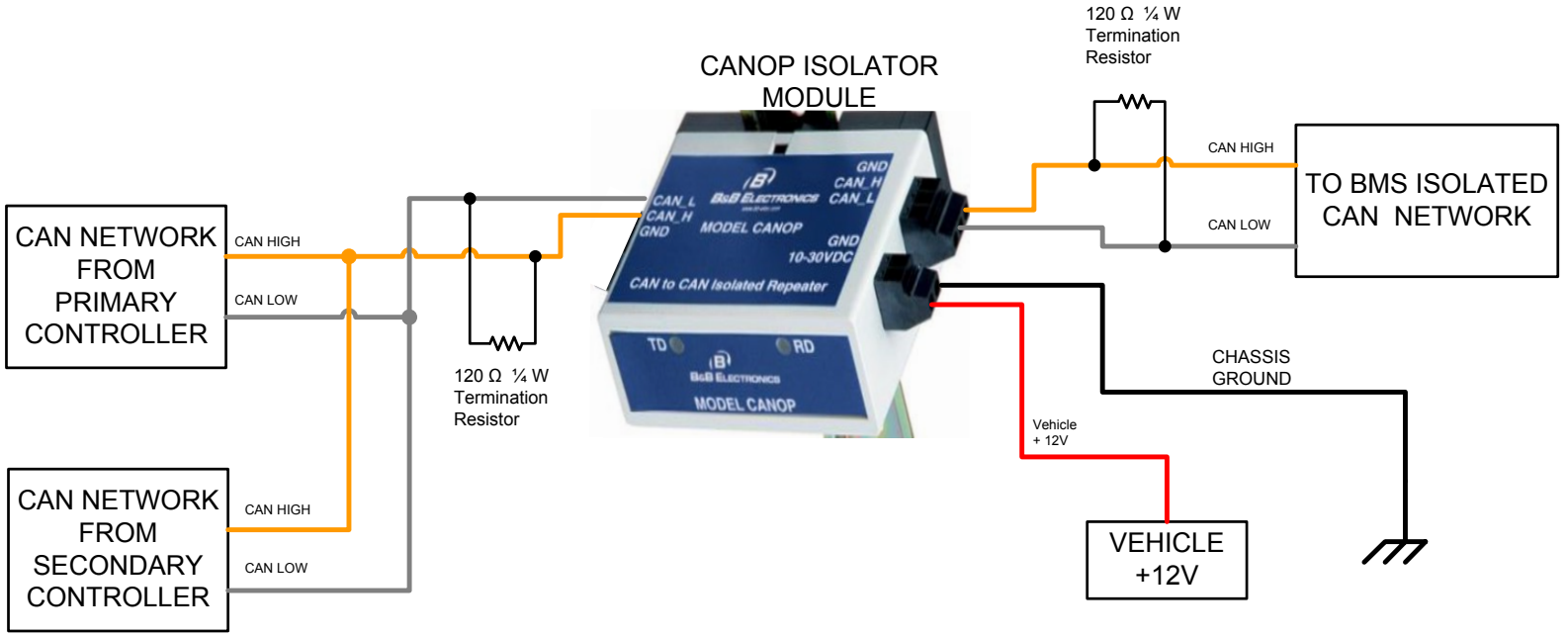
REVISIONS		
REV	DESCRIPTION	APPROVED
A	INITIAL RELEASE	3/11/2013
B	Revision for clarification	10/30/2013



CAD TYPE VISIO	CAD LOC.	CAD FILE	DRW SIZE A
OPER. NO.	UNIT	DRAWING 1010-CAN-OP-ISOLATOR	
DESIGN	DETAIL	TITLE CAN ISOLATOR DUAL 1238 CONTROLLER	
CHECKED	SAFETY		
SCALE NONE	DATE 4/17/13	REVISION B SHEET 1 OF 1	HPEVS

