



Service Parts Topics

Date	November, 1999	T601
No.	99T5-7A	
File Group:	5	Engine Family B C

Subject

Fuel Shutdown Solenoid Troubleshooting and Repair

T & R Manual	Shop Manual	O & M Manual	A R Manual	Specs Manual	Other
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NOTE: This service parts topic supersedes topic 99T5-7; please replace 99T5-7 with this one. Additional information for the Freightliner, Bluebird, and Ford applications have been added to this topic.

This service parts topic provides a comprehensive set of troubleshooting guidelines for fuel shutdown solenoids manufactured by Synchro-Start Products, Inc. for Cummins Engine Company, Inc.

The changes suggested in this service parts topic include product improvements of solenoid, wiring, and mechanical linkage components. Product issues with the solenoid system can possibly include, but are **not** limited to, the following scenarios:

1. Engine will **not** start.
2. Engine starts but will **not** shut down.
3. Engine starts but will **not** continue to run.
4. Solenoid pull coil is wired to the "S" terminal of the starter.

Engines Affected

Two-valve 4B, 6B, and 6C

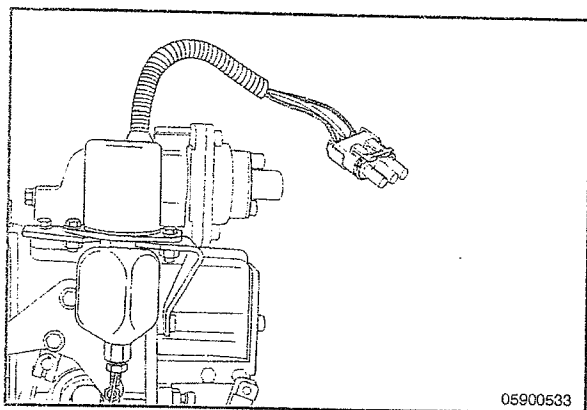
All applications

All ratings

Information

1. The Cummins wiring harness overlay, Part No. 3935750 and 3935751, included in this service parts topic will **not** work on a Bluebird bus or any application equipped with a Synchro-Start pull-coil timer module. There are also several other types of pull-coil timers on the market. If there is a question whether or **not** these wiring harness overlays will work with the system being repaired, call Cummins Engine Company's Midrange Service Engineering Department at 1-812-377-9059.
2. For all fuel shutdown solenoid capscrews that are directly screwed into the aluminum body in-line fuel pumps, the M6 capscrews will be tightened to 7 N•m [62 in-lb] and fastened with Loctite 242, Part No. 3824040 or 3824041.
3. For all fuel shutdown solenoids attached to steel brackets, the capscrews will be tightened to 9 N•m [80 in-lb] and fastened with Loctite 242.

NOTE: This is a product improvement and is **not** subject to campaign.

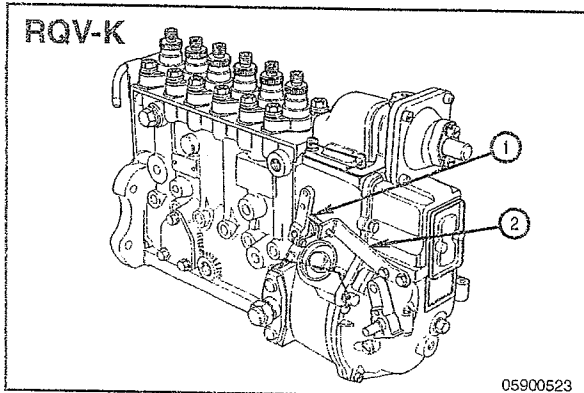


Fuel Shutdown Solenoid Troubleshooting and Repair

1. With the shutdown lever held in the SHUTDOWN position, check the battery voltage while cranking the engine.

- If the battery voltage drops to less than 11 VDC while cranking the engine, repair the charging system, or replace the battery.
- If battery voltage is greater than 11 VDC while cranking the engine, go to step 2.

RQV-K

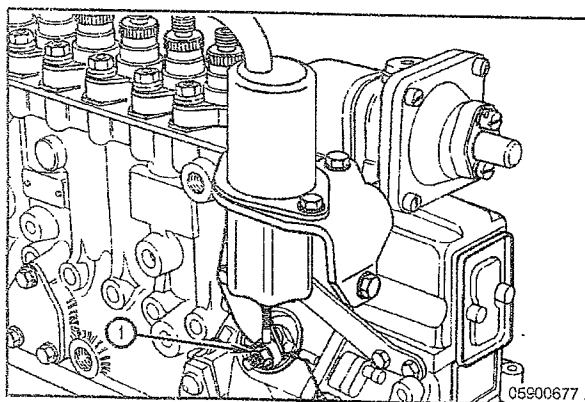


2. Check for a shutdown lever stop screw (1) and bracket (2) on the fuel pump governor assembly.



- If the stop bracket and screw are **not** present or if the stop bracket is broken, obtain the parts listed in the table, and install the stop screw and bracket on the governor housing. If the problem still exists, go to step 3.
- If the stop screw and bracket are present, go to step 3.

Fuel Pump Governor Type	Quantity	Cummins Part No.	Bosch® Part No.
RSV stop bracket	1	3934449	9 421 270 200
RSV stop screw	1	3934450	1 423 450 036
RSV M6 nut	1	3934451	2 915 011 007
RSV M6 x 16-mm capscrew	2	3600815	
RQVK stop bracket	1	3935762	2 421 332 099
RQVK stop screw	1	3934450	1 423 450 036
RQVK M6 nut	1	3093946	



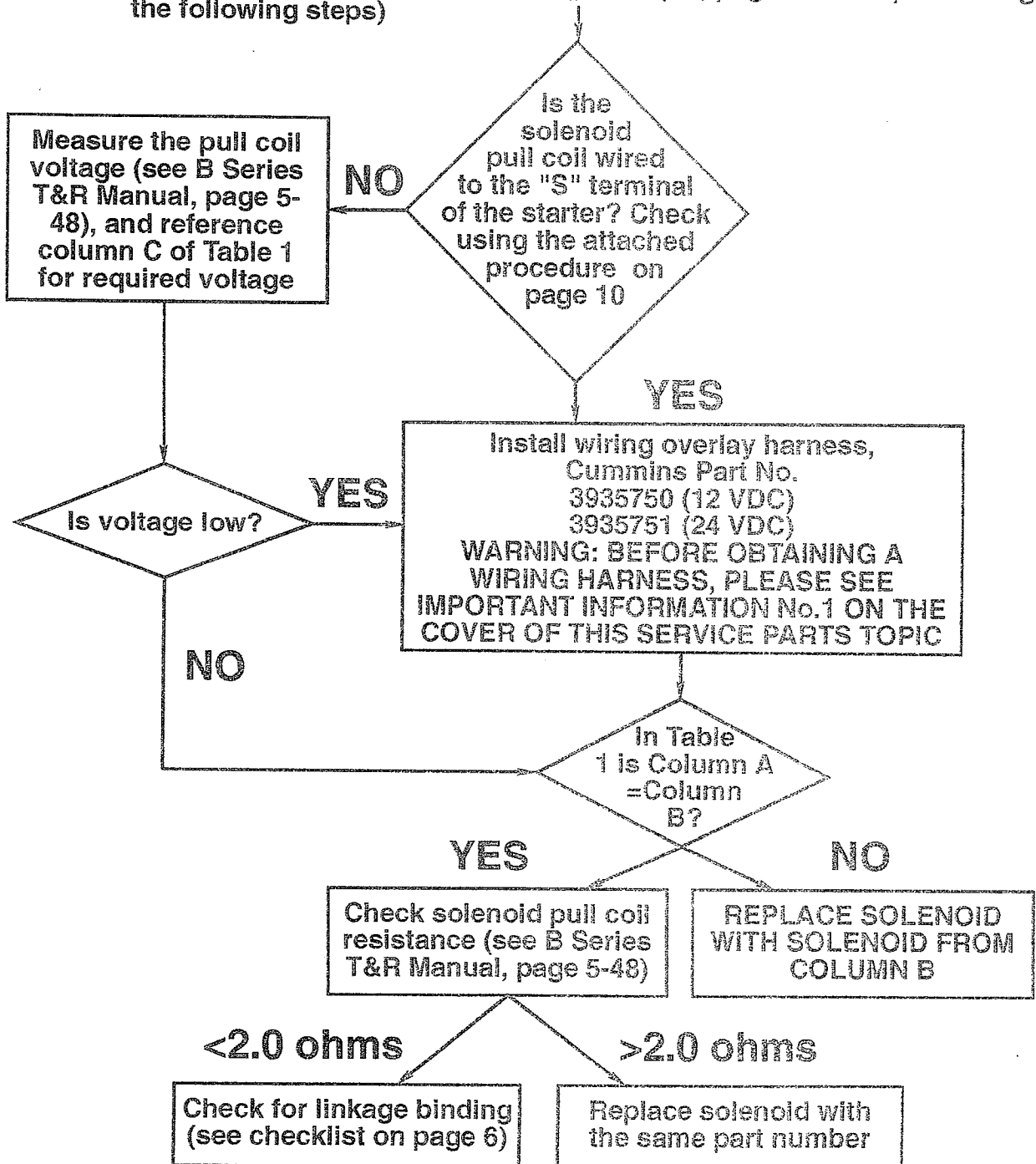
3. Inspect the shutdown system during several cycles of the ignition switch. Check for complete shutoff lever travel, from resting against the stop screw to the RUN position.

- If the solenoid pulls in and operates normally but the engine will **not** start, see the appropriate troubleshooting symptom charts for other fuel system issues in the troubleshooting and repair manual.
- If the solenoid does **not** pull in and the engine will **not** start, go to the **NO START** flowchart on page 3.
- If the solenoid pulls in but will **not** hold in (engine starts but will **not** continue to run), go to the **NO RUN** flowchart on page 4.
- If the solenoid pulls in but does **not** return to the SHUTDOWN position (engine starts but will **not** shut down), go to the **NO SHUTDOWN** flowchart on page 5.

NO START

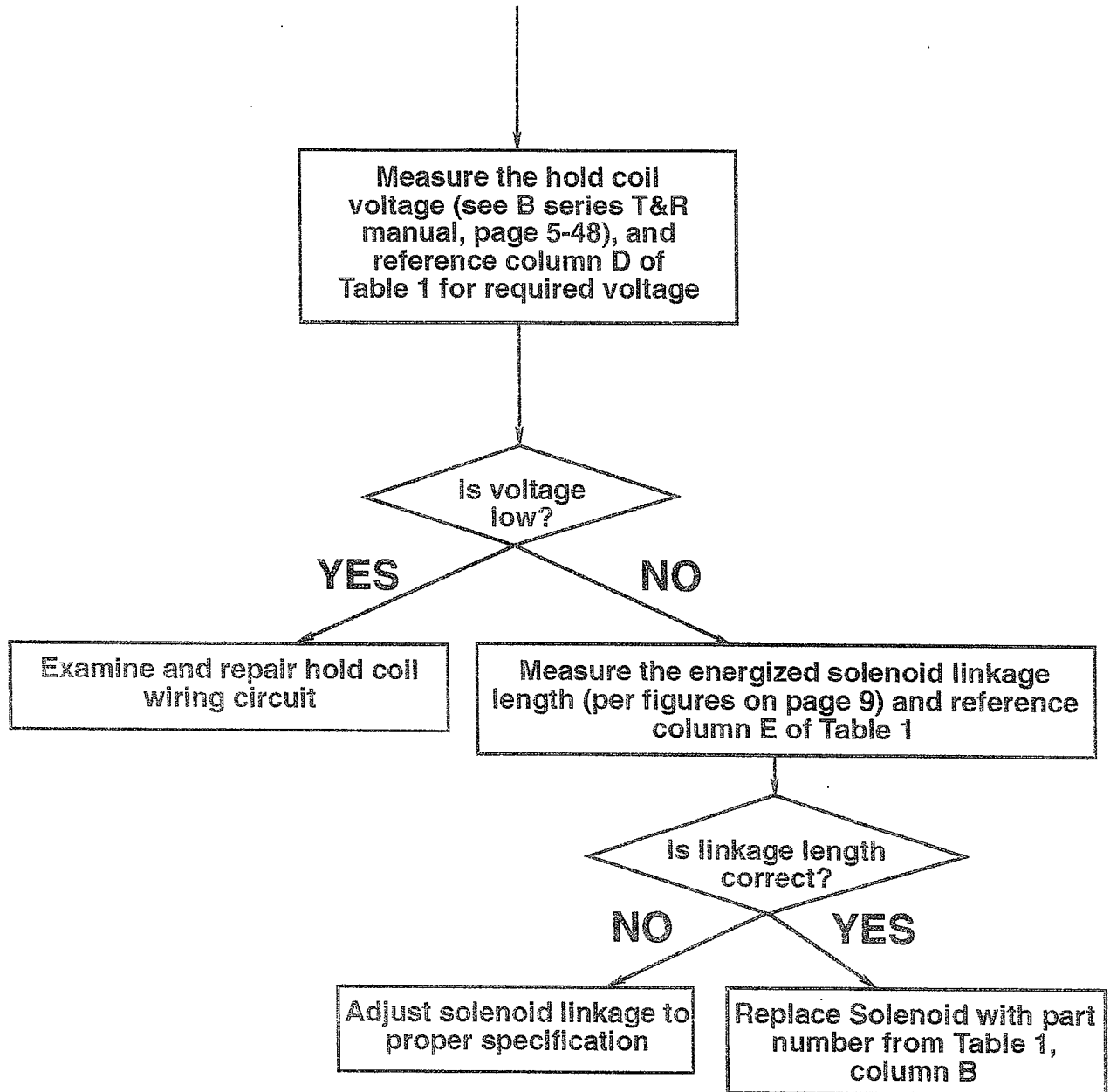
(Solenoid does not pull in)

NOTE: Battery Voltage must be checked (per step 1, page 2 before performing the following steps)

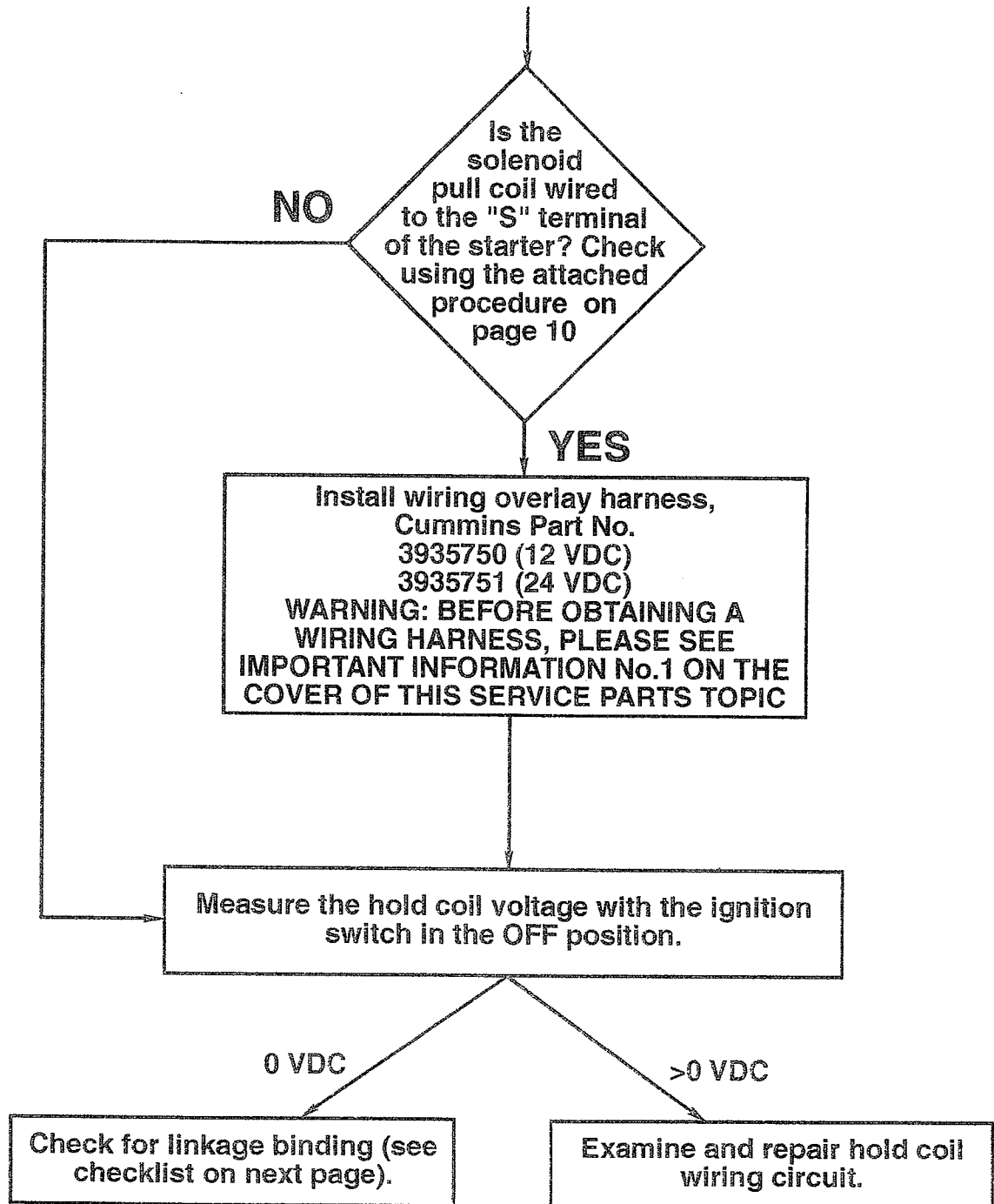


NO RUN

(solenoid pulls in but will not hold in)



NO SHUTDOWN



BINDING CHECKLIST

Check for the following:

1. External solenoid linkage corrosion
2. Misalignment of solenoid bracket
3. Broken swivel (this will be inside the boot for all RPS88 solenoids)
4. Torn boot (leads to No. 8)
5. Swivel hex hitting stop lever
6. Capscrews that connect solenoid rod end to shutoff lever, hitting on governor housing
7. Improper spring-on shutoff lever (RSV governors)
8. Excessive plunger-to-liner friction.

Check this procedure by unhooking the solenoid rod end and manually pushing the plunger into the solenoid liner, being sure to start approximately at the 1-inch maximum travel position.

Table 1, Fuel Shutdown Solenoid Specifications

A		B	C	D	E	
On Engine Solenoid Part No.	Engine/ Pump/ Governor or Exception	New Solenoid Part No. (*solenoid kit)	Minimum Pull-in Voltage	Minimum Hold-in Voltage	Energized Rod Length (in)	Rod Length Fig. No.
3282656	4B/A/RSV	3800670*	8.7	5.8	6.33	4
	6B/A/RSV	3800602*	8.7	5.8	6.33	4
	6B/P/RSV	3800604*	8.7	5.8	5.15	4
3282460	4B/A/RSV	3800671*	17.1	11.9	6.33	4
	6B/A/RSV	3800603*	17.1	11.9	6.33	4
	6B/P/RSV	3800605*	17.1	11.9	5.15	4
3349017		3349017	10.8	5.8	5.37	1
3349081		3349081	21.6	11.6	5.37	1
3354943		3354943	10.9	6.7	5.65	2
3355427		3355427	21.8	13.4	5.65	2
3919422**	See Note	3800677*	8.3	4.4	2.93	1
3919422	4B Freightliner	3800687***	8.3	4.4	8.81	1
	6B Freightliner	3800679***	8.3	4.4	11.63	1
	Ford	3800675*	8.3	4.4	2.93	1
	Bluebird	3800777*	8.3	4.4	2.93	1
3919423**	See Note	3800678*	16.6	8.8	2.93	1
3919423	4B Freightliner	3800678***	16.6	8.8	28.81	1
	6B Freightliner	3800680***	16.6	8.8	11.63	1
	Ford	3800676*	16.6	8.8	2.93	1
	Bluebird	3800778*	16.6	8.8	2.93	1
3923201	Chrysler	3800723*	8.3	4.4	2.93	1
3923257		3928160	8.3	5.8	4.61	1
3923258		3928161	16.6	11.6	4.61	1
3924137		3924137	10.0	5.7	6.67	2
3924450	Thomas	3806186*	8.3	4.2	11.63	1
3926329**		3800678*	16.6	8.8	2.93	1
3926329	4B Freightliner	3800678***	16.6	8.8	8.81	1
	6B Freightliner	3800680***	16.6	8.8	11.63	1
	Ford	3800676*	16.6	8.8	2.93	1
	Bluebird	3800778*	16.6	8.8	2.93	1
3926411		3926411	9.6	6.2	5.5	2
3926412		3926412	19.4	12.4	5.5	2
3927152**	See Note	3800677*	8.3	4.4	2.93	1
3927152	4B Freightliner	3800687***	8.3	4.4	8.81	1
	6B Freightliner	3800679***	8.3	4.4	11.63	1
	Ford	3800675*	8.3	4.4	2.93	1
	Bluebird	3800777*	8.3	4.4	2.93	1
3928160		3928160	8.3	5.8	4.61	1
3928161		3928161	16.6	11.6	4.61	1
3930233		3930233	8.3	5.8	4.61	1
3930234		3930234	16.6	11.6	4.61	1
3930235		3930235	8.0	5.8	6.04	2
3930236		3930236	16.0	11.6	6.04	2
3930658		3932529	9.7	4.7	6.33	4
3930964		3930964	8.3	4.4	11.63	1

(Continued)

A		B	C	D	E	
3931195	4B/A/RSV	3800670*	8.7	5.8	6.33	4
	6B/A/RSV	3800602*	8.7	5.8	6.33	4
	6B/P/RSV	3800604*	8.7	5.8	5.15	4
3931196	4B/A/RSV	3800671*	17.1	11.9	6.33	4
	6B/A/RSV	3800603*	8.7	5.8	6.33	4
	6B/P/RSV	3800605*	8.7	5.8	5.15	4
3931557	Chrysler	3800723*	8.3	4.3	2.93	1
3931570	Chrysler	3800723*	8.3	4.4	2.93	1
3931590		3932530	19.1	9.4	6.33	4
3932017 ¹		3932625	8.7	5.3	4.62	3
3932018 ²		3932626	17.4	10.6	4.62	3
3932529		3932529	9.7	4.7	6.33	4
3932530		3932530	19.1	9.4	6.33	4
3932545		3932545	8.3	4.4	5.79	1
3932546		3932546	16.6	8.8	5.79	1
3932625 ¹		3932625	8.7	5.3	4.62	3
3932626 ²		3932626	17.4	10.6	4.62	3
3934171**	See Note	3800677*	8.3	4.4	2.93	1
3934171	4B Freightliner	3800687***	8.3	4.4	8.81	1
	6B Freightliner	3800679***	8.3	4.4	11.63	1
	Ford	3800675*	8.3	4.4	2.93	1
	Bluebird	3800777*	8.3	4.4	2.93	1
3934172**	See Note	3800678*	16.6	8.8	2.93	1
3934172	4B Freightliner	3800678***	16.6	8.8	8.81	1
	6B Freightliner	3800680***	16.6	8.8	11.63	1
	Ford	3800676*	16.6	8.8	2.93	1
	Bluebird	3800778*	16.6	8.8	2.93	1
3934174		3934174	8.3	4.4	9.86	1
3934177		3934177	16.6	8.8	9.86	1
3934948		3934948	10.2	6.4	5.67	2
3934972**	See Note	3800677*	8.3	4.4	2.93	1
3934972	4B Freightliner	3800687***	8.3	4.4	8.81	1
	6B Freightliner	3800679***	8.3	4.4	11.63	1
	Ford	3800675*	8.3	4.4	2.93	1
	Bluebird	3800777*	8.3	4.4	2.93	1
3934973**	See Note	3800678*	16.6	8.8	2.93	1
3934973	4B Freightliner	3800678***	16.6	8.8	8.81	1
	6B Freightliner	3800680***	16.6	8.8	11.63	1
	Ford	3800676*	16.6	8.8	2.93	1
	Bluebird	3800778*	16.6	8.8	2.93	1
3934974	Chrysler	3800723*	8.3	4.4	2.93	1
3935429		3935429	8.7	17.1	6.33	4
3935430		3935430	5.8	11.9	6.33	4
3935431		3935431	8.7	5.8	5.15	4
3935432		3935432	17.1	11.9	5.15	4
3935456	6B/P/RQVK	3935456	8.3	4.4	11.63	1
3935457	6B/P/RQVK	3935457	15.7	8.8	11.63	1
3935458	4B/P/RQVK	3935458	8.8	4.4	8.81	1
3935459	4B/P/RQVK	3935459	15.7	8.8	8.81	1
3935649		3935649	8.3	4.4	2.93	1
3935650		3935650	16.6	8.8	2.93	1

(Continued)

A		B	C	D	E	
3936026	Chrysler	3936026	8.3	4.4	2.93	1
4003403	Marine (EPS)	4003403	11.0	4.1	N/A	N/A
4003404	Marine (EPS)	4003404	21.8	8.1	N/A	N/A
4003405	Marine (EPS)	4003405	11.0	4.1	N/A	N/A
4003406	Marine (EPS)	4003406	21.8	8.1	N/A	N/A

NOTE: * Solenoid Kit

** The kit in column B will **not** work with Ford, Freightliner vehicles with custom bodies, or Bluebird buses.

*** Freightliner vehicles with custom bodies such as Oshkosh or Utilimaster **must** use this kit. Complete Freightliner vehicles can use the solenoid kit in column B of the first row of a given part number that is listed.

¹ Same as Part No. 3931195.

² Same as Part No. 3931196.

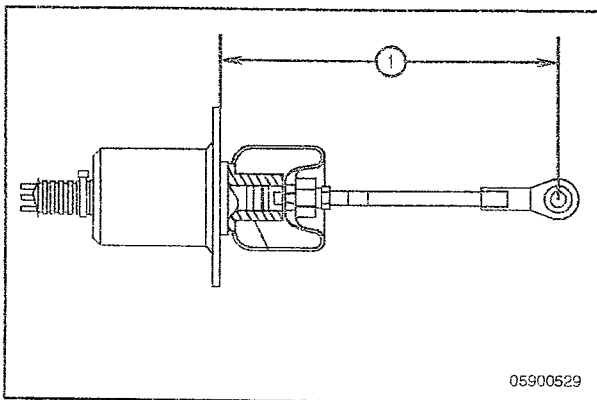


Fig. 1 (1, Rod Length)

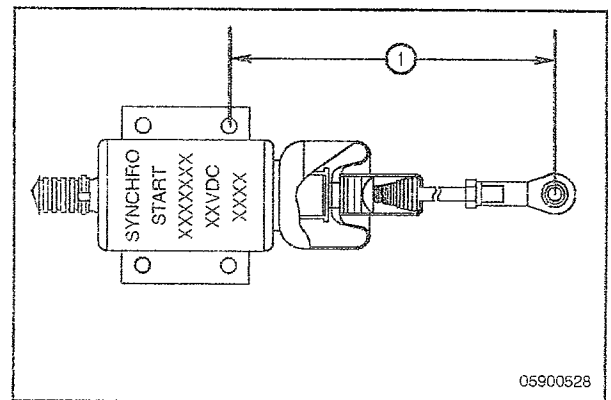


Fig. 2 (1, Rod Length)

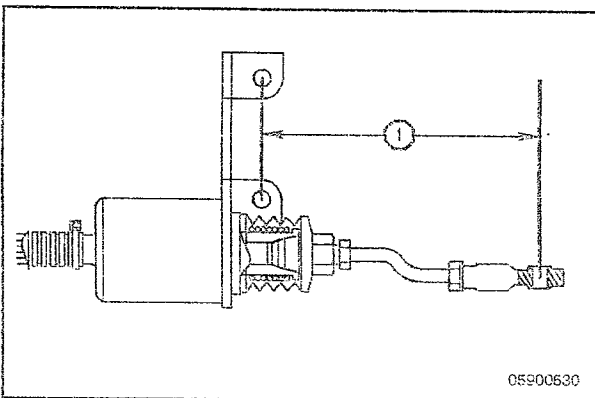


Fig. 3 (1, Rod Length)

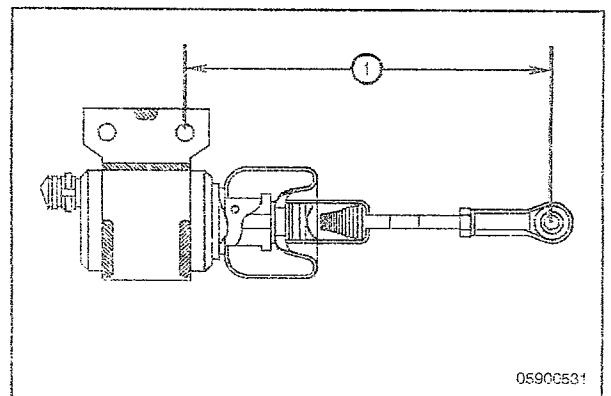
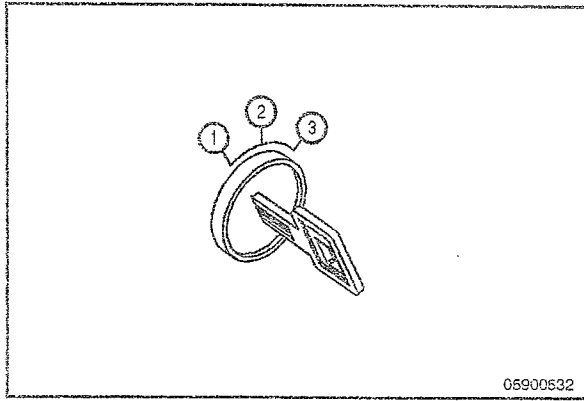
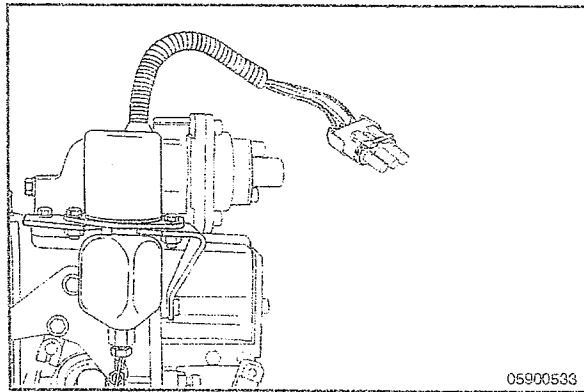


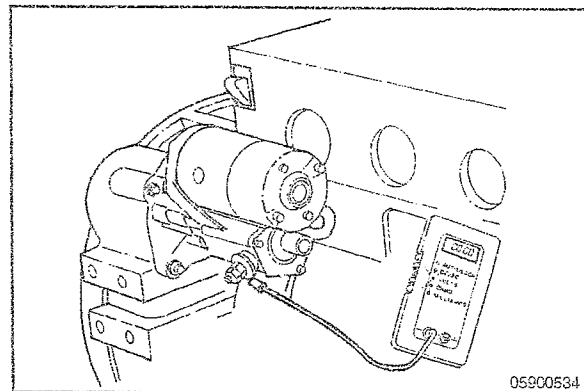
Fig. 4 (1, Rod Length)

**Test for Pull Coil Wired to the "S" Terminal of the Starter**

1. Turn the ignition switch to the OFF position.



2. Disconnect the fuel shutdown solenoid electrical connector.



3. Place one end of the digital multimeter on the "S" terminal of the starter.

4. Place the other lead of the digital multimeter on the center pin (B) of the OEM wiring harness solenoid electrical connector. This is the pin opposite the white wire of the solenoid side of the connector.

Measure the resistance between these two points. The resistance should be infinite (open circuit) if the solenoid is wired correctly. If the resistance is **not** infinite, the solenoid is wired to the "S" terminal of the starter.