



16-R Cruise Control Owner's/Installation Manual



**ROSTRA
PRECISION
CONTROLS INC.**

2519 Dana Drive
Laurinburg, NC 28352

FORM 2481
1/99
Rev. C

This Manual, Your Kit and You

This kit was designed for most U.S. specification cars, light trucks, and vans. Vehicles with diesel engines must have these items in order for the Cruise Control to work properly:

1. A vacuum pump.
2. A vacuum regulator. (250-4115)

DO NOT INSTALL THIS SYSTEM ON A DIESEL POWERED VEHICLE WHICH HAS A MANUAL TRANSMISSION WITHOUT A DISENGAGEMENT SWITCH ON THE CLUTH PEDAL ASSEMBLY (250-4206)

Low displacement engines with limited vacuum will get better performance if a vacuum reservoir is installed. Vacuum reservoirs, pumps, regulators and other accessories are available from your dealer, automotive service center, or most automotive parts outlet.

All through the instructions there are WARNINGS, CAUTIONS, AND NOTES which are meant to make it easier for you to put the Cruise Control on your car and safer to use it. We have gathered these tips from people across the country who have told us about their problems and how they worked around them.

Even with all these reports from the field, we cannot cover every condition which you might encounter. There are just too many different car makes and models. We do our best to tell you how to handle most vehicles, but we must Depend On Your Good Judgement for Dealing with the rest.

Therefore, we believe you can understand why we strongly urge you to think carefully about what could happen to you, your passengers, and your car if you use any tools, parts, fastening methods, routing or procedures which are not described in this manual.

There is no drain on the battery if the control switch is left on. The Cruise Control needs no regular service.

WARNING:

Failure to follow the instruction manual could not only cause the Cruise Control to work improperly, but could cause the Cruise Control not to function correctly, possibly causing damage to your vehicle and/or injury or death to both to you and your passengers.

WARNING:

If you question the applications of the Cruise Control, please consult the applicable application guide. Only install on approved applications.



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ROSTRA PRECISION CONTROLS, INC 1992

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Installer/Owner - Please Read

Since diesel engines do not have ignition systems there is nothing to stop those engines from going to wide open throttle when the clutch is pressed, so an Independent Disengagement Switch is required for these applications. If you have diesel engine and an automatic transmission and you accidentally shift into neutral while controlling speed, immediately tap the brake pedal.

Operating Instructions

If system has not been road tested, it may not perform as described below. ROAD TEST starts on page 22.

NOTE: Do Not use speed control on slippery, wet roads, or in heavy traffic.

As in previous systems, the ACCEL feature will not work until you have a set speed. Each time you turn the ignition switch off or slide the Control Switch button to OFF, you de-energize the system. To re-energize it, you must move the button to ON and wait 3 seconds, if you are driving above the low speed setting, you can "set" a control speed setting, then the RESUME/ACCEL button will function. Disengaging the system with the brake clutch pedal does not require a 3 second wait, and the ACCEL and RESUME features remain operational.

In the regulator box of your Cruise control is a safety switch which will not let the system be engaged for automatic speed control until your vehicle is moving at a speed greater than about 30 mph. This is to keep your engine from accelerating if someone should accidentally press the button to RESUME/ACCEL while the vehicle is standing or moving in stop-and-go traffic.

At the factory the "low speed switch" is set between 27 and 33 mph for most vehicles using 2,000 4,000 and 8,000 pulse per mile signal. It should be checked during the ROAD TEST. The regulator for vehicles using a Magnet & Pick-Up Coil or a Signal Generator must be re-adjusted, see Road Test, page 22.

The Control Switch is used to operate all of the system's features described in the following paragraphs.

OFF-ON: The first time you use the Cruise Control, you should do so on a fairly straight paved road which is free of heavy traffic. Move the slide button to the ON position. Nothing will happen, this is to make the system ready to use.

SET SPEED: To engage the system or "set speed", drive at any speed above 35 mph, press the SET/COAST button and release it. Remove your foot from the accelerator and your speed will remain constant within plus or minus 1 1/2 mph, or within the capability of your engine. Your "SET SPEED" is now in the regulator's memory.

You can increase speed at any time with the accelerator pedal. When you release the pedal, you will return to your set speed.

ACCELERATION: You can also increase your speed by pressing and holding the button to RESUME/ACCEL. Your vehicle will accelerate until you release the button, at which time a new set speed is now in the regulator's memory.

COAST: When you want to reduce your set speed, press and

hold the SET/COAST button. This erases the old set speed, disengages the Cruise Control, and allows the vehicle to coast. Just before it reaches the speed you want, release the button and you will give the regulator a new speed at which to control, providing it is above your low speed setting.

RESUME: When disengaging the Cruise Control, you can return to your set speed by manually driving to a speed above 32 mph, pressing the RESUME/ACCEL button, then releasing it. Your vehicle will accelerate to the last set speed in the regulators memory, and control there.

If while you were stopped, you moved the slide button to OFF or turned the ignition off, the Resume feature will not function, because the set speed has been erased from the regulator's memory.

DISENGAGEMENT - You may disengage from automatic speed regulation in four ways:

1. Depress the brake pedal.
2. Push the slide switch to OFF. This clears the memory of the electronic system.
3. Turn off the ignition switch. Use this method only in an emergency.
4. Shift the Automatic Transmission to the Neutral position, or depress the clutch pedal. (Gasoline powered vehicles only.) This system has engine over-rev circuitry to protect your vehicles engine during automatic operation from over speeding. If you have a manual transmission you will find that when you depress your clutch before you press the brake pedal, your engine will start to race for an instant before the over speed circuit disengages the cruise control system. If this bothers you, it can be avoided by depressing the brake pedal first.

If you have an automatic transmission and, while using your Cruise Control you put the shift lever in neutral or press the accelerator pedal into kickdown position, the over-rev circuit will detect engine speed up and disengage the system. When ready to continue automatic control, simply press the slide button to RESUME/ACCEL and release it.

IMPORTANT - Diesel engines do not have ignition systems, so the engine over -rev circuit cannot be utilized. If you have a diesel powered vehicle and accidentally shift into neutral or depress the clutch pedal while controlling speed, your

engine will go to wide open throttle until you either tap the brake, slide the control switch to OFF or turn off the ignition.

UNUSUAL CONDITIONS - When the regulator is adjusted correctly, your selected speed should be held within + or - 1 1/2 mph. This control span will widen as you drive at higher altitudes. *Engine condition or a leak in the vacuum system can also impair the Cruise Control's performance because engine vacuum is its muscle to open the throttle when more speed is called for.

Any throttle opening lowers the vacuum to some degree. A wide open throttle can drop the vacuum almost to zero. When

pulling an extra heavy load, * climbing a very steep hill, or bucking a severe head wind, a much wider than normal throttle opening is called for, but this drops the vacuum so low that the servo is deprived of the strength it needs to hold speed.

The way to handle these once-in-awhile problems is to bring the vehicle up to speed with the accelerator pedal, then let the Cruise Control take over again.

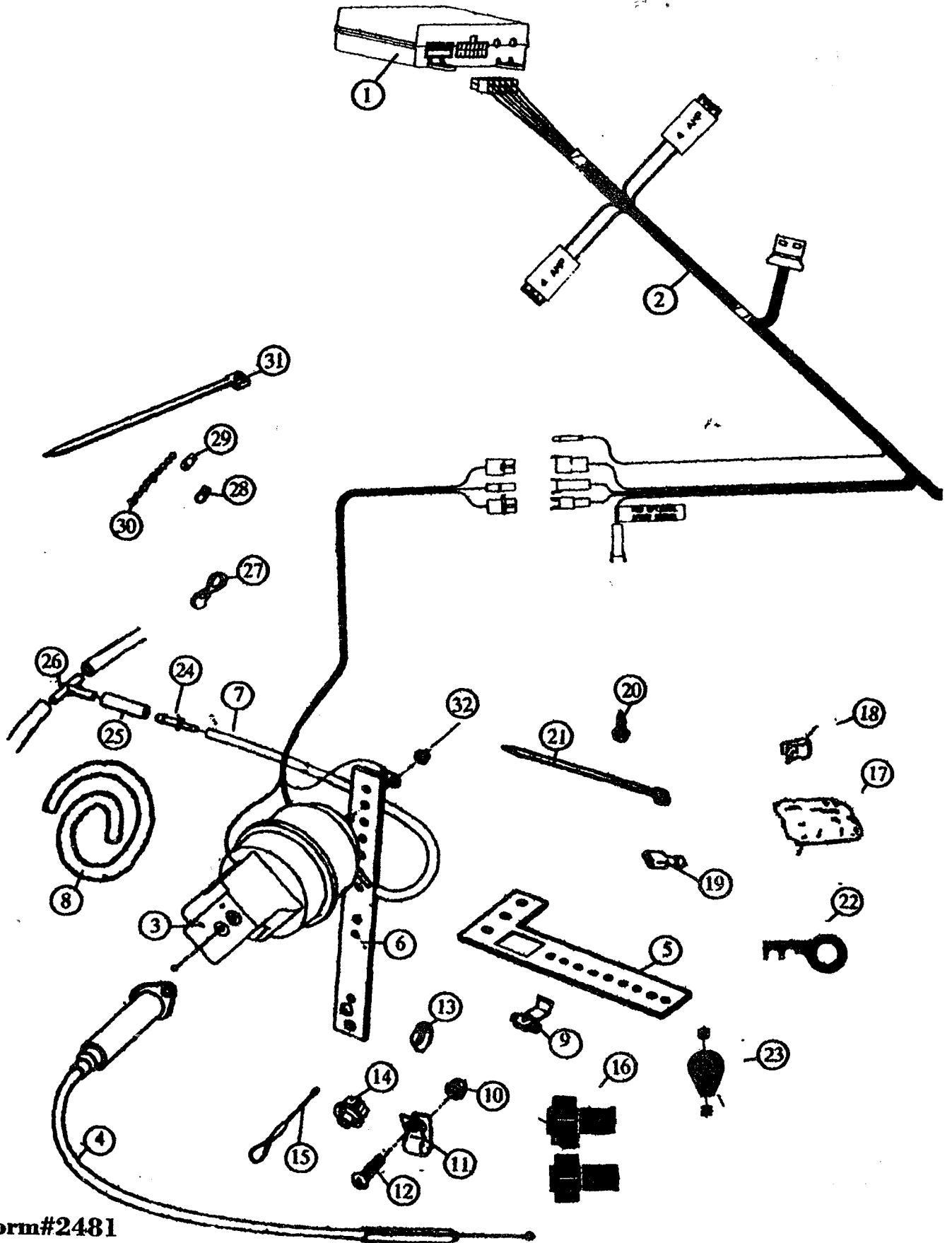
Use your Cruise Control carefully until you become as familiar with it as your are with your accelerator or your brake.

* Suggest a Vacuum Reservoir Package 250-3417.

Parts Listing

①	250-3558	Electronic Regulator	⑩⑥	* *	Con. self strip 18-22 awg (2)
②	250-3559	Wiring Harness	⑩⑦	* *	Putty Sealing
③	250-3508	Servo	⑩⑧	* *	Threaded Tub Clamp
④	250-3085	Cable Assembly - Servo	⑩⑨	* *	Terminal 1/4" Female
⑤	250-3086	Bracket-Servo Cable - #199	⑩⑩	* *	Screws, 1/4-14 x 3/4" (4)
⑥	250-3014	Bracket-Servo	⑩⑪	* *	Tie Strap 4"
⑦	250-3016	Hose-Vacuum Hose 5/32" x 48" Long	⑩⑫	* *	2 -Bead Connector
⑧	250-3425	Convolutud Tubing	⑩⑬	* *	Adp. Thr. clip w/cable
⑨	* *	Connector selfstrip 14-18(2)	⑩⑭	* *	Reducer - Vacuum Hose -1/4"-3/16"
⑩	* *	Nut & Washer Assembly - #10-32 Hex & Ext. Tooth (3)	⑩⑮	* *	Hose - Vacuum 7/32" x1 3/8" long
⑪	* *	Clamp-Tube Type 1/4" 5/16", 3/8"	⑩⑯	* *	Tees - Vacuum Hose 3/16-3/16-3/16 - 1/4-1/4-1/4 5/16-5/16-1/4
⑫	* *	Screw, #10-32 x 1/2" Rd. Hd. (3)	⑩⑰	* *	Coupling - Bead Chain Eyelet Type
⑬	* *	Throttle Retaining Clip - GM	⑩⑱	* *	Cover - Bead Chain connector(3)
⑭	* *	Threaded Snap in Adapter	⑩⑲	* *	Connector - Bead Chain (3)
⑮	250-3089 or ** (10 Pack)	Hook-up Cable (looped)	⑩⑳	* *	Bead-Chain
** Order Small Parts Package 250 - 2213			⑩㉑	* *	Tie Straps 7" (10)
Servo Extension Harness use 250-3531			⑩㉒	* *	1/4 x 20 Nut & Washer (3)
Vacuum Reservoir use 250-3417					
Vacuum Regulator use 250-4115					
Disengage Switch Use 250-4206					

Parts Identification 16-R



Installation Instructions

1. Tools Needed

Most of these tools will be needed to put the Cruise Control on your vehicle.

- | | |
|------------------------------------------------------------------------|---------------------------------------------------------------------------|
| A. Car jack and jack stands or ramps. | G. Center Punch. |
| B. A set of wrenches. | H. Electric Drill. |
| C. Screwdrivers - 1 medium and 1 small blade,
1 small cross-recess. | I. Drill bits - 3/16" and 1/4" |
| D. Pliers - plain and side-cutter | J. 1" hole saw, or 1" chassis punch, or a half-round
or rat-tail file. |
| E. Bench Vise. | K. Knife. |
| F. Hammer. | L. Digital volt/OHM meter |

2. Switch Settings - Setting the Ten (10) programming switches on the 16-R System

The cruise control module must be programmed for the vehicle on which it is installed. The TEN (10) programming switches let the microprocessor know SEVEN (7) very important things about the vehicle, including the installation and the control preferences. Follow the chart below to program the control module.

SEVEN PROGRAMMING FUNCTIONS	PROGRAMMING SWITCHES									
	1	2	3	4	5	6	7	8	9	10
A. ACCELERATION RATE: (NORMAL) SLOW----- FAST-----	OFF ON									
B. GAIN CONTROL: LOW----- (NORMAL) HIGH-----		ON OFF								
*C. VSS SOURCE: AC GENERATOR OR MAGNETS----- ECM-----				OFF ON						
D. PULSES PER MILE (VSS) 8000 or 8 POLE GENERATOR----- 4000----- 2000 or MAGNETS----- (NOTE 1)			ON OFF OFF		OFF OFF ON					
E. ENGINE: 3 OR 4 CYLINDER----- 5 OR 6 CYLINDER----- 8 CYLINDER-----						OFF OFF ON	OFF ON OFF			
F. TRANSMISSION: MANUAL----- AUTOMATIC-----								ON OFF		
G. CONTROL SWITCH CLOSED CIRCUIT----- (GM OE SWITCHES ONLY) OPEN CIRCUIT-----									ON OFF	OFF ON

NOTE 1: Magnets and pick-up coil require "LOW SPEED LSS" to be adjusted with "LOW SPEED LSS" potentiometer on module during road test. (27 mph suggested)

*NOTE: Ford Vehicles with a Differential Speed Sensor, turn No. 4 switch Off and DO NOT USE 250-4213 (Ford Intermediate Harness).

3. Servo Mounting

A. Attach cable to servo by following four steps in drawing

B. Servo cable pulls on the carburetor lever or pulley segment (air throttle valve on diesel or fuel injected engines) just like the existing throttle cable; therefore, it should be routed alongside the throttle cable - it may even be attached to the throttle cable later. Hold servo cable in this position so ball on end of cable is about 2 to 3 inches from end of existing throttle cable.

C. Now swing servo around to any open area large enough to hold it. It should be located where it will not interfere with oil checks and other engine services. Shock tower or fender inner panel are usually good locations. Drawing on page 9 shows various ways to mount servo and route cable. Left side of engine compartment is shown, but right side is just as good, however, wire length should be considered. Heavy

strap bracket can be bent, twisted and shortened. Top left diagram shows servo mounted with stud through side panel so bracket is not used.

D. Cable should be routed without any bends smaller than a 3" radius. It should clear all sharp, hot, or moving objects. If cable is too long because servo is mounted close to carburetor, cable can be routed in a 360 degree loop (6" dia. min.) and still function properly. (see upper right hand diagram on page 9)

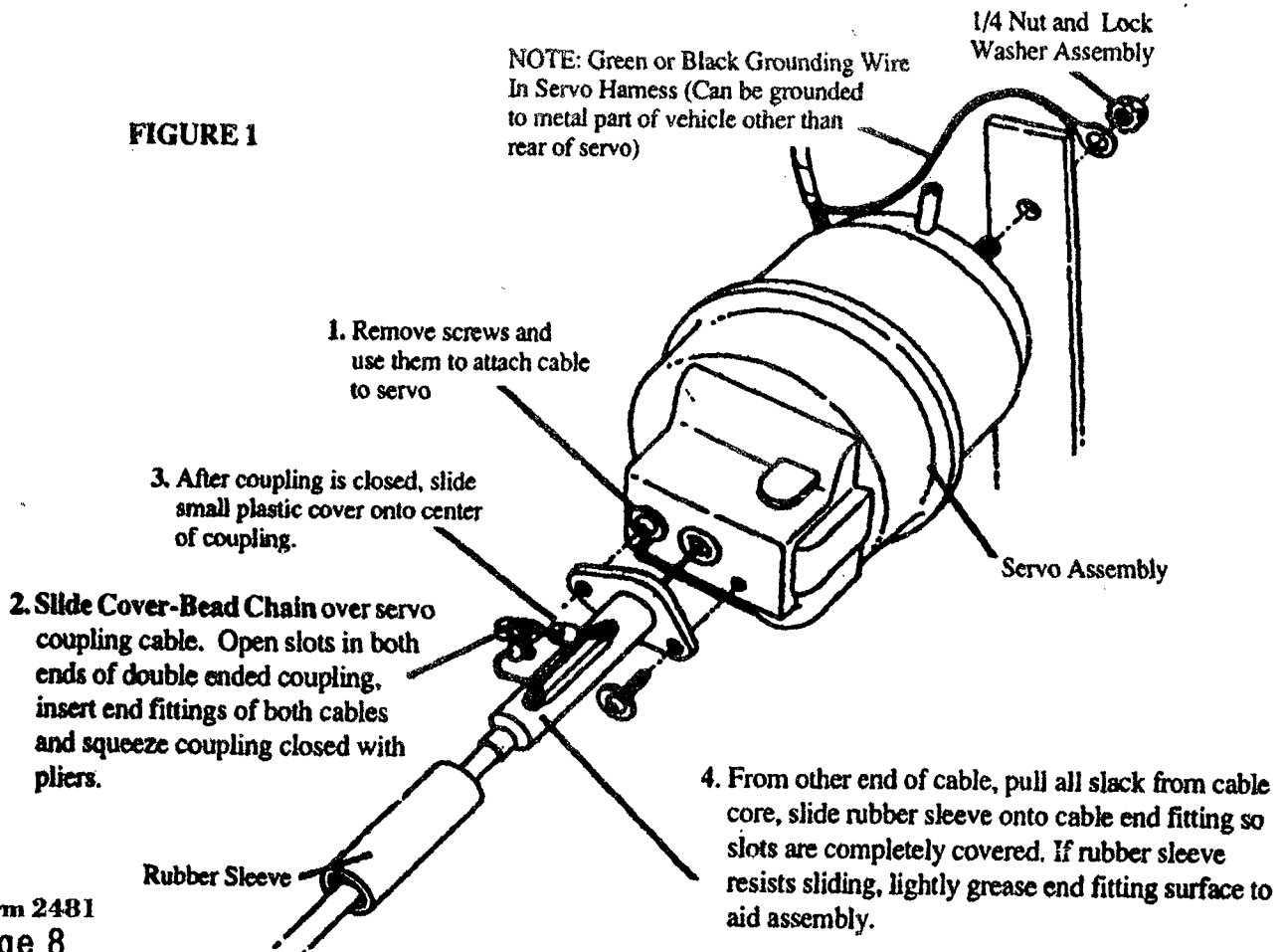
E. If shock tower stud is to be used, remove existing nut and install bracket, then replace nut. If servo will be mounted on a body panel, use bracket as template to mark selected spot for two 3/16" holes. Attach bracket with 1/4" tapping screws.

F. Put servo stud through proper hole in bracket, put eyelet terminal of servo's grounding wire over stud, turn servo so vacuum fitting is in direction for best hose routing, then secure servo tight with 1/4-20 nut and lockwasher assembly.

NOTE

Operation, servo makes a chattering sound which may be heard in the driver's compartment if servo is mounted on Bulkhead.

FIGURE 1



These drawings show various servo mounting and cable routings on left side of engine compartment

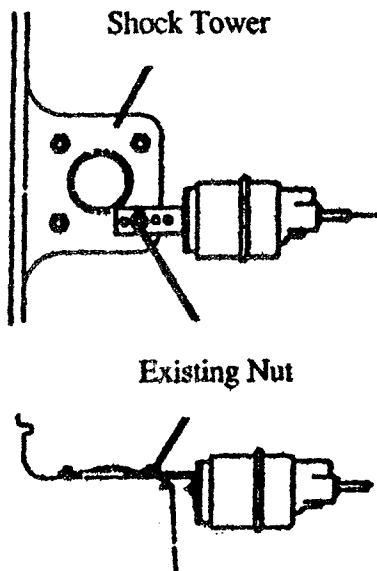
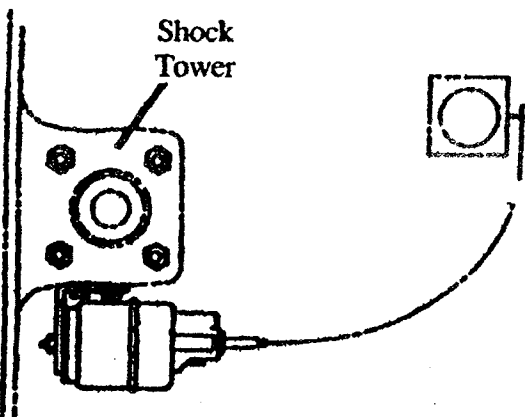
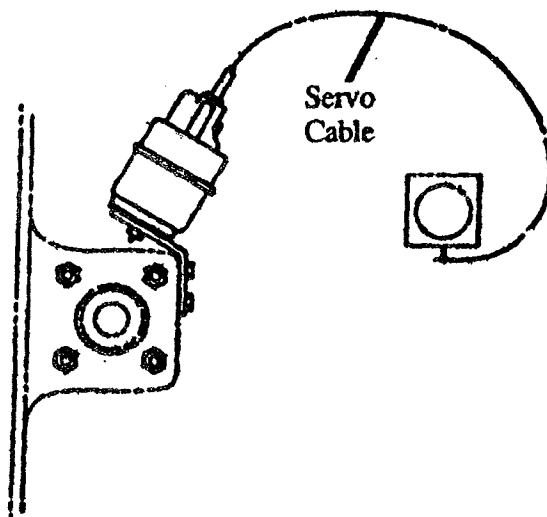
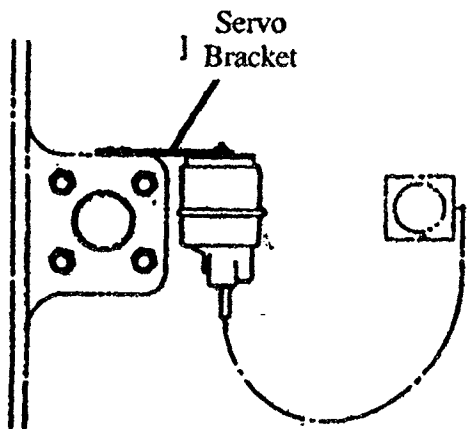
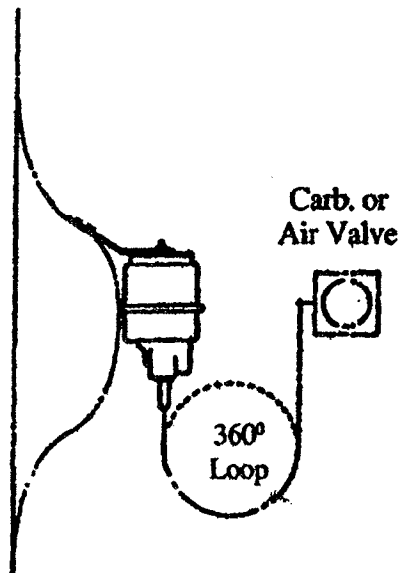
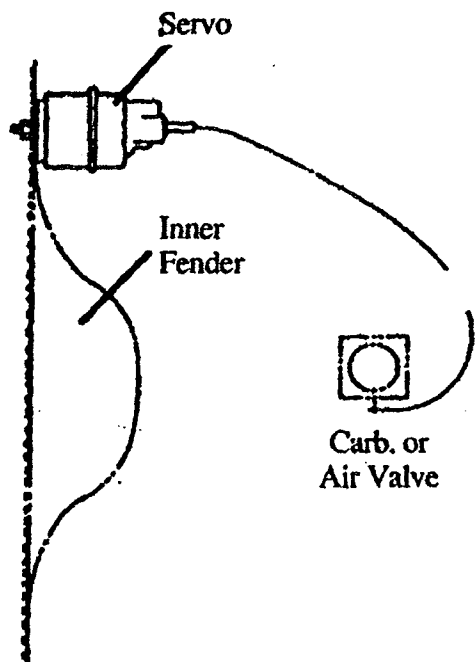
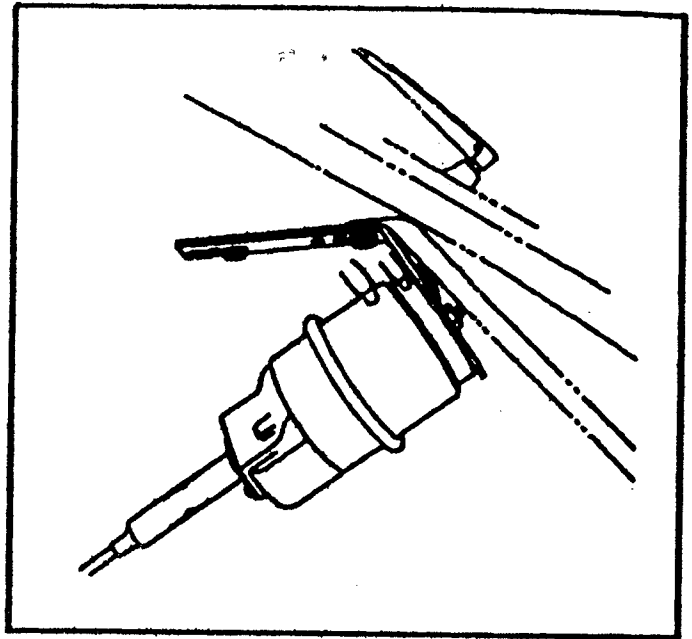


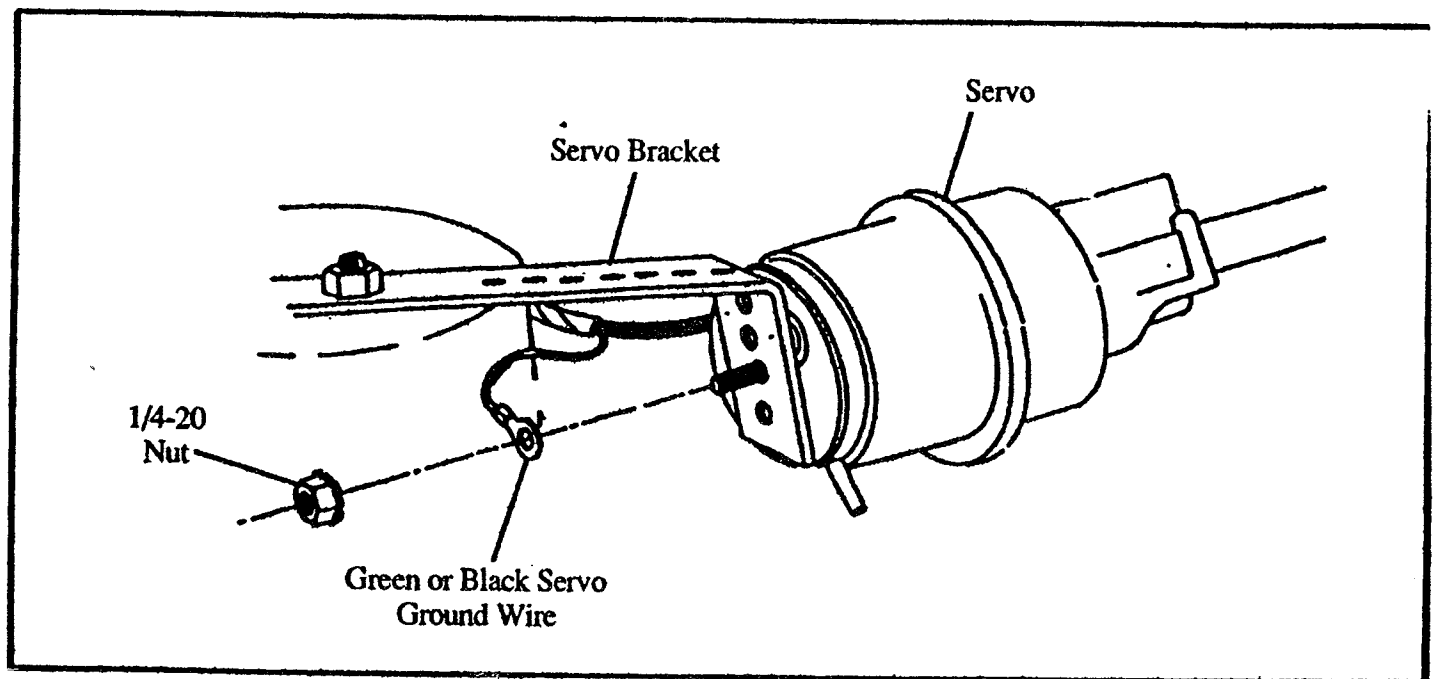
Figure 2

Servo Mounting - Continued

NOTE: For Dodge and Plymouth Vans; bend bracket for best cable routing as shown. Use existing radiator brace bolt for securing bracket at bend. Drill $3/16$ " hole and use $1/4$ " tapping screw to fasten end.



CAUTION: SERVO MUST BE GROUNDED!
If panel selected is fiberglass or other non-conducting surface, green or black wire must be grounded to metal part of vehicle.



NOTE: Ground Wire can be connected to metal part of vehicle.

4. Allowing For Lost Motion in Throttle Attachment

You must allow at least three (3) free beads, of Bead Chain between the throttle connection place and the end of the Cruise Control Module cable for lost motion. See Figure 6. This will keep the Cruise Control Module cable from bending and/or damage when not in use.

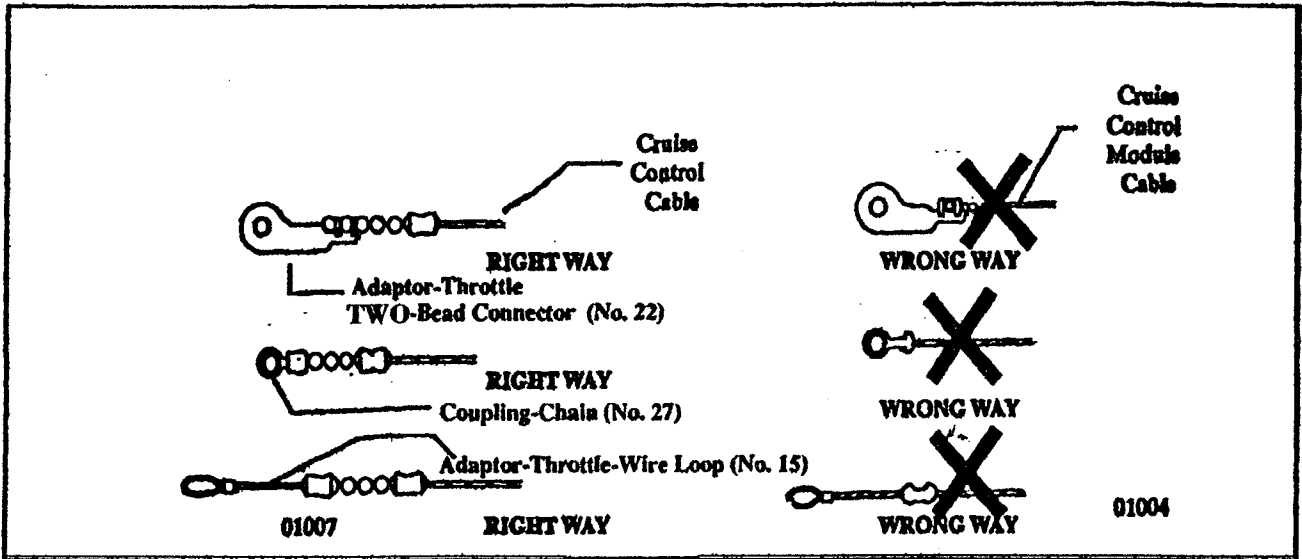


Figure 6

CAUTION: When using the Connector Bead Chain to connect the Bead Chain to the Cruise Control Module cable you must always use the Cover-Bead Chain Connector. The Cover-Bead Chain Connector must also be used when using the Coupling-Chain. See Figure 7. Failure to use the Cover-Bead Chain Connector could possibly cause the Bead Chain or the Cruise Control Module cable to hang in the Connector-bead Chain causing the throttle to be held in partially open position. This condition could occur when the Cruise Control is not being used.

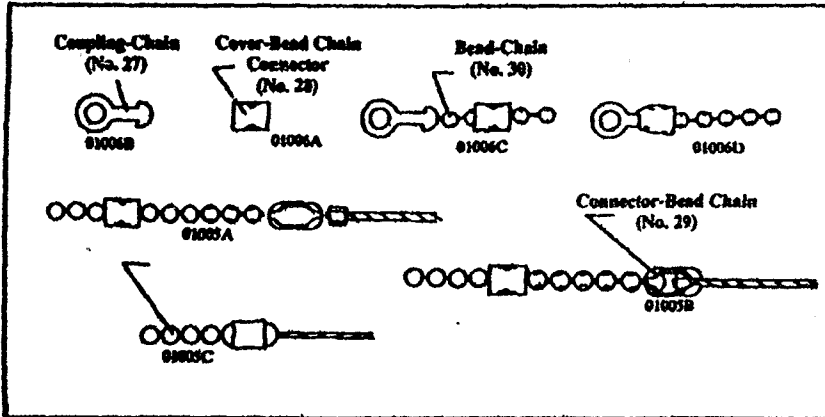


Figure 7

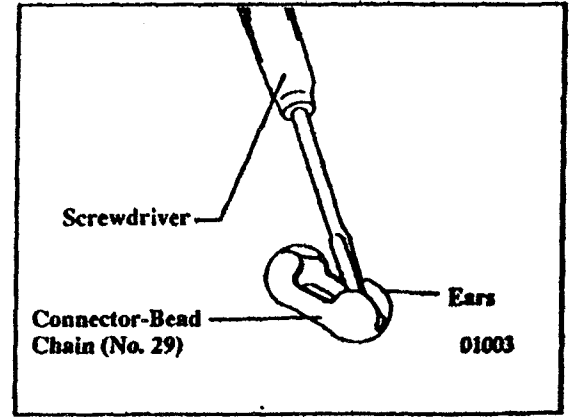


Figure 8

NOTE: Gently open the ends of the Connector-Bead chain to allow Bead Chain and Cruise Control Module cable to be inserted. Secure in place with pliers by bending ears back to the closed position.

WARNING:

Failure to follow the instruction manual could not only cause the Cruise Control to work improperly, but could cause the throttle to hang up, possibly causing damage to your vehicle and injury and or death to you and your passengers.

5. Attaching Cruise Control Module Cable To Throttle

This section will cover the proper ways to use the hardware available. After each section, there will be sample illustrations showing how the connector is used in an actual installation. It must be noted however, that you should have an understanding of how each attachment method works so that a proper installation is achieved.

There are 5 basic ways of making the attachment to the throttle:

- A. Adaptor-Throttle-TWO Bead Connector
- B. Connector-Bead Chain and Clamp-Tube
- C. Pedal Attachment
- D. Throttle Clip with Cable
- E. Adaptor-Throttle-Wire Loop
- F. Adaptor-Throttle-Wire w/ T-Bar(250-4184)

A. Adaptor-Throttle-Three Bead Connector (No. 22)

Whenever a pin (fixed or removable) is used as the attaching point for connecting the throttle cable to the throttle lever, the Adaptor-Throttle-TWO Bead Connector can be used. Most GM & Chrysler applications can use this method. Attach Bead Chain to the Adaptor-Throttle-TWO Bead Connector and secure beads by folding the 2 metal tabs. Remove clip or pin which retains throttle cable (and washer if provided) and install TWO Bead Connector on the same side of throttle cable as the Cruise Control cable will be attached.(this is necessary so that Cruise Control cable and throttle cable will not cross). The Adaptor-Throttle-TWO Bead Connector may need to be bent so that it clears the throttle cable. (See Figure 10).Also, Tie Strap-Nylon 4" can be used to hold the Adaptor-Throttle-TWO Bead Connector to the sleeve of, the throttle cable.

When the distance between the pin and the Cruise Control Module cable mounting is close, the Adaptor-Throttle-TWO Bead Connector can be shortened by using a double fold in connector. (See Figure 11).

When Adaptor-Throttle-TWO Bead Connector is properly used, the following parts will be used:
(See Figure 12).

- Adaptor-Throttle-TWO Bead Connector
- Bead Chain at least 3 exposed beads for lost motion.
- Connector-Bead Chain
- Cover-Bead Chain Connector

For some applications, it may be necessary to enlarge the hole in the Adaptor-Throttle-TWO Bead Connector so that it will fit over the pin on throttle lever.

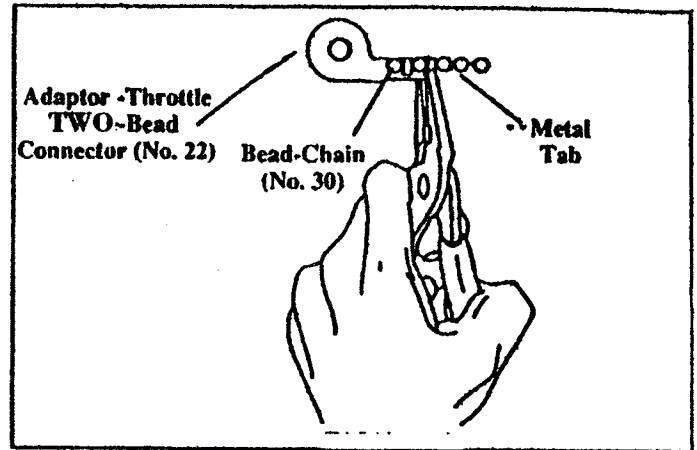


Figure 9

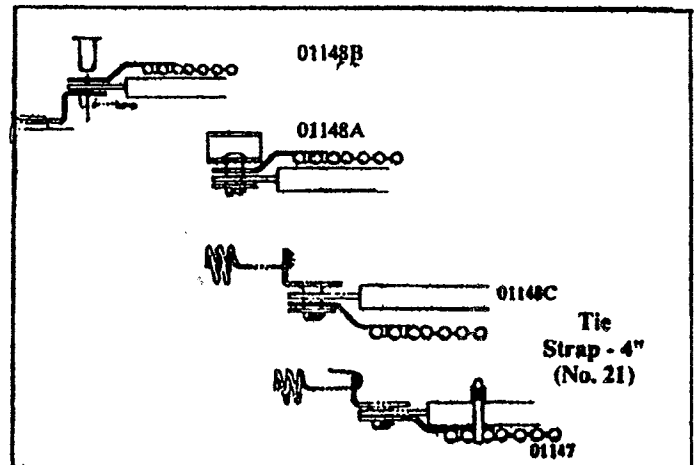


Figure 10

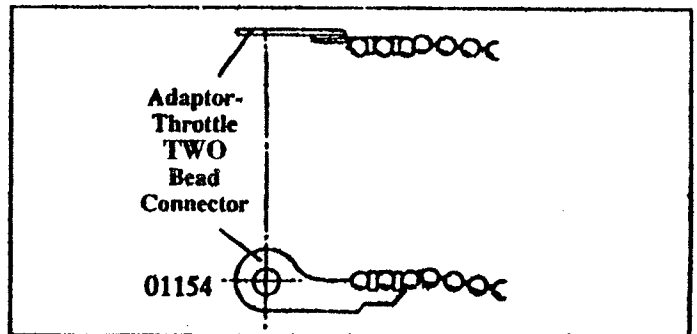


Figure 11

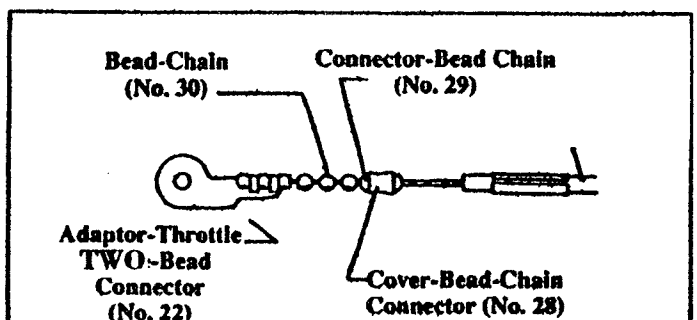


Figure 12

Sample illustrations of Adaptor-Throttle- Two Bead Connector installation.

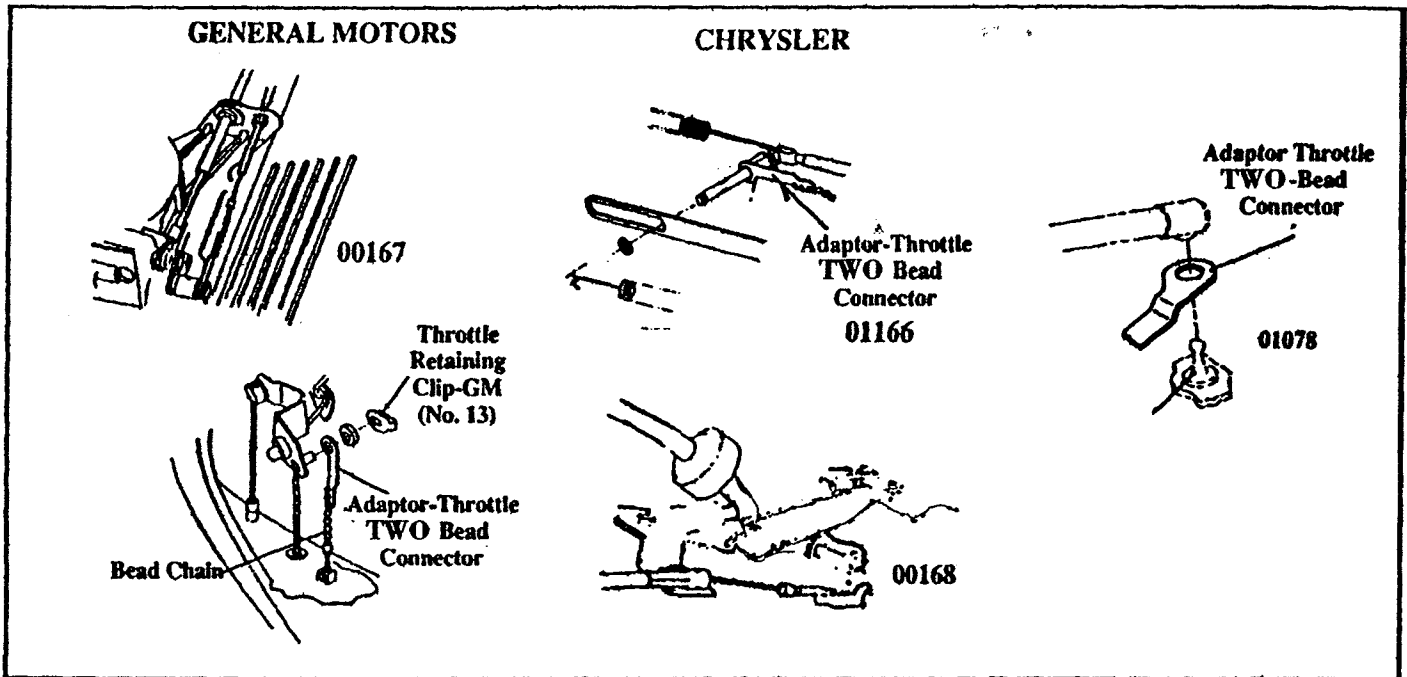


Figure 13

B. Coupling-Chain (No. 27) and Clamp Tube (No. 11)

When you have a throttle cable, and the Adaptor-Throttle TWO-Bead Connector cannot be used, use the Coupling-Chain and a Clamp-Tube Figure 14.

Select a Clamp-Tube that fits the throttle cable. Make sure the tabs of the Clamp-Tube point away from the carburetor or air throttle, this will prevent the throttle from hanging. Put Screw #10-32 Round Head through the holes in the Clamp-Tube. Attach Bead Chain to the Connector-Bead Chain.

NOTE: Use the Cover-Bead Chain Connector No. 28. Slide the Coupling-Chain over the Screw #10-32 Round Head and tighten with Nut & Lockwasher Ass'y #10-32. See Figure 14.

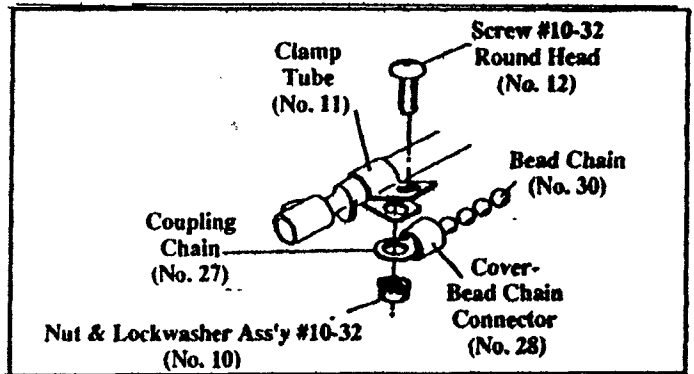


Figure 14

C. Pedal Attachment

When the accelerator pedal is used as an attachment point. The Coupling-Chain and Clamp-Tube can be used. See Figure 16.

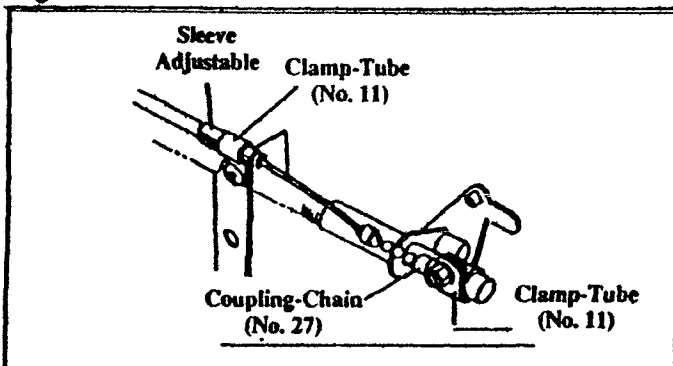


Figure 15

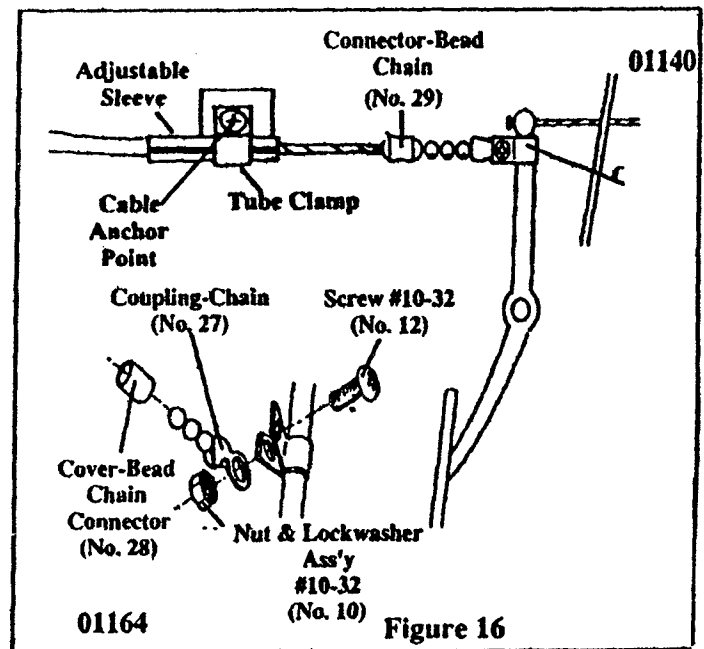


Figure 16

C. GM, Ford, and Chrysler Throttle
Using THROTTLE CLIP WITH CABLE

1. Some GM, Ford, and Chrysler vehicles have an attachment stud on the throttle pulley.
2. Slide a Bead Chain Connector Cover over the cruise cable, then attach the Bead Chain Connector to the cable. Attach the Throttle Clip with Cable to the Bead Chain Connector. And slide the Connector Cover over the Bead Chain Connector. (Figure 17A)
3. Slide the Throttle Clip over the throttle pulley attachment stud. Push Throttle Clip onto the stud until it snaps firmly onto the stud.

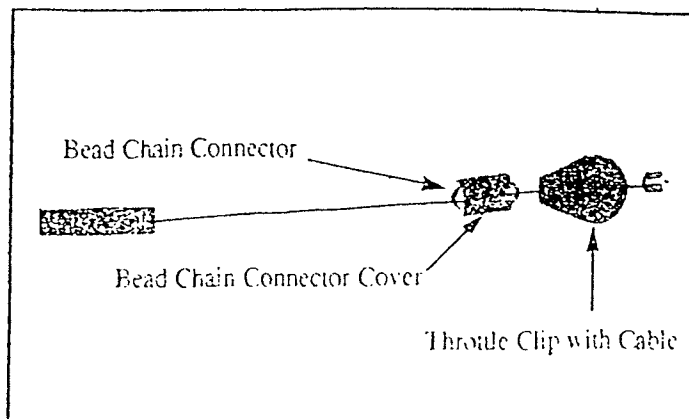


FIGURE 17A

D. Adaptor-Throttle-Wire Loop (No. 15)

On some vehicles it may be necessary to remove the air cleaner so the throttle pulley segment is showing. Then set the pulley segment in an "open" throttle position, and remove the throttle cable from the pulley. Hold the loop end of the Adaptor-Throttle-Wire Loop between the holes in each side of the pulley. Slide the barrel at the end of the throttle cable through the slotted hole, then through the Adaptor-Throttle-Wire Loop and into the second hole. See Figure 17B

Connect the Adaptor-Throttle-Wire Loop to the Bead Chain using the Connector-Bead Chain. Cut the desired amount of Bead Chain and connect to the Cruise Control Module cable. Always use the Cover-Bead Chain Connector as shown in Figure 17 B

To secure the Adaptor-Throttle-Wire Loop to the throttle cable, punch a small hole in the Cover-Bead Chain Connector and slide the Tie Strap-Nylon -4" through the hole and secure to the existing throttle cable as shown in Figure 18.

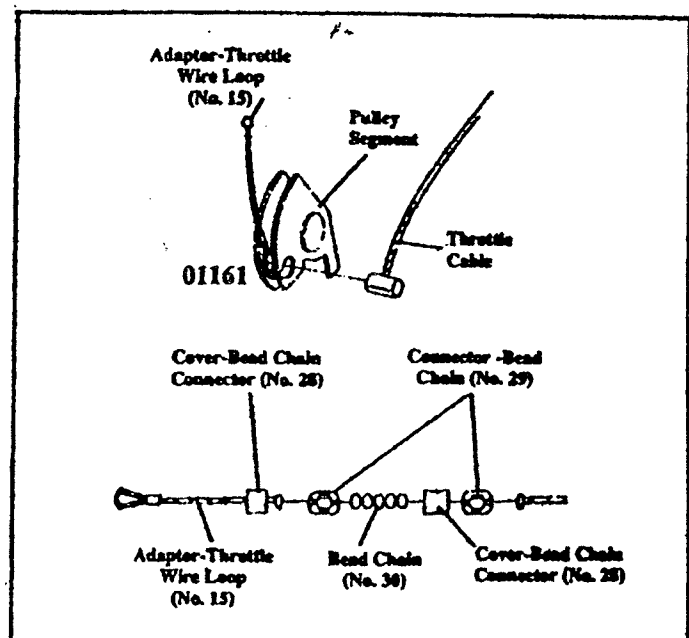


Figure 17B

WARNING:

If the Adaptor-Throttle-Wire Loop (No. 15) is not secured to the existing throttle cable it could come out of the pulley segment, possibly causing the throttle to be held in a partially open position.

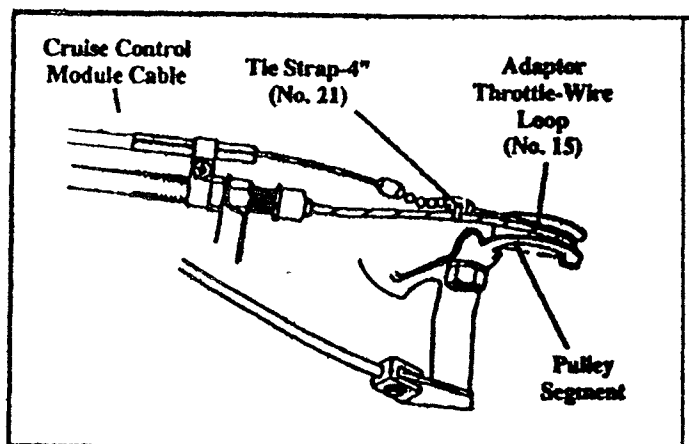


Figure 18

E. Adaptor-Throttle-Wire with T-Bar (250-4184)

Remove air cleaner to expose the dual pulley segments. Find the blank anchor that is located above the throttle anchor. This anchor is hollow except at one end. Use a 1/4" bit an drill as shown in Figure 19.

Place the Nut & Lockwasher Ass'y 1/4"-20 on the Cruise Control Module cable. Using a 7/16" box end wrench turn clockwise as shown in Figure 20.

Continue to turn clockwise until the formed threads are between 1-3/8" to 1-1/2" as shown in Figure 21.

Insert the Cruise Control Module cable through the blank anchor and thread the other Nut & Lockwasher Ass'y 1/4"-20 in place and attach the Connector-Bead Chain to the Cruise Control Module cable as shown in Figure 22

Attach the Adaptor-Throttle-Wire w/Barrel to the top pulley segment. Slide the Cover-Bead Chain Connector onto the Adaptor-Throttle-Wire w/Barrel to the Connector-Bead Chain as shown in Figure 23.

Make sure to slide Cover-Bead Chain Connector over Connector-Bead Chain.

Install the Clamp-Tube 6 to 7 inches from the anchor as shown in Figure 24. Re-install air cleaner.

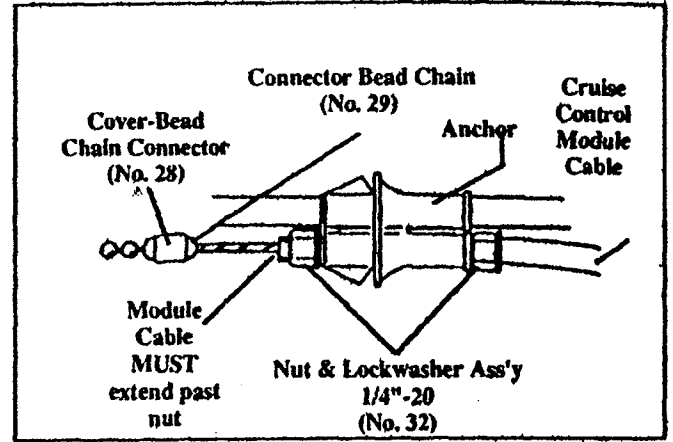


Figure 22

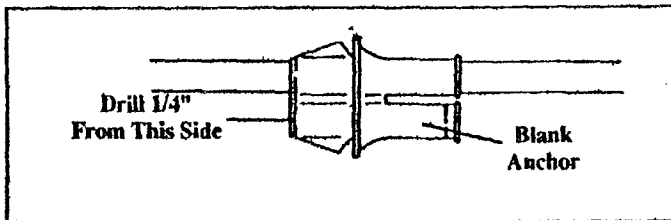


Figure 19

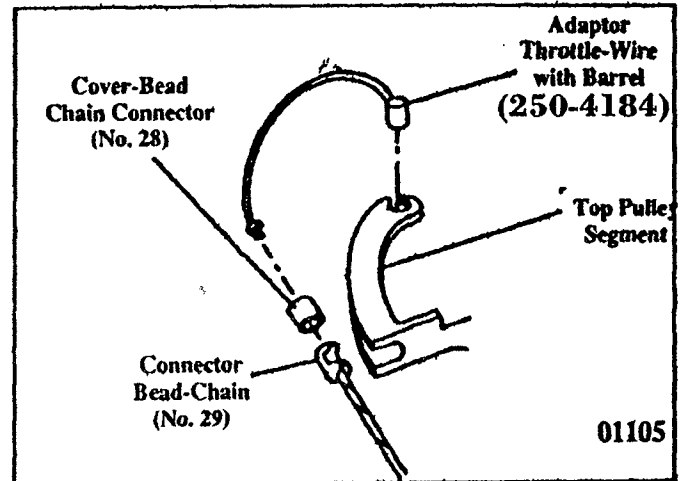


Figure 23

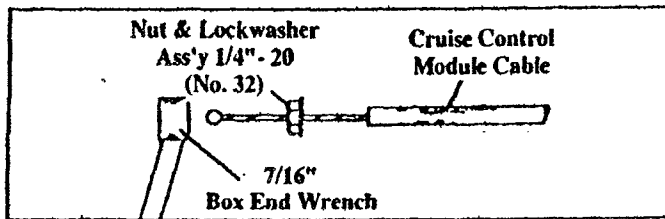


Figure 20

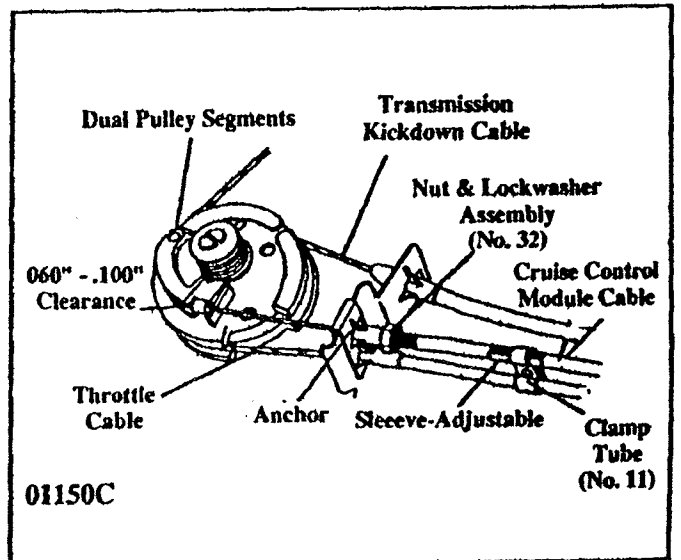


Figure 24

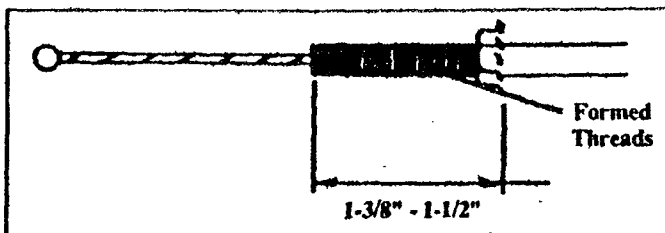


Figure 21

6. Anchoring The Cruise Control Module Cable

These are three (3) types of connectors used to anchor the Cruise Control Module cable.

- A. **Clamp-Tube**
- B. **Adaptor-Throttle-Threaded Snap-In**
- C. **Nut & Lockwasher Ass'y 1/4"-20**

CAUTION: When using **Clamp-Tube** on Cruise Control Cable, **Sleeve-Adjustable** MUST be used to prevent slippage or binding of cable.

A. **Clamp-Tube**

Two **Clamp-Tube** may be used to anchor the Cruise Control Module cable to the existing throttle cable as shown in Figure 25

NOTE: When anchoring to the existing throttle cable keep as close to the throttle cable bracket as possible to minimize flexing which can cause a pulsating accelerator pedal.

One 1/4" **Clamp-Tube** may be used to anchor the Cruise Control Module cable to the existing throttle cable bracket.

In some cases there is an existing hole, in other cases you can drill a 3/16" hole in the bracket.

One 1/4" **Clamp-Tube** may also be used to anchor the Cruise Control Module cable using the **Bracket-Cable Mounting** as shown in Figure 26.

B. **Adaptor-Throttle-Threaded Snap-In**

Before using the **Adaptor-throttle-Threaded Snap-In** remove the **Sleeve-Adjustable** from the Cruise Control Module Cable. To use the **Adaptor-Throttle-Threaded Snap-In**, it will be necessary to form threads on the end of the Cruise Control Module cable. This is easily accomplished by placing the **Nut & Lockwasher Ass'y 1/4" - 20** on the end of the Cruise Control Module cable with your fingers, then place a 7/16" box end wrench and turn clockwise, see Figure 30, until the desired amount of threads have been formed. See Figure 28

After the threads have been formed screw the **Threaded Snap-In-Adaptor** on to the Cruise Control Module cable as shown in Figure 29

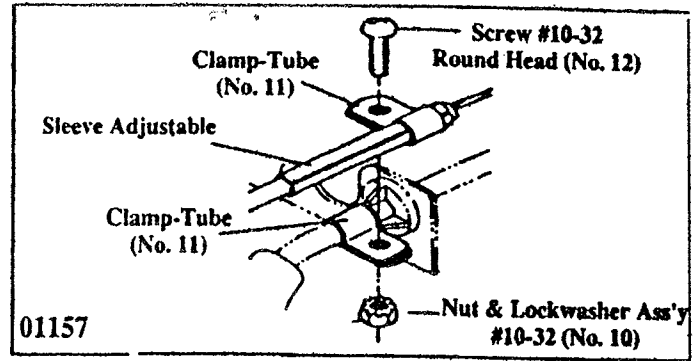


Figure 25

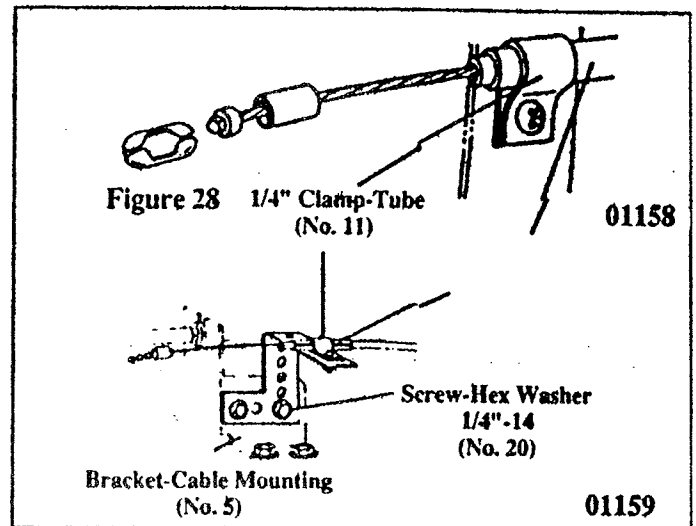


Figure 26

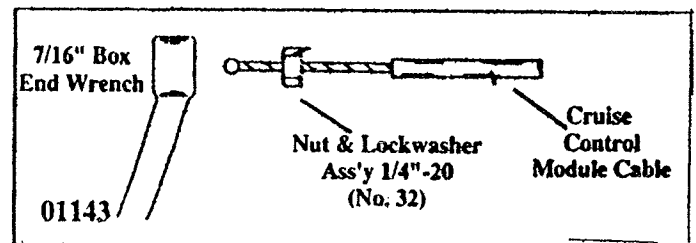


Figure 27

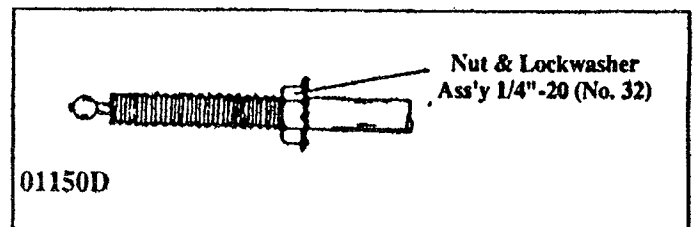


Figure 28

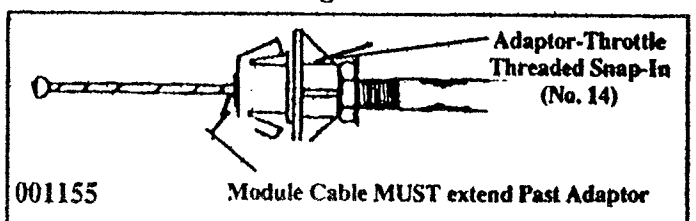


Figure 29

The Threaded Snap-in-Adaptor snaps into an existing square hole as shown in Figure 34 (common on GM vehicles) or snaps into the Bracket-Cable Mounting as shown in Figure 30.

C. Nut and Lockwasher Ass'y (No. 32) and/or Blank Anchor

To use Nut and Lockwasher Ass'y 1/4"-20 , it will be necessary to form threads on the end of the Cruise Control Module cable. This is easily accomplished, see Figure 20 or 21.

The cable anchor can be in two forms see Figure 32 or 33. Use a 1/4" drill bit or an existing 1/4" hole as shown in Figure 32 or 33. Insert the Cruise Control Module cable through the 1/4" hole and thread the other Nut & Lockwasher Ass'y 1/4"-20 and attach the Bead Chain Connector and Bead Chain Connector Cover to the Cruise Control Module cable as shown in Figure 34.

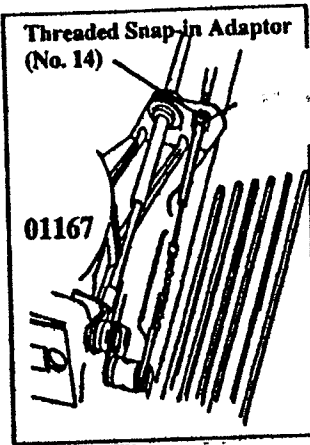


Figure 31

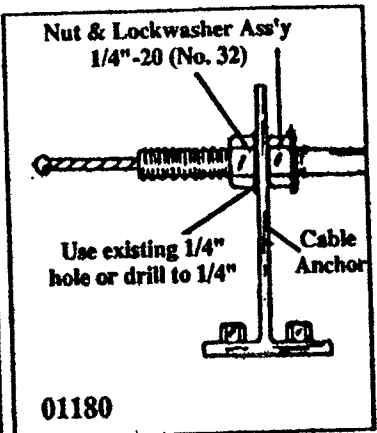


Figure 32

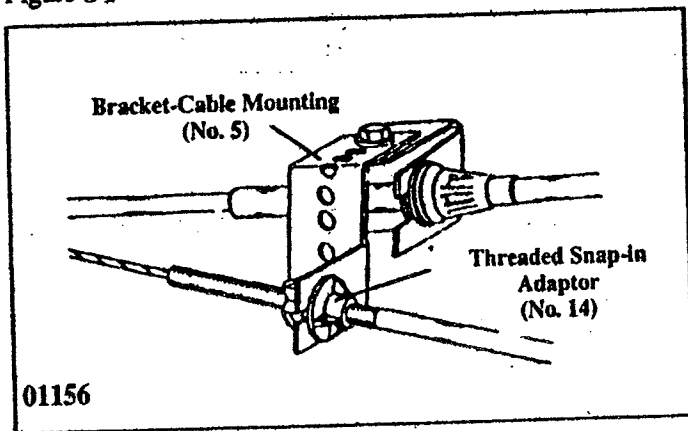


Figure 30

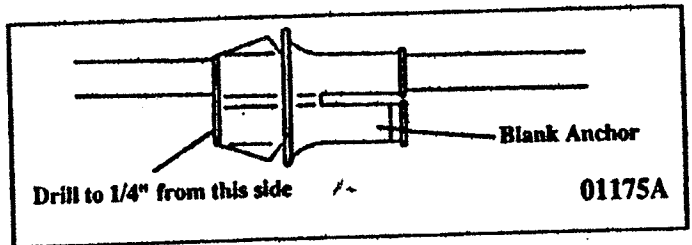


Figure 33

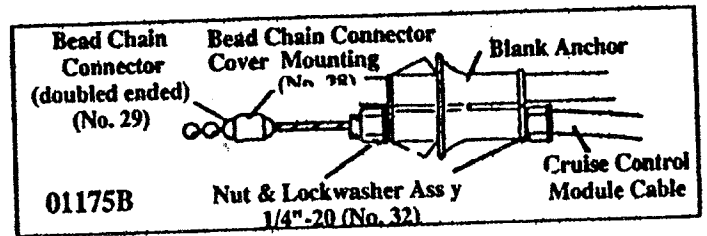


Figure 34

7. Vacuum Line Installation

WARNING:
DO NOT cut the power brake vacuum supply line. An improper connection to this line could impair the function of the vehicle's brakes.

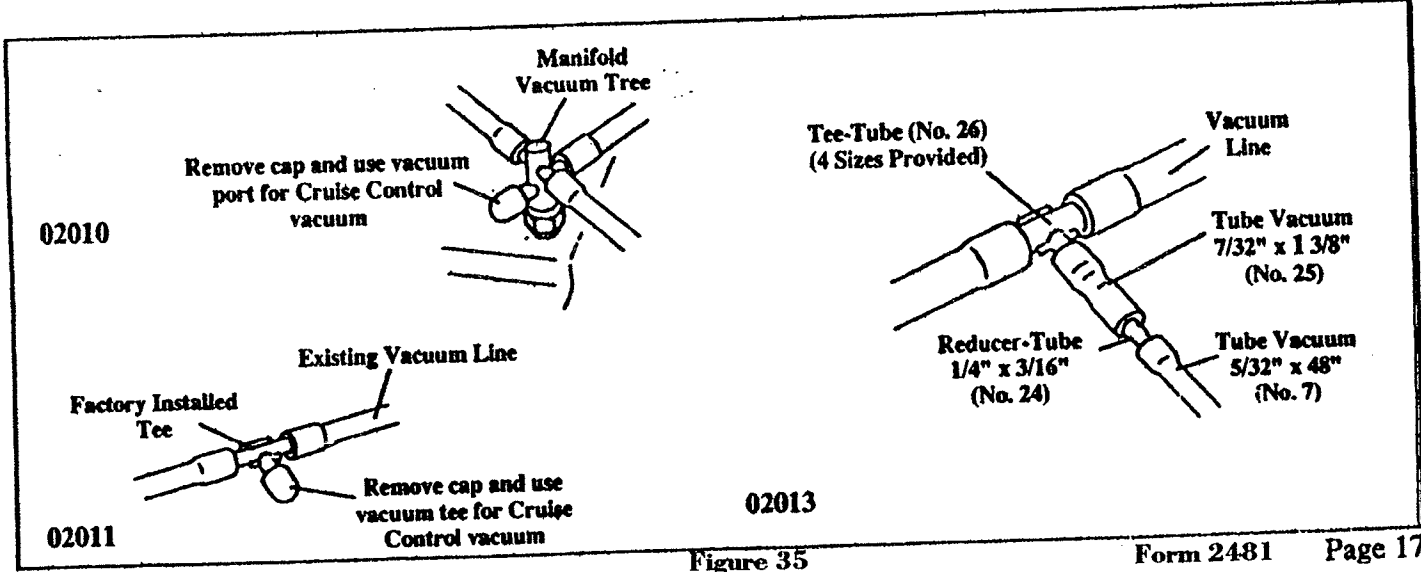


Figure 35

Vacuum Reservoir: Usually mounted on inner fender well or engine bulkhead. Maintains vacuum of other vehicle accessories. Figure 36.

After locating a vacuum source and making a connection, route Tube-Vacuum-5/32" x 48" from this source and attach to the vacuum port on Servo. **DO NOT** forget to remove the Protective cap, prior to installing Tube-Vacuum-5/32" x 48".

WARNING:

Failure to follow the instruction manual could cause the Cruise Control to work improperly, possibly causing damage to your vehicle and injury and or death to you and your passengers.

Vacuum Check

Run the engine at idle. Unplug the Tube-Vacuum from the Cruise Control Servo and place your finger over the end of the tube. You should feel a strong suction. If not you should find another location for a stronger vacuum source.

8. Tachometer Signal Wire Connections

This Cruise Control system requires the input of a tachometer signal on ALL gasoline powered vehicles so that engine speed (RPM) can be monitored. On diesel powered vehicles, use a 250-4206 kit instead of tachometer signal.

1. Locate the tachometer signal on the vehicle.

Possible Locations:

- A. The negative (-) side of the ignition coil. Figure 41.
- B. A terminal on the distributor marked "Tach" (most GM high energy ignition systems) Figure 38
- C. On distributorless ignition systems, there is a tach signal wire located at the ignition control module. Consult a shop manual if necessary. Figure 39

2. Route the wire from the Cruise Control Electronic Regulator to the tach signal. Keep wire away from hot, moving, or sharp objects.

3. Cut excess wire from tach wire harness and attach to the signal in one of the following ways.

A. For terminal on GM distributor Figure 38, crimp the Terminal -1/4" Female on the end of tach wire and plug into distributor.

B. If you cannot use procedure A, use a Connector-Self Stripping and attach to a wire coming from a tach signal. Figure 40

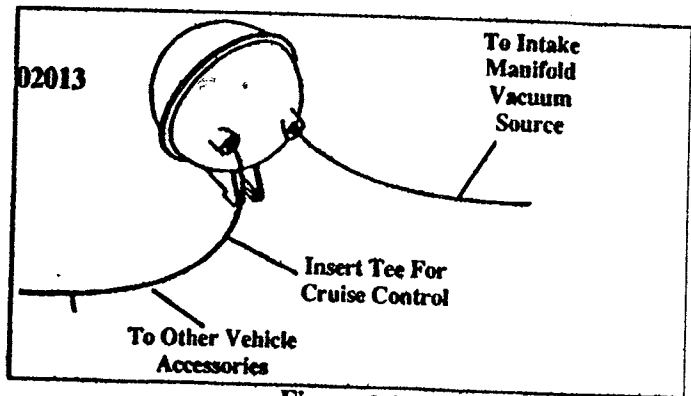


Figure 36

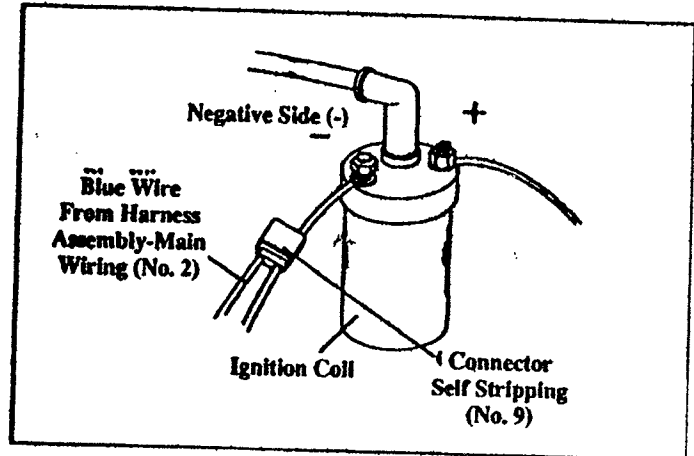


Figure 37

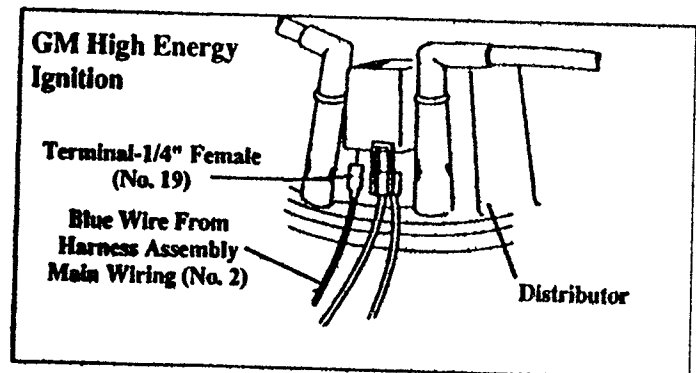


Figure 38

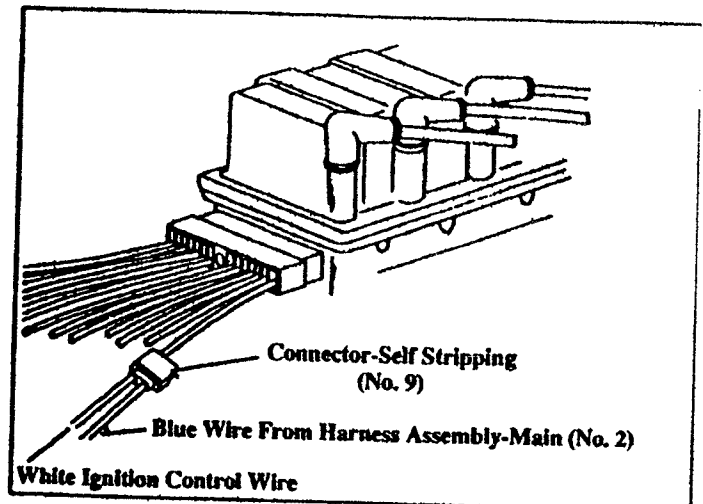


Figure 39

9. Control Switch Installation

If your control switch is the type which clamps on the turn signal lever, or which requires cutting the turn signal lever, or is mounted on the instrument panel, follow instructions packaged with it. If you have a switch which replaces the complete original equipment turn signal lever, remove the existing lever and install the Cruise Control switch and lever assembly as instructed in the vehicle shop service manual.

CAUTION: If a two way radio is in the vehicle or is later installed, the Cruise Control regulator should be located as far from the radio transceiver as practical (at least 3") and the Cruise Control wiring should be routed as far from the radio wires and coaxial cable as practical. The radio should be wired directly to battery ground connection and the standing wave ratio of the antenna should be as low as possible.

10. The Wiring Harness

A. To find a place to get electrical power you will need to "ground" one lead of your volt ohm meter. Find electrical ground by turning on the ignition switch and touching one lead to a hot fused terminal at fuse panel; touch other lead to unpainted metal part of vehicle. The metal you touch to make continuity, is ground. Bracket for parking brake lever is usually a good ground. Turn ignition switch off.

To Splice With Blue Plastic Connector,
Follow These Four Steps

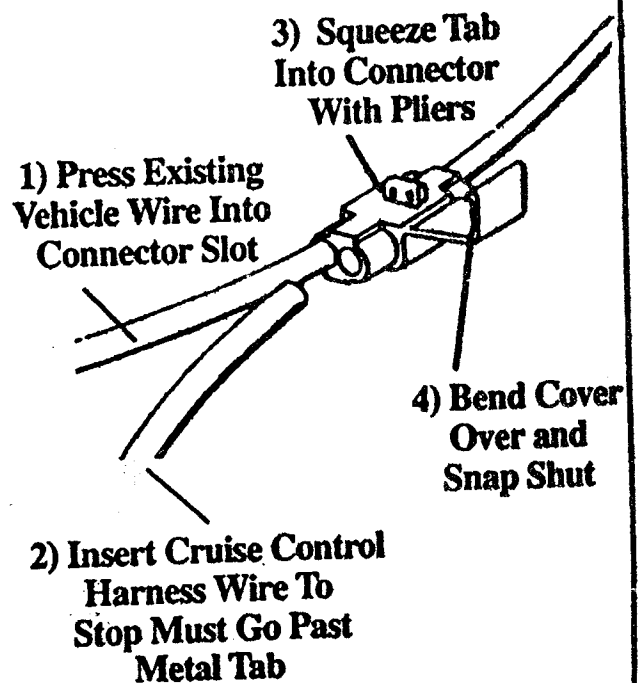


Figure 40

NOTE: Some fuse panels are behind shields which must be removed first. On other vehicles the screw that mounts the panel must be removed to get to the fuses.

B. Locate the fuse panel, the BROWN FUSED WIRE of the Harness Assembly-Main Wiring must be attached to a fuse that is energized (battery voltage) when the ignition switch is on and is de-energized (zero volts) when ignition switch is turned OFF or to the START (CRANK) position.

C. Attach terminated Brown Wire to fuse panel as shown in Figure 41

DO NOT use the following power supplies:

- * Turn Signal
- * Hazard Lights
- * Windshield Wipers
- * Blower Fan
- * Hot side of Brake Switch
(same wire as red wire)

D. Locate the vehicle brake switch - the switch which makes your brake lights go on when you apply your brakes. One of the two wires to this switch is "hot" all of the time, other wire is energized only when you apply the brakes. It is called the "cold side" of the brake switch.

E. Touch one lead to ground (located in step A), touch other lead to one of the brake light switch terminals. If test, shows voltage (12 volts) that is the hot side of switch. Check color of wire connected to that terminal. Red fused wire of Cruise Control harness will be spliced to that wire.

F. Touch test lead to other brake light switch terminal. Test should show no voltage until brake pedal is pressed. Violet wire of harness will be spliced to this wire on "cold" side of the switch.

G. Use blue plastic splicing connector to splice red fused harness wire to "hot" side of brake switch and violet wire to "cold" side of switch.

H. Connect 2-wire, 4-wire, and 1-wire connector from servo to matching connectors, on harness.

I. Connect Flat 4-wire connector that plugs into the control switch.

J. The Grey wire is to be attached to the VSS (Vehicle Speed Sensor) wire (See other form for locations or consult shop manual.)

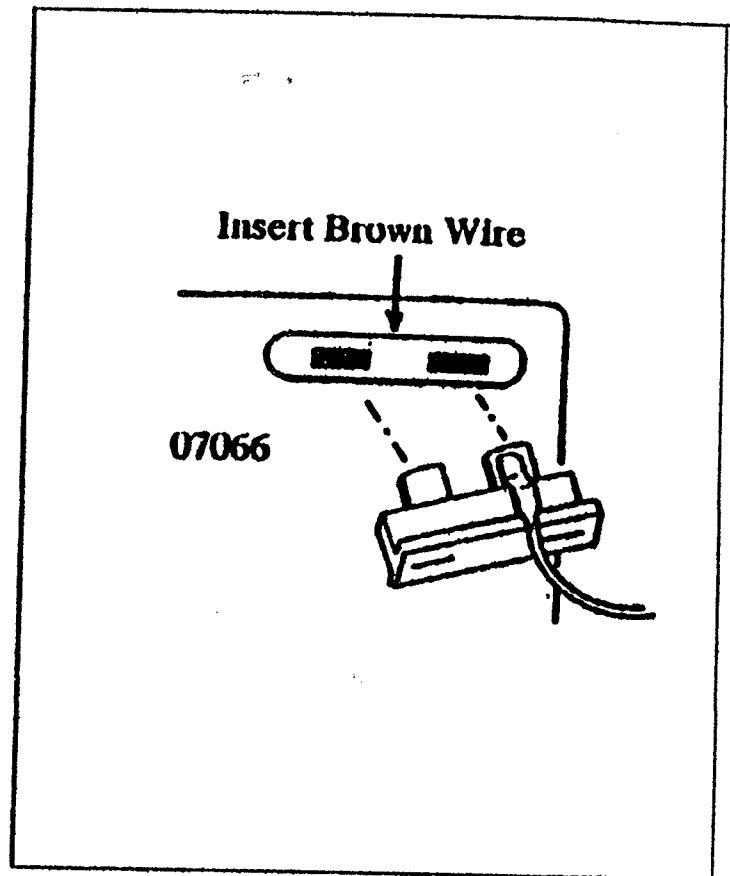


Figure 41

CONTROL SWITCH

You need to unplug the 14-pin connector from the cruise control module for these tests.

To make the test:

1. Ground the test light lead and verify that the test light works by proving a known power source.
2. Follow the test chart below for these tests when using a closed circuit control, switch.

CLOSED CIRCUIT CONTROL SWITCH					
		WIRE COLORS AT 14 PIN CONNECTOR			
IGNITION SWITCH POSITIONS	CONTROL SWITCH POSITIONS	RED	DARK GREEN	YELLOW	BROWN
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	ON	ON	OFF	OFF
OFF	On and press & hold SET/COAST	ON	OFF	ON	OFF
OFF	On & Press & Hold RESUME/ACCEL	ON	ON	ON	OFF
ON	ON	ON	ON	OFF	ON
START	ON	ON	ON	OFF	OFF

Follow the test chart below for these test when using an open circuit control switch.

OPEN CIRCUIT CONTROL SWITCH					
		WIRE COLORS AT 14 PIN CONNECTOR			
IGNITION SWITCH POSITIONS	CONTROL SWITCH POSITIONS	RED	DARK GREEN	YELLOW	BROWN
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	ON	OFF	OFF	OFF
OFF	On and press & hold SET/COAST	ON	ON	OFF	OFF
OFF	On & Press & Hold RESUME/ACCEL	ON	OFF	ON	OFF
ON	ON	ON	OFF	OFF	ON
START	ON	ON	OFF	OFF	OFF

PROBLEM No Power on red wire (Power) NOTE: If any problems are found on red wire, correct before proceeding to others.	PROBABLE CAUSES Brake light Fuse Connection at hot side of brake switch In-line 4 amp Fuse Connection at Flat Four Pin Connection Control Switch
Incorrect operation of Dark Green wire (SET/COAST)	Connection at Flat 4 pin connector Control Switch
Incorrect operation of Yellow wire (RESUME/ACCEL)	Connection of Flat 4 pin connector Control Switch
Incorrect operation of Brown Wire (accessory power-radio fuse)	Wrong Power Source In-line 9 amp Fuse

At this point the violet wire of the 14-pin connector is to be tested. (Unplug the 14-pin connector from the regulator for this test.)

Attach the test light lead to a power source and verify test light operation by touching the "Probe End" to ground; the test light should burn.

Probe VIOLET WIRE: If the violet wire is attached to the cold side of the brake light switch and has continuity to ground through the brake light bulbs, the test light will burn. Pressing the brake pedal will make the test light go out when the brake lights come on.

▽ **NOTE:** Test for Violet wire grounding circuit is the same for closed circuit control switch and open circuit control switch.

There are 13 wires in the module connector. Each must have correct functions, inputs and outputs for the Cruise Control to operate properly.

Pin #	Wire Color
1.	TAN = Throttle position feedback 180-1200 OHMS at idle test with OHM meter (Tan to Black) 5
2.	DARK GREEN = (SET/SPEED) 12 volts with closed circuit control switch. (opens when set button pressed) 0 volts with open circuit control switch. (12 Volts when Set Button pressed)
3.	BROWN = Power from accessory circuit, controlled by the ignition switch
4.	GREY = (VSS) Vehicle Speed Input (sine or square wave with vehicle moving)
5.	RED = Power from brake lamp switch through Control Switch.
6.	WHITE = Vent Valve = Normally 0 volts at rest = 12 volts when cruise is engaged 0 Volts momentary anytime the cruise is decreasing throttle opening.
7.	MAROON = (Charge Valve) Normally 0 volts (12 volts momentary anytime the cruise is increasing throttle opening).
8.	ORANGE = Charge & vent valves common. From Orange to Maroon = 38-48 OHMS From Orange to White = 38-48 OHMS
9.	VIOLET = Ground through brake lamps when brake is not pressed.
10.	YELLOW (RESUME) = Open circuit (12 volts when resume is pressed) also (12 Volts when set is pressed with closed circuit control switch.
11.	PINK = (Dump Valve) Normally 0 volts (12 volts with cruise control engaged). Pink to ground = 38-48 ohms
12.	BLACK = Ground
13.	BLUE = (TACH) Engine RPM

Every wire must be attached correctly and either receive or output correctly for the cruise control to operate properly

If the Blue Tach wire is left off the cruise will operate, but engine overrun protection and clutch disengage do not operate.

13. Road Test

DO NOT BY-PASS THIS STEP!

Even if all parts are OK and have been installed correctly, you can have a system that doesn't work well just because the regulator is adjusted incorrectly. You need a small blade-type screwdriver to make adjustments. Read these **WARNING & CAUTIONS** first.

WARNING

1. For your safety, take someone along to read instructions and adjust while you drive.
2. Road test should not be done when roads are slippery nor in heavy traffic.
3. Read **OPERATING INSTRUCTIONS** before making Road Test if you have never used Cruise Control.

CAUTION:

1. When you adjust the regulator, you will turn a small electronic part called a potentiometer or "pot." Each pot has a slot for your screwdriver. You can see through the holes in the electronic regulator. A pot can turn only 3/4 of a circle. When you hit the stop in either direction, don't force it, and don't push in too hard.
2. The holes of the Low Speed Adjustment and the Centering Adjustment are close together. Be sure you adjust the right pot each time you make a new setting.
3. Your settings will be right and easier to make if you adjust the regulator while driving on fairly straight and level roads. You will have to slow down to 15 mph to make the Low Speed Setting, so don't use interstate highways.

NOTE:

Low Speed Switch Adjustment (Use only if Magnet & Pick-Up Coil or Signal Generator is used.)

The Cruise Control will not control speed when you are driving slower than the "Low Speed" setting. If the system did not have a low speed limit, a driver might accidentally move the **RESUME/ACCEL** button while standing still or moving in slow traffic. This would make the engine go to wide open throttle if there happened to be a set speed still stored in the regulator's memory.

You can pick any low speed setting between 20 and 40 mph. Take 3.15 times the low speed you think you would like, and you will know the top limit at which you can control speed. For example, if your low speed setting is 20 mph, your top limit will be 63 mph. A low speed setting of 40 mph will give a top limit of 126 mph. The right setting is between 27 and 33 mph.

Don't forget your small screwdriver; and remember-counter-clockwise is the direction you turn a light bulb when you unscrew it from the socket. If you are alone, do not make adjustments while driving.

1. Move slide button of control switch to **ON**. Drive at a speed of 45 mph. Press and release **SET/COAST** button, then take your foot off the accelerator pedal. Your speed should be controlled at 45 mph, and this setting is in the regulator's memory.

2. Slow your vehicle to 15 mph. Press slide button of control switch to **RESUME/ACCEL** position and hold it there as you very gradually increase speed. When you feel your vehicle suddenly speed up and the accelerator pedal give way under your foot, glance at the speedometer and release the slide button. The speed at which the system took control is the "low speed setting" of your regulator. If it is not between 27 and 33 mph, it should be corrected. Tap the brake pedal to disengage the system.

On one side of your regulator there are two holes. Insert a small screwdriver into the one marked **LSS ADJ**, and if your setting was too fast, turn the potentiometer or "pot" counterclockwise just a little. If it was too slow (below 27 mph), turn the pot clockwise a little.

3. Drive at 15 mph once more and hold the slide button to the **RESUME** position as you slowly increase speed. The system should take over this time at a speed closer to 27 mph. Continue this procedure until you get the setting you want.

Centering Adjustment

1. Tap the brake to disengage the system, and drive at a steady 45 mph with your foot. Do this on a fairly level section of road. Press and release the SET/COAST button. Note the speedometer when you released the button. Take your foot off the accelerator. The cruise control should keep your vehicle moving within 2 mph of your "set speed".

2. If your "control" speed is more than 2 mph above your "set" speed, turn the CTR ADJ pot just a little counterclockwise. Turn it clockwise if the control speed was more than 2 mph below set speed. The CENTERING hole is next to the LOW SPEED hole.

Tap the brake and manually drive at 45 mph again. Press and release the SET/COAST button and see what your control speed is. Most people like it to be a mile or two above the set speed rather than below.

Operational Check

1. After all adjustments have been made so your Cruise Control works the way you want it to, drive at 45 mph and SET speed. Ride for a few seconds, then tap the brake and slow down for about 5 seconds. Press and release the RESUME/ACCEL button. When you get back to a steady 45 mph, press and hold the SET/COAST button until you reach 35 mph, then release it. Ride at that speed for a few seconds. Press the RESUME/ACCEL button and hold it until you reach 55 mph, then release it. Watch it for a few seconds, then push the slide button to OFF.

2. See TROUBLE SHOOTING GUIDE if there is any problem. The Road Test is finished.

14. Regulator Installation

The regulator and wiring must be hidden up under the dash. This is becoming a problem in some of the smaller vehicles.

After finding a safe, clear space, fasten the regulator in place with screws or the wire ties supplied. Also hold the wiring up out of sight with the wire ties. Tie wires and module out of the way from moving parts and hot objects.

Installation is now complete.

This Record May Be Of Interest To You Later

At the time my Cruise Control was installed, I was driving a _____

My mileage was: _____

The date was: _____

I bought the kit from: _____

Installer's name: _____

Employed by: _____

Located at: _____

Kit price: \$ _____

Installation Cost: \$ _____

Paid by: _____

Check No. _____ Money Order No. _____

Cash: _____ Credit Card: _____

AMEX _____ VISA _____

Other: _____ MasterCard _____

Discovery _____

Notes: _____

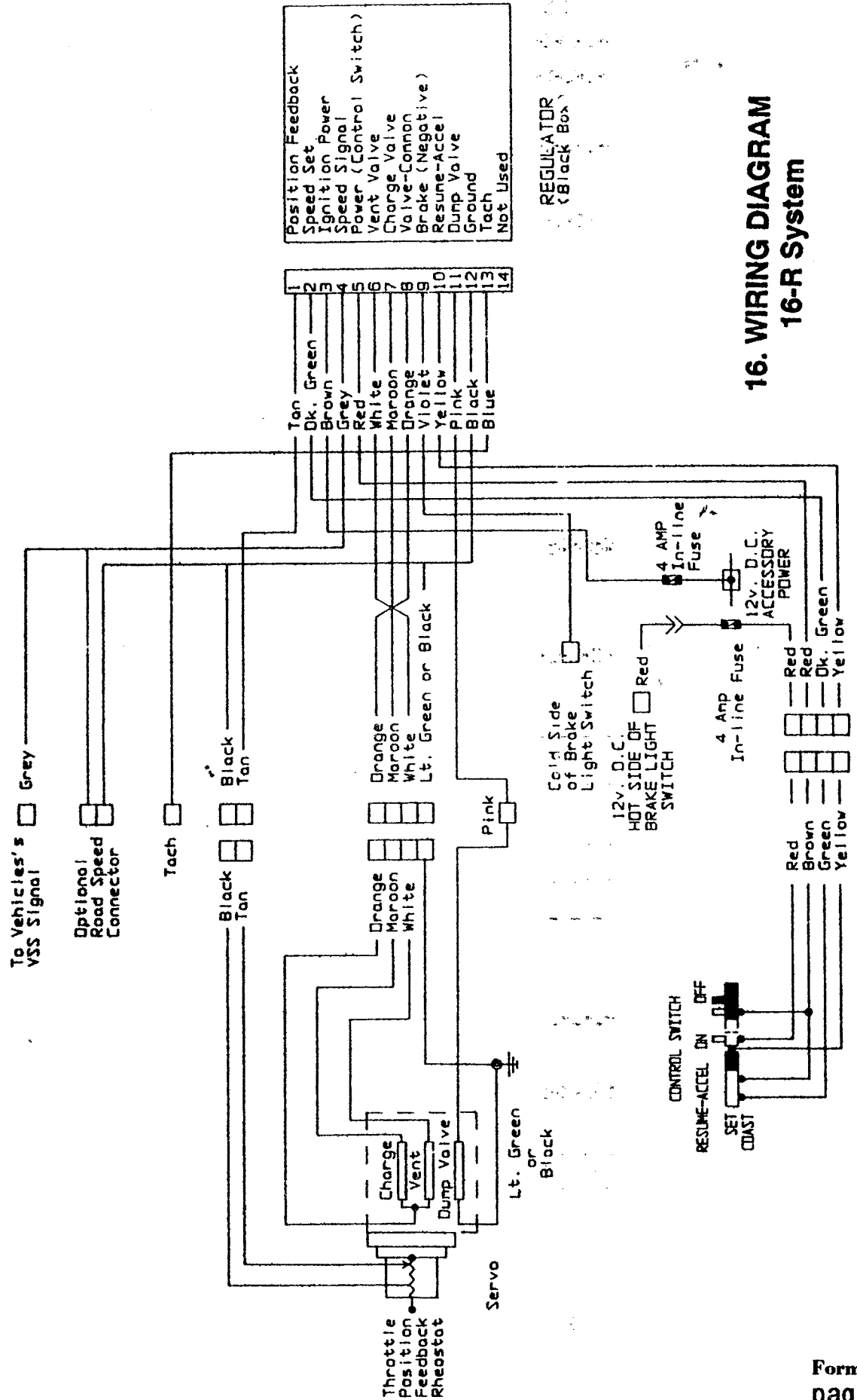
15. Technical Service

In the event that you need technical assistance with trouble shooting, please have the following information when calling the Technical Service Department 910-277-1828

This information is important for a proper and speedy diagnosis of the problems encountered.

1. The model number and manufacture code of the Cruise Control Module which is printed on the case is required
My number is: _____
2. Vehicle make, model and year: _____
3. Transmission type (automatic or manual): _____
4. Brake Switch wiring connections. Ensure that the following is correct!
"Hot Side" connected to - Red wire from Main Wiring Harness
"Cold Side" connected to - Violet wire from Main Wiring Harness
5. Power Supply wiring connection.
Brown wire from Main Wiring Harness: _____
6. Vacuum Source: _____
7. Speed signal source:
VSS (vehicle speed signal)? _____
Signal generator? _____
Magnet & Pick-up coil? _____
8. Tachometer wiring connection.
Blue wire from Main Wiring Harness: _____
9. Cruise Control Module programming switch setting:

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



16. WIRING DIAGRAM 16-R System

17. TROUBLE SHOOTING GUIDE

CONDITION	POSSIBLE CAUSE	REMEDY
In-line fuse blown.	Short or ground in Control Switch wiring harness or main wiring harness of Cruise Control.	Check where wiring passes thru or around any sharp, hot or moving metal part. Check grommet in bulkhead. Repair short, replace fuse with 5 amp. max. Perform Electrical Check Procedure.
Does not engage (SET), "ON - OFF" Switch "ON". NOTE: System will not engage if vehicle is not moving faster the LOW SPEED SETTING.	No voltage at (RED wire) of connector at regulator.	Check connection where RED fused wire is spliced to hot side of brake switch-make a good connection. Brake light fuse blown - replace fuse.
	No Voltage at (BROWN wire) of connector at regulator.	Check connection where BROWN wire is connected to 12 volt D.C. accessory power - make a good connection. Accessory fuse blown - replace fuse.
	No ground connection at cold side of brake light switch.	Check connection where VIOLET wire is spliced to cold side of brake light switch - make a good connection.
	Both brake light bulbs burned out.	Replace brake light bulbs.
	Brake lights on all the time.	Adjust brake light switch.
	Ported vacuum, restricted vacuum, or no vacuum.	Be sure vacuum connection is made to a source that has continuous vacuum (below carburetor throttle plate on gasoline engine).
		Check for leaking, collapsed or kinked hoses.
	LIGHT GREEN, and or BLACK wires of dump valve and servo wiring harness not grounded.	Ground LIGHT GREEN and or BLACK wires to vehicle's chassis.
	Dump valve inoperative (coil open or valve leaking.)	Electrical Check - unplug connector from regulator and check continuity between (PINK) (LIGHT GREEN) or (BLACK). If circuit is open, check ground of LIGHT GREEN or BLACK wire at dump valve and connection of PINK wire. If connections OK and circuitry open, replace servo.
	Faulty electrical or vacuum connection.	Tighten connections and make electrical checks.
	Control Switch inoperative.	Make Control Switch Check.
	Servo not connected to throttle.	Check bead chain or cable connection at servo and at throttle.
	Low Speed Switch set too high or too low.	See "Low Speed Switch Adjustment" in ROAD TEST section.

TROUBLE SHOOTING GUIDE - continued

CONDITION	POSSIBLE CAUSE	REMEDY
<p>Does not engage (SET), "ON-OFF" switch "ON".</p> <p>NOTE: System will not engage if vehicle is not moving faster than the LOW SPEED SETTING. (Cont.)</p>	<p>No signal from road speed pick-up coil. Air gap excessive. Magnet(s) missing. Pick-up coil shorted or open.</p> <p>(Only if magnet & pick-up used instead of VSS or Signal Generator)</p> <p>Servo rheostat open, vent valve inoperative, charge valve inoperative.</p> <p>NOTE: Continuity checks at right to be made at 14-pin connector with regulator unplugged from wiring harness.</p> <p>If all of above check okay, regulator could be defective.</p>	<p>Bend coil bracket to get 3/4" - 1 1/4" gap.</p> <p>Replace missing magnets.</p> <p>Unplug regulator and check between BLACK and DARK BLUE terminals. Resistance should be 41-51 OHMS. If open or shorted, replace coil. Also check BLUE and GREY wires. Repair any bare spot with tape.</p> <p>Rheostat Check: Resistance between (BLACK) and (TAN) to be 180-1200 OHMS.</p> <p>Vent Valve Check: Resistance between terminal (WHITE) and (ORANGE) to be 38-48 OHMS.</p> <p>Charge Valve Check: Resistance between terminal (MAROON) and (ORANGE) to be 38-48 OHMS.</p> <p>NOTE: If any of the above three checks show circuit open or shorted, replace servo.</p> <p>Replace regulator.</p>
<p>Engine accelerates when started.</p>	<p>No slack in bead chain and/or Servo cable.</p> <p>Faulty Servo.</p> <p>Faulty Regulator.</p>	<p>Re-check and adjust slack with throttle at hot idle position.</p> <p>Replace Servo.</p> <p>Replace Regulator.</p>
<p>Vehicle continues to accelerates after depressing and releasing "SET/COAST" button.</p>	<p>Centering on Regulator set too high.</p> <p>Faulty Servo.</p> <p>Faulty Regulator.</p>	<p>Make centering adjustment to Regulator See Road Test.</p> <p>Replace Servo.</p> <p>Replace Regulator.</p>
<p>"RESUME/ACCEL" feature inoperative.</p>	<p>Bad ground connection.</p> <p>Control Switch faulty.</p> <p>Faulty Regulator.</p>	<p>Ground LIGHT GREEN or BLACK wires chassis of vehicle.</p> <p>Perform Control Switch Check. Replace if it does not check properly.</p> <p>Replace Regulator.</p>
<p>When using Resume or Accel feature; throttle opens and system disengages.</p> <p>NOTE: This condition applies to gasoline powered vehicles</p>	<p>Regulator senses a rapid engine speed change. Regulator is doing what it is designed to do.</p>	<p>Re-adjust servo to throttle travel, so servo cannot pull throttle to "kickdown" position.</p>

TROUBLE SHOOTING GUIDE - continued

CONDITION	POSSIBLE CAUSE	REMEDY
When cruising at a set speed, driver presses accelerator pedal into passing gear and then lets up, Cruise Control disengages. NOTE: This condition applies to gasoline powered vehicles only.	Regulator senses a rapid engine speed change. Regulator is doing what it is designed to do.	Actuate "Resume" and return to last set "Cruising Speed"
Does not disengage when brake is applied.	Improper brake light switch adjustment.	Adjust brake light switch.
	Faulty brake light switch.	Replace brake light switch.
	Throttle linkage hanging up or not closing.	Fix throttle linkage.
	Faulty Servo	Replace Servo
	Faulty Regulator.	Replace Regulator.
System re-engages when brake is released.	Faulty Regulator.	Replace Regulator.
"Resume/Accel" do not cancel when ignition switch is turned off.	Wrong power source, power is always on.	Connect BROWN wire of Cruise Control harness to vehicle wire which has 12 volts when ignition is ON or ACCY position and has no voltage when ignition is OFF.
Throttle does not return to normal idle.	Improper Cruise Control Servo linkage adjustment.	Adjust Cruise Control Servo linkage.
	Improper Accelerator linkage adjustment.	Adjust accelerator linkage.
	Weak or disconnected throttle return spring.	Replace or connect spring.
Accelerates and coasts alternately or has pulsating accelerator pedal.	Variable voltage.	Select a power source for BROWN wire which has a constant 12 volts.
	Improper Servo to throttle connection.	Re-do throttle connection and adjustment.
Vehicle speed increases or decreases more than 2 MPH. when setting speed with "SET/COAST" button.	Centering improperly adjusted.	See "Centering Adjustment: in ROAD TEST section.
Erratic operation of Cruise Control. NOTE: Only applies to vehicle using magnet & pick-up coil to sense road speed.	Ported vacuum (above throttle plate).	Find vacuum source which is continuous.
	Gap between pick-up coil bolt and magnet (s) too large.	Bend or move coil bracket to get 3/4" - 1 1/4" gap.
	Magnets not aligned with coil bolt.	Relocate magnet(s) or bend bracket.
	Pick-up coil bracket flexing.	Reinforce bracket or move mounting screws.
	Faulty Servo.	Replace Servo.

TROUBLE SHOOTING GUIDE - continued

CONDITION	POSSIBLE CAUSE	REMEDY
Erratic operation of Cruise Control (cont.)	Faulty Regulator.	Replace Regulator.
System disengages when using turn signal for lane change.	Sometimes when contacts in turn signal or hazard flasher are opened, it causes the Cruise Control system to lose its ground.	Actuate "Resume" and return to previously selected cruise speed.
System disengages without applying brakes.	Loose wiring connections.	Repair and perform Electrical Check Procedure.
	Collapsed vacuum supply hose.	Replace hose.
	Leaky vacuum connections.	Check and repair vacuum connections.
	Servo linkage broken or throttle clamp slipped.	Repair linkage or replace. Adjust and tighten clamp.
	Brake light switch adjusted so a flopping pedal will occasionally actuate brake lights and cause Cruise Control to disengage.	Adjust brake/light switch so pedal must move farther to operate switch.
	Faulty servo (Rheostat momentarily opens and closes.)	Replace Servo.
System engages but loses speed and then slowly returns to selected set speed. NOTE: Only applies to vehicle using magnet & pick-up coil to sense road speed.	Dump valve leaks.	Replace Servo.
	Pick-up coil bracket bent creating improper gap between bolt head and magnet.	Reset gap 3/4" - 1 1/4".
	Magnet (s) missing.	Replace missing magnet(s) (1 required on drive shaft, 2 on axle).
	Service work on vehicle has been performed and something has been left unplugged or something has been removed and not replaced.	Check connection to vacuum source as described in manual. Unplug regulator from connector and perform "Electrical Check Procedure." Review all previous Conditions, Possible Causes, and Remedies to help find problem.