THROTTLE CONFIGURATION

Depending on the type of throttle used for the application, the different types of throttle configurations are listed within 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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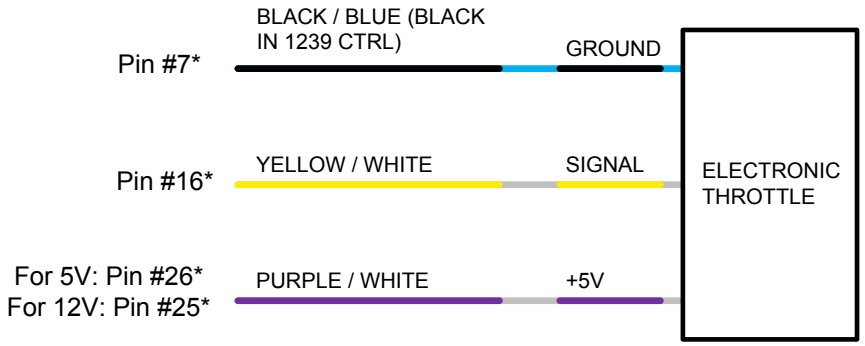
A	INITIAL RELEASE	1/22/2013

TYPE 1 ELECTRONIC THROTTLE**



* Typical connection, verify correct voltage and connection in throttle documents or instructions.
Not all Electronic Throttles supported

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

CAD TYPE VISIO	APPLICABLE SOFTWARE		
UNIT NONE	DRAWING 1010-THROTTLE-001		
DRW SIZE A	TITLE ELECTRONIC THROTTLE		
DATE 1/22/13			
SUPPLIER PART			
SCALE NONE	SHEET 4 OF 4	REVISION B	HPEVS

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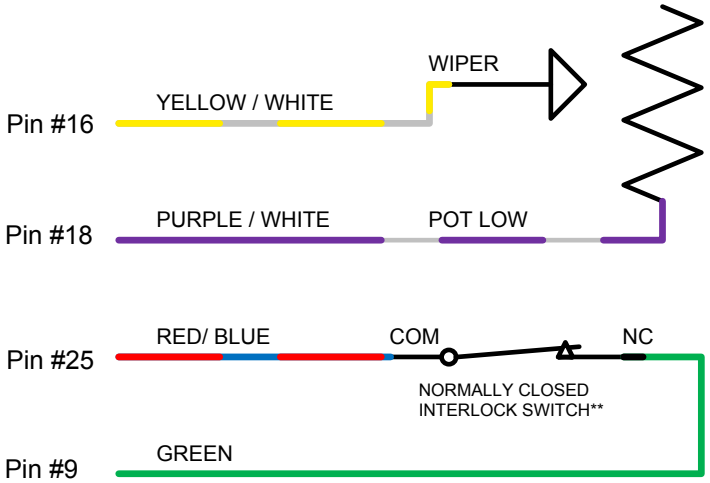
A	INITIAL RELEASE	1/22/2013



2 WIRE TYPE 2 THROTTLE

** When the accelerator pedal IS PRESSED the interlock switch is released to its NORMAL 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	TITLE 2 WIRE TYPE 2 THROTTLE	
CHECKED	SAFETY		
SCALE NONE	DATE 1/22/13	REVISION A SHEET 1 OF 3	HPEVS

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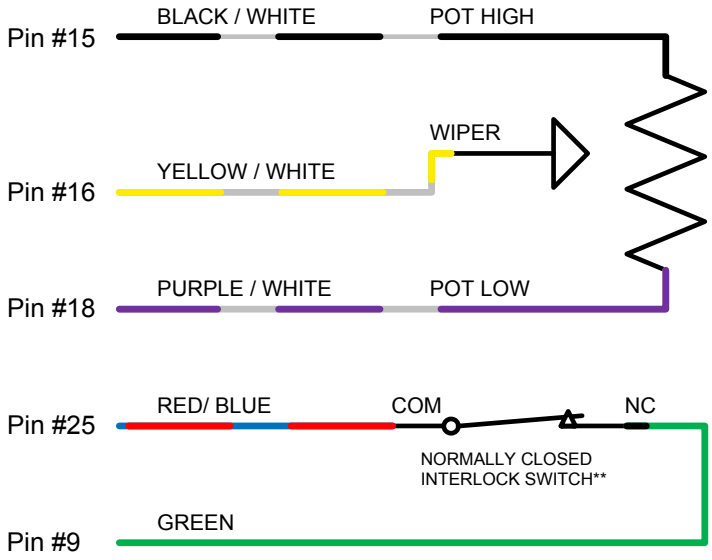
A	INITIAL RELEASE	1/22/2013



3 WIRE TYPE 3 THROTTLE

** When the accelerator pedal IS PRESSED the interlock switch is released to its NORMAL 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	TITLE 3 WIRE TYPE 3 THROTTLE	
CHECKED	SAFETY		
SCALE NONE	DATE 1/22/13	REVISION A SHEET 2 OF 3	HPEVS

