Document Number:
XE-ETA4PM-R0A

FRC

A Safe Fleet Brand

infinityPRO

REMOTE ENGINE THROTTLE
MODEL: ETA400

ETA500 FIELD PROGRAMMING UNIT

FIRE RESEARCH CORPORATION

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INTRODUCTION

Overview

The InfinityPRO series of remote engine throttles use optical technology. There is no potentiometer, electromechanical switch, or mechanical stop. The engine RPM control signal is set at idle when power is applied regardless of the control knob position.

The throttle uses an Infrared Encoder (IRE) to detect the direction and speed of the control knob when it is rotated. The electrical signal from the encoder is interpreted by the microprocessor and the engine RPM control signal is adjusted. The InfinityPRO responds to how fast the control knob is rotated and increases or decreases the engine RPM proportionally.

Pressing the idle button immediately sets the engine RPM to idle.

The InfinityPRO is programmed to interface with a specific type of engine. It can be preprogrammed from the factory or programmed at installation as required with an FRC field programming unit.

Features

Always Starts From Idle RPM

No Mechanical Stops

Senses How Fast the Control Knob is Rotated

Interlock Signal Recognition

Provides Throttle Enable Signal

Idle Button

Field Programmable for Engine Type

Multiple Remote Throttles (Option)

Remote to a Primary FRC Governor (Option)

FIELD PROGRAMMING UNIT

The InfinityPRO is programmed to interface with a specific type of engine. It can be pre-programmed from the factory or programmed in the field for some engines as required.

The FRC programming unit (P/N ETA500) can be used to check or program the InfinityPRO for the following engine types.

MODEL	ENGINE	PROGRAM CODE
ETA400	Generic	19
ETA401	Cummins IS Series	1
ETA402	Detroit Diesel (Series 50 and 60)	2
ETA404-A	Navistar	13
ETA404-D	Navistar MaxxForce	4
ETA405	Caterpillar	5
ETA406-A	Ford 7.3L	6
ETA406-B*	Ford 6.0L, 6.4L	12
ETA407	Mack	7
ETA408-B	Scania P, R, and T series	6
ETA409*	GMC	9
ETA410-A	Mercedes	10

* **Note:** An adapter and cable assembly replaces the basic InfinityPRO cable when connecting the throttle to a Ford 6.0 or GMC engine.

The following engine types are not programmable and must be set at FRC.

ETA408-A Scania

ETA410-B Mercedes Euro

ETA418 Iveco

Program Check/Change

1. Connect the programming unit cable to the ETA400 throttle.

2. Press the power button to ON.

3. The throttle programmed model number will show in the display.

4. Press the IDLE button on the throttle to change the model number and program it for the correct engine.

5. Press the power button to OFF and disconnect the throttle.

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INSTALLATION

There are three screws in the knob. One slotted head screw is the detent adjustment for the knob and is set at the factory. This screw should not be adjusted in the field. The two socket head set screws are used to secure the control knob on the outer shaft.

Refer to Figure 1 for component nomenclature and dimensions.

Tools Required

Drill Motor (with 7/8" bit)

3/32 Inch Hex Wrench

1-1/8 Inch Open End Wrench

Pre-Installation

1. Mark location for mounting hole. (The decal supplied with the InfinityPRO is 3.25-in. high by 3-in. wide. Allow for clearance around the mounting hole location.)

2. Drill a **0.875" (7/8")** diameter hole in mounting surface.

3. Remove control knob by loosening two set screws.

4. Remove outer nut from nipple.

Install Remote Throttle

1. Set inner nut and star washer to allow 0.85-inch (approximately one thread) to be exposed after outer nut is tightened.

2. Install InfinityPro plate, install and tighten outer nut.

3. Slide control knob over idle button and onto outer shaft. Ensure that there is clearance between the back of the knob, nut, and mounting surface. (The knob should spin freely.) If there is any rubbing, reset the position of both nuts per step 1.

4. Tighten two socket head set screws.

5. Connect cables. (Refer to Wiring section.)
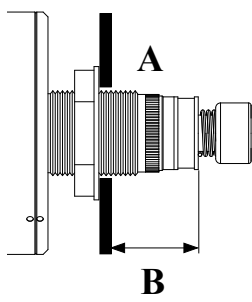
A
Drill a 0.875" hole in the mounting surface.

B
Position the inner nut so that this dimension is 0.85". This will leave approximately one thread exposed after the outer nut is tightened.

Star Washer   Nipple   Idle Button   Control Knob

Inner Nut   Outer Shaft   Outer Nut

Connector

Plate

Mounting Surface
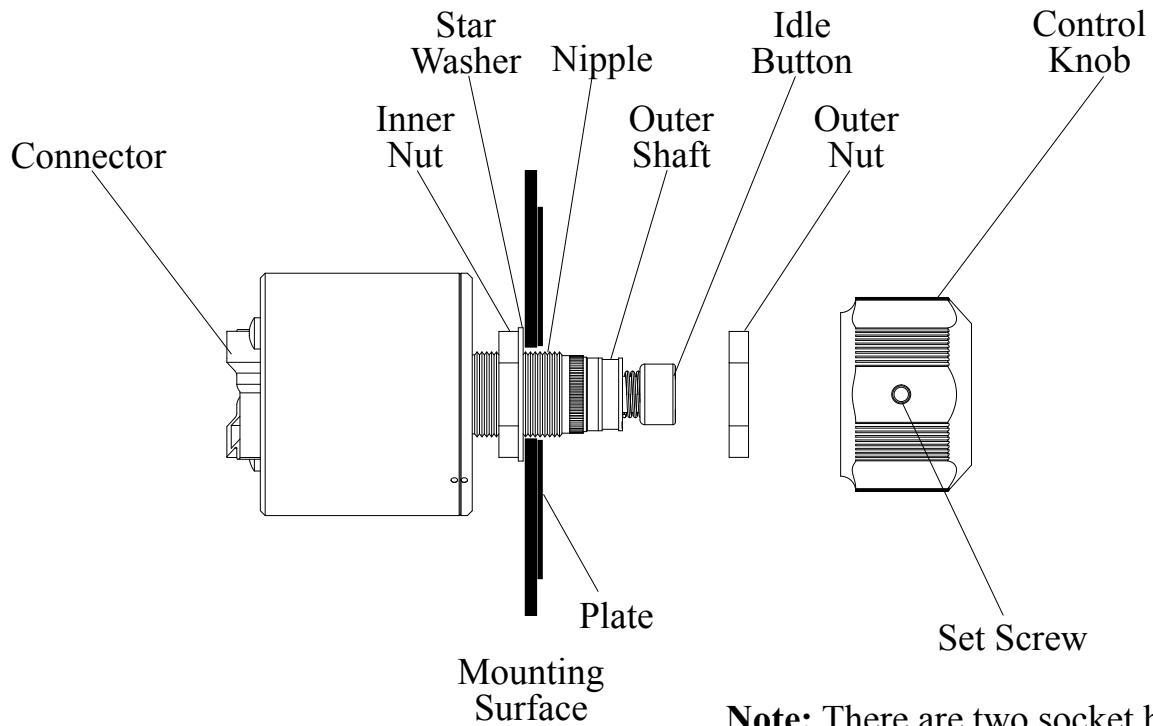
Set Screw

Note: There are two socket head set screws 120° apart that hold the control knob on the outer shaft. **Do not adjust the slotted head screw.**

2.5"   2.0"

2.19"   1.35"

4.34"
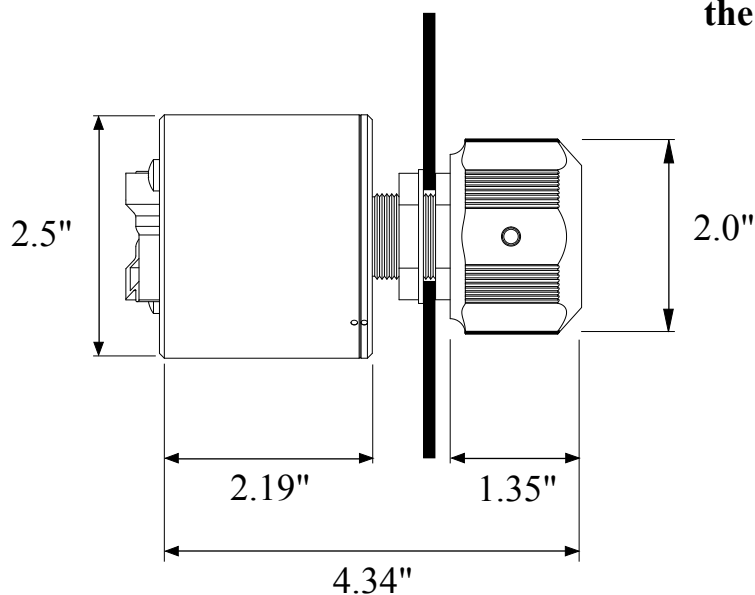
Note: The panel decal for the InfinityPRO is 3.25" high by 3" wide.

Figure 1. ETA Nomenclature and Dimensions

7

OPERATION

The InfinityPRO throttle always starts from idle when the pump interlock signal is recognized regardless of the control knob position. It senses how fast the control knob is rotated and increase or decrease the engine RPM proportionally.

If the control knob is rotated quickly; the RPM changes quickly.

If the control knob is rotated slowly; the RPM changes slowly.

• Rotate the control knob clockwise to increase engine RPM.

• Rotate the control knob counterclockwise to decrease engine RPM.

• Press the red IDLE button to immediately return the engine to idle.

WIRING

The following figures include the schematics, wiring diagrams, block diagrams, and cable for the InfinityPRO remote throttle.

Connector and Cable

Note: An adapter and cable assembly replaces the basic **InfinityPRO** cable when connecting the throttle to a GMAC engine. Refer to the engine specific wiring diagram.

InfinityPRO
Connector

InfinityPRO
Cable

Pin 8   Pin 1

RED

BLK

ORG

WHT

GRN

YEL

BLU

BRN

8-Pin
Deutsch
Connector

Butt
Connectors
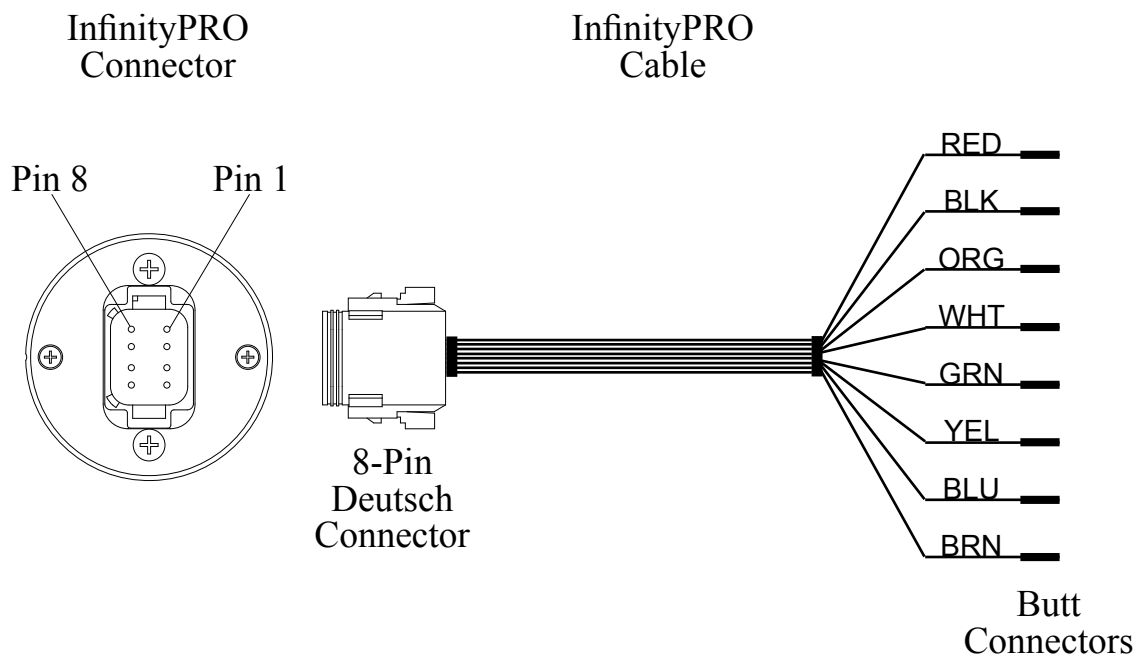
InfinityPRO Connector/Cable		
Pin	Wire Color	Description
1	Red	Supply Voltage (9 - 30 VDC)
2	Black	Ground
3	Orange	+5 VDC Reference From ECM
4	White	Throttle Signal To ECM
5	Green	Signal Return From ECM
6	Yellow	Interlock Input (12 or 24 VDC)
7	Blue	Throttle Enable Signal (or IVS)
8	Brown	Foot Pedal Signal Input

Note: Not all wires are used for all engines. Refer to the engine specific wiring diagram for InfinityPRO interface connections.

Figure 2. ETA Connector and Cable

Cummins Harness Connections

Interface Information

The ECM Remote Accelerator (Throttle) Option has to be set to ON. The diagnostic tool cannot be used to do this, an Insight service tool must be used. Refer to an authorized dealer to program this option.
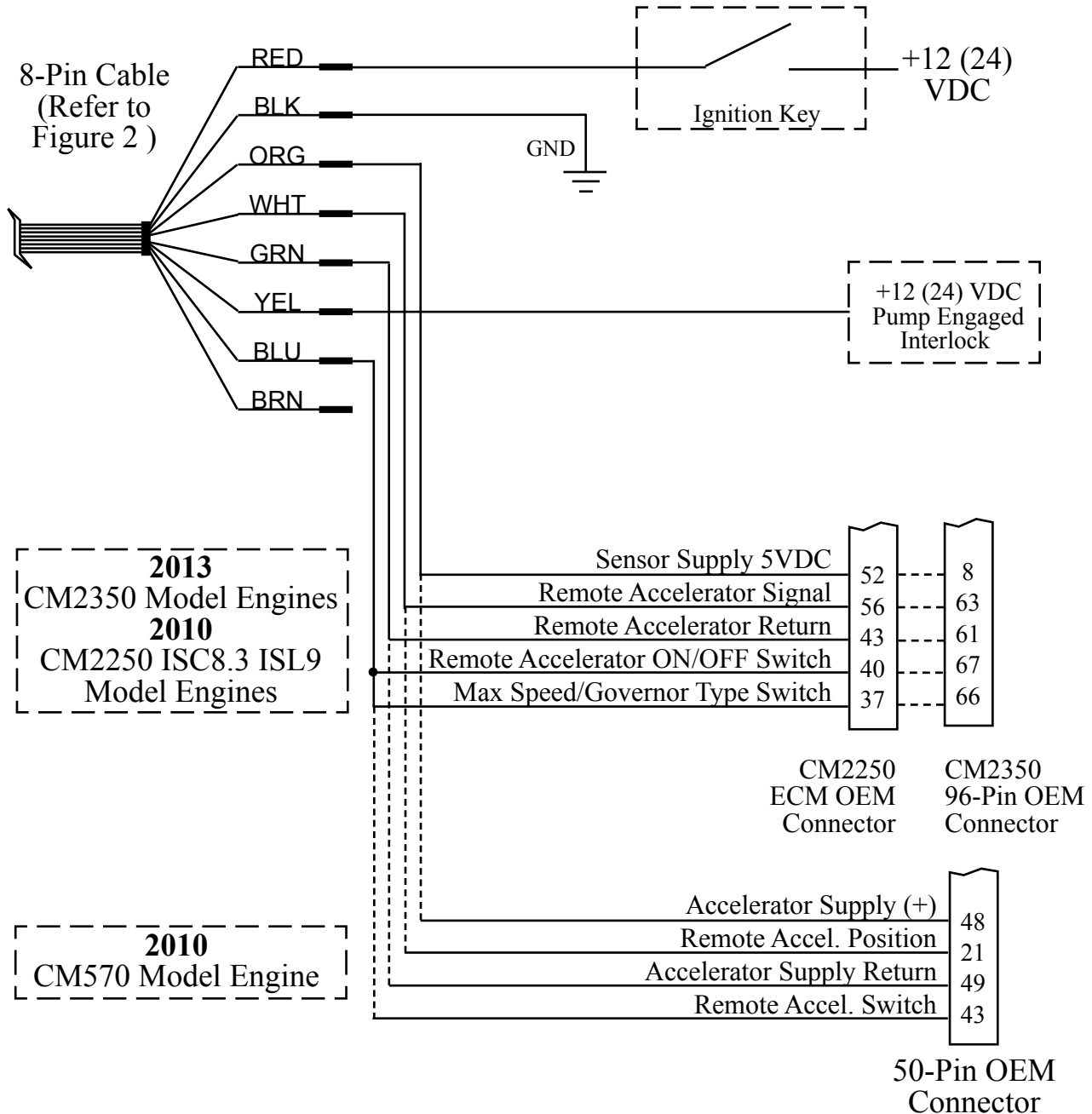
**Figure 3. Cummins ETA401 Wiring
(Sheet 1 of 2)**
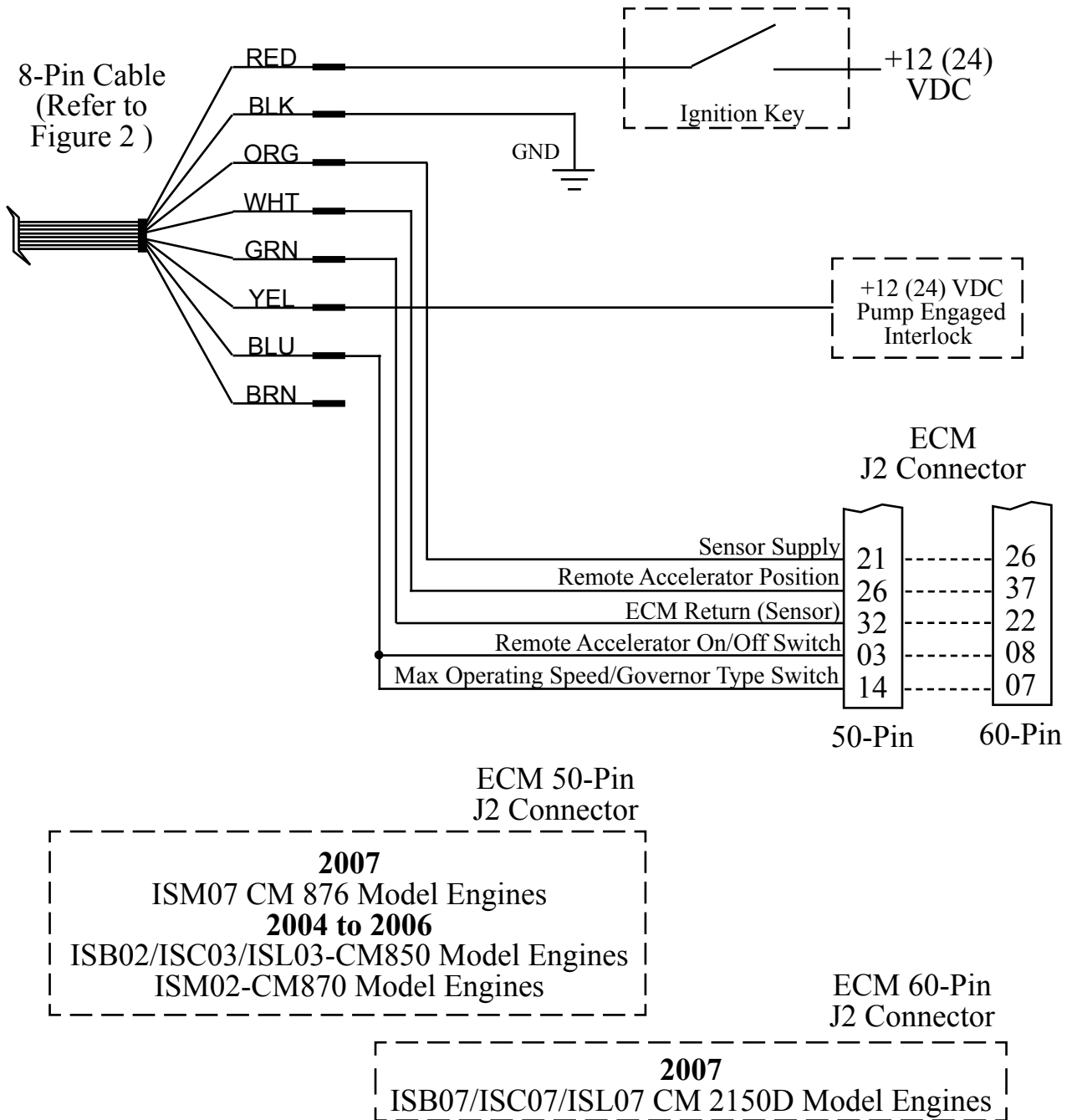
**Figure 3. Cummins ETA401 Wiring
(Sheet 2 of 2)**

Detroit Diesel (Series 50 and 60) Harness Connections

Interface Information

InfinityPRO
Cable
(Refer to
Figure 2)

RED

BLK

ORG

WHT

GRN

YEL

BLU

BRN

Ignition Key

+12 (24)
VDC

GND

+12 (24) VDC
Pump Engaged
Interlock

Vehicle Interface Harness

Remote Throttle
Select Switch — 2/8

Remote PTO Switch — 2/9

18-PIN Connector #2

2007 Engine
DDEC VI
Vehicle Interface Harness

Sensor Supply — 3/3

Remote PTO — 3/4

Sensor Return — 3/2

21-PIN Connector #3

Older Model
Engines/ECMs

Vehicle Interface
Harness Connector

DDEC
III, IV

DDEC
V

ECM

916 — A-3 | Yel/Red — V-11 | Sensor Supply (5 VDC)

510 — D-1 | Ppl/Yel — V-14 | Variable Speed Governor

952 — C-3 | Yel/Blk — V-60 | Sensor Return

Figure 4. Detroit Diesel (Series 50 and 60) ETA402 Wiring

Navistar Harness Connections

Interface Information

The ECM must be programmed for remote variable throttle operation.

Voltage Control
Post 2007 MAXXFORCE 7, DT, 9, 10, 11, and 13 Engines

Red Wire ———————————— Ignition Key ——— +12 (24) VDC

Black Wire ————————— GND

Yellow Wire ————————————————————— +12 (24) VDC Pump Engaged Interlock

InfinityPRO Cable (Refer to Figure 2)

	12VZA Circuit # (I6)	12VZA Circuit # (V8)		12VZB Circuit # (IBBE)		ECM Function
Orange Wire	K97FV	K95	X1-27	K92A4	X1-14	Voltage Ref 5V
White Wire	K99F	K97RPS	X1-50	K92A5	X1-20	REM Accelerator
Green Wire	K97WA	K95R	X1-35	K92A3	X1-6	Signal Return
Blue Wire	K97CC	K97RVAR	X1-60	K92A12	X3-20	Variable PTO Enable
	K97XC	K97SCX	X1-11	K92A7	X4-6	Transfer Case

Split Shaft Only

Figure 5. Navistar ETA404 Wiring

Caterpillar Harness Connections

Interface Information

The ECM Remote Throttle Option has to be enabled. Refer to an authorized dealer to program this option.

C7,C9,C10,C11,C12,C13,C15 Engine Interface

Engines with 70-pin OEM connector.

InfinityPRO Cable (Refer to Figure 2)

RED — Ignition Key — +12 (24) VDC

BLK — GND

ORG

WHT

GRN

YEL — +12 (24) VDC Pump Engaged Interlock

BLU

BRN

ECM

G845-PU — 68 — Input #8 (Remote Throttle PWM)

K999-GN — 56 — Input #1 PTO ON/OFF Switch

70-Pin Vehicle Harness Connector
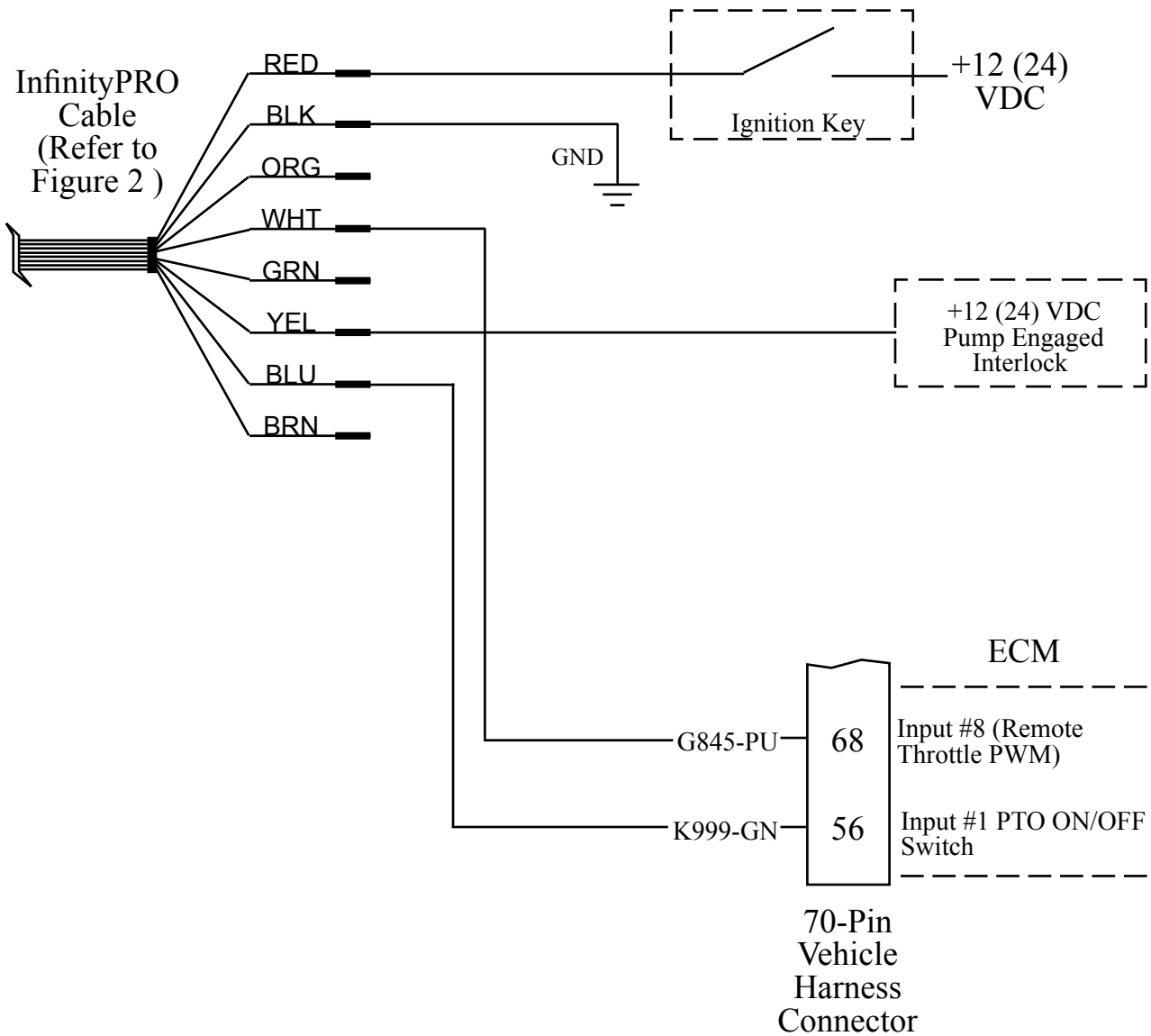
Figure 6. Caterpillar ETA405 Wiring
(Sheet 1 of 3)

C10, C12 Engine Interface

Engines with 40-pin OEM connector.

InfinityPRO
Cable
(Refer to
Figure 2)

RED

BLK

ORG

WHT

GRN

YEL

BLU

BRN

Ignition Key

GND

+12 (24)
VDC

+12 (24) VDC
Pump Engaged
Interlock

ECM

K982-YL — 31 — Multi-Function Input #3
Remote Throttle PWM

K999-GN — 8 — Multi-Function Input #1
PTO ON/OFF Switch

40-Pin
Vehicle
Harness
Connector
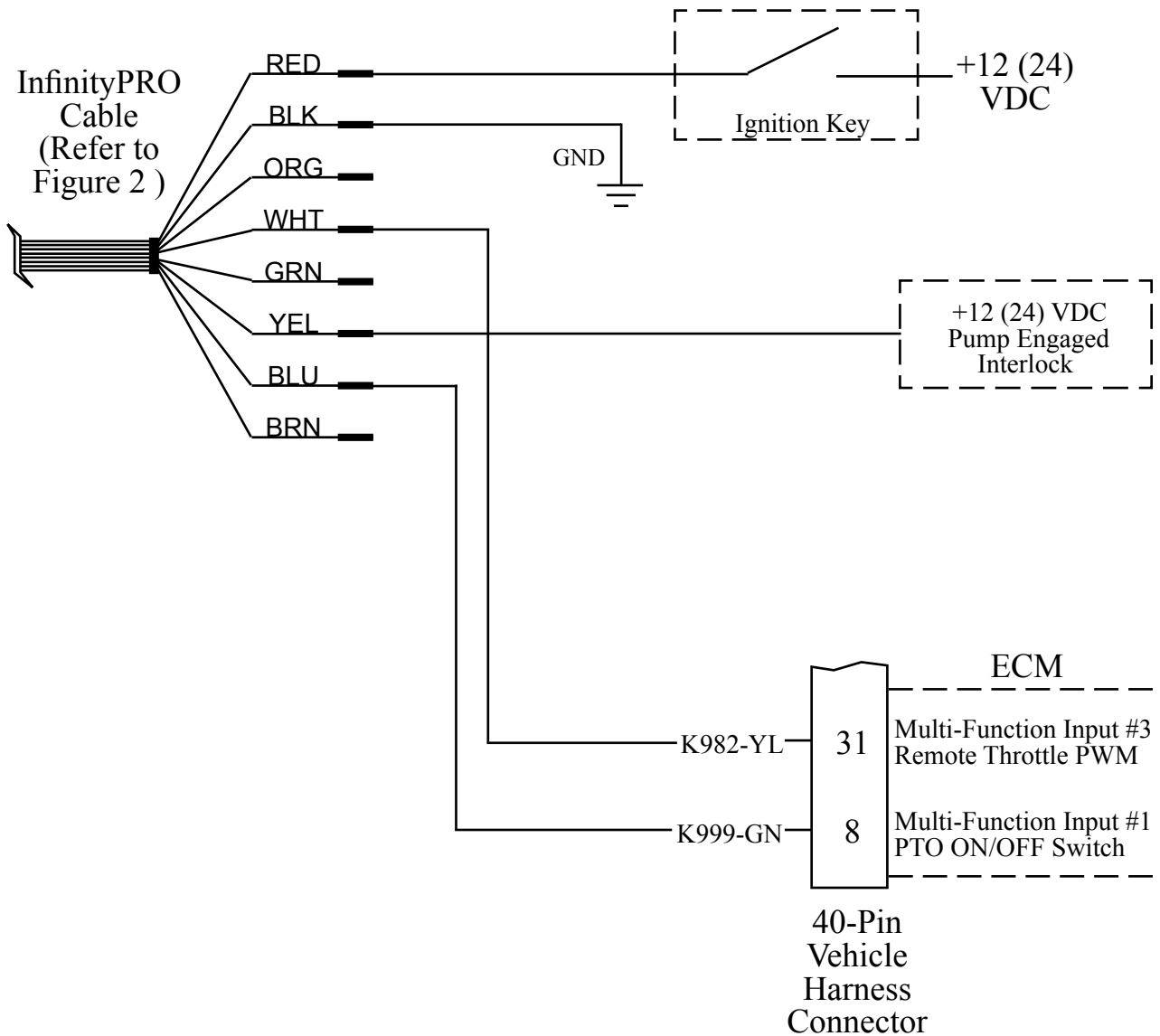
**Figure 6. Caterpillar ETA405 Wiring
(Sheet 2 of 3)**

Older Engine Interface

Engines with 40-pin OEM connector.

InfinityPRO
Cable
(Refer to
Figure 2)

RED

BLK

GND

ORG

WHT

GRN

YEL

BLU

BRN

+12 (24) VDC
Pump Engaged
Interlock

Note: Use a plug and receptacle on the Throttle Position Input wire (C986-BR) so the ends can be reconnected if the InfinityPRO is removed.

