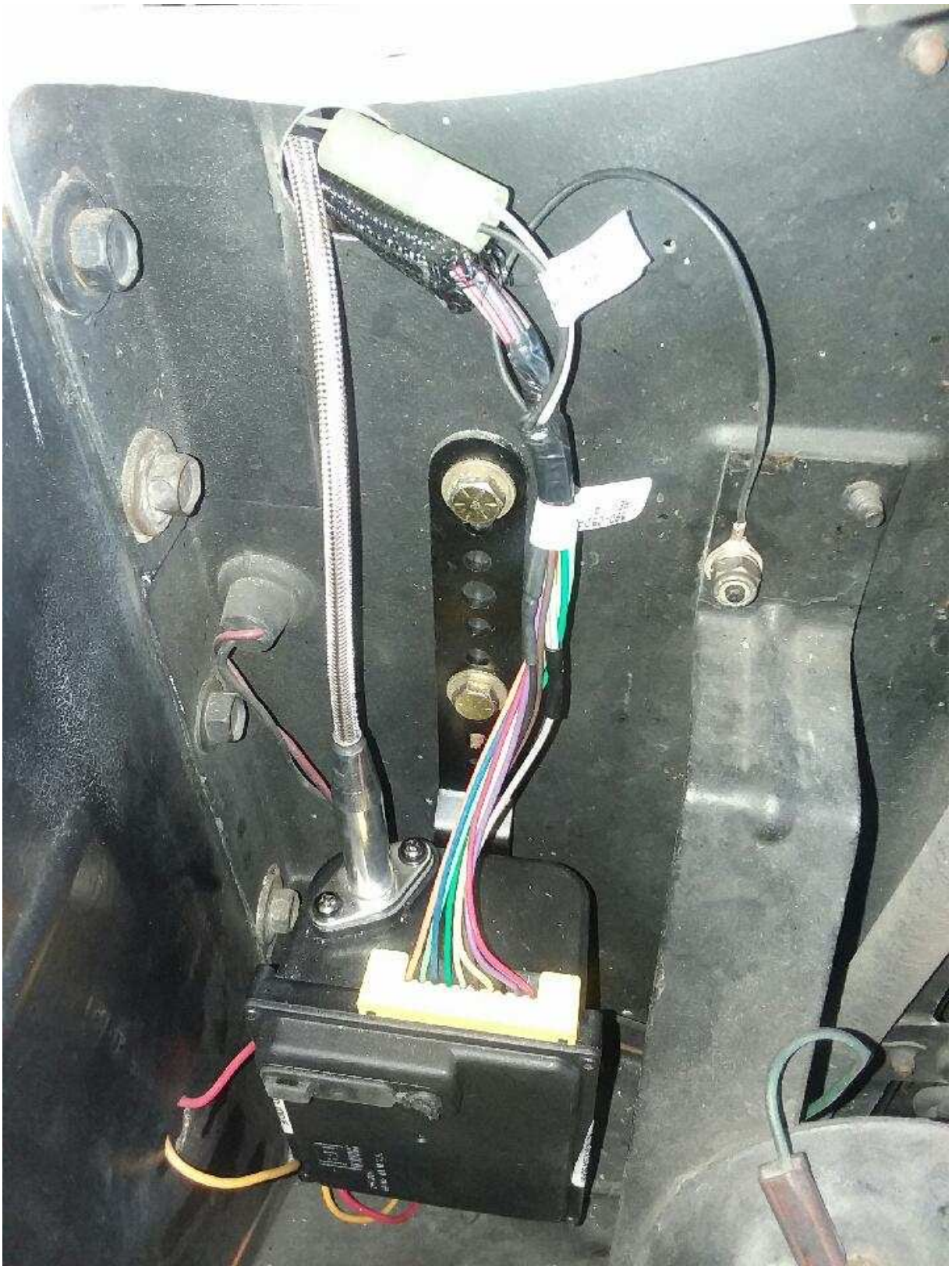
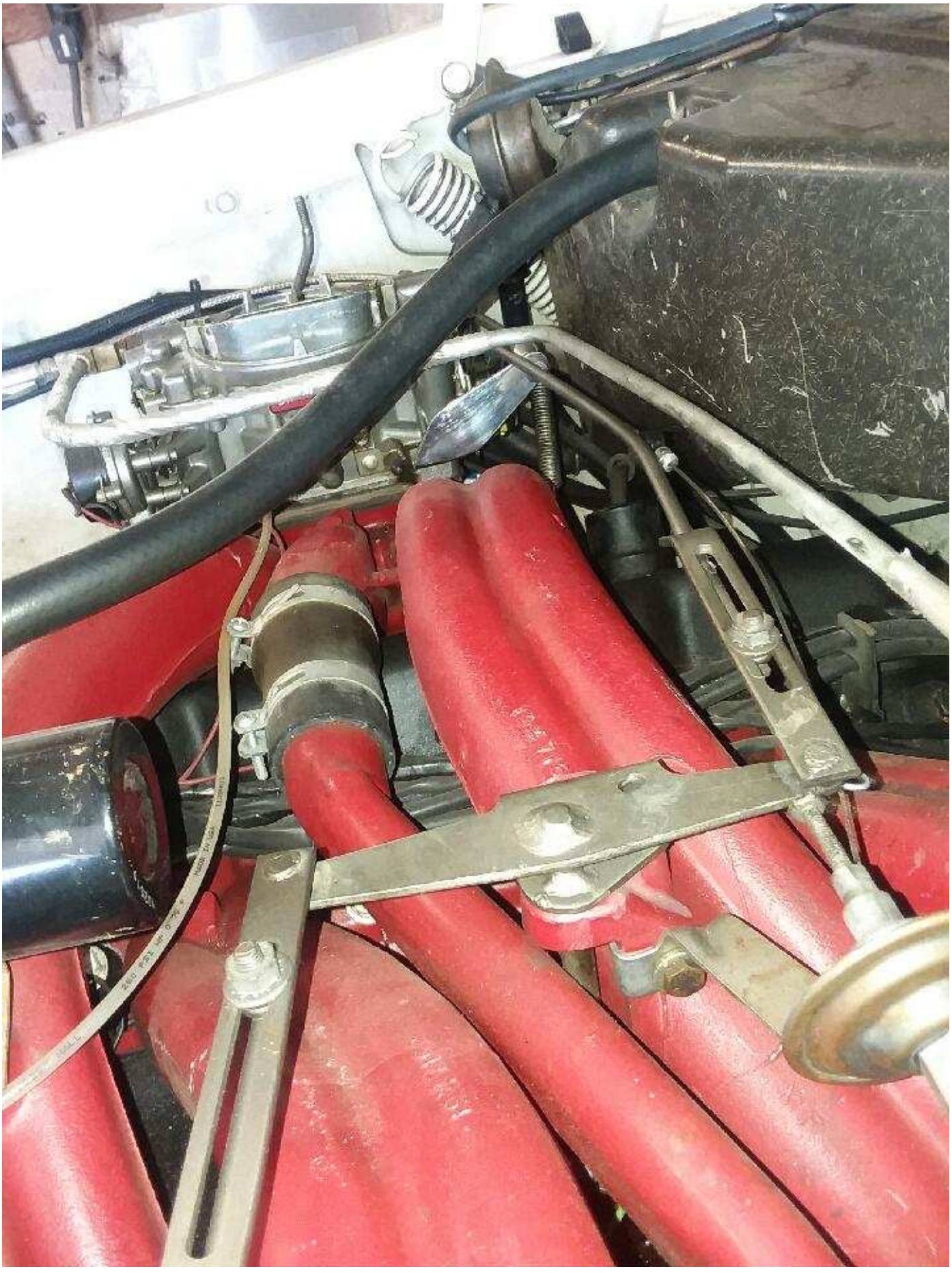
Installation of Dakota Digital CRS-2000 Cruise Control on Cross Ram Engine