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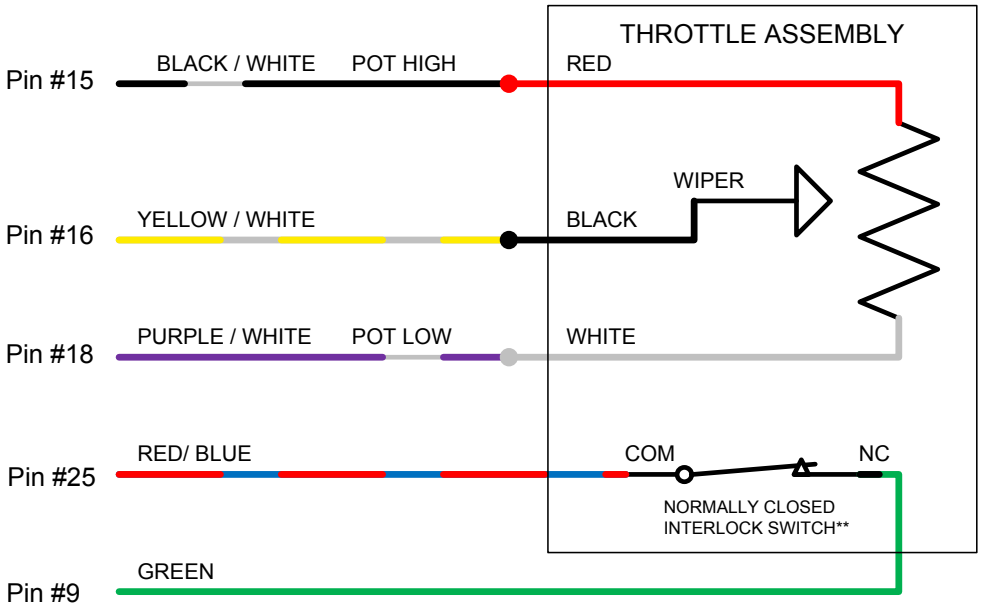
REVISIONS		
REV	DESCRIPTION	APPROVED
A	INITIAL RELEASE	11/27/2013



CURTIS PB8 THROTTLE ASSEMBLY

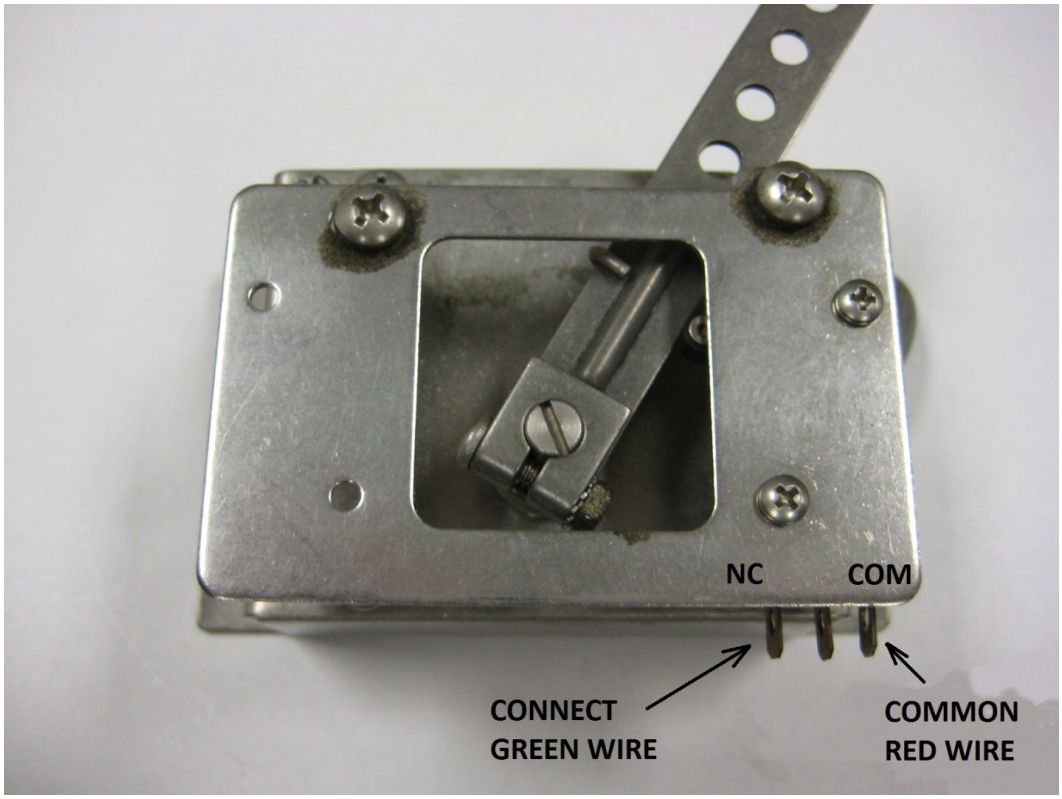
** When the accelerator pedal IS PRESSED the interlock switch is released to its NORMAL position (switch not activated) thus completing the circuit since its green wire is connected to the normally closed (NC) connection.

