# \* BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES \*

1995 Volvo 850

GENERAL INFORMATION Brake Systems - Motorist Assurance Program Standards For Automotive Repair

All Makes & Models

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# INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)

# OVERVIEW OF MOTORIST ASSURANCE PROGRAM

The Motorist Assurance Program is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

Our organization's mission is to strengthen the relationship

Our organization's mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take greater responsibility for their vehicles—through proper, manufacturer—recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt:

- 1) a Pledge of Assurance to their Customers and
- 2) the Motorist Assurance Program Standards of Service.

All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service demonstrating to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made and the results communicated to the customer according to industry standards. Given that the industry did not have such standards, the Motorist Assurance Program successfully promulgated industry inspection communication standards in 1994-95 for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical Systems. Further, revisions to all of these inspection communication standards are continually re-published. In addition to these, standards for Drive Train and Transmissions have recently been promulgated. Participating shops utilize these Uniform Inspection & Communication Standards as part of the inspection process and for communicating their findings to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials (and their representatives), concerned with auto repair and/or consumer protection, are conducted. Feedback from these sessions is brought back to the association, and the program adjusted as needed.

To assure auto repair customers recourse if they were not

satisfied with a repair transaction, the Motorist Assurance Program offers mediation and arbitration through MAP/BBB-CARE and other non-profit organizations. MAP conducted pilot programs in twelve states before announcing the program nationally in October, 1998. During the pilots, participating repair shops demonstrated their adherence to the Pledge and Standards and agreed to follow the UICS in communicating the results of their inspection to their customers. To put some "teeth" in the program, an accreditation requirement for shops was initiated. The requirements are stringent, and a self-policing method has been incorporated which includes the "mystery shopping" of outlets.

We welcome you to join us as we continue our outreach with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site www. motorist.org or contact us at:

1444 I Street, NW Suite 700 Washington, DC 20005 Phone (202) 712-9042 Fax (202) 216-9646 January 1999

#### MAP UNIFORM INSPECTION GENERAL GUIDELINES

## OVERVIEW OF SERVICE REQUIREMENTS AND SUGGESTIONS

It is MAP policy that all exhaust, brake, steering, suspension, wheel alignment, drive-line, engine performance and maintenance, and heating, ventilation and air conditioning, and electrical services be offered and performed under the standards and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be "Required" or "Suggested". In addition, suggestions may be made to satisfy the requests expressed by the customer.

When a component is suggested or required to be repaired or replaced, the decision to repair or replace must be made in the customer's best interest, and at his or her choice given the options available.

This section lists the various parts and conditions that indicate a required or suggested service or part replacement. Although this list is extensive, it is not fully inclusive. In addition to this list, a technician may make a suggestion. However, any suggestions must be based on substantial and informed experience, or the vehicle manufacturer's recommended service interval and must be documented.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

#### Example:

An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.

#### Example:

A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's discard specifications.

Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or addresses a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may be only to suggest service.

#### Example:

An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.

#### Example:

The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. When a repair is required, a MAP shop must refuse partial service on that system if, in the judgment of the service provider, proceeding with the work could create or continue an unsafe condition. When a procedure states that required or suggested repair or replacement is recommended, the customer must be informed of the generally acceptable repair/replacement options whether or not performed by the shop.

When presenting suggested repairs to the customer, you must present the facts, allowing the customer to draw their own conclusions and make an informed decision about how to proceed.

The following reasons may be used for required and suggested services. These codes are shown in the "Code" column of the MAP Uniform Inspection & Communications Standards that follow:

Reasons to Require Repair or Replacement

- A Part no longer performs intended purpose
- B Part does not meet a design specification (regardless of performance)
- C Part is missing

NOTE: When a repair is required, the shop must refuse partial service to the system in question, if the repair creates or continues an unsafe condition.

Reasons to Suggest Repair or Replacement

- 1 Part is close to the end of its useful life (just above discard specifications, or weak; failure likely to occur soon, etc.)
- 2 To address a customer need, convenience, or request (to stiffen ride, enhance performance, eliminate noise, etc.)
- 3 To comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
- 4 Technician's recommendation based on substantial and informed experience

NOTE: Suggested services are always optional. When presenting suggested repairs to the customer, you must present the facts, allowing the customer to draw their own conclusions

and make an informed decision about how to proceed.

## **BRAKES**

# SERVICE PROCEDURES REQUIRED & SUGGESTED FOR PROPER

VEHICLE OPERATION

Some states may have specifications that differ from OEM. Check your local/state regulations. Where state or local laws are stricter, they take precedence over these guidelines.

# ACCELEROMETERS (G SENSOR OR LATERAL)

#### ACCELEROMETER INSPECTION

Condition	Code	Procedure
Connector loose Loose	. A . B . C	Require replacement. Require repair or replacement. Require repair or replacement. Require repair replacement. Require re-positioning to vehicle manufacturer's specifications.
Output signal incorrect	. В	Require replacement.

## **ACCUMULATORS**

#### ACCUMULATOR INSPECTION

Condition	Code		Procedure
Leaking	. C	 Require	replacement.

#### **ANCHOR PINS**

See BACKING PLATES.

# ANTI-LOCK BRAKE SYSTEMS

NOTE: Anti-lock brakes are an integral part of the brake system. It is essential that the anti-lock brakes function properly when brake service is performed.

Anti-lock brake systems are commonly referred to as "ABS" and will be referred to as "ABS" throughout these guidelines. Some ABS components also function as part of a traction control system (TCS).

WARNING: When diagnosing and servicing high pressure components, observe safety procedures and equipment requirements established by the vehicle manufacturer to reduce the possibility of serious personal injury.

NOTE: Intermittent electrical conditions are often caused by a loss of ground, poor connection, or water intrusion into the wiring harness.

NOTE: Electro-magnetic interference (EMI) may be caused by incorrect installation of accessories or components. EMI can result in improper system operation.

# **BACKING PLATES**

#### BACKING PLATE INSPECTION

Condition	Code		Procedure
Anchor pin bent  Anchor pin broken  Anchor pin worn, affecting	. A	1 1	-
structural integrity Backing plate bent Backing plate broken Backing plate cracked Corroded, affecting	. В . В . А	Require Require repair or Require Require repair or	replacement. replacement.
structural integrity Loose Missing	. В . С	Require repair or Require Require repair or Require repair or	replacement. replacement.

# **BRAKE FLUID**

CAUTION: Most manufacturers prohibit the use of DOT 5 brake fluid in a system equipped with ABS.

DOT 3, DOT 4, and DOT 5.1 brake fluids are clear or light amber in color. DOT 5 brake fluid is violet in color. Correct fluid required for the brake system is stamped on the master cylinder cover.

#### BRAKE FLUID INSPECTION

Condition	Code	Procedure
Beyond service interval	. 3	Suggest flushing and refilling with correct fluid.
Brake fluid type incorrect	. в	Require flushing and refilling with correct fluid.
Hydraulic component overhaul or replacement Rubber master cylinder	. A or B	(1) Require service. Suggest flushing and refilling with correct fluid.
cover gasket distorted and gummy	. A	(2) Require replacement of gasket.

- (1) If a fluid other than brake fluid is present in the brake system which DOES affect the rubber parts, the required service is to:
  - \* Remove all components having rubber parts from the system.
  - \* Flush lines with denatured alcohol or brake cleaner
  - \* Repair or replace all components having rubber parts
  - \* Flush and fill with correct brake fluid. (Code A)

If a fluid other than brake fluid is present in the brake

system which DOES NOT affect the rubber parts, the required service is to flush and fill with the correct brake fluid. (Code B)  $\,$ 

(2) - This condition may indicate contaminated brake fluid.

# **BRAKE FRICTION MATERIAL**

See FRICTION MATERIAL.

## **BRAKE PADS**

See FRICTION MATERIAL.

# **BRAKE PEDALS**

# BRAKE PEDAL INSPECTION

Condition	Code	Procedure
Broken	. A	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li><li>Require replacement of pedal pad.</li></ul>
Pedal pad worn Pivot bushings worn,	. 1	Suggest replacement.
	. A	Require replacement of pivot bushings.

# **BRAKE SHOES**

See FRICTION MATERIAL.

# **BRAKE SHOE HARDWARE**

See also SELF-ADJUSTING SYSTEMS.

## BRAKE SHOE HARDWARE INSPECTION

Condition	Code	Procedure
Broken Distorted Missing Surfaces rust-pitted Worn, affecting	. A	 Require replacement. Require replacement.
performance	. A	 Require replacement.

# **BRAKE STOPLIGHT SWITCHES**

# BRAKE STOPLIGHT INSPECTION

Condition	Code	Procedure
Broken	. A	Require replacement Require replacement Require repair or replacement.
type) leaking	. A	Require repair or replacement.

Connector melted Connector missing Missing Out of adjustment	C C	(1) Require replacement Require replacement Require replacement Require adjustment or replacement.
Output signal incorrect . Terminal burned, affecting	В	Require replacement.
performance	A	(2) Require repair or replacement.
Terminal burned, not affecting performance Terminal corroded,	2	Suggest repair or replacement.
·	A	Require repair or replacement.
·	2	Suggest repair or replacement.
performance Terminal loose, not	В	Require repair or replacement.
	1 A	<ul><li> Suggest repair or replacement.</li><li> Require repair or replacement.</li></ul>
11	A	Require replacement.
		rect prior to replacement of part. ect prior to repair or replacement

# **BULB SOCKETS**

# BULB SOCKET INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
		<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>
performance Burned, not affecting	. A	(1) Require repair or replacement.
performance		(1) Suggest repair or replacement.
Connector broken Connector missing Connector (Weatherpack		Require repair or replacement Require replacement.
type) leaking		<pre> Require repair or replacement(2) Require repair</pre>
Corroded, affecting performance Corroded, not affecting		Require repair or replacement.
performance	. 2 . A	<pre> Suggest repair or replacement Require repair or replacement (2) Require replacement.</pre>

Shorted	Α		Require	e repair	or	replacement.
Terminal broken	A		Require	e repair	or	replacement.
Terminal burned, affecting			_	_		_
performance	Α			(2	) R	equire repair
-						replacement.
Terminal burned, not						-
affecting performance	2		Suggest	repair	or	replacement.
Terminal corroded,			3 3	-		-
affecting performance	Α		Require	e repair	or	replacement.
Terminal corroded, not			-	<u> </u>		<u>.</u>
affecting performance	2		Suggest	repair	or	replacement.
Terminal loose, affecting			3 3	-		-
performance	В		Require	e repair	or	replacement.
Terminal loose, not			-	-		-
affecting performance	1		Suggest	repair	or	replacement.
5 1			3 3	-		-
(1) - Determine cause and c	orre	ect	prior to	o repair	or	
replacement of socket			-	-		
(2) - Determine cause and c	orre	ect	prior to	o repair	or	
replacement of part.			-	<del>-</del>		
1						

# **BULBS AND LEDS**

NOTE: Copied from Electrical UIGs and modified. Does not include soldered-in components.

## BULB AND LED INSPECTION

Condition	Code	Procedure
Application incorrect Base burned, affecting	. В	(1) Require replacement.
performance	. A	
Base burned, not affecting performance		
	. A	Require repair or replacement.
Base corroded, not affecting performance . Base loose, affecting	. 2	Suggest repair or replacement.
performance		Require repair or replacement.
performance Burned out Intermittent Missing	. 1 . A . A	Suggest repair or replacement Require replacement Require replacement Require replacement.
Seized in socket  Terminal broken  Terminal burned, affectir	. A	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>
performance	_	(2) Require repair or replacement.
Terminal burned, not affecting performance .	. 2	
	. A	Require repair or replacement.
Terminal corroded, not affecting performance. Terminal loose, affecting		Suggest repair or replacement.
performance		Require repair or replacement.

Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement.

- Application incorrect includes wrong bulb coating or color.
- (2) Determine cause and correct prior to repair or replacement of part.

# **CALIPER HARDWARE**

#### CALIPER HARDWARE INSPECTION

Condition	Code	Procedure
Bent		± , ± , ± ,
performance  Dust boots on slider pin		Require repair or replacement.
(bolt) missing  Dust boots on slider pin		Require replacement of boots.
(bolt) torn	. C	÷ , ÷
Shim (OE standard) missing Shim out of position		(2) Require replacement (1) Require removal or replacement.
Shim worn	. A	(1) Require removal or replacement.
Slider pin (bolt) bent .	. В	Require replacement of slider pin or bolt and lubricants.
Slider pin (bolt)		-
rust-pitted	. A	Require replacement of slider pin or bolt and lubricants.
Slider pin (bolt) worn .	. A	Require replacement of slider pin or bolt and lubricants.
Threads damaged Threads stripped (threads		
± ± ·		Require replacement.
	. A	Require replacement.
(1) - Removal is acceptab (2) - Aftermarket shims m		shim is not OE. suggested to reduce noise.

(2) - Aftermarket shims may be suggested to reduce noise.

# **CALIPERS**

You are not required to replace or rebuild calipers in axle sets. However, when replacing or rebuilding a caliper due to the conditions that follow, you may suggest servicing, rebuilding, or replacement of the other caliper (on the same axle) for improved performance and preventive maintenance (for example, the part is close to the end of its useful life, replacing the caliper may extend pad life, or contribute to more balanced braking).

CAUTION: When installing loaded calipers, it is required that friction material be matched in axle sets for consistent braking characteristics.

# CALIPER INSPECTION

Condition	Code	Procedure
	A	Require repair or replacement of caliper.
Bleeder screw broken off in caliper	A	(1) Require repair or replacement of caliper.
Bleeder screw plugged	А	
Bleeder screw seized	A	
Casting corroded, affecting structural	7	•
integrity	ng	Require replacement.
structural integrity Dust boot around caliper	A	Require replacement.
torn	A	boot.
Leaking	A	Require repair or replacement.
damaged	A	Require repair or replacement of component with damaged threads.
Mounting pin threads stripped in caliper bracket (threads		
	A	Require repair or replacement of caliper bracket.
Mounting pin threads stripped in steering knuckle (threads	_	
missing)	A	Require repair or replacement of steering knuckle.
stripped (threads	Δ	Require repair or replacement
	• • 11	of component with stripped threads.
Parking brake cable support, lever, or retur	cn	
spring bent		Require replacement of parts.
spring broken Parking brake mechanism	A	Require replacement of parts.
caliper inoperative Piston corroded (pitted	_	Require repair or replacement.
or peeling chrome plating)	В	Require replacement of piston and rebuilding or replacement of caliper.
Piston damaged, affecting performance		Require replacement of piston and rebuilding or replacement
Piston damaged, not		of caliper.
affecting performance		No service suggested or required.
Piston finish worn off	В	Require replacement of piston and rebuilding or replacement

of caliper. Piston sticking A Require rebuilding or replacement of caliper. Slide mechanism
sticking A Require repair or replacement of slide mechanism.
<ul> <li>(1) - Only required if the hydraulic system must be opened.</li> <li>(2) - Seized is defined as a bleeder screw that cannot be removed after a practical attempt at removing. Only required if the hydraulic system must be opened.</li> </ul>

# **CONTROLLERS**

See ELECTRONIC CONTROLLERS.

# DIGITAL RATIO AXLE CONTROLLERS AND BUFFERS (DRAC AND DRAB)

## DIGITAL RATIO AXLE CONTROLLER AND BUFFER INSPECTION

Condition	Code	Procedure
Connector broken Connector (Weatherpack	. A	Require repair or replacement.
type) leaking Connector melted	. A	Require repair or replacement (1) Require replacement.
Connector missing Missing Output signal incorrect	. C	Require replacement Require replacement Require repair or replacement.
Terminal burned, affecting performance	g	
Terminal burned, not	• 11	or replacement.
•	. 2	Suggest repair or replacement.
·	. A	Require repair or replacement.
		Suggest repair or replacement.
		Require repair or replacement.
· · · · · · · · · · · · · · · · · · ·	. 1	Suggest repair or replacement.
<ul><li>(1) - Determine cause and</li><li>(2) - Determine cause and replacement of part</li></ul>	corre	ect prior to replacement of part. ect prior to repair or

## **DISABLE SWITCHES**

See SWITCHES.

# **DRUMS**

Determine the need to recondition based upon individual drum conditions that follow. Friction material replacement does not require drum reconditioning unless other justifications exist. DO NOT recondition new drums unless they are being pressed or bolted onto an existing hub. It is not necessary to replace drums in axle sets. However, when replacing or reconditioning a drum due to the conditions that follow, you may suggest reconditioning of the other drum on the

same axle to eliminate uneven braking behavior. Always wash drums after servicing or before installing.

# DRUM INSPECTION

Condition	Code	Procedure
Balance weight missing .		No service suggested or required.
Bell-mouthed, affecting performance	. A	Require reconditioning or replacement.
Cooling fin broken		No service suggested or required.
Cracked	. B	<u> </u>
reconditioning  Drum diameter will exceed OEM "machine to" specifications after required		(1) Suggest replacement.
reconditioning		(2) Require replacement Suggest reconditioning or replacement.
Measured diameter is greater than OEM discard specifications Out-of-round (runout), affecting performance .	. B	Require reconditioning or
Out-of-round (runout), exceeding manufacturer's		replacement.
specifications	. В	Require reconditioning or replacement.
Scored	. В	Require reconditioning or replacement.
Surface threaded due to improper machining	. В	Require reconditioning or replacement.
Tapered, affecting performance	. A	Require reconditioning or replacement.
specifications exis specifications, the specifications.	t. If	for which OEM "machine to" OEM does not supply "machine to" may be worn to discard
(2) - If OEM does not sup may machine to disc	pply "nard s	machine to" specifications, you pecifications.

# **ELECTRICAL PUMPS AND MOTORS**

Copied fuel pump conditions from engine UIGs & deleted pulsator from leaking conditions.

ELECTRICAL PUMP AND MOTOR INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement
Attaching hardware missing	. C	of hardware Require replacement of
Attaching hardware not functioning	. A	
Connector broken Connector (Weatherpack		of hardware Require repair or replacement.
type) leaking Connector melted	. A	<pre> Require repair or replacement(1) Require repair</pre>
Connector missing Contaminated	. A	
Inoperative  Leaking externally	. A	(3) Require repair or replacement Require repair or replacement.
Leaking internally Noisy Terminal broken	. 2	<ul><li>Require repair or replacement.</li><li>Suggest repair or replacement.</li><li>Require repair or replacement.</li></ul>
Terminal burned, affectin performance		(1) Require repair or replacement.
Terminal burned, not affecting performance . Terminal corroded,	. 2	-
affecting performance . Terminal corroded, not		1 1
affecting performance . Terminal loose, affecting performance		<ul><li> Suggest repair or replacement.</li><li> Require repair or replacement.</li></ul>
Terminal loose, not affecting performance .		Suggest repair or replacement.
Threads damaged Threads stripped (threads missing)		<pre> Require repair or replacement Require replacement.</pre>
Wire lead conductors exposed		<ul><li> Require repair or replacement.</li><li> Require repair or replacement.</li></ul>
Wire lead open	. A	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>
of part.		ect prior to repair or replacement
replacement.		amination. Require repair or ermittent operation or out of OEM
specifications.	<u> </u>	Time term operation of out of OEF

# **ELECTRONIC CONTROLLERS**

# ELECTRONIC CONTROLLER INSPECTION

Condition	Code	Procedure
Application incorrect . Attaching hardware	В	Require replacement.
	C	Require replacement of

specification. Some components may be serviceable. Check

**FLUID** 

See BRAKE FLUID.

# FLUID LEVEL SENSOR SWITCHES

for accepted cleaning procedure.

See SWITCHES.

# FOUR WHEEL DRIVE SWITCHES

See SWITCHES.

# FRICTION MATERIAL

Original Equipment Manufacturer (OEM) specifications designate replacement at different thicknesses. NOTE:

CAUTION: It is required that friction material be matched in axle sets for consistent braking characteristics.

## FRICTION MATERIAL INSPECTION

Condition	Code	Procedure
Contaminated, for example fluid that leaked from	,	
<pre>caliper, wheel cylinder,   or axle seal Cracked through Flaking or chunking</pre>	. B	(1) Require replacement.  Require replacement.  Require replacement.
Glazed (shiny)		No service suggested or required.
Grooves or ridges		(2) No service suggested or required.
Permanently attached hardware bent Permanently attached	. A	Require replacement.
hardware broken Permanently attached	. A	Require replacement.
hardware loose Permanently attached	. A	Require replacement.
hardware missing Permanently attached		Require replacement.
hardware seized Rivets loose Separating from backing Shoe table or web bent .	. В . В	Require repair or replacement Require replacement Require replacement Require replacement.
Shoe table or web cracked		Require replacement.
Shoe table or web worn, affecting performance . Surface cracking		Require replacement No service suggested or required. Further inspection may be necessary to determine cause.
Tapered wear Thickness of one pad is greater than opposite pa in the same caliper		40)
(uneven wear)		(4) Replacement of friction material not suggested or required. Further inspection required. See CALIPERS and CALIPER HARDWARE.
Wear indicator device (electronic) contacts		and offilial minowind.
rotor	. B	(5) Require replacement of appropriate parts.
Wear indicator device (mechanical) bent		(6) Further inspection required.
Wear indicator device (mechanical) broken		(6) Further inspection required.

Wear indicator device (mechanical) contacts rotor (6) Further inspection
Worn close to minimum specifications 1 (7) Suggest replacement. Worn to, or below minimum specifications B Require replacement.
<ol> <li>Identify and repair cause of contamination prior to replacing friction material.</li> <li>When reconditioning or replacing drums or rotors, replacement of friction material may be suggested depending on the severity of the grooves or ridges.</li> <li>Some vehicles use pads that are tapered by design. Refer to specific vehicle application. If not normal, require replacement of pads and correction of cause.</li> <li>Uneven pad thickness is normal on some vehicles. Refer to specific vehicle applications.</li> <li>The pad wear indicator light may come on due to other electrical problems.</li> </ol>
<ul> <li>(6) - Explain to the customer that the purpose of the wear indicator is to alert him or her to check for friction wear. Wear indicators may be bent or broken. Therefore, the friction material must be measured. The need for friction material replacement is determined based upon the conditions stated in this section. Periodic inspection is suggested.</li> <li>(7) - When the part appears to be close to the end of its useful life, replacement may be suggested.</li> </ul>

# G SENSORS

See ACCELEROMETERS.

# HOSES

# HOSE INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
		Require replacement Require repair or replacement.
(threads missing) Incorrectly secured		Require replacement. Require repair.
Inner fabric (webbing) cut Leaking		
Missing Outer covering is cracked to the extent that inner fabric of hose	. C	

is visible	В	Require replacement.
Restricted	Α	Require replacement.
Routed incorrectly	В	Require repair.

# HYDRAULIC MODULATORS

NOTE: Many mo

Many modulators can only be replaced as complete assemblies. Whenever possible, replace the failed component part. If replacement of the failed part is not possible, then replace the modulator assembly.

## HYDRAULIC MODULATOR INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement
Connector broken Connector (Weatherpack	. A	of hardware Require repair or replacement.
type) leaking	. A C A A A A A A A C C G	Require repair or replacement
Terminal burned, not affecting performance .	. 2	Suggest repair or replacement.
Terminal corroded, affecting performance . Terminal corroded, not	. A	Require repair or replacement.
affecting performance . Terminal loose, affecting		Suggest repair or replacement.
performance Terminal loose, not		Require repair or replacement.
affecting performance . Threads damaged Threads stripped (threads	. A	<ul><li> Suggest repair or replacement.</li><li> Require repair or replacement.</li></ul>
missing)	. A	Require replacement Require repair or replacement Require repair or replacement.
exposed	. A	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>

- (1) Determine cause and correct prior to replacement of part.
- (2) Inoperative includes intermittent operation or out of OEM specification.

# **HYDRO-BOOSTERS**

NOTE: Hydro-boosters and hydro-electric boosters are combined.

HYDRO-BOOSTER INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
Connector broken Connector (Weatherpack	. A	Require repair or replacement.
type) leaking	. A	Require repair or replacement (1) Require replacement Require replacement.
inadequate assist Leaking Leaks fluid at fitting .	. A	<pre> Require repair or replacement Require repair or replacement Require tightening or replacement.</pre>
Leaks fluid at unit Leaks fluid from pressure		Require repair or replacement.
hose(s)	. B	. Require replacement of hose(s).
compartment	. В . А	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>
performance		(1) Require repair or replacement.
Terminal burned, not affecting performance . Terminal corroded,	. 2	Suggest repair or replacement.
	. A	Require repair or replacement.
	. 2	Suggest repair or replacement.
performance Terminal loose, not		Require repair or replacement.
affecting performance . Threads stripped (threads		Suggest repair or replacement.
missing)		Require replacement.
(1) - Determine cause and	corre	ect prior to replacement of part.

# HYDRO-ELECTRIC BOOSTERS (POWERMASTER)

See HYDRO-BOOSTERS.

# **IGNITION DISABLE SWITCHES**

See SWITCHES.

# LATERAL ACCELERATION SWITCHES

See ACCELEROMETERS.

# LEDS

See BULBS AND LEDS.

# LENSES

# LENSE INSPECTION

Condition	Code	Procedure
Application incorrect Attaching hardware	. A	Require replacement.
2	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
Broken, affecting performance Broken, not affecting	. A	Require replacement.
•		No service suggested or required.
	. A	Require replacement. Require replacement.
•	. A	Require replacement.
performance		

# MASTER CYLINDERS

# MASTER CYLINDER INSPECTION

Condition	Code	Procedure
	. В	Require repair or replacement.
Brake pedal drops intermittently	. A	(1) Require repair or replacement.
Fluid level low		(2) Further inspection required.
Internal valve failure . Master cylinder leaking	. A	Require repair or replacement.
brake fluid internally	. A	Require repair or replacement.
Piston does not return .	. A	Require repair or replacement.
Ports plugged Rubber master cylinder cover gasket distorted	. A	Require repair or replacement.
	. A	(3) Require replacement of the gasket.

- (1) This condition may be normal on some vehicles equipped with anti-lock brakes.
- (2) Refer to OEM procedures for adjusting low fluid level. Inspect for brake hydraulic system leaks and friction material wear.
- (3) This condition may indicate contaminated brake fluid. See BRAKE FLUID.

## **MODULATORS**

See HYDRAULIC MODULATORS.

## **MOTORS**

See ELECTRICAL PUMPS AND MOTORS.

## PARKING BRAKE SWITCHES

See SWITCHES.

# PARKING BRAKE SYSTEMS

NOTE: The parking brake is an i

The parking brake is an integral part of the brake system. It is important that the parking brake function properly when brake service is performed.

# PARKING BRAKE SYSTEM INSPECTION

-		
Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
Cable improperly adjusted	. В	Require cable adjustment.
	. A	Require replacement of cable assembly.
Cable sticking Cable stuck inside condui and cannot be lubricated so that parking brake	t	Require cable lubrication.
	. A	Require replacement of cable assembly.
Inoperative (1)	. A	Require replacement of inoperative parts.
Parking brake parts bent	. В	Require repair or replacement of bent parts.
Parking brake parts broken	. A	Require replacement of broken parts.
Parking brake parts		parts.

missing	С	Require replacement of miss	sing
Threads damaged Threads stripped (threads	А	par Require repair or replacement	ent.
	A	Require replacement	∍nt.
(1) - Inoperative includes	int	ermittent operation.	

# PADS

See FRICTION MATERIAL.

# PEDAL TRAVEL SWITCHES

See SWITCHES.

# PEDALS

See BRAKE PEDALS.

# POWERMASTER

See HYDRO-BOOSTERS.

# **PUMPS**

See ELECTRICAL PUMPS AND MOTORS.

# PRESSURE DIFFERENTIAL SWITCHES

See SWITCHES.

# PRESSURE SWITCHES

See SWITCHES.

# RELAYS

NOTE: Copied from Electrical UIGs

## RELAY INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
Housing broken Housing cracked Inoperative (1) Missing Terminal broken Terminal burned,	. 2 . A . C	Suggest replacement. Require replacement. Require replacement. Require repair or replacement.
affecting performance .	. A	(2) Require repair or replacement.

Terminal burned, not affecting performance .. 2 .. Suggest repair or replacement. Terminal corroded, affecting performance .. A .. Require repair or replacement. Terminal corroded, not affecting performance .. 2 Suggest repair or replacement. Terminal loose, affecting performance ..... Require repair or replacement. В Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement. (1) - Inoperative includes intermittent operation or out of OEM specification. (2) - Determine cause and correct prior to repair or replacement of part.

# **ROTORS**

Determine the need to recondition based upon individual rotor conditions that follow. Friction material replacement does not require rotor reconditioning unless other justifications exist. DO NOT recondition new rotors unless they are being pressed or bolted onto an existing hub. It is not necessary to replace rotors in axle sets. However, when replacing or reconditioning a rotor due to the conditions that follow, you may suggest reconditioning of the other rotor on the same axle to eliminate uneven braking behavior.

Determine the need to replace based upon the individual rotor conditions that follow. Reconditioning is defined as machining and block sanding, or block sanding only. Block sanding is defined as using 120-150 grit sandpaper with moderate to heavy force for 60 seconds per side. Always wash rotors after servicing or before installing.

#### ROTOR INSPECTION

Condition	Code	Procedure
Cracked	. B	(1) Require replacement Require replacement Suggest reconditioning or replacement of rotor according to OEM specifications.
Lateral runout (wobble) exceeds OEM specifications	. В	Require re-indexing, reconditioning, or replacement according to specifications.
Measured thickness is les than OEM discard specifications Rotor thickness is less than OEM "machine to" specifications but thick	. В	Require replacement.
than "discard at" specifications, and the rotor does not require	. 1	(2) Suggest replacement.

		(3) Require replacement.
Surface is rust-pitted	В	Require reconditioning or replacement of rotor according to OEM specifications.
Surface is scored	В	(4) Require reconditioning or replacement of rotor according to OEM specifications.
Thickness variation (parallelism) exceeds OEM		
specifications	В	Require reconditioning or replacement of rotor according to OEM specifications.

- (1) Examples of severe corrosion are: composite plate separated from friction surfaces and cooling fins cracked or missing.
- (2) Only applies to vehicles for which OEM "machine to" specifications exist. If OEM does not supply "machine to" specifications, the rotor may be worn to discard specifications.
- (3) If OEM does not supply "machine to" specifications, you may machine to discard specifications.
- (4) Scoring is defined as grooves or ridges in the friction contact surface. Some vehicle manufacturers require machining when scoring exceeds their allowable specifications.

# **SELF-ADJUSTING SYSTEMS**

SELF-ADJUSTING SYSTEM INSPECTION

Condition	Code	Procedure
Bent	. A	Require repair or replacement of bent part.
Broken	. A	Require repair or replacement of broken part.
Inoperative	. A	(1) Require repair or replacement of inoperative
Missing	. C	parts Require replacement of missing part.
Star wheel does not turn freely	. A	Require repair or replacement.
(1) - Inoperative include	s inte	ermittent operation.

#### SHOE HARDWARE

See BRAKE SHOE HARDWARE.

## **SHOES**

See FRICTION MATERIAL.

# **SOCKETS**

See BULB SOCKETS.

SPEED SENSORS (ELECTRONIC WHEEL AND VEHICLE)

NOTE: Copied Vehicle Speed Sensors from Engine UIGs & added Air Gap incorrect, loose, and wire lead misrouted. For "contaminated" removed coolant & fuel examples from note.

# SPEED SENSOR INSPECTION

Condition	Code	Procedure
Air gap incorrect	. В	(1) Require adjustment or replacement.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware threads damaged	. A	Require repair or replacement of hardware.
Attaching hardware threads stripped		
(threads missing)	. A	Require repair or replacement of hardware.
Connector broken Connector (Weatherpack		Require repair or replacement.
type) leaking Connector melted	. A	Require repair or replacement (2) Require repair or replacement.
Connector missing Contaminated		Require replacement (3) Require repair or
Inoperative	. В	replacement(4) Require repair or replacement. Further
Lead routing incorrect .	. В	inspection required Require rerouting according to vehicle manufacturer's
Looking	70	specifications.
Leaking Loose		Require repair or replacement.
Missing Resistance out of	. C	Require replacement.
specification	. B	Require repair or replacement.
Sensor housing cracked . Terminal broken		Suggest replacement Require repair or replacement.
Terminal burned, affecting performance .	. A	(2) Require repair or
Terminal burned, not		replacement.
affecting performance . Terminal corroded,	. 2	Suggest repair or replacement.
	. A	Require repair or replacement.
	. 2	Suggest repair or replacement.
affecting performance . Terminal loose, not	. В	Require repair or replacement.
affecting performance .		
Threads damaged Threads stripped	. A	Require repair or replacement.
(threads missing) Wire lead conductors	. A	Require replacement.
exposed		Require repair or replacement.
Wire lead corroded Wire lead misrouted		Require repair or replacement Require re-routing according to vehicle manufacturer's

specifications.

Wire lead open ........ A .. Require repair or replacement.

Wire lead shorted ...... A .. Require repair or replacement.

(1) - If a sensor is not adjustable, further inspection is required to identify and correct cause.

(2) - Determine cause and correct prior to repair or replacement of part.

(3) - Determine source of contamination, such as metal particles or water. Require repair or replacement.

(4) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable; check

## STEEL BRAKE LINES

for accepted cleaning procedure.

#### STEEL BRAKE LINE INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
Corroded, affecting structural integrity Fitting incorrect (for example, compression	. A	Require replacement.
fitting)	. B	Require replacement Require repair or replacement Require repair or replacement.
(copper, etc.) Restricted Routed incorrectly Rust-pitted Threads damaged Threads stripped	. A . B . 1	Require replacement Require routing correction Suggest replacement.
(threads missing)	. A	Require replacement.

## STOPLIGHT SWITCHES

See BRAKE STOPLIGHT SWITCHES.

# **SWITCHES**

NOTE: Copied from Electrical UIGs & added "float saturated" from old fluid level sensor switches.

#### STEEL BRAKE LINE INSPECTION

Condition		Code		Procedure
Attaching broken	hardware	А	 Require repair	or replacement of hardware.

Attaching hardware missing	С	Require replacement of
Attaching hardware not		hardware.
functioning	А	Require repair or replacement of hardware.
Binding, affecting performance	А	Require repair or replacement.
Binding, not affecting performance	2	Suggest repair or replacement.
Broken	Α	Require repair or replacement.
performance	A	(1) Require repair or replacement.
Burned, not affecting performance	2	(1) Suggest repair or
Cracked, affecting		replacement.
performance	A	Require repair or replacement.
performance	1	Suggest repair or replacement.
Float saturated Leaking	A A	Require replacement Require repair or replacement.
Malfunctioning	A	(2) Require repair or
		replacement.
Melted, affecting performance	А	(1) Require repair or
		replacement.
Melted, not affecting	2	(1) Suggest repair or
performance	2	(1) Suggest repair or replacement.
Missing	С	Require replacement.
Out of adjustment	В	Require repair or replacement.
Terminal broken Terminal burned, affecting	А	Require repair or replacement.
performance	Α	(1) Require repair or
Tarminal house of mak		replacement.
Terminal burned, not affecting performance	2	Suggest repair or replacement.
Terminal corroded,		
affecting performance Terminal corroded, not	A	Require repair or replacement.
affecting performance	2	Suggest repair or replacement.
Terminal loose, affecting		
performance Terminal loose, not	В	Require repair or replacement.
affecting performance	1	Suggest repair or replacement.
Won't return		
Worn	1	Suggest replacement.
(1) - Determine cause and creplacement of part.	orr	ect prior to repair or
(2) - Includes inoperative,		termittent operation, or failure to
perform all functions	•	

# **TIRES**

Consult the vehicle owner's manual or vehicle placard for correct size, speed ratings, and inflation pressure of the original tires.

Condition	Code		Procedure
Tire diameter incorrect, affecting ABS or TCS	. A	Require	replacement.
Tire pressure incorrect, affecting ABS or TCS Tire size incorrect,	. A	Require repair or	replacement.
affecting ABS or TCS	. A	Require	replacement.

# TOOTHED RINGS (TONE WHEEL)

NOTE: Copied from Drivetrain UIGs.

If the toothed ring requires replacement and cannot be replaced as a separate component, replace the assembly of which the ring is a part.

# TOOTHED RING INSPECTION

Condition	Code	Procedure
Alignment incorrect	. В	Require repair or replacement.
Bent	. В	Require replacement.
performance	. A	Require repair. Identify and correct cause.
Missing	. С	Require replacement.
<pre>incorrect Teeth broken Teeth damaged, affecting</pre>		
performance	. A	Require replacement.

# **VACUUM BOOSTERS**

# VACUUM BOOSTER INSPECTION

Condition	Code	Procedure
Applies too much assist (oversensitive) Attaching hardware	. A	Require replacement.
2	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement of hardware.
Auxiliary vacuum pump inoperative	. A	
Check valve grommet deteriorated, affecting performance	. A	Require replacement of grommet.

Check valve grommet deteriorated, not affecting performance	1	Cuggost roplacement of grownet
Check valve inoperative .		
Check valve leaking	A	Require replacement of check valve.
Check valve missing	С	Require replacement of check valve.
Check valve noisy Connector broken Connector (Weatherpack	2 A	Suggest replacement Require repair or replacement.
type) leaking	A A C A	Require repair or replacement (3) Require replacement Require replacement Require replacement.
performance	A	(3) Require repair or replacement.
Terminal burned, not affecting performance Terminal corroded,	2	Suggest repair or replacement.
affecting performance Terminal corroded, not	A	Require repair or replacement.
affecting performance Terminal loose, affecting	2	Suggest repair or replacement.
performance Terminal loose, not	В	Require repair or replacement.
affecting performance Threads damaged Threads stripped (threads	1 A	<ul><li> Suggest repair or replacement.</li><li> Require repair or replacement.</li></ul>
missing) Vacuum hose filter	Α	Require replacement.
leaking Vacuum hose filter	А	Require replacement of filter.
restricted	A A	<ul><li>Require replacement of filter.</li><li>Require repair or replacement.</li></ul>
exposed	B A A	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>
OEM specification. (2) - Inoperative includes	int	ermittent operation or out of ermittent operation. ect prior to replacement of part.

# **VACUUM HOSES**

See HOSES.

# VALVES

VALVE INSPECTION

Condition	Code		Procedure
Attaching hardware broken	. A	Require re	pair or replacement of hardware.
Attaching hardware missing	. C	Req	uire replacement of

hardware.

Attaching hardware not functioning	А	Require repair or replacement of hardware.
LeakingLinkage bent (rear	В	
load valves)	A	Require repair or replacement of linkage.
Linkage broken (rear load valves)	А	Require repair or replacement of linkage.
Linkage disconnected (rear load valves)	С	Require repair or replacement of linkage.
Pressure out of		
specification	В	Require adjustment. If not possible, require replacement.
Seized	A A	Require replacement Require repair or replacement.
Terminal burned,	А	Require repair or repracement.
affecting performance	A	(1) Require repair or replacement.
Terminal burned, not		
affecting performance Terminal corroded,	2	Suggest repair or replacement.
affecting performance	A	Require repair or replacement.
Terminal corroded, not affecting performance	2	Suggest repair or replacement.
Terminal loose, affecting	_	baggest repair of repracement.
performance	В	Require repair or replacement.
affecting performance	1	Suggest repair or replacement.
Threads damaged	Α	Require repair or replacement.
Threads stripped (threads	_	
missing)	A	Require replacement.
Wire lead burned Wire lead conductors	A	Require repair or replacement.
exposed	В	Require repair or replacement.
Wire lead open	Α	Require repair or replacement.
Wire lead shorted	A	Require repair or replacement.
(1) - Determine cause and coof part.	orre	ect prior to repair or replacement

# WHEEL ATTACHING HARDWARE

For conditions noted below, also check condition of wheel stud holes.  $\ensuremath{\,}^{\circ}$ 

CAUTION: Proper lug nut torque is essential. Follow manufacturer's torque specifications and tightening sequence. DO NOT lubricate threads unless specified by the vehicle manufacturer.

# WHEEL ATTACHING HARDWARE INSPECTION

Condition	Code	Procedure
Broken	. A	

	А	Require replacement of nut.
Lug nut installed		
backward	В	Require repair.
Lug nut mating surface		
dished	Α	Require replacement of nut.
Lug nut mating type		
incorrect	В	Require replacement of nut.
Lug nut seized	Α	Require replacement of nut
		and/or stud.
Stud incorrect	В	Require replacement of stud.
Threads damaged	Α	Require repair or replacement
3		of component with damaged
		threads.
Threads stripped (threads		
	Α	Require replacement of
, , , , , , , , , , , , , , , , , , , ,		component with stripped
		threads.

(1) - Some manufacturers require replacement of all studs on any wheel if two or more studs or nuts on the same wheel are broken or missing.

# WHEEL BEARINGS, RACES AND SEALS

NOTE:

Grease seal replacement is required if seal is removed. You are not required to replace these components in axle sets. Determine the need to replace based upon the individual component conditions that follow.

# WHEEL BEARINGS, RACES AND SEALS INSPECTION

Condition	Code	Procedure
Axle seal on drive axle leaking	. A	inspection of axle, bearing,
Bearing end-play exceeds specifications	. В	housing, and vent tube.  Require adjustment of bearing, if possible. If proper adjustment cannot be obtained, require replacement of bearing
Bearing rollers, balls or races are worn, pitted, of feel rough when rotated a		assembly.
an assembly	. В	Require replacement of bearing assembly.
Seal leaking	. A	(1) Require replacement of seal and inspection of bearings.
Spindle worn	. В	Require replacement of spindle and bearings.
(1) - Require inspection (	of mat	ing and sealing surface and

repair or replace as necessary. Check vent. A plugged vent may force fluid past the seal.

# WHEEL CYLINDERS

You are not required to replace or rebuild wheel cylinders in axle sets. However, when rebuilding or replacing a wheel cylinder due

to the conditions that follow, you may suggest rebuilding or replacement of the other wheel cylinder (on the same axle) for preventive maintenance, for example, the part is close to the end of its useful life.

Determine the need to rebuild or replace based upon the individual wheel cylinder conditions that follow.

# WHEEL CYLINDER INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	Require replacement of bent parts.
Attaching hardware broken	. A	-
Attaching hardware corroded, affecting structural integrity	. A	. Require replacement of corroded
Attaching hardware loose	. A	parts Require repair or replacement.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement
Bleeder port damaged (if non-repairable) Bleeder screw broken off		of hardware Require replacement.
<pre>in wheel cylinder (if no repairable) Bleeder screw plugged</pre>	. A	(1) Require replacement (1) Require repair or replacement of bleeder screw.
Bleeder screw seized Bore corroded (pitted) . Bore grooved Bore oversized Dust boot missing	<ul><li>B</li><li>A</li><li>B</li></ul>	(2) Require replacement Require replacement Require replacement Require replacement Require replacement of dust
Dust boot torn	. A	. (3) Require replacement of dust boot.
Leaking	. A	(4) Require rebuilding or replacement.
Piston corroded, affecting performance	-	Require replacement of piston and rebuilding or replacement
Piston finish worn off .	. В	of wheel cylinder Require replacement of piston and rebuilding or replacement
Piston stuck in bore	. A	of wheel cylinder Require replacement of wheel
Loose	. A	cylinder Require repair or replacement Require repair or replacement.
missing)		Require replacement.

- (1) Only required if the hydraulic system must be opened.
- (2) Seized is defined as bleeder screw that cannot be removed after a practical attempt at removing. Only required if the hydraulic system must be opened.

- (3) Inspect for conditions related to wheel cylinder.(4) Leaking is defined as a drop or more. Dampness is normal.

# WIRING HARNESSES

Copied from Electrical UIGs.

WIRING HARNESS INSPECTION

Condition	Code	Procedure
Application incorrect Attaching hardware	. В	Require repair or replacement.
broken	. A	Require repair or replacement of hardware.
Attaching hardware missing	. C	Require replacement of hardware.
Attaching hardware not functioning	. A	Require repair or replacement
Connector broken Connector (Weatherpack	. A	of hardware Require repair or replacement.
type) leaking Connector melted	. A	Require repair or replacement (1) Require repair or replacement.
Connector missing Insulation damaged,	. C	Require replacement.
conductors exposed Insulation damaged,	. A	$\ldots$ Require repair or replacement.
conductors not exposed Open		Suggest replacement Require repair or replacement.
Protective shield (conduit) melted	. 2	(1) Suggest repair or replacement.
Protective shield (conduit) missing Resistance (voltage drop)		Suggest repair or replacement.
out of specification Routed incorrectly Secured incorrectly Shorted Terminal broken	. A . B . B . A . A	Require repair or replacement. Require repair. Require repair. Require repair or replacement. Require repair or replacement.
Terminal burned, affectin performance		(1) Require repair or replacement.
	. 2	<u>-</u>
	. A	Require repair or replacement.
	. 2	Suggest repair or replacement.
Terminal loose, affecting performance	. В	Require repair or replacement.
Terminal loose, not affecting performance . Voltage drop out of	. 1	Suggest repair or replacement.
	. A	Require repair or replacement.
(1) - Determine cause and replacement of part		ect prior to repair or