Cruise Control Module Mounting: (Note, Seal Wiring Connector to Prevent Water Damage)

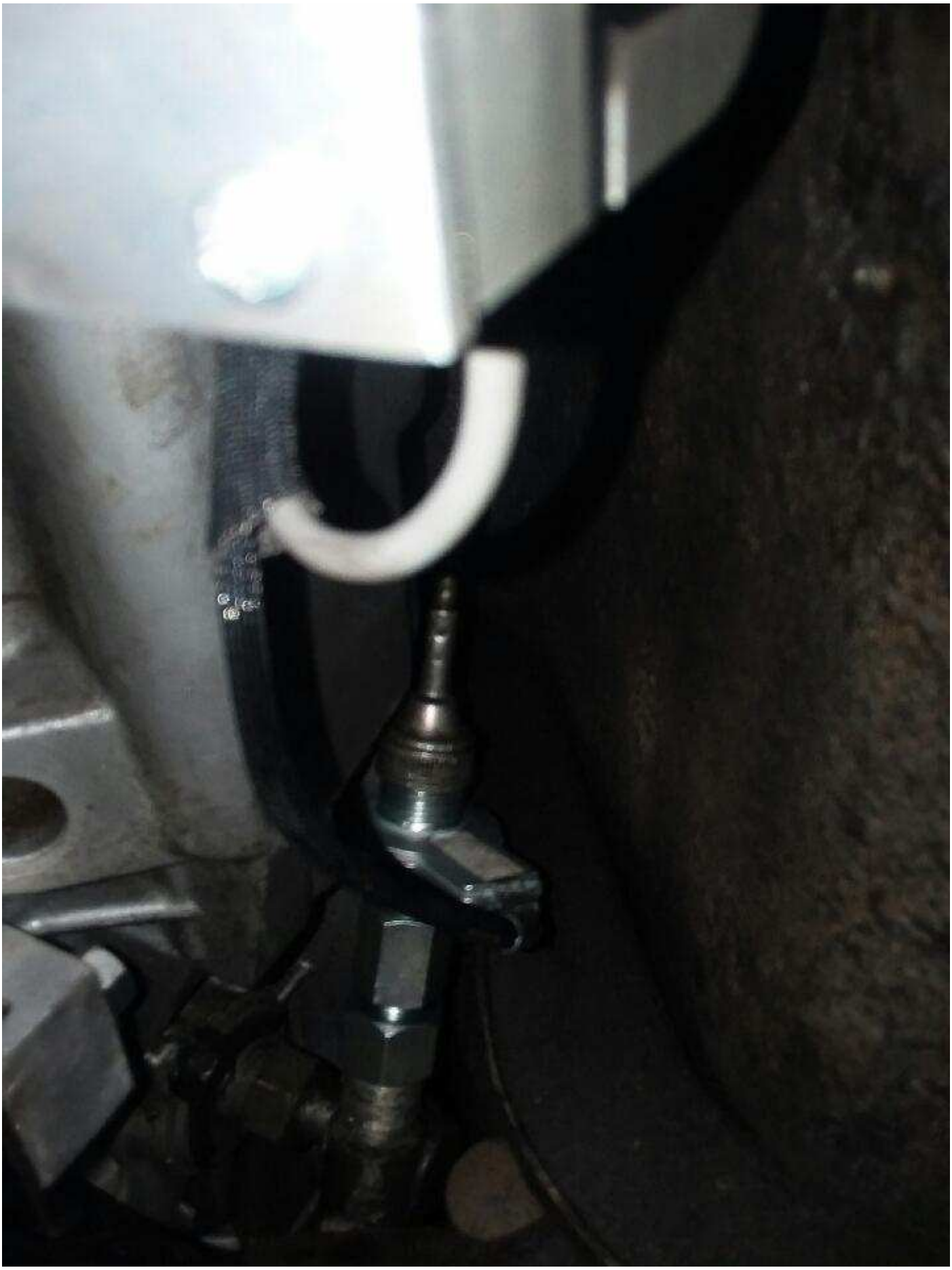


Anchor Cable Sheath

Attach cable to throttle



Speedometer Cable Speed Pulse Generator Connection at Transmission:



Black - Ground Wire
In order to find a good ground for the cruise system, find a vehicle ground point which is a clean unpainted metal surface. If the cruise control does not "see" ground at all times, it will not function.

Brown - Accessory Power
Find a fuse at the fuse panel that supplies power to one of the vehicles accessories. It should be +12 volts when the key is ON and zero (0) volts when the key is OFF or in the START (CRANK) position.

Good source is Ballast Resistor BEFORE resistor

Red - Brake Positive
"Hot" side of brake switch: Use the wire at the brake switch connector with constant +12 volts

Violet - Brake Negative
"Cold" side of brake switch: Use the wire at the brake switch connector with close to zero (0) resistance when brake is not pressed, and +12 volts or open resistance when brake is pressed.