CAD TYPE VISIO	APPLICABLE SOFTWARE		
UNIT NONE	DRAWING 1010-THROTTLE-001		
DRW SIZE A	TITLE CURTIS PB8 THROTTLE ASSEMBLY		
DATE 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 IS PRESSED the interlock switch is released to its NORMAL 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 within the table below. Electrical schematics are also included in the following pages.

BRAKE INPUT CONFIGURATION	**TYPE**
NO BRAKE POT INSTALLED	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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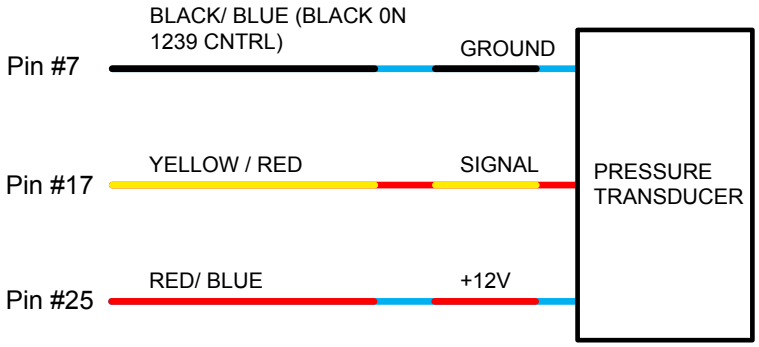
REV	DESCRIPTION	APPROVED
A	INITIAL RELEASE	2/19/2013



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	TITLE PRESSURE TRANSDUCER	
CHECKED	SAFETY		
SCALE NONE	DATE 2/19/13	REVISION A SHEET 2 OF 2	HPEVS

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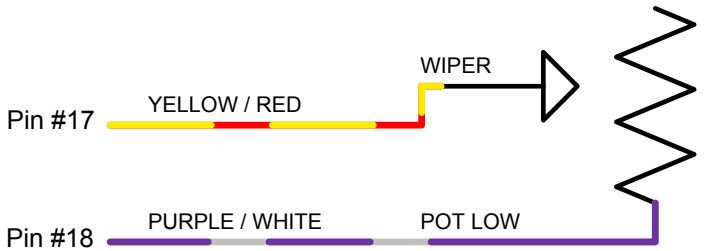

TYPE 2
2 WIRE BRAKE POT

CAD TYPE VISIO	CAD LOC.	CAD FILE	DRW SIZE A
OPER. NO.	UNIT	DRAWING 1010-BRAKE	
DESIGN	DETAIL	TITLE 2 WIRE BRAKE POT	
CHECKED	SAFETY		
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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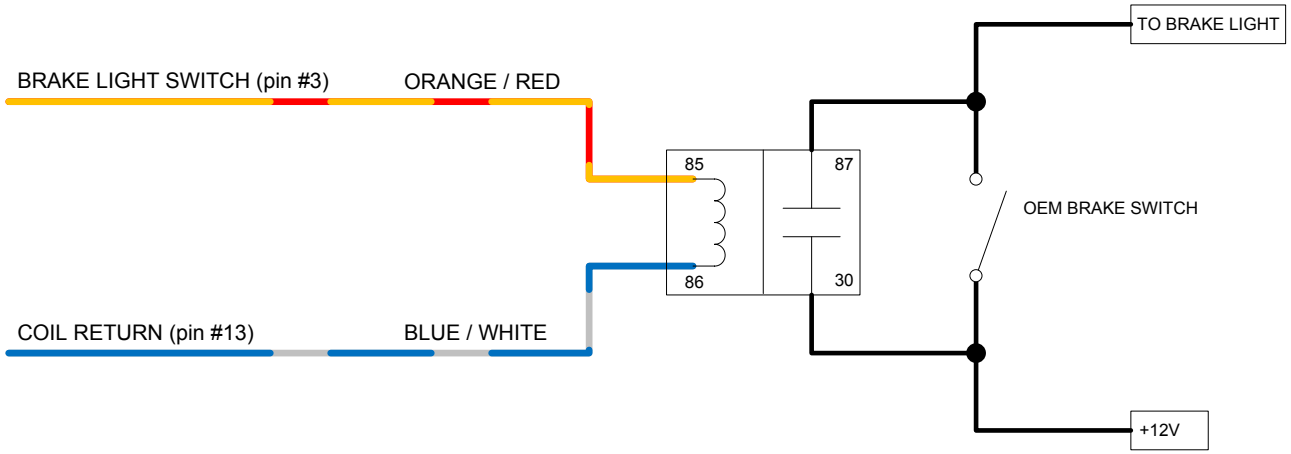
A	INITIAL RELEASE	2/19/2013

