SECTION 14

ENGINE TUNE-UP

CONTENTS

ENGINE TUNE-UP PROCEDURES

There is no scheduled interval for performing an engine tune-up. As long as the engine performance is satisfactory, no tune-up should be needed. Minor adjustments in the valve and injector operating mechanism, governor, etc. should only be required periodically to compensate for normal wear on parts.

To comply with emissions regulations for on-highway vehicle engines, injector timing, exhaust valve clearance, engine idle and no-load speeds, and throttle delay or fuel modulator settings must be checked and adjusted, if necessary, at 50,000 mile intervals (refer to Section 15.1).

The type of governor used depends upon the engine application. Since each governor has different characteristics, the tune-up procedure varies accordingly. The following types of governors are used:

1. Limiting speed mechanical.
2. Variable speed mechanical.
3. Hydraulic.

The mechanical governors are identified by a name plate attached to the governor housing. The letters D.W.-L.S. stamped on the name plate denote a double-weight limiting speed governor. A single-weight variable speed governor name plate is stamped S.W.-V.S.

Normally, when performing a tune–up on an engine in service, it is only necessary to check the various adjustments for a possible change in the settings. However, if a cylinder head, governor or injectors have been replaced or overhauled, then certain tune–up adjustments are required. Accurate tune–up adjustments are very important if maximum performance and economy are to be obtained.

If a supplementary governing device, such as the throttle delay mechanism, is used, it must be disconnected prior to the tune–up. After the governor and injector rack adjustments are completed, the supplementary governing device must be reconnected and adjusted.

To tune–up an engine completely, perform all of the adjustments in the applicable tune–up sequence given below.

CAUTION: To prevent the possibility of personal injury, use turbocharger inlet shield J 26554–A anytime the turbocharger inlet is exposed.

Use new valve rocker cover gaskets after the tune–up is completed and reinstall the valve rocker covers.

Tune–Up Sequence For Mechanical Governor

CAUTION: Before starting an engine after an engine speed control adjustment or after removal of the engine governor cover, the technician must determine that the injector racks move to the no–fuel position when the governor stop lever is placed in the stop position. Engine overspeed will result if the injector racks cannot be positioned at no fuel with the governor stop lever. An overspeeding engine can result in engine damage which could cause personal injury.

1. Adjust the exhaust valve clearance, cold.
2. Time the fuel injectors.
3. Adjust the governor gap.
4. Position the injector rack control levers.
5. Adjust the maximum no–load speed.
6. Adjust the idle speed.
7. Adjust the Belleville spring for "TT" horsepower.
8. Adjust the buffer screw.
9. Adjust the throttle booster spring (variable speed governor only).
10. Adjust the supplementary governing device, if used.

Tune–up Sequence For Hydraulic Governor

1. Adjust the exhaust valve clearance.
2. Time the fuel injectors.
3. Position the injector rack control levers.
4. Adjust the governor linkage.
5. Adjust the load limit screw.
6. Compensation adjustment (PSG governors only).
7. Adjust the speed droop.
8. Adjust the maximum no–load speed.

EMISSIONS REGULATIONS FOR ON-HIGHWAY VEHICLE ENGINES

On–highway vehicle engines built by Detroit Diesel Allison are certified to be in compliance with Federal and California Emission Regulations established for each model year.

Engine certification is dependent on five physical characteristics:

1. Fuel injector type.
2. Maximum full–load engine speed.
3. Camshaft timing.
4. Fuel injector timing.
5. Throttle delay (orifice size).

The following Charts summarize all of the pertinent data concerning the specific engine configurations required for each model year.

When serviced, all on–highway vehicle engines should comply with the specifications for the specific model year in which the engine was built.

Trucks in a fleet containing engines of various model years can be tuned to the latest model year, provided the engines have been updated to meet the specifications for that particular year.

1974 CERTIFIED AUTOMOTIVE ENGINES

Engine	Injectors	*Maximum Full-Load Engine Speed	Camshaft Timing	Injector Timing	Injector Timing Gage	Throttle Delay	Yield Link
6V, 8V	9270	2100	Standard	1.460"	J 1853	No	No
6V, 8V	9275	2100	Standard	1.460"	J 1853	No	No
6V, 8V	9280	2100	Standard	1.460"	J 1853	No	No
6VT, 8VT	9280	2100	Standard	1.484"	J 1242	‡ Yes	Yes
6V, 8V	9285	2100	Standard	1.460"	J 1853	No	No
6VT, 8VT	9285	2100	Standard	1.484"	J 1242	‡ Yes	Yes
6VT, 8VT	9290	2100	Standard	1.484"	J 1242	‡ Yes	Yes

* Not to exceed fuel injector size and maximum operating speed that has been established for the specific application of the engine.

‡ .078" diameter fill hole, .016" diameter discharge orifice.

Use minimum idle speed of 500 rpm on all engines.

1975 CERTIFIED AUTOMOTIVE ENGINES

Engine	Injectors	*Maximum Full-Load Engine Speed	Camshaft Timing	Injector Timing	Injector Timing Gage	Throttle Delay	Yield Link
FEDERAL							
6V, 8V	9270	2100	Standard	1.460"	J 1853	No	No
6V, 8V	9275	2100	Standard	1.460"	J 1853	No	No
6V, 8V	9280	2100	Standard	1.460"	J 1853	No	No
6VT, 8VT	9280	2100	Standard	1.484"	J 1242	‡ Yes	Yes
6V, 8V	9285	2100	Standard	1.460"	J 1853	No	No
6VT, 8VT	9285	2100	Standard	1.484"	J 1242	‡ Yes	Yes
6VT, 8VT	9290	2100	Standard	1.484"	J 1242	‡ Yes	Yes
FEDERAL AND CALIFORNIA							
6VTA, 8VTA	9280	2100	Standard	1.484"	J 1242	§‡ Yes	Yes
6VTA, 8VTA	9285	2100	Standard	1.484"	J 1242	§‡ Yes	Yes
6VTA, 8VTA	9290	2100	Standard	1.484"	J 1242	§‡ Yes	Yes

* Not to exceed fuel injector size and maximum operating speed that has been established for the specific application of the engine.

‡ .078" diameter fill hole, .016" diameter discharge orifice.

§ Offset piston linkage.

Use minimum idle speed of 500 rpm on all engines, except coach engines where a minimum of 400 rpm is allowed.

1976 CERTIFIED AUTOMOTIVE ENGINES

Engine	CALIFORNIA				FEDERAL							
	6V-92TA Aftercooled		8V-92TA Aftercooled		6V-92	8V-92	6V-92T			8V-92T		
	TA	TTA	TA	TTA			T	OTM	TT	T	OTM	TT
Injectors	9A80 9A85 9A90	9A90	9280 9285 9290	9290	9270 9275 9280 9285	9270 9275 9280 9285	9280 9285 9290	9280 9285 9290	9290	9280 9285 9290	9280 9285 9290	9290
Approved Constant Horsepower for TTA Engines		270		365					240-270			365
*Maximum Full-Load Engine Speed	2100	▲ 1900 min. 1950 max.	2100	▲ 1900 min. 1950 max.	2100	2100	2100	2100	▲ 1900 min. 1950 max.	2100	2100	▲ 1900 min. 1950 max.
Camshaft Timing	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.500"	1.500"	1.484"	1.484"	1.460"	1.460"	1.484"	1.484"	1.484"	1.484"	1.484"	1.484"
Throttle Delay Yield Link	‡ Req'd.	‡ Req'd.	‡ Req'd.	‡ Req'd.	Not Req'd.	Not Req'd.	‡ Req'd.	‡ Req'd.	‡ Req'd.	‡ Req'd.	‡ Req'd.	‡ Req'd.
Turbocharger A/R	TV 8102 1.08	TV 8102 1.08	TV 8101 1.60	TV 8101 1.60			T 18A40 1.14	TV 8102 1.2.3	TV 8102 1.23	T 18A40 1.50	TV 8101 1.84	TV 8101 1.84

* Use a minimum idle speed of 400 rpm on all coach engines with throttle delay, and a minimum idle speed of 500 rpm on all other automotive applications.

▲ TT (TTA) must have full load rpm within the range shown.

‡ .078" diameter fill hole, .016" diameter discharge orifice.

6V and 8V-92 engine cylinder liners have a 1.05" port height; 1.95:1 blower drive ratio (6V-92TA).

1977 CERTIFIED AUTOMOTIVE ENGINES

(Federal)

Engine	6V-92	8V-92	6V-92T			8V-92T			8V-92TA	
			T	OTM	TT	T	OTM	TT	T	TT
(a) Injectors	9270 9275 9280 9285	9270 9275 9280 9285	9280 9285 9290	9280 9285 9290	9290	9280 9285 9290	9280 9285 9290	9290 9A90	9290	9290
(a) Approved Minimum Constant Horsepower					Min. - Max. 240-270			365 (9290) 335 (9A90)		365
(a) Maximum Rated Speed	2100	2100	2100	2100	1950	2100	2100	2100 (9290)	2100	2100
(a) Minimum Rated Speed	2100 (9270) 1950 (9275) 1950 (9280) 2100 (9285)	2100 (9270) 1950 (9275) 1950 (9280) 2100 (9285)	2100 (9280) 1950 (9285) 1950 (9290)	2100 (9280) 1950 (9285) 1900 (9290)	1900	2100 (9280) 1950 (9285) 1950 (9290)	2100 (9280) 1950 (9285) 1900 (9290)	1800 (9A90)	1900	1900
Gear Train Timing	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.460"	1.460"	1.484"	1.484"	1.484"	1.484"	1.484"	1.484"	1.484"	1.484"
Throttle Delay (Yield Link)	None	None	(f) % REQ.	(f) % REQ.	(f) % REQ.	(f) % REQ.	(f) % REQ.	(f) % REQ.	(f) % REQ.	(f) % REQ.
Setting			.636" (9290) .570" (9280 and 9285)		.636"	.636" (9290) .570" (9280 and 9285)		.636" (9290) .570" (9A90)	.636"	.636"
Liner Port Height	1.05"	1.05"	1.05"	1.05"	1.05"	1.05"	1.05"	1.05"	1.05"	1.05"
Compression Ratio	19:1	19:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1
Blower Drive Ratio	2.6:1	2.6:1	2.05:1	2.05:1	2.05:1	2.05:1	2.05:1	2.05:1	2.05:1	2.05:1
Governor Type		Limiting Speed								
Thermostat		170-180° F (77-82° C) Nominal Opening Temperature								
Turbocharger A/R			T18A40 1.14	TV8102 1.23	TV8102 1.23	TI8A90 1.50	TV8101 1.84	TV8101 1.84	TV8101 1.60	TV8101 1.60

(California)

Engine	6V-92		8V-92	
	TA	TTA	TT	TTA
(a) Injectors	9A80 9A85 9A90	9A90	9A80 9A85 9A90	9A90
(a) Approved Minimum Constant Horsepower		Min. - Max. 240-270		335
(a) Maximum Rated Speed	2100	1950	2100	2100
(a) Minimum Rated Speed	1950	1900	1950	1800
Gear Train Timing	Std.	Std.	Std.	Std.
Injector Timing	1.484"	1.484"	1.484"	1.484"
Throttle Delay (Yield Link)	(f) % REQ.	(f) % REQ.	(f) % REQ.	(f) % REQ.
Setting	.636" (9A90) .570" (9A80 and 9A85)	.636"	.636" (9A90) .570" (9A80 and 9A85)	.636
Liner Port Height	.950"	.950"	.950"	.950"
Compression Ratio	17:1	17:1	17:1	17:1
Blower Drive Ratio	2.05:1	2.05:1	2.05:1	2.05:1
Governor Type	Limiting Speed			
Thermostat	170-180° F (77-82° C) Nominal Opening Temperature			
Turbocharger A/R	TV8102 1.08	TV8102 1.08	TV8101 1.60	TV8101 1.60

(a) Not to exceed fuel injector size and maximum operating speed that has been established. No-load speed will vary with injector size and governor type

(f) Small fill hole (.078" Dia.), .016" discharge orifice.

% Offset piston linkage.

Use minimum idle speed of 500 rpm on all engines, except coach engines where a minimum of 400 rpm is allowed.

1978 CERTIFIED AUTOMOTIVE ENGINES

FEDERAL

ENGINE FAMILIES	6V-92	8V-92	6V-92T			8V-92T			8V-92TA	
			T	OTM	TT	T	OTM	TT	TA	TTA
INJECTORS (a)	9270 9275 9280 9285	9270 9275 9280 9285	9280 9285 9290(g)	9280 9285 9290(g)	9290(g)	9280 9285 9290(g)	9280 9285 9290(g)	9290(g) 9A90(g)	9290(g)	9290(g)
APPROVED CONSTANT HORSEPOWER FOR TT & TTA ENGINES					240-270			9290-365 9A90 335-365		365
MAXIMUM FULL LOAD SPEED (b)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
MINIMUM FULL LOAD SPEED	9270-1950 9275-1950 9280-1950 9285-2100	9270-1950 9275-1950 9280-1950 9285-2100	1900	1900	1800	1900	1900	9290-1900 9A90-1800**	1900	1900
CAMSHAFT LOBE POSITION	STD.	STD.	STD.	STD.	STD.	STD.	STD.	STD.	STD.	STD.
INJECTOR TIMING	1.460	1.460	1.484	1.484	1.484	1.484	1.484	1.484	1.484	1.484
THROTTLE DELAY YIELD LINK	NOT REQ.	NOT REQ.	(f) REQ.	(f) REQ.	(f) REQ.	(f) REQ.	(f) REQ.	(f) REQ.	(f) REQ.	(f) REQ.
TURBOCHARGER A/R			*T18A40 1.14	TV8102 1.23	TV8102 1.23	*T18A90 1.50	TV8101 1.84	TV8101 1.84	TV8101 1.60	TV8101 1.60

**335 BHP 8V-92TT use 9A90 injectors only @ 1800 RPM.

CALIFORNIA

ENGINE FAMILIES	6V-92TAC		8V-92TAC	
	TAC	TTAC	TAC	TTAC
INJECTORS (a)	9A80 9A85 9A90(g)	9A90(g)	9A80 9A85 9A90(g)	9A90(g)
APPROVED CONSTANT HORSEPOWER FOR TTAC ENGINES		240-270		335-365
MAXIMUM (b) FULL LOAD SPEED	2100	2100	2100	2100
MINIMUM FULL LOAD SPEED	1950	1900	1950	1800
CAMSHAFT LOBE POSITION	RET.	RET.	RET	RET.
INJECTOR TIMING	1.484	1.484	1.484	1.484
THROTTLE DELAY YIELD LINK	(f) REQ.	(f) REQ.	(f) REQ.	(f) REQ.
TURBOCHARGER A/R	TV8102 1.08	TV8102 1.08	TV8101 1.60	TV8101 1.60

(a) See Engine Application Rating (Sales Tech Data Book I, Vol. 3) for specific application usage of injector size and full-load speed combination. No-load speed will vary with injector size and governor type.

(b) Use a minimum idle speed of 400 rpm on all coach engines with throttle delay and a minimum idle speed of 500 rpm on all other engines.

(f) Small fill hole (.078" dia.), .016" discharge orifice.

(g) .570" setting — gage J-25559.

1979 CERTIFIED AUTOMOTIVE ENGINES

	FEDERAL ENGINES					CALIFORNIA ENGINES				
FAMILIES	6V-92TA COACH	6V-92TA	6V-92TTA	8V-92TA	8V-92TTA	6V-92TAC COACH	6V-92TAC	6V-92TTAC	8V-92TAC	8V-92TTAC
Injectors	9B70 9B75 9B80	9B70, 9B75 9B80, 9B85 9B90	9B90	9A80 9A85 9A90	9A90	9B70 9B75 9B80	9B70, 9B75 9B80, 9B85 9B90	9B90	9A80 9A85 9A90	9A90
Maximum Full Load Speed	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Minimum Full Load Speed	1800	1800	1800	1900	1800	1800	1800	1800	1900	1800
Minimum Idle Speed	500	500	500	500	500	500	500	500	500	500
Gear Train Timing	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.470	1.470	1.470	1.480	1.480	1.490	1.490	1.490	1.500	1.500
Throttle Delay Setting	.636 ①	§ .504 9B90-.570	§ .570	§ .570 9A90-.636	.636 §	.636 ①	.570 § 9B90-.636	.636 §	.594 § 9A90-.660	.660 §
Liner Port Height	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Liner Part Number	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176
Turbocharger A/R	TV8102 1.23 A/R	TV8102 1.23 A/R	TV8102 1.23 A/R	TV8101 ▲ 1.60 A/R	TV8101 ▲ 1.60 A/R	TV8102 1.23 A/R	TV8102 1.23 A/R	TV8102 1.23 A/R	TV8101 ▲ 1.60 A/R	TV8101 ▲ 1.60 A/R
Turbocharger Part Number	5102353	5102353	5102353	‡ 5101513	‡ 5101513	5102353	5102353	5102353	‡ 5101513	‡ 5101513
Blower Drive Ratio	2.05:1	2.05:1	2.05:1	1.95:1	1.95:1	2.05:1	2.05:1	2.05:1	1.95:1	1.95:1
Blower Part Number	5101528	5101528	5101528	5101483	5101483	5101528	5101528	5101528	5101483	5101483
Compression Ratio	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1
Exhaust Valve Material	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X	Stellite Face Inconel X
Exhaust Valve Part Number	† 5100437	† 5100437	† 5100437	5100437	5100437	5100437	5100437	5100437	5100437	5100437
Certification Label Number	14B7-270	14B7-270	14B7-270	14B7-272	14B7-272	14B7-271	14B7-271	14B7-271	14B7-273	14B7-273

① Double fill hole (.250) .016 diameter discharge orifice.

† 6V-92TA - Carpenter valve. Available.

‡ Double 0-92 (5107590).

§ Small fill hole (.078 dia.) .016 diameter discharge orifice.

▲ Optional 5LM-864, 6.5 sq. in., 5107687.

PIN GAGE

J-25558 For .069" & .072"

TIMING GAGES

Series 53, 71 & 92

J-1853 For 1.460"
J-26888 For 1.466"
J-24236 For 1.470"
J-29065 For 1.480"
J-1242 For 1.484"
J-29066 For 1.490"
J-9595 For 1.496"
J-25454 For 1.500"
J-8909 For 1.508"
J-25502 For 1.520"

THROTTLE DELAY AND STARTING AID GAGES

J-24889 For .345"
J-28779 For .365"
J-24882 For .385"
J-9509-2 For .404"
J-23190 For .454"
J-29062 For .504"
J-25559 For .570"
J-26927 For .586" & .686"
J-25560 For .636"
J-29064 For .660"

1980 CERTIFIED AUTOMOTIVE ENGINES

	FEDERAL						CALIFORNIA					
ENGINE FAMILIES	(b) 6V-92TA Coach	(b) (c) 6V-92TA Coach	6V-92TA	6V-92TTA	8V-92TA	8V-92TTA	(b) 6V-92TAC Coach	(b) (c) 6V-92TAC Coach	6V-92TAC	6V-92TTAC	8V-92TAC	8V-92TTAC
Injectors (a)	9B70 9B75 9B80	7G65 7G70 7G75	9B90	9B90	9A90	9A90	9C70 9C75 9C80	7G65 7G70 7G75	9C90	9C90	9C90	9C90
Maximum Full Load Speed (a)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Minimum Full Load Speed	1800	1800	1800	1800	1800	1800	1900	1900	1900	1900	1900	1900
Minimum Idle Speed	500	500	500	500	500	500	500	500	700	700	700	700
Gear Train Timing	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.470	1.470	1.470	1.470	1.480	1.480	1.480	1.460	1.480	1.480	1.480	1.480
Throttle Delay Setting	(e) .636	(e) .636	(d) .570	(d) .570	(d) .636	(d) .636	(e) .636	(e) .636	(d) .660	(d) .660	(d) .660	(d) .660
Turbocharger A/R	TV8102 1.23 A/R	TV7101 1.39 A/R	TV8102 1.23 A/R	TV8102 1.23 A/R	TV8101 1.60 A/R 5LM-864 6.5 Sq. In.	TV8101 1.60 A/R 5LM-864 6.5 Sq. In.	TV8102 1.08	TV7101 1.39 A/R	TV8102 1.08	TV8102 1.08	TV8101 1.39	TV8101 1.39

(a) Refer to Engine Application Rating (Sales Tech Data Book I, Vol. 3) for specific application usage of injector size and full load speed combination. No load speed will vary with injector size and governor.

(b) Use No. 1 Diesel Fuel.

(c) Engines built June, 1980 or later.

(d) Small fill hole (.078 dia.) .016 dia. discharge orifice.

(e) Double fill hole (.250 dia.) .016 dia. discharge orifice.

1980 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT)
6V-92TA (Coach #)	9B70 9B75 9B80	253 @ 2100 265 @ 2100 277 @ 2100	722 @ 1200 762 @ 1200 805 @ 1200
6V-92TA	9B90	335 @ 2100	957 @ 1300
6V-92TTA	9B90	250 @ 1800 270 @ 1950 270 @ 2100 307 @ 1900 335 @ 2100	957 @ 1300 957 @ 1300 957 @ 1300 957 @ 1300 957 @ 1300
6V-92TAC (California) (Coach)	9C70 9C75 9C80	204 @ 2100 224 @ 2100 248 @ 2100	622 @ 1300 683 @ 1300 743 @ 1300
6V-92TAC (California)	9C90	305 @ 2100	921 @ 1300
6V-92TTAC (California)	9C90	270 @ 1950 305 @ 2100	921 @ 1300 921 @ 1300
8V-92TA	9A90	435 @ 2100	1242 @ 1400
8V-92TTA	9A90	335 @ 1800 365 @ 1950 365 @ 2100 435 @ 2100	1242 @ 1400 1242 @ 1400 1242 @ 1400 1242 @ 1400
8V-92TAC (California)	9C90	405 @ 2100	1236 @ 1300
8V-92TTAC (California)	9C90	365 @ 1950 405 @ 2100	1236 @ 1300 1236 @ 1300

ALL ENGINE HORSEPOWER RATINGS ARE BASED ON SAE CONDITIONS
85°F (29.4°C) — AIR INLET TEMPERATURE
29.00 IN. HG (98.19 kPa) — BAROMETER (DRY)

No. 1 DIESEL FUEL

1981 CERTIFIED AUTOMOTIVE ENGINES

FEDERAL

ENGINE FAMILIES	6V-92TA Coach	6V-92TA	6V-92TTA	8V-92TA	8V-92TTA
Injectors (a)	7G65 7G70 7G75	9B90	9B90	9A90	9A90
Maximum Full Load Speed (a)	2100	2100	2100	2100	2100
Minimum Full Load Speed	1800	1800	1800	1900	1800
Minimum Idle Speed	500	500	500	500	500
Gear Train Timing	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.470	1.470	1.470	1.480	1.480
Throttle Delay Setting	.504 (b) .636 (c)	(b) .570	(b) .570	(b) .636	(b) .636
Turbocharger A/R	TV-7101 1.39 A/R	TV-8102 1.23 A/R	TV-8102 1.23 A/R	TV-8101 1.60 A/R 5LM-864 6.5 Sq. In.	TV-8101 1.60 A/R 5LM-864 6.5 Sq. In.

CALIFORNIA

ENGINE FAMILIES	6V-92TAC Transit Coach	6V-92TAC All Others Coaches	6V-92TAC	6V-92TTAC	8V-92TAC	8V-92TTAC
Injectors (a)	9E65 9E70	7G65 7G70 7G75	9C90	9C90	9C90	9C90
Maximum Full Load Speed (a)	2100	2100	2100	2100	2100	2100
Minimum Full Load Speed	1900	1900	1900	1900	1900	1900
Minimum Idle Speed	500	700	700	700	700	700
Gear Train Timing	Std.	Std.*	Std.	Std.	Std.	Std.
Injector Timing	1.460	1.460	1.480	1.480	1.480	1.480
Throttle Delay Setting	(c) .636	(b) .636	(b) .660	(b) .660	(b) .660	(b) .660
Turbocharger A/R	TV-7101 1.23	TV-7101 1.39 A/R	TV-8102 1.08	TV-8102 1.08	TV-8101 1.39	TV-8101 1.39

(a) Refer to Engine Application Rating (Sales Tech Data Book I, Vol. 3) for specific application usage of injector size and full load speed combination. No load speed will vary with injector size and governor.

(b) Small fill hole (.078 dia.) .016 dia. discharge orifice.

(c) Double fill hole (.250 dia.) .016 dia. discharge orifice.

1981 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT)
6V-92TA (Coach)	7G65 7G70 7G75	253 @ 2100 277 @ 2100 294 @ 2100	766 @ 1200 816 @ 1300 873 @ 1300
6V-92TA	9B90	335 @ 2100	957 @ 1300
6V-92TTA	9B90	250 @ 1800 270 @ 1950 270 @ 2100 307 @ 1900 335 @ 2100	957 @ 1300 957 @ 1300 957 @ 1300 957 @ 1300 957 @ 1300
6V-92TAC (California) (Transit Coach)	9E65 9E70	240 @ 2100 260 @ 2100	798 @ 1000 846 @ 1000
6V-92TAC (California) (All Other Coaches)	7G65 7G70 7G75	230 @ 2100 253 @ 2100 271 @ 2100	744 @ 1200 800 @ 1300 856 @ 1300
6V-92TAC (California)	9C90	305 @ 2100	921 @ 1300
6V-92TTAC (California)	9C90	270 @ 1950 305 @ 2100	921 @ 1300 921 @ 1300
8V-92TA	9A90	435 @ 2100	1242 @ 1400
8V-92TTA	9A90	335 @ 1800 365 @ 1950 365 @ 2100 404 @ 1900 435 @ 2100	1242 @ 1400 1242 @ 1400 1242 @ 1400 1242 @ 1400 1242 @ 1400
8V-92TAC (California)	9C90	405 @ 2100	1236 @ 1300
8V-92TTAC (California)	9C90	365 @ 1950 405 @ 2100	1236 @ 1300 1236 @ 1300

ALL ENGINE HORSEPOWER RATINGS ARE BASED ON SAE CONDITIONS

85°F (29.4°C) — AIR INLET TEMPERATURE

29.00 IN. HG (98.19 kPa) — BAROMETER (DRY)

1982 CERTIFIED AUTOMOTIVE ENGINES

	FEDERAL					CALIFORNIA				
FAMILIES	**6V-92TA Coach**	**6V-92TA**	**6V-92TTA**	**8V-92TA**	**8V-92TTA**	**6V-92TA Coach**	**6V-92TA**	**6V-92TTA**	**8V-92TA**	**8V-92TTA**
INJECTORS	7G65 7G70 7G75	9B80 9B85 9B90	9B90	9A80 9A85 9A90 7G75 S	9A90	9E65 9E70 7G75 Ⓧ	9F90	9F90	7G75 Ⓢ • 9F80 9F85 9F90	9F90
MAX. FULL LOAD SPEED	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
MIN. FULL LOAD SPEED	1800	1800	1800	1800	1800	1900	1800	1800	1800	1800
MIN. IDLE SPEED	500/500 ##	500	500	500	500	Ⓧ ## 500/700	500	500	700	700
GEAR TR. TIMING	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
INJECTOR TIMING	1.470	1.470	1.470	1.466	1.466	1.460	1.520	1.520	1.520	1.520
THROTTLE DELAY SETTING ⊕	.636 .504##	%% 9B90-.570	.570%%	.570%% 9A90-.636	.636%%	X .636	9F80, 85-.570 9F90-.636	.636	9F90-.660 9F80, 85-.594	.660
LINER PORT HGHT.	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
LINER PART NO.	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176
TURBO-CHARGER A/R	TV-7101 1.39 A/R	TV-7111 1.23 A/R	TV-7111 1.23 A/R	TV-8117 1.39 A/R	TV-8117 1.39 A/R	TV-7101 Ⓧ 1.23	TV-7111 1.23 A/R	TV-7111 1.23 A/R	TV-8117 1.39 A/R	TV-8117 1.39 A/R
TURBO-CHARGER P/N	5103760	8923051	8923051	S 8923340	8923340	5101509	8923051	8923051	8923340	8923340
BLOWER DR. RATIO	2.05:1	1.95:1	1.95:1	1.95:1	1.95:1	2.05	1.95	1.95	2.00 S	2.00
BLOWER PART NO.	5101528 5104936 5103854	5101528 5104936 5103854	5101528 5104936 5103854	5101484 8920613 8923371	5101484 8920613 8923371	Ⓟ	Ⓡ	Ⓡ	8923474 8923476 8923475	8923474 8923476 8923475
COMP. RATIO	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1
EXHAUST VALVE P/N	5106136	5106136	5106136	5106136	5106136	5106136	5106136	5106136	5106136	5106136
CERT. LABEL NO.	14B7-337	14B7-337	14B7-337	14B7-337	14B7-339					

S SILVER ENGINE - 7G75, 1800 RPM, TV-7111 TURBO, 8923648, 1.39 A/R (48-1), .465 THROTTLE DELAY, 1.470 INJ. TIMING, 700 RPM IDLE.

SINGLE FILL HOLE-UPRIGHT PARLOR COACH

%% SMALL FILL HOLE (.078 DIA.) .016 DIA. DISCHARGE ORIFICE

⊕ DOUBLE FILL HOLE (.250 DIA.) .016 DIA. DISCHARGE ORIFICE

Ⓟ 5101528, 5104936, 5103854

Ⓡ 8923495, 8923497, 8923496

SINGLE FILL HOLE-UPRIGHT COACH

ⓍPARLOR COACH - 7G65, 70, 75 - TV-7101 A/R 1.39 (P/N 5103760) 700 RPM IDLE, .078 DIA. THROTTLE DELAY FILL HOLE

Ⓢ SILVER ENGINE - 7G75, 1800 RPM, TV-7111, 8923735, 1.39 A/R (52-3), THROTTLE DELAY .594, 1.508 INJECTOR TIMING, 1.95:1 BLOWER DRIVE RATIO, USES FEDERAL BLOWERS.

1982 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT)
6V-92TA (Coach)	7G65 7G70 7G75	253 @ 2100 277 @ 2100 294 @ 2100	766 @ 1200 816 @ 1300 873 @ 1300
6V-92TA/TTA	9B90	307 @ 1800 270 @ 1800 270 @ 2100 330 @ 2100	963 @ 1200 963 @ 1200 963 @ 1200 963 @ 1200
6V-92TAC (California) (Transit Coach)	9E65 9E70	240 @ 2100 260 @ 2100	798 @ 1000 846 @ 1000
6V-92TAC (California) (All Other Coaches)	7G65 7G70 7G75	232 @ 2100 253 @ 2100 271 @ 2100	744 @ 1200 800 @ 1300 856 @ 1300
6V-92TAC/TTAC (California)	9F90	304 @ 1800 270 @ 1800 270 @ 2100 325 @ 2100	958 @ 1200 958 @ 1200 958 @ 1200 958 @ 1200

ALL ENGINE HORSEPOWER RATINGS ARE BASED ON SAE CONDITIONS
85°F (29.4°C) — AIR INLET TEMPERATURE
29.00 IN. HG (98.19 kPa) — BAROMETER (DRY)

1982 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT)
8V-92TA (355)	7G75	355 @ 1800	1150 @ 1200
8V-92TA/TTA	9A90	365 @ 1950 365 @ 2100 445 @ 2100	1250 @ 1300 1250 @ 1300 1250 @ 1300
8V-92TAC (California 355)	7G75	355 @ 1800	1150 @ 1200
8V-92TAC/TTAC (California)	9F90	365 @ 1950 365 @ 2100 440 @ 2100	1250 @ 1300 1250 @ 1300 1250 @ 1300

Effective January 1, 1982, California allowed the use of Federal certified engines in *Public Transit Busses* and in *Authorized Emergency Vehicles* as defined in section 165 of the California Vehicle Code.

1983 CERTIFIED AUTOMOTIVE ENGINES

FEDERAL **CALIFORNIA**

ENGINE FAMILIES	6V-92TA Coach	6V-92TA/ TTA	8V-92TA Transit Coach	8V-92TA (355)	8V-92TA/ TTA	6V-92TAC Transit Coach	6V-92TAC All Other Coaches	6V-92TAC/ TTAC	8V-92TAC (355)	8V92TAC/ TTAC
Injectors (a)	7G65 7G70 7G75	9B90	9E65 9E70	9E70	9A90	9E65 9E70	7G65 7G70 7G75	9F90	7G75	9F90
Maximum Full Load Speed (a)	2100	2100	2100	1800	2100	2100	2100	2100	1800	2100
Minimum Full Load Speed	1800	1800	1800	1800	1800	1900	1900	1800	1800	1800
Minimum Idle Speed	500	500	500	500	500	500	700	500	500	700
Gear Train Timing	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.470	1.464	1.466	1.470	1.460	1.460	1.460	1.520	1.508	1.515
Throttle Delay Setting	.636 (h) .504 (f)	(f) (l)	(h) .636	DNA	(f) .594	(h) .636	(f) .636	(f) .636	DNA	(f) .660
Modulator Setting	DNA	.480	DNA	.345	.480	DNA	DNA	.480	.454	.490
Turbocharger A/R	TV7101 1.39 A/R	TV7301 1.08 A/R	TV7111 1.39 A/R	TV7301 1.23 A/R	TV8301 1.39 A/R	TV7101 1.23 A/R	TV7101 1.39 A/R	TV7111 1.23 A/R	TV7301 1.23 A/R	TV8301 1.39 A/R
Turbocharger Part No.	5103760	8924252 (m)(o) 8923051 (n)	89236498 (n)	8924682 (m)	8923340 (n) 8924254 (m)(o)	5101509	5103760	8924253 (m)(o) 8923051 (n)	8924682 (m)	8923340 (n) 8924254 (m)(o)
Blower Drive Ratio	2.05:1	1.95:1	1.95:1	1.95:1	1.95:1	2.05:1	2.05:1	1.95:1	1.95:1	1.95:1
Blower Part No.	5101528 (m)	5104936 (n) 8923953 (m) 8924627 (o)	5101484 (m)	8923954 (m)	8920613 (n) 8923954 (m) 8924629 (o)	5101528 (m)	5101528 (m)	8923495 (m) 8923496 (o) 8923497 (n)	8923954 (m) 8924629 (o)	8924047 (m) 8924630 (o) 8923475 (n)
Comparison Ratio	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1	17:1
Exhaust Valve Part No.	5106136	5106136	5106136	5106136	5106136	5106136	5106136	5106136	5106136	5106136
Liner Part No.	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176	5107176
Liner Port Height	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95

DNA—Does not apply.

(a) Refer to Engine Application Rating (Sales Tech Data Book 1, Vol. 3) for specific application usage of injector size and full load speed combination. No load speed will vary with injector size and governor.

(f) Small fill hole (.078 dia.) .016 dia. discharge orifice.

(h) Double fill hole (.250 dia.) .016 dia. discharge orifice.

(l) 6V-92 TA with rated speed below 1900 RPM use throttle delay setting .636". For rated speed 1900 and above use .610".

(m) Front Blower - Mounted Turbo.

(n) Rear Blower - Mounted Turbo.

(o) Rear Bracket - Mounted Turbo.

1983 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT)
6V-92TA (Coach)	7G65 7G70 7G75	253 @ 2100 277 @ 2100 294 @ 2100	766 @ 1200 816 @ 1300 873 @ 1300
6V-92TA/TTA	9B90	307 @ 1800 270 @ 1800 270 @ 2100 330 @ 2100	963 @ 1200 963 @ 1200 963 @ 1200 963 @ 1200
6V-92TAC (California) (Transit Coach)	9E65 9E70	240 @ 2100 260 @ 2100	798 @ 1000 846 @ 1000
6V-92TAC (California) (All Other Coaches)	7G65 7G70 7G75	232 @ 2100 253 @ 2100 271 @ 2100	744 @ 1200 800 @ 1300 856 @ 1300
6V-92TAC/TTAC (California)	9F90	304 @ 1800 270 @ 1800 270 @ 2100 325 @ 2100	958 @ 1200 958 @ 1200 958 @ 1200 958 @ 1200

1983 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT)
8V-92TA (Transit Coach)	9E65 9E70	330 @ 2100 345 @ 2100	1043 @ 1200 1090 @ 1200
8V-92TA (355)	9E70	355 @ 1800	1150 @ 1200
8V-92TA/TTA	9A90	365 @ 1950 365 @ 2100 445 @ 2100	1250 @ 1300 1250 @ 1300 1250 @ 1300
8V-92TAC (California 355)	7G75	355 @ 1800	1150 @ 1200
8V-92TAC/TTAC (California)	9F90	365 @ 1950 365 @ 2100 440 @ 2100	1250 @ 1300 1250 @ 1300 1250 @ 1300

ALL ENGINE HORSEPOWER RATINGS ARE BASED ON SAE CONDITIONS

85°F (29.4°C) — AIR INLET TEMPERATURE

29.00 IN. HG (98.19 kPa) — BAROMETER (DRY)

Effective January 1, 1982, California allowed the use of Federal certified engines in *Public Transit Busses* and in *Authorized Emergency Vehicles* as defined in section 165 of the California Vehicle Code.

1984 CERTIFIED AUTOMOTIVE ENGINES

FEDERAL

ENGINE FAMILIES	6V-92TA Coach	6V-92TA (1600 RPM)	6V-92TA/TTA	8V-92TA Transit Coach	8V-92TA (355)	8V-92TA (1600 RPM)	8V-92TA/TTA
Injectors (a)	7G65 7G70 7G75	9E85	9B90	9E65 9E70	7G75	9E80	9A90
Maximum Full Load Speed (a)	2100	1600	2100	2100	1800	1600	2100
Minimum Full Load Speed	1800	1600	1750	2100	1800	1600	1800
Minimum Idle Speed	500	500	500	500	500	500	500
Gear Train Timing	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.470	1.500	1.475	1.470	1.470	1.496	1.470
Throttle Delay Setting	.636 (h) .504 (f)	DNA	(f) .636	(h) .636	DNA	DNA	(f) .594
Modulator Setting	DNA	.404	.465	DNA	.465	.404	.404
Turbocharger A/R	TV7101 1.39 A/R	TV7301 1.08 A/R	TV7301 1.08 A/R	TV7111 1.39 A R	TV7301 1.23 A R	TV7301 1.23 A R	TV8301 1.39 A R

CALIFORNIA

ENGINE FAMILIES	6V-92TAC TRANSIT COACH	6V-92TAC ALL OTHER COACHES	6V-92TAC/TTAC	8V-92TAC (355)	8V-92TAC/TTAC
Injectors (a)	9E65 9E70	7G65 7G70 7G75	9F90	7G75	9F90
Maximum Full Load Speed (a)	2100	2100	2100	1800	2100
Minimum Full Load Speed	1900	1900	1800	1800	1800
Minimum Idle Speed	500	700	500	500	700
Gear Train Timing	Std.	Std.	Std.	Std.	Std.
Injector Timing	1.460	1.460	1.520	1.508	1.520
Throttle Delay Setting	(h) .636	(f) .636	DNA	DNA	(f) .660
Modulator Setting	DNA	DNA	.490	.454	.490
Turbocharger A/R	TV-7101 1.23 A/R	TV-7101 1.39 A/R	TV-7301 1.23 A/R	TV-7301 1.23 A/R	TV-8301 1.39 A/R

6V Cam Assy. – LB 8926265 (Fed.)
6V Cam Assy. – RB 8926264 (Fed.)
8V Cam Assy. – LB 8926246 (Fed.)
8V Cam Assy. – RB 8926245 (Fed.)
6V Cam Assy. – LB 5108111 (Cal.)
6V Cam Assy. – RB 5108112 (Cal.)
8V Cam Assy. – LB 5108117 (Cal.)
8V Cam Assy. – RB 5108118 (Cal.)

ENGINE	INJECTOR	RATED BHP	PEAK TORQUE (LB-FT.)
6V-92TA (Coach)	7G65 7G70 7G75	253 @ 2100 277 @ 2100 294 @ 2100	766 @ 1200 816 @ 1300 873 @ 1300
6V-92TA (1600 RPM)	9E85	290 @ 1600	1015 @ 1000
6V-92TA/ TTA	9B90	307 @ 1800 270 @ 1800 270 @ 2100 330 @ 2100	963 @ 1200 963 @ 1200 963 @ 1200 963 @ 1200
6V-92TAC (California) (Transit Coach)	9E65 9E70	240 @ 2100 260 @ 2100	798 @ 1000 846 @ 1000
6V-92TAC (California) (All Other Coaches)	7G65 7G70 7G75	232 @ 2100 253 @ 2100 271 @ 2100	744 @ 1200 800 @ 1300 856 @ 1300
6V-92TAC/ TTAC (California)	9F90	304 @ 1800 270 @ 1800 270 @ 2100 325 @ 2100	958 @ 1200 958 @ 1200 958 @ 1200 958 @ 1200
8V-92TA (Transit Coach)	9E65 9E70	330 @ 2100 345 @ 2100	1043 @ 1200 1090 @ 1200
8V-92TA (1600 RPM)	9E80	350 @ 1600	1275 @ 1000
8V-92TA (355)	7G75	355 @ 1800	1150 @ 1200
8V-92TA/ TTA	9A90	365 @ 1950 365 @ 2100 400 @ 1800 445 @ 2100	1250 @ 1300 1250 @ 1300 1250 @ 1300 1250 @ 1300
8V-92TAC (California 355)	7G75	355 @ 1800	1150 @ 1200
8V-92TAC/ TTAC (California)	9F90	365 @ 1950 365 @ 2100 440 @ 2100	1250 @ 1300 1250 @ 1300 1250 @ 1300

ALL ENGINE HORSEPOWER RATINGS ARE BASED ON SAE J 1349 CONDITIONS

DNA Does not apply.

(a) Refer to Engine Application Rating (Sales Tech Data Book 18SA315) for specific application usage of injector size and full load speed combination. No load speed will vary with injector size and governor.

(f) Small fill hole (.078 dia.) .016 dia. discharge orifice.

(h) Double fill hole (.250 dia.) .016 dia. discharge orifice.

Effective January 1, 1982, California allowed the use of Federal certified engines in *Public Transit Busses* and in *Authorized Emergency Vehicles* as defined in section 165 of the California Vehicle Code.

1985 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	RPM	PEAK TORQUE (LB-FT)	RPM	MAX FL SPEED	MIN FL SPEED	MIN IDLE SPEED	INJECTOR TIMING	THROTTLE DELAY SETTING	FUEL MODULATOR SETTING	TURBO	A/R
6V-92T (AIR/AIR)	9K85	290	1600	1050	1000	1600	1600	500	1.475	DNA	.454	TA-7501	2.59
	9J85	300	1800	975	1200	1800	1750	500	1.464	DNA	.465	TA-7501	2.69
6V-92TA (1600 RPM)	9E85	290	1600	1015	1000	1600	1600	500	1.480	DNA	.385	TV-7511	1.08
6V-92TA	9B80	268	1800	862	1200	2100	1800	500	1.470	.570	DNA	TV-7111	1.23
	9B80	286	2100	862	1200	2100	1800	500	1.470	.570	DNA	TV-7111	1.23
	9B90	307	1800	963	1200	2100	1800	500	1.470	.570	DNA	TV-7111	1.23
	9B90	330	2100	963	1200	2100	1800	500	1.470	.570	DNA	TV-7111	1.23
	9G85	300	1800	975	1200	1800	1750	500	1.466	DNA	.465	TV-7511	1.08
	9G90	350	2100	1020	1200	2100	1900	500	1.466	.636	.480	TV-7511	1.08
6V-92TTA	9B90	270	1800	963	1200	2100	1800	500	1.470	.570	DNA	TV-7111	1.23
	9B90	270	2100	963	1200	2100	1800	500	1.470	.570	DNA	TV-7111	1.23
	9G85	270	1800	975	1200	1800	1750	500	1.466	DNA	.465	TV-7511	1.08
	9G85	270	2100	975	1200	2100	1750	500	1.466	DNA	.465	TV-7511	1.08
	9G90	300	2100	1020	1200	2100	1900	500	1.466	.636	.480	TV-7511	1.08
6V-92TAC (CAL)	9F85	294	1800	950	1200	2100	1800	500	1.520	.660	.490	TV-7511	1.23
	9F85	320	2100	950	1200	2100	1800	500	1.520	.660	.490	TV-7511	1.23
	9F90	300	1800	1000	1200	2100	1800	500	1.520	DNA	.490	TV-7511	1.23
	9F90	340	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
6V-92TTAC (CAL)	9F90	270	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
	9F90	300	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
6V-92TA (ALCC)	9H85	300	1800	975	1200	1800	1750	500	1.475	DNA	.454	TV-7511	1.08
6V-92TA (COACH)	9F70, 9T70 #1	245	2100	775	1200	2100	1800	500	1.460	.594	DNA	TV-7511	0.96
	9F70, 9T70 #2	253	2100	775	1200	2100	1800	500	1.460	.594	DNA	TV-7511	0.96
	9G75, 9S75 #1	260	2100	823	1200	2100	1800	500	1.460	.594	DNA	TV-7511	0.96
	9G75, 9S75 #2	277	2100	840	1200	2100	1800	500	1.460	.594	DNA	TV-7511	0.96
	9F80, 9S80 #1	280	2100	849	1200	2100	1800	500	1.460	.636	DNA	TV-7511	1.08
	9F80, 9S80 #2	294	2100	875	1200	2100	1800	500	1.460	.636	DNA	TV-7511	1.08
	9H85 #1	315	2100	976	1200	2100	1800	700	1.460	.636	.480	TV-7511	1.08
	9H85 #2	325	2100	1007	1200	2100	1800	700	1.460	.636	.480	TV-7511	1.08
6V-92TAC (COACH/CAL)	9E65, 9S65 #1	230	2100	793	1000	2100	1800	500	1.470	.636	DNA	TV-7511	1.08
	9E65, 9S65 #2	240	2100	825	1000	2100	1800	500	1.470	.636	DNA	TV-7511	1.08
	9E70, 9S70 #1	245	2100	835	1000	2100	1800	500	1.470	.636	DNA	TV-7511	1.08
	9E70, 9S70 #2	260	2100	872	1000	2100	1800	500	1.470	.636	DNA	TV-7511	1.08
	9F80, 9S80 #1	255	2100	846	1000	2100	1800	500	1.470	.636	DNA	TV-7511	1.08
	9F80, 9S80 #2	270	2100	882	1000	2100	1800	500	1.470	.636	DNA	TV-7511	1.08
	9F90 #1	310	2100	954	1200	2100	2100	500	1.470	.660	DNA	TV-7511	1.23
	9F90 #2	320	2100	989	1200	2100	2100	500	1.470	.660	DNA	TV-7511	1.23
6V-92TA (PARLOR) (COACH)	9F70 #2	253	2100	775	1200	2100	1800	500	1.460	.504	DNA	TV-7511	0.96
	9G75 #2	277	2100	840	1200	2100	1800	500	1.460	.504	DNA	TV-7511	0.96
	9F80 #2	300	2100	893	1200	2100	1800	500	1.460	.504	.454	TV-7511	0.96
	9H85 #2	330	2100	1007	1200	2100	1800	500	1.460	.636	.480	TV-7511	1.08
8V-92TA (1600 RPM)	9E80	350	1600	1250	1000	1600	1600	500	1.470	DNA	.385	TV-8512	1.23
8V-92TA	7G75	350	1800	1175	1200	1800	1800	500	1.460	DNA	.385	TV-8512	1.23
	9G85	400	1800	1250	1300	2100	1800	500	1.458	DNA	.404	TV-8511	1.39
	9G85	450	2100	1250	1300	2100	1800	500	1.458	.594	.404	TV-8511	1.39
	9G90	475	2100	1330	1300	2100	1900	500	1.458	.610	.454	TV-8511	1.39
8V-92TTA	9G85	365	1900	1250	1300	2100	1800	500	1.458	.594	.404	TV-8511	1.39
	9G90	400	2100	1330	1300	2100	1900	500	1.458	.610	.454	TV-8511	1.39
8V-92TAC (CAL)	7G75	350	1800	1175	1200	1800	1800	500	1.508	DNA	.454	TV-8512	1.23
	9F90	400	1800	1250	1300	2100	1800	700	1.520	DNA	.490	TV-8511	1.39
	9F90	450	2100	1250	1300	2100	1800	700	1.520	.660	.490	TV-8511	1.39
8V-92TTAC (CAL)	9F90	400	2100	1250	1300	2100	1800	700	1.520	.660	.490	TV-8511	1.39
8V-92TA (ALCC)	7G75	350	1800	1175	1200	1800	1800	500	1.470	DNA	.404	TV-8512	1.23
	9G85	400	1800	1250	1300	1800	1800	500	1.475	DNA	.454	TV-8511	1.39
8V-92TA (COACH)	9E65 #2	340	2100	1134	1000	2100	2100	500	1.470	.636	DNA	TV-8512	1.23
	9E70 #2	365	2100	1187	1000	2100	2100	500	1.470	.636	DNA	TV-8512	1.23
8V-92TA (PARLOR) (COACH)	9A80 #2	404	2100	1143	1300	2100	2100	500	1.458	.594	.404	TV-8511	1.39

TA Turbocharged/Jacket Water Aftercooled.
TTA Constant Horsepower/Turbocharged/Jacket Water Aftercooled.
All Engine Horsepower Ratings Are Based On SAE J1349 Conditions.
*** Minimum Idle Speed: 500 W/Fuel Modulator, 700 W/Throttle Delay.

ALCC Advanced Liquid Charge Cooling.
DNA Does Not Apply.

#1 Diesel Fuel #1.
#2 Diesel Fuel #2.

Effective January 1, 1982, California allowed the use of Federal certified engines in *Public Transit Busses* and in *Authorized Emergency Vehicles* as defined in section 165 of the California Vehicle Code.

1986 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	RPM	PEAK TORQUE (LB-FT)	RPM	MAX FL SPEED	MIN FL SPEED	MIN IDLE SPEED	INJECTOR TIMING	THROTTLE DELAY SETTING	FUEL MODULATOR SETTING	TURBO	A/R
6V-92T	9K85	290	1600	1050	1000	1600	1600	500	1.496	DNA	.454	TA-7501	2.59
(AIR/AIR)	9J85	300	1800	975	1200	1800	1750	500	1.464	DNA	.465	TA-7502	2.95
6V-92TA (1600 RPM)	9E85	290	1600	1015	1000	1600	1600	500	1.480	DNA	.385	TV-7511	1.08
6V-92TAC	9F85	306	2100	917	1200	2100	1950	700	1.520	.570	.454	TV-7111	1.23
(CAL) @	9F90	325	2100	958	1200	2100	1950	700	1.520	.636	.480	TV-7111	1.23
6V-92TA	9G85	300	1800	975	1200	1800	1800	500	1.466	DNA	.465	TV-7511	1.08
	9G90	350	2100	1020	1200	2100	2100	500	1.466	.636	.480	TV-7511	1.08
6V-92TTA	9G85	270	1800	975	1200	1800	1800	500	1.466	DNA	.465	TV-7511	1.08
	9G85	270	2100	975	1200	2100	2100	500	1.466	DNA	.465	TV-7511	1.08
	9G90	300	2100	1020	1200	2100	2100	500	1.466	.636	.480	TV-7511	1.08
6V-92TAC	9F85	320	2100	950	1200	2100	1950	500	1.520	.660	.490	TV-7511	1.23
(CAL)	9F90	300	1800	1000	1200	2100	1800	500	1.520	DNA	.490	TV-7511	1.23
	9F90	340	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
6V-92TTAC	9F90	270	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
(CAL)	9F90	300	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
	9F90	270	1800	1000	1200	1800	1800	500/700***	1.520	.660	.490	TV-7511	1.23
6V-92TA (ALCC)	9H85	300	1800	975	1200	1800	1800	500	1.475	DNA	.454	TV-7511	1.08
6V-92TA	9F70, 9T70 #1	245	2100	775	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
(COACH)	9F70, 9T70 #2	253	2100	775	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9G75, 9S75 #1	260	2100	823	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9G75, 9S75 #2	277	2100	840	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9F80, 9S80 #1	280	2100	849	1200	2100	2100	500	1.460	.636	DNA	TV-7511	1.08
	9F80, 9S80 #2	294	2100	875	1200	2100	2100	500	1.460	.636	DNA	TV-7511	1.08
	9H85 #1	315	2100	976	1200	2100	2100	700	1.460	.636	.480	TV-7511	1.08
	9H85 #2	325	2100	1007	1200	2100	2100	700	1.460	.636	.480	TV-7511	1.08
6V-92TAC	9E65, 9S65 #1	230	2100	793	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
(COACH/CAL)	9E65, 9S65 #2	240	2100	825	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9E70, 9S70 #1	245	2100	835	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9E70, 9S70 #2	260	2100	872	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9F80, 9S80 #1	255	2100	846	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9F80, 9S80 #2	270	2100	882	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9F90 #1	310	2100	954	1200	2100	2100	500	1.470	.660	DNA	TV-7511	1.23
	9F90 #2	320	2100	989	1200	2100	2100	500	1.470	.660	DNA	TV-7511	1.23
6V-92TA	9F70 #2	253	2100	775	1200	2100	2100	500	1.460	.504	DNA	TV-7511	0.96
(PARLOR)	9G75 #2	277	2100	840	1200	2100	2100	500	1.460	.504	DNA	TV-7511	0.96
(COACH)	9F80 #2	300	2100	893	1200	2100	2100	500	1.460	.504	.454	TV-7511	0.96
	9H85 #2	330	2100	1007	1200	2100	2100	500	1.460	.636	.480	TV-7511	1.08
8V-92TA (1600 RPM)	9E80	350	1600	1250	1000	1600	1600	500	1.470	DNA	.454	TV-8512	1.23
8V-92TA	7G75	350	1800	1175	1200	1800	1800	500	1.460	DNA	.385	TV-8512	1.23
	9G85	400	1800	1250	1300	2100	1800	500	1.458	DNA	.404	TV-8511	1.39
	9G85	450	2100	1250	1300	2100	1800	500	1.458	.594	.404	TV-8511	1.39
	9G90	475	2100	1330	1300	2100	2100	500	1.458	.610	.454	TV-8511	1.39
8V-92TTA	9G90	400	2100	1330	1300	2100	1900	500	1.458	.610	.454	TV-8511	1.39
8V-92TAC	7G75	350	1800	1175	1200	1800	1800	500	1.508	DNA	.454	TV-8512	1.23
(CAL)	9F90	400	1800	1250	1300	2100	1800	700	1.520	DNA	.490	TV-8511	1.39
	9F90	450	2100	1250	1300	2100	1800	700	1.520	.660	.490	TV-8511	1.39
8V-92TTAC (CAL)	9F90	400	2100	1250	1300	2100	1800	700	1.520	.660	.490	TV-8511	1.39
8V-92TA	7G75	350	1800	1175	1200	1800	1800	500	1.470	DNA	.454	TV-8512	1.23
(ALCC)	9G85	400	1800	1250	1300	1800	1800	500	1.475	DNA	.465	TV-8511	1.39
8V-92TA	9E65 #2	340	2100	1134	1000	2100	2100	500	1.470	.636	DNA	TV-8512	1.23
(COACH)	9E70 #2	365	2100	1187	1000	2100	2100	500	1.470	.636	DNA	TV-8512	1.23
8V-92TA (PARLOR) (COACH)	9A80 #2	404	2100	1143	1300	2100	2100	500	1.458	.594	.404	TV-8511	1.39

NOTES:

TA Turbocharged/Jacket Water Aftercooled.
TTA Constant Horsepower/Turbocharged/Jacket Water Aftercooled.
All Engine Horsepower Ratings Are Based On SAE J1349 Conditions.
Specifications Subject to Change Without Notice.

JWAC Jacket Water Aftercooled.
AIR/AIR Air-to-Air Charge Cooling.
ALCC Advanced Liquid Charge Cooling.

#1 Diesel Fuel #1.
#2 Diesel Fuel #2.
DNA Does Not Apply.
@ With Blower 8923497.

*** Minimum Idle Speed: 500 W/Fuel Modulator, 700 W/Throttle Delay.

1987 CERTIFIED AUTOMOTIVE ENGINES

ENGINE	INJECTOR	RATED BHP	RPM	PEAK TORQUE (LB-FT)	RPM	MAX FL SPEED	MIN FL SPEED	MIN IDLE SPEED	INJECTOR TIMING	THROTTLE DELAY SETTING	FUEL MODULATOR SETTING	TURBO	A/R
6V-92T (AIR/AIR)	9K85	290	1600	1050	1200	1600	1600	500	1.496	DNA	.454	TA-7501	2.59
	9J85	300	1800	975	1200	1800	1750	500	1.464	DNA	.465	TA-7502	2.95
6V-92T (DDEC) (AIR/AIR)	5234770	300	1800	1050	1200	1800	1800	500	1.460	DNA	DNA	TA-7502	2.95
6V-92T (A/A) DDEC-CAL	5234770	300	1800	1050	1200	1800	1800	500	1.460	DNA	DNA	TA-7502	2.95
6V-92TA (1600 RPM)	9E85	290	1600	1015	1000	1600	1600	500	1.480	DNA	.385	TV-7511	1.08
6V-92TA	9G85	300	1800	975	1200	1800	1800	500	1.466	DNA	.465	TV-7511	1.08
	9G90	350	2100	1020	1200	2100	1900	500	1.466	.636	.480	TV-7511	1.08
6V-92TA (JWAC) +	5234770	300	1800	975	1200	1800	1800	500	1.460	DNA	DNA	TV-7511	1.08
(DDEC) +	5234770	350	2100	1020	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	1.08
6V-92TTA	9G85	270	1800	975	1200	1800	1800	500	1.466	DNA	.465	TV-7511	1.08
	9G85	270	2100	975	1200	2100	2100	500	1.466	DNA	.465	TV-7511	1.08
	9G90	300	2100	1020	1200	2100	2100	500	1.466.	.636	.480	TV-7511	1.08
6V-92TAC (CAL)	9F85	320	2100	950	1200	2100	1950	500	1.520	.660	.490	TV-7511	1.23
	9F90$	325	2100	958	1200	2100	1800	700	1.520	.636	.480	TV-7511	1.23
	9F90	300	1800	1000	1200	2100	1800	500	1.520	DNA	.490	TV-7511	1.23
	9F90	340	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
	9F80	300	2100	920	1200	2100	1800	500	1.520	.660	.490	TV-7511	1.08
6V-92TTAC (CAL)	9F90	270	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
	9F90	300	2100	1000	1200	2100	1800	500/700***	1.520	.660	.490	TV-7511	1.23
	9F90	270	1800	1000	1200	1800	1800	500/700***	1.520	.660	.490	TV-7511	1.23
6V-92TA (ALCC)	9H85	300	1800	975	1200	1800	1800	500	1.475	DNA	.454	TV-7511	1.08
	DDEC	300	1800	975	1200	1800	1800	500	1.460	DNA	.454	TV-7511	1.08
6V-92TA	9E60,#1	205	2100	672	1000	2100	2100	500	1.475	.636	DNA	TV-7503	1.08
	9E60,#2	220	2100	710	1000	2100	2100	500	1.475	.636	DNA	TV-7503	1.08
(COACH)	9F70,9T70#1	245	2100	775	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9F70,9T70#2	253	2100	775	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9G75,9S75#1	260	2100	823	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9G75,9S75#2	277	2100	840	1200	2100	2100	500	1.460	.594	DNA	TV-7511	0.96
	9F80,9S80#1	280	2100	849	1200	2100	2100	500	1.460	.636	DNA	TV-7511	1.08
	9F80,9S80#2	294	2100	875	1200	2100	2100	500	1.460	.636	DNA	TV-7511	1.08
	9H85#1	315	2100	976	1200	2100	2100	500	1.460	.636	.480	TV-7511	1.08
	9H85#2	325	2100	1007	1200	2100	2100	500	1.460	.636	.480	TV-7511	1.08
6V-92TA (DDEC) (COACH)	5234850#1	245	2100	757	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
	5234850#1	245	2100	823	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
	5234850#2	253	2100	780	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
	5234850#2	253	2100	840	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
	5234850#1	260	2100	823	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
	5234850#2	277	2100	840	1200	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
6V-92TA (DDEC)	5234850	300	1950	1042	1300	1950	1950	600	1.460	DNA	DNA	TV-7511	0.96
(PARLOR)	5234850	287	1950	893	1200	1950	1950	600	1.460	DNA	DNA	TV-7511	0.96
(COACH)	5234850#2	300	2100	893	1200	2100	2100	600	1.460	DNA	DNA	TV-7511	0.96
	5234850#1	285	2100	870	1200	2100	2100	600	1.460	DNA	DNA	TV-7511	0.96
6V-92TAC (DDEC)	5234850#2	260	2100	867	1000	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
(COACH/CAL)	5234850#1	245	2100	815	1000	2100	2100	500	1.460	DNA	DNA	TV-7511	0.96
6V-92TAC (COACH/CAL)	9E65#1	230	2100	793	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9E65#2	240	2100	825	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9E70#1	245	2100	835	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9E70#2	260	2100	872	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9F80#1	255	2100	846	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
	9F80#2	270	2100	882	1000	2100	2100	500	1.470	.636	DNA	TV-7511	1.08
6V-92TAC (COACH/CAL)	9F90#1	310	2100	954	1200	2100	2100	500	1.470	.660	DNA	TV-7511	1.23
	9F90#2	320	2100	989	1200	2100	2100	500	1.470	.660	DNA	TV-7511	1.23
6V-92TA (PARLOR COACH)	9F80#2	300	2100	893	1200	2100	2100	500	1.460	.504	.454	TV-7511	0.96
	9H85#2	330	2100	1007	1200	2100	2100	500	1.460	.636	.454	TV-7511	1.08
8V-92TA (1600 RPM)	9E80	350	1600	1250	1000	1600	1600	500	1.470	DNA	.454	TV-8512	1.23
8V-92TA	7G75	350	1800	1175	1200	1800	1800	500	1.460	DNA	.385	TV-8512	1.23
	9G85	400	1800	1250	1300	2100	1800	500	1.458	DNA	.404	TV-8511	1.39
	9G85	450	2100	1250	1300	2100	1800	500	1.458	.594	.404	TV-8511	1.39
	9G90†	475	2100	1330	1300	2100	2100	500	1.475	.570	.404	TV-8511	1.39
8V-92TA (DDEC)	5234770	400	1800	1315	1300	1800	1800	500	1.460	DNA	DNA	TV-8511	1.23
	5234775†	475	2100	1425	1300	2100	2100	500	1.460	DNA	DNA	TV-8511	1.39
	+5234770	450	2100	1330	1300	2100	2100	500	1.460	DNA	DNA	TV-8511	1.39
	5234770	400	2100	1330	1300	2100	2100	500	1.460	DNA	DNA	TV-8511	1.23
8V92TAC DDEC-CAL	5234770	400	1800	1315	1300	1800	1800	500	1.460	DNA	DNA	TV-8511	1.39
8V-92TTA	9G90	400	2100	1330	1300	2100	2100	500	1.458	.570	.404	TV-8511	1.39
8V-92TAC (CAL)	7G75	350	1800	1175	1200	1800	1800	500	1.508	DNA	.454	TV-8512	1.23
	9F90	400	1800	1250	1300	1800	1800	700	1.520	.660	.490	TV-8511	1.39
	9F90	450	2100	1250	1300	2100	1800	700	1.520	.660	.490	TV-8511	1.39
8V-92TTAC (CAL)	9F90	400	2100	1250	1300	2100	700	1800	1.520	.660	.490	TV-8511	1.39
8V-92TA (ALCC)	7G75	350	1800	1175	1200	1800	1800	500	1.470	DNA	.454	TV-8512	1.23
	9G85	400	1800	1250	1300	1800	1800	500	1.475	DNA	.465	TV-8511	1.39
8V-92TA (PARLOR COACH)	9E65#2	340	2100	1134	1000	2100	2100	500	1.470	.636	DNA	TV-8512	1.23
	9E70#2	365	2100	1187	1000	2100	2100	500	1.470	.636	DNA	TV-8512	1.23
	9A80#2	404	2100	1143	1300	2100	2100	500	1.458	.594	.404	TV-8511	1.39
8V-92TA (DDEC) (PARLOR COACH)	5234770#2	400	2100	1150	1300	2100	2100	500	1.460	DNA	DNA	TV-8511	1.23

NOTES: ***Minimum Idle Speed: 500 w/Fuel Modulator, 700 w/Throttle Delay.
$ Non Bypass Blower
† Full-Sized Blower
+ Pending 4-87
#1 Diesel Fuel #1
#2 Diesel Fuel #2

DNA — Does Not Apply
AIR/AIR — Air to Air Charge Cooling
ALCC — Advanced Liquid Charge Cooling
TA — Turbocharged/Jacket Water Aftercooled.
TTA — Constant Horsepower/Turbocharged/Jacket Water Aftercooled.
All Engine Horsepower Ratings are Based on SAE J1349 Conditions.
Specifications Subject to Change without Notice.

Truck Models

ENGINE	CERTI-FICATION	INJECTOR	RATED BHP	RPM	PEAK TORQUE (LB-FT)	RPM	MAX FL SPEED	MIN FL SPEED	MIN IDLE SPEED	INJECTOR TIMING	FUEL MODULATOR SETTING	TURBO	A/R
6V-92T (A/A DDEC)	F	5234915	300	1800	1050	1200	DNA	DNA	500	1.520	DNA	TA-7503	2.95 Sq. In.
6V-92TAC (DDEC)	C	5234915	300	2100	975	1200	DNA	DNA	500	1.520	DNA	TV-7512	1.08
6V-92TA (DDEC)	F F	5234775 5234915	350 300	2100 1800	1020 975	1200 1200	DNA DNA	DNA DNA	500 500	1.520 1.520	DNA DNA	TV-7512 TV-7512	1.23 1.08
6V-92TA (MUI)	F	9G90	350	2100	995	1200	DNA	DNA	500	1.480	.454	TV-7512	1.23
8V-92TA (DDEC)	F F F	5234775 5234775 5234915	475 475 400	2100 2100 1800	1425 1350 1315	1200 1200 1200	DNA DNA DNA	DNA DNA DNA	600 600 600	1.520 1.520 1.520	DNA DNA DNA	TV-8513 TV-8513 TV-8513	1.39 1.39 1.23
8V-92TA (MUI)	F	9G85	445	2100	1330	1200	DNA	DNA	500	1.480	.404	TV-8513	1.39
8V92TAC (DDEC)	C C	5234775 5234915	450 400	2100 1800	1425 1315	1200 1200	DNA DNA	DNA DNA	600 600	1.520 1.520	DNA DNA	TV-8513 TV-8513	1.39 1.23

Coach Models

ENGINE	CERTI-FICATION	INJECTOR	RATED BHP	RPM	PEAK TORQUE (LB-FT)	RPM	MAX FL SPEED	MIN FL SPEED	MIN IDLE SPEED	INJECTOR TIMING	FUEL MODULATOR SETTING	TURBO	A/R
6V-92TA (DDEC)	F	5234775#2◇	330	2100	1020	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.23
	F	5234915#2◇	300	1950	1050	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	F	5234915#1◇	285	2100	800	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	F	5234915#2◇	300	2100	880	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	F	5234915#1◇	276	1950	800	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	F	5234915#2◇	289	1950	890	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	F	5234915#1■	260	2100	800	1200	DNA	DNA	600	1.520	DNA	TV-7512	0.96
	F	5234915#2■	277	2100	880	1200	DNA	DNA	600	1.520	DNA	TV-7512	0.96
	F	5234915#1■	245	2100	705	1200	DNA	DNA	600	1.520	DNA	TV-7512	0.96
	F	5234915#2■	253	2100	775	1200	DNA	DNA	600	1.520	DNA	TV-7512	0.96
6V-92TA (MUI)	F	9G85◇	330	2100	990	1200	DNA	DNA	500	1.475	.404	TV-7512	1.23
	F†	9F80◇	300	2100	890	1200	DNA	DNA	500	1.466	.365	TV-7512	1.08
	F†	9G75#2■	277	2100	880	1000	DNA	DNA	500	1.475	.594*	TV-7511	0.96
	F†	9F70#2■	253	2100	825	1000	DNA	DNA	500	1.475	.594*	TV-7511	0.96
	F†	9G75#1■	267	2100	867	1000	DNA	DNA	500	1.475	.594*	TV-7511	0.96
	F†	9F70#1■	245	2100	814	1000	DNA	DNA	500	1.475	.594*	TV-7511	0.96
6V-92TAC (DDEC)	C	5234915#2◇	300	2100	975	1200	DNA	DNA	500	1.520	DNA	TV-7512	1.08
	C	5234915#2◇	300	2100	820	1200	DNA	DNA	500	1.520	DNA	TV-7512	1.08
	C	5234915#1■	260	2100	815	1000	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	C	5234915#2■	277	2100	880	1200	DNA	DNA	600	1.520	DNA	TV-7512	1.08
	C	5234915#1■	245	2100	730	1000	DNA	DNA	600	1.520	DNA	TV-7512	0.96
	C	5234915#2■	253	2100	775	1200	DNA	DNA	600	1.520	DNA	TV-7512	0.96
8V-92TA (DDEC)	F	5234775◇	475	2100	1350	1200	DNA	DNA	600	1.520	DNA	TV-8513	1.39
	F	5234915◇	400	2100	1150	1200	DNA	DNA	600	1.520	DNA	TV-8513	1.23
8V-92TAC (MUI)	F	9F80◇	400	2100	1235	1200	DNA	DNA	500	1.470	.404	TV-8513	1.23
8V-92TAC (DDEC)	C	5234775◇	450	2100	1425	1200	DNA	DNA	600	1.520	DNA	TV-8513	1.39
	C	5234915◇	400	2100	1150	1200	DNA	DNA	600	1.520	DNA	TV-8513	1.23

DNA=Does Not Apply ◇=Parlor ■=Transit #1-Diesel Fuel #1 #2=Diesel Fuel #2

* Throttle Delay

† Data Also Applies to 9S80, 9S75 and 9T70 Injectors

EXHAUST VALVE CLEARANCE ADJUSTMENT

The correct exhaust valve clearance at normal engine operating temperature is important for smooth, efficient operation of the engine.

Insufficient valve clearance can result in loss of compression, misfiring cylinders and, eventually, burned valve seats and valve seat inserts. Excessive valve clearance will result in noisy operation, increased valve face wear and valve lock damage.

Whenever the cylinder head is overhauled, the exhaust valves are reconditioned or replaced, or the valve operating mechanism is replaced or disturbed in any way, the valve clearance must be adjusted to the cold setting to allow for normal expansion of the engine parts during the engine warm–up period. This will ensure a valve setting that is close enough to the specified clearance to prevent damage to the valves when the engine is started.

The exhaust valve bridges must be adjusted and the adjustment screws locked securely at the time the cylinder head is installed on the engine. The necessary adjustment procedure is outlined in Section 1.2.2.

The exhaust valve bridge balance should be checked when a general valve adjustment is performed. After the bridges are balanced, adjust the valve clearance at the *push rod only.*

Do not disturb the exhaust valve bridge adjusting screw.

All of the exhaust valves may be adjusted in firing order sequence during one full revolution of the crankshaft. Refer to the *General Specifications* at the front of the manual for the engine firing order.

Valve Clearance Adjustment (Cold Engine)

1. If not done previously, clean the loose dirt from the exterior of the engine and remove the valve rocker covers. Discard the gaskets. Then, cover any drain cavities in the cylinder head to prevent foreign material from entering.

2. Place the governor speed control lever in the *idle speed* position. If a stop lever is provided, secure it in the *stop* position.

3. Rotate the crankshaft, with engine barring tool J 22582 or with the starting motor, until the injector follower is fully depressed on the particular cylinder to be adjusted. If a wrench or barring tool is used on the crankshaft bolt at the front of the engine, do not turn the crankshaft in a left–hand direction of rotation because the bolt may be loosened.

CAUTION: To reduce the risk of personal injury when barring over or "bumping" the starter while performing an engine tune–up, personnel should keep their hands and clothing away from the engine as there is a remote possibility the engine could start.

4. Loosen the exhaust valve rocker arm push rod locknut.

5. Place a .016" feeler gage (J 9708–01) between the valve bridge and the valve rocker arm pallet (Fig. 1). Adjust the push rod to obtain a smooth "pull" on the feeler gage.

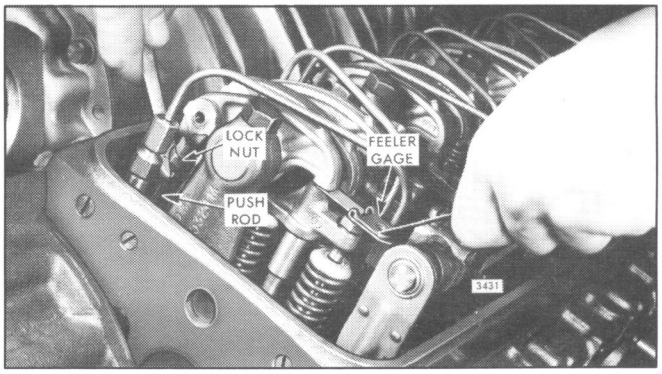


Fig. 1 – Adjusting Valve Clearance

6. Remove the feeler gage. Hold the push rod with a 5/16" wrench and tighten the locknut with a 1/2" wrench.

7. Recheck the clearance. At this time, if the adjustment is correct, the .015" gage will pass freely between the valve bridge and the rocker arm pallet, but the .017" gage will not pass through. Readjust the push rod, if necessary.

8. Adjust and check the remaining exhaust valves in the same manner as above.

Valve Clearance Adjustment (Hot Engine)

It is *not* necessary to make a final hot engine exhaust valve clearance adjustment after a cold engine adjustment has been performed. However, if a hot engine adjustment is desired, use the following procedure.

Maintaining normal engine operating temperature is particularly important when making the hot engine exhaust valve clearance adjustment. If the engine is allowed to cool off before setting any of the valves, the clearance, when running at full load, may become insufficient.

NOTICE: Since these adjustments are normally made while the engine is stopped, it may be necessary to run the engine between adjustments to maintain normal operating temperature.

1. With the engine at normal operating temperature (refer to Section 13.2), set the exhaust valve clearance with feeler gage J 9708–01. At this time, if the valve clearance is correct, the .013" gage will pass freely between the valve bridge and the valve rocker arm pallet, but the .015" feeler gage will not pass through. Readjust the push rod, if necessary.
2. After the exhaust valve clearance has been adjusted, check the fuel injector timing (Section 14.2).

Check Exhaust Valve Clearance Adjustment

1. With the engine at 100°F (38°C) or less, check the valve clearance.
2. If a .016" feeler gage $\pm$ .004" will pass between the valve bridge and the valve rocker arm pallet, the valve clearance is satisfactory. If necessary, adjust the push rod.

FUEL INJECTOR TIMING

To time an injector properly, the injector follower must be adjusted to a definite height in relation to the injector body.

All of the injectors can be timed in firing order sequence during one full revolution of the crankshaft. Refer to *General Specifications* in the *General Information* Section at the front of the manual for the engine firing order.

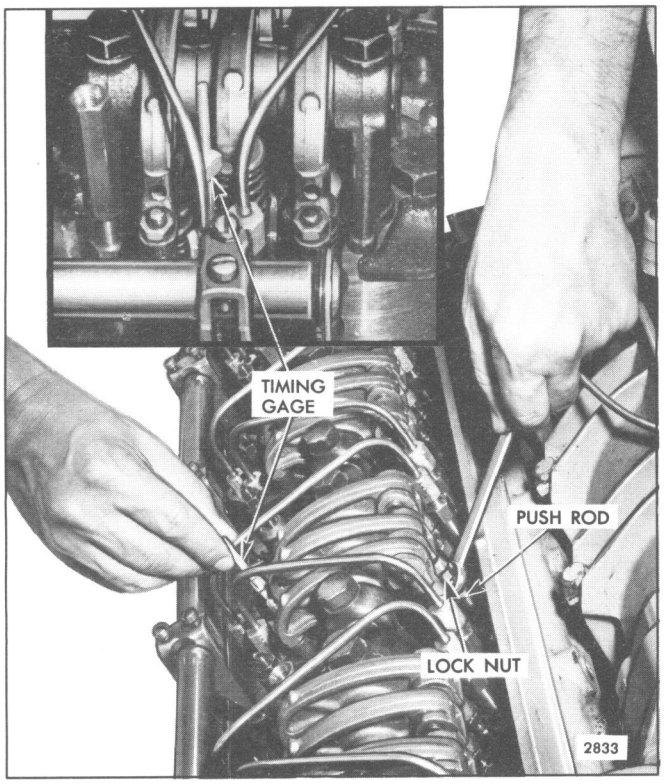


Fig. 1 – Timing Fuel Injector

Time Fuel Injector

After the exhaust valve clearance has been adjusted (Section 14.1), time the fuel injectors as follows:

1. Place the governor speed control lever in the *idle speed* position. If a stop lever is provided, secure it in the *stop* position.
2. Rotate the crankshaft, with the starting motor or with engine barring tool J 22582, until the exhaust valves are fully depressed on the particular cylinder to be timed. If a wrench is used on the crankshaft bolt at the front of the engine, do not turn the crankshaft in a left–hand direction of rotation because the bolt could be loosened.

CAUTION: To reduce the risk of personal injury when barring over or "bumping" the starter while performing an engine tune–up, personnel should keep their hands and clothing away from the engine as there is a remote possibility the engine could start.

3. Place the small end of the injector timing gage (refer to Table 1 or Section 14 for the correct timing gage) in the hole provided in the top of the injector body with the flat of the gage toward the injector follower (Fig. 1).

• Injector	Timing Dimension	Timing Gage	Camshaft Timing
9270	1.460"	J 1853	Standard
9275*	1.460"	J 1853	Standard
9280*	1.460"	J 1853	Standard
9285*	1.460"	J 1853	Standard
9290*	1.460"	J 1853	Standard
9295#	1.484"	J 1242	Standard
9200†	1.484"	J 1242	Standard
9215	1.484"	J 1242	Standard
M15@	1.460"	J 1853	Standard
M15**	1.470"	J 24236	Standard

* Turbocharged engines use 1.484" timing (gage J1242).
† 16V 92T (1800 rpm generator set – 860 bhp).
# Generator set only.
• For automotive applications, refer to Section 14.
@ Marine pleasurecraft and all purpose industrial (non–FP). Exceptions: Models 8063–7400, 8083–7400 use 1.470".
** All purpose industrial (FP).

TABLE 1 – INJECTOR TIMING

4. Loosen the injector rocker arm push rod locknut.
5. Turn the push rod and adjust the injector rocker arm until the extended part of the gage will just pass over the top of the injector follower.
6. Hold the push rod and tighten the locknut. Check the adjustment and, if necessary, readjust the push rod.
7. Time the remaining injectors in the same manner as outlined above.
8. If no further engine tune–up is required, reinstall the valve rocker covers, using new gaskets.

LIMITING SPEED MECHANICAL GOVERNOR

INJECTOR RACK CONTROL ADJUSTMENT

6V AND 8V ENGINES

Two types of limiting speed mechanical governors are used. The difference between each type of governor is in the high–speed spring retainer and spring housing assembly. Certain engines use the standard limiting speed governor while some engine applications use the dual range limiting speed governor. The only variation in the tune–up procedure between each type of governor is in the setting of the maximum no–load speed.

After adjusting the exhaust valves and timing the fuel injectors, adjust the governor and position the injector rack control levers.

Before proceeding with the governor and injector rack adjustments, disconnect any supplementary governing device. After the adjustments are completed, reconnect and adjust the supplementary. governing device as outlined in Section 14.14.

Back out the external starting aid screw.

On "TT" engines, back out the Belleville spring retainer nut until there is approximately .060" clearance between the washers and the retainer nut (Fig. 1).

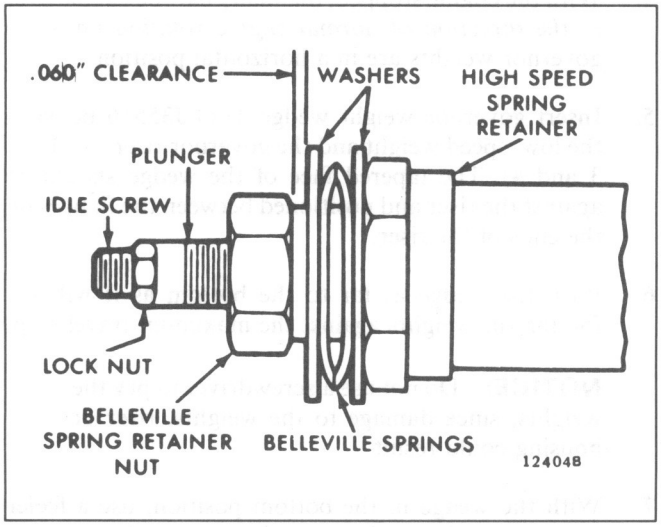


Fig. 1 – Belleville Washer Location

ADJUST GOVERNOR GAP

A properly adjusted governor gap will accomplish the following:

- Provide sufficient weight travel in the idle range to prevent stalling during deceleration. A tight gap reduces weight travel in the idle range.
- Provide enough weight travel in the high speed control range to prevent engine overspeed with light loads at full throttle. A loose gap reduces weight travel in the high speed range.
- Prevent the force generated by the low speed weights (double weight governors) from compressing the high speed spring. If the gap is too tight, the force of the heavy idle weights operating on the high speed spring will cause the high speed spring to compress at too low a speed, resulting in low power.

DOUBLE WEIGHT GOVERNOR

The gap on double weight limiting speed governors may be set using the "static" or the "engine–on" method. The "static" or *weight pry* method allows the technician to set the gap accurately in the most efficient, cost effective manner. For this reason DDC recommends using this method whenever possible.

Static Method

The following procedure is accomplished with the engine *stopped* using governor weight wedge tool J 35516.

CAUTION: To avoid personal injury and prevent possible engine damage, the following precautions should be observed:

•Make sure the turbocharger compressor inlet guard or compressor air inlet shield J 26554–A is installed any time the engine is running and the turbocharger air inlet piping is removed. The use of these guards does not preclude any other safety practices contained in this service manual.

•After replacing the governor cover and before starting the engine, make sure the injector racks move to the "no fuel" position when the governor stop lever is in the "stop" position.

Verification of the governor gap setting should not be considered necessary until "Vehicle Low Power/Performance at Low Mileage" (section 15.2) has been used to troubleshoot an engine performance concern.

Checking the Gap

1. In a vehicle, set the engine idle speed at 600 RPM and stop the engine.

   NOTICE: This static governor gap setting is established at the factory based upon a 600 RPM engine idle. Therefore, when *verifying* a factory tune–up the governor idle speed should be set at 600 RPM.

   CAUTION: Disconnect the grounded battery cable(s) to prevent accidental engine cranking and possible personal injury while the gap is being checked or set.

2. Clean and remove the governor cover. Discard the gasket.

3. With the engine stopped, manually bar the engine over *in the direction of normal engine rotation* until the governor weights are in a horizontal position.

   On "TT" governors, the Belleville spring retainer nut must be backed out until there is approximately .060" clearance between the washers and the retainer nut before checking or resetting the governor gap.

4. Insert governor weight wedge J35516 between the low–speed weight and the governor riser (see Figs. 2, 3 and 4). The tapered face of the wedge should be against the riser and positioned between the flanges on the ends of the riser.

5. Push the wedge as far to the bottom as it will go, forcing the weights against the maximum travel stop.

   NOTICE: Do not use a screwdriver to pry the weights, since damage to the weights, riser or housing could result.

6. While holding the wedge in the bottom position, use a feeler gauge to measure the gap between the low speed spring cap and the high speed spring plunger (see Figs. 5 and 6). The gap should measure .003" – .019". Reset the gap to .008" if the measured gap is out of limits (see "GOVERNOR GAP ADJUSTMENT PROCEDURE" below).

7. Remove the wedge and replace the governor cover, using a new gasket.

8. Reset Belleville springs (see Section 14.3.5 of the Service Manual).

GOVERNOR GAP ADJUSTMENT PROCEDURE

These procedures permit adjusting the gap while the governor is installed on an engine or removed and on a bench.

Before adjusting the gap on "TT" governors, the Belleville spring retainer nut must be backed out until there is approximately .060" clearance between the washers and the retainer nut (see Fig. 5).

A. Setting The Gap — Governor On The Engine

1. Disconnect any supplementary governor devices.

2. Set the engine idle speed at 600 RPM and stop the engine.

   CAUTION: Disconnect the grounded battery cable(s) to prevent accidental engine cranking and possible personal injury while the gap is being checked or set.

3. Clean and remove the governor cover. Discard the gasket.

4. With the engine stopped, manually bar the engine over *in the direction of normal engine rotation* until the governor weights are in a horizontal position.

5. Insert governor weight wedge Tool J35516 between the low–speed weight and the governor riser (see Figs. 3 and 4). The tapered face of the wedge should be against the riser and positioned between the flanges on the ends of the riser.

6. Push the wedge as far to the bottom as it will go, forcing the weights against the maximum travel stop.

   NOTICE: Do not use a screwdriver to pry the weights, since damage to the weights, riser or housing could result.

7. With the wedge in the bottom position, use a feeler gauge to set the gap between the low speed spring cap and the high speed spring plunger at .008". Then tighten the governor gap adjusting screw lock nut (see Figs. 5 and 6).

8. Push down on the governor weight wedge tool to be sure it did not move while the gap was being set. Recheck the gap while holding the tool in this position. If the gap is incorrect, reset to .008", repeating the steps outlined above.

9. Remove the wedge.

The buffer, idle speed, no–load speed and starting aid screws, the injector racks and supplemental governor devices require adjustment whenever the governor gap is changed.

10. Reset Belleville springs (see Section 14.3.5 of the Engine Service Manual).

B. Setting The Gap — Governor On A Bench

NOTICE: When setting the governor gap on a bench, the governor *must* be mounted on a blower to support and protect the governor weight carrier shaft.

1. Position the idle screw. On all non–"TT" governors with a normal 1.00" long idle adjustment screw, the screw should be set so that it extends .325". On all "TT" governors with a normal 1.00" long idle adjustment screw, the screw should be set to extend .400". This dimension is measured from the face of the idle speed adjusting screw lock nut to the end of the idle speed adjusting screw with a tolerance of ± .015" (see Fig. 5). For governors with a variable high–speed option, which use a 1.75" long idle adjustment screw, the screw should be set to extend 1.075" on all non–"TT" governors or 1.150" on all "TT" governors. These idle screw projections result in a nominal 600 RPM idle speed.

2. Rotate the governor weights until they are in a horizontal position.

3. Insert governor weight wedge Tool J35516 between the low–speed weight and the governor riser (see Figs. 3 and 4). The tapered face of the wedge should be against the riser and positioned between the flanges on the ends of the riser. To prevent the weights from rotating when the governor weight wedge tool is inserted, a clean, soft rag should be wedged between the blower housing and the blower rotors.

4. Push the wedge as far to the bottom as it will go, forcing the weights against the maximum travel stop.

NOTICE: Do not use a screwdriver to pry the weights, since damage to the weights, riser or housing could result.

5. Check to make sure that the governor high–speed spring plunger is seated. Turn in the high–speed retainer as required to seat the plunger.

6. With the wedge in the bottom position, use a feeler gauge between the low speed spring cap and the high speed spring plunger to set the gap at .008". Then tighten the governor gap adjusting screw lock nut (see Figs. 5 and 6).

7. Push down on the governor weight wedge tool to be sure it did not move while the gap was being set. Recheck the gap while holding the tool in this position. If the gap is incorrect, reset to .008", repeating the steps outlined above.

8. Remove the wedge and reinstall the cover using a new gasket.

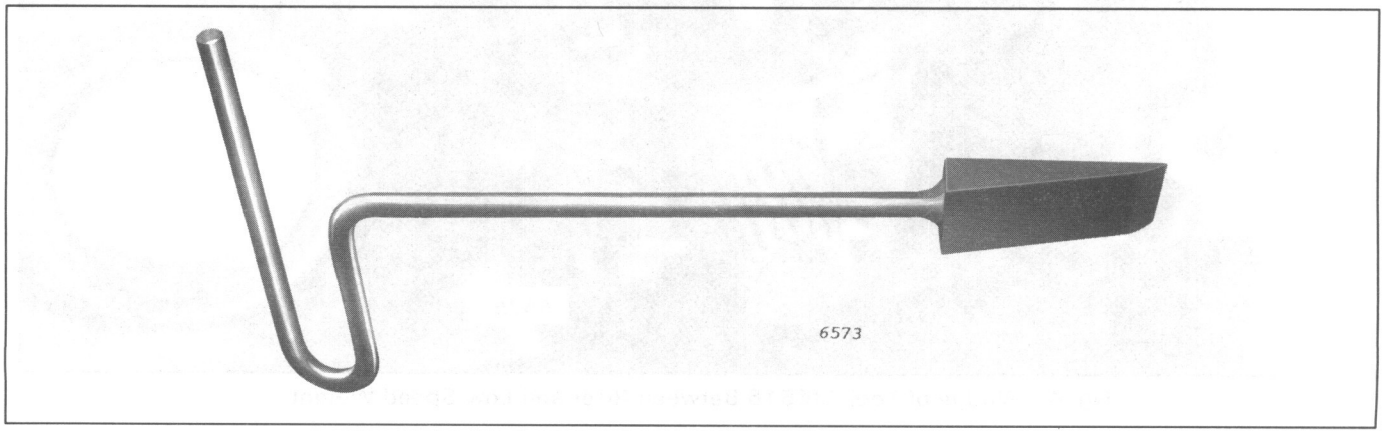


Fig. 2 – Governor Weight Wedge Tool J35516

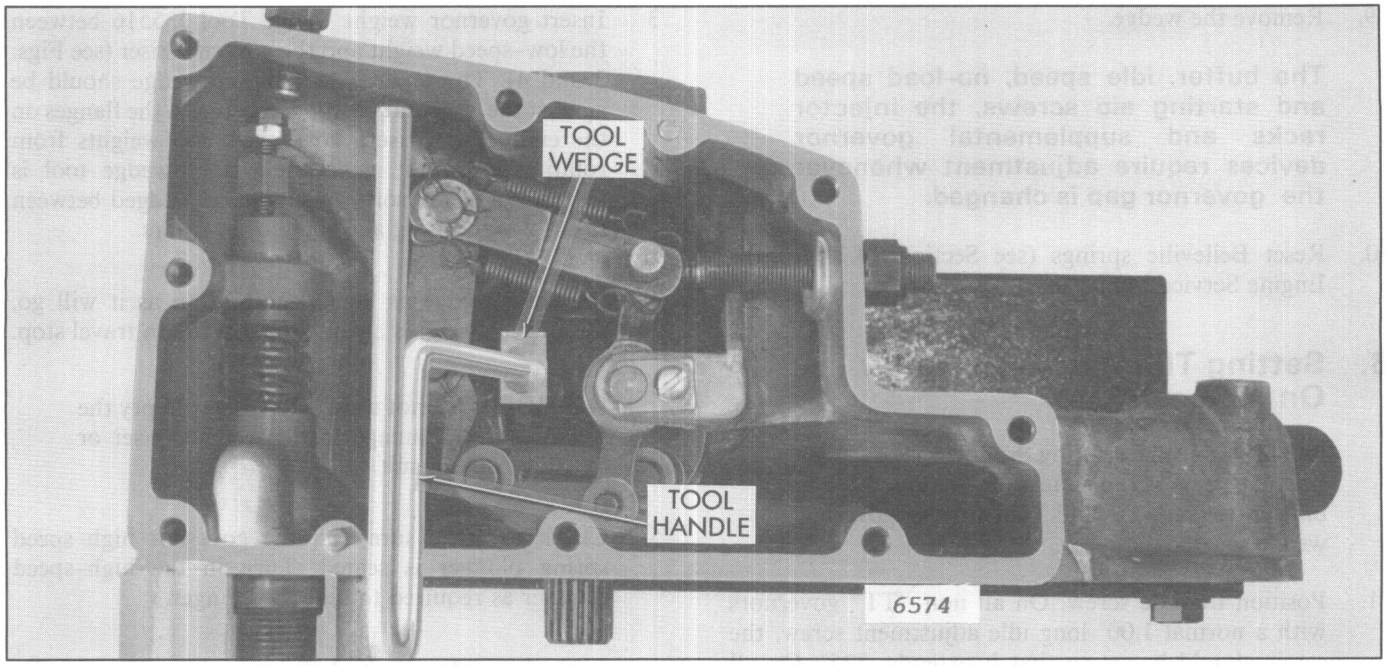


Fig. 3 – Tool J35516 Inserted Between Low Speed Weight and Riser

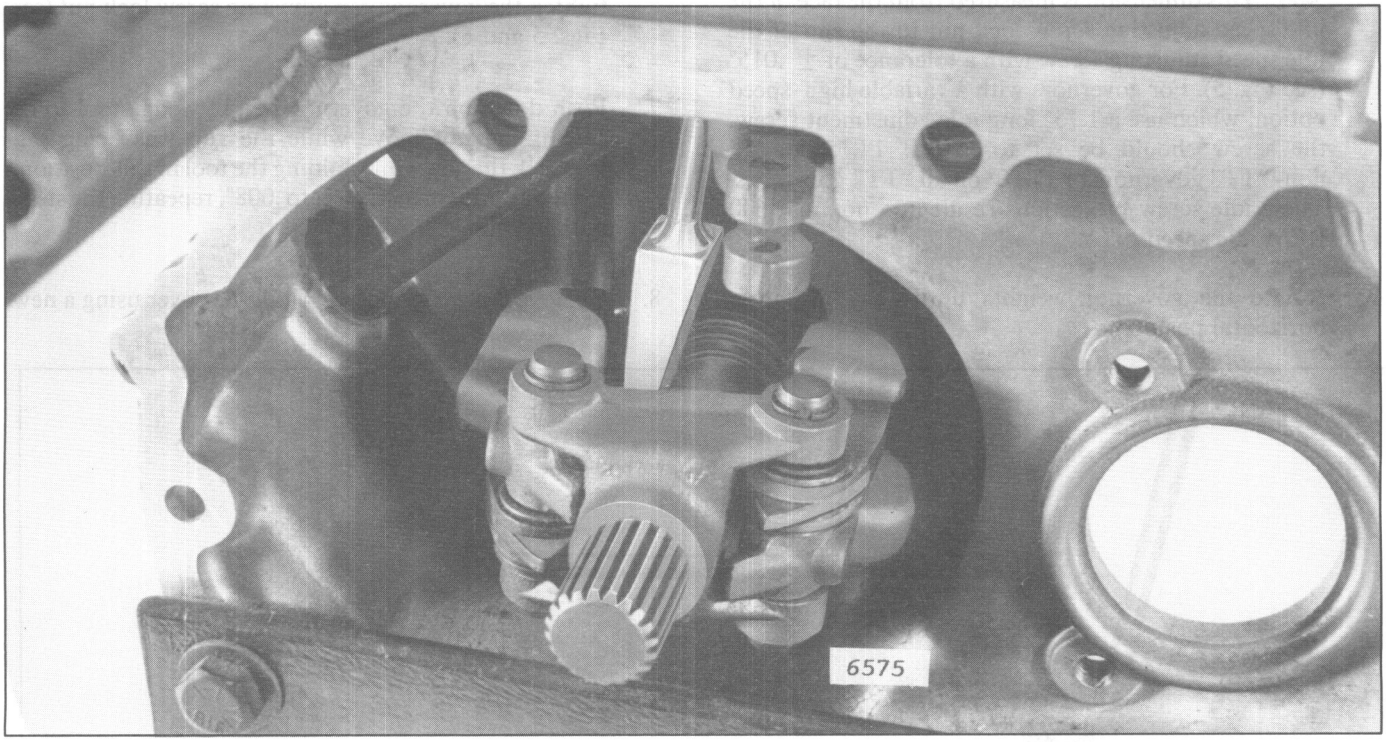


Fig. 4 – Wedge of Tool J35516 Between Riser and Low Speed Weight

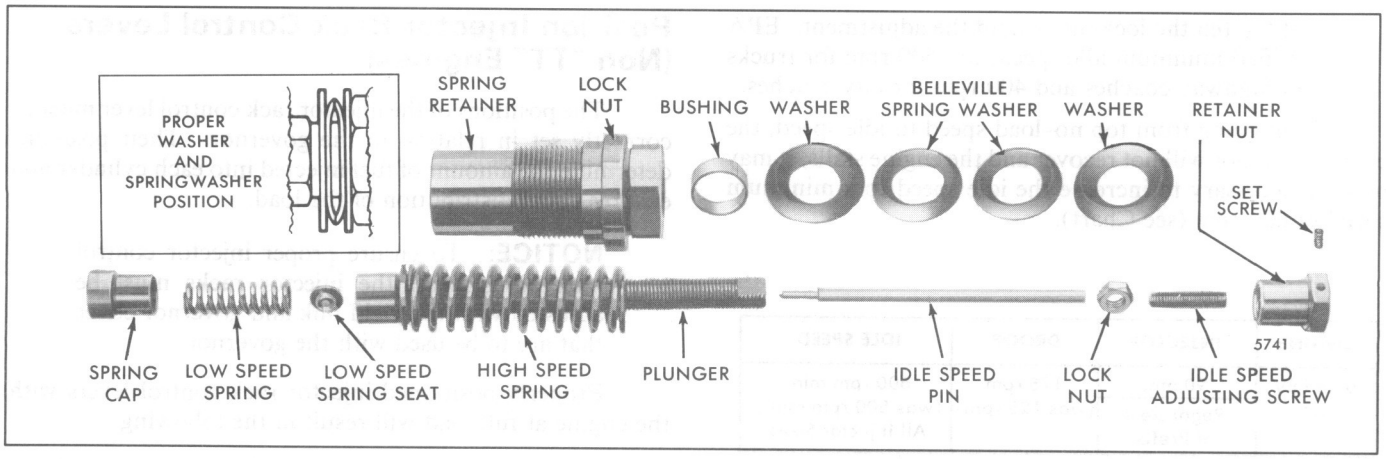


Fig. 5 – High and Low-Speed Springs and Plunger Details Including Belleville Washers (TTA–Fuel Squeezer Engines)

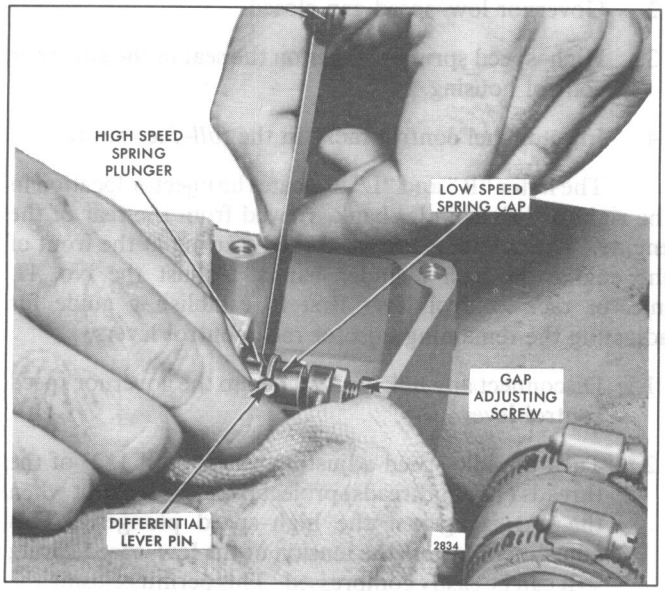


Fig. 6 – Adjusting Governor Gap

ADJUST GOVERNOR GAP

ENGINE ON METHOD

Double Weight Governor

With the engine stopped and at normal operating temperature, adjust the governor gap as follows:

CAUTION: If the gap adjustment is to be made with the engine in the vehicle, it is suggested that the fan assembly be removed due to the closeness of the fan blades to the engine governor.

1. Remove the high–speed spring retainer cover.
2. Back out the buffer screw until it extends approximately 5/8" from the locknut (Fig. 17).
3. Start the engine and loosen the idle speed adjusting screw locknut. Then, adjust the idle screw to obtain the desired engine idle speed (Fig. 16). Hold the screw and tighten the locknut to hold the adjustment. For "TT" engines, set the idle speed to 500 rpm. EPA certified minimum idle speeds are 500 rpm for trucks and highway coaches and 400 rpm for city coaches.
4. Stop the engine. Clean and remove the governor cover and lever assembly and the valve rocker covers. Discard the gaskets.
5. Start and run the engine between 1100 and 1300 rpm by manual operation of the differential lever. Do not overspeed the engine.
6. Check the gap between the low–speed spring cap and the high–speed spring plunger with a feeler gage (Fig. 6). The gap should be .002"–.004". If the gap setting is incorrect, reset the gap adjusting screw.
7. Recheck the gap with the engine operating between 1100 and 1300 rpm and readjust, if necessary.
8. Stop the engine and, using a new gasket, install the governor cover and lever assembly. Tighten the screws.

Single Weight Governor

With the engine stopped and at normal operating temperature, adjust the governor gap as follows:

NOTICE: If the gap adjustment is to be made with the engine in the vehicle, it is suggested that the fan assembly be removed due to the closeness of the fan blades to the engine governor.

1. Remove the high–speed spring retainer cover.
2. Back out the buffer screw until it extends approximately 5/8" from the locknut (Fig. 17).
3. Start the engine and loosen the idle speed adjusting screw locknut. Then, adjust the idle screw to obtain the desired engine idle speed (Fig. 16). Hold the screw

and tighten the locknut to hold the adjustment. EPA certified minimum idle speeds are 500 rpm for trucks and highway coaches and 400 rpm for city coaches.

If, in going from top no–load speed to idle speed, the engine governor will not recover and the engine stalls, it may become necessary to increase the idle speed to a minimum speed of 600 rpm (see Chart).

ENGINE	INJECTOR	DROOP	IDLE SPEED
6 and 8V Turbo	90 mm	175 rpm (was 125 rpm)	600 rpm min. (was 500 rpm min.) All Injector Sizes
	Regardless of Prefix		

4. Stop the engine. Clean and remove the governor cover and lever assembly and the valve rocker cover. Discard the gaskets.
5. Remove the fuel rod from the differential lever and the injector control tube lever.
6. Check the gap between the low–speed spring cap and the high–speed spring plunger with gage J 23478 (.200") – (Fig. 7). Be sure the external starting aid screw (if used) is backed out far enough to make it ineffective when making this adjustment.
7. If required, loosen the locknut and turn the gap adjusting screw until a slight drag is felt on the gage.
8. Hold the adjusting screw and tighten the locknut.
9. Recheck the gap and readjust, if necessary.
10. Install the fuel rod between the govenor and injector control tube lever.
11. Use a new gasket and install the governor cover and lever assembly.

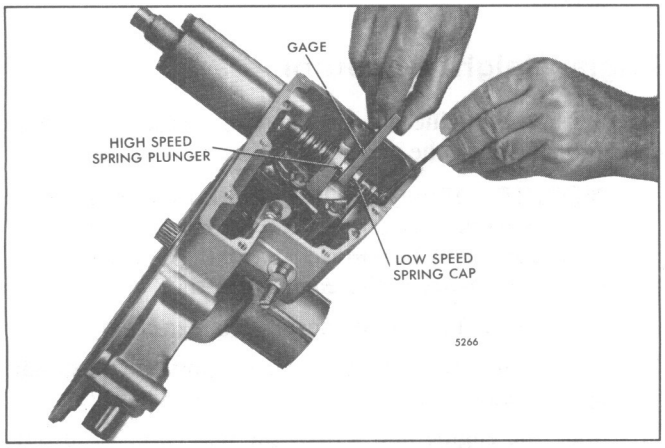


Fig. 7 – Adjusting Governor Gap (Single Weight Governor) with Feeler Gage J 23478

Position Injector Rack Control Levers (Non "TT" Engines)

The positions of the injector rack control lever must be correctly set in relation to the governor. Their positions determine the amount of fuel injected into each cylinder and ensures equal distribution of the load.

NOTICE: To ensure proper injector control rack adjustment, the injector racks must be adjusted with the yield link and governor cover that are to be used with the governor.

Properly positioned injector rack control levers with the engine at full load will result in the following:

1. Speed control lever at the *maximum speed* position.
2. Governor low–speed gap closed.
3. High–speed spring plunger on the seat in the governor control housing.
4. Injector fuel control racks in the *full–fuel* position.

The letter "R" and "L" indicate the injector location in the right or left cylinder bank, viewed from the rear of the engine. The cylinders are numbered starting at the front of the engine on each cylinder bank. Adjust the No. 1L injector rack control lever first to establish a guide for adjusting the remaining injector rack control levers.

1. Disconnect any linkage attached to the governor speed control lever.
2. Turn the idle speed adjusting screw until 1/2" of the threads (12–14 threads) project from the locknut when the nut is against the high–speed plunger. This adjustment lowers the tension of the low–speed spring so it can be easily compressed. This permits closing the low–speed gap without bending the fuel rods or causing the *yield mechanism springs to yield or stretch*. A false fuel rack setting may result if the idle speed adjusting screw is not backed out as noted above.

Injector racks must be adjusted so the effort to move the throttle from the *idle speed* position to the *maximum speed* position is uniform. A sudden increase in effort can result from:

a. Injector racks adjusted too tight causing the yield link to separate.

b. Binding of the fuel rods.

c. Failure to back out idle screw.

3. Back out the buffer screw approximately 5/8", if it has not already been done.
4. Remove the clevis pin from the fuel rod and the right cylinder bank injector control tube lever.

5. Loosen all of the inner and outer injector rack control lever adjusting screws or adjusting screws and locknuts. Be sure all of the injector rack control levers are free on the injector control tubes.

6. Move the speed control lever to the *maximum speed* position and hold it in that position with light finger pressure (Fig. 8 or 9).

Two Screw Assembly

Turn the inner adjusting screw of the No. 1L injector rack control lever down until a slight movement in the control tube lever is observed or a step–up in effort to turn the screwdriver is noted (Fig. 8). This will place the No. 1L injector rack in the *full–fuel* position. Turn down the outer adjusting screw until it bottoms lightly on the injector control tube. Then, alternately tighten both the inner and outer adjusting screws.

One Screw and Locknut Assembly

Tighten the adjusting screw of the No. 1L injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted (Fig. 9). Tighten the screw approximately 1/8 of a turn more and lock securely with the adjusting screw locknut. This will place the No. 1L injector rack in the *full–fuel* position.

NOTICE: Overtightening of the injector rack control lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

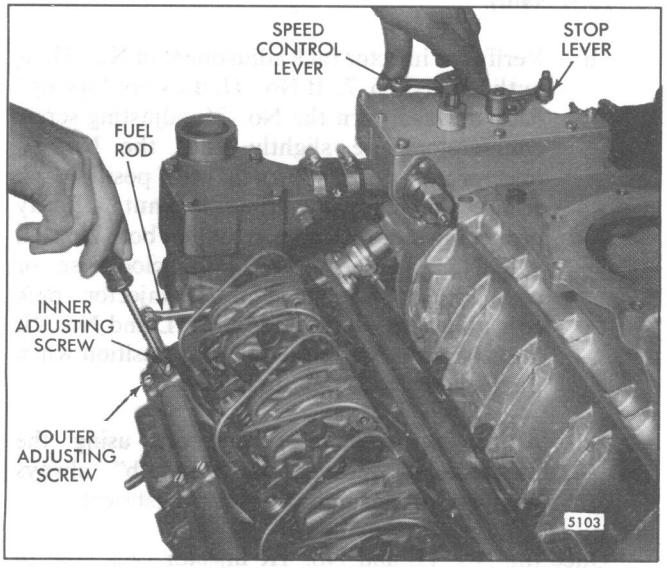


Fig. 8 – Positioning No. 1 Injector Rack Control Lever (Two Screw Assembly)

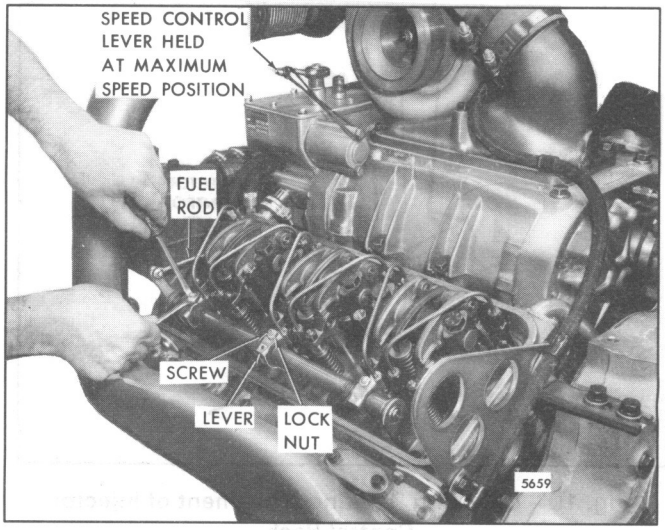


Fig. 9 – Position No. 1 Injector Rack Control Lever (One Screw and Locknut Assembly)

The above step should result in placing the governor linkage and control tube assembly in the same position that they will attain while the engine is running at full load.

7. To be sure of the proper rack adjustment, hold the speed control lever in the *maximum speed* position and press down on the injector rack with a screwdriver or finger tip and note the "rotating" movement of the injector control rack (Fig. 10). Hold the speed control lever in the *maximum speed* position and, using a screwdriver, press downward on the injector control rack. The rack should tilt downward, and when the pressure of the screwdriver is released, the control rack should "spring" back upward (Fig. 11).

If the rack does not return to its *original* position, it is too loose. To correct this condition with the *Two Screw Assembly*, back off the outer adjusting screw slightly and tighten the inner adjusting screw slightly. To correct this condition with the *One Screw and Locknut Assembly*, loosen the locknut and turn the adjusting screw clockwise a slight amount and retighten the locknut.

The setting is too tight if, when moving the speed control lever from the *no–speed* to the *maximum speed* position, the injector rack becomes tight before the speed control lever reaches the end of its travel (as determined by the stop under the governor cover). This will result in a step–up in effort required to move the speed control lever to the end of its travel. To correct this condition with the *Two Screw Assembly*, back off the inner adjusting screw slightly and tighten the outer adjusting screw slightly. To correct this condition with the *One Screw and Locknut Assembly*, loosen the locknut and turn the adjusting screw counterclockwise a slight amount and retighten the locknut.

8. Remove the clevis pin from the fuel rod and the left bank injector control tube lever.

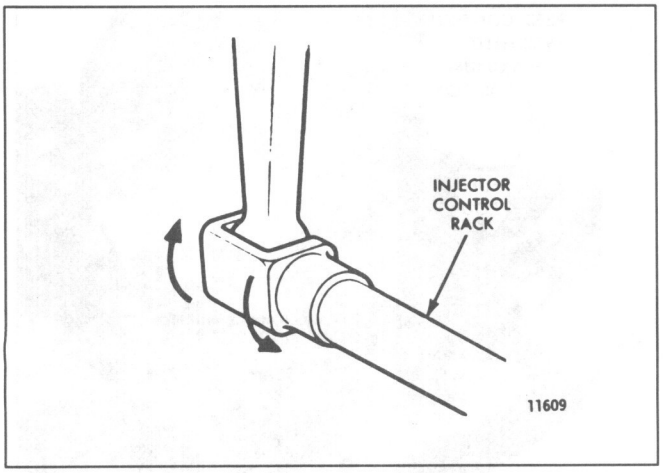


Fig. 10 – Checking Rotating Movement of Injector Control Rack

9. Insert the clevis pin in the fuel rod and the right cylinder bank injector control tube lever and position the No. 1R injector rack control lever as previously outlined in Step 6 and 7 for the No. 1L injector rack control lever.

10. Insert the clevis pin in the fuel rod and the left bank injector control tube lever. Repeat the check on the No. 1L and No. 1R injector rack control levers as outlined in Step 7. Check for and eliminate any deflection which occurs at the bend in the fuel rod where it enters the cylinder head.

11. To adjust the remaining injector rack control levers, remove the clevis pins from the fuel rods and the injector control tube levers, hold the injector control racks in the *full–fuel* position by means of the lever on the end of the control tube and proceed as follows:

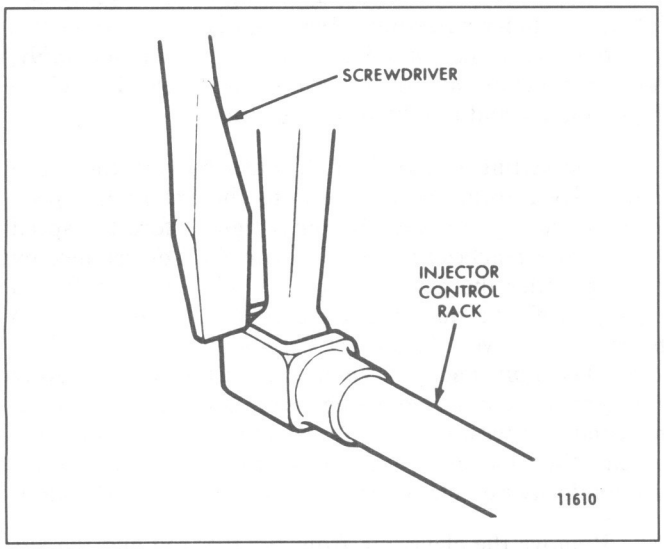


Fig. 11 – Checking Injector Control Rack "Spring"

Two Screw Assembly.

a. Turn down the inner adjusting screw of the injector rack control lever until the screw bottoms (injector control rack in the *full–fuel* position).

b. Turn down the outer adjusting screw of the injector rack control lever until it bottoms on the injector control tube.

c. While still holding the control tube lever in the *full–fuel* position, adjust the inner and outer adjusting screws to obtain the same condition as outlined in Step 7. Tighten the screws.

NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

One Screw and Locknut Assembly.

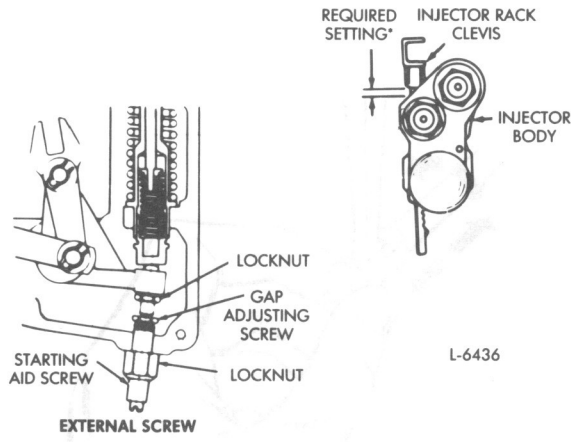
a. Tighten the adjusting screw of the No. 2L injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Securely lock the adjusting screw locknut.

NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

b. Verify the injector rack adjustment of No. 1L as outlined in Step 7. If No. 1L does not "spring" back upward, turn the No. 2L adjusting screw counterclockwise slightly until the No. 1L injector rack returns to its *full–fuel* position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 1L and No. 2L injectors. Turn clockwise or counterclockwise the No. 2L injector rack adjusting screw until both No. 1L and No. 2L injector racks are in the *full–fuel* position when the locknut is securely tightened.

c. Adjust the remaining injectors using the proceedures outlined in Step "b" always verifying proper injector rack adjustment.

Once the No. 1L and No. 1R injector rack control levers are adjusted, do not try to alter their settings. All adjustments are made on the remaining control racks.



INJECTOR	GAGE SETTING*	TOOL NUMBER
9200	.454"	J23190
9215	.454"	J23190
9225	.454"	J23190
9280	.385"	J24882
9285	.385"	J24882
9290	.454"	J23190
9295	.454"	J23190
9A80	.385"	J24882
9A85	.385"	J24882
9A90	.454"	J23190
9B70	.385"	J24882
9B75	.385"	J24882
9B80	.385"	J24882
9B85	.385"	J24882
9B90	.454"	J23190
9C70	.385"	J24882
9C75	.385"	J24882
9C80	.385"	J24882
9C90	.454"	J23190
9E65	.385"	J24882
9E70	.385"	J24882
9E80	.385"	J24882
9E85	.385"	J24882

INJECTOR	GAGE SETTING*	TOOL NUMBER
9F70	.454"	J23190
9F80	.454"	J23190
9F85	.454"	J23190
9F90	.454"	J23190
7G65	.385"	J24882
7G70	.385"	J24882
7G75	.385"	J24882
9G75	.454"	J23190
9G85	.454"	J23190
9G90	.454"	J23190
9H85	.404"	J9509C
9J85	.454"	J23190
9K85	.404"	J9509C
9S65	.454"	J23190
9S70	.454"	J23190
9S75	.454"	J23190
9S80	.454"	J23190
9T70	.454"	J23190

Fig. 12 – Starting Aid Screw Adjustment

12. When all of the injector rack control levers are adjusted, recheck their settings. With the control tube lever in the *full–fuel* position, check each control rack as in Step 7. All of the control racks must have the same "spring" condition with the control tube lever in the *full–fuel* position.

13. Insert the clevis pin in the fuel rod and the injector control tube levers.

14. Turn the idle speed adjusting screw in until it projects 3/16" from the locknut, to permit starting the engine.

15. On current turbocharged engines, adjust the external starting aid screw as follows:

    a. With the engine *stopped,* place the governor stop lever in the *run* position and the speed control lever in the *idle speed* position.

    b. Adjust the starting aid screw to obtain the required setting between the shoulder on the injector rack clevis and the injector body (Fig. 12). Select the proper gage and measure the setting at No. 2R cylinder. When the starting aid screw is properly adjusted, the gage should have a small clearance of 1/64" in the space along the injector rack shaft between the rack clevis and the injector body.

    c. After completing the adjustment, hold the starting aid screw and tighten the locknut.

    d. Check the injector rack clevis–to–body clearance after performing the following:

        1. Position the stop lever in the *run* position.

        2. Move the speed control lever from the *idle speed* position to the *maximum speed* position.

        3. Return the speed control lever to the *idle speed* position.

Movement of the governor speed control lever is to take–up the clearance in the governor linkage. The injector rack clevis–to–body clearance can be increased by turning the starting aid screw farther in against the gap adjusting screw, or reduced by backing it out. The starting aid screw will be ineffective if the speed control lever is advanced toward wide open throttle during start–up.

CAUTION: Before starting an engine after an engine speed control adjustment or after removal of the engine governor cover and lever assembly, the technician must determine that the injector racks move to the *no–fuel* position when the governor stop lever is placed in the *stop* position. Engine overspeed will result if the injector racks cannot be positioned at no fuel with the governor stop lever. An overspeeding engine can result in engine damage which could cause personal injury.

16. Use new gaskets and reinstall the valve rocker covers.

Postion Injector Rack Control Levers ("TT" Engines)

To ensure proper injector control rack adjustment, the injector racks must be adjusted with the yield link and governor cover that are to be used with the governor.

The position of the injector rack control levers must be correctly set in relation to the governor. Their positions determine the amount of fuel injected into each cylinder and ensure equal distribution of the load. Properly positioned injector rack control levers with the engine at full load will result in the following:

1. Speed control lever at the *maximum speed* position.
2. Governor low–speed gap closed.
3. High–speed spring plunger on the seat in the governor control housing.
4. Injector fuel control racks in the *full–fuel* position.
5. The effort to move the throttle from the *idle speed* position to the *maximum speed* position is uniform. A sudden increase in effort usually near the *full–fuel* position can result from:
   a. Injector racks adjusted too tight causing the yield link to separate.
   b. Binding of the fuel rods on the cylinder head.
   c. Failure to back out idle screw.

The letters "R" and "L" indicate the right or left cylinder bank as viewed from the rear of the engine. The cylinder positions are established starting at the front of the engine on each cylinder bank. For example, the first cylinder from the front of the engine on the left bank is considered No. 1L, the second is No. 2L, and so forth.

1. Disconnect any linkage attached to the governor speed control lever.
2. Turn the idle speed adjusting screw until there is no tension in the idle spring. A false fuel rack setting may result if the idle speed adjusting screw is not backed out as noted above or removed.

Injector racks must be adjusted so the effort to move the throttle from the *idle speed* position to the *maximum speed*position is uniform. A sudden increase in effort usually near the *full–fuel* position can result from:

   a. Injector racks adjusted too tight causing the yield link to separate.
   b. Binding of the fuel rods on the cylinder head.
   c. Failure to back out the idle screw.

3. Remove the clevis pin from the fuel rod at the right bank injector control tube lever.
4. Loosen all of the injector rack control lever adjusting screws and locknuts on both cylinder heads enough to determine the freeness of the control lever and injector rack. Be sure all of the injector rack control levers are free on the injector control tubes.

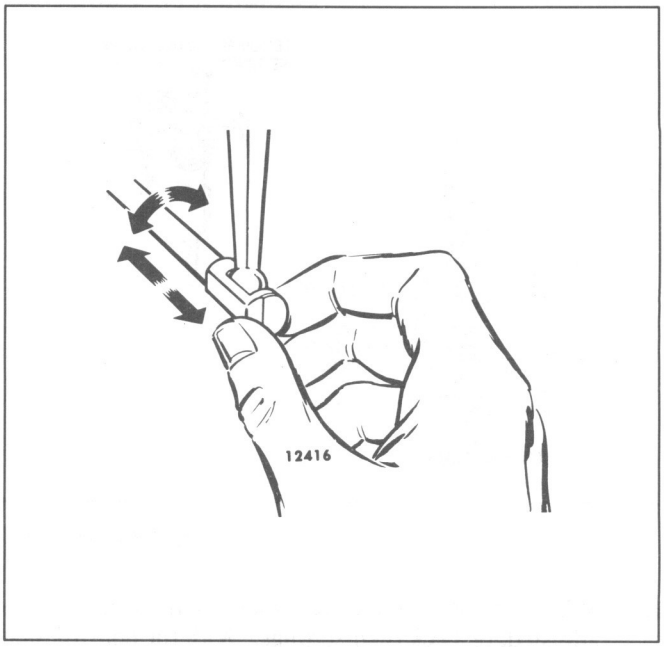


Fig. 13 – Checking Rotating Movement of Injector Control Rack

5. Move the speed control lever to the *maximum speed* position with light finger pressure. Turn down the adjusting screw of the No. 1L injector rack control tube lever until the injector rack clevis is bottomed against the injector body. The injector rack should be easily rotated but not moved in and out (Fig. 13). This will place the No. 1L injector rack in the *full–fuel* position.

The preceding steps should result in placing the governor linkage and control tube assembly in the same position they will attain while the engine is operating at full load.

6. To verify proper injector rack adjustment, hold the speed control lever in the *maximum speed* position using a screwdriver or finger tip and note that the injector rack clevis rotates freely but the rack will not move inboard or outboard. If the rack and lever moves inboard or outboard, it is too loose. The injector rack is too tight if the rack clevis springs back after being depressed with a screwcriver. Again, verify the injector rack adjustment.
7. Remove the clevis pin from the fuel rod at the left bank injector control tube lever.
8. Insert the clevis pin in the fuel rod at the right cylinder bank injector control tube lever and position the No. 1L injector rack control lever as previously outlined in Procedures 5 and 6 for the No. 1L injector rack control lever. Insert the clevis pin in the fuel rod at the left bank injector control tube lever.

9. Verify that the adjustment for the No. 1L and No. 1R injector racks are equal. Move the speed control lever to the *maximum speed* position. Rotate the clevis pins at the injector control tube levers and note a *slight* drag or resistance. With the fingertips the pin should move freely back and forth with no fuel rod deflection. This slight drag should be equal for both pins. If the drag is not equal turn either the No. 1R or No. 1L rack adjusting screw until both 1L and 1R pins are the same. Move the speed control lever back to the *idle* position and then back to the *full–fuel* position and note that the fuel rods do not deflect. If they do deflect the rack adjustment for either bank is too tight and *must* be readjusted as outlined previously.

Once the No. 1L and No. 1R injector rack control levers are adjusted, do not try to alter their settings. All adjustments are made on the remaining control racks.

10. To adjust the remaining injector rack control levers, remove the clevis pins from the fuel rod at the injector control tube levers. Hold the left bank injector control racks in the *full–fuel* position by means of the lever on the end of the control tube and proceed as follows:

    a. Tighten the adjusting screw of the No. 2L injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Now you can have "kick–up" which you should not have had before. Securely lock the adjusting screw locknut.

    b. Verify the injector rack adjustment on No. 1L. If No. 1L does not "spring" back upward, turn the No. 2L adjusting screw counterclockwise slightly until the No. 1L injector rack returns to its *full–fuel* position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 1L and No. 2L injectors. Turn clockwise or counterclockwise the No. 2L injector rack adjusting screw until both No. 1L and No. 2L injector racks are in the *full–fuel* position when the locknut is securely tightened.

    c. Adjust the remaining injectors using the procedures outlined in Step "B", always verifying proper injector rack adjustment.

11. When all of the injector rack control levers are adjusted, recheck their settings. With the control tube level in the *full–fuel* position, check each injector control rack as outlined in Step 10. All of the injector control racks must have the same spring condition with the control tube levers in the *full–fuel* position as described in Item 10 (a and b).

12. Insert the clevis pins in the fuel rods at the injector control tube lever and secure with a cotter pin. Recheck the rack settings as described in Item 5.

13. Turn the idle speed adjusting screw in until it projects approximately 3/16" from the locknut to permit starting of the engine.

    CAUTION: Before starting an engine after an engine speed control adjustment or after removal of the engine governor cover and lever assembly, the technician must determine that the injector racks move to the *no–fuel* position when the governor stop lever is placed in the *stop* position. Engine overspeed will result if the injector racks cannot be positioned at no fuel with the governor stop lever. An overspeeding engine can result in engine damage which could cause personal injury.

14. Use new gaskets and reinstall the valve rocker covers.

Adjust Maximum No–Load Engine Speed

All governors are properly adjusted before leaving the factory. However, if the governor has been reconditioned or replaced, and to ensure the engine speed will not exceed the recommended no–load speed as given on the engine option plate, set t

STANDARD GOVERNOR

After positioning the injector rack control levers, set the maximum no–load engine speed:

Be sure the buffer screw projects approximately 5/8" from the locknut to prevent interference while adjusting the maximum no–load speed.

1. Loosen the spring retainer locknut (Fig. 14) and back off the high–speed spring retainer approximately five turns.

2. With the engine running at operating temperature and no load on the engine, place the speed control lever in the *maximum speed* position. Turn the high–speed spring retainer until the engine is operating at the recommended no–load speed.

3. Hold the high–speed spring retainer and tighten the locknut, using spanner wrench J 5345–5.

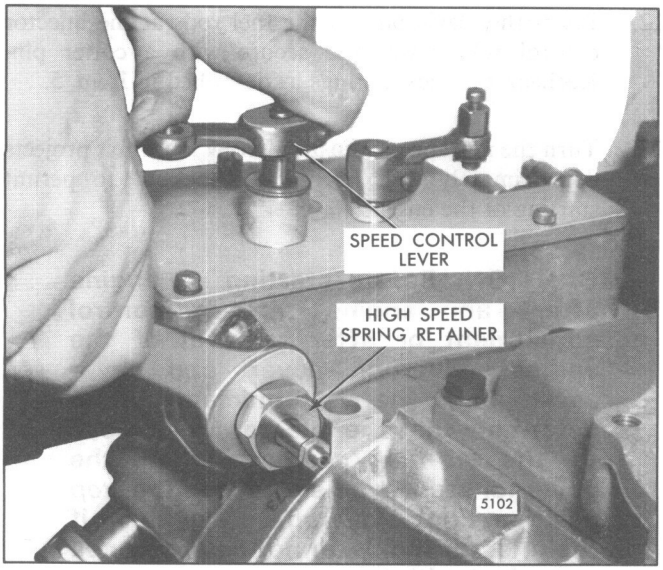


Fig. 14 – Adjusting Maximum No–Load Speed

DUAL RANGE GOVERNOR

After positioning the injector control levers, set the maximum engine speeds.

Be sure the buffer screw (or fast idle air cylinder) projects 5/8" from the locknut to prevent interference while adjusting the maximum no–load speeds.

With the spring housing assembly mounted on the governor, the piston and sleeve assembled with four .100" shims and ten .010" shims and the low maximum speed screw extending from the spring housing approximately 1–1/4", proceed as follows:

NOTICE: Do not apply air or oil pressure to the governor until performing Step 1f.

1. Set the high maximum no–load engine speed:
   a. Start and warm–up the engine. Then, position the speed control lever in the *maximum speed* position.
   b. Turn the low maximum speed adjustment screw in until the high maximum speed desired is obtained.
   c. Stop the engine and remove the spring housing assembly.
   d. Note the distance ("X" distance Fig. 15) the piston is from the bottom of the spring housing when it is against the low maximum speed screw, then remove the sleeve from the piston. When checking this distance, the piston should be held tight against the adjustment screw of the cover that is held in position, with its gasket, against the end of the spring housing.

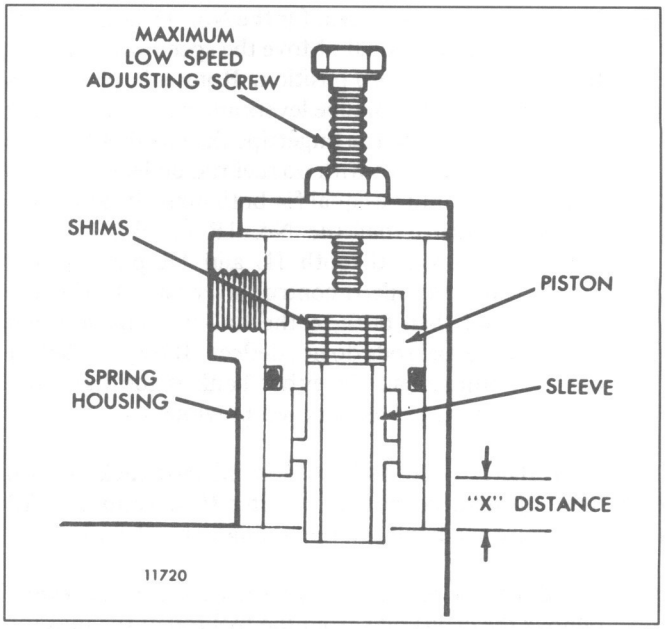


Fig. 15 – Dual Range Governor (Top View)

NOTICE: Do not permit the seal ring on the piston to slide past the air inlet port, since the seal ring will be damaged.

   e. Remove a quantity of shims, from the shims within the piston, equal to the distance noted in Step d.
   f. Start the engine and position the speed control lever in the *maximum speed* position and apply air or oil pressure to the governor and note the engine speed.
   g. Remove the air or oil pressure from the governor and stop the engine. Then, install or remove shims as required to obtain the correct high maximum no–load speed. Removing shims will decrease the engine speed and adding shims will increase the engine speed. Each .010" shim removed or added will decrease or increase the engine speed approximately 10 rpm.
2. Set the low maximum no–load engine speed:
   a. Adjust the low maximum speed adjusting screw, with the speed control lever held in the *maximum speed* position, until the desired low maximum speed is obtained. Turn the screw in to increase or out to decrease the engine speed.
   b. Recheck the engine speed and readjust, if necessary.
3. Check both the hgh maximum and low maximum engine speeds. Make any adjustment that is necessary as outlined in Steps 1 and 2.

Adjust Idle Speed

With the maximum no–load speed properly adjusted, adjust the idle speed as follows:

1. With the engine running, at normal operating temperature and with the buffer screw backed out to avoid contact with the differential lever, turn the idle speed adjusting screw until the engine operates at approximately 15 rpm below the recommended idle speed (Fig. 16).

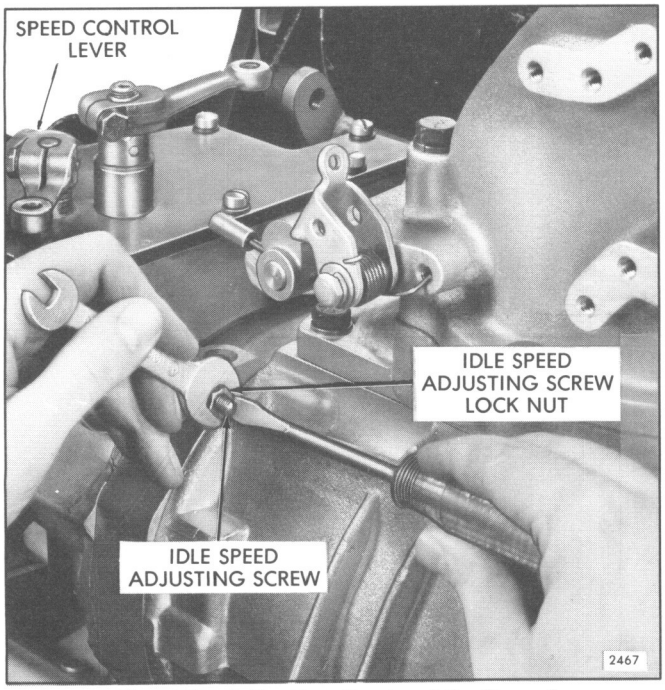


Fig. 16 – Adjusting Engine Idle Speed

NOTICE: It may be necessary to use the buffer screw to eliminate engine roll. Back out the buffer screw, after the idle speed is established, to the previous setting (5/8").

2. Hold the idle screw and tighten the locknut.
3. Install the high–speed spring retainer cover and tighten the two bolts.
4. For "TT" engines, refer to Section 14.3.5 for the adjustment of the Belleville spring.

Adjust Buffer Screw

If the engine is running satisfactorily and has no roll, do not set the buffer screw.

With the idle speed properly set, adjust the buffer screw as follows:

1. With the engine running at normal operating temperature, turn the buffer screw in so it contacts the differential lever as lightly as possible and still eliminates engine roll (Fig. 17). Do not increase the engine idle speed more than 15 rpm with the buffer screw.

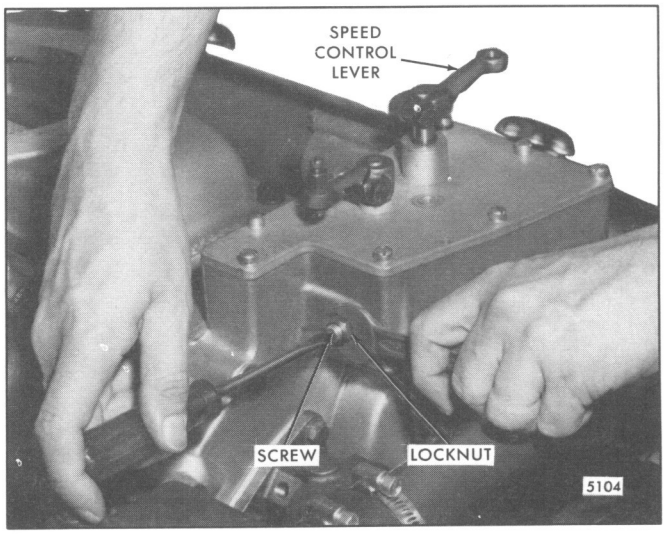


Fig. 17 – Adjusting Buffer Screw

2. Recheck the maximum no–load speed. If it has increased more than 25 rpm, back off the buffer screw until the increase is less than 25 rpm.
3. Hold the buffer screw and tighten the locknut.
4. Shutdown the engine.

LIMITING SPEED MECHANICAL GOVERNOR AND INJECTOR RACK CONTROL ADJUSTMENT

12V–92 AND 16V–92 ENGINES

The governor (Fig. 1) on the 12V and 16V engine is mounted on and driven from the front end of the rear blower.

NOTICE: Before proceeding with the governor and injector rack adjustments, disconnect any supplementary governing device. After the adjustments are completed, reconnect and adjust the supplementary governing device, as outlined in Section 14.14.

Back out the external starting aid screw. After adjusting the exhaust valves and timing the fuel injectors, adjust the governor and position the injector rack control levers.

If the engine or governor has been overhauled, or the injector control linkage has been disturbed, the control link levers in the governor housing and auxiliary control link housing must be aligned before proceeding with the engine tune–up. Refer to Fig. 2 and position the control link levers, as follows:

1. Disconnect the linkage to the governor speed control lever and stop levers.
2. Remove the covers from the governor housing and auxiliary control link housing.
3. Disconnect the adjustable link from the lever in the auxiliary control link housing.
4. Remove the connecting pin from the auxiliary governor control link lever.

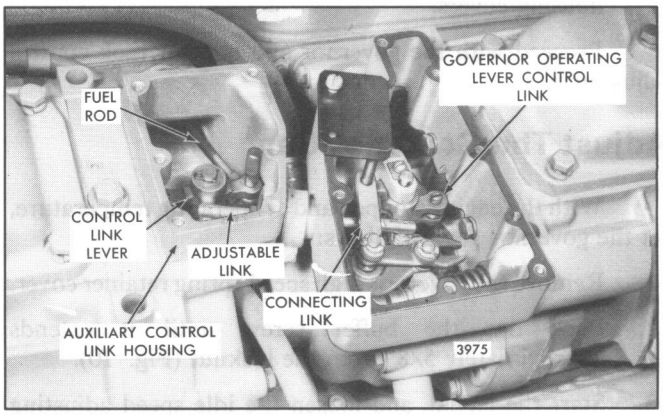


Fig. 2 – Positioning Control Link Levers with Tools J 21779 and J 21780

5. Install gage J 21779 so it extends through the lever and fuel rod and into the gage hole in the bottom of the housing. With the gage in place, the auxiliary control link lever will be in the *mid–travel* position.
6. Remove the connecting pin from the control link lever in the governor housing and install gage J 21780. Install the gage so the pin extends through the connecting link, control lever and fuel rod and the governor housing dowel pin extends into the small hole in the gage. Then install a governor cover bolt (Fig. 2). With gage J 21780 in place, the governor control link lever will be in the mid–travel position and parallel to the auxiliary control link lever.

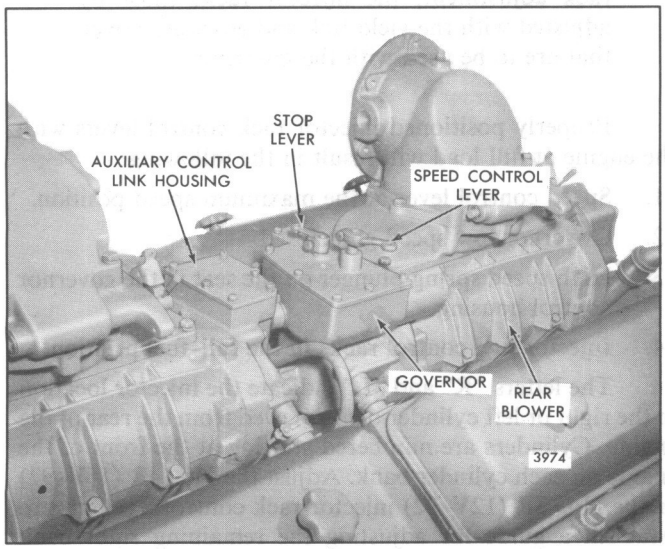


Fig. 1 – Governor Mounting

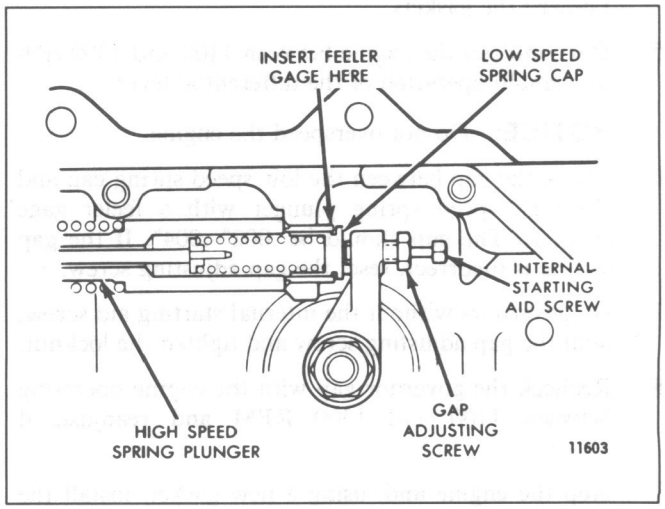


Fig. 3 – Governor Gap Adjustment

7. Adjust the length of the adjustable connecting link to retain the lever positions obtained in Steps 5 and 6 and install the link.
8. Remove gages J 21779 and J 21780 and reinstall the control link lever connecting pins.
9. Install the governor housing and auxiliary control link housing covers.

Proceed with the governor and injector rack control adjustment.

Adjust The Governor Gap

With the engine stopped and at operating temperature, set the governor gap as follows:

1. Remove the governor high speed spring retainer cover.
2. Back out the buffer screw until it extends approximately 5/8" from the locknut (Fig. 10).
3. Start the engine and loosen the idle speed adjusting screw locknut. Then adjust the idle screw to obtain the desired idle speed (Fig. 9). The recommended idle speed is 400–450 rpm, but may vary with special engine applications.

Hold the screw and tighten the locknut to hold the adjustment.

NOTICE: Governors used in turbocharged engines include a starting aid screw threaded into the governor housing (current engines) or the governor gap adjusting screw (early engines). A locknut is not required on early engines as both the gap adjusting screw and the starting aid screw incorporate a nylon patch in lieu of locknuts.

4. Stop the engine. Clean and remove the governor cover and lever assembly and the valve rocker covers. Discard the gaskets.
5. Start and run the engine between 1100 and 1300 rpm by manual operation of the differential lever.

NOTICE: Do not overspeed the engine.

6. Check the gap between the low speed spring cap and the high speed spring plunger with a feeler gage (Fig. 3). The gap should be .002"–.004". If the gap setting is incorrect, reset the gap adjusting screw.
7. On governors without the internal starting aid screw, hold the gap adjusting screw and tighten the locknut.
8. Recheck the governor gap with the engine operating between 1100 and 1300 RPM and readjust, if necessary.
9. Stop the engine and, using a new gasket, install the governor cover and lever assembly.

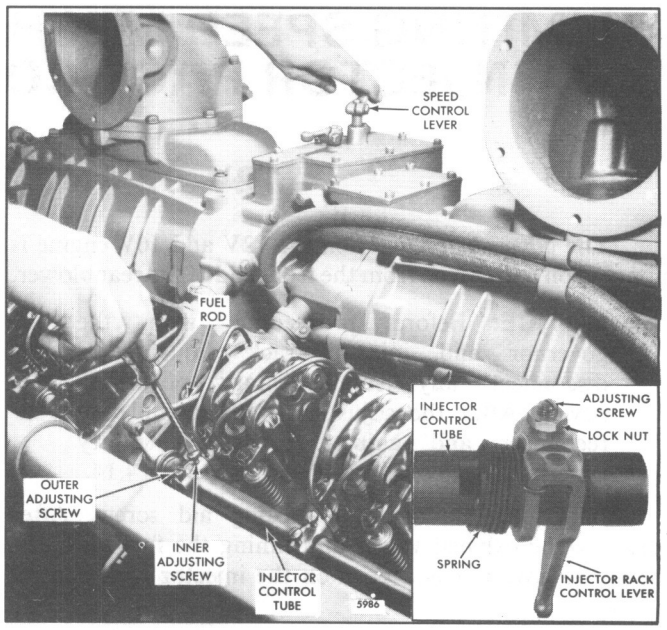


Fig. 4 – Positioning No. 4R (16V–92) or No. 3R (12V–92) Injector Rack Control Lever

NOTICE: Do not install the governor cover and lever assembly at this time on early engines that include the internal starting aid screw.

Position Injector Rack Control Levers

The position of the injector racks must be correctly set in relation to the governor. Their position determines the amount of fuel injected into each cylinder and ensures equal distribution of the load.

NOTICE: To ensure proper injector control rack adjustment, the injector racks must be adjusted with the yield link and governor cover that are to be used with the governor.

Properly positioned injector rack control levers with the engine at full load will result in the following:

1. Speed control lever at the maximum speed position.
2. Governor low speed gap closed.
3. High speed spring plunger on the seat in the governor control housing.
4. Injector fuel control racks in the full–fuel position.

The letters "R" and "L" indicate the injector location in the right or left cylinder bank, viewed from the rear of the engine. Cylinders are numbered starting at the front of the engine on each cylinder bank. Adjust the No. 4R (16V–92) or the No. 3R (12V–92) injector rack control lever first to establish a guide for adjusting the remaining right bank injector rack control levers.

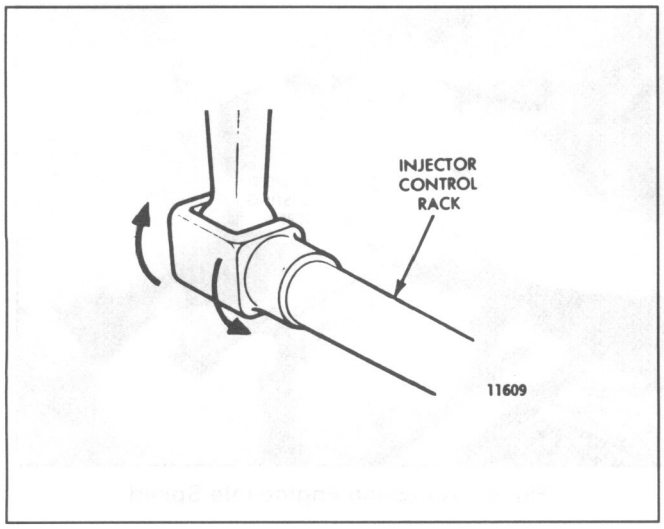


Fig. 5 – Checking Rotating Movement of Injector Control Rack

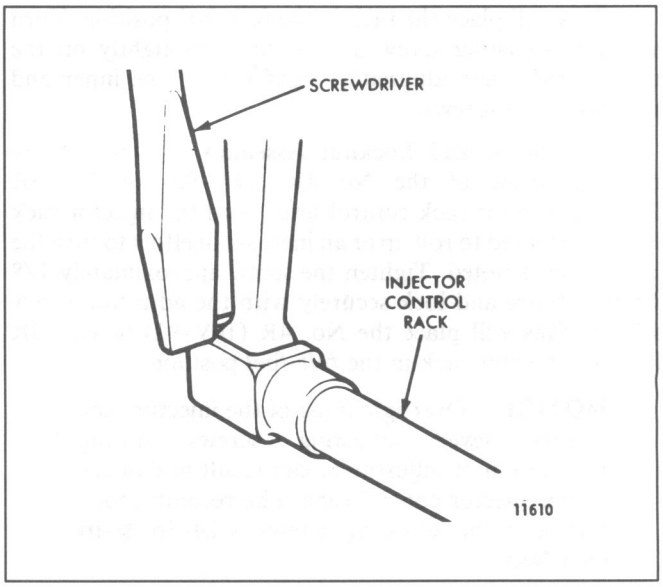


Fig. 6 – Checking Injector Control Rack "Spring"

1. Adjust the idle speed adjusting screw until 1/2" of the threads (12–14 threads) project from the locknut when the nut is against the high–speed plunger.

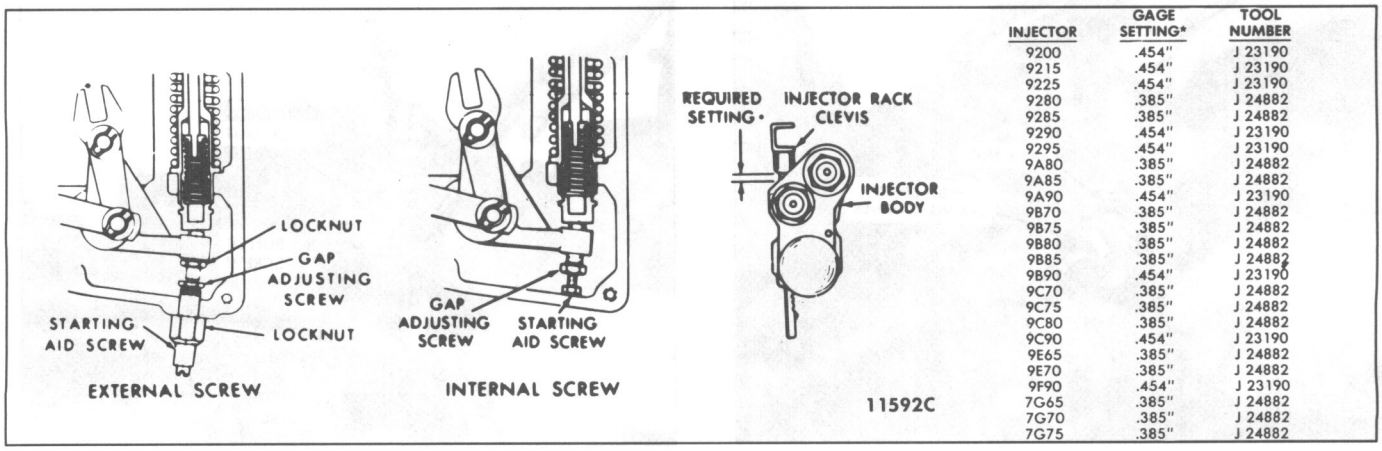
   NOTICE: A false full–fuel rack setting may result if the idle speed adjusting screw is not backed out as noted above.

Injector racks must be adjusted so the effort to move the throttle from the idle speed position to the maximum speed position is uniform. A sudden increase in effort can result from:

   a. Injector racks adjusted too tight causing the yield link to separate.
   b. Binding of the fuel rods.
   c. Failure to back out the idle screw.

2. Back out the buffer screw approximately 5/8" if it has not already been done.
3. Loosen all of the inner and outer injector rack control lever adjusting screws or adjusting screws and locknuts on both cylinder banks. Be sure all of the levers are free on the injector control tubes.
4. Check for any bind in the governor to control tube linkage by moving the linkage through its full range of travel.
5. Remove the clevis pins which attach the right rear bank and both left bank fuel rods to the injector control tube levers.
6. Move the speed control lever to the maximum speed position.
7. Hold the speed control lever with light finger pressure (Fig. 4) and proceed as follows:

Two Screw Assmebly — Adjust the No. 4R (16V–92) or No. 3R (12V–92) injector rack by turning the inner adjusting screw down until a slight movement of the control tube is observed or a step–up in effort to turn the screwdriver is noted.



INJECTOR	GAGE SETTING*	TOOL NUMBER
9200	.454"	J 23190
9215	.454"	J 23190
9225	.454"	J 23190
9280	.385"	J 24882
9285	.385"	J 24882
9290	.454"	J 23190
9295	.454"	J 23190
9A80	.385"	J 24882
9A85	.385"	J 24882
9A90	.454"	J 23190
9B70	.385"	J 24882
9B75	.385"	J 24882
9B80	.385"	J 24882
9B85	.385"	J 24882
9B90	.454"	J 23190
9C70	.385"	J 24882
9C75	.385"	J 24882
9C80	.385"	J 24882
9C90	.454"	J 23190
9E65	.385"	J 24882
9E70	.385"	J 24882
9F90	.454"	J 23190
7G65	.385"	J 24882
7G70	.385"	J 24882
7G75	.385"	J 24882

Fig. 7 – Starting Aid Screw Adjustment

This will place the rack in the full–fuel position. Turn the outer adjusting screw until it bottoms lightly on the control tube. Then alternately tighten both the inner and outer adjusting screws.

One Screw and Locknut Assembly — Tighten the adjusting screw of the No. 4R (16V–92) or No. 3R (12V–92) injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Tighten the screw approximately 1/8 of a turn more and lock securely with the adjusting screw locknut. This will place the No. 4R (16V–92) or No. 3R (12V–92) injector rack in the *full–fuel* position.

NOTICE: Overtightening of the injector rack control lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

The above step should result in placing the governor linkage and control tube assembly in the same position that they will attain while the engine is running at full load.

8. To be sure of the proper rack adjustment, hold the speed control lever in the *maximum speed* position and press down on the injector rack with a screwdriver or finger tip and note the "rotating" movement of the injector control rack (Fig. 5). Hold the speed control lever in the *maximum speed* position and, using a screwdriver, press downward on the injector control rack. The rack should tilt downward (Fig. 6) and, when the pressure of the screwdriver is released, the control rack should " spring" back upward.

If the rack does not return to its original position, it is too loose. To correct this condition with the *Two Screw Assembly, back off the outer adjusting screw slightly and tighten the inner adjusting screw slightly. To correct this condition with the One Screw and Locknut Assembly,* loosen the locknut and turn the adjusting screw clockwise a slight amount and retighten the locknut.

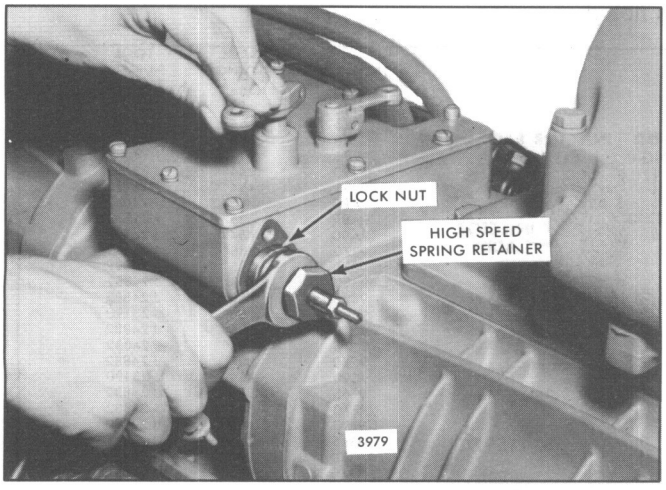


Fig. 8 – Adjusting Maximum No–Load Speed

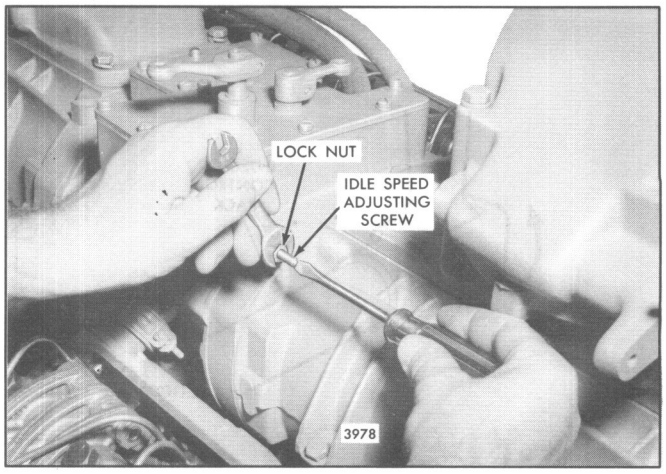


Fig. 9 – Adjusting Engine Idle Speed

The setting is too tight if, when moving the speed control lever from the *no–speed* to the *maximum speed* position, the injector rack becomes tight before the speed control lever reaches the end of its travel (as determined by the stop under the governor cover). This will result in a step–up in effort required to move the speed control lever to the end of its travel. To correct this condition with the *Two Screw Assembly,* back off the inner adjusting screw slightly and tighten the outer adjusting screw slightly. To correct this condition with the *One Screw and Locknut Assembly,* loosen the locknut and turn the adjusting screw counterclockwise a slight amount and retighten the locknut.

9. Remove the fuel rod–to–control tube lever clevis pin from the right front bank fuel rod and install it on the right right rear bank fuel rod and adjust the No. 5R (16V–92) or No. 4R (12V–92) injector rack, as outlined in Steps 6, 7, and 8.

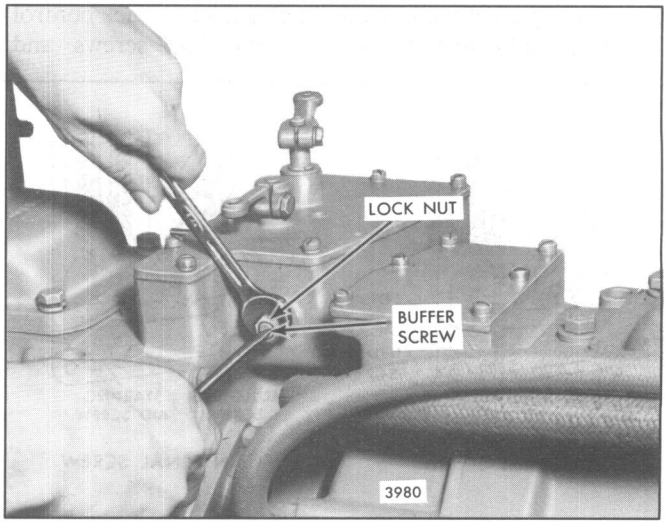


Fig. 10 – Adjusting Buffer Screw

10. Repeat Step 9 for adjustment of the No. 4L and No. 5L (16V–92) or No. 3L and No. 4L (12V–92) injector racks. When the settings are correct, the No. 4R, 5R, 4L and 5L (16V–92) or No. 3R, 4R, 3L and 4L (12V–92) injector racks will be snug on the ball end of the control levers when the injectors are in the full–fuel position.

11. With the fuel rod disconnected from the injector control tube lever, adjust the remaining injector rack control levers on the right front bank. Hold the No. 4R (16V–92) or No. 3R (12V–92) injector rack in the full–fuel position by means of the control tube lever and proceed as follows:

    Two Screw Assembly:

    a. Turn the inner adjusting screw of the No. 3R (16V–92) or No. 2R (12V–92) injector rack control lever until the injector rack has moved into the full–fuel position. Turn the outer adjusting screw down until it bottoms lightly on the injector control tube. Then alternately tighten both the inner and outer adjusting screws.

    NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

    b. Recheck the No. 4R (16V–92) or No. 3R (12V–92) injector rack to be sure it has remained snug on the ball end of the injector rack control lever. If the rack of the No. 4R (16V–92) or No. 3R (12V–92) injector has become loose, back off the inner adjusting screw slightly on the No. 3R (16V–92) or No. 2R (12V–92) injector rack control lever and tighten the outer adjusting screw.

    One Screw and Locknut Assembly:

    a. Tighten the adjusting screw of the No. 3R (16V–92) or No. 2R (12V–92) injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Securely lock the adjusting screw locknut.

    NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

    b. Verify the injector rack adjustment of No. 4R (16V–92) or No. 3R (12V–92), as outlined in Step 8. If No. 4R (16V–92) or No. 3R (12V–92) does not "spring" back upward, turn the No. 3R counterclockwise slightly until the No. 4R (16V–92) or No. 3R (12V–92) injector rack returns to its full–fuel position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 4R and No. 3R (16V–92) or No. 3R and No. 2R (12V–92) injectors. Turn clockwise or counterclockwise the No. 3R (16V–92) or No. 2R (12V–92) injector rack adjusting screw until both No. 4R and No. 3R (16V–92) or No. 3R and No. 2R (12V–92) injector racks are in the full–fuel position when the locknut is securely tightened.

When the settings are correct, both injector racks must respond in the same manner on the ball ends of the control levers when the injector control tube lever is held in the full–fuel position.

12. Position the remaining injector rack control levers on the right front cylinder bank, as outlined in Step 11.

13. Adjust the remaining injector rack control levers on the right rear, left front and left rear cylinder banks in the same manner as outlined in Steps 11 and 12.

14. Install the four fuel rod–to–control tube lever clevis pins and check the adjustment of the injector rack control levers.

15. Turn the idle speed adjusting screw in until it projects 3/16" from the locknut, to permit starting the engine.

16. On *current turbocharged engines,* adjust the external starting aid screw, as follows:

    a. With the engine* stopped place the governor stop lever in the run* position and the speed control lever in the idle speed position.

    b. Adjust the starting aid screw to obtain the required setting between the shoulder on the injector rack clevis and the injector body (Fig. 7). Select the proper gage and measure the setting at any convenient cylinder. When the starting aid screw is properly adjusted, the gage should have a small clearance of 1/64" in the space along the injector rack shaft between the rack clevis and the injector body.

    c. After completing the adjustment, hold the starting aid screw and tighten the locknut.

    d. Check the injector rack clevis–to–body clearance after performing the following:

        1. Position the stop lever in the run position.
        2. Move the speed control lever from the idle speed position to the maximum speed position.

3. Return the speed control lever to the idle speed position.

Movement of the speed control lever is to take–up the clearance in the governor linkage. The injector rack clevis–to–body clearance can be increased by turning the starting aid screw farther in against the gap adjusting screw, or reduced by backing it out.

NOTICE: The starting aid screw will be ineffective if the speed control lever is advanced toward wide open throttle during start–up.

CAUTION: An overspeeding engine can result in engine damage which could cause personal injury.

17. Use new gaskets and reinstall the valve rocker covers.

Adjust Idle Speed

1. With the engine running, at normal operating temperature and with the buffer screw backed out to avoid contact with the differential lever, turn the idle speed adjusting screw (Fig. 9) until the engine is operating approximately 15 rpm below the recommended idle speed. The recommended idle speed is 400–450 rpm but may vary with certain engine applications.

   NOTICE: It may be necessary to use the buffer screw to eliminate engine roll. Back out the buffer screw, after the idle speed is established, to the previous setting (5/8").

2. Hold the idle screw and tighten the locknut.
3. Install the high speed spring retainer cover.

*Adjust Maximum No–Load Engine Speed

All governors are properly adjusted before leaving the factory. However, if the governor has been reconditioned or replaced and to ensure the engine speed will not exceed the recommended no–load speed as given on the option plate, set the maximum no–load speed as follows:

NOTICE: Be sure the buffer screw projects 5/8" to prevent interference while adjusting the maximum no–load speed.

1. Loosen the spring retainer locknut and back off the high–speed spring retainer approximately five turns (Fig. 8).
2. With the engine running at operating temperature and no load on the engine, place the speed control lever in the *maximum speed* position. Turn the high speed spring retainer until the engine is operating at the recommended no–load speed.
3. Hold the high speed spring retainer and tighten the locknut using spanner wrench J 5345–5.

Adjust Buffer Screw

With the idle speed properly set, adjust the buffer screw, as follows:

1. With the engine running at normal operating temperature, turn the buffer screw in so it contacts the differential lever as lightly as possible and still eliminates engine roll (Fig. 10).

   NOTICE: Do not increase the engine idle speed more than 15 rpm with the buffer screw.

2. Recheck the maximum no–load speed. If it has increased more than 25 rpm, back off the buffer screw until the increase is less than 25 rpm.
3. Hold the buffer screw and tighten the locknut.

STATIC DOUBLE WEIGHT LIMITING SPEED GOVERNOR GAP CHECKING AND SETTING PROCEDURE

The following is accomplished with the engine *stopped.*

A new governor weight wedge tool (J35516 – Fig. 11) and the accompanying procedure can be used *only* on double weight limiting speed governors.

CAUTION: To avoid personal injury and prevent possible engine damage, the following precautions should be observed:

Make sure the compressor inlet guard or compressor air inlet shield J 26554 is installed any time the engine is running and the turbocharger compressor air inlet piping is removed. The use of these guards does not preclude any other safety practices contained in the Service Manual.

After replacing the governor cover and before starting the engine, make sure that the injector racks move to the "no fuel" position when the governor stop lever is in the "stop" position.

Verification of the governor gap setting should not be considered necessary until "Vehicle Low Power/ Performance at Low Mileage" (Section 15.2) has been used to troubleshoot the engine performance concern.

Governor Gap Checking Procedure

1. In a vehicle, set the engine idle speed at 600 RPM and stop the engine.

   NOTICE: The static governor gap setting is established at the factory based upon a 600 RPM engine idle. Therefore, when *verifying* a factory tune–up the governor idle speed should be set at 600 RPM.

   CAUTION: Disconnect the grounded battery cable (s) to prevent accidental engine cranking and possible personal injury while the gap is being checked or set.

2. Clean and remove the governor cover. Discard the gasket.
3. With the engine stopped, manually bar the engine over *in the direction of normal engine rotation* until the governor weights are in a horizontal position.

   On "TT" governors, the Belleville spring retainer nut must be backed out until there is approximately .060" clearance between the washers and the retainer nut before checking or resetting the governor gap.
4. Insert governor weight wedge J35516 between the low–speed weight and the governor riser (see Figs. 12 and 13). The tapered face of the wedge should be against the riser and positioned between the flanges on the ends of the riser.
5. Push the wedge as far to the bottom as it will go, forcing the weights against the maximum travel stop.

   NOTICE: Do not use a screwdriver to pry the weights, since damage to the weights, riser, or housing could result.
6. While holding the wedge in the bottom position, use a feeler gauge to measure the gap between the low speed spring cap and the high speed spring plunger (see Figs. 14 and 15). The gap should measure .003" – .019". Reset the gap to .008" if the measured gap is out of limits (see "GOVERNOR GAP ADJUSTMENT PROCEDURE" below).
7. Remove the wedge and replace the governor cover, using a new gasket.
8. Reset Belleville springs (see Section 14.3.5 of the Service Manual).

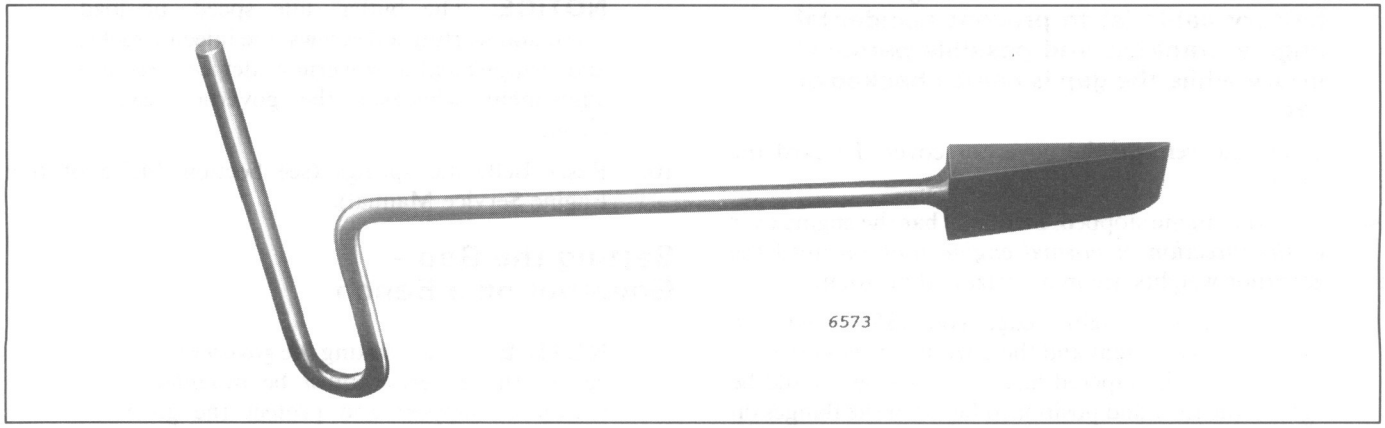


Fig. 11 – Governor Weight Wedge Tool J35516

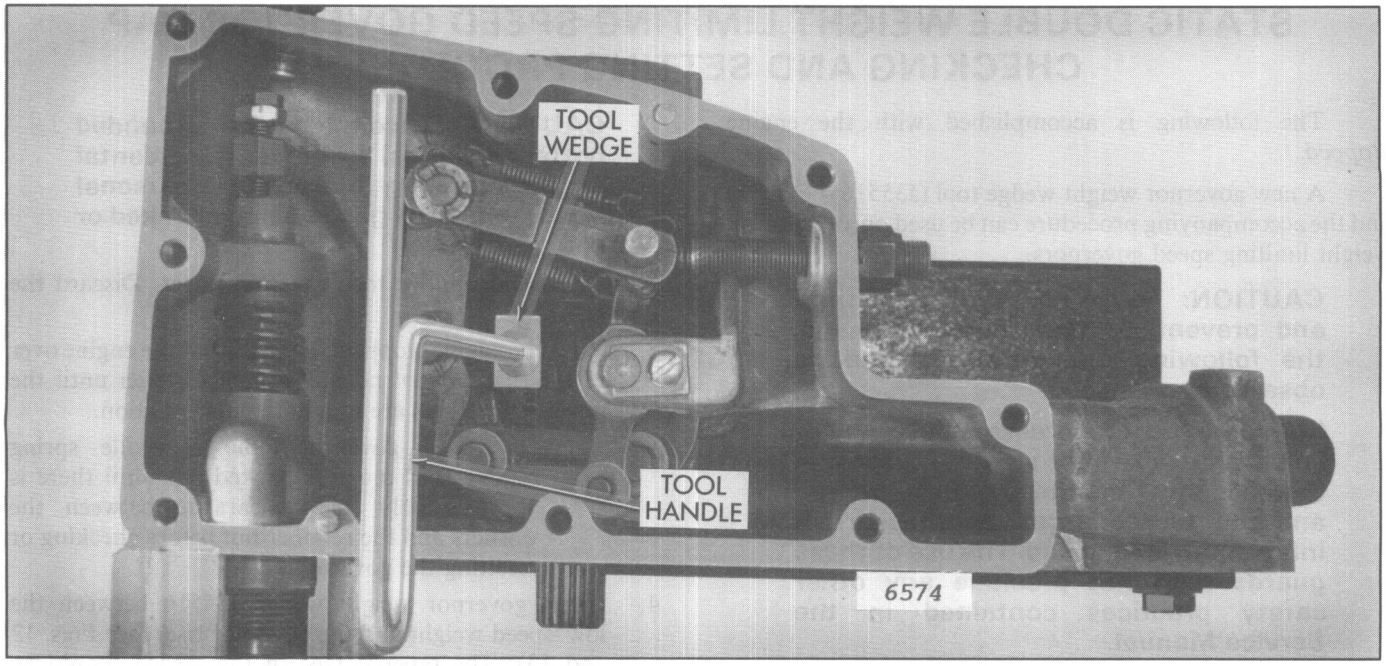


Fig. 12 – Tool J35516 Inserted Between Low Speed Weight and Riser

Governor Gap Adjustment Procedure

These procedures permit adjusting the gap while the governor is installed on an engine or removed and on a bench.

Before adjusting the gap on "TT" governors, the Belleville spring retainer nut must be backed out until there is approximately .060" clearance between the washers and the retainer nut (see Fig. 14).

Setting the Gap – Governor on the Engine

1. Disconnect any supplementary governor devices.
2. Set the engine idle speed at 600 RPM and stop the engine.

   CAUTION: Disconnect the grounded battery cable (s) to prevent accidental engine cranking and possible personal injury while the gap is being checked or set.
3. Clean and remove the governor cover. Discard the gasket.
4. With the engine stopped, manually bar the engine over *in the direction of normal engine rotation* until the governor weights are in a horizontal position.
5. Insert governor weight wedge Tool J35516 between the low–speed weight and the governor riser (see Figs. 12 and 13). The tapered face of the wedge should be against the riser and positioned between the flanges on the ends of the riser.
6. Push the wedge as far to the bottom as it will go, forcing the weights against the maximum travel stop.

   NOTICE: Do not use a screwdriver to pry the weights, since damage to the weights, riser, or housing could result.
7. Use a feeler gauge to set the gap between the low speed spring cap and the high speed spring plunger at .008". Then tighten the governor gap adjusting screw lock nut (see Figs. 14 and 15).
8. Push down on the governor weight wedge tool to be sure it did not move while the gap was being set. Recheck the gap while holding the tool in this position. If the gap is incorrect, reset to .008", repeating the steps outlined above.
9. Remove the wedge.

   NOTICE: The buffer, idle speed, no–load speed and starting aid screws, the injector racks, and supplemental governor devices require adjustment whenever the governor gap is changed.
10. Reset Belleville springs (see Section 14.3.5 of the Engine Service Manual).

Setting the Gap – Governor on a Bench

NOTICE: When setting the governor gap on a bench, the governor *must* be mounted on a blower to support and protect the governor weight carrier shaft.

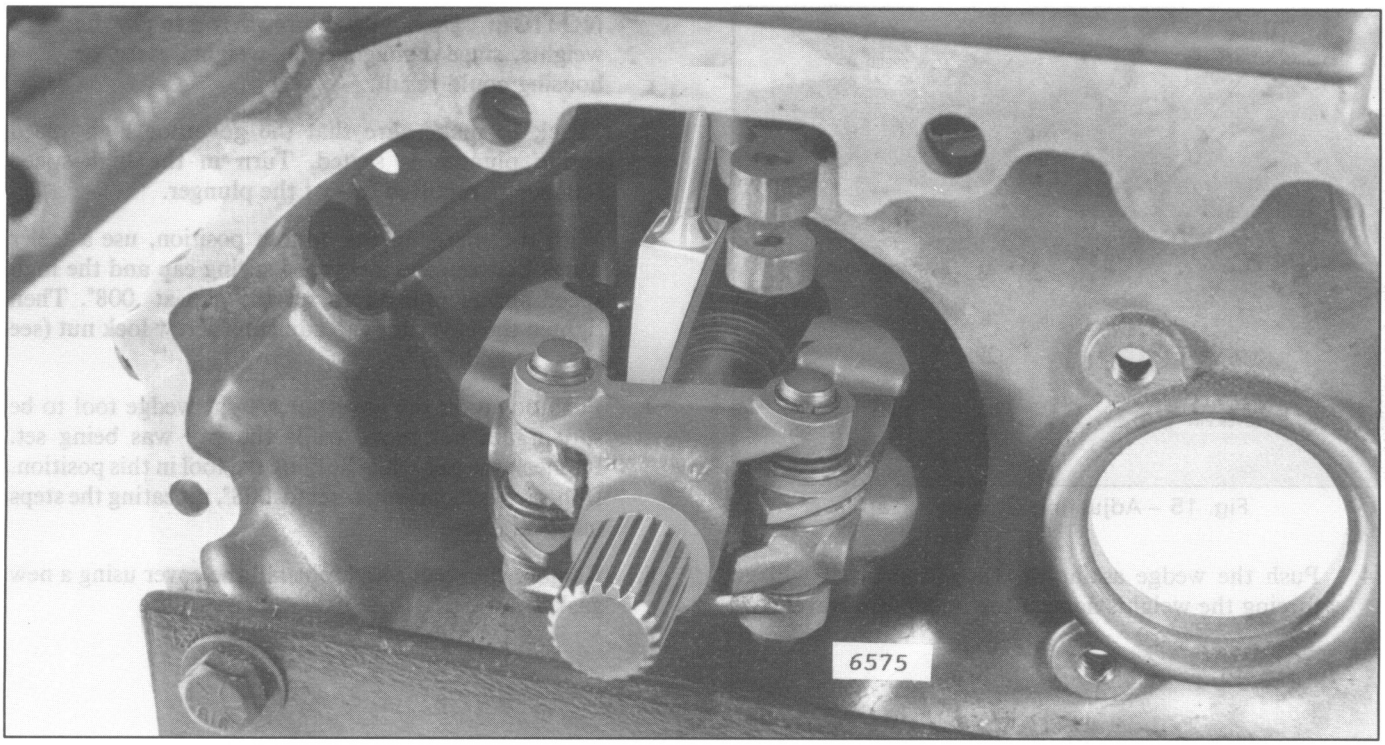


Fig. 13 – Wedge of Tool J35516 Between Riser and Low Speed Weight (Detail)

1. Position the idle screw. On all Non–"TT" governors with a normal 1.00" long idle adjustment screw, the screw should be set so that it extends .325". On all "TT" governors with a normal 1.00" long idle adjustment screw, the screw should be set to extend .400". This dimension is measured from the face of the idle speed adjusting screw lock nut to the end of the idle speed adjusting screw with a tolerance of ± .015" (see Fig. 14). For governors with a variable high–speed option, which use a 1.75" long idle adjustment screw, the screw should be set to extend 1.075" on all non–"TT" governors or 1.150" on all "TT" governors. These idle screw projections result in a nominal 600 RPM idle speed.
2. Rotate the governor weights until they are in a horizontal position.
3. Insert governor weight wedge Tool J35516 between the low–speed weight and the governor riser (see Figs. 12 and 13). The tapered face of the wedge should be against the riser and positioned between the flanges on the ends of the riser. To prevent the weights from rotating when the governor weight wedge tool is inserted, a clean, soft rag should be wedged between the blower housing and the blower rotors.

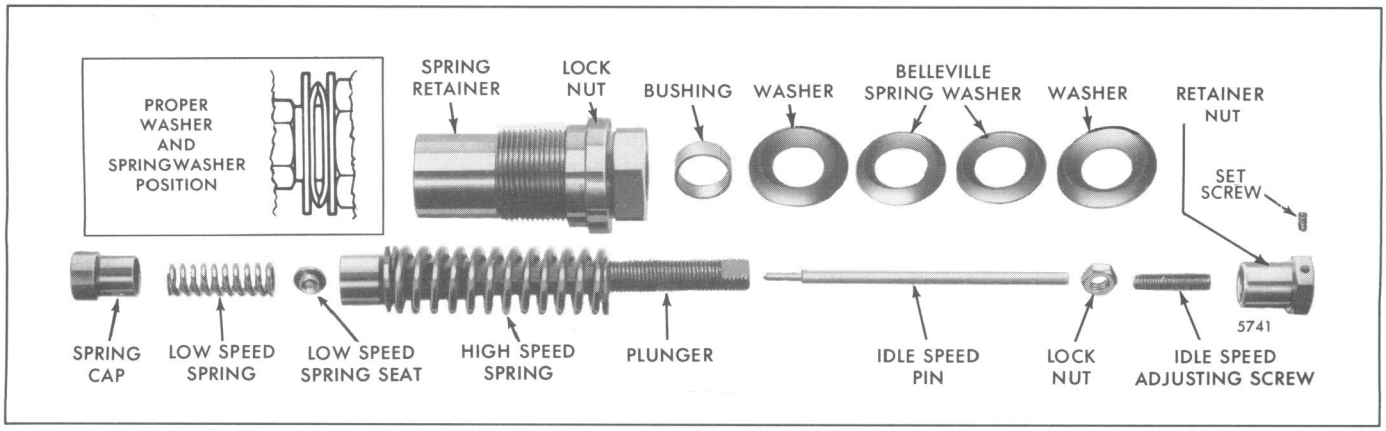


Fig. 14 – High and Low–Speed Springs and Plunger Details Including Belleville Washers (TTA Engines)

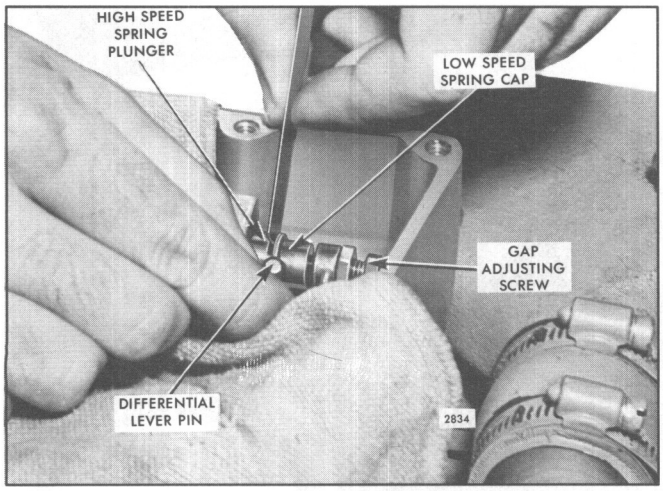


Fig. 15 – Adjusting Governor Gap

4. Push the wedge as far to the bottom as it will go, forcing the weights against the maximum travel stop.

NOTICE: Do not use a screwdriver to pry the weights, since damage to the weights, riser, or housing could result.

5. Check to make sure that the governor high–speed spring plunger is seated. Turn in the high–speed retainer as required to seat the plunger.

6. With the wedge in the bottom position, use a feeler gauge between the low speed spring cap and the high speed spring plunger to set the gap at .008". Then tighten the governor gap adjusting screw lock nut (see Figs. 14 and 15).

7. Push down on the governor weight wedge tool to be sure it did not move while the gap was being set. Recheck the gap while holding the tool in this position. If the gap is incorrect, reset to .008", repeating the steps outlined above.

8. Remove the wedge and reinstall the cover using a new gasket.

LIMITING SPEED MECHANICAL GOVERNOR

ADJUSTMENT – (VARIABLE LOW–SPEED)

The variable low–speed limiting speed mechanical governor is used on turbocharged highway vehicle engines where the same engine powers both the vehicle and the auxiliary equipment for unloading bulk products (such as cement, grain or liquids) and a high idle speed range is desired during auxiliary operation.

The governor is a single–weight type and provides an idle speed range of 500 to 1800 rpm.

During highway operation, the governor functions as a limiting speed governor, controlling the engine idling speed and limiting the maximum operating speed. At the unloading area, the throttle is left in the*idle speed* position and the speed adjusting handle, on the cable operated governor (Fig. 1), is turned to the speed required within the above range to operate the auxiliary equipment. For the air operated governor (Fig. 2), the engine speed is changed to the speed required by increasing or decreasing the air supply pressure to the governor. The governor then functions as a variable speed governor, maintaining a constant speed when the load is constantly changing, during the unloading operation. Before resuming highway operations, the speed adjusting handle on the cable operated governor must be turned back to the stop, then turned ahead about one–quarter of a turn. The air operated governor's air supply pressure must be vented before resuming highway operations.

CAUTION: Failure to return the device to normal idle speed could result in loss of control of the engine at idle and personal injury could result.

Governor identification is provided by a name plate attached to the governor housing. The letters V.L.S.–L.S. stamped on the name plate denote a variable low–speed limiting speed mechanical governor.

After adjusting the exhaust valves and timing the injectors, adjust the governor and position the injector rack control levers.

Adjust Governor Gap

With the engine at operating temperature, adjust the governor gap as follows:

1. Stop the engine. Back out the buffer screw until it extends approximately 5/8" from the locknut.
2. Remove the governor cover and lever assembly.
3. Check the gap (.200") between the low–speed spring cap and the high–speed spring plunger with gage J 23478 (Fig. 3). A .200" stack–up of feeler gages can be used to check the gap if the gage is not available. Be sure the external starting aid screw is backed out far enough to make it ineffective when making this adjustment.
4. If required, loosen the locknut and turn the gap adjusting screw until a slight drag is felt on the gage.
5. Hold the adjusting screw and tighten the locknut.
6. Recheck the gap and readjust, if necessary.
7. Affix a new gasket to the top of the governor housing. Place the governor cover assembly on the governor housing with the pin in the stop control shaft assembly in the slot of the diffrential lever and the dowel pins in the housing in the dowel pin holes in the cover.

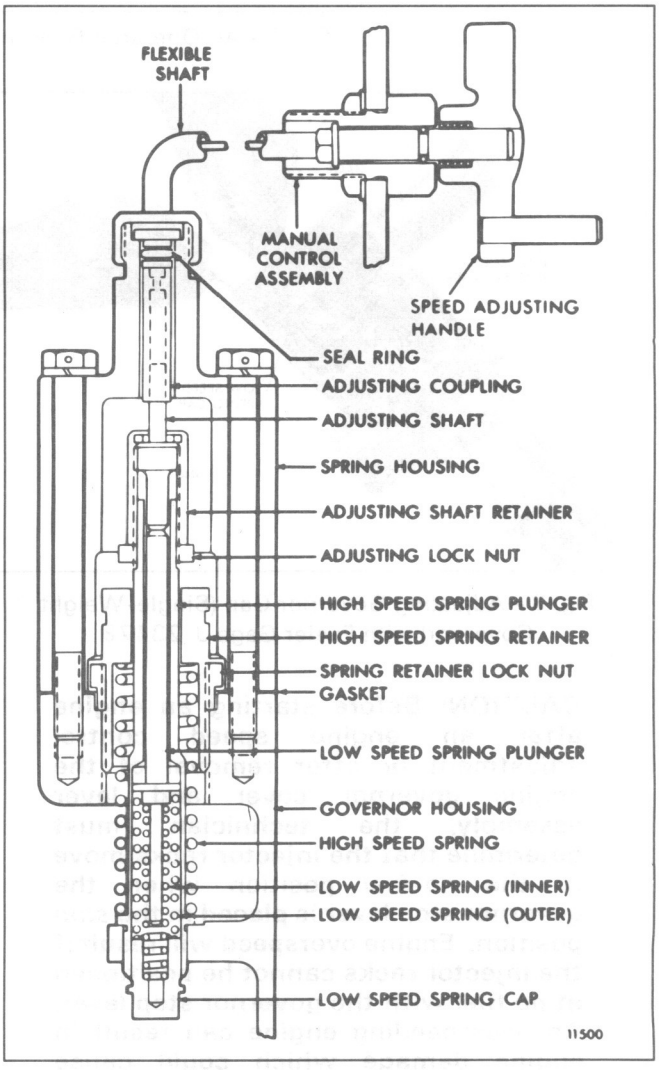


Fig. 1 – Cable Operated Governor Spring Housing and Components

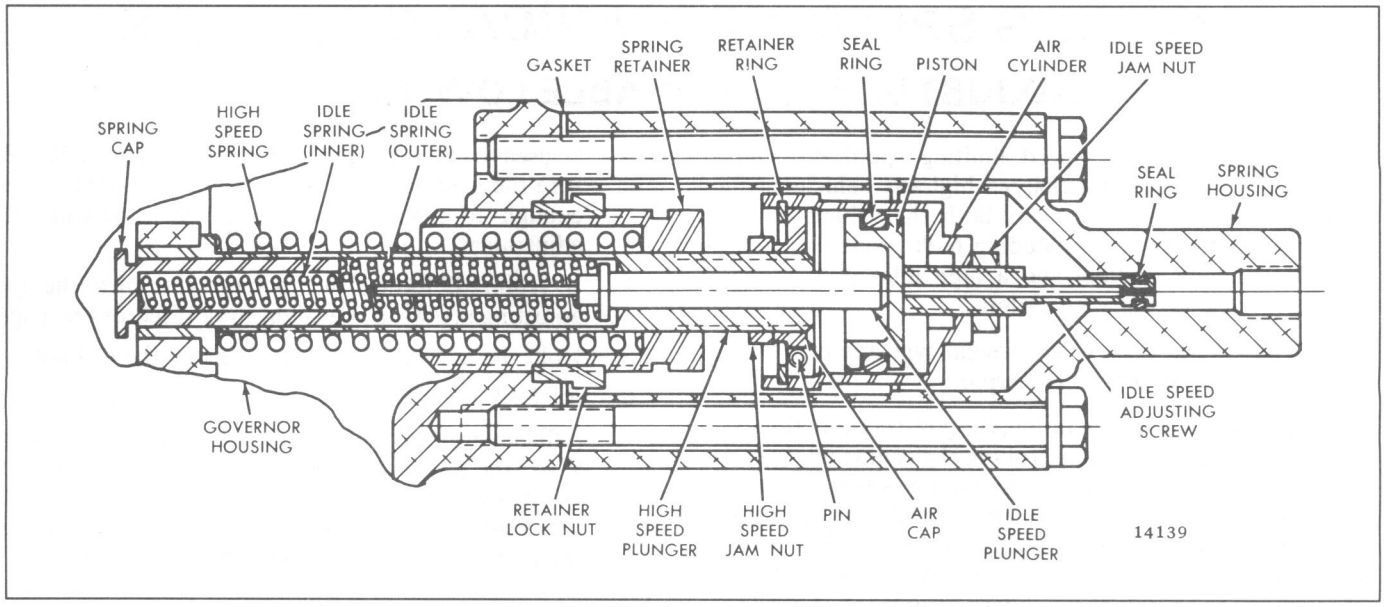


Fig. 2 – Air Operated Governor Spring Housing and Components

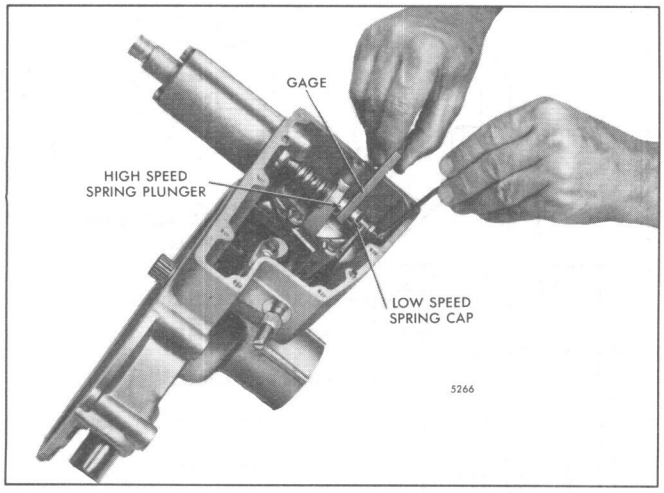


Fig. 3 – Adjusting Governor Gap (Single–Weight Governor) with Feeler Gage J 23478

CAUTION: Before starting an engine after an engine speed control adjustment or after removal of the engine governor cover and lever assembly, the technician must determine that the injector racks move to the *no–fuel* position when the governor stop lever is placed in the *stop* position. Engine overspeed will result if the injector racks cannot be positioned at no fuel with the governor stop lever. An overspeeding engine can result in engine damage which could cause personal injury.

Position Injector Rack Control Levers

If the governor gap was adjusted, position the injector rack control levers as outlined in Section 14.3.

Check Spring Housing Gasket

Remove the spring housing from the governor housing. Check the gasket for tears, breaks, etc. If the gasket requires replacement, remove the spring pack from the governor housing, replace the gasket and reinstall the spring pack.

NOTICE: When removing the spring pack, care should be taken so that the low–speed spring cap does not fall off the spring pack into the governor.

Adjust Maximum No–Load Engine Speed

Adjust the maximum no–load engine speed as outlined for the limiting speed mechanical governor in Section 14.3.

Adjust Idle Speed

CABLE OPERATED GOVERNOR

a. Back out the variable low–speed adjusting shaft until the shoulder on the shaft contacts the shaft retainer (Fig. 1).

b. Hold the locknut and loosen the low–speed adjusting shaft retainer. Start the engine.

c. Adjust the retainer and shaft assembly to obtain the desired idle speed (500 rpm minimum). Then, hold the retainer and tighten the locknut to retain the adjustment. It may be necessary to use the buffer screw to eliminate engine roll.

d. Place the spring housing over the spring pack. Install the variable low–speed adjuster coupling. Center the coupling before securing the spring housing to the governor. Tighten the attaching bolts. Install the flexible shaft and manual control assembly.

Verify operation of the installation by using the speed adjusting handle to check idle speed settings.

AIR OPERATED GOVERNOR

■Maximum Idle Speed

a. Remove the air cylinder assembly from the high–speed plunger. Loosen the idle speed jam nut. Turn the idle speed, adjusting screw clockwise into the air cylinder, until the piston contacts the air cap and the air cap contacts the retainer ring (Fig. 3). Rotate the air cylinder on the high–speed plunger 2–3 turns.

b. Start the engine. With the speed control lever in the *idle* position, turn the air cylinder clockwise to raise the idle speed and counterclockwise to lower the idle speed. Initial observed idle speed will be between the minimum and maximum idle speeds.

c. Lock the air cylinder to the high–speed plunger with the jam nut in the position which provides the desired maximum idle speed.

■ Minimum Idle Speed

Make this adjustment after the maximum idle speed adjustment is completed.

a. Run the engine with the speed control lever in the *idle speed* position.

b. Turn the idle speed adjusting screw counterclockwise to lower the idle speed. Over 1/8" travel of the screw is required to reach minimum idle speed. Tighten the jam nut when at the desired minimum idle speed (see RPM minimum). It may be necessary to use the buffer screw to eliminate engine roll.

c. Install the spring housing over the spring pack. Tighten the attaching bolts. Connect the air supply to the spring housing. Verify operation of installation by applying and varying air pressure to check the idle speed settings.

If speeds of less than 1800 rpm are always required, the speed can be set and achieved with unregulated air. Additional lower speeds can be achieved with regulated air pressure.

Adjust Buffer Screw

Adjust the buffer screw as outlined in Section 14.3, if not already done during the tune–up.

LIMITING SPEED MECHANICAL GOVERNOR ADJUSTMENT

FAST IDLE CYLINDER

The limiting speed governor equipped with a fast idle air cylinder is used on vehicle engines where the engine powers both the vehicle and auxiliary equipment.

The fast idle system consists of a fast idle air cylinder installed in place of the buffer screw and a throttle locking air cylinder mounted on a bracket fastened to the governor cover (Fig. 1). An engine shutdown air cylinder, if used, is also mounted on the governor cover.

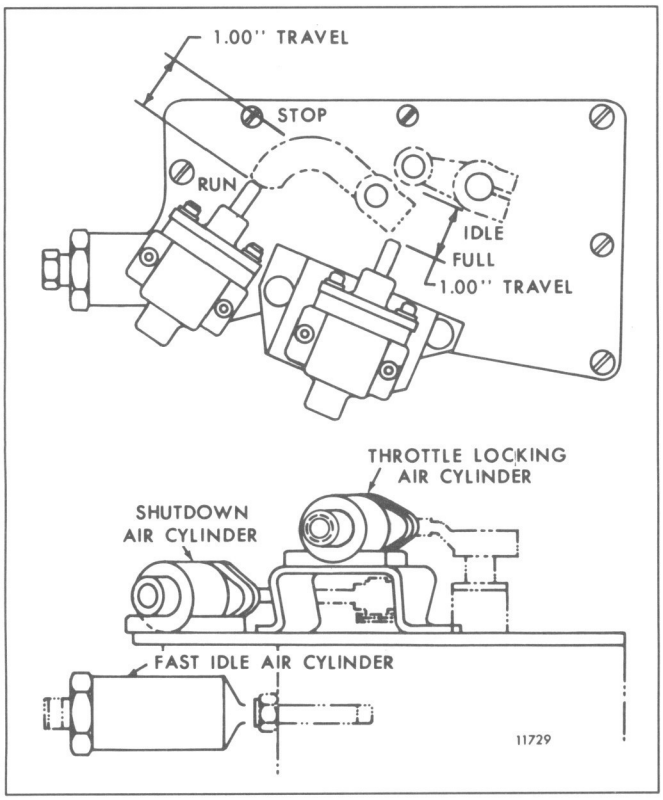


Fig. 1 – Governor with Fast Idle Cylinder

The fast idle air cylinder and the throttle locking air cylinder are actuated at the same time by air from a common air line. The engine shutdown air cylinder is connected to a separate air line.

The air supply for the fast idle air cylinder is usually controlled by an air valve actuated by an electric solenoid. The fast idle system should be installed so that it will function only when the parking brake system is in operation to make it tamper–proof.

The vehicle accelerator–to–governor throttle linkage is connected to a yield link so the operator cannot overcome the force of the air cylinder holding the speed control lever in the *idle* position while the engine is operating at the single fixed high idle speed.

Operation

During highway operation, the governor functions as a limiting speed governor.

For operation of auxiliary equipment, the vehicle is stopped and the parking brake set. Then, with the engine running, the low speed switch is placed in the *on* position. When the fast idle air cylinder is actuated, the force of the dual idle spring (Fig. 2) is added to the force of the governor low–speed spring, thus increasing the engine idle speed.

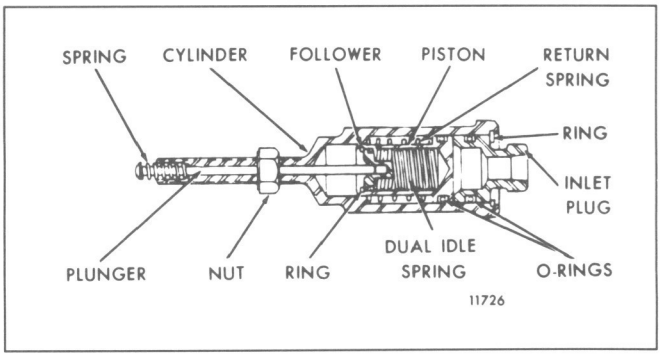


Fig. 2 – Fast Idle Air Cylinder

The governor now functions as a constant speed governor at the high idle speed setting, maintaining a near constant engine speed regardless of the load within the capacity of the engine. The fast idle system provides a single fixed high idle speed that is not adjustable, except by disassembling the fast idle air cylinder and changing the dual idle spring. As with all mechanical governors, when load is applied, the engine speed will be determined by the governor droop.

Adjust Governor

Adjust the governor as outlined in Section 14.3. However, before adjusting the governor gap, back out the de–energized fast idle air cylinder until it will not interfere with the governor adjustments. After the normal idle speed setting is made, adjust the de–energized fast idle air cylinder as follows:

1. Turn in the fast idle cylinder assembly until an increase of idle speed is noted. The increase in idle speed should not exceed 15 rpm. Tighten the fast idle jam nut.

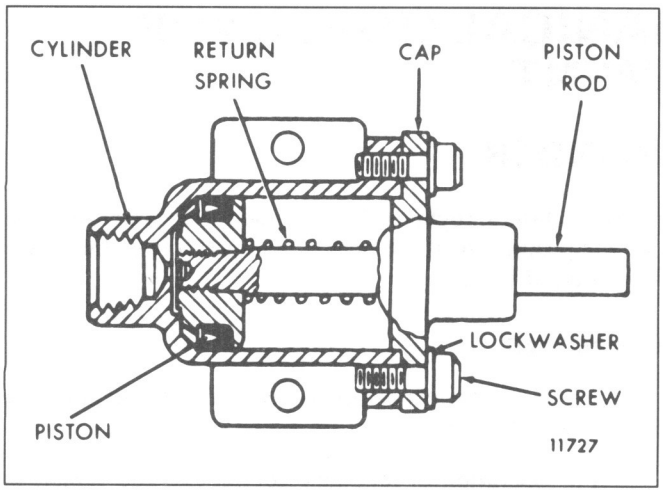


Fig. 3 – Throttle Locking Air Cylinder

2. Lock the governor throttle in the *idle* position and apply full shop air pressure to the fast idle air cylinder. The engine idle speed must increase from 325 to 500 rpm $\pm$ 50 rpm, depending on the original idle speed setting and fast idle spring used.

The throttle locking air cylinder is adjusted on its mounting bracket so it will lock the throttle in the *idle* position when it is activated, but will not limit the throttle movement when not activated (Fig. 3).

GOVERNOR SETTINGS FOR "TT" ENGINES

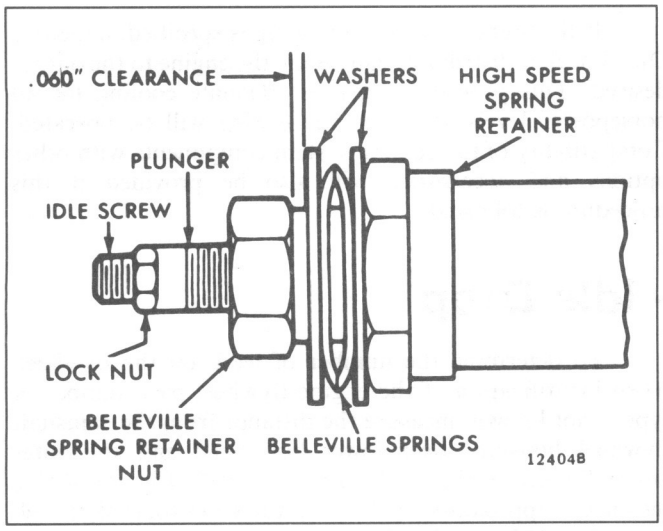


Fig. 1 – Belleville Washer Location

The operating characteristics of a "TT" engine are – it's ability to maintain reasonably constant horsepower over a wide speed range and its 6% torque rise per one hundred rpm. These characteristics are achieved by the action of two Belleville springs (washers) in a limiting speed governor.

> **NOTICE:** The horsepower for "TT" engines indicate a flat horsepower performance curve. However, during dynamometer testing an engine may exhibit horsepower readings slightly above or below the flat curve. A 5% horsepower variation from the flat published curve is acceptable.

The spring force provided by the Belleville springs works with the governor weights to pull the injector racks out of fuel as the engine speed is increased. Conversely, as the engine speed is reduced by increased load, the high–speed spring overcomes the force of the Belleville springs and moves the injector racks to an increased fuel position. The racks move progressively into more fuel to maintain the constant horsepower until the racks are in full fuel at a speed near 1500 rpm.

Tune–up the "TT" engine the same as a standard engine tune–up as outlined in Section 14.3.

After completing the standard engine tune–up of setting injector timing, valve clearance, governor gap, injector racks and engine speeds, adjust the Belleville spring (washer) "TT" (tailor torqued) device.

Remove the piston from the throttle delay or apply shop air pressure to the fuel modulators to make sure they are inoperative during the tune–up process.

> **NOTICE:** Use spanner wrench J 5345–5 to loosen or tighten the spring retainer locknut during the no–load speed adjustment. Always use the yield link in the governor when performing the engine tune–up.

Adjustment of the Belleville springs for the TT horsepower can be accomplished by two methods, depending on the equipment available at the service outlet. These methods are:

1. Idle Drop – without a dynamometer
2. Power Reduction Factor – using an engine, chassis or output shaft dynamometer

For satisfactory results, both methods require an engine in good condition and properly tuned.

> **NOTICE:** Do not attempt a Belleville spring (washer) adjustment, an idle drop setting, or a power reduction setting until an engine tune–up has been properly performed.

HORSEPOWER RATING AND COOLING SYSTEM CAPACITY

On–highway truck manufacturers provide cooling systems compatible with the horsepower ratings of the engines ordered by their customers. Vehicles are normally equipped with a base cooling system when the low horsepower version of an engine is specified. A higher engine horsepower rating increases the heat rejection rate for the engine and, in practically all instances, will require an upgraded cooling system. When vehicles are ordered with higher engine horsepower ratings, upgraded cooling systems are automatically provided by the truck manufacturers.

The horsepower ratings of most Detroit Diesel vehicle engines can be easily upgraded after the engine is put in service. However, *increasing the horsepower output without also modifying the cooling system will, in practically all instances, lead to engine overheating when the engine is used in certain service applications and geographic areas of operation. Damage resulting from engine modifications contrary to manufacturer's recommendations will not be covered under warranty.*

> **NOTICE:** Installation and use of any fuel injectors other than those which have been certified for each engine may constitute *tampering* and be in violation of Federal and/or State laws.

If increased horsepower is essential to vehicle operation, the truck dealer/distributor or local Detroit Diesel distributor should be contacted to determine whether the cooling system can handle additional heat load or to specify the parts necessary to uprate the cooling system.

A truck buyer who knows that a higher horsepower rating will be required during the life of his vehicle should order the vehicle with cooling system components for the higher horsepower engine *or* order the vehicle with the higher horsepower rating.

If the higher horsepower rating is specified, a Detroit Diesel dealer/distributor can derate the engine to the output desired. This procedure ensures adequate cooling for all horsepower levels at which the engine will be operated. Compatibility of the cooling system components with other options and accessories will also be provided if this procedure is followed.

METHOD 1 – Idle Drop

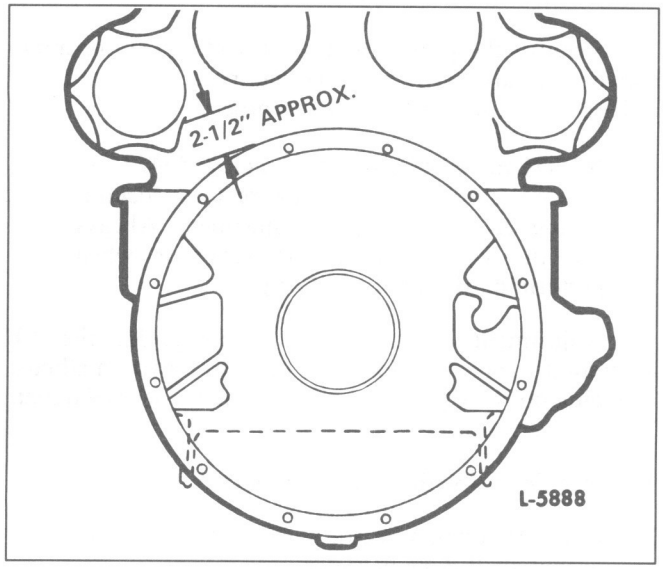


Fig. 2 – Identification of Engine Flywheel

The idle drop method is an effective, accurate means of setting "TT" horsepower.

The idle drop method requires a specific reduction in engine speed to position the Belleville springs and the governor low and high–speed springs. The positioning of these governor components results in obtaining the desired "TT" horsepower.

When performing an idle drop horsepower adjustment on a "TT" engine having a 102 or 118 tooth flywheel, an accurate tachometer is mandatory (Digital Tachometer J 26791 recommended). Each one (1) rpm error in setting the idle drop results in a two or three horsepower error.

The tachometer is installed in the flywheel housing drain plug hole and operates by counting the flywheel teeth, using a magnetic probe to pick–up impulses off the flywheel ring gear. The electronic module displays the engine speed digitally to one decimal place within one rpm accuracy. These capabilities make it ideal for setting horsepower on the "TT" engines using the idle drop method.

To determine the number of teeth on the flywheel, when identification of the engine flywheel part number or type is not known, measure the distance from the camshaft flywheel housing cover lower bolt head and the outer circumference of the flywheel housing bell (Fig. 2). If this distance is approximately 1–1/4", it is a 118 tooth flywheel. For the 102 tooth flywheel, the distance will be approximately 2–1/2".

When the number of teeth on the flywheel is known, set the switch on the tachometer to the proper position. Proceed as follows:

1. Perform the standard engine tune–up. Set the no–load speed as required by the engine type, injector size and governor (see Charts).
2. Disconnect the accelerator linkage from the governor speed control lever if it has not already been done.
3. Run the engine until a stabilized engine coolant temperature is obtained.
4. Refer to 1978 Chart and, using engine type, injector size and governor, select the initial and specified idle drop numbers for the rated "TT" horsepower and rated engine speed at which the engine is to operate.

Each idle drop Chart (1979 on) includes the following information:

Maximum Full Load RPMs

Governor Part Numbers

Belleville Washer Part Numbers

Injector Size

Initial Idle Drop Starting RPM

The above should be considered to insure the correct chart is being used. To maintain certification as required by law, the engine horsepower cannot be adjusted beyond the limits outlined on each chart.

5. Set the initial idle speed (using the idle adjusting screw) to that determined in Step "4" above.

6. With the governor speed control lever in the idle position, turn the Belleville spring retainer nut (Fig. 1) clockwise on the plunger until the specified idle drop speed is achieved. Secure the retainer nut with the locking screw. When the specified idle speed is achieved, the engine is power controlled to the "TT" horsepower rating.

NOTICE: Idle speeds must be exact and steady. If they are not, check for bind or rubbing in the fuel control system: governor, fuel rods, injector control tubes and injector control racks.

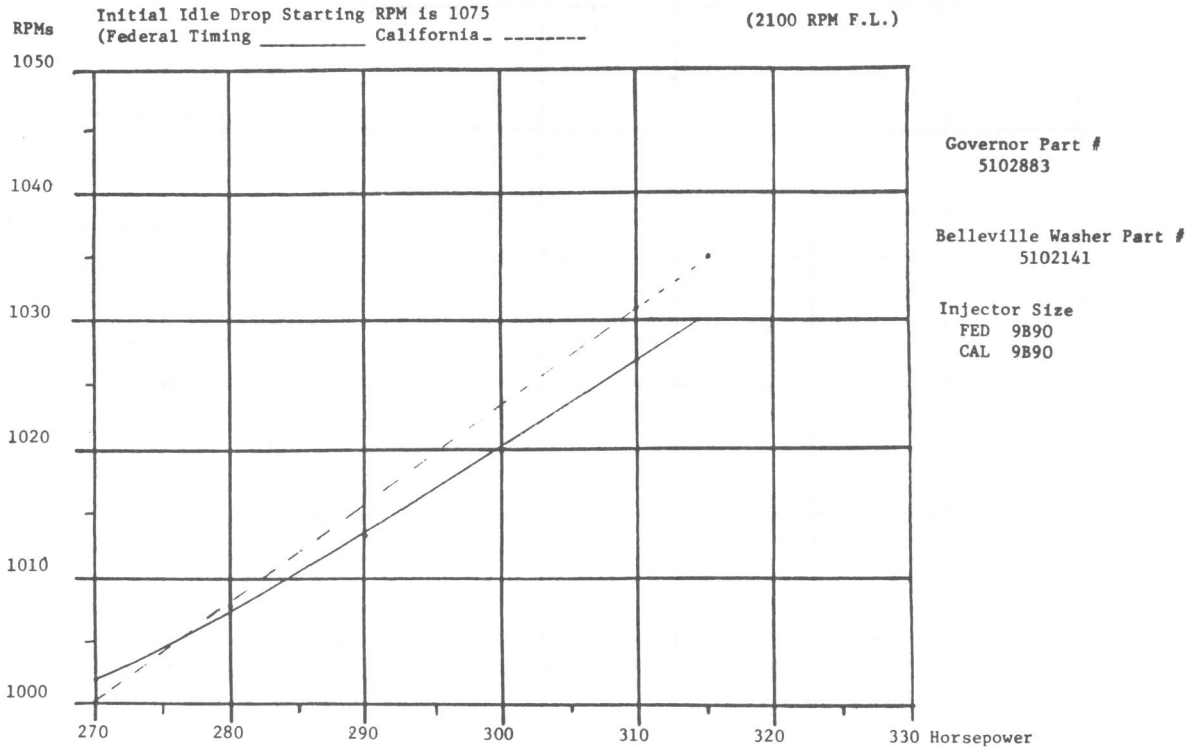
7. Lower the idle speed to the desired operating idle speed, using the idle adjusting screw.
8. Adjust the buffer screw and the starting aid screw.

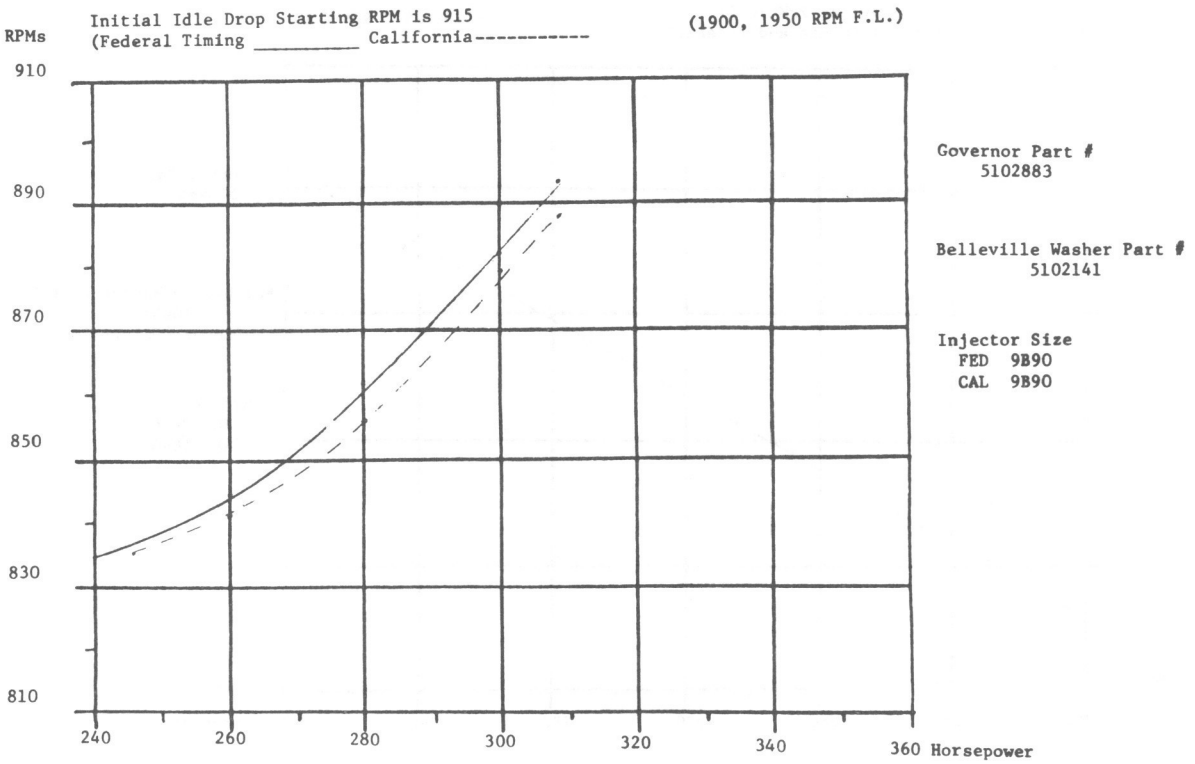
ENGINE TYPE	INJECTOR SIZE	THROTTLE DELAY SETTING	RATED HORSEPOWER @ RATED SPEED	INITIAL IDLE	IDLE DROP SETTING
6V-92TT*	9290	.570	270 @ 1800 260 @ 1800 250 @ 1800 240 @ 1800	880 880 880 880	810 804 798 792
6V-92TT*	9290	.570	270 @ 1850 260 @ 1850 250 @ 1850 240 @ 1850	880 880 880 880	808 802 796 790
6V-92TT	9290	.636	270 @ 1900 260 @ 1900 250 @ 1900 240 @ 1900	915 915 915 915	850 845 840 835
6V-92TT	9290	.636	270 @ 1950 260 @ 1950 250 @ 1950 240 @ 1950	915 915 915 915	848 843 838 833
6V-92TT*	9290	.636	270 @ 1900 260 @ 1900 250 @ 1900 240 @ 1900	950 950 950 950	877 873 869 865
6V-92TT*	9290	.636	270 @ 1950 260 @ 1950 250 @ 1950 240 @ 1950	950 950 950 950	875 871 867 863
6V-92TT	9290	.636	290 @ 1900	915	860
6V-92TT	9290	.636	290 @ 1950	915	858
6V-92TT*	9290	.636	270 @ 1950 260 @ 1950 250 @ 1950 240 @ 1950	950 950 950 950	875 871 867 863
6V-92TT	9290	.636	270 @ 2100	1075	995
6V-92TTA*	9A90	.636	270 @ 1900	975	900
6V-92TTA*	9A90	.636	270 @ 1950	975	899
6V-92TTA	9A90	.636	270 @ 1900 260 @ 1900 250 @ 1900 240 @ 1900	915 915 915 915	838 832 825 819
6V-92TTA	9A90	.636	270 @ 1950 260 @ 1950 250 @ 1950 240 @ 1950	915 915 915 915	837 831 824 818
6V-92TTA	9A90	.636	270 @ 2100	1075	995
8V-92TT*	9A90	.570	335 @ 1800	830	765
8V-92TT*	9A90	.570	335 @ 1850	830	763
8V-92TT	9290	.636	365 @ 1900	915	850
8V-92TT	9290	.636	365 @ 1950	915	848
8V-92TT*	9A90	.570	365 @ 1900 335 @ 1900	950 950	880 870
8V-92TT*	9A90	.570	365 @ 1950 335 @ 1950	950 950	878 868
8V-92TT	9290	.636	365 @ 2100	1075	1005
8V-92TTA*	9A90	.636	335 @ 1800	880	795
8V-92TTA*	9A90	.636	335 @ 1850	880	793
8V-92TTA*	9A90	.636	365 @ 1900 335 @ 1900	950 950	877 865
8V-92TTA*	9A90	.636	365 @ 1950 335 @ 1950	950 950	875 863
8V-92TTA	9A90	.636	365 @ 1900 335 @ 1900	950 950	867 845
8V-92TTA	9A90	.636	365 @ 1950 335 @ 1950	950 950	865 843
8V-92TTA	9A90	.636	365 @ 2100	1075	1000

*Uses Belleville Spring (Orange Dye)

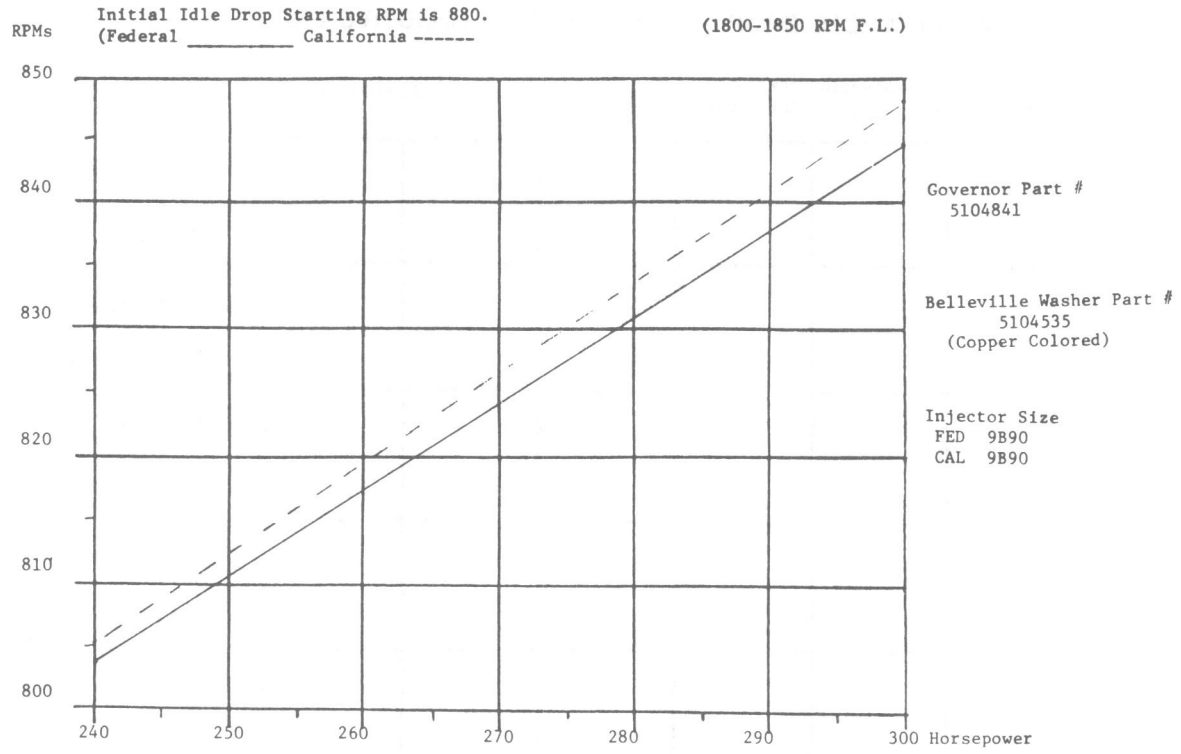
1978 Fed. & Calif.

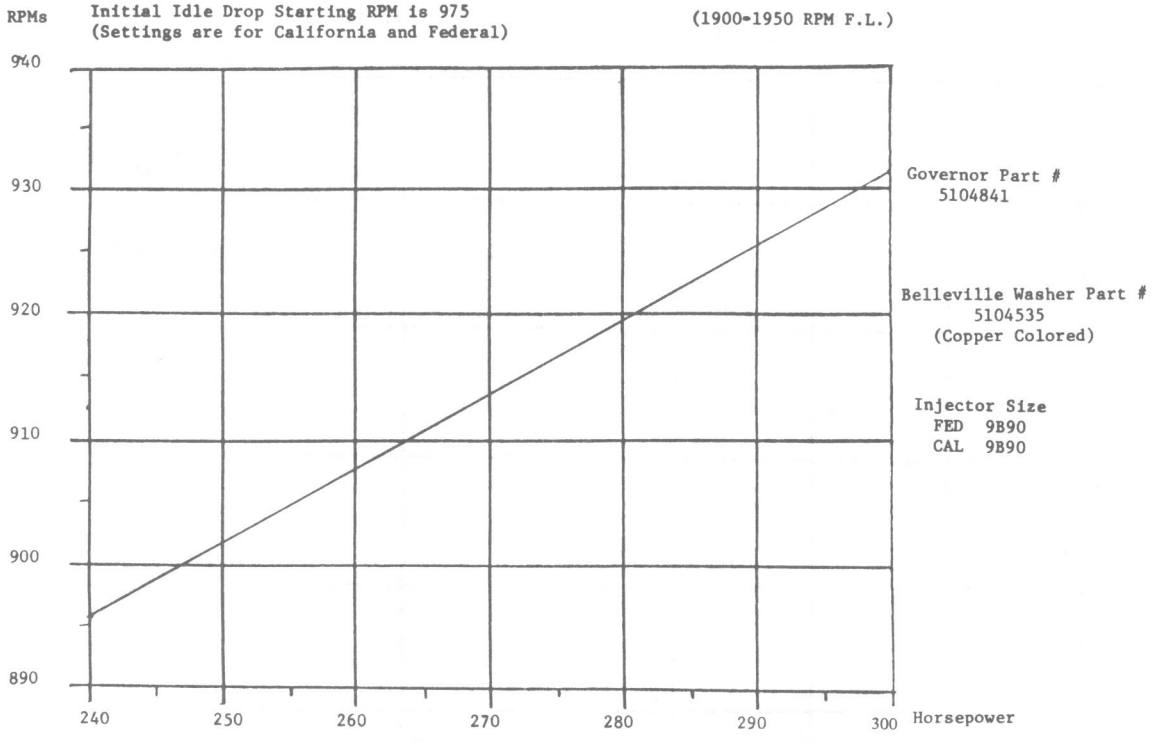
6V-92TTA IDLE DROP SETTINGS FOR AUTOMOTIVE ENGINES





1979 Fed. & Calif., 1980–1981 Fed. – Only

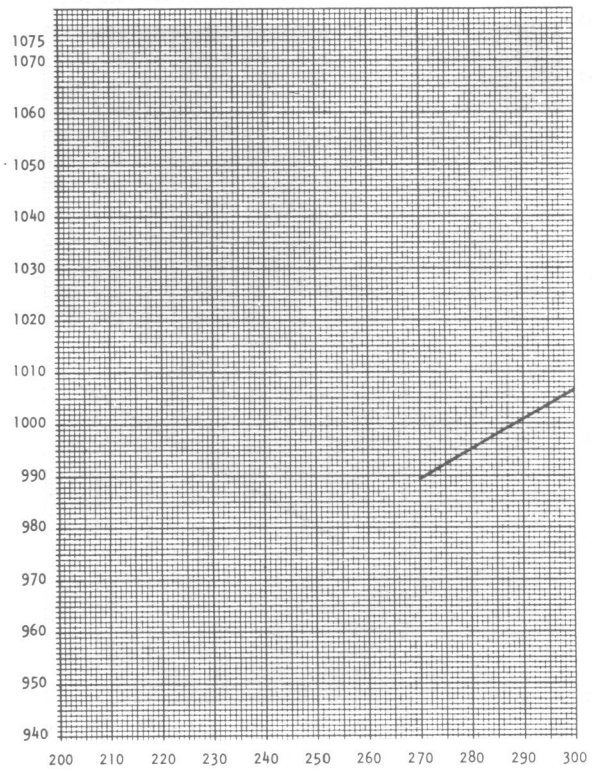




1979 Fed. & Calif., 1980–1981 Fed. – Only

5102883 GOVERNOR
1075 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
2100 RPM FULL LOAD

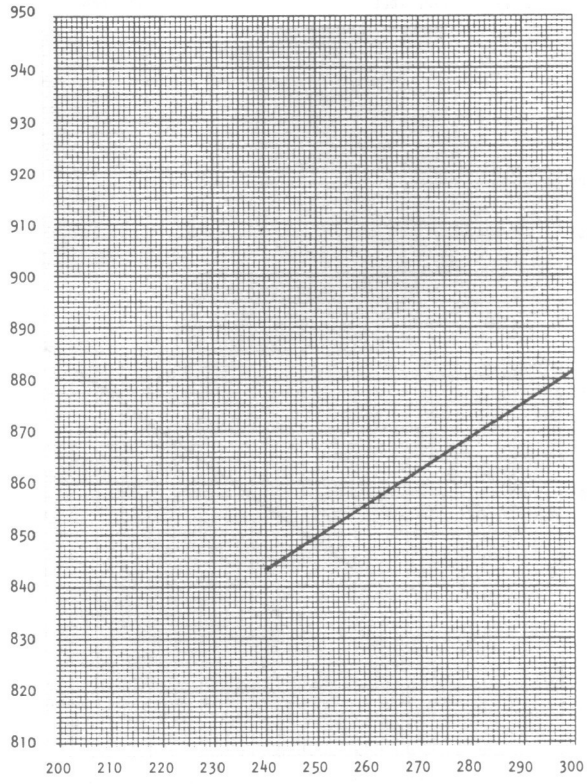


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 989 RPM YIELDS 270 HP
DROP TO 1006 RPM YIELDS 300 HP

5102883 GOVERNOR
950 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD

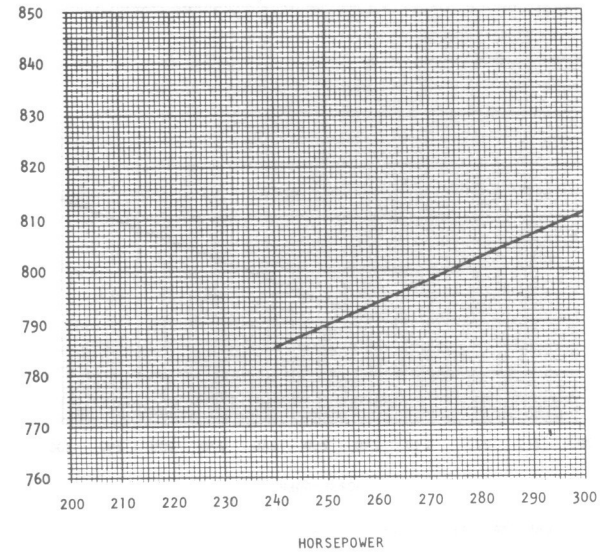
IDLE DROP RPM



TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 844 RPM YIELDS 240 HP
DROP TO 863 RPM YIELDS 270 HP

8922147 GOVERNOR
850 RPM INITIAL IDLE

6V-92 FEDERAL ENGINES
1900-1950 RPM FULL LOAD

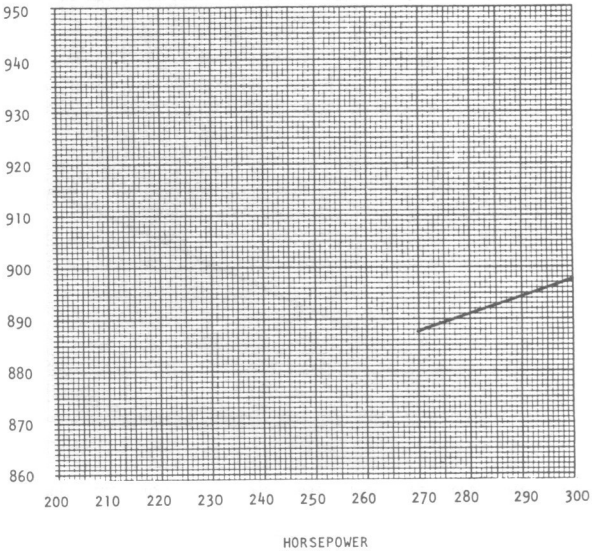


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 785 RPM YIELDS 240 HP
DROP TO 798 RPM YIELDS 270 HP

8922147 GOVERNOR
950 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
2100 RPM FULL LOAD

IDLE DROP RPM

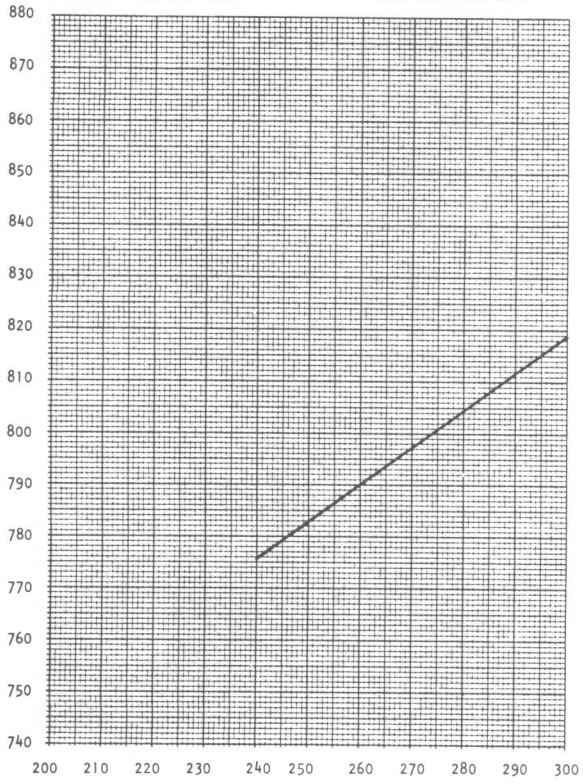


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 888 RPM YIELDS 270 HP
DROP TO 897 RPM YIELDS 300 HP

1982 Fed. – Silver Engines Only

5104841 GOVERNOR
880 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
1800 RPM FULL LOAD



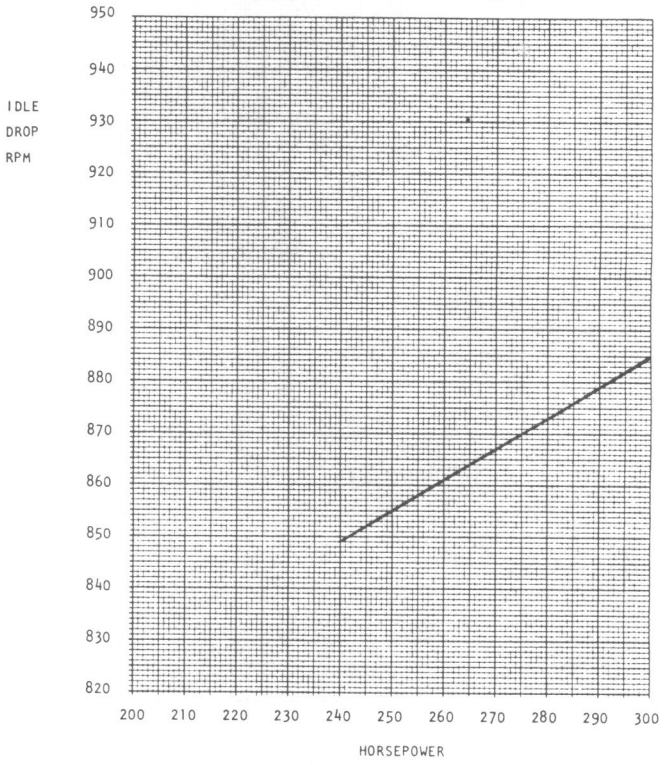
TYPICAL "TAILORED TORQUE" SETTINGS:

DROP TO 775 RPM YIELDS 240 HP

DROP TO 797 RPM YIELDS 270 HP

5104841 GOVERNOR
950 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD



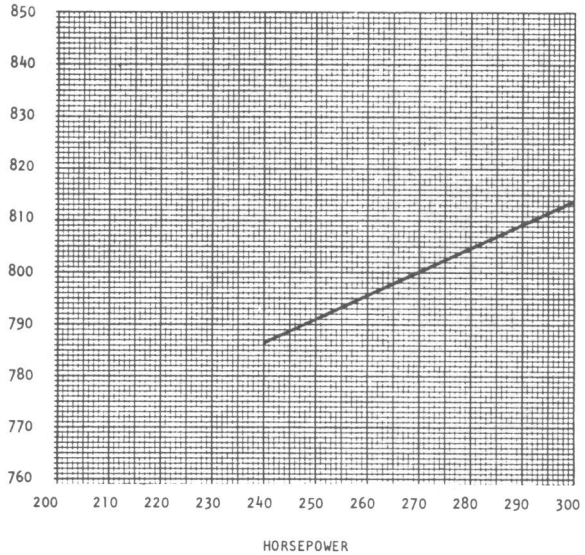
TYPICAL "TAILORED TORQUE" SETTINGS:

DROP TO 849 RPM YIELDS 240 HP

DROP TO 867 RPM YIELDS 270 HP

8922050 GOVERNOR
850 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
1800 RPM FULL LOAD



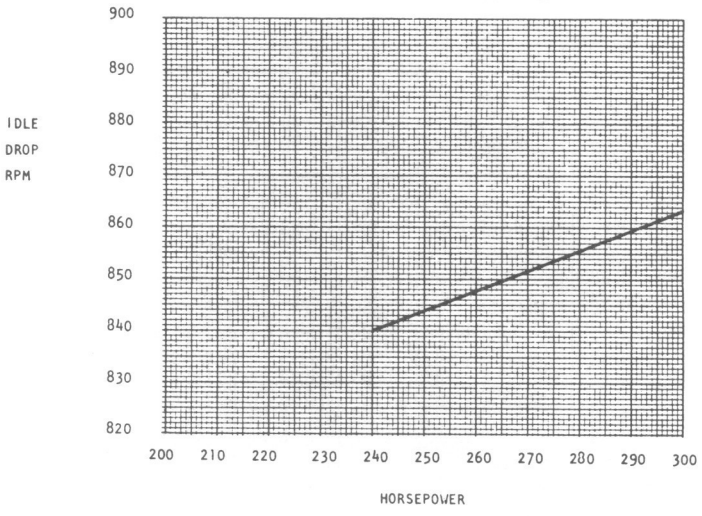
TYPICAL "TAILORED TORQUE" SETTINGS:

DROP TO 787 RPM YIELDS 240 HP

DROP TO 800 RPM YIELDS 270 HP

8922050 GOVERNOR
900 RPM INITIAL IDLE

6V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD



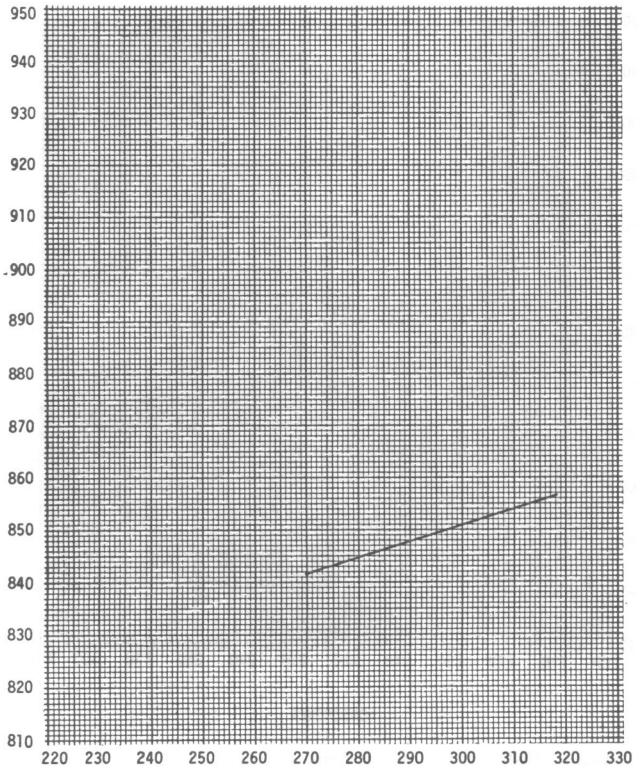
TYPICAL "TAILORED TORQUE" SETTINGS:

DROP TO 840 RPM YIELDS 240 HP

DROP TO 852 RPM YIELDS 270 HP

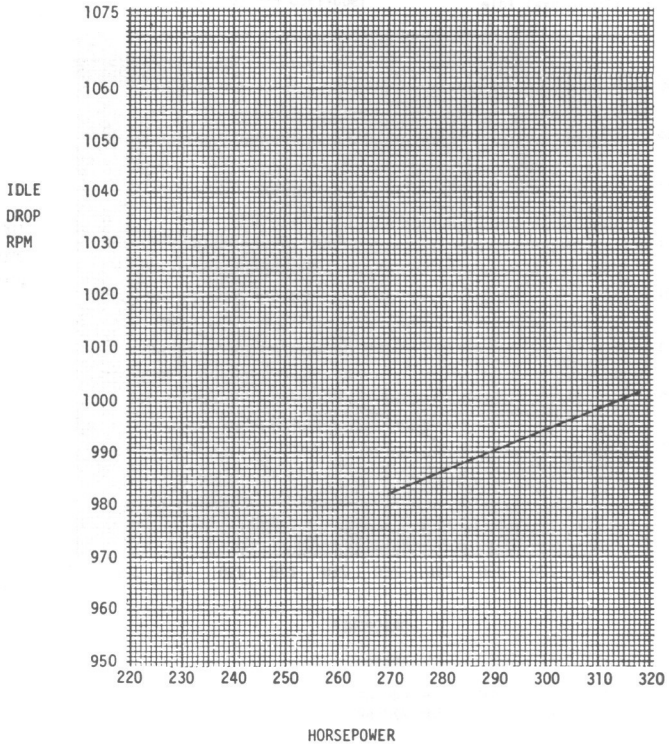
1982 Fed. – Silver Engines Only

8924430 Governor 6V-92 Federal Engine
950 RPM Initial Idle 2100 RPM Full Load



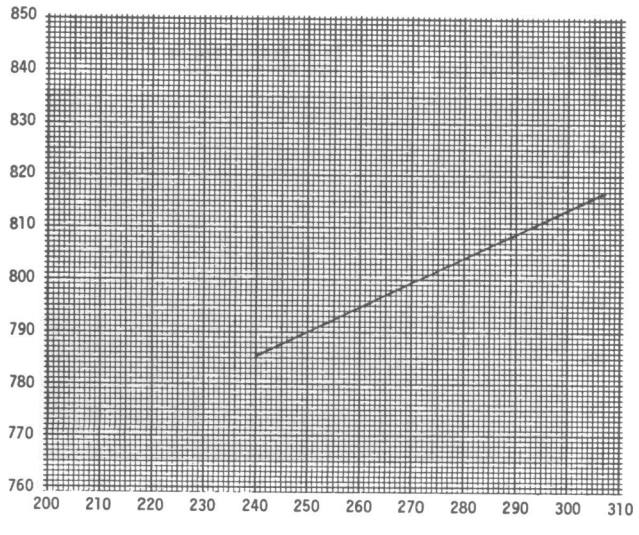
Typical "Tailored Torque" Setting:
Drop to 842 RPM Yields 270 HP

8924428 Governor 6V-92 Federal Engine
1075 RPM Initial Idle 2100 RPM Full Load



Typical "Tailored Torque" Setting:
Drop to 983 RPM Yields 270 HP

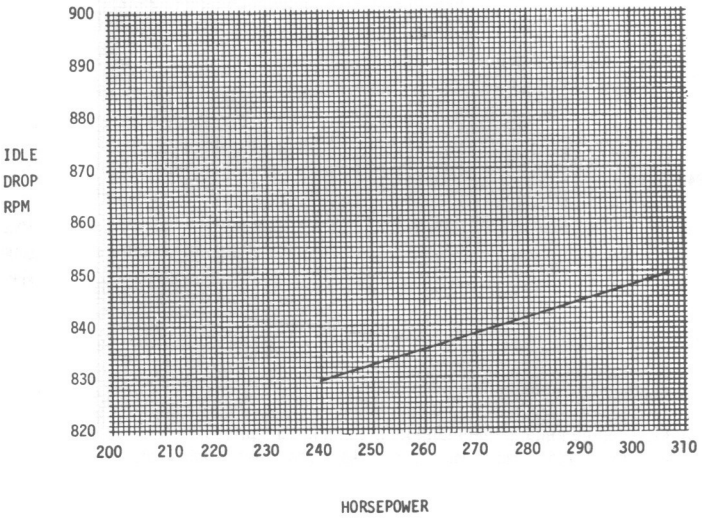
8924430 Governor 6V-92 Federal Engine
850 RPM Initial Idle 1900-1950 RPM Full Load



Typical "Tailored Torque" Settings:

Drop to 786 RPM Yields 240 HP
Drop to 800 RPM Yields 270 HP

8924431 Governor 6V-92 Federal Engine
900 RPM Initial Idle 1900-1950 RPM Full Load



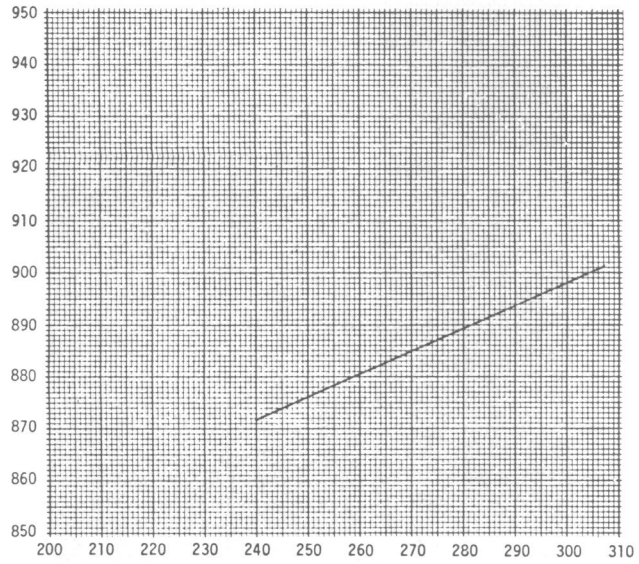
Typical "Tailored Torque" Settings:

Drop to 830 RPM Yields 240 HP
Drop to 839 RPM Yields 270 HP

1983 Federal

8924429 Governor
950 RPM Initial Idle

6V-92 Federal Engine
1900-1950 RPM Full Load

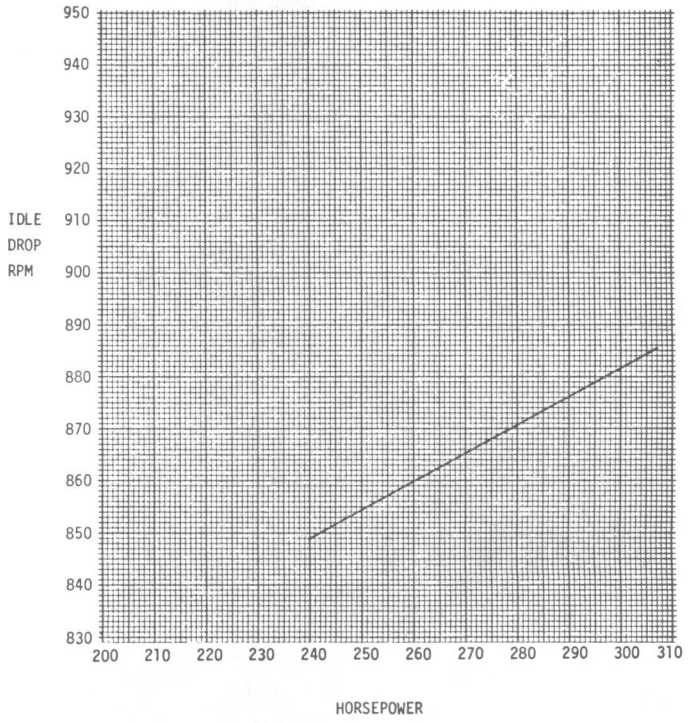


Typical "Tailored Torque" Settings:

Drop to 872 RPM Yields 240 HP
Drop to 885 RPM Yields 270 HP

8924428 Governor
950 RPM Initial Idle

6V-92 Federal Engine
1900-1950 RPM Full Load

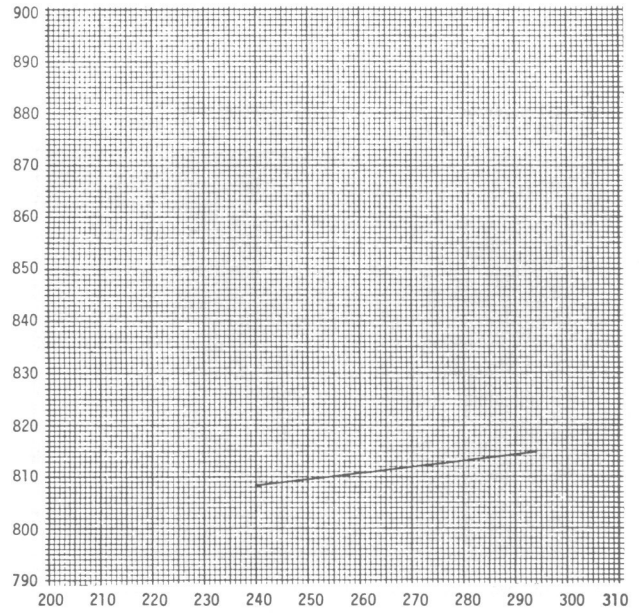


Typical "Tailored Torque" Settings:

Drop to 849 RPM Yields 240 HP
Drop to 866 RPM Yields 270 HP

8924429 Governor
900 RPM Initial Idle

6V-92 Federal Engine
1800 RPM Full Load

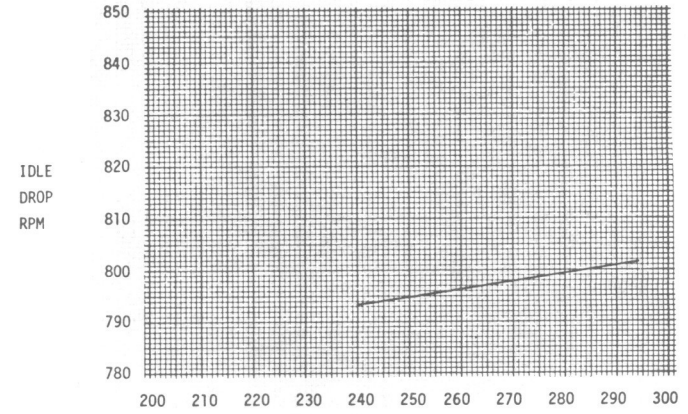


Typical "Tailored Torque" Settings:

Drop to 809 RPM Yields 240 HP
Drop to 812 RPM Yields 270 HP

8924431 Governor
850 RPM Initial Idle

6V-92 Federal Engine
1800 RPM Full Load

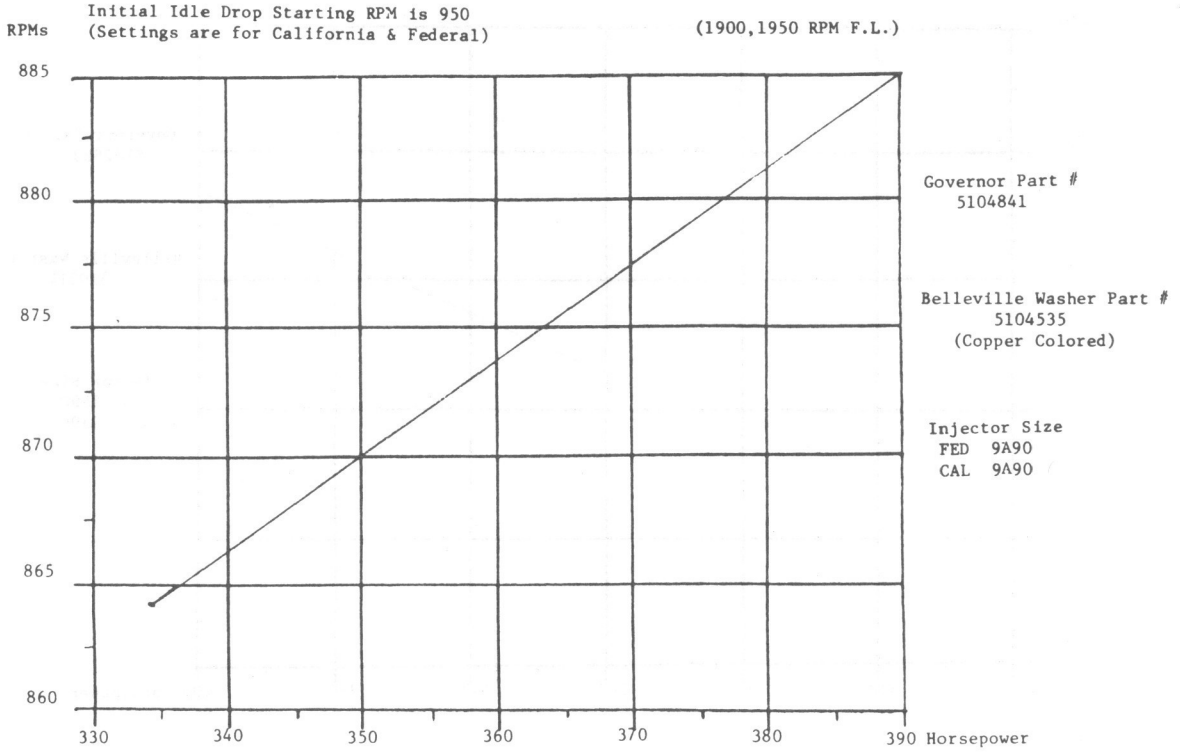


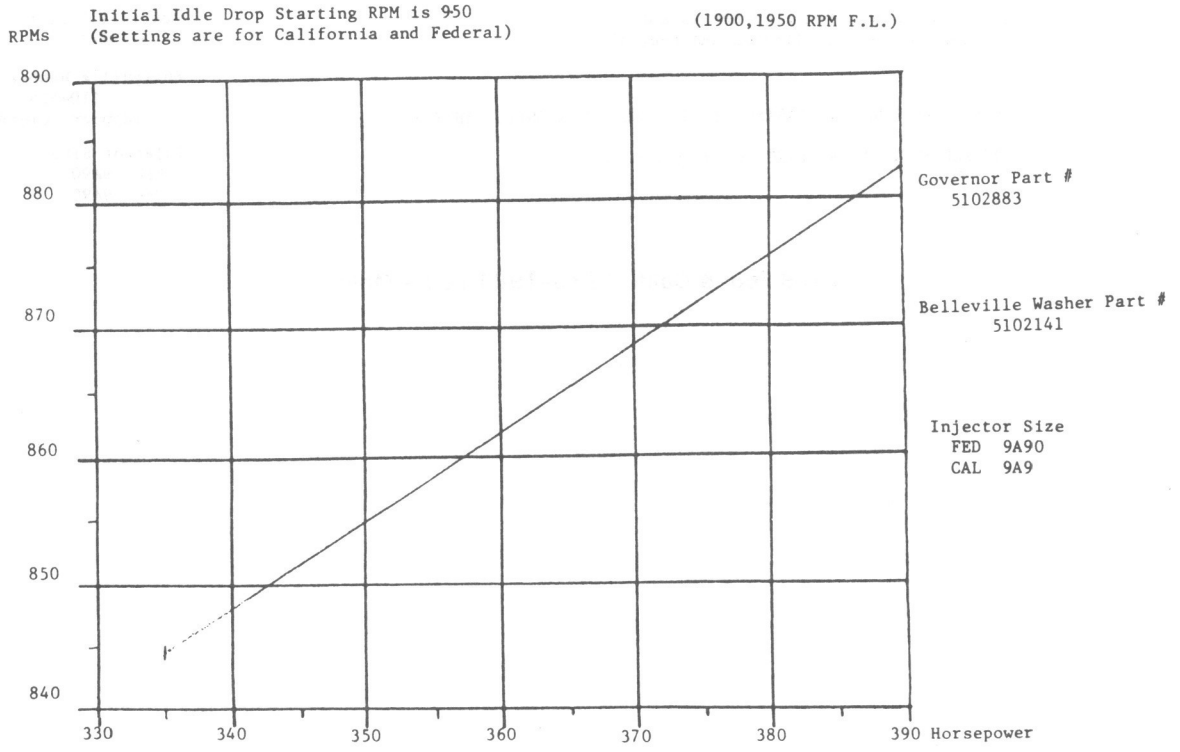
Typical "Tailored Torque" Settings:

Drop to 794 RPM Yields 240 HP
Drop to 798 RPM Yields 270 HP

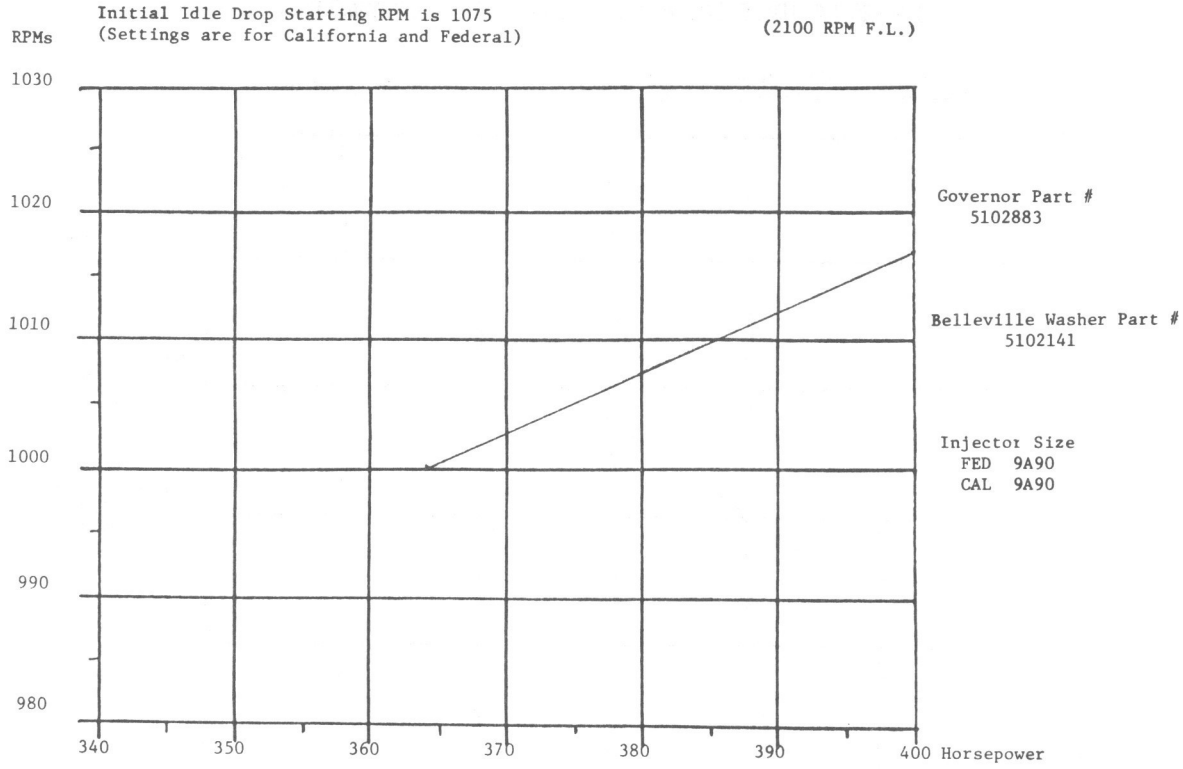
1983 Federal (Cont.)

8V-92TTA IDLE DROP SETTINGS FOR AUTOMOTIVE ENGINES





1979 Fed. & Calif., 1980–1981 Fed. – Only



8V92TTA IDLE DROP SETTINGS FOR 1979 (1800 RPM F.L.) ENGINES

Initial Idle Drop Starting RPM is 880
(Settings are for California and Federal)

THE SETTING FOR THIS ENGINE IS 335 HORSEPOWER ONLY. THIS IS

ACQUIRED BY IDLE DROPPING TO 795 R.P.M.'S.

Governor Part #
5104841

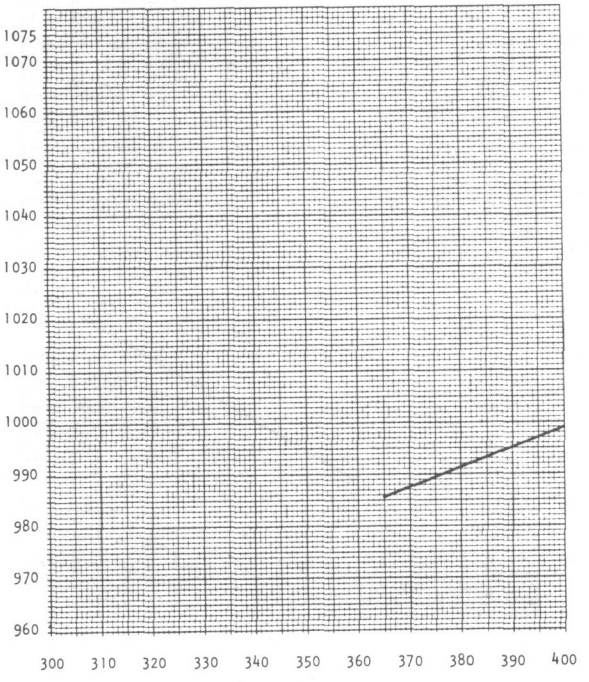
Belleville Washer Part #
5104535
(Copper Colored)

Injector Size
FED 9A90
CAL 9A90

1979 Fed. & Calif., 1980–1981 Fed. – Only

5102883 GOVERNOR
1075 RPM INITIAL IDLE

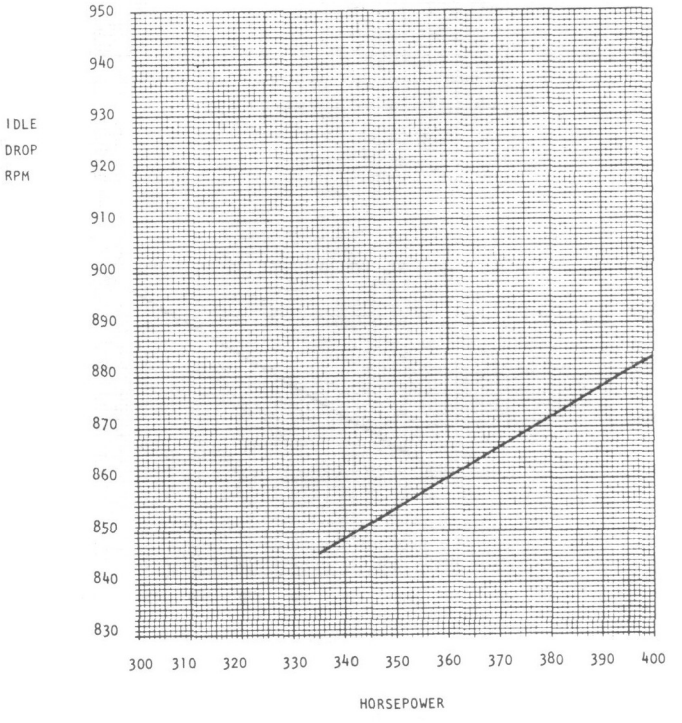
8V-92 FEDERAL ENGINE
2100 RPM FULL LOAD



TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 986 RPM YIELDS 365 HP
DROP TO 999 RPM YIELDS 400 HP

5102883 GOVERNOR
950 RPM INITIAL IDLE

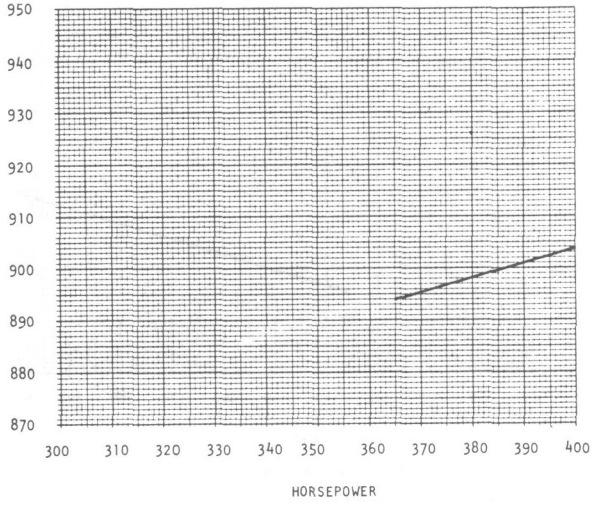
8V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD



TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 846 RPM YIELDS 335 HP
DROP TO 863 RPM YIELDS 365 HP

8922147 GOVERNOR
950 RPM INITIAL IDLE

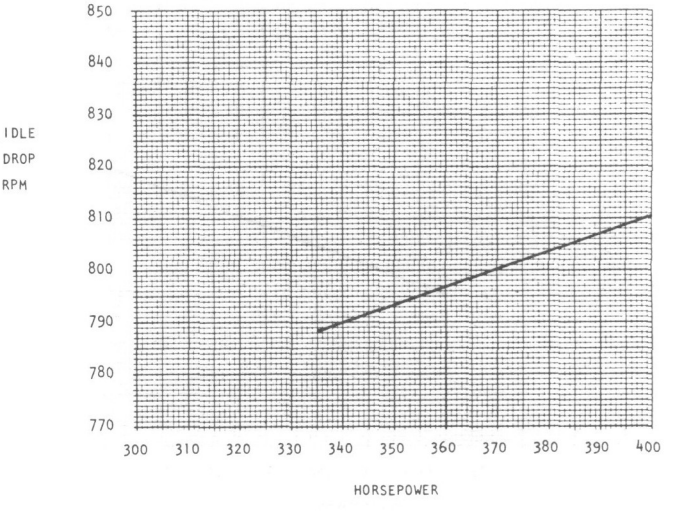
8V-92 FEDERAL ENGINE
2100 RPM FULL LOAD



TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 894 RPM YIELDS 365 HP
DROP TO 904 RPM YIELDS 400 HP

8922147 GOVERNOR
850 RPM INITIAL IDLE

8V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD

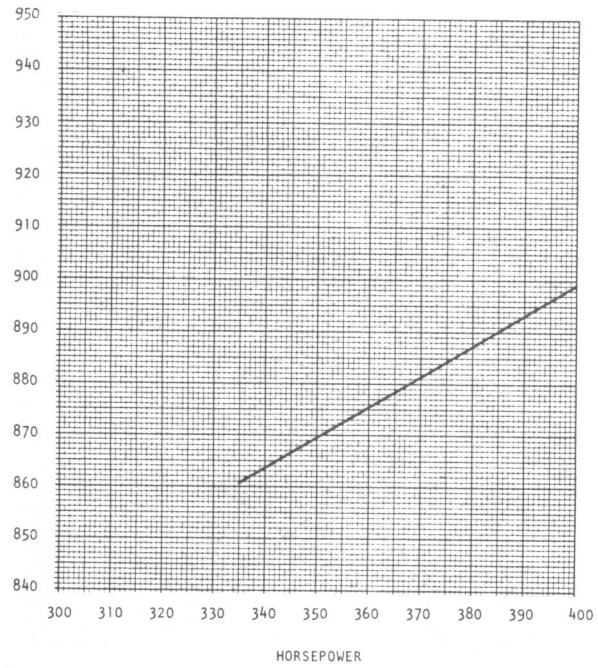


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 788 RPM YIELDS 335 HP
DROP TO 799 RPM YIELDS 365 HP

1982 Fed. – Silver Engines Only

5104841 GOVERNOR
950 RPM INITIAL IDLE

8V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD

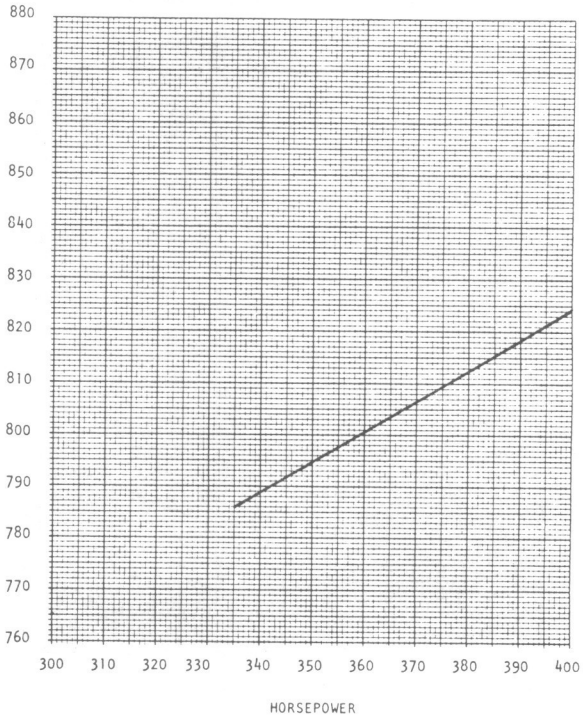


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 861 RPM YIELDS 335 HP
DROP TO 878 RPM YIELDS 365 HP

5104841 GOVERNOR
880 RPM INITIAL IDLE

8V-92 FEDERAL ENGINE
1800 RPM FULL LOAD

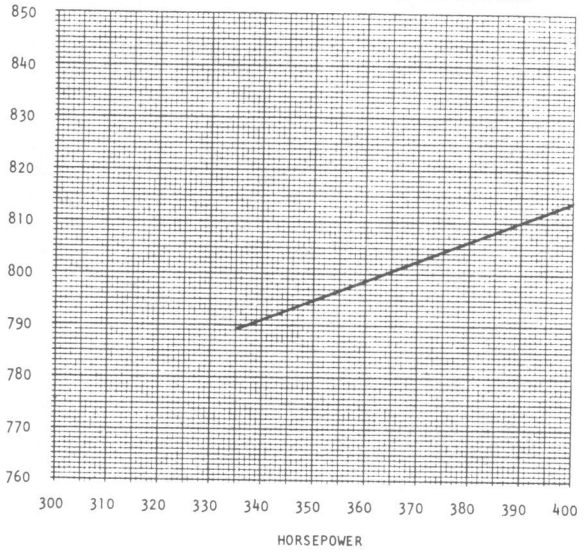
IDLE DROP RPM



TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 786 RPM YIELDS 335 HP
DROP TO 803 RPM YIELDS 365 HP

8922050 GOVERNOR
850 RPM INITIAL IDLE

8V-92 FEDERAL ENGINE
1800 RPM FULL LOAD

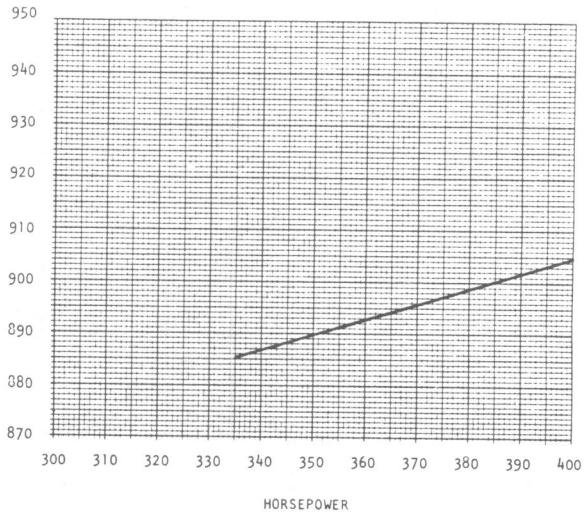


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 789 RPM YIELDS 335 HP
DROP TO 800 RPM YIELDS 365 HP

8922050 GOVERNOR
950 RPM INITIAL IDLE

8V-92 FEDERAL ENGINE
1900-1950 RPM FULL LOAD

IDLE DROP RPM

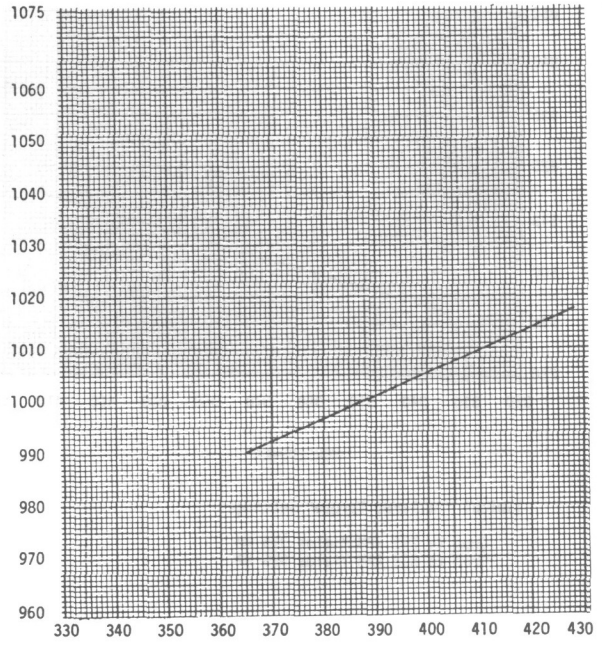


TYPICAL "TAILORED TORQUE" SETTINGS:
DROP TO 885 RPM YIELDS 335 HP
DROP TO 894 RPM YIELDS 365 HP

1982 Fed. – Silver Engines Only

8924428 Governor
1075 RPM Initial Idle

8V-92 Federal Engine
2100 RPM Full Load

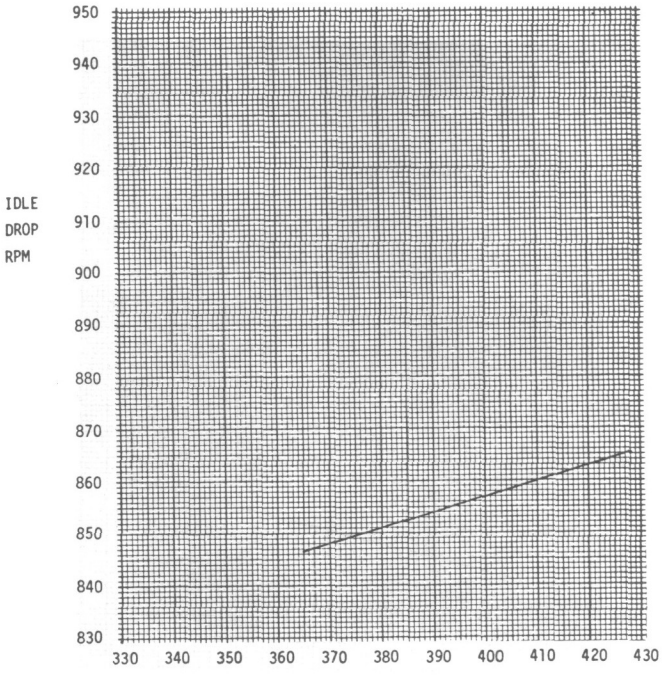


Typical "Tailored Torque" Setting:

Drop to 990 RPM Yields 365 HP

8924430 Governor
950 RPM Initial Idle

8V-92 Federal Engine
2100 RPM Full Load

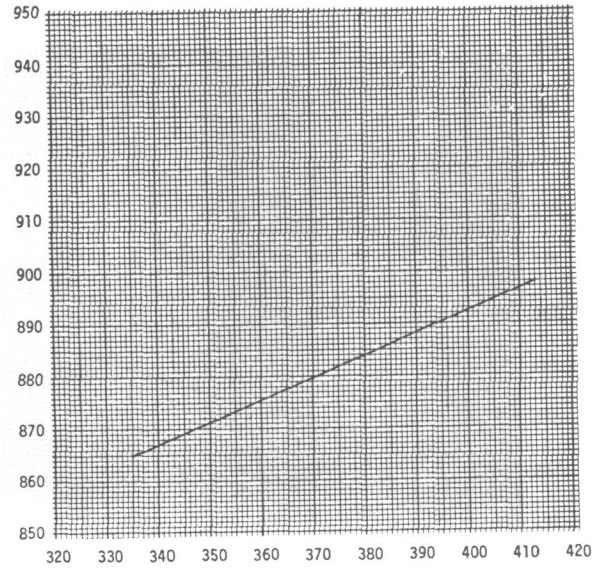


Typical "Tailored Torque" Setting:

Drop to 847 RPM Yields 365 HP

8924429 Governor
950 RPM Initial Idle

8V-92 Federal Engine
1900-1950 RPM Full Load

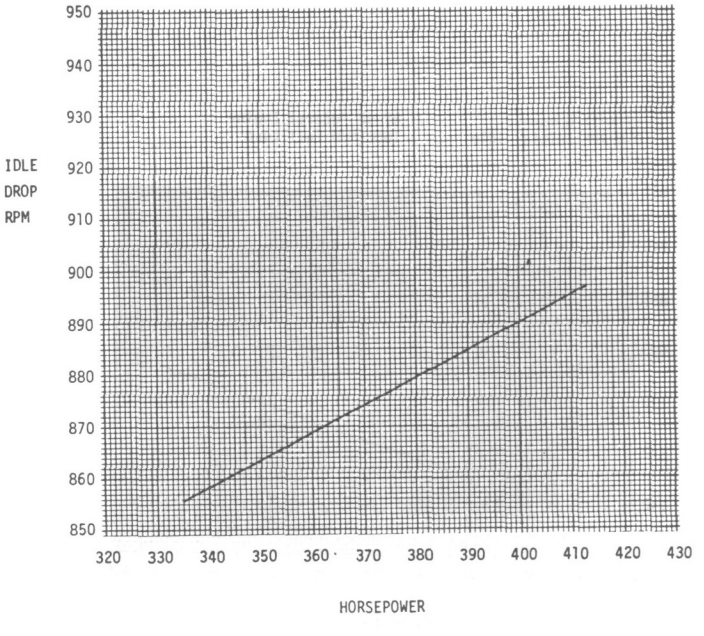


Typical "Tailored Torque" Settings:

Drop to 865 RPM Yields 335 HP
Drop to 878 RPM Yields 365 HP

8924428 Governor
950 RPM Initial Idle

8V-92 Federal Engine
1900-1950 RPM Full Load



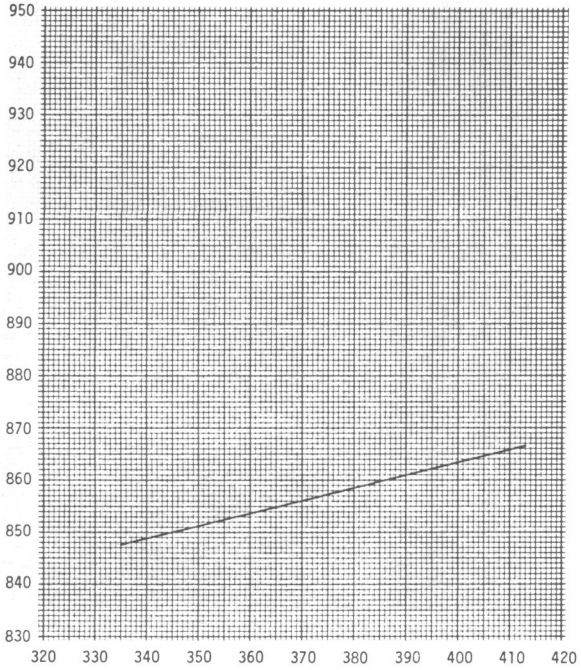
Typical "Tailored Torque" Settings:

Drop to 856 RPM Yields 335 HP
Drop to 872 RPM Yields 365 HP

1983 Federal

8924431 Governor
950 RPM Initial Idle

8V-92 Federal Engines
1900-1950 RPM Full Load



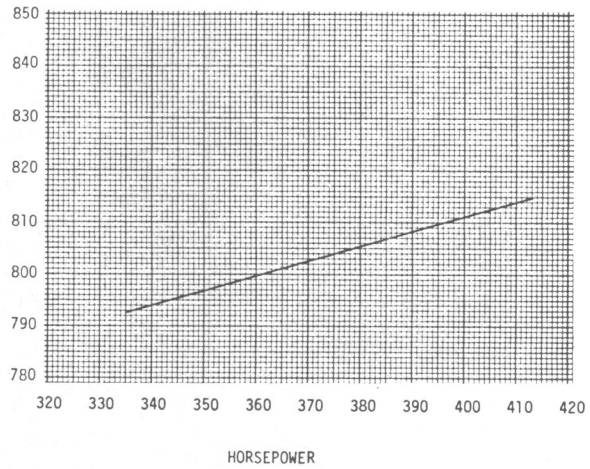
Typical "Tailored Torque" Settings:

Drop to 848 RPM Yields 335 HP
Drop to 855 RPM Yields 365 HP

8924430 Governor
850 RPM Initial Idle

8V-92 Federal Engine
1900-1950 RPM Full Load

IDLE
DROP
RPM

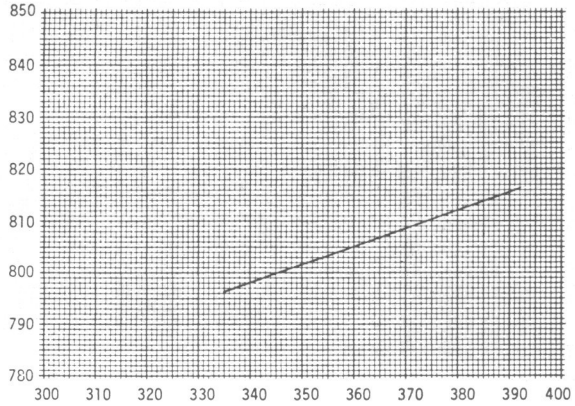


Typical "Tailored Torque" Settings:

Drop to 793 RPM Yields 335 HP
Drop to 802 RPM Yields 365 HP

8924431 Governor
850 RPM Initial Idle

8V-92 Federal Engine
1800 RPM Full Load



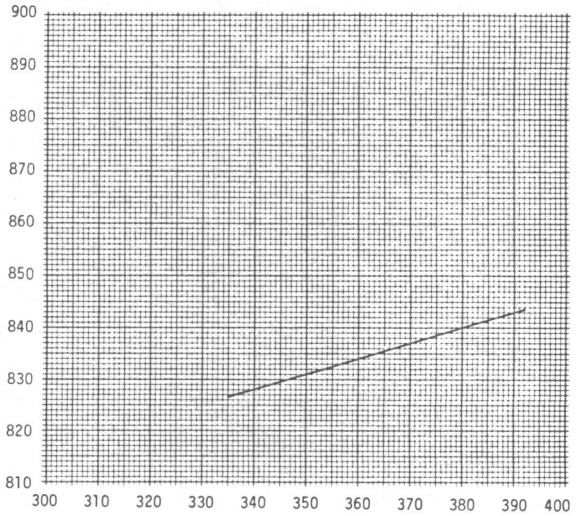
Typical "Tailored Torque" Settings:

Drop to 797 RPM Yields 335 HP
Drop to 807 RPM Yields 365 HP

8924429 Governor
900 RPM Initial Idle

8V-92 Federal Engine
1800 RPM Full Load

IDLE
DROP
RPM



Typical "Tailored Torque" Settings:

Drop to 826 RPM Yields 335 HP
Drop to 835 RPM Yields 365 HP

1983 Federal (Cont.)

METHOD 2 – Power Reduction Factor

This method consists of setting "TT" engine horsepower to a specific percentage below full throttle horsepower as observed on an engine, chassis or output shaft dynamometer.

This method will provide the desired horsepower, within a reasonable tolerance, even with normal variations of test conditions. Some of these variations would be:

Dynamometer Calibration

Driveline Efficiency

Fuel Grade and Temperature

Air Density

Tire Slippage

Proceed as follows:

1. Perform the standard engine tune up.

NOTICE: The throttle delay piston must be removed and the Belleville spring retainer nut must be backed out until there is approximately .060" clearance between the washers and retainer nut (Fig. 1) prior to operating the engine on the dynamometer.

ENGINE TYPE	MAXIMUM RATED B.H.P.	RATED "TT" HORSEPOWER	RATED ENGINE SPEED	NO-LOAD SPEED	POWER REDUCTION FACTOR
6V-92TT – 9290 Injectors Federal Certified Throttle delay setting .636 *Throttle delay setting .570	335 @ 2100 RPM 2275 RPM Maximum No-Load Speed	270* 270* 270 270 270 260* 260* 260 260 250* 250* 250 250 240* 240* 240 240	1800 1850 1900 1950 2100 1800 1850 1900 1950 1800 1850 1900 1950 1800 1850 1900 1950	1950 2000 2050 2100 2250 1950 2000 2050 2100 1950 2000 2050 2100 1950 2000 2050 2100	.91 .89 .88 .86 .82 .88 .86 .84 .83 .84 .83 .81 .80 .81 .79 .78 .77
6V-92TT – 9290 Injectors Federal Certified Throttle delay setting .636	335 @ 2100 RPM 2275 RPM Maximum No-Load Speed	290 290	1900 1950	2050 2100	.94 .93
6V-92TTA – 9A90 Injectors California Approved Federal Certified Throttle delay setting .636	318 @ 2100 RPM 2275 RPM Maximum No-Load Speed	270 270 270 260 260 250 250 240 240	1900 1950 2100 1900 1950 1900 1950 1900 1950	2050 2100 2250 2050 2100 2050 2100 2050 2100	.91 .89 .86 .87 .86 .84 .83 .81 .79
8V-92TT – 9290 Injectors Federal Certified Throttle delay setting .636	430 @ 2100 RPM 2275 RPM Maximum No-Load	365 365 365	1900 1950 2100	2050 2100 2250	.92 .91 .87
8V-92TT – 9A90 Injectors Federal Certified Throttle delay setting .570	430 @ 2100 RPM 2275 RPM Maximum No-Load	335 335 335 335	1800 1850 1900 1950	1950 2000 2050 2100	.87 .86 .85 .83
8V-92TTA – 9A90 Injectors California Approved Federal Certified Throttle delay setting .636	424 @ 2100 RPM 2275 RPM Maximum No-Load	365 365 365 335 335 335 335	1900 1950 2100 1800 1850 1900 1950	2050 2100 2250 1950 2000 2050 2100	.92 .91 .87 .88 .86 .84 .83
8V-92TTA – 9290 Injectors Federal Certified Throttle delay setting .636	440 @ 2100 RPM 2275 RPM Maximum No-Load	365 365 365	1900 1950 2100	2050 2100 2250	.90 .89 .85

Selected Engine Ratings – 1978 Fed. & Calif.

Engine Type	Max. Rated BHP	Rated TT H.P.	Rated Engine Speed	No-Load Speed	Power Reduction Factor
6V-92TTA Federal and California Engines	335 @ 2100 RPM 2275 RPM Maximum No Load Speed INJ. 9B90 TIM. 1.470 T/D .570	290	2100	2250	.89
		280	2100	2250	.86
		270	2100	2250	.82
		290	1950	2100	.93
		280	1950	2100	.90
		270	1950	2100	.86
		260	1950	2100	.83
		250	1950	2100	.80
		240	1950	2100	.77
		290	1900	2050	.94
		280	1900	2050	.91
		270	1900	2050	.88
		260	1900	2050	.84
		250	1900	2050	.81
		240	1900	2050	.78
		290*	1850	2000	.96
		280*	1850	2000	.93
		270*	1850	2000	.89
		260*	1850	2000	.86
		250*	1850	2000	.83
*Uses Belleville Spring (Copper Flashed) P/N 5104535		240*	1850	2000	.79
		307*	1800	1950	N/A
		290*	1800	1950	.98
		280*	1800	1950	.95
		270*	1800	1950	.91
		260*	1800	1950	.88
		250*	1800	1950	.84
		240*	1800	1950	.81
8V-92TTA Federal and California Engines	Fed. - 435 @ 2100 RPM 2275 RPM Maximum No Load INJ. 9A90 TIM. 1.480 T/D .636	365	1900	2050	.92
		365	1950	2100	.91
		365	2100	2250	.87
	Cal. - 430 @ 2100 RPM 2275 RPM Maximum No Load INJ. 9A90 TIM. 1.500 T/D .660	335	1800	1950	.88
		335	1850	2000	.86
		335	1900	2050	.84
		335	1950	2100	.83

Selected Engine Ratings - 1979 Fed. & Calif., 1980-1981 Fed. - only

2. Set the no–load speed as required (see Charts).

3. Run the engine until the engine coolant temperature is above 170°F (77°C).

4. Using an engine, chassis or output shaft dynamometer, measure and record full throttle horsepower at 100 rpm below rated engine speed with the Belleville springs loose (Fig. 1).

   NOTICE: Satisfactory power adjustment can be obtained only if the full throttle horsepower and adjusted horsepower (Step 4) are obtained with the engine cooling in the same mode, i.e., operating or not operating.

5. Select the power reduction factor in Table 2 or 3 for the proper engine type, desired rated horsepower and rated engine speed.

6. Multiply the horsepower recorded in Step 4 by the factor selected in Step 5. Record this value.

7. Adjust the Belleville spring retainer nut clockwise so that the observed horsepower is reduced to that recorded in Step 6 at 100 rpm below rated engine speed, with the governor speed control lever in the maximum speed position and the fan in the same mode as in Step 4. Verify that the engine is obtaining adjusted "TT" horsepower, within 5%, at rated engine speed. If the adjusted "TT" horsepower cannot be obtained at rated engine speed, governor droop interference may be the cause. If necessary, to eliminate droop interference, readjust the engine no–load speed from 150 to 175 rpm above rated engine speed and repeat the power reduction factor method.

8. Check the idle speed and, if necessary, reset to the specified idle speed.

9. Adjust the buffer screw and starting aid screw.

Engine Type	Max. Rated BHP	Rated TT H.P.	Rated Engine Speed	No-Load Speed	Power Reduction Factor
6V-92TTA California Engines	305 @ 2100 RPM 2275 RPM Maximum No Load Speed INJ. 9C90 TIM. 1.480 T/D .660 *Uses Belleville Spring (Copper Flashed) P/N 5104535	270	2100	2250	.88
		270	1950	2100	.91
		260	1950	2100	.87
		250	1950	2100	.84
		240	1950	2100	.81
		270	1900	2050	.92
		260	1900	2050	.89
		250	1900	2050	.85
		240	1900	2050	.82
		270*	1850	2000	.93
		260*	1850	2000	.90
		250*	1850	2000	.86
		240*	1850	2000	.83
		270*	1800	1950	.95
		260*	1800	1950	.91
		250*	1800	1950	.88
		240*	1800	1950	.84
8V-92TTA California Engines	Cal. - 405 @ 2100 RPM 2275 RPM Maximum No Load INJ. 9C90 TIM. 1.480 T/D .660	365	1900	2050	.93
		365	1950	2100	.92
		365	2100	2250	.90
		335	1800	1950	.88
		335	1850	2000	.87
		335	1900	2050	.85
		335	1950	2100	.84

Selected Engine Ratings – 1980–1981 Calif. – Only

Engine Type	Max. Rated H.P.	Rated TT H.P.	Rated Eng. Speed	No-Load Speed	Power Reduction Factor
6V-92TTA Federal	330 @ 2100 RPM 2275 RPM Max. No-Load Speed INJ. 9B90 TIM. 1.470 T/D .570	270	2100	2250	.83
		270	1950	2100	.86
		240	1950	2100	.76
		270	1900	2050	.88
		240	1900	2050	.78
		307*	1800	1950	N/A
		270*	1800	1950	.91
		240*	1800	1950	.81
8V-92TTA Federal	445 @ 2100 RPM 2275 RPM Max. No-Load Speed INJ. 9A90 TIM. 1.466 T/D .636	365	2100	2250	.84
		365	1950	2100	.87
		335	1950	2100	.80
		365	1900	2050	.89
		335	1900	2050	.82
		411*	1800	1950	N/A
		365*	1800	1950	.92
		335*	1800	1950	.85
6V-92TTA California	325 @ 2100 RPM 2275 RPM Max. No-Load Speed INJ. 9F90 TIM. 1.520 T/D .636	270	2100	2250	.85
		270	1950	2100	.87
		240	1950	2100	.77
		270	1900	2050	.89
		240	1900	2050	.79
		304*	1800	1950	N/A
		270*	1800	1950	.92
		240*	1800	1950	.82
8V-92TTA California	440 @ 2100 RPM 2275 RPM Max. No-Load Speed INJ. 9F90 TIM. 1.520 T/D .660	365	2100	2250	.85
		365	1950	2100	.89
		335	1950	2100	.81
		365	1900	2050	.91
		335	1900	2050	.83
		403*	1800	1950	N/A
		365*	1800	1950	.94
		335*	1800	1950	.87

*Uses Belleville spring (copper flashed) P/N 5104535.
N/A – Not Applicable.

Selected Engine Ratings – 1982 Fed. & Calif.

Engine Type and Max. Rated BHP		Rated TT H.P.	Rated Engine Speed(rpm)	No-Load Speed (rpm)	Power Reduction Factor
6V-92TTA Federal 330 @ 2100 RPM Ⓑ 2275 RPM Max. No-Load Speed	Injector 9B90 Timing 1.464 Throttle Delay .636 Ⓐ .610 Ⓑ Modulator Setting .480	270 Ⓑ	2100	2225	.83
		270 Ⓑ	1950	2075	.86
		240 Ⓑ	1950	2075	.76
		270 Ⓑ	1900	2025	.88
		240 Ⓑ	1900	2025	.78
		307 Ⓐ *	1800	1925	N/A
		270 Ⓐ *	1800	1925	.91
		240 Ⓐ *	1800	1925	.81
8V-92 TTA Federal 445 @ 2100 RPM 2275 RPM Max. No-Load Speed	Injector 9A90 Timing 1.460 Throttle Delay .594 Modulator Setting .480	365	2100	2225	.84
		365	1950	2075	.87
		335	1950	2075	.80
		365	1900	2025	.89
		335	1900	2025	.82
		411*	1800	1925	N/A
		365*	1800	1925	.92
		335*	1800	1925	.85
6V-92 TTA California 325 @ 2100 RPM 2275 RPM Max. No-Load Speed	Injector 9F90 Timing 1.520 Throttle Delay .636 Modulator Setting .480	270	2100	2225	.85
		270	1950	2075	.87
		240	1950	2075	.77
		270	1900	2025	.89
		240	1900	2025	.79
		304*	1800	1925	N/A
		270*	1800	1925	.92
		240*	1800	1925	.82
8V-92 TTA California 440 @ 2100 RPM 2275 RPM Max. No-Load Speed	Injector 9F90 Timing 1.515 Throttle Delay .660 Modulator Setting .490	365	2100	2225	.85
		365	1950	2075	.89
		335	1950	2075	.81
		365	1900	2025	.91
		335	1900	2025	.83
		403*	1800	1925	N/A
		365*	1800	1925	.94
		335*	1800	1925	.87

** = Uses Belleville Spring (Washer) 5104535 (Copper Flashed).*
N/A = Not Applicable

Selected Engine Ratings – 1983 Fed. & Calif.

Engine Type and Max. Rated BHP		Rated TT H.P.	Rated Engine Speed (rpm)	No-Load Speed (rpm)	Power Reduction Factor
6V-92TA 330 @ 2100 RPM	Injector 9B90 Timing 1.475 Throttle Delay .636 Modulator Setting .465	270 270	1800 2100	1950 2250	.91 .83
6V-92TAC 325 @ 2100 RPM	Injector 9F90 Timing 1.520 Throttle Delay DNA Modulator Setting .490	270 270	1800 2100	1950 2250	.92 .84
8V-92TA 445 @ 2100 RPM	Injector 9A90 Timing 1.470 Throttle Delay .594 Modulator Setting .404	365 365	1950 2100	2100 2250	.87 .84
8V-92TAC 440 @ 2100 RPM	Injector 9F90 Timing 1.520 Throttle Delay .660 Modulator Setting .490	365 365	1950 2100	2100 2250	.89 .85

Selected Engine Ratings – 1984 Fed. & Calif.

Engine Type and Max. Rated BHP		Rated TT H.P.	Rated Engine Speed (rpm)	No-Load Speed (rpm)	Power Reduction Factor
6V-92TA 300 @ 1800 RPM	Injector 9G85 Timing 1.466 Throttle Delay DNA Modulator Setting .465	270 270	1800 2100	1925 2250	.91 .83

Selected Engine Ratings – 1985 Fed. Only

Engine Type and Max. Rated BHP		Rated TT H.P.	Rated Engine Speed (rpm)	No-Load Speed (rpm)	Power Reduction Factor
6V-92TA 350 @ 2100 RPM	Injector 9G90 Timing 1.466 Throttle Delay .636 Modulator Setting .480	300	2100	2250	.88
6V-92TA 300 @ 2100 RPM	Injector 9G90 Timing 1.470 Throttle Delay .570 Modulator Setting DNA	270 270	1800 2100	1950 2250	.93 .86
6V-92TAC 340 @ 2100 RPM	Injector 9F90 Timing 1.520 Throttle Delay .660 Modulator Setting .490	300 270	2100 2100	2250 2250	.90 .81
8V-92TA 475 @ 2100 RPM	Injector 9G90 Timing 1.458 Throttle Delay .610 Modulator Setting .454	400 400	2100 1800	2250 1950	.87 .87
8V-92TAC 450 @ 2100 RPM	Injector 9F90 Timing 1.520 Throttle Delay .660 Modulator Setting .490	400	2100	2250	.91

Selected Engine Ratings – 1985, 1986 Fed. & Calif.

Engine Type and Max. Rated BHP		Rated TT H.P.	Rated Engine Speed (rpm)	No-Load Speed (rpm)	Power Reduction Factor
8V-92TA 475 @ 2100 RPM	Injector 9G90 Timing 1.475 Throttle Delay .570 Modulator Setting .404	400	2100	2250	.97

Selected Engine Ratings – 1986 Fed. Only

Engine Type and Max. Rated BHP		Rated TT H.P.	Rated Engine Speed (rpm)	No-Load Speed (rpm)	Power Reduction Factor
6V-92TA 300 @ 1800 RPM	Injector 9G85 Timing 1.466 Throttle Delay DNA Modulator Setting .465	270 270	1800 2100	1925 2250	.91 .83
6V-92TA 350 @ 2100 RPM	Injector 9G90 Timing 1.466 Throttle Delay .636 Modulator Setting .480	300	2100	2250	.87
6V-92TAC 340 @ 2100 RPM	Injector 9F90 Timing 1.520 Throttle Delay .660 Modulator Setting .490	270 300 270	1800 2100 2100	1950 2250 2250	.90 .81 .90
8V-92TA 475 @ 2100 RPM	Injector 9G90 Timing 1.475 Throttle Delay .570 Modulator Setting .404	400	2100	2250	.97
8V-92TAC 450 @ 2100 RPM	Injector 9F90 Timing 1.520 Throttle Delay .660 Modulator Setting .490	400	2100	2250	.90

Selected Engine Ratings – 1987 Fed. & Calif.

FLEXISPEC ENGINE GOVERNOR ADJUSTMENTS "TT" ENGINE

When it is desirable to adjust a "TT" 6V or 8V–92 engine to obtain non–TT maximum rated horsepower, proceed as follows:

1. Adjust the engine governor to obtain a no–load speed 175 rpm above the desired rated speed. Refer to Section 14.3 for the no–load engine speed adjustment.
2. Position the Belleville spring retainer to provide approximately .060" clearance between the Belleville washers and the retainer when the engine is not running (Fig. 1).

VARIABLE SPEED MECHANICAL GOVERNOR

INJECTOR RACK CONTROL ADJUSTMENT (6V–92 AND 8V–92)

The single–weight variable speed governor is mounted at the front of the engine and is driven by a blower rotor.

After adjusting the exhaust valves and timing the fuel injectors, adjust the variable speed mechanical governor and position the injector rack control levers.

Before proceeding with the governor and injector rack adjustments, disconnect any supplementary governing device. After the adjustments are completed, reconnect and adjust the supplementary governing device.

Adjust Governor Gap

With the engine stopped and at normal operating temperature, adjust the governor gap as follows:

1. Disconnect any linkage attached to the governor levers.
2. Back out the buffer screw until it extends approximately 5/8" from the locknut.
3. Clean and remove the governor cover and valve rocker covers. Discard the gaskets.
4. Place the speed control lever in the *maximum speed* position.
5. Insert a .006" feeler gage between the spring plunger and the plunger guide (Fig. 1). If required, loosen the locknut and turn the adjusting screw until a slight drag is noted on the feeler gage.

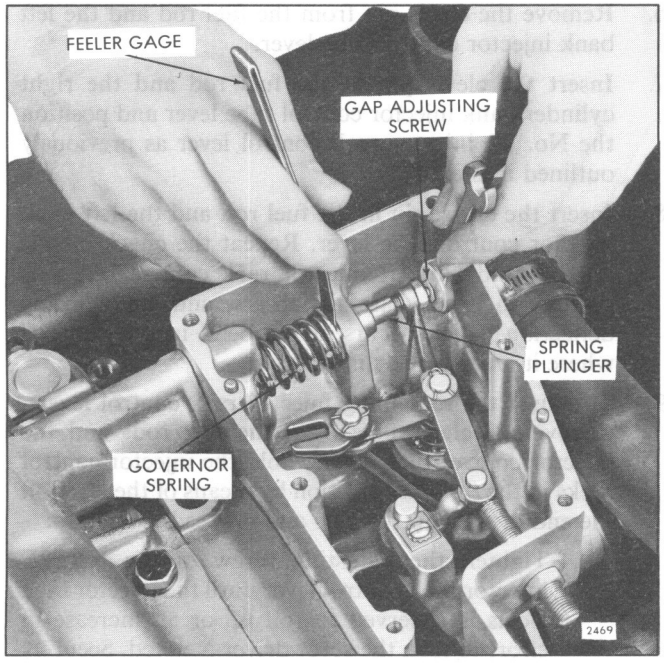


Fig. 1 – Adjusting Governor Gap

6. Hold the adjusting screw and tighten the locknut. Check the gap again and, if necessary, readjust.
7. Affix a new gasket on the top of the governor housing. Place the governor cover assembly on the governor housing with the pin in the throttle control shaft assembly in the slot of the differential lever and the dowel pins in the housing in the dowel pin holes in the cover. Tighten the screws.

Position Injector Rack Control Levers

The position of the injector rack control levers must be correctly set in relation to the governor. Their position determines the amount of fuel injected into each cylinder and ensures equal distribution of the load.

The engines use spring–loaded injector control tube assemblies which have a yield spring at each injector rack control lever with one screw and locknut to keep each injector rack properly positioned.

Properly positioned injector rack control levers, with the engine at full load, will result in the following:

1. Speed control lever at the *maximum speed* position.
2. Stop lever in the *run* position.
3. High–speed spring plunger within .005" to .007" of its seat in the governor control housing.
4. Injector fuel control racks in the *full–fuel* position.

The letters "R" and "L" indicate the injector location in the right or left cylinder bank, viewed from the rear of the engine. The cylinders are numbered starting at the front of the engine on each cylinder bank, Adjust the No. 1L injector rack control lever first to establish a guide for adjusting the remaining control levers.

1. Remove the clevis pin from the fuel rod and the right cylinder bank injector control tube lever.
2. Loosen all of the adjusting screws and locknuts on both injector control tubes. Be sure all of the injector rack control levers are free on the injector control tubes.
3. Move the speed control lever to the *maximum speed* position.
4. Move the stop lever to the *run* position and hold it in that position with light finger pressure. Tighten the adjusting screw of the No. 1L injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted (Fig. 2). Tighten the screw approximately 1/8 of a turn more and lock securely with the adjusting screw locknut. This will place the No. 1L injector rack in the *full–fuel* position.

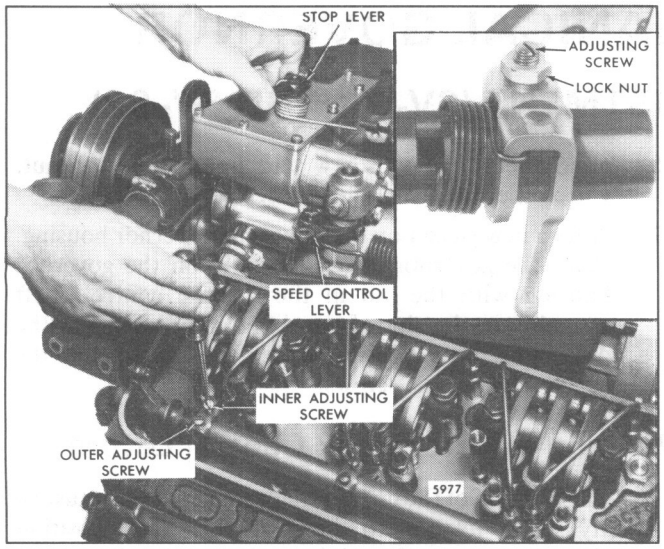


Fig. 2 – Positioning No. 1 Injector Rack Control Lever

NOTICE: Overtightening of the injector rack control lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

The above step should result in placing the governor linkage and control tube assembly in the same position that they will attain while the engine is running at full load.

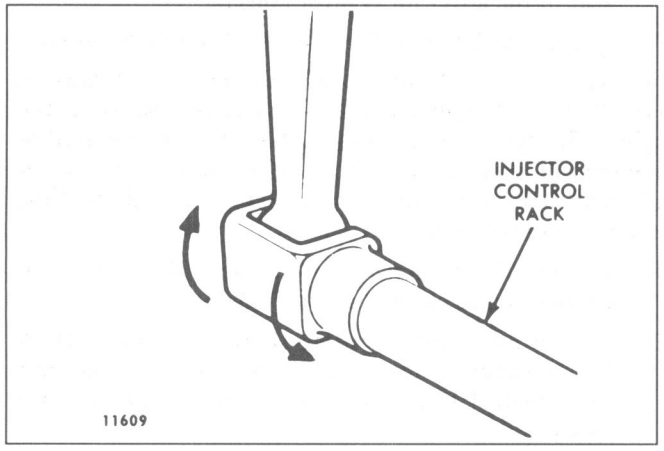


Fig. 3 – Checking Rotating Movement of Injector Control Rack

5. To be sure of the proper rack adjustment, hold the stop lever in the *run* position and press down on the injector rack with a screwdriver or finger tip and note the "rotating" movement of the injector control rack when the stop lever is in the *run* position (Fig. 3). Hold the stop lever in the *run* position and, using a screwdriver, press downward on the injector control rack. The rack should tilt downward and, when the pressure of the screwdriver is released, the control rack should "spring" back upward (Fig. 4).

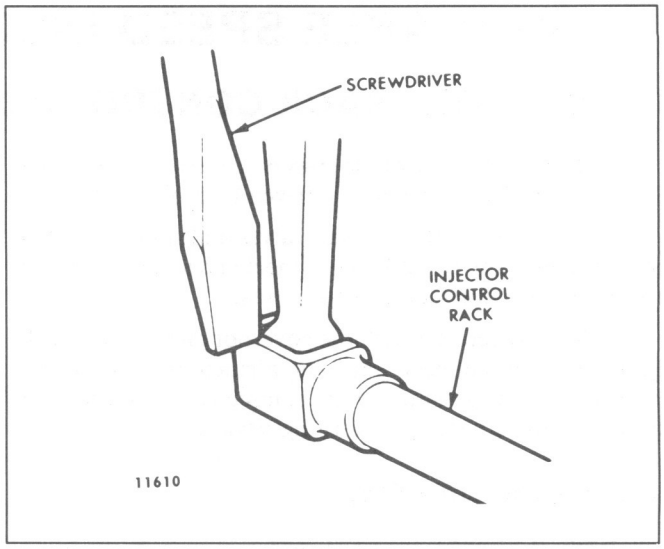


Fig. 4 – Checking Injector Control Rack "Spring"

If the rack does not return to its *original* position, it is too loose. To correct this condition, loosen the locknut and turn the adjusting screw clockwise a slight amount and retighten the locknut.

The setting is too tight if, when moving the stop lever from the stop to the *run* position, the injector rack becomes tight before the stop lever reaches the end of its travel. This will result in a step–up in effort required to move the stop lever to the end of its travel. To correct this condition, loosen the locknut and turn the adjusting screw counterclockwise a slight amount and retighten the locknut.

6. Remove the clevis pin from the fuel rod and the left bank injector control tube lever.
7. Insert the clevis pin in the fuel rod and the right cylinder bank injector control tube lever and position the No. 1R injector rack control lever as previously outlined in Step 4.
8. Insert the clevis pin in the fuel rod and the left bank injector control tube lever. Repeat the check on the No. 1L and No. 1R injector rack control levers as outlined in Step 5. Carefully observe and eliminate any deflection which occurs at the bend in the fuel rod where it enters the cylinder head.
9. To adjust the remaining injector rack control levers, remove the clevis pins from the fuel rods and the injector control tube levers, hold the injector control racks in the *full–fuel* position by means of the lever on the end of the control tube and proceed as follows:
   a. Tighten the adjusting screw of the No. 2L injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Securely lock the adjusting screw locknut.

NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

b. Verify the injector rack adjustment of No. 1L as outlined in Step 5. No. 1L does not "spring" back upward, turn the No. 2L adjusting screw counterclockwise slightly until the No. 1L injector rack returns to its *full–fuel* position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 1L and No. 2L injectors. Turn clockwise or counterclockwise the No. 2L injector rack adjusting screw until both No. 1L and No. 2L injector racks are in the *full–fuel* position when the locknut is securely tightened.

c. Adjust the remaining injectors using the procedures outlined in Step "B" always verifying proper injector rack adjustment.

Once the No. 1L and No. 1R injector rack control levers are adjusted, do not try to alter their settings. All adjustments are made on the remaining control racks.

10. When all of the injector rack control levers are adjusted, recheck their settings. With the control tube lever in the *full–fuel* position, check each control rack as in Step 5. All of the control racks must have the same "spring" condition with the control tube lever in the *full–fuel* position.

11. Insert the clevis pins in the fuel rods and the injector control tube levers.

CAUTION: Before starting an engine after an engine speed control adjustment or after removal of the engine governor cover and lever assembly, the technician must determine that the injector racks return to the *no–fuel* position when the governor stop lever is placed in the *stop* position. Engine overspeed will result if the injector racks cannot be positioned at no fuel with the governor stop lever. An overspeeding engine can result in engine damage which could cause personal injury.

12. Use new gaskets and reinstall the valve rocker covers.

Adjust Maximum No–Load Speed

All governors are properly adjusted before leaving the factory. However, if the governor has been reconditioned or replaced, and to ensure the engine speed will not exceed the recommended no–load speed as given on the engine option plate, set the maximum no–load speed as outlined below.

Start the engine and, after it reaches normal operating temperature, determine the maximum no–load speed of the engine with an accurate hand tachometer. Then, stop the engine and make the following adjustments, if required:

1. Disconnect the booster spring and the governor stop lever spring.
2. Remove the variable speed spring housing and the spring retainer located inside the housing from the governor housing.
3. Refer to Table 1 and determine the stop or shims required for the desired full–load speed. The speed will increase approximately 1 rpm for each .001" in shims added.

Full Load Speed*	Stops	Shims
1200 - 1750	2	Up to .325"
1750 - 2100	1	in Shims
2100 - 2300	0	Maximum

*No-Load Speed is 150-200 rpm above the Full-Load Speed, depending on engine application.

Table 1

4. Install the variable speed spring retainer and housing and tighten the two bolts.
5. Connect the booster spring. Start the engine and recheck the maximum no–load speed.
6. If required, add or remove shims to obtain the necessary operating speed. If the maximum no–load speed is raised or lowered more than 50 rpm by the installation or removal of shims, recheck the governor gap. If readjustment of the governor gap is required, the position of the injector racks must be rechecked.

Governor stops are used to limit the compression of the governor spring, which determines the maximum speed of the engine.

Adjust Idle Speed

With the maximum no–load speed properly adjusted, adjust the idle speed as follows:

1. Place the speed control lever in the *idle* position and the stop lever in the *run* position.
2. With the engine running at normal operating temperature, back out the buffer screw to avoid contact with the differential lever.
3. Loosen the locknut and turn the idle speed adjusting screw until the engine is operating at approximately 15 rpm below the recommended idle speed (Fig. 5). The recommended idle speed is 500 rpm, but may vary with special engine applications.
4. Hold the idle speed adjusting screw and tighten the locknut.

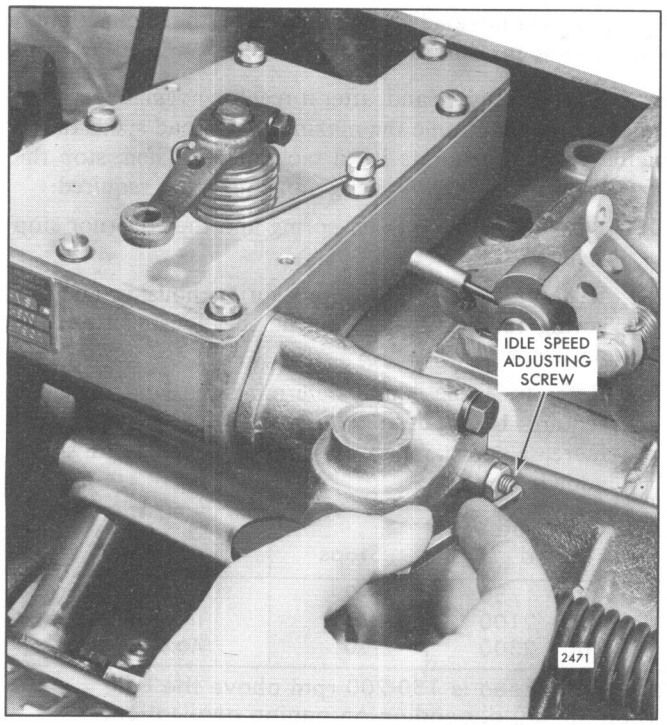


Fig. 5 – Adjusting Idle Speed

Adjust Buffer Screw

1. With the engine running at normal operating temperature, turn the buffer screw IN so that it contacts the differential lever as lightly as possible and still eliminates engine roll (Fig. 6). Do not raise the engine idle speed more than 15 rpm with the buffer screw.

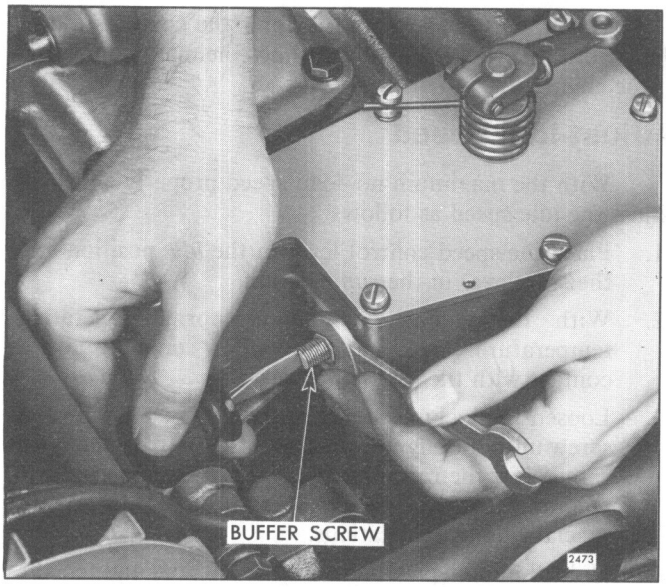


Fig. 6 – Adjusting Buffer Screw

2. Hold the buffer screw and tighten the locknut.

Adjust Booster Spring

With the idle speed adjusted, adjust the booster spring as follows:

1. Move the speed control lever to the *idle* speed position.

2. Refer to Fig. 7 and loosen the booster spring retaining nut on the speed control lever. Loosen the locknuts on the eyebolt at the opposite end of the booster spring.

3. With the speed control lever in the *idle* position, move the bolt in the slot of the speed control lever until the center of the bolt is on or slightly over center (toward the *idle speed* position) of an imaginary line through the bolt, lever shaft and eyebolt. Hold the bolt from turning and tighten the locknut.

4. Start the engine and move the speed control lever to the *maximum speed* position and release it. The speed control lever should return to the *idle speed* position, If it does not, reduce the booster spring tension. If it does, continue to increase the spring tension until the point is reached that it will not return to idle. Then, reduce the spring tension until it does return to idle and tighten the locknut on the eyebolt. This setting will result in the minimum force required to operate the speed control lever.

5. Connect the linkage to the governor levers.

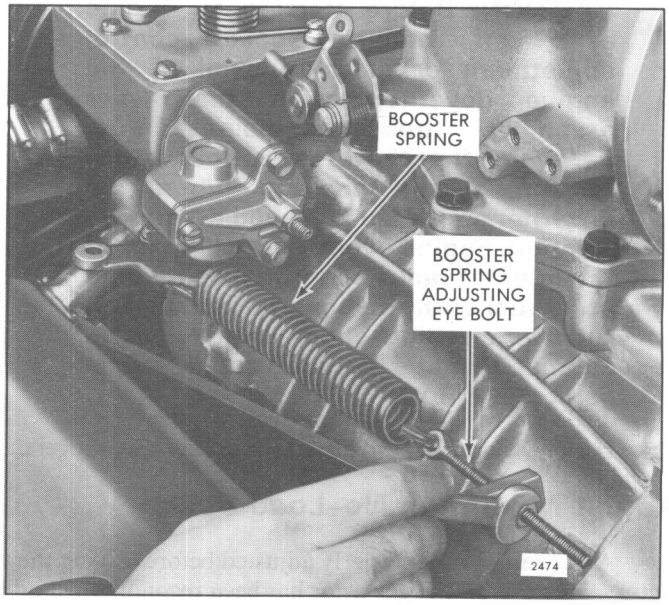


Fig. 7 – Adjusting Booster Spring

VARIABLE SPEED MECHANICAL GOVERNOR AND INJECTOR RACK CONTROL ADJUSTMENT (12V-92 and 16V-92)

The governor on the 12V and 16V engines is mounted on and driven from the front end of the rear blower (Fig. 1).

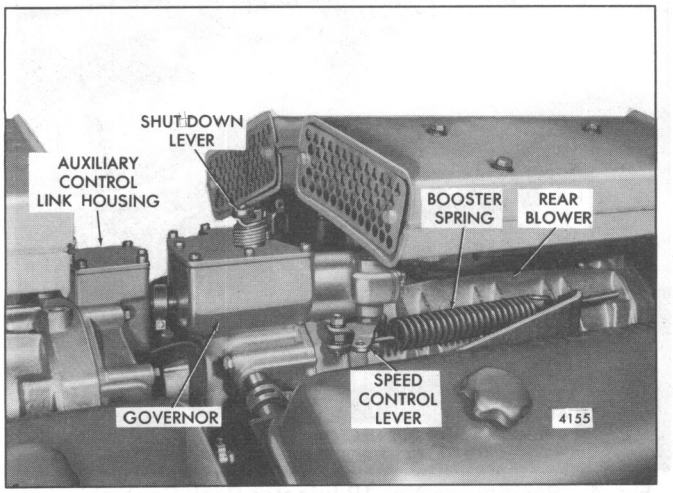


Fig. 1 – Governor Mounting

After adjusting the exhaust valves and timing the fuel injectors, adjust the governor and injector rack control levers.

If the engine or governor has been overhauled, or the injector control linkage has been disturbed, the control link levers in the governor housing and auxiliary control link housing must be aligned before proceeding with the engine tune–up. Refer to Fig. 2 and position the control link levers as follows:

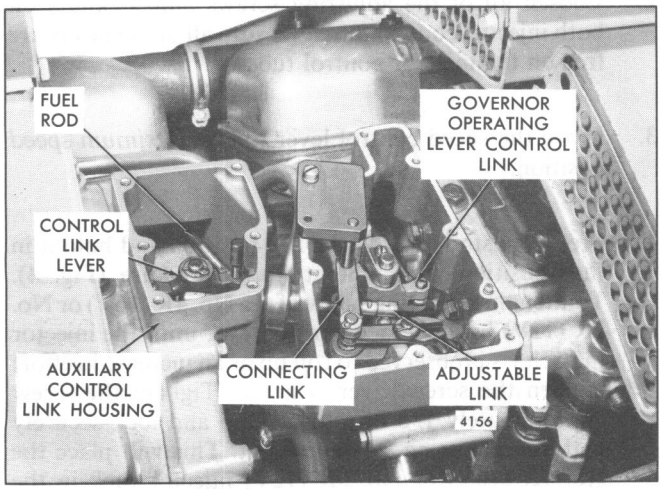


Fig. 2 – Positioning Control Link Levers

1. Disconnect the linkage to the governor speed control and stop levers.
2. Remove the covers from the governor housing and auxiliary control link housing.
3. Disconnect the adjustable link from the lever in the auxiliary control link housing.
4. Remove the connecting pin from the auxiliary governor control link lever.
5. Install gage J 21779 so it extends through the lever and fuel rod and into the gage hole in the bottom of the housing. With the gage in place, the auxiliary control link lever will be in the *mid–travel* position.
6. Remove the connecting pin from the control link lever in the governor housing and install gage J 21780. Install the gage so the pin extends through the connecting link, control lever, and fuel rod; and the governor housing dowel pin extends into the small hole in the gage. Then install a governor cover bolt to lock the gage in place (Fig. 2). With gage J 21780 in place, the governor control link lever will be in the *mid–travel* position and parallel to the auxiliary control link lever.
7. Adjust the length of the adjustable connecting link to retain the lever positions obtained in Steps 5 and 6 and install the link.
8. Remove gages J 21779 and J 21780 and reinstall the control link lever connecting pins.
9. Install the governor housing and auxiliary control link housing covers.

   Proceed with the governor and injector rack control adjustment.

Adjust Governor Gap

With engine stopped and at normal operating temperature, adjust the governor gap as follows:

1. Clean and remove the governor cover and the valve rocker covers. Discard the gaskets.
2. Back out the buffer screw until it extends approximately 5/8" from the locknut.
3. Place the speed control lever in the *maximum speed* position.

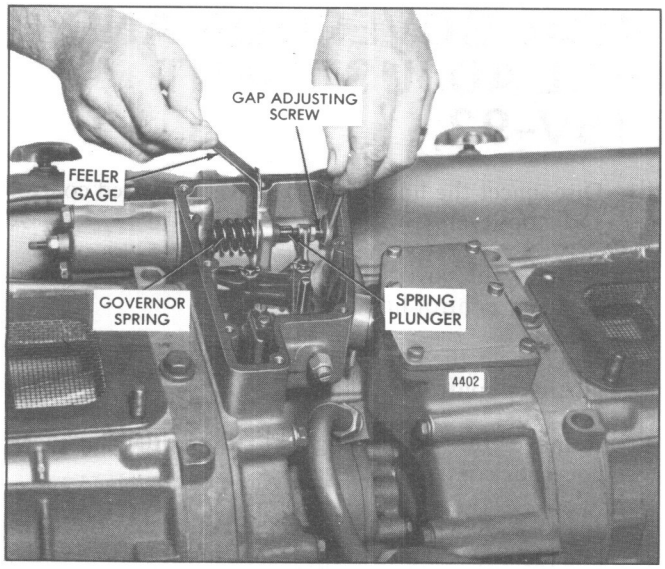


Fig. 3 – Adjusting Governor Gap

4. Insert a .006" feeler gage between the spring plunger and the plunger guide (Fig. 3). If required, loosen the locknut and turn the adjusting screw until a slight drag is noted on the feeler gage.

5. Hold the adjusting screw and tighten the locknut. Check the gap and readjust if necessary.

6. Affix a new gasket to the top of the governor housing. Place the governor cover assembly on the governor housing with the pin in the throttle control shaft assembly in the slot of the differential lever and the dowel pins in the cover. Tighten the screws.

Position Injector Rack Control Levers

The position of the injector rack control levers must be correctly set in relation to the governor. Their position determines the amount of fuel injected into each cylinder and ensures equal distribution of the load.

The engines use spring–loaded injector control tube assemblies which have a yield spring at each injector rack control lever with one screw and locknut to keep each injector rack properly positioned.

Properly positioned injector rack control levers with the engine at full load will result in the following:

1. Speed control lever at the *maximum speed* position.
2. Stop lever in the *run* position.
3. High–speed spring plunger within .005" to .007" of its seat in the governor control housing.
4. Injector fuel control racks in the *full–fuel* position.

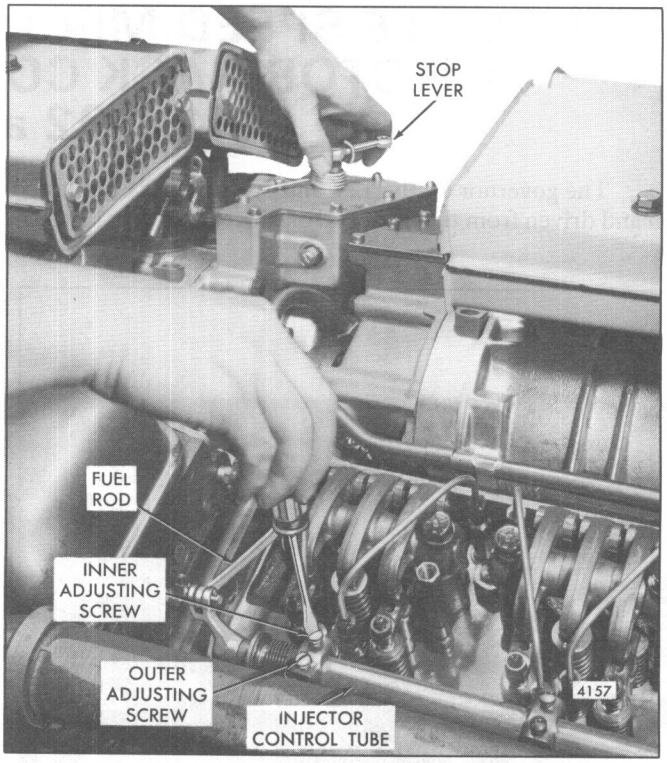


Fig. 4 – Positioning No. 4R Injector Rack Control Lever

The letters "R" and "L" indicate the injector location on the right or left cylinder bank, viewed from the rear of the engine. Cylinders are numbered starting at the front of the engine on each cylinder bank. Adjust the No. 4R injector rack control lever first to establish a guide for adjusting the remaining right bank injector rack control levers.

1. Remove the clevis pins which attach the right rear bank and both left–bank fuel rods to the injector control tube levers.

2. Loosen all of the adjusting screws and locknuts on both injector control tubes. Be sure all of the levers are free on the injector control tubes.

3. Move the speed control lever to the *maximum speed* position.

4. Move the stop lever to the *run* position and hold it in that position with a light finger pressure (Fig. 4). Tighten the adjusting screw of the No. 4R (16V) or No. 3R (12V) injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Tighten the screw approximately 1/8 of a turn more and lock securely with the adjusting screw locknut. This will place the No. 4R (16V) or No. 3R (12V) injector rack in the *full–fuel* position.

NOTICE: Overtightening of the injector rack control lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb.–in** (3–4 N•m).

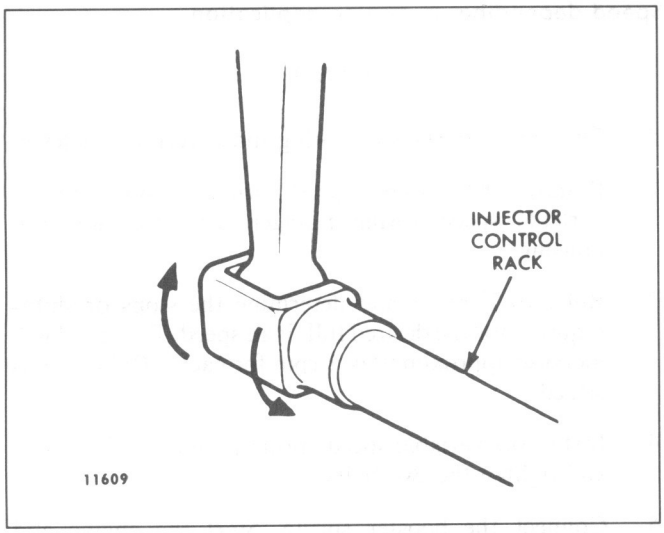


Fig. 5 – Checking Rotating Movement of Injector Control Rack

The above step should result in placing the governor linkage and control tube assembly in the same position that they will attain while the engine is running at full load.

5. To be sure of the proper rack adjustment, hold the stop lever in the *run* position and press down on the injector rack with a screwdriver or finger tip and note the "rotating" movement of the injector control rack when the stop lever is in the *run* position (Fig. 5). Hold the stop lever in the *run* position and, using a screwdriver, press downward on the injector control rack. The rack should tilt downward (Fig. 6) and, when the pressure of the screwdriver is released, the control rack should "spring" back upward.

   If the rack does not return to its *original* position, it is too loose. To correct this condition, loosen the locknut and turn the adjusting screw clockwise a slight amount and retighten the locknut.

   The setting is too tight if, when moving the stop lever from the stop to the *run* position, the injector rack becomes tight before the stop lever reaches the end of its travel. This will result in a step–up in effort required to move the stop lever to the end of its travel. To correct this condition, loosen the locknut and turn the adjusting screw counterclockwise a slight amount and retighten the locknut.

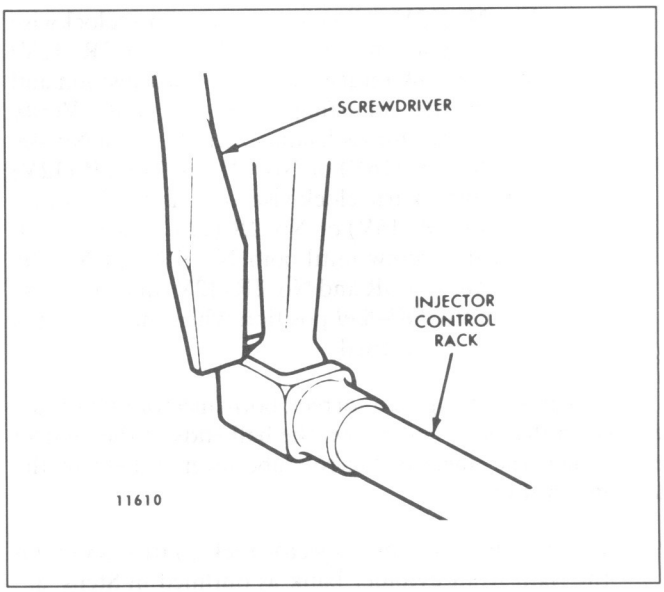


Fig. 6 – Checking Injector Control Rack "Spring"

6. Remove the fuel rod–to–control tube lever clevis pin from the right front bank fuel rod and install it on the right rear bank fuel rod and adjust the No. 5R (16V) or No. 4R (12V) injector rack as outlined in Steps 4 and 5.

7. Repeat Step 6 for adjustment of the No. 4L and 5L (16V) or No. 3L and 4L (12V) injector racks. When the settings are correct, the No. 4R, 5R, 4L and 5L (16V) or No. 3R, 4R, 3L and 4L (12V) injector racks will be snug on the ball end of the control levers when the injectors are in the *full–fuel* position.

8. With the fuel rod disconnected from the injector control tube lever, adjust the remaining injector rack control levers on the right front bank. Hold the No. 4R (16V) or No. 3R (12V) injector rack in the *full–fuel* position by means of the control tube lever and proceed as follows:

   a. Tighten the adjusting screw of the No. 3R (16V) or No. 2R (12V) injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Securely lock the adjusting screw locknut.

   NOTICE: Overtightening of the injector rack control lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb.–in** (3–4 N•m).

   b. Verify the injector rack adjustment of No. 4R (16V–92) or No. 3R (12V) as outlined in Step 5. If No. 4R (16V) or No. 3R (12V) does not "spring" back upward, turn the No. 3R (16V) or

No. 2R (12V) adjusting screw counterclockwise slightly until the No. 4R (16V) or No. 3R (12V) injector rack returns to its *full–fuel* position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 4R and No. 3R (16V) or No. 3R and No. 2R (12V) injectors. Turn clockwise or counterclockwise the No. 3R (16V) or No. 2R (12V) injector rack adjusting screw until both No. 4R and No. 3R (16V) or No. 3R and No. 2R (12V) injector racks are in the *full–fuel* position when the locknut is securely tightened.

When the settings are correct, both injector racks must respond in the same manner on the ball ends of the control levers when the injector control tube lever is held in the *full–fuel* position.

9. Position the remaining injector rack control levers on the right front cylinder bank as outlined in Steps 8.

10. Adjust the remaining injector rack control levers on the right rear, left front and left rear cylinder banks in the same manner as outlined in Steps 8 and 9.

11. Install the four fuel rod–to–control tube lever clevis pins and check the adjustment of the injector rack control levers.

CAUTION: Before starting an engine after an engine speed control adjustment or after removal of the engine governor cover and lever assembly, the technician must determine that the injector racks return to the no–fuel position when the governor stop lever is placed in the *stop* position. Engine overspeed will result if the injector racks cannot be positioned at no fuel with the governor stop lever. An overspeeding engine can result in engine damage which could cause personal injury.

12. Use new gaskets and reinstall the valve rocker covers.

Adjust Maximum No–Load Speed

All governors are properly adjusted before leaving the factory. However, if the governor has been reconditioned or replaced, and to ensure the engine speed will not exceed the recommended no–load speed as given on the engine option plate, set the maximum no–load speed as outlined below.

Start the engine and, after it reaches normal operating temperature, determine the maximum no–load speed of the engine with an accurate hand tachometer. Then, stop the engine and make the following adjustments, if required:

Full Load Speed*	Stops	Shims
1200 - 1750	2	Up to .325"
1750 - 2100	1	in Shims
2100 - 2300	0	Maximum

*No Load Speed is 150-225 rpm above Full-Load Speed depending on engine application.

TABLE 1

1. Disconnect the booster spring and governor stop lever.

2. Remove the variable speed spring housing and the variable speed spring plunger from the governor housing.

3. Refer to Table 1 and determine the stops or shims required for the desired full–load speed. The speed will increase approximatley 1 rpm for each .001" in shims added.

4. Install the variable speed spring plunger and housing and tighten the two bolts.

5. Connect the booster spring. Start the engine and recheck the maximum no–load speed.

6. If required, add or remove shims to obtain the desired full–load speed. If the maximum no–load speed is raised or lowered more than 50 rpm by the installation or removal of shims, recheck the governor gap. If readjustment of the governor gap is required, the position of the injector racks must be rechecked.

Governor stops are used to limit the compression of the governor spring, which determines the maximum speed of the engine.

Adjust Idle Speed

With the maximum no–load speed properly adjusted, adjust the idle speed as follows:

1. Place the speed control lever in the *idle* position and the stop lever in the *run* position.

2. With the engine running at normal operating temperature, back out the buffer screw to avoid contact with the differential lever.

3. Loosen the locknut and turn the idle speed adjusting screw until the engine is operating at approximately 15 rpm below the recommended idle speed (Fig. 7). The recommended idle speed is 550 RPM, but may vary with special engine applications.

4. Hold the idle speed adjusting screw from turning and tighten the locknut.

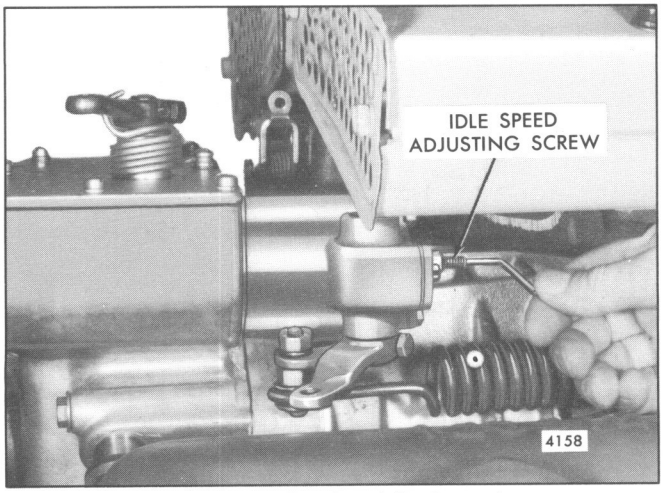


Fig. 7 – Adjusting Idle Speed

Adjust Buffer Screw

1. With the engine running at normal operating temperature, turn the buffer screw IN so it contacts the differential lever as lightly as possible and still eliminates engine roll (Fig. 8). Do not raise the idle speed more than 15 RPM with the buffer screw.
2. Hold the buffer screw from turning and tighten the locknut.

Adjust Booster Spring

With the idle speed adjusted, adjust the booster spring as follows:

1. Move the speed control lever to the *idle speed* position.
2. Refer to Fig. 9 and loosen the nut on the booster spring retaining bolt on the governor speed control lever. Loosen the locknuts on the eyebolt at the opposite end of the spring.
3. Move the bolt in the slot of the speed control lever until the center of the bolt is on or slightly over center (toward the *idle speed* position) of an imaginary line through the bolt, lever shaft and eyebolt. Hold the bolt from turning and tighten the locknut.
4. Start the engine and move the speed control lever to the *maximum speed* position and release it. The speed control lever should return to the *idle speed* position. If it does not, reduce the spring tension. If the lever does return to the *idle* position, increase the tension of the spring until the lever will not return to idle. Then, reduce the spring tension until the lever will return to idle and tighten the locknut on the eyebolt. This setting will result in a minimum force required to operate the speed control lever.
5. Connect the linkage to the governor levers.

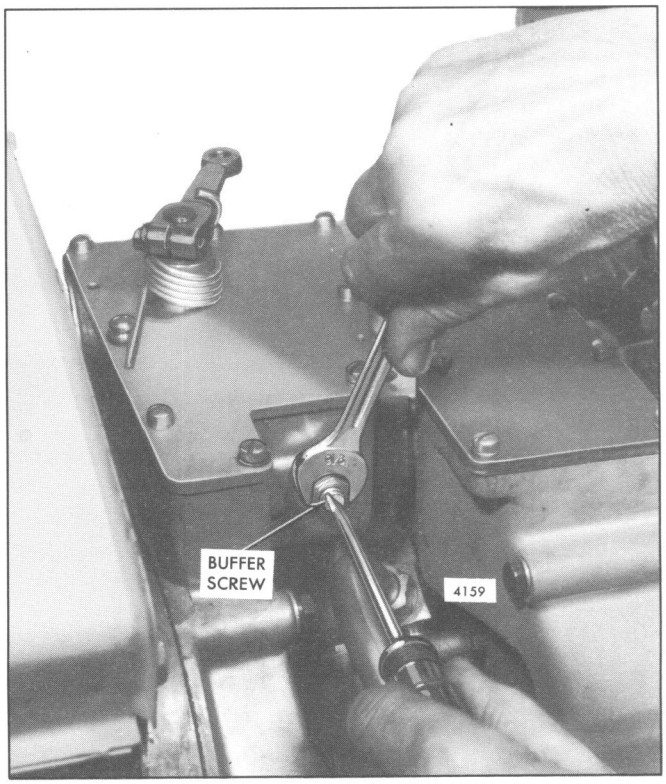


Fig. 8 – Adjusting Buffer Screw

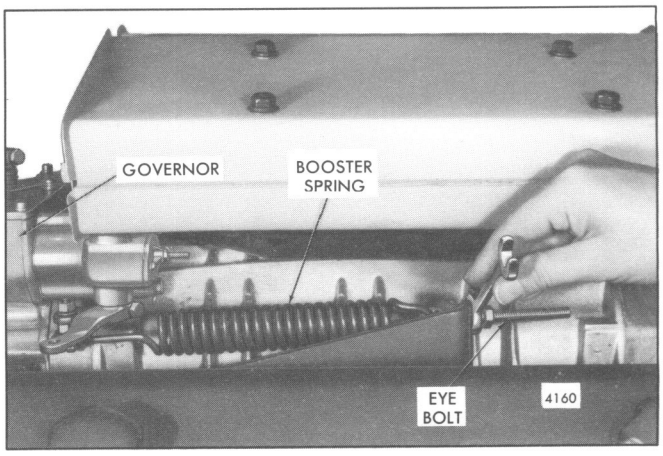


Fig. 9 – Adjusting Booster Spring

SG VARIABLE SPEED HYDRAULIC GOVERNOR

INJECTOR RACK CONTROL ADJUSTMENT (6V–92 AND 8V–92)

After adjusting the exhaust valves and timing the fuel injectors, adjust the governor linkage and position the injector rack control levers (Fig. 1).

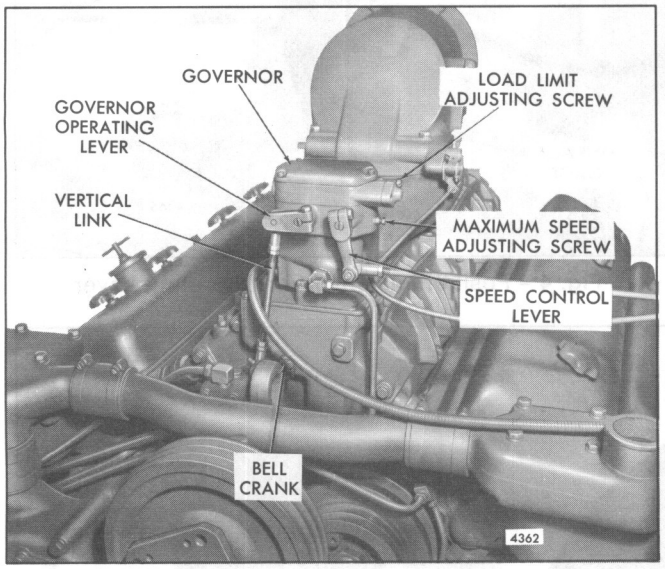


Fig. 1 – Hydraulic Governor Mounted on Engine

Position Injector Rack Control Levers and Adjust Governor Linkage

The position of the injector racks must be correctly set in relation to the governor. Their positions determine the amount of fuel injected into each cylinder and ensures equal distribution of the load.

1. Clean and remove the valve rocker cover from each cylinder head. Discard the gaskets.
2. Loosen all the adjusting screws and locknuts. Be sure all control levers are free on the control tubes.
3. Disconnect the vertical link assembly from the governor operating lever and the bell crank.
4. Loosen the bolt and slide the governor operating lever from the serrated shaft.
5. Place the bolt (removed from the lower end of the vertical link) through the bell crank and into the recessed hole in the drive housing (Fig. 2).
6. Adjust the No. 1R injector rack by tightening the adjusting screw until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted (Fig. 2). Tighten the screw approximately 1/8 of a turn more and lock securely with the adjusting screw locknut. This will place the No. 1R injector rack in the *full–fuel* position.

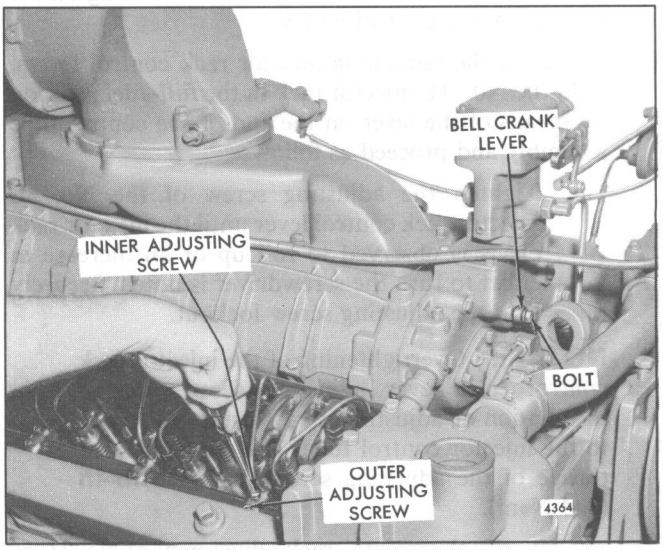


Fig. 2 – Positioning No. 1R Injector Rack Control Lever

NOTICE: Care should be taken to avoid setting the racks too tight causing the fuel rod to bend.

7. To be sure the rack control lever is properly adjusted, press down on the injector rack with a screwdriver or finger tip (Fig. 3). A light pressure should cause the rack to rotate. The rack is sufficiently tight if the rack returns or "springs" back to its *original* position when the pressure is removed. The rack is too tight if a heavy pressure is required to rotate the rack.

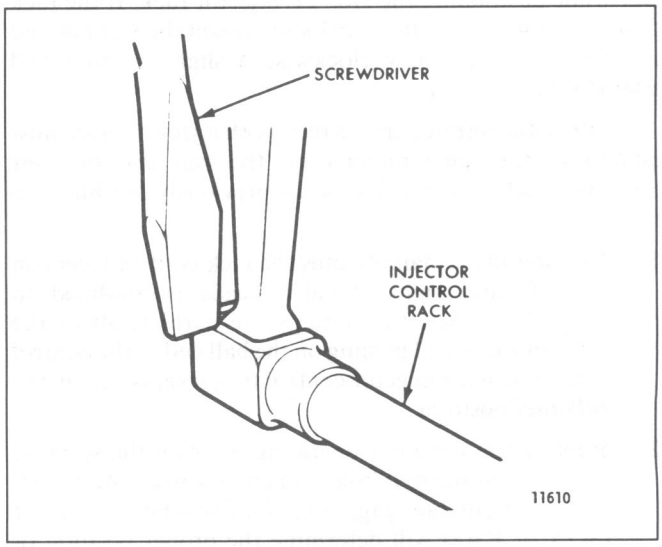


Fig. 3 – Checking Injector Rack "Spring"

8. Adjust the No. 1L injector rack control lever as outlined in Steps 6 and 7.

9. Check the adjustment on the No. 1R and 1L injector rack control lever. If the setting is correct, the injector racks will be in the *full–fuel* position and snug on the ball end of the control levers.

10. To adjust the remaining injector rack control levers, hold the No. 1L injector rack in the *full–fuel* position by means of the lever on the end of the control tube assembly and proceed as follows:

    a. Tighten the adjusting screw of the No. 2L injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Securely lock the adjusting screw locknut.

    NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

    b. Verify the injector rack adjustment of No. 1L as outlined in Step 7. If No. 1L does not "spring" back upward, turn the No. 2L adjusting screw counterclockwise slightly until the No. 1L injector rack returns to its *full–fuel* position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 1L and No. 2L injectors. Turn clockwise or counterclockwise the No. 2L injector rack adjusting screw until both No. 1L and No. 2L injector racks are in the *full–fuel* position when the locknut is securely tightened.

Recheck the No. 1L injector rack to be sure that it has remained snug on the ball end of the injector rack control lever while positioning the No. 2L injector rack. If the rack of No. 1L injector has become loose, loosen the locknut and turn the adjusting screw clockwise a slight amount and retighten the lcoknut.

When the settings are correct, both injector racks must respond in the same manner on the ball end of their respective rack control levers as previously outlined in Step 7.

11. Position the remaining injector rack control levers on the left and right cylinder heads as outlined in Step 10b. When the settings are correct, all of the injector racks will be snug on the ball end of the control levers when the injector control tube lever is held in the *full–fuel* position.

12. Replace the governor operating lever on the serrated shaft so that the bolt hole is lined up within the proper lines on the linkage gage (Fig. 4). The type of governor (SGX or PSG) will determine the proper position of the lever.

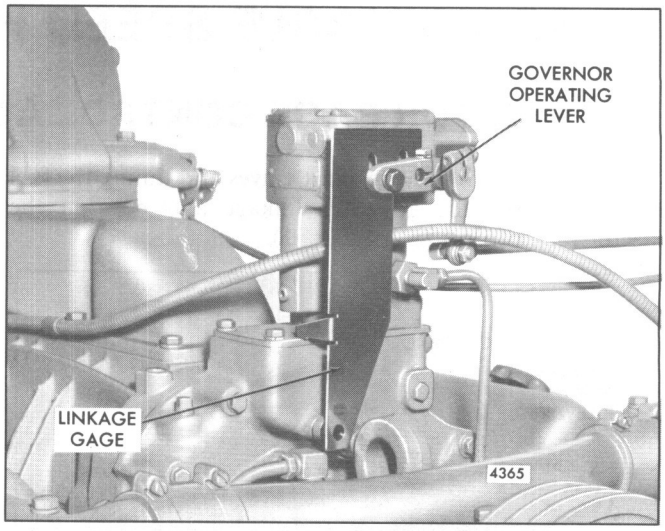


Fig. 4 – Positioning Governor Operating Lever

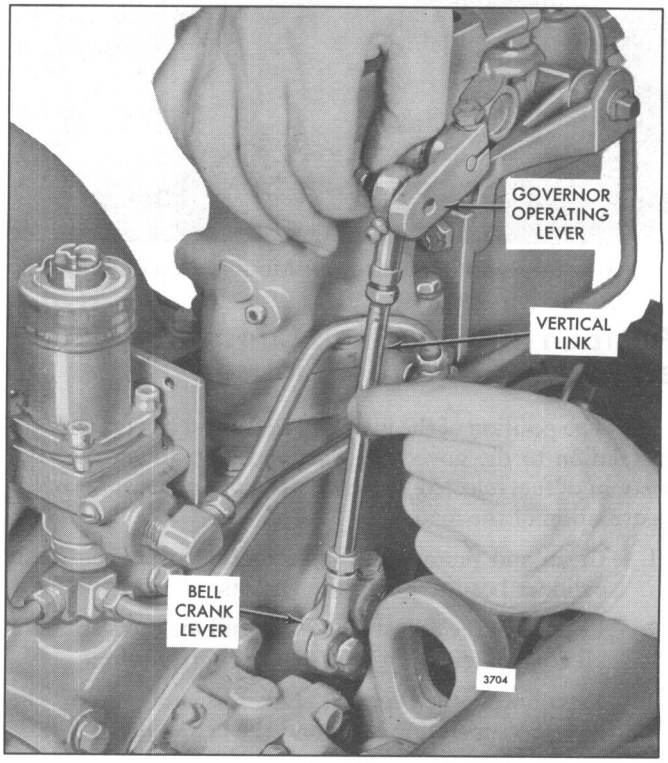


Fig. 5 – Adjusting Vertical Link

13. Remove the gage.

14. Move the bell crank lever to the *no–fuel* position.

15. Adjust the length of the vertical link so that the bolt holes of the levers and the centers of the rod end bearings are lined up (Fig. 5).

16. Replace the two bolts in the levers and tighten the bolts.

17. Remove the governor cover.

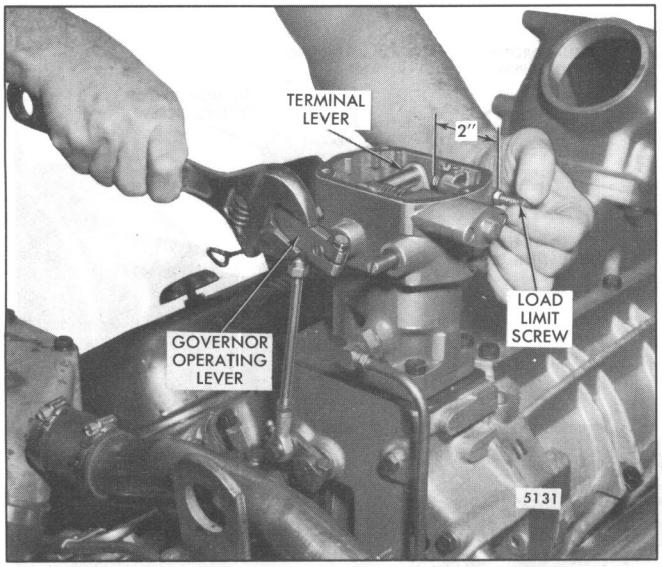


Fig. 6 – Adjusting Load Limit Screw

18. With the load limit screw backed all the way out, retain the governor operating lever in the *full–fuel* position. The governor terminal lever should touch the boss in the governor housing (Fig. 6). Adjust the vertical link so that all of the injector racks are in the *full–fuel* position, then tighten the rod end lock nuts securely.

19. Use a new gasket and reinstall a valve rocker cover on each cylinder head.

Adjust Load Limit

The load limit is set at the factory and further adjustment should be unnecessary. However, if the governor has had major repairs or the injector rack control levers have been repositioned, the load limit screw should be readjusted. With the injector rack control levers properly adjusted, the load limit may be set as follows:

1. Loosen the load limit screw locknut and adjust the load limit screw to obtain a distance of approximately 2" from the outside face of the boss on the governor subcap to the end of the screw. Then, place and retain the governor operating lever in the *full–fuel* position (Fig. 6). Do not overstress the linkage.

2. Turn the load limit adjusting screw until a .020" space exists between the fuel rod collar and the terminal lever. If the adjustment cannot be made with a feeler gage, turn the load limit adjusting screw (with the locknut tight enough to eliminate slack in the threads) inward until the injector racks just loosen on the ball end of the control levers.

3. Release the governor operating lever and hold the adjusting screw while tightening the locknut. Then, install the governor cover and tighten the screws.

Compensation Needle Valve Adjustment (PSG Governor)

Start the engine and, after the engine reaches normal operating temperature, adjust the governor compensation needle valve (without load on the engine) as follows:

1. Open the compensation needle valve (Fig. 10) two or three turns and allow the engine to "hunt" or "surge" for about one–half (1/2) minute to bleed any air which may be trapped in the governor oil passages.

2. Gradually close the valve until the "hunting" just stops. Check the amount of valve opening by closing the valve completely and noting the number of turns required to close it. Open the valve to the previously determined position at which the "hunting" stopped. Test the action of the governor by manually disturbing the engine speed. The engine should return promptly to the original steady speed with only a small overshoot. The correct valve setting will be between 1/8 and 1/2 turn open. Closing the valve farther than necessary will make the governor slow in returning the engine to normal speed after a load change.

Adjust Governor Speed Droop

INTERNAL DROOP ADJUSTMENT

The purpose of adjusting the speed droop is to establish a definite engine speed at no load with a given speed at rated full load.

The governor speed droop is set at the factory and further adjustment should be unnecessary. However, if the governor has been overhauled, the speed droop must be readjusted.

The best method of determining the engine speed is by using an accurate hand tachometer.

If a full rated load can be established on the unit, and the fuel rods, injector rack control levers and the load limit have been adjusted, set the speed droop as follows:

1. Start the engine and run it at approximately one–half the rated no–load speed until the lubricating oil temperature stabilizes. When the engine lubricating oil is cold, the governor regulation may be erratic. Regulation will become increasingly stable as the temperature of the oil increases.

2. Stop the engine and remove the governor cover.

3. Loosen the lock nut and back off the maximum speed adjusting screw approximately 5/8".

4. Loosen the screw and move the bracket so that the screw is midway between the ends of the slot in the bracket. Tighten the screw (Fig. 7).

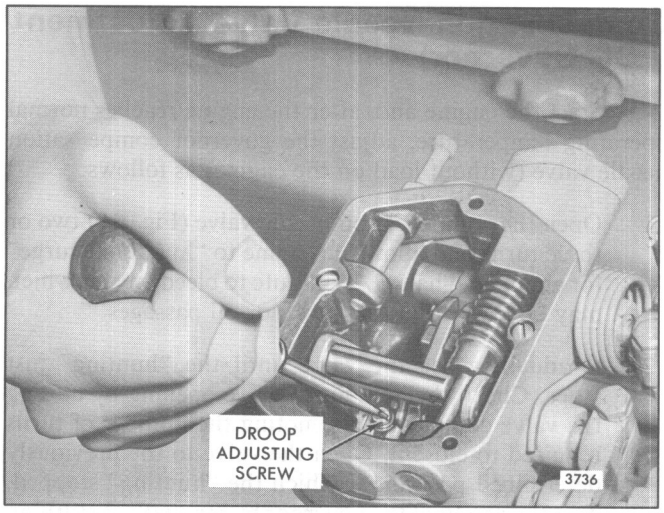


Fig. 7 – Adjusting Speed Droop

5. With the throttle in the *run* position, adjust the engine speed until the engine is operating at 3 to 5% above the recommended full–load speed.
6. Apply the full rated load on the engine and readjust the engine speed to the correct full–load speed.
7. Remove the rated load and note the engine speed after the speed stabilizes under no load. If the speed droop is correct, the engine speed will be approximately 3 to 5% higher than the full–load speed.

If the speed droop is too high, stop the engine, loosen the droop adjusting screw and move the adjusting bracket *in* toward the center of the governor. Tighten the screw. To increase the speed droop, move the bracket *out*, away from the center of the governor.

The speed droop in governors which control engines driving generators in parallel must be identical, otherwise the electrical load will not be equally divided.

Adjust the speed droop bracket in each governor to obtain the desired variation between engine no–load and full–load speeds. The recommended speed droop for generator sets operating in parallel is 50 rpm (2–1/2 cycles) for units operating at 1,000 and 1,200 rpm, and 75 rpm (2–1/2 cycles) for units operating at 1,500 and 1,800 rpm (Table 1). However, this speed droop recommendation may be varied to suit the individual application. Install the governor cover.

Full Load	No Load
50 cycles, 1000 rpm	52.5 cycles, 1050 rpm
60 cycles, 1200 rpm	62.5 cycles, 1250 rpm
50 cycles, 1500 rpm	52.5 cycles, 1575 rpm
60 cycles, 1800 rpm	62.5 cycles, 1875 rpm

TABLE 1

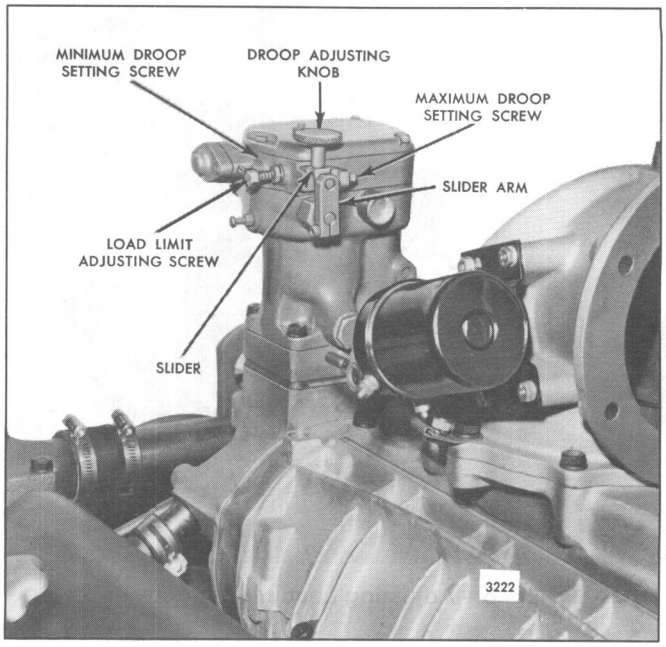


Fig. 8 – External Droop Control on PSG Isochronous Governor

EXTERNAL DROOP CONTROL

Some PSG type governors are equipped with an external adjustable droop control (Fig. 8). This permits the speed droop to be adjusted without removing the governor cover. With this feature, a unit can be paralleled with another unit that is operating at constant frequency (zero droop). The incoming unit must have its droop bracket set in the *maximum* position while it is being paralleled and while operating in parallel. When it is desired to stop the unit operating at constant frequency, shift the load to the incoming unit and move the governor droop bracket to zero droop. Then adjust the outgoing unit to maximum droop, remove it from the line and stop the engine. The incoming unit will now be carrying the load and operating at constant frequency (zero droop).

Adjust the governor speed droop as follows:

1. Start the engine and run it at approximately one–half of the rated full–load speed until the lubricating oil temperature stabilizes.
2. Remove the load from the engine.
3. Back off the compensation needle valve to release any air that may be trapped in the system. Turn the needle valve in slowly to reduce governor "hunting". The correct needle valve setting will be between 1/8 and 1/2 turn open.
4. Back out the minimum and maximum droop setting screws.
5. Loosen the droop adjusting knob and move the slide all the way in toward the center of the governor. Then tighten the knob.

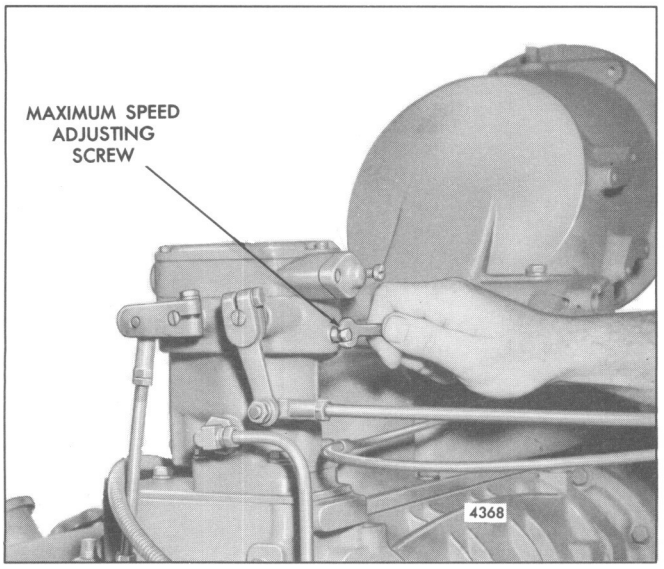


Fig. 9 – Adjusting Maximum No–Load Engine Speed

6. Loosen the locknut on the maximum speed adjusting screw and turn the screw out until 5/8" of the threads are exposed (Fig. 9).

7. With the engine operating at the recommended full–load speed, apply the full rated load and recheck the engine speed. If required, readjust the engine to full–load speed.

8. Remove the load and note the engine speed. If the zero droop setting is correct, the engine speed will remain constant. If the engine speed is higher, loosen the droop adjusting knob and set the slider to a *reduced droop* position.

9. When the desired minimum droop setting is reached, loosen the locknut and turn the minimum droop setting screw inward until it contacts the droop linkage within the governor. This will be felt by a step up of resistance while turning the adjusting screw. Lock the adjusting screw in this position.

10. Loosen the droop adjusting knob and slide the droop bracket in a direction to increase the droop. Perform Steps 7 and 8 to check the droop until the desired maximum speed droop is attained.

11. When the desired maximum droop setting is reached, loosen the locknut and turn the maximum droop setting screw inward until it contacts the droop slider arm. Lock the adjusting screw in this position.

12. Recheck the minimum and maximum droop setting as outlined in Steps 7 and 8 and adjust the adjustment screws, if necessary, until the correct settings are obtained.

Adjust Maximum No–Load Speed

With the speed droop properly adjusted, set the maximum no–load speed as follows:

1. With the engine operating at no load, adjust the speed until the engine is operating at approximately 8% higher than the rated full–load speed.

2. Turn the maximum speed adjusting screw (Fig. 9) in until the screw contacts the throttle linkage internally, limiting the maximum speed of the engine at 8% above the rated full load speed.

3. Hold the screw and tighten the lock nut.

Governors With Synchronizing Motor

Some hydraulic governors are equipped with a reversible electric synchronizing motor mounted on the governor cover (Fig. 10).

The adjustments on a governor equipped with a synchronizing motor are the same as on a governor without the motor. However, the governor cover and motor assembly must be removed when setting the engine speed droop (except on a governor equipped with an external droop adjustment). The cover and motor must be reinstalled to check the speed droop.

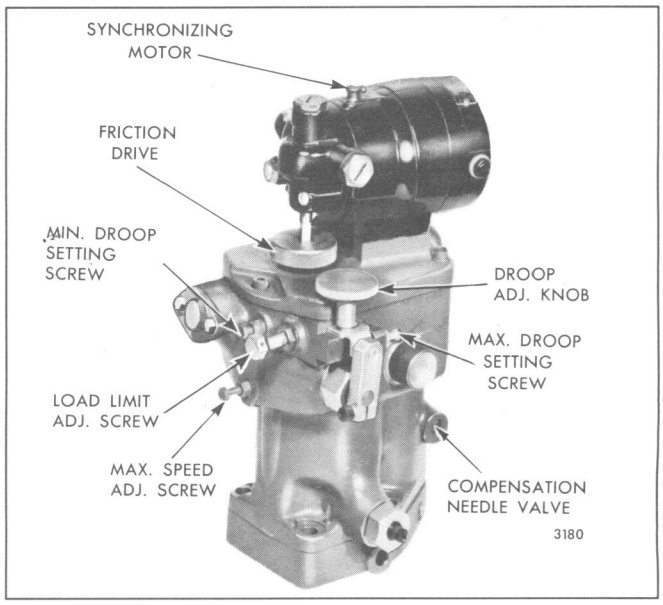


Fig. 10 – Typical Synchronizing Motor Mounting

SG VARIABLE SPEED HYDRAULIC GOVERNOR

INJECTOR RACK CONTROL ADJUSTMENT (12V AND16V)

The governor on the 12V and 16V engine is mounted on and driven from the front end of the rear blower (Fig. 1). The governor–to–injector control tube linkage is shown in Fig. 2.

After adjusting the exhaust valves and timing the fuel injectors, adjust the governor linkage and position the injector rack control levers.

Position Injector Rack Control Levers and Adjust Governor Linkage

The position of the injector racks must be correctly set in relation to the governor. Their positions determine the amount of fuel injected into each cylinder and ensures equal distribution of the load

1. Clean and remove the valve rocker cover from each cylinder head. Discard the gaskets.
2. Loosen all the adjusting screws and locknuts. Be sure all control levers are free on the control tubes.
3. Disconnect the vertical link assembly from the governor operating lever and the bell crank (Fig. 2).
4. Loosen the bolt and slide the governor operating lever from the serrated shaft.
5. Place the bolt (removed from the lower end of the vertical link) through the bell crank and into the recessed hole in the governor drive housing (Fig. 3).

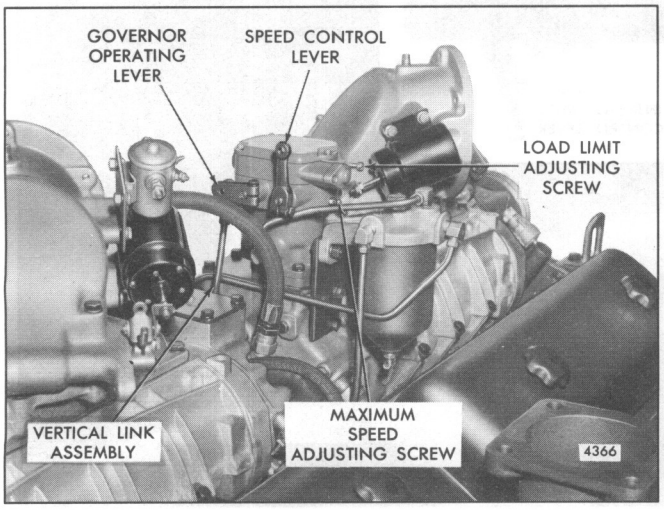


Fig. 1 – Hydraulic Governor Mounting

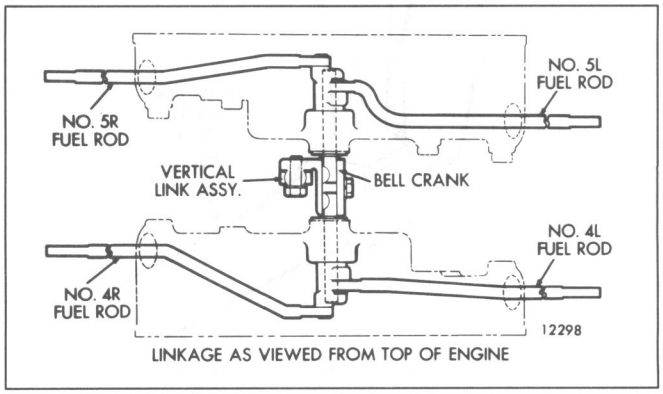


Fig. 2 – Governor to Injector Rack Control Linkage

6. Adjust the No. 4R (16V) or No. 3R (12V) injector rack by tightening the adjusting screw until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted (Fig. 5). Tighten the screw approximately 1/8 of a turn more and lock securely with the adjusting screw locknut. This will place the No. 4R (16V) or No. 3R (12V) injector rack in the *full–fuel* position.

NOTICE: Care should be taken to avoid setting the racks too tight causing the fuel rod to bend.

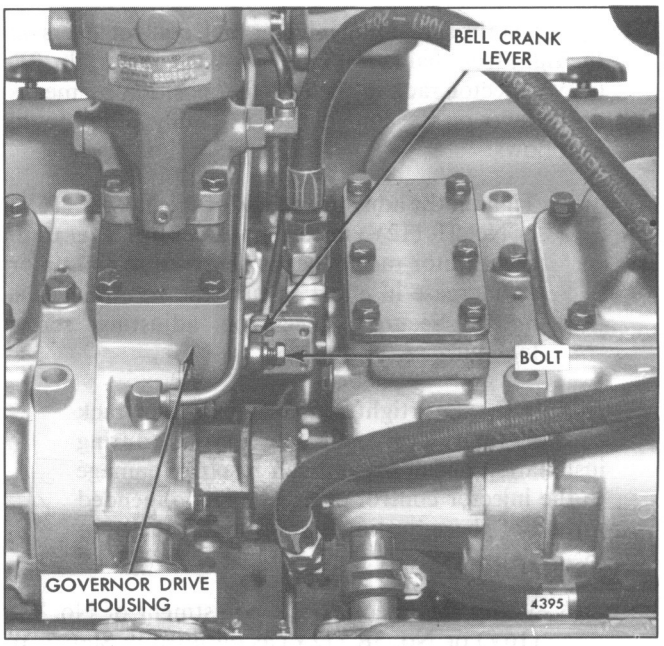


Fig. 3 – Positioning Bolt through Bell Crank Lever

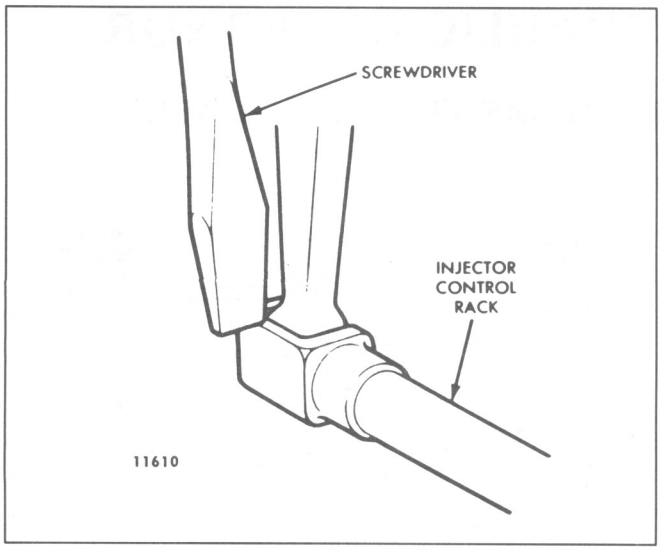


Fig. 4 – Checking Injector Rack "Spring"

7. To be sure the rack control lever is properly adjusted, press down on the injector rack with a screw driver or finger tip (Fig. 4). A light pressure should cause the rack to rotate. The rack is sufficiently tight if the rack returns ("springs" back) to its *original* position when the pressure is removed. The rack is too tight if a heavy pressure is required to rotate the rack.

8. Adjust the No. 5R, 4L and 5L (16V) or No. 4R, 3L and 4L (12V) injector rack control levers as outlined in Steps 6 and 7. when the settings are correct, all four of the injector racks will be snug on the ball end of the control levers when the injectors are in the *full–fuel* position.

9. To adjust the remaining injector rack control levers on the right front bank, hold the No. 4R (16V) or No. 2R (12V) injector rack in the *full–fuel* position by means of the lever on the control tube assembly and proceed as follows:

   a. Tighten the adjusting screw of the No. 3R (16V) or No. 2R (12V) injector rack control lever until the injector rack clevis is observed to roll up or an increase in effort to turn the screwdriver is noted. Securely lock the adjusting screw locknut.

   NOTICE: Overtightening of the injector rack control tube lever adjusting screws during installation or adjustment can result in damage to the injector control tube. The recommended torque of the adjusting screws is 24–36 **lb–in** (3–4 N•m).

   b. Verify the injector rack adjustment of No. 4R (16V) or No. 3R (12V) as outlined in Step 7. If No. 4R (16V) or No. 3R (12V) does not "spring" back upward, turn the No. 3R (16V) or No. 2R (12V) adjusting screw counterclockwise slightly until the No. 4R (16V) or No. 3R (12V) injector rack returns to its *full–fuel* position and secure the adjusting screw locknut. Verify proper injector rack adjustment for both No. 4R and No. 3R (16V) or No. 3R and No. 2R (12V) injectors. Turn clockwise or counterclockwise the No. 3R (16V) or No. 2R (12V) injector rack adjusting screw until both No. 4R and No. 3R (16V) or No. 3R and No. 2R (12V) injector racks are in the *full–fuel* position when the locknut is securely tightened.

Recheck the No. 4R (16V) or No. 3R (12V) injector rack to be sure that it has remained snug on the ball end of the injector rack control lever. If the rack of No. 4R (16V) or No. 3R (12V) injector has become loose, lossen the locknut and turn the adjusting screw clockwise a slight amount and retighten the locknut.

When the settings are correct, both injector racks must respond in the same manner on the ball ends of their respective rack control levers as previously outlined in Step 7.

10. Position the remaining injector rack control levers on the right front cylinder head as outlined in Step 9b. When the settings are correct, all of the injector racks will be snug on the ball end of the control levers when the injector control tube lever is held in the *full–fuel* position.

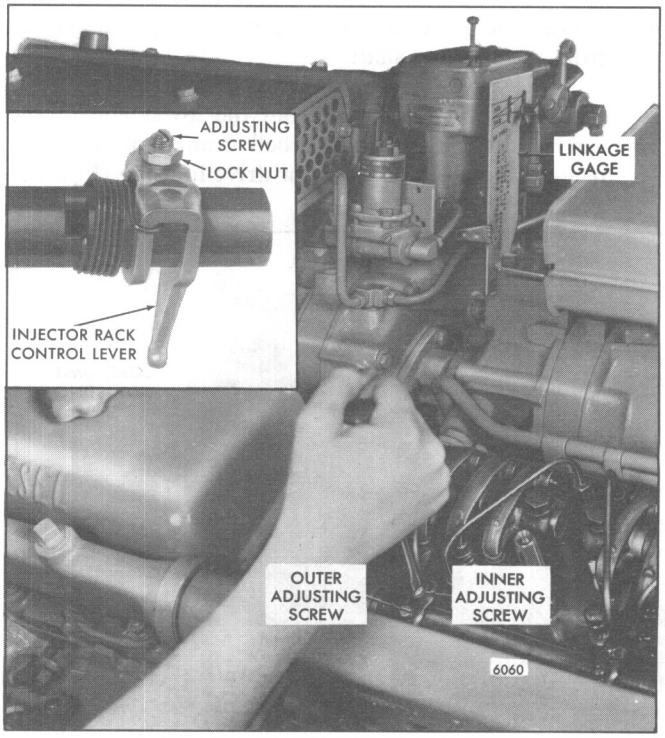


Fig. 5 – Positioning No. 4R Injector Rack Control Lever

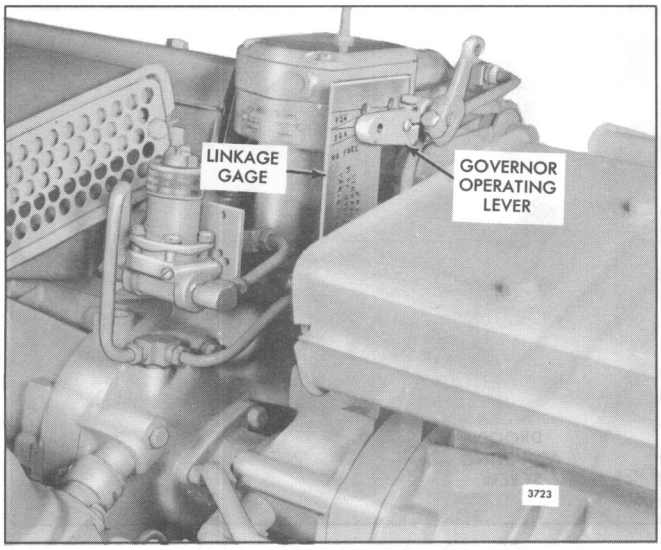


Fig. 6 – Positioning Governor Operating Lever

11. Adjust the remaining injector rack control levers on the right rear, left front and left rear cylinder heads in the same manner as outlined in Steps 9 and 10.

12. Replace the governor operating lever on the serrated shaft so that the bolt hole is lined up within the proper lines on the gage. The type of governor (SGX or PSG) will determine the proper position of the lever (Fig. 6).

13. Remove the gage.

14. Move the bell crank lever to the *no–fuel* position.

15. Adjust the length of the vertical link so that the bolt holes of the levers and the centers of the rod end bearings are lined up (Fig. 7).

16. Replace the two bolts in the levers and tighten the bolts.

17. Remove the governor cover.

18. With the load limit screw backed all the way out, retain the governor operating lever in the *full–fuel* position. The governor terminal lever should touch the boss on the governor housing. Adjust the vertical link so that all the injector racks are in the *full–fuel* position, then tighten the rod end locknuts securely.

19. Use a new gasket and install the valve rocker cover on each cylinder head.

Adjust Load Limit

The load limit is set at the factory and further adjustment should be unnecessary. However, if the governor has had major repairs or the injector rack control levers have been repositioned, the load limit screw should be readjusted.

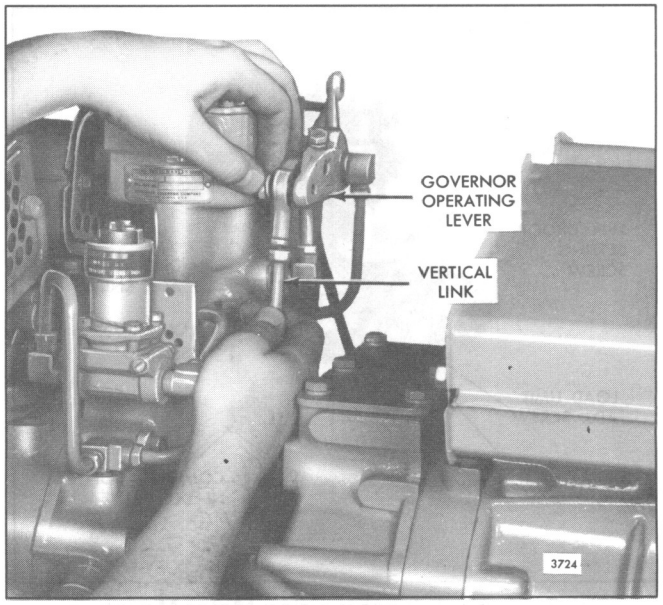


Fig. 7 – Adjusting Vertical Link

With the injector rack control levers properly adjusted, set the load limit as follows:

1. With the governor cover off and the load limit screw locknut loosened, place and retain the governor operating lever in the *full–fuel* position (Fig. 8). Do not overstress the linkage.

2. Turn the load limit adjusting screw in until the injector racks just loosen on the ball end of the control levers.

3. Release the governor operating lever and hold the adjusting screw while tightening the locknut. Install the governor cover and tighten the screws.

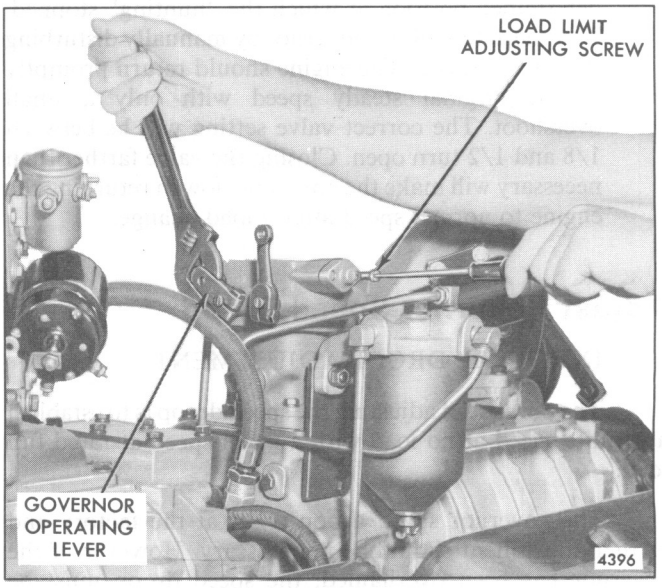


Fig. 8 – Adjusting Load Limit Screw

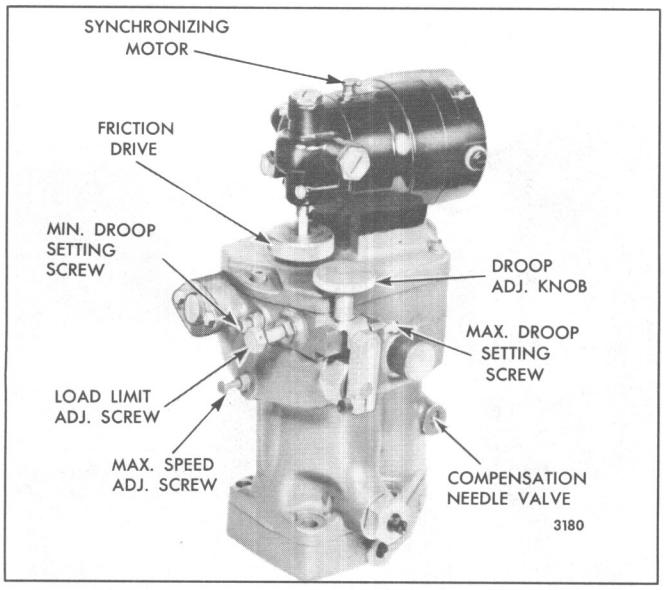


Fig. 9 – Typical Synchronizing Motor Mounting

Compensation Needle Valve Adjustment (PSG Governor)

Start the engine and, after the engine reaches normal operating temperature, adjust the governor compensation needle valve, without load on the engine, as follows:

1. Open the valve (Fig. 9) two or three turns and allow the engine to "hunt" or "surge" for about one–half minute to bleed any air which may be trapped in the governor oil passages.
2. Gradually close the valve until the "hunting" just stops. Check the amount of valve opening by closing the valve completely and noting the number of turns required to close it. Open the valve to the previously determined position at which the "hunting" stopped. Test the action of the governor by manually disturbing the engine speed. The engine should return promptly to the original steady speed with only a small overshoot. The correct valve setting will be between 1/8 and 1/2 turn open. Closing the valve farther than necessary will make the governor slow in returning the engine to normal speed after a load change.

Adjust Governor Speed Droop

INTERNAL DROOP ADJUSTMENT

The purpose of adjusting the speed droop is to establish a definite speed at no load with a given speed at rated full load.

The governor speed droop is set at the factory and further adjustment should be unnecessary. However, if the governor has been overhauled, the speed droop must be readjusted.

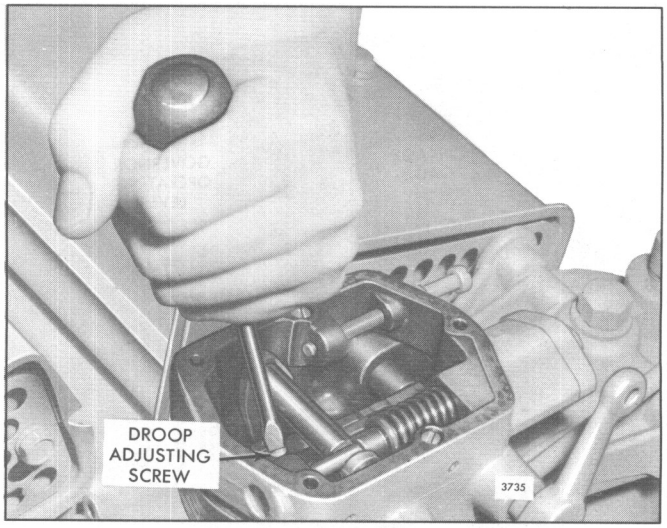


Fig. 10 – Adjusting Speed Droop

The best method of determining the engine speed is by using an accurate hand tachometer.

If a full rated load can be established on the unit, and the fuel rods, injector rack control levers and the load limit have been adjusted, set the speed droop as follows:

1. Start the engine and run it at approximately one–half the rated no–load speed until the lubricating oil temperature stabilizes. When the engine lubricating oil is cold, the governor regulation may be erratic. Regulation will become increasingly stable as the temperature of the oil increases.
2. Stop the engine and remove the governor cover.
3. Loosen the lock nut and back off the maximum speed adjusting screw approximately 5/8".
4. Loosen the droop adjusting screw (Fig. 10). Move the droop bracket so that the screw is midway between the ends of the slot in the bracket. Tighten the screw.
5. With the throttle in the *run* position, adjust the engine speed until the engine is operating at 3 to 5% above the recommended full–load speed.
6. Apply the full rated load on the engine and readjust the engine speed to the correct full–load speed.

Full Load	No Load
50 cycles, 1000 rpm	52.5 cycles, 1050 rpm
60 cycles, 1200 rpm	62.5 cycles, 1250 rpm
50 cycles, 1500 rpm	52.5 cycles, 1575 rpm
60 cycles, 1800 rpm	62.5 cycles, 1875 rpm

TABLE 2

7. Remove the rated load and note the engine speed after the speed stabilizes under no load. If the speed droop is correct, the engine speed will be approximately 3 to 5% higher than the full–load speed.

If the speed droop is too high, stop the engine, loosen the droop adjusting screw and move the adjusting bracket IN toward the center of the governor. Tighten the screw. To increase the speed droop, move the bracket OUT, away from the center of the governor.

The speed droop in governors which control engines driving generators in parallel must be identical, otherwise the electrical load will not be equally divided.

Adjust the speed droop bracket in each governor to obtain the desired variation between engine no–load and full–load speeds. The recommended speed droop for generator sets operating in parallel is 50 rpm (2–1/2 cycles) for units operating at 1,000 and 1,200 rpm, and 75 rpm (2–1/2 cycles) for units operating at 1,500 and 1,800 rpm (Table 2). However, this speed droop recommendation may be varied to suit the individual application.

EXTERNAL DROOP CONTROL

Some PSG type governors are equipped with an external adjustable droop control (Fig. 9). This permits the speed droop to be adjusted without removing the governor cover. With this feature, a unit can be paralleled with another unit that is operating at constant frequency (zero droop). The incoming unit must have its droop bracket set in the *maximum* position while it is being paralleled and while operating in parallel. When it is desired to stop the unit operating at constant frequency, shift the load to the incoming unit and move the governor droop bracket to zero droop. Then adjust the outgoing unit to maximum droop, remove it from the line and stop the engine. The incoming unit will now be carrying the load and operating at constant frequency (zero droop).

Adjust the governor speed droop as follows:

1. Start the engine and run it at approximately one–half of the rated full–load speed until the lubricating oil temperature stabilizes.
2. Remove the load from the engine.
3. Back off the compensation needle valve to release any air that may be trapped in the system. Turn the needle valve in slowly to reduce governor "hunting". The correct needle valve setting will be between 1/8 and 1/2 turn open.
4. Back out the minimum and maximum droop setting screws.
5. Loosen the droop adjusting knob and move the slider all the way in toward the center of the governor (Fig. 8). Then, tighten the knob.
6. Loosen the locknut on the maximum speed adjusting screw and turn the screw out until 5/8" of the threads are exposed.
7. With the engine operating at the recommended full–load speed, apply the full rated load and recheck the engine speed. If required, readjust the engine to full–load speed.
8. Remove the load and note the engine speed. If the zero droop setting is correct, the engine speed will remain constant. If the engine speed is higher, loosen the droop adjusting knob and set the slider to a *reduced droop* position.
9. When the desired minimum droop setting is reached, loosen the locknut and turn the minimum droop setting screw in until it contacts the droop linkage within the governor. This will be felt by a step up or resistance while turning the adjusting screw. Lock the adjusting screw in this position.
10. Loosen the droop adjusting knob and slide the droop bracket in a direction to increase the droop. Perform Steps 7 and 8 to check the droop until the desired maximum speed droop is attained.
11. When the desired maximum droop setting is reached, loosen the locknut and turn the maximum droop setting screw inward until it contacts the droop slider arm. Lock the adjusting screw in this position.
12. Recheck the minimum and maximum droop setting as outlined in Steps 7 and 8 and adjust the adjustment screws, if necessary, until the correct settings are obtained.

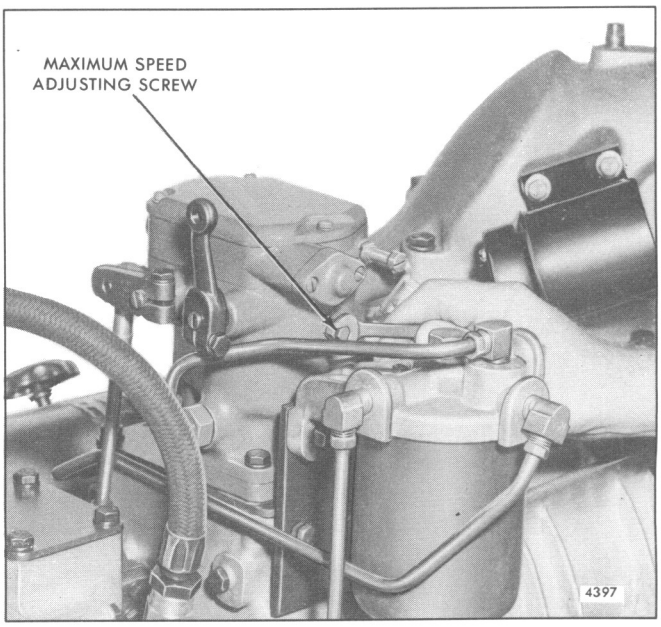


Fig. 11 – Adjusting Maximum No–Load Engine Speed

Adjust Maximum No–Load Speed

With the speed droop properly adjusted, set the maximum no–load speed as follows:

1. With the engine operating at no–load, adjust the speed until the engine is operating at approximately 8% higher than the rated full–load speed.
2. Turn the maximum speed adjusting screw (Fig. 11) in until the screw contacts the throttle linkage internally, limiting the maximum speed of the engine at 8% above the rated full load speed.
3. Hold the screw and tighten the lock nut.

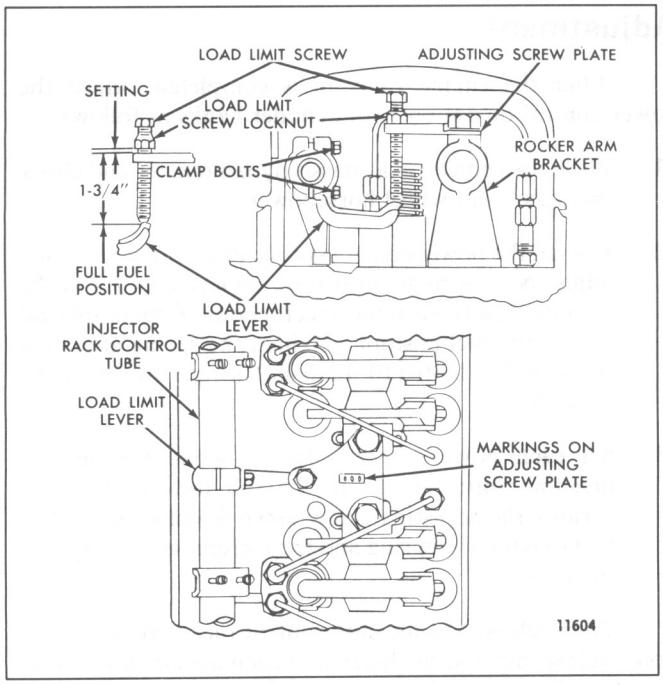
Governors With Synchronizing Motor

Some hydraulic governors are equipped with a reversible electric synchronizing motor mounted on the governor cover (Fig. 9).

The adjustments on a governor equipped with a synchronizing motor are the same as on a governor without the motor. However, the governor cover and motor assembly must be removed when setting the engine speed droop (except on a governor equipped with the external droop adjustment). The cover and motor must be reinstalled to check the speed droop.

SUPPLEMENTARY GOVERNING DEVICE ADJUSTMENT

ENGINE LOAD LIMIT DEVICE



1 – Engine Load Limit Device

Engines with mechanical governors may be equipped with a load limit device to reduce the maximum horsepower (Fig. 1).

This device consists of a load limit screw threaded into a plate mounted between two adjacent rocker arm shaft brackets and a load limit lever clamped to the injector control tube.

The load limit device is located between the No. 1 and No. 2 cylinders on *each* cylinder bank of a 6V engine and between the No. 2 and No. 3 cylinders on *each* cylinder bank of an 8V engine. On the 12V and 16V engines, four load limit devices are used (one on each cylinder head). The load limit device is located between the No. 1 and No. 2 cylinders and between the No. 4 and No. 5 cylinders (12V engines) or between the No. 2 and No. 3 cylinders and between the No. 6 and No. 7 cylinders (16V engines) on each cylinder bank.

When properly adjusted for the maximum horsepower desired, this device limits the travel of the injector control racks and thereby the fuel output of the injectors.

Adjustment

After the engine tune–up is completed, make sure the load limit devices are properly installed as shown in Fig. 1. Make sure the counterbores in the adjusting screw plates are up. The rocker arm shaft bracket bolts which fasten the adjusting screw plate to the brackets are tightened to 75–85 lb–ft (102–115 N•m) torque. All other rocker arm shaft bracket bolts are tightened to 90–100 lb–ft (122–136 N•m) torque. Then adjust the load limit device, on each cylinder head, as follows:

1. Loosen the load limit screw locknut and remove the screw.
2. Loosen the load limit lever clamp bolts so the lever is free to turn on the injector rack control tube.
3. With the screw out of the plate, lock the load limit screw locknut so the bottom of the nut is 1 3/4" from the bottom of the load limit screw for the initial setting (Fig. 1).
4. Thread the load limit screw into the adjusting screw plate until the lock nut *bottoms* against the top of the plate.
5. Hold the injector rack control tube in the full–fuel position and place the load limit lever against the bottom of the load limit screw. Then tighten the load limit lever clamp bolts.
6. Check to ensure that the injector racks will just go into the full–fuel position — readjust the load limit lever, if necessary.
7. Hold the load limit screw to keep it from turning, then *set* the locknut until the distance between the bottom of the locknut and the top of the adjusting screw plate corresponds to the dimension (or number of turns) stamped on the plate.

   NOTICE: If the plate is not stamped, adjust the load limit screw while operating the engine on a dynamometer test stand and note the number of turns required to obtain the desired horsepower. Then stamp the plate accordingly.
8. Thread the load limit screw into the plate until the locknut *bottoms* against the top of the plate. Be sure the nut turns with the screw.
9. Hold the load limit screw to keep it from turning, then tighten the locknut to secure the setting.

POWER CONTROL DEVICE

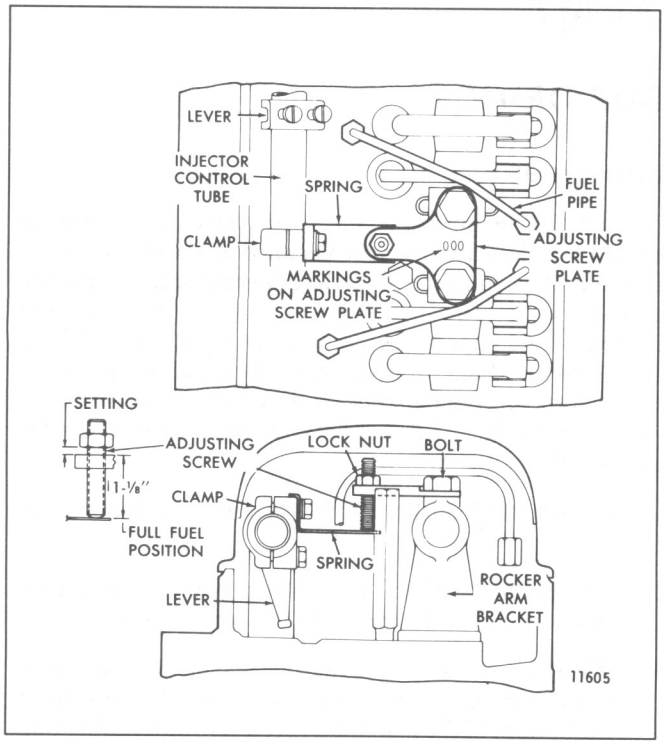


Fig. 2 – Power Control Device

The power control (torque limiting) device (Fig. 2) is used on some vehicle engines to limit the maximum horsepower output at the wheels without diminishing the performance at lower speeds where full power may be required. It limits the horsepower at, or just below, the normal full–load governed speed. These limiting characteristics are proportionately lessened as the engine speed is reduced and the horsepower required is reduced.

This device, one on each cylinder bank, consists of an adjusting screw threaded into a plate mounted between two adjacent rocker arm shaft brackets and a spring attached to a clamp on the injector control tube.

NOTICE: The rocker arm shaft bolts that retain the adjusting screw plates are tightened to 75–85 lb–ft (102–115 N•m) torque; all other rocker arm shaft bracket bolts are tightened to 90–100 lb–ft (122–136 N•m) torque.

The power control device is located between the No. 1 and No. 2 cylinders on *each* cylinder bank of a 6V engine, between the No. 2 and No. 3 cylinders on *each* cylinder bank of an 8V engine.

Adjustment

After the engine tune–up is completed, adjust the power control device on both cylinder banks as follows:

1. Place the vehicle on a chassis dynamometer and check the maximum wheel horsepower.

2. Loosen the power control spring attaching bolts. Then adjust both springs until they project parallel to the cylinder heads when the injector control racks are held in the full–fuel position. Tighten the spring attaching bolts to 7–9 lb–ft (10–12 N•m) torque to retain the adjustment.

3. Set each power control device, while holding the injector control racks in the full–fuel position, by turning the adjusting screw down (clockwise) until it just touches the spring and the locknut is tight against the plate.

Then release the injector control racks. Wipe the oil from each spring and the bottom of each adjusting screw so the point of contact can be seen readily.

NOTICE: Steps 2 and 3 must be completed on both cylinder banks before proceeding with Step 4.

4. Start the engine. Then, with the engine running at full governed speed, check the horsepower. If necessary, readjust the screws to obtain the specified horsepower. Turn the screws down to decrease the horsepower; turn the screws up to increase the horsepower. When the desired wheel horsepower is obtained, hold the screws from turning and tighten the locknuts.

NOTICE: If a dynamometer is not available, back up the locknuts the distance stamped on the plates. Then turn the screws and locknuts down together until the locknuts *bottom* on the plates. Hold the screws from turning and tighten the locknuts.

THROTTLE DELAY MECHANISM

The throttle delay mechanism is used in turbocharged engines to retard full–fuel injection when the engine is accelerated. This reduces exhaust smoke and also helps to improve fuel economy.

The throttle delay mechanism is installed between the No. 1 and No. 2 cylinders on the right bank cylinder head (Fig. 3).

It consists of a special rocker arm shaft bracket (which incorporates the throttle delay cylinder), a piston, throttle delay lever, connecting link, orifice plug, ball check valve and U–bolt.

A throttle delay bracket with two 1/4" fill holes and a 30–40" water restriction check valve is used in some 6V–92TA Coach engines. All tilt Coach engine models and some upright models use this throttle delay.

A yield link replaces the standard operating lever connecting link in the governor.

Operation

Oil is supplied to a reservoir above the throttle delay cylinder through an oil supply fitting in the drilled oil passage in the rocker arm shaft bracket (Fig. 3). As the injector racks are moved toward the no–fuel position, free movement of the throttle delay piston is assured by air drawn into the cylinder through the ball check valve. Further movement of the piston uncovers an opening which permits oil from the reservoir to enter the cylinder and displace the air. When the engine is accelerated, movement of the injector racks toward the full–fuel position is momentarily retarded while the piston expels the oil from the cylinder through an orifice. To permit full accelerator travel, regardless of the retarded injector rack position, a spring loaded yield link replaces the standard operating lever connecting link in the governor.

Inspection

The current throttle delay bracket has a closer tolerance on the piston and cylinder bore. The current piston link pin hole is offset below the piston centerline and has a larger pin boss diameter. The current piston link has two tabs to ensure that the piston is installed with the piston pin hole offset down. The current piston and link must be used together to ensure correct positioning of the piston. The current check valve has a nylon check ball in place of the former brass ball. When inspecting the throttle delay hydraulic cylinder, it is important that the check valve be inspected for wear.

To inspect the check valve, fill the throttle delay cylinder with diesel fuel oil and watch for check valve leakage while moving the engine throttle from the idle position to the *full–fuel* position. If more than a drop of leakage occurs, replace the check valve.

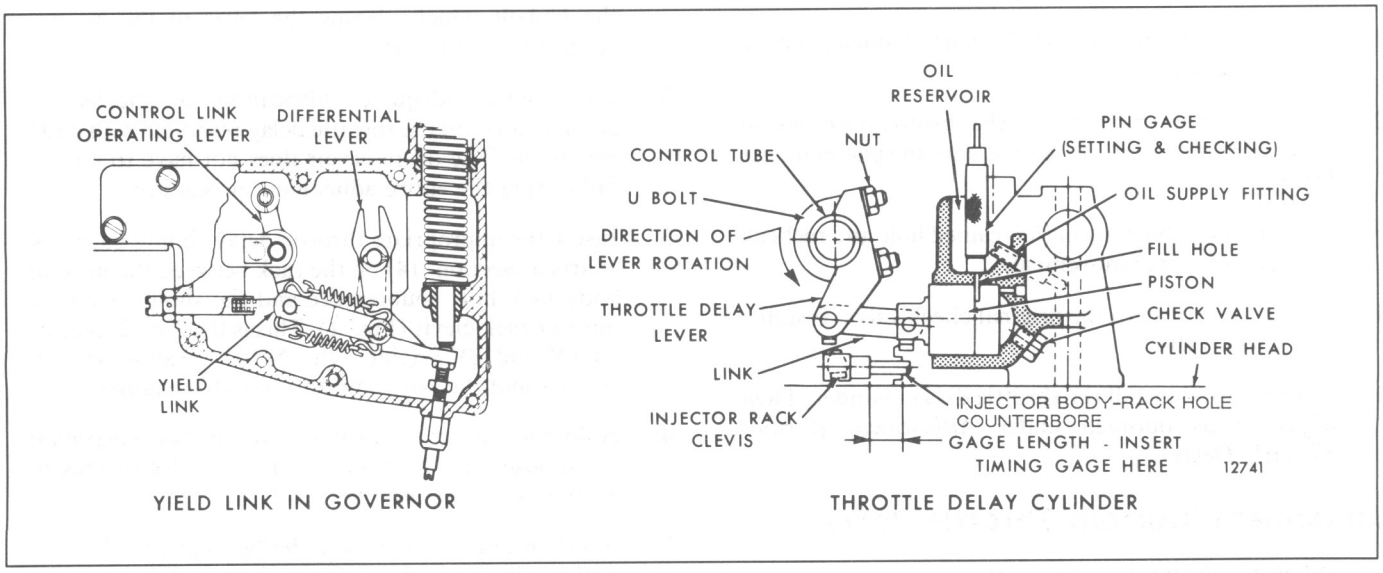


Fig. 3 – Throttle Delay Cylinder and Yield Link

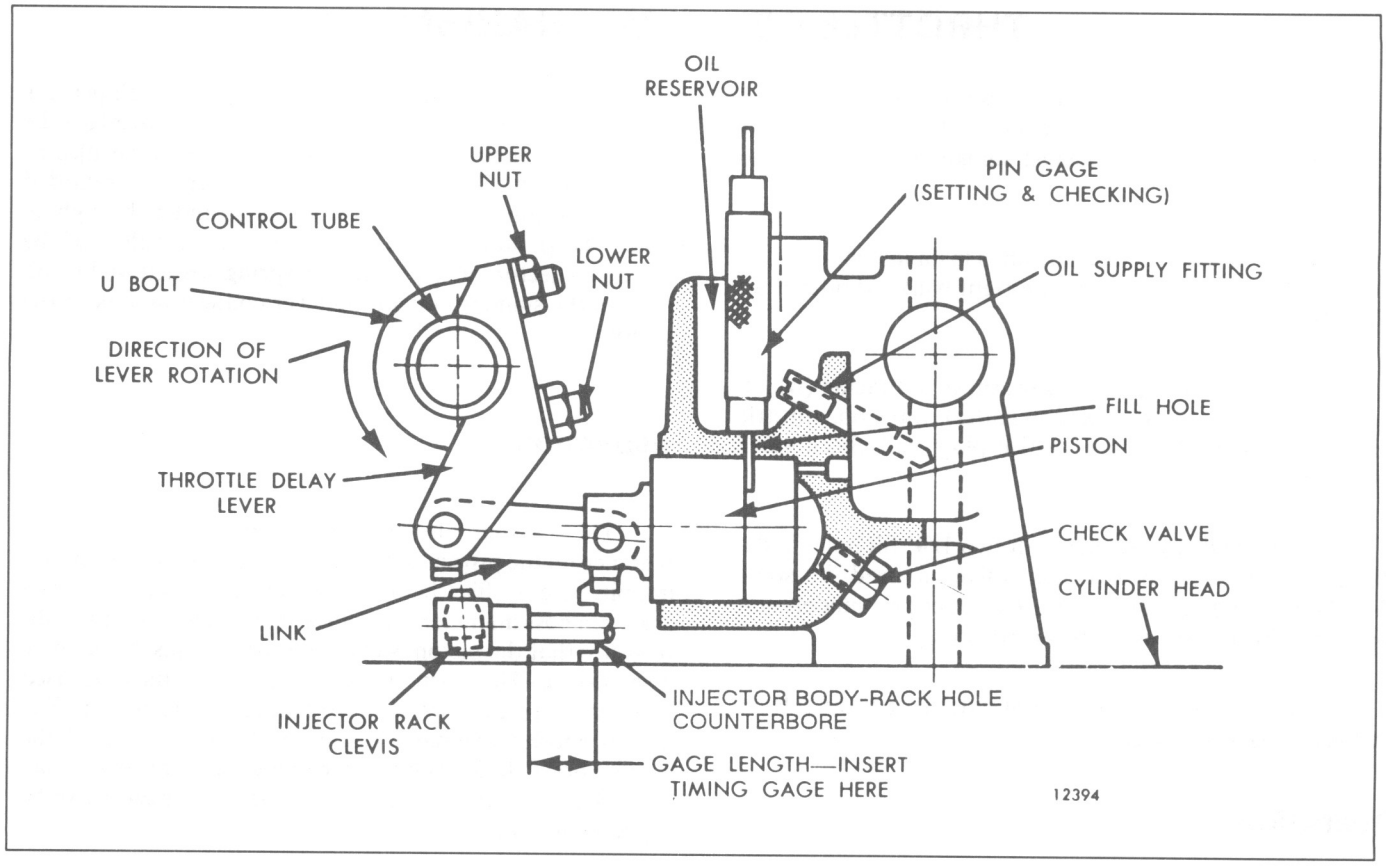


Fig. 4 – Adjusting Throttle Delay Cylinder (Current)

Service Note

The current throttle delay cylinder rocker arm bracket has a 5/64" diameter fill hole. The former throttle delay cylinder with a 1/4" diameter fill hole can be modified as follows:

1. Ream the fill hole to .2646"–.2666" diameter with a 17/64" reamer.
2. Remove any burrs formed in the throttle delay piston bore with fine emery cloth to be sure the piston moves freely.
3. Press a service bushing in the reamed hole and recheck the piston for free movement.
4. Remove and discard the original check valve. Install a new check valve.
5. Assemble and install the throttle delay cylinder. Then adjust it as outlined under *Adjustment (former Throttle Delay).*

Adjustment (Current Throttle Delay)

Whenever the injector rack control levers are adjusted, disconnect the throttle delay mechanism by loosening the U–bolt which clamps the lever to the injector control tube. After the injector rack control levers have been positioned, the throttle delay mechanism must be readjusted. With the engine stopped, proceed as follows:

1. Disconnect the throttle delay mechanism by loosening the U–bolt which clamps the lever to the injector control tube (Fig. 4).
2. To provide adequate lubrication of mechanical components, fill the throttle delay reservoir with clean engine oil. The oil reservoir does not have to remain full during the entire adjustment procedure.
3. Insert the appropriate throttle delay timing gage (see charts in Section 14) on the rack between the injector body rack hole counterbore and the shoulder on the injector rack clevis (Fig. 1). This is the No. 2 injector on 6V and 8V engines, the No. 5 injector on 12V engines and the No. 6 injector on 16V engines.
4. Hold the governor throttle lever in the *maximum speed* position. This should cause the injector rack to move toward the *full–fuel* position.
5. Insert pin gage J 25558 with the "go" (green .069") end in the cylinder fill hole. If the throttle delay housing has multiple holes, use the hole indicated in Fig. 5.

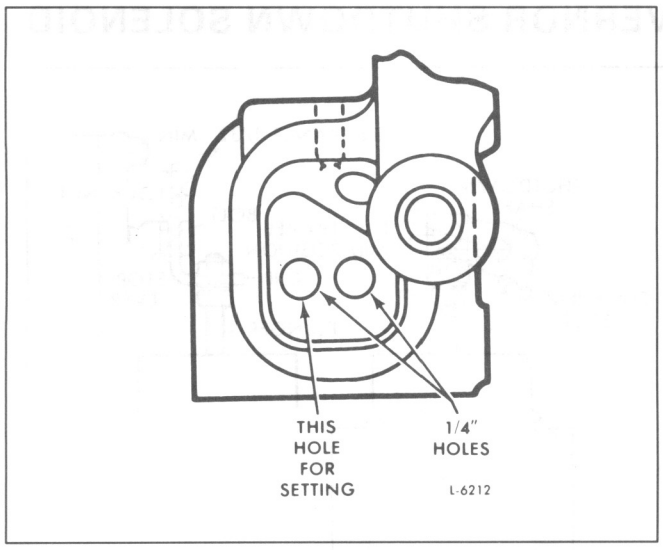


Fig. 5 – Throttle Delay with Multiple Fill Holes

6. Rotate the throttle delay lever in the direction shown in Fig. 4 until further movement is limited by the piston contacting the pin gage.

7. Tighten the U–bolt while exerting a slight pressure on the lever in the direction of rotation.

8. Check the setting, as follows:

   a. Remove the pin gage.

   b. Reinsert the "go" (green .069") end of the gage in the fill hole. If the gage will not go past the piston without resistance, increase the torque on the lower U–bolt nut. Remove the gage.

   c. Reverse the pin gage and attempt to insert the "no go" (red .072") end in the fill hole. If the "no go" end of the gage enters the fill hole past the piston without resistance, increase the torque on the upper U–bolt nut. It should not be possible to insert the gage past the piston without moving the injector racks toward the *no–fuel* position.

9. Release the governor throttle lever and remove the timing gage and pin gage. If either U–bolt nut is tightened without the pin gage being inserted, recheck the setting.

10. Move the injector control tube assembly between the *no–fuel* and the *full–fuel* position to make sure there is no bind.

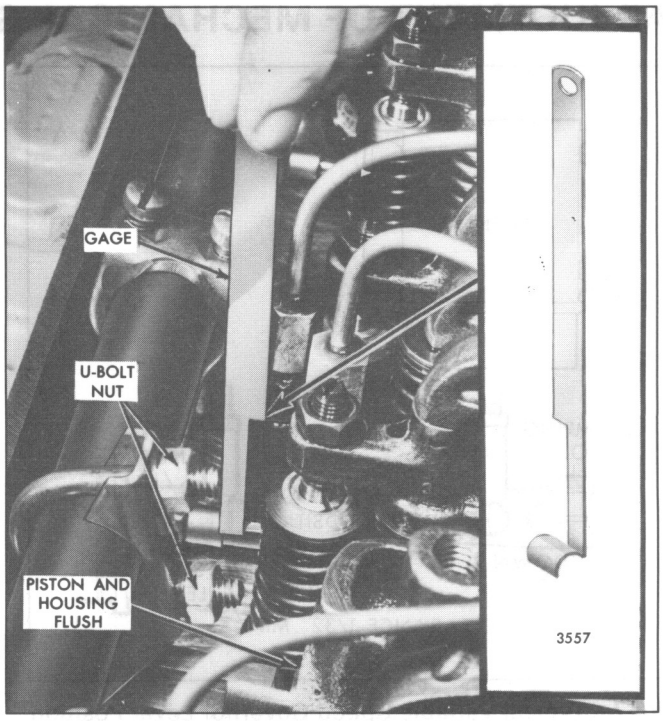


Fig. 6 – Adjusting Throttle Delay Cylinder (Former)

Adjustment (Former Throttle Delay)

Whenever the injector rack control levers are adjusted, disconnect the throttle delay mechanism by loosening the U–bolt which clamps the lever to the injector control tube. After the injector rack control levers have been positioned, the throttle delay mechanism must be readjusted. With the engine stopped, proceed as follows:

1. Refer to Fig. 6 and insert gage J 23190 (.454" setting) between the injector body and the shoulder on the injector rack. Then exert a light pressure on the injector control tube in the direction of full fuel.

2. Align the throttle delay piston so it is flush with the edge of the throttle delay cylinder.

3. Tighten the U–bolt on the injector control tube and remove the gage.

4. Move the injector rack from the no–fuel to the full–fuel position to make sure it does not bind.

ADJUSTMENT OF MECHANICAL GOVERNOR SHUTDOWN SOLENOID