Dark Blue - Tachometer (TACH) Wire
The TACH function is a safety feature of the Cruise Control. If a vehicle with an automatic transmission is accidentally "knocked" into neutral while the vehicle is in motion and the Cruise Control is active, the TACH wire, when connected, will disengage the Cruise Control before engine over-rev. If the TACH wire is not "hooked-up", the cruise control will function; however the TACH over-rev safety feature will be inactive; this is dangerous and not recommended. Dakota Digital, INC. always recommends the attachment of the TACH wire.

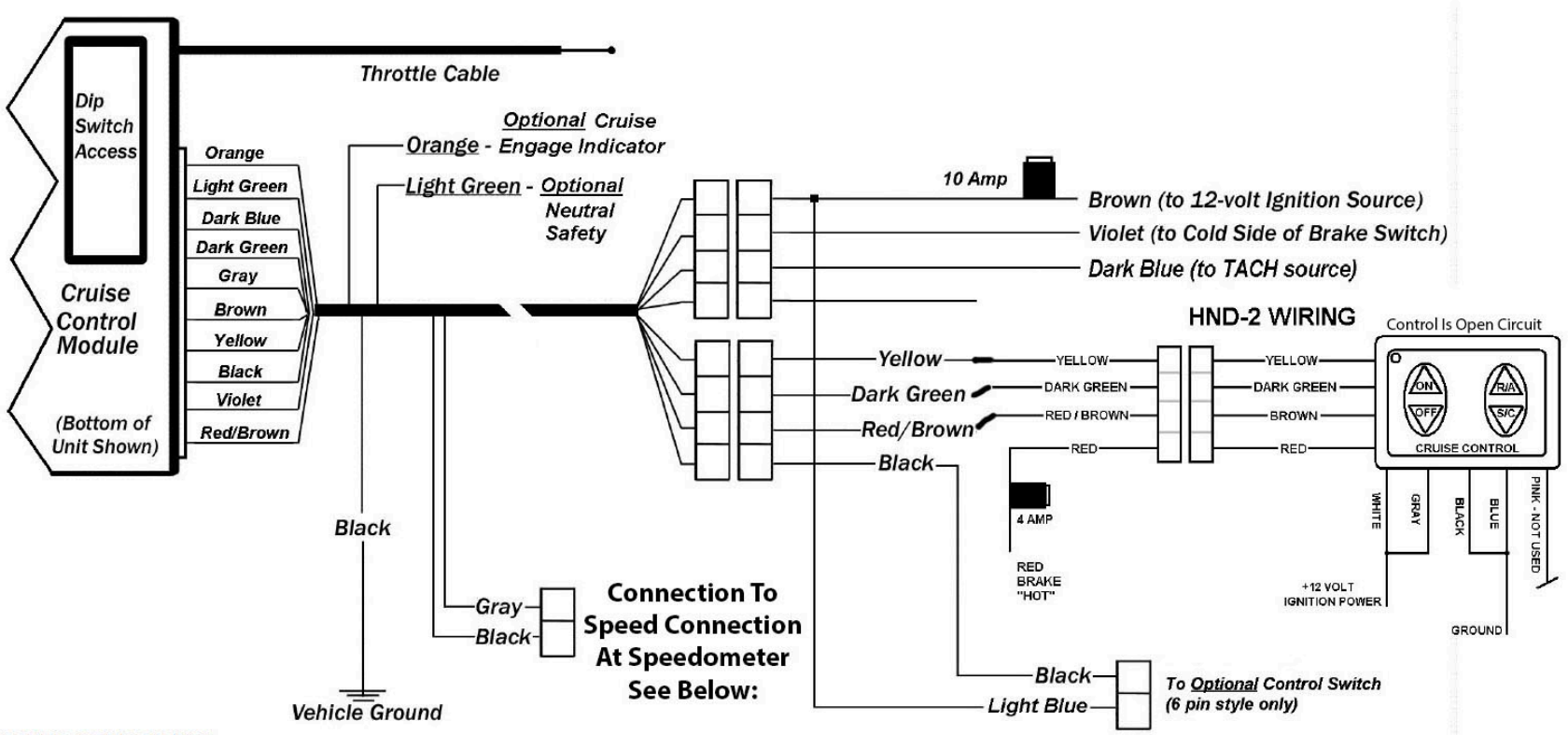
Negative coil wire works for tach input

Gray - Vehicle Speed Sensor (VSS) Wire
The Gray Vehicle Speed Signal (VSS) wire is how the Cruise Control "knows" how fast the vehicle is moving. The Pulses Per Mile/Kilometer (PPM/PPK) are a characteristic of the vehicle and must be set accordingly.