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	TITLE OPTION 1 BRAKE LIGHT SWITCH	
CHECKED	SAFETY		
SCALE NONE	DATE 12/5/13	REVISION A SHEET 3 OF 4	HPEVS

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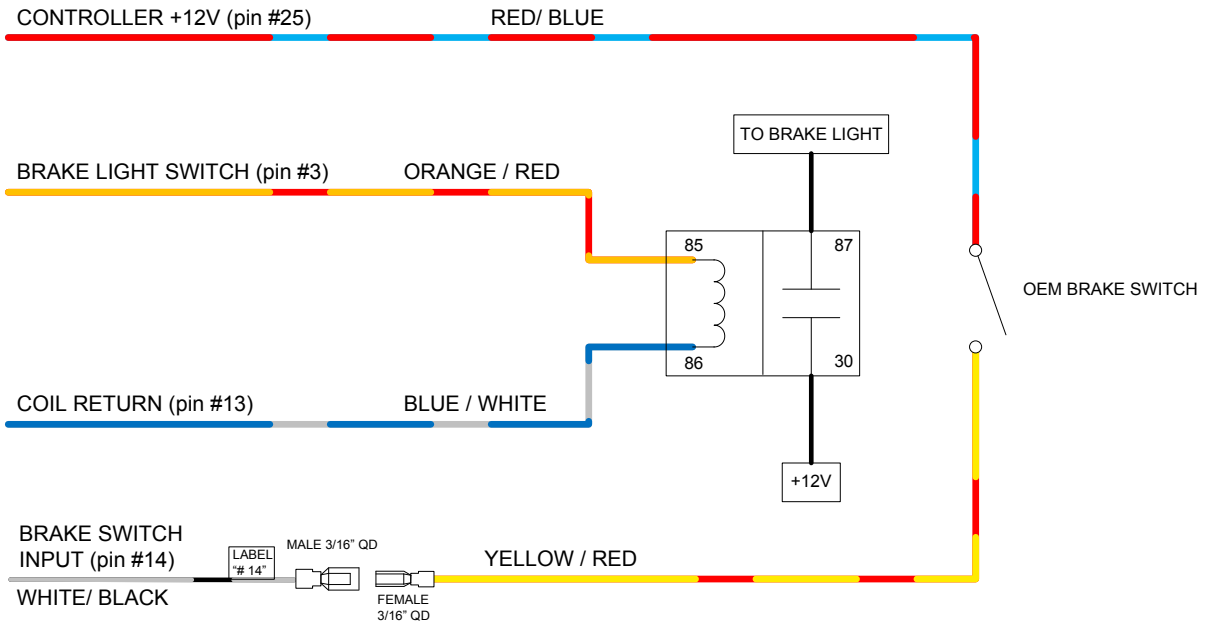
A	INITIAL RELEASE	2/19/2013

ACTIVE BRAKE LIGHT CONFIGURATION
OPTION 2
FOR BRAKE TYPE 3
1234, 1236, &1238 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 A
OPER. NO.	UNIT	DRAWING 1010-BRAKE	
DESIGN	DETAIL	TITLE OPTION 2 BRAKE LIGHT SWITCH 1234,1236, &1238 CONTROLLER	
CHECKED	SAFETY		
SCALE NONE	DATE 12/5/13	REVISION A SHEET 3 OF 4	HPEVS

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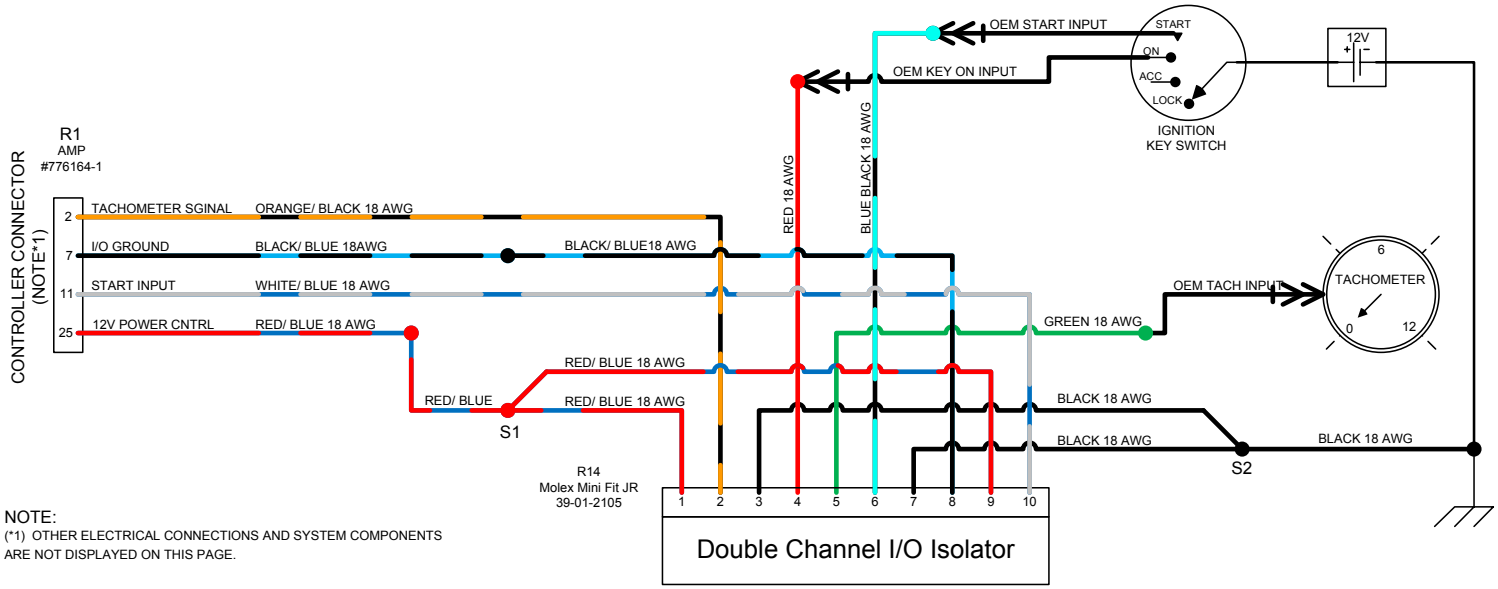

NOTE:
(*1) OTHER ELECTRICAL CONNECTIONS AND SYSTEM COMPONENTS ARE NOT DISPLAYED ON THIS PAGE.

I/O ISOLATOR PIN FUNCTION

1 – CHANNEL 1 CONTROLLER 12V
2 – CHANNEL 1 TACHOMETER SIGNAL
3 – CHANNEL 1 GROUND
4 – CHANNEL 1 VEHICLE 12V
5 – CHANNEL 1 OUTPUT TO TACHOMETER
6 – CHANNEL 2 IGNITION KEY INPUT
7 – CHANNEL 2 GROUND
8 – CHANNEL 2 CONTROLLER I/O GROUND
9 – CHANNEL 2 CONTROLLER 12V
10 – CHANNEL 2 CONTROLLER START INPUT

CAD TYPE VISIO	CAD LOC.	CAD FILE	DRW SIZE B
OPER. NO.	UNIT	DRAWING 1010-2CH-ISOLATOR-001	
DESIGN	DETAIL	TITLE DUAL CHANNEL OPTO-ISOLATOR SYSTEM SCHEMATICS	
CHECKED	SAFETY		
SCALE NONE	DATE 4/19/12	REVISION B SHEET 1 OF 1	HPEVS