White Wire

C C

Cab Foot
Throttle

J50 P50

ECM

C986-BR

37

Throttle Position Input
PWM

40-Pin
Vehicle
Harness
Connector
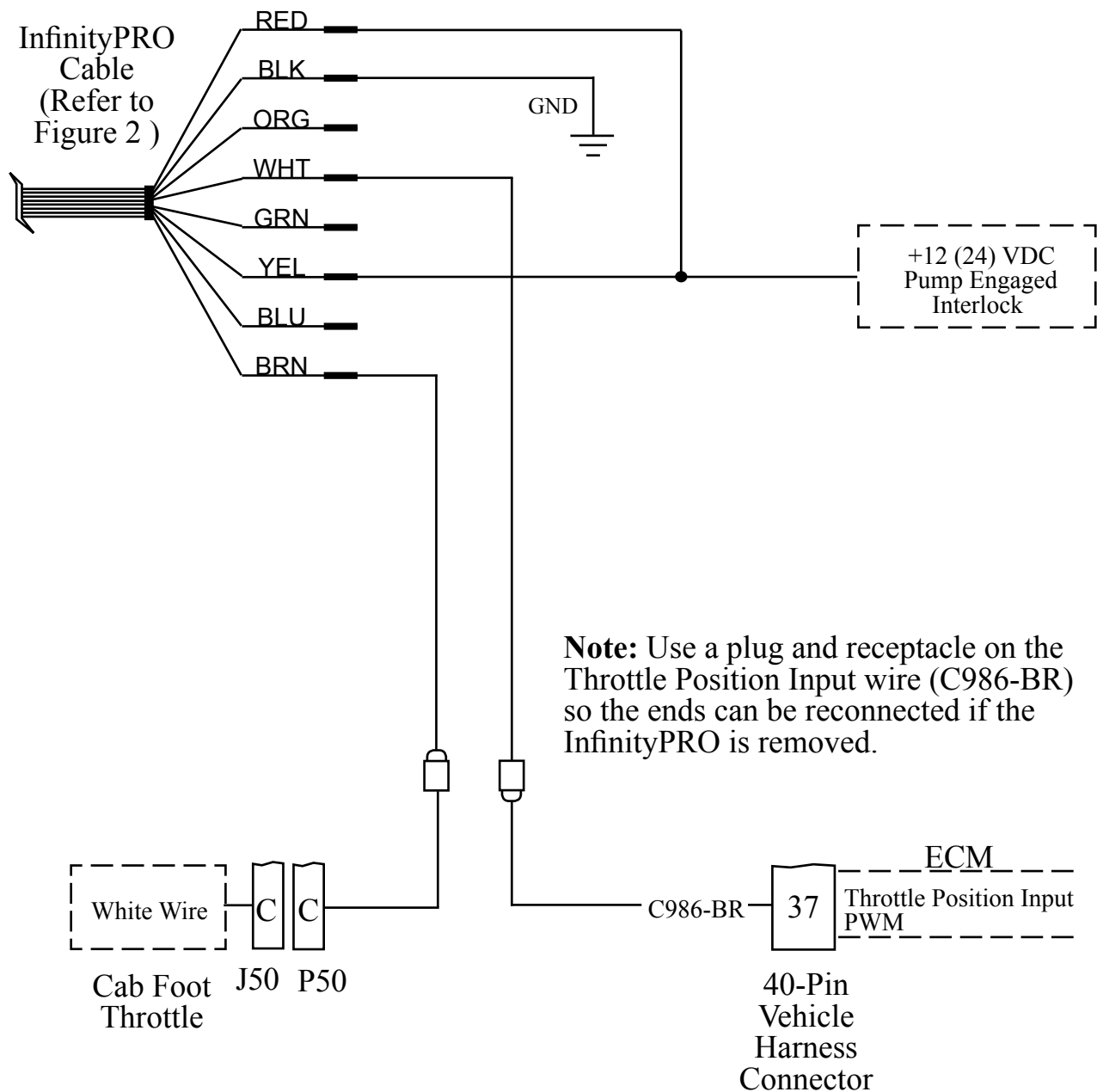
**Figure 6. Caterpillar ETA405 Wiring
(Sheet 3 of 3)**

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Ford Harness Connections

7.3L Power Stroke Engine Interface

The InfinityPRO cable needs to be wired to the cab foot throttle harness. Use a voltmeter to determine which pins are 5 V Reference, Idle Validation, and Engine Control Signal.

Idle Validation will be at ground. When the foot pedal is pressed it will rise to 12 VDC.

Engine Control Signal will be 0.6 volts at idle and rise to approximately 2.7 volts as the foot pedal is pressed.

Figure 7A. Ford 7.3L ETA406-A Wiring

2011 Model F-250/350/450/550 - 6.7L Diesel Engines

Stationary Elevated Idle Control (SEIC)

Note: Do not press the accelerator or service brake pedal when engaging the fire pump, this prevents the switch into SEIC.

Note: Refer to Figure 2. ETA Connector and
Cable for power and interlock wire connections.
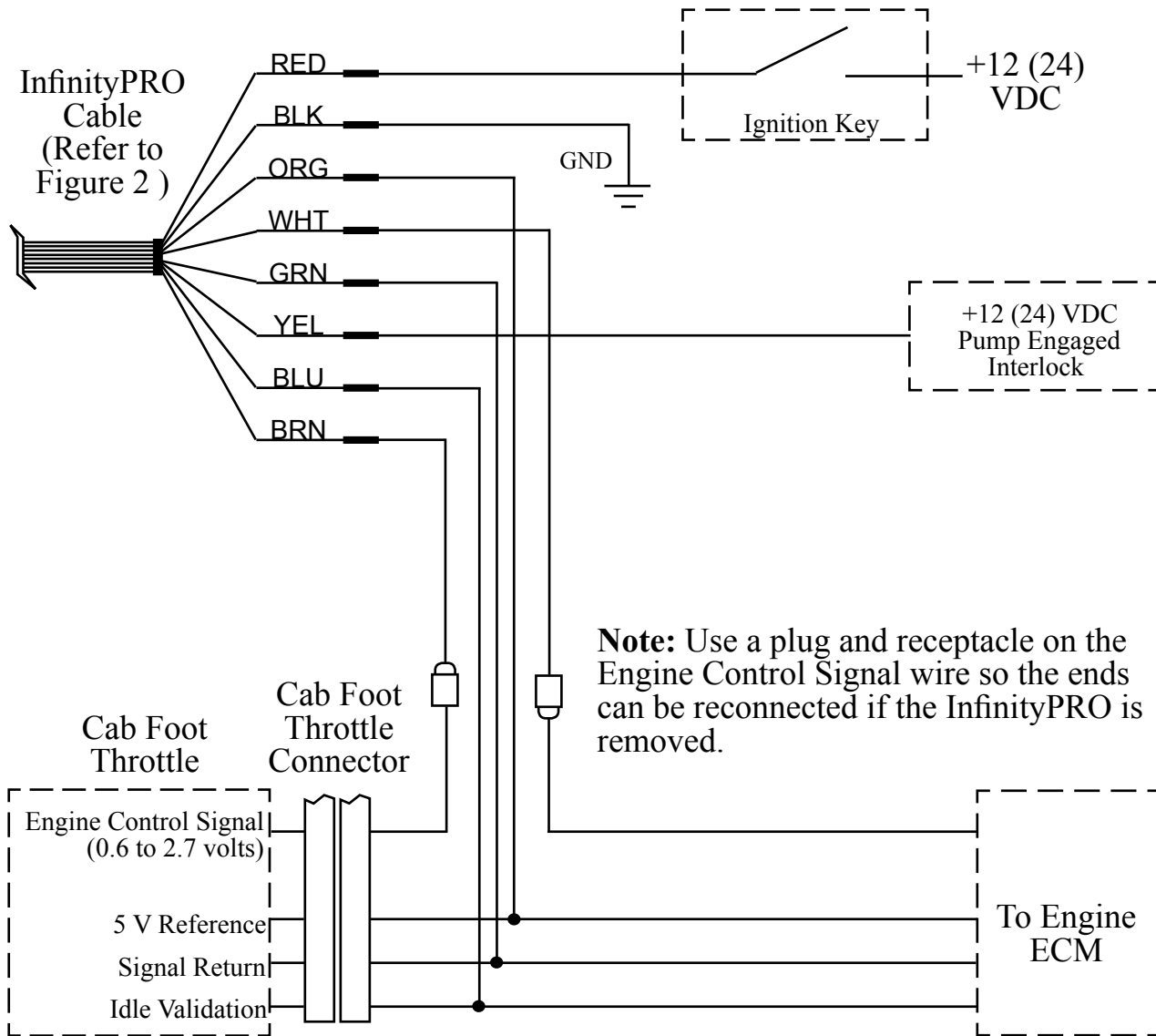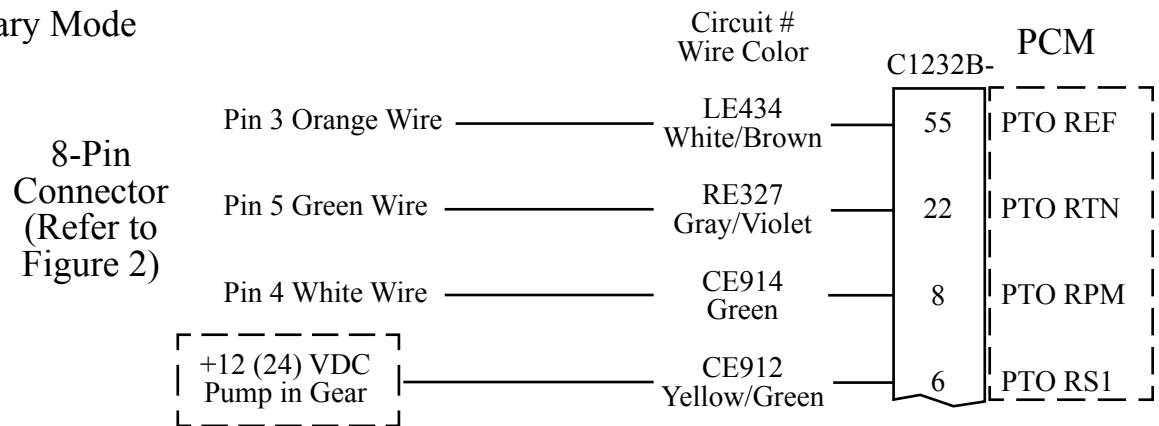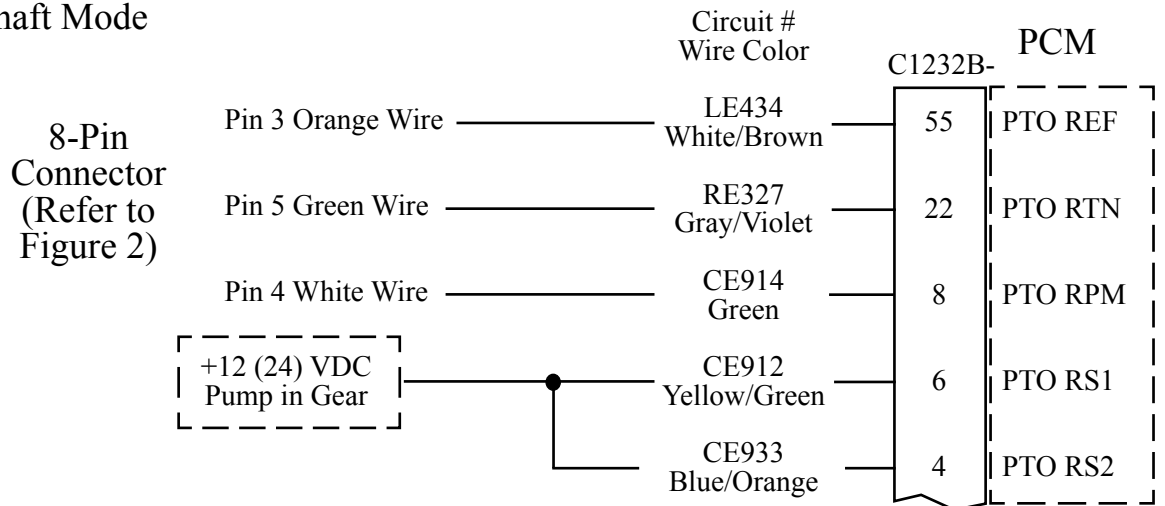
> Access wires for SEIC are located in cabin, tagged and bundled above the parking brake pedal assembly behind datalink connector.

Stationary Mode

8-Pin Connector (Refer to Figure 2)		Circuit # Wire Color	C1232B-	PCM
Pin 3 Orange Wire		LE434 White/Brown	55	PTO REF
Pin 5 Green Wire		RE327 Gray/Violet	22	PTO RTN
Pin 4 White Wire		CE914 Green	8	PTO RPM
+12 (24) VDC Pump in Gear		CE912 Yellow/Green	6	PTO RS1

Split Shaft Mode

8-Pin Connector (Refer to Figure 2)		Circuit # Wire Color	C1232B-	PCM
Pin 3 Orange Wire		LE434 White/Brown	55	PTO REF
Pin 5 Green Wire		RE327 Gray/Violet	22	PTO RTN
Pin 4 White Wire		CE914 Green	8	PTO RPM
+12 (24) VDC Pump in Gear		CE912 Yellow/Green	6	PTO RS1
		CE933 Blue/Orange	4	PTO RS2

Split Shaft Mode is activated by applying supply voltage to both the PTORS1 and PTORS2 PCM circuits simultaneously.
1. Assure engine is running and fully warmed-up.
2. Apply parking brake.
3. Transmission in neutral to disengage drive wheels.
4. With foot off brake and accelerator, switch Split-Shaft PTO on.
5. Without pressing the brake, shift transmission into drive. If vehicle unexpectedly lurches or moves, immediately press brake pedal and shift transmission into park or neutral to secure vehicle.
6. Engage PTO load.
  Once the system enablers are met voltage may be added to the SEIC system for activation.
  If power is applied prior to the enablers being met, a system error may occur, and the SEIC system will have to be reset.
  If an SEIC disabler occurs the engine requires a change-of-state, meaning the operator is required to turn off voltage to the PTO-Request circuit, and back on again to re-invoke SEIC and PTO operation.

Figure 7C. Ford 6.7L ETA406-C Wiring

Mack Harness Connections

Interface Information

The infintyPRO cable needs to be wired to the cab foot throttle harness. Use a voltmeter to determine which pins are 5 V Reference and Engine Control Signal.

Engine Control Signal will be 0.7 volts at idle and rise to approximately 3.8 volts as the foot pedal is pressed.
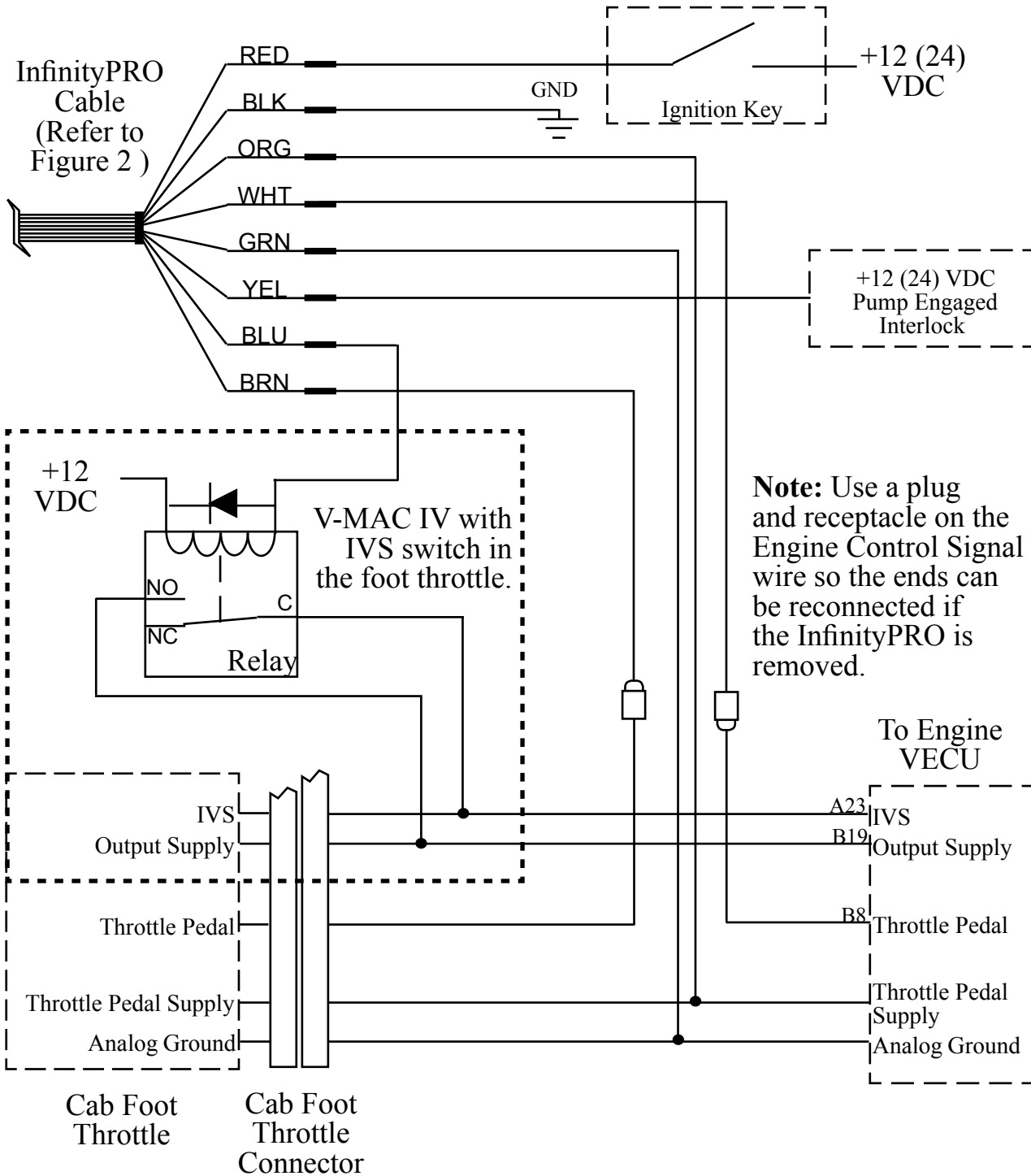
Figure 8. Mack ETA407 Wiring

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Scania Harness Connections ETA408-A

Interface Information

The infintyPRO cable needs to be wired to the cab foot throttle harness. Use a voltmeter to determine which pins are 5 V Reference, Idle Validation Switch, and Engine Control Signal.

Idle Validation Switch (white wire) will be at 24 VDC. When the foot pedal is pressed it will drop to ground.

Engine Control Signal will be 0.4 volts at idle and rise to approximately 3.1 volts as the foot pedal is pressed.
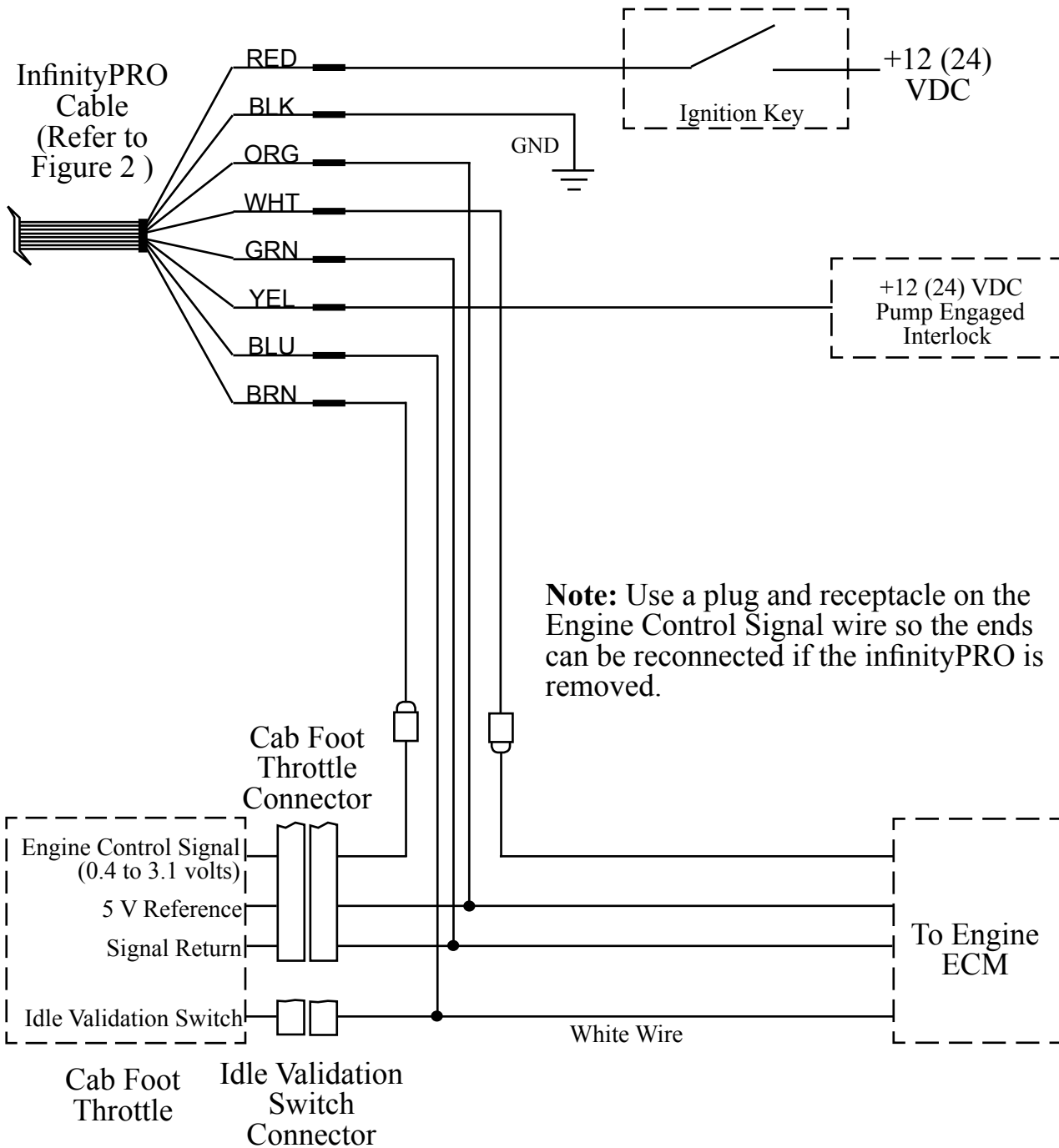
Figure 9A. Scania ETA408-A Wiring

Scania IVS Set Point Adjustment ETA408-A

This procedure is provided as instructions for changing the IVS set point. The set point will establish the voltage level on pin 4 (white wire) that will cause the IVS output at pin 7 (blue wire) to be set to ground.

1. Connect a voltmeter to ETA408 pin 4 (white wire) to monitor the Engine Control Signal output voltage level from the ETA408 to the ECM.

2. Have the engine running and the pump engaged interlock circuit closed.

3. Press and hold the IDLE button, wait for 10 seconds.

4. Hold the IDLE button in and rotate the control knob to obtain the desired output voltage level at pin 4.

5. Release the IDLE button to store the new IVS set point in the memory.

Scania Harness Connections ETA408-B

Interface Information

For use on P, R, and T-series trucks equipped with a bodywork control unit (BWS). Connector C259 is available on all vehicles ordered with any of the bodywork options. It is located on the plate for the electrical bodywork interface for body builders. Connector C259 is white and has 21 pins. (February 2005 and newer.)

C259

The EXT switch must be in the ON position when operating the Infinity.

C493
C489
C259
C494
C447
C449

Contact Housing (MCP)

InfinityPRO Cable (Refer to Figure 2)

RED —————————— Ignition Key —— +12 (24) VDC

BLK

ORG ——— GND

WHT

GRN

YEL ———————————— +12 (24) VDC Pump Engaged Interlock

BLU

BRN

Engine RPM Control 2 +5 Volts | 11
Engine RPM Control 2 Signal | 10
Engine RPM Control 2 Earth | 9
Engine RPM Control 2 +24 Volts | 8

C259 Connector

Note: Signal to pin 10 is 0.6 to 3.0 V

Figure 9B. Scania ETA408-B Wiring

GMC Harness Connections

Interface Information

An adapter and cable assembly is needed to interface the ETA409 with GMC engines. There are multiple types available for diesel or gas in variations that depend on the model and year of the engine.

RED

BLK

YEL

GRN

+12 (24) VDC

Ignition Key

GND

+12 (24) VDC
Pump Engaged
Interlock

GMC InfinityPRO
Adapter and Cable
Assembly

Mount in the cab, no
more than 12" from
the foot pedal.

To Cab
Foot
Throttle

To Engine
ECM

Connector is located
near foot throttle.
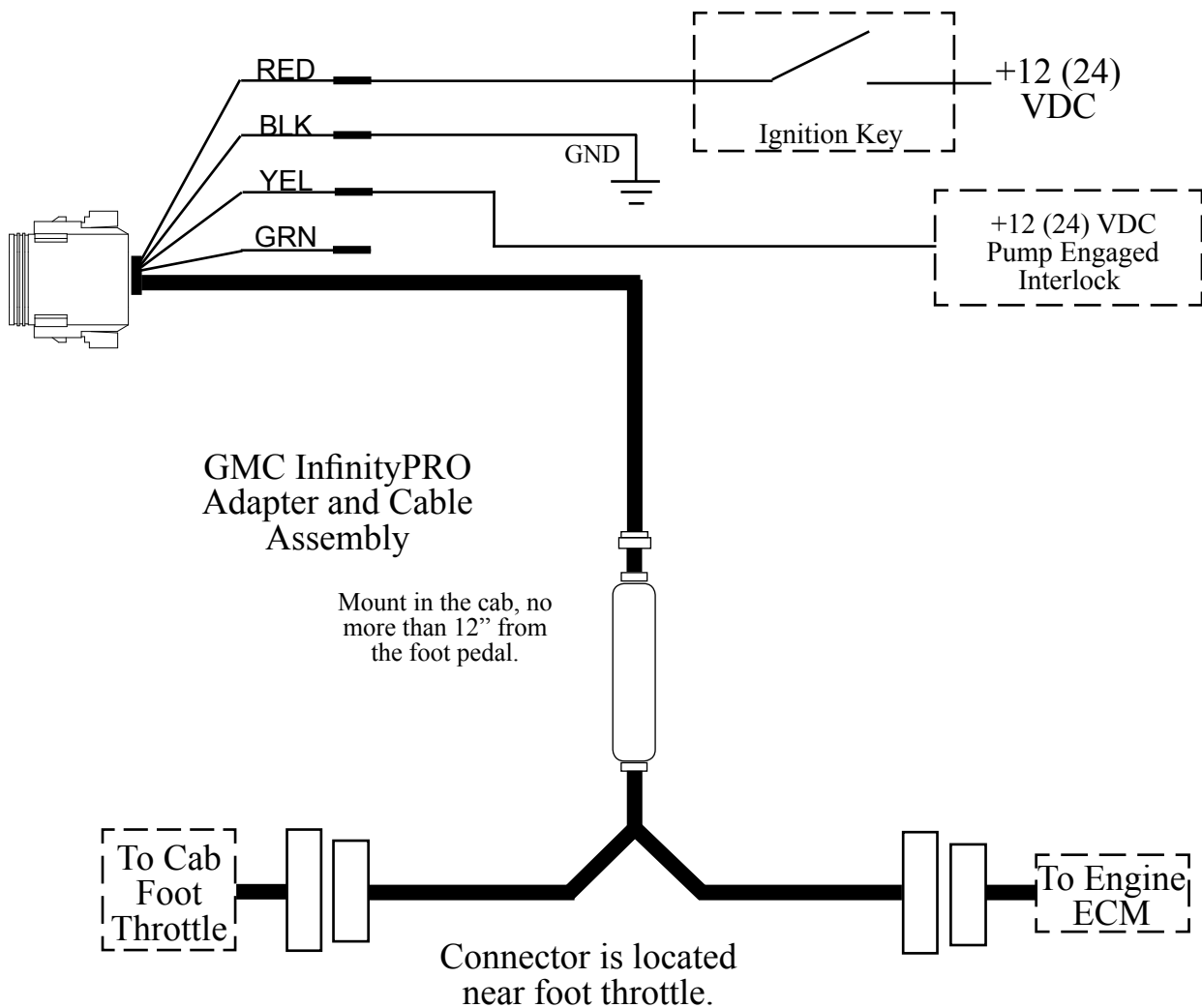
Figure 10. GMC ETA409 Wiring

Mercedes Harness Connections

ETA410-A Interface Information

InfinityPRO Cable (Refer to Figure 2)

RED
BLK
ORG
WHT
GRN
YEL
BLU
BRN

GND

Ignition Key

+12 (24) VDC

+12 (24) VDC Pump Engaged Interlock

2007 Engine DDEC® VI Vehicle Interface Harness

Remote Throttle Select Switch — 2/8
Remote PTO Switch — 2/9

18-PIN Connector #2

Sensor Supply — 3/3
Remote PTO — 3/4
Sensor Return — 3/2

21-PIN Connector #3

2006 and Older Connectors

VCU

18 — Remote Throttle Signal Analog
17 — Remote PTO Power Supply
7 — Remote Accel Select Sw
10 — Remote PTO Sw

VCU 18-Pin Connector

VCU

14 — Sensor Ground (Throttle Pedal & Remote)

VCU 21-Pin Connector

Figure 11A. Mercedes ETA410-A Wiring

ETA410-B Euro Version Interface Information

It is required that parameter 500 output from the manual throttle actuator speed has YES stored as a parameter

Figure 11B. Mercedes ETA410-B Wiring

Iveco Harness Connections
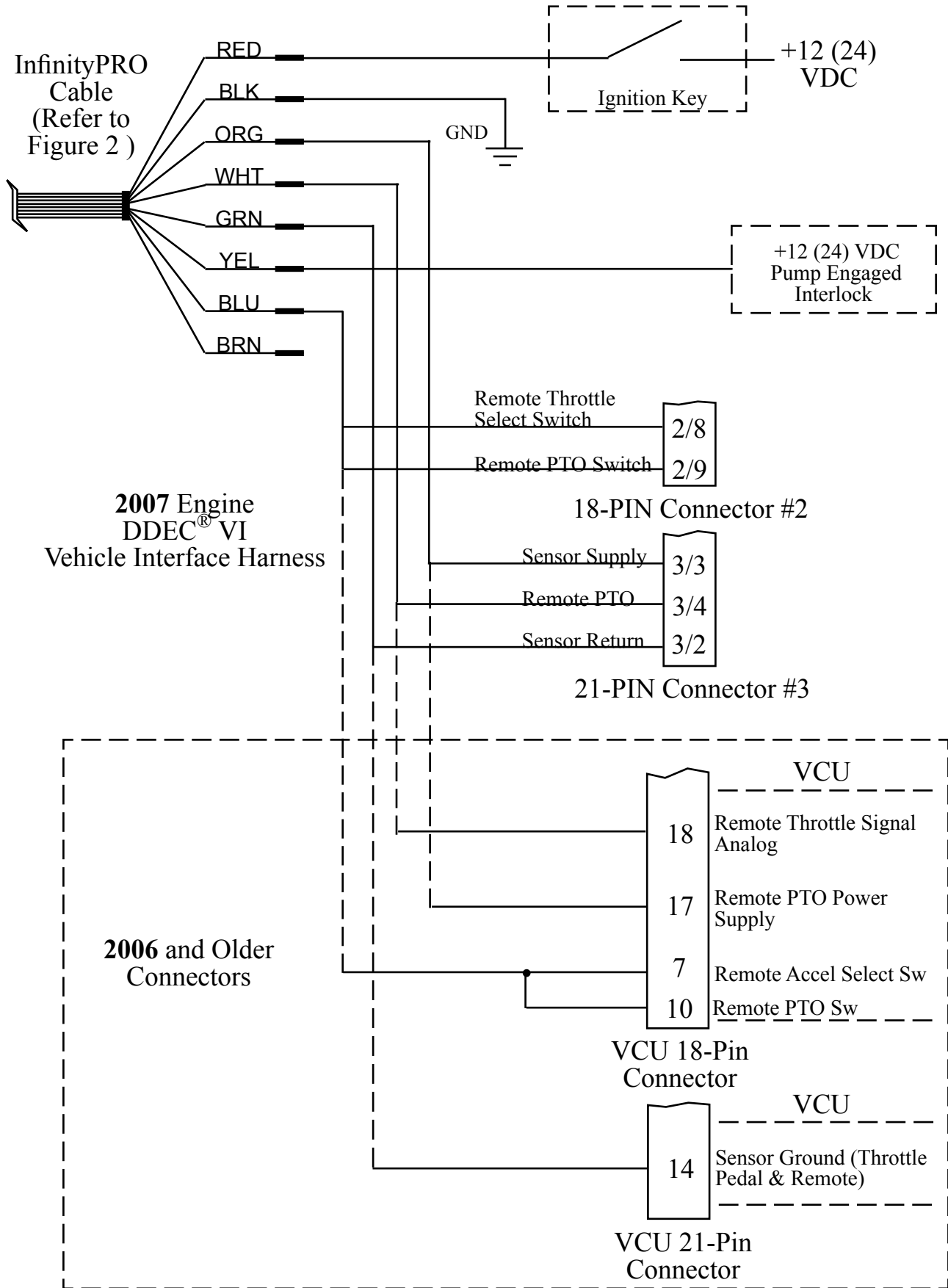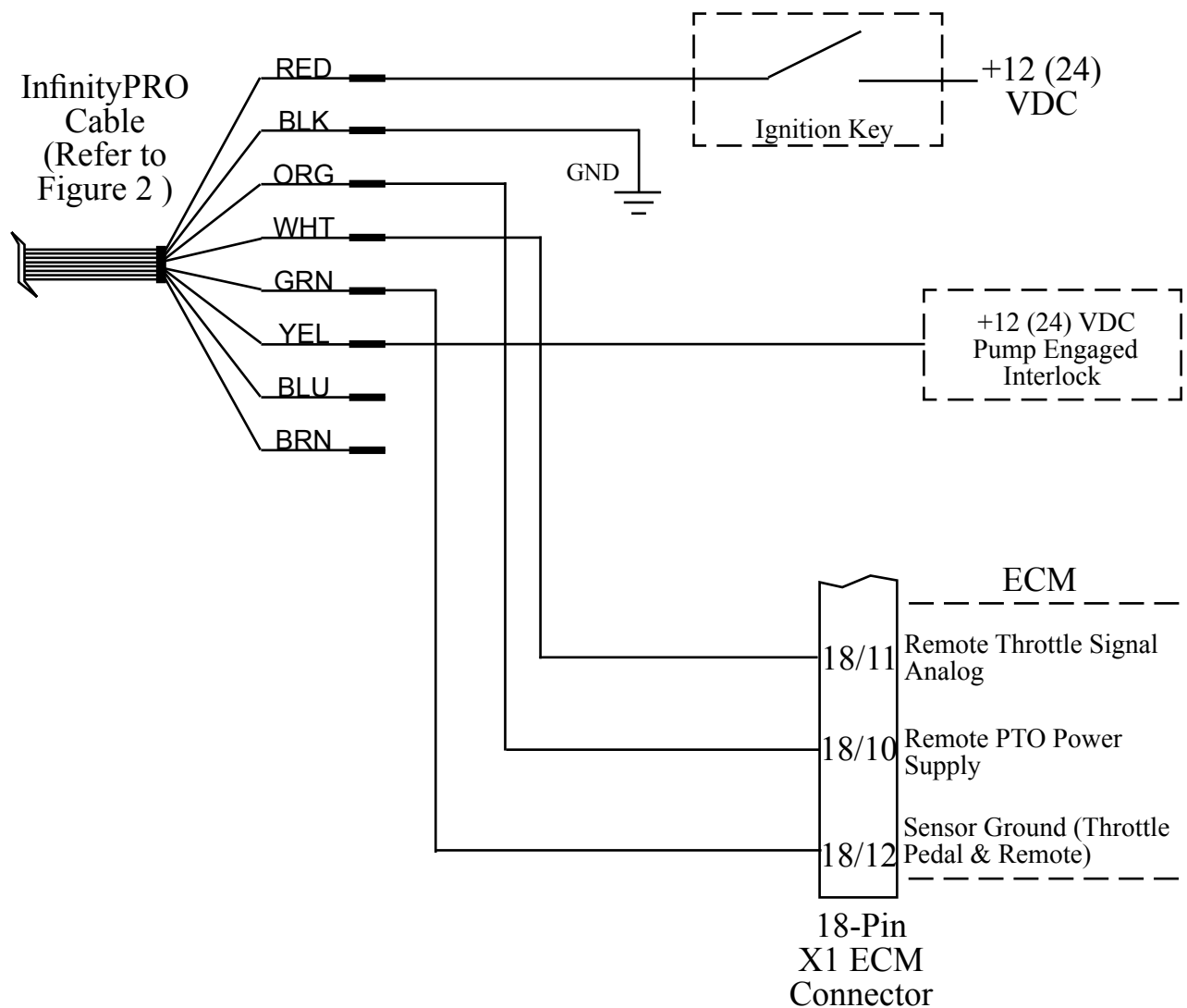
Interface Information

<u>Programming by IVECO service is not required</u>

Enable EDC mode-3 when throttle is active.

(Use external relay to short pin 19 to pin 16 on 20-Way Connector.)

Default setting in EDC mode-3 are:

Min\Max RPM	1900\700
RPM ramp rate	250RPM/s
TAP function	Enabled.
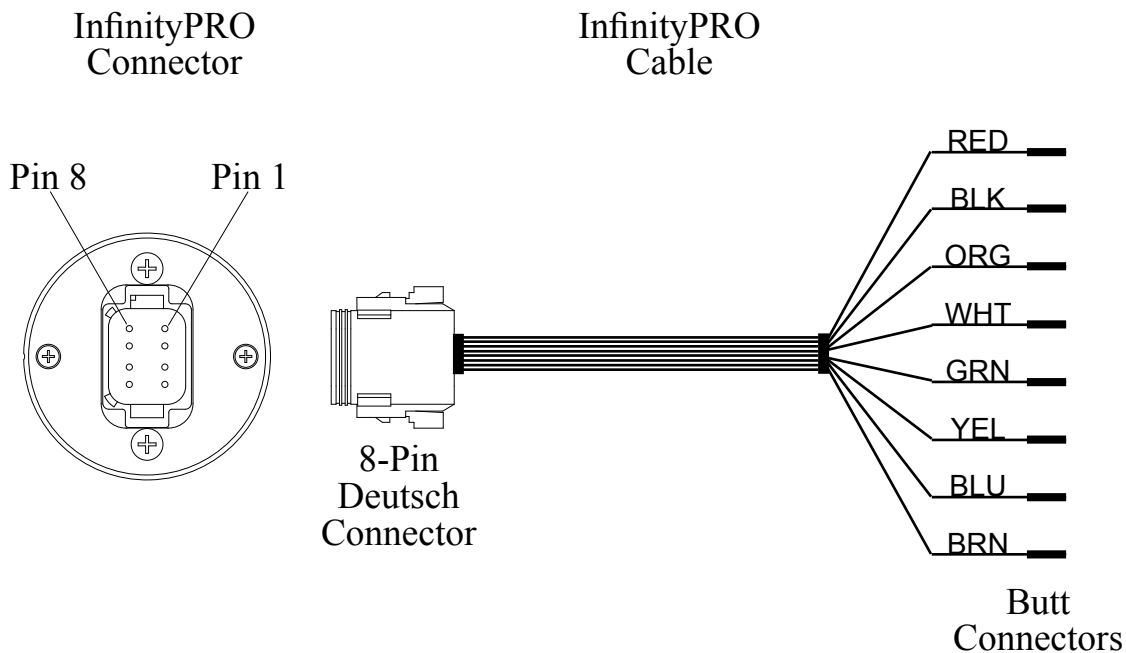
InfinityPRO Connector/Cable for Iveco Engine			
Pin	Wire Color	Description	To 20-Way Connector
1	Red	Supply Voltage (+12/24 VDC)	Pin 3
2	Black	Supply Ground	Pin 9
3	Orange	N/C	
4	White	SET + Output To ECM	Pin 14
5	Green	Ground	Pin 9
6	Yellow	Interlock Input (Supply +12/24 VDC to Activate Throttle)	
7	Blue	SET - Output To ECM	Pin 13
8	Brown	N/C	

Figure 12. Iveco ETA418 Wiring

REMOTE THROTTLE - FRC GOVERNOR AS PRIMARY CONTROLLER

A remote throttle that is to be used with a governor as the primary controller has a short cable adjacent to the 8-pin Deutsch connector. This is the FRC datalink cable that is used to interconnect the remote throttle to the governor.

The remote throttle 8-pin Deutsch connector cable is for wiring to power only..

Remote Throttle Connected to a Primary FRC Governor

3 Pin Connector/Cable		
Pin	Wire Color	Description
A	Red	FRC Datalink (+)
B	Black	FRC Datalink (−)
C		N/C

To Primary Governor
FRC Datalink
(Refer to specific governor
manual for connector pinouts.)

Remote
Throttle

3-Pin Deutsch
Connectors

InfinityPRO
Cable

RED
BLK
ORG   GND
WHT
GRN
YEL
BLU
BRN

+12 (24)
VDC

Ignition Key

Remote Throttle Connector/Cable		
Pin	Wire Color	Description
1	Red	Supply Voltage
2	Black	Ground
3	Oragne	N/C
4	White	N/C
5	Green	N/C
6	Yellow	N/C
7	Blue	N/C
8	Brown	N/C

Note: The remote throttle cable only connects to power and ground.
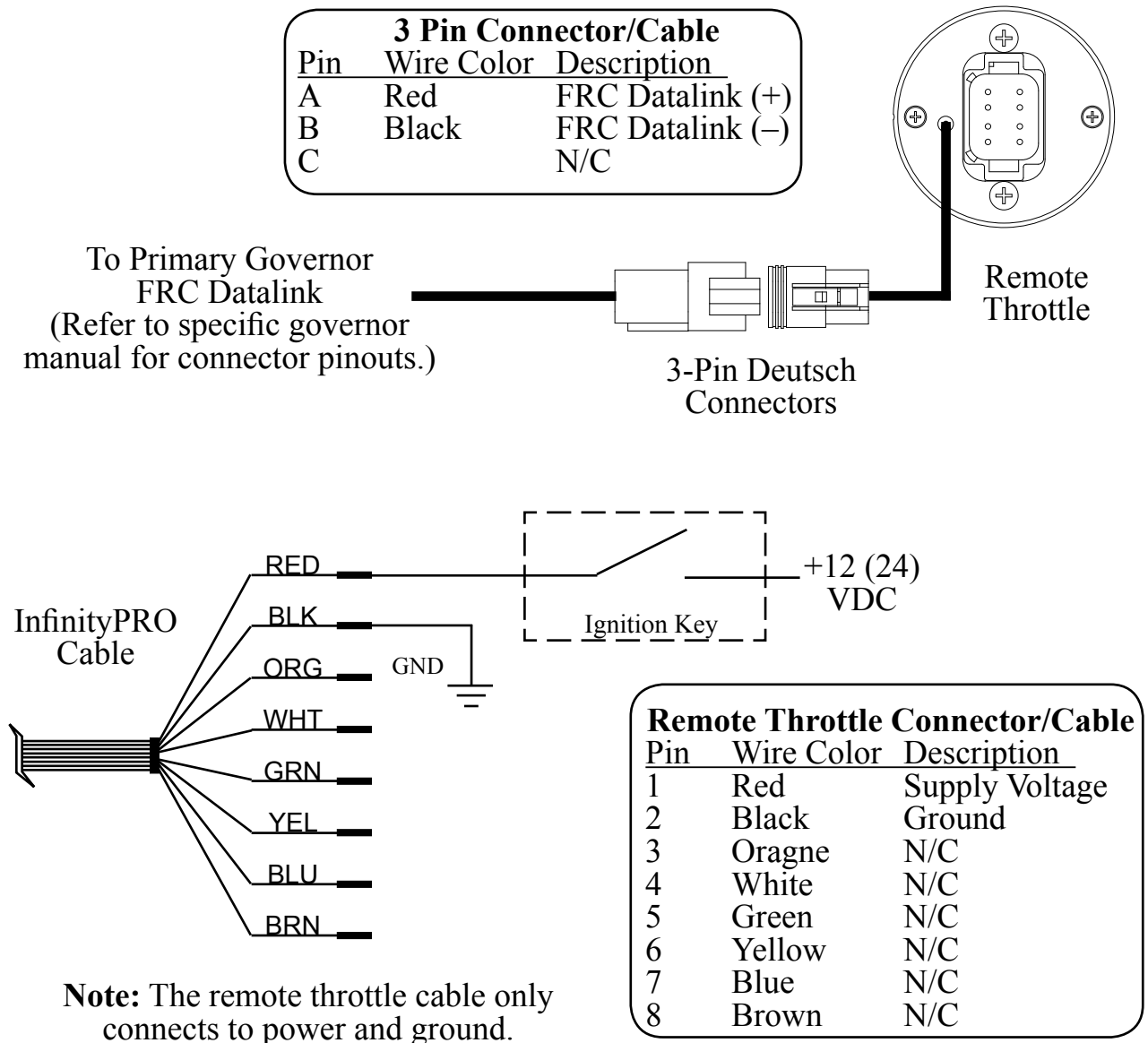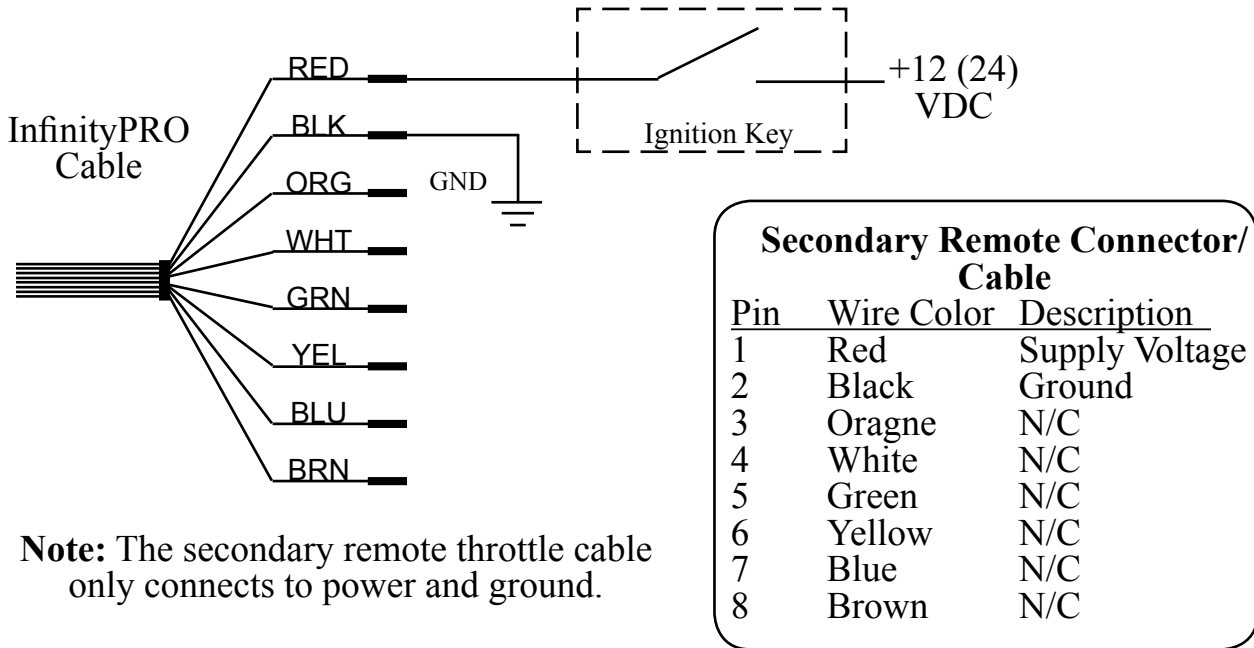
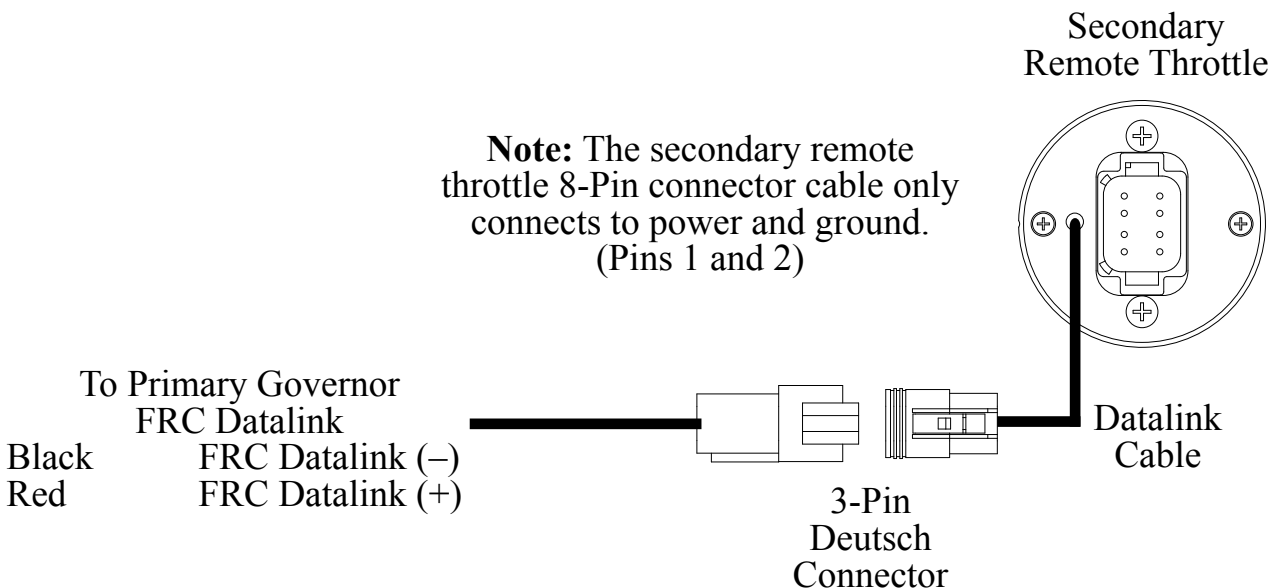**Figure 13. Remote Throttle to a Primary FRC Governor Wiring**

OPTIONAL MULTIPLE REMOTE THROTTLES

A throttle that is to be used for multiple throttle configurations will have a short cable adjacent to the 8-pin Deutsch connector. This is the datalink cable and is used to interconnect the primary remote throttle (or FRC governor) to any secondary remote throttles.

The primary remote throttle 8-pin Deutsch connector cable is for wiring to power, interlocks, and the engine interface. Refer to the engine specific wiring diagram for interface connections.
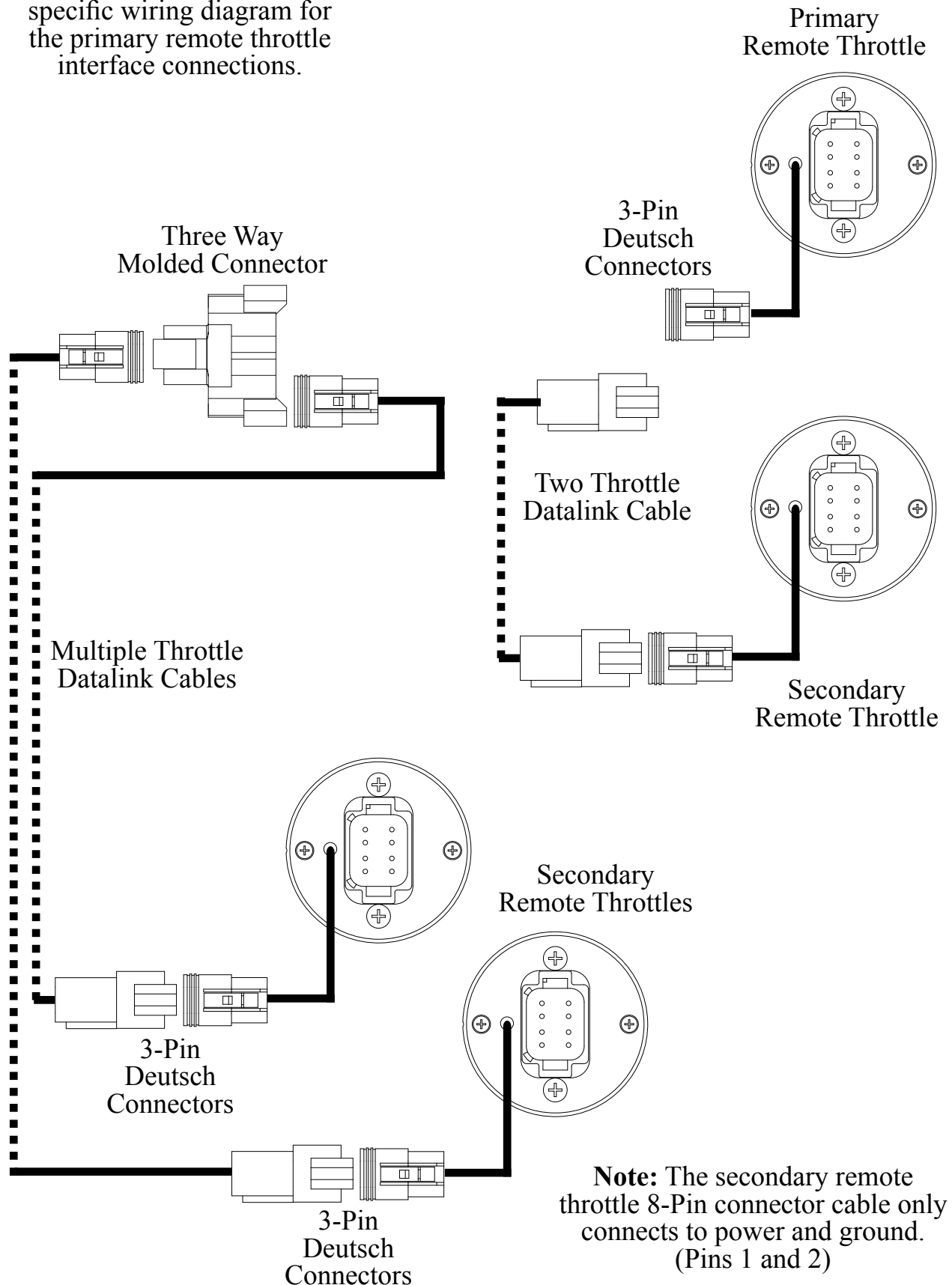
InfinityPRO Cable

RED
BLK
ORG — GND
WHT
GRN
YEL
BLU
BRN

Ignition Key   +12 (24) VDC

Secondary Remote Connector/Cable

Pin	Wire Color	Description
1	Red	Supply Voltage
2	Black	Ground
3	Oragne	N/C
4	White	N/C
5	Green	N/C
6	Yellow	N/C
7	Blue	N/C
8	Brown	N/C

Note: The secondary remote throttle cable only connects to power and ground.

Primary FRC Governor With One Secondary Remote Throttle

Secondary Remote Throttle

Note: The secondary remote throttle 8-Pin connector cable only connects to power and ground. (Pins 1 and 2)

To Primary Governor FRC Datalink

Black   FRC Datalink (−)
Red   FRC Datalink (+)

3-Pin Deutsch Connector

Datalink Cable

**Figure 14. Multiple ETA Remote Throttles Wiring
(Sheet 1 of 2)**

Primary Remote Throttle With One or More Secondary Remote Throttles

Note: Refer to the engine specific wiring diagram for the primary remote throttle interface connections.

Primary
Remote Throttle

Three Way
Molded Connector

3-Pin
Deutsch
Connectors

Two Throttle
Datalink Cable

Multiple Throttle
Datalink Cables

Secondary
Remote Throttle

Secondary
Remote Throttles

3-Pin
Deutsch
Connectors

Note: The secondary remote throttle 8-Pin connector cable only connects to power and ground. (Pins 1 and 2)

3-Pin
Deutsch
Connectors

Figure 14. Multiple ETA Remote Throttles Wiring
(Sheet 2 of 2)

⚠ DANGER

PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.

2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.

3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.

4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.

5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.

6. Failure to follow these guidelines may result in death, burns or other severe injury.

FEMSA

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