Speedometer Driven
VSS is 8000 pulses/mile

Light Green – **Optional** Neutral Safety (NSS) - *(wire is taped at beginning of harness)*
The NSS function is an optional safety feature of the Cruise Control. If a vehicle with an automatic transmission is accidentally "knocked" into neutral while the vehicle is in motion and the Cruise Control is active, the NSS wire, when connected, will disengage the Cruise Control before engine over-rev. If the NSS wire is not "hooked-up", the cruise control will function; but the Dark Blue tachometer wire must then be used. This light green wire terminates in the harness.

Orange – **Optional** Enable Output (ENO) Wire - *(wire is taped at beginning of harness)*
The ENO Function allows you to use the Cruise Control as a driver for an external L.E.D. The ENO Wire will supply a ground to an LED (the positive side of an LED has ignition power), when the system is engaged. This orange wire terminates in the harness.



SPEED CONNECTION:

When using a cable drive speedometer, the metal, 8,000 pulse per mile, speed pulse generator is placed in line with the cable. This can be done at either the transmission side or the speedometer side of the cable. The two wires from the sensor connect as follows:

Systems with black and gray wires twisted together from the sensor: **Output signal is Sine wave form**
BLACK wire to ground, GRAY wire from sensor harness to GRAY wire from cruise harness.

Set Dip Switches:

	1	2	3	4	5	6	7	8	9	10	11	12
ON	■	■			■	■	■	■	■	■		■
OFF			■	■							■	

Top diagram are the settings for my system! If cruise drops 5 mph when set change switch 1 to ON. If system has a problem keeping up speed on hills change switch 9 to ON.

SWITCH SETTINGS

The CRUISE MODULE must be programmed for the vehicle on which it is installed. The twelve (12) programming switches must be set according to the chart below in order for the Cruise Control to operate properly. Figure 1

NOTE 1: Both the VSS (Gray) and TACH (Dark Blue) wires must be connected. (The lone Gray wire will not be used if the Magnetic Sensor kit is used as it plugs direct to the "Optional Speed Sensor" plug).

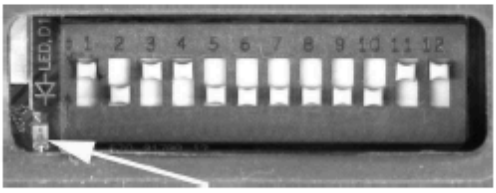
NOTE 2: If using an "Open Circuit" control switch with the Cruise Control, Switch number twelve (12) will have to be OFF. If you are unsure as to whether the control switch is "Open Circuit" or "Closed Circuit", look at the label of the packaging in which the switch came.

NOTE 3: If any of the twelve (12) switches need to be changed after installation of the Cruise Control, the control switch and the vehicle ignition must be in the OFF position; this is to allow the Cruise Control to RESET.

The twelve (12) programming switches are located under the Black Rubber Grommet on back of the CRUISE MODULE.
Figure 1 represents the twelve (12) programming switches for a vehicle characterized by:

-Switch (1 & 2) Gain Sensitivity
-Switch (3 thru 6) VSS Pulses Per Mile
-Switch (7 thru 9) Engine Cylinder Setup Timer
-Switch (10) Square/Sine Wave Input
-Switch (11) Manual/Automatic Transmission
-Switch (12) Closed/Open Circuit Control Switch

Fig.1 - ON=UP



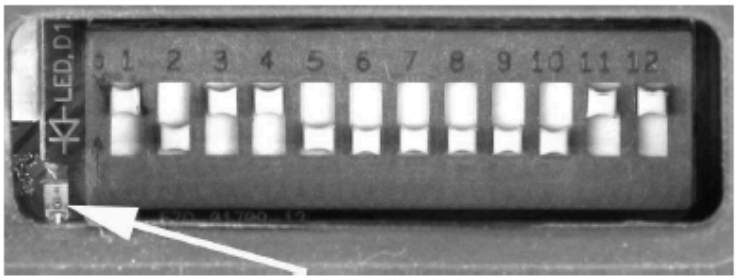
Programming Functions:

Programming Functions	1	2	3	4	5	6	7	8	9	10	11	12
Gain (Sensitivity)												
Extra Low	OFF	OFF										
Low	ON	OFF										
Mid	OFF	ON										
High	ON	ON										
Pulses/Mile (Pulses/Kilometer) see *Page 15*												
2000 (1250)			OFF	OFF	OFF	OFF						
4000 (2500)			ON	OFF	OFF	OFF						
6000 (3700)			OFF	ON	OFF	OFF						
8000 (5000)			ON	ON	OFF	OFF						
10000 (6200)			OFF	OFF	ON	OFF						
12000 (7500)			ON	OFF	ON	OFF						
18000 (11200)			OFF	ON	ON	OFF						
24000 (15000)			ON	ON	ON	OFF						
3200 (2000)			OFF	OFF	OFF	ON						
6400 (4000)			ON	OFF	OFF	ON						
9650 (6000)			OFF	ON	OFF	ON						
12870 (8000)			ON	ON	OFF	ON						
16090 (10000)			OFF	OFF	ON	ON						
19300 (12000)			ON	OFF	ON	ON						
28960 (18000)			OFF	ON	ON	ON						
38600 (24000)			ON	ON	ON	ON						
Engine/SetUp Timer												
8 Cylinder/Low							OFF	OFF	OFF			
4 Cylinder/Low							ON	OFF	OFF			
6 Cylinder/Low							OFF	ON	OFF			
6 Cylinder/Extra High							ON	ON	OFF			
8 Cylinder/High							OFF	OFF	ON			
4 Cylinder/High							ON	OFF	ON			
6 Cylinder/High							OFF	ON	ON			
4 Cylinder/Extra High							ON	ON	ON			
VSS Source see *Page 15*												
Sine Wave Input**										OFF		
Square Wave Input*										ON		
Transmission												
Manual											OFF	
Automatic											ON	
Control Switch see *Page 17*												
Open Circuit												OFF
Closed Circuit												ON

* VEHICLE'S COMPUTER (or 3 wire pulse generator)
** AUXILIARY VSS SOURCE (signal generator or magnet kit)

Test System:

SELF DIAGNOSTIC TESTING PROCEDURE
The Cruise Control is equipped with a Red Self Diagnostic Surface Mount Light Emitting Diode (LED) located underneath the rubber grommet on the CRUSE MODULE.
Utilize the following Self Diagnostic Procedure to troubleshoot your cruise control if it does not function properly once installed.



Carefully follow the procedures below to enter your cruise control into Self Diagnostic Mode.

Step 1: Turn the cruise control switch OFF.
Step 2: Turn the ignition to the OFF position.
Step 3: *Standard Control Switch (all except HND-2)*: Press and hold the RESUME/ACCEL slide switch while you turn the ignition switch to the ON position without starting the engine. Now release the RESUME/ACCEL slide switch.

HND-2 Control Switch: Turn the ignition switch to the ON position without starting the engine, hold the RESUME/ACCEL button down while you turn the cruise control switch to the ON position.

Step 4:
The Diagnostic LED should be OFF at this time. You are now in Self Diagnostic Mode. Continue to follow the procedures below to test your cruise control switch, brake switch connections and VSS signal.

Step 5:
Press and Release the SET/COAST button. The LED should light each time the button is pressed and go out when it is released. If so, continue to Step 6; if not, go to Step 5a.

a. Check steps to entering Diagnostic Mode and test again.
b. Check Programming Switch# 12. It should be ON for a Normally Closed Circuit Control Switch and OFF for a Normally Open Circuit Control Switch. If set incorrectly, reset and reenter Diagnostic Mode.
c. Check power to the CRUISE MODULE if none of the diagnostic commands are functioning.
d. Check Cruise Control Switch.

Step 6:
Press and release the RESUME/ACCEL slide switch / button. The LED should light each time the slide switch / button is pressed and go out when it is released. If so, continue to Step 7; if not, go to Step 6a.

a. Check steps to entering Diagnostic Mode and test again.
b. Check power to the CRUISE MODULE if none of the diagnostic commands are functioning.
c. Check Cruise Control Switch.

Step 7:
You will need a second person to help you perform this test. Press and release the Brake Pedal. The LED should light each time the brake is pressed and go out when it is released. If so, continue to Step 8; if not, go to Step 7a.

a. Check steps to entering Diagnostic Mode and test again.
b. Check power to the Red Brake Positive wire.
c. Check power to the CRUISE MODULE if none of the diagnostic commands are functioning.
d. Check Brake Switch Connector and wiring to brake switch.

Step 8:

A. Vehicle's own computer as VSS source: Roll the vehicle at least two (2) meters forward or backward, the LED should flash and continue to flash at the same rate. If so, continue to Step 9; if not, go to Step 8Ai.

i. Check steps to entering Diagnostic Mode and test again.
ii. Check Programming Switch# 10. It should be ON for Square Wave Input. If set incorrectly, reset and reenter Diagnostic Mode.
iii. Some vehicles need to be pushed more than two (2) meters. In that case, raise one (1) of the vehicle drive wheels (both drive wheels on a limited slip differential) and block the non drive wheels. Use a support stand for safety. Spin the drive wheel by hand as fast as possible. The LED should flash and continue to flash at the same rate. If so, continue to Step 9; if not, go to Step 8Aiv.
iv. Either your VSS wire is incorrect or your connection is bad. Inspect your VSS connection and reenter Self Diagnostic Mode.

B. Auxiliary Speed Sensor ([SIGNAL GENERATOR or MAGNET & COIL PICK-UP KIT (KIT# 250-4165)] Raise one (1) of the vehicle drive wheels (both drive wheels on a limited slip differential) and block the non drive wheels. Use a support stand for safety. Spin the drive wheel by hand as fast as possible (You must spin the wheel at least 4.8 KPH (3 MPH) or faster in order to test an auxiliary speed signal.) The LED should flash and continue to flash at the same rate. If so, continue to Step 9; if not, go to Step 8Bi.

i. Check steps to entering Diagnostic Mode and test again.

ii. Check Programming Switch# 10. It should be OFF for Sine Wave Input. If set incorrectly, reset and reenter Diagnostic Mode.

Step 9:
Your Cruise Control 2 has successfully passed the Self Diagnostic Testing Procedure. If it still does not function, test your TACH signal.

X. TACH SIGNAL TESTING PROCEDURE

Step 1: Turn the cruise control switch OFF.
Step 2: Turn the ignition to the OFF position.
Step 3: *Standard Control Switch (all except HND-2)*: Press and hold the RESUME/ACCEL button while you turn the ignition switch to the ON position and start the engine. Now release the the RESUME/ACCEL slide switch.

HND-2 Control Switch: Turn the ignition switch to the ON position and start the engine, hold the RESUME/ACCEL button down while you turn the cruise control switch to the ON position.

Step 4: The Diagnostic LED should be flashing. Rev the engine, the LED should flash faster at higher RPM's. If so, your TACH signal is valid, if not, go to Step 4a.

a. Check steps to entering Diagnostic Mode and test again.
b. Either your TACH wire is incorrect or your connection is bad. Inspect your TACH connection and reenter Self Diagnostic Mode.

XI. CONTROL SWITCH TESTING PROCEDURE

Utilize the following continuity charts to test your control switch if you suspect that it is not functioning properly. You need to unplug the 10-pin connector from the CRUISE MODULE to perform these tests.

1. Ground the test light lead and verify that the light works by probing a known power source.
2. Follow the test charts below using the appropriate chart for your control switch.

Standard Control Switch (all except HND-2)

Ignition Switch Position	Control Switch Position	Red Wire	Dark Green Wire	Yellow Wire	Brown Wire
Off	Off	+12 V	O V	O V	O V
Off	On	+12 V	+12 V	O V	+12 V
Off	**On** Press & Hold **Set/Coast**	+12 V	O V	+12 V	+12 V
Off	**On** Press & Hold **Resume/Accel**	+12 V	+12 V	+12 V	+12 V

HND-2 Control Switch

Ignition Switch Position	Control Switch Position	Red Wire	Dark Green Wire	Yellow Wire	Brown Wire
Off	Off	+12 V	O V	O V	O V
On	On, (amber LED on)	+12 V	O V	O V	+12 V
On	**On** Press & Hold **Set/Coast**	+12 V	+12 V	O V	+12 V
On	**On** Press & Hold **Resume/Accel**	+12 V	O V	+12 V	+12 V

System uses HND-2 surface mounted Control Switch

We Used Lokar Braided Cable for Control LOK-1601:

Braided Cable for Cruise Control Kits *LOK-1601*

Control For Cruise Mounted on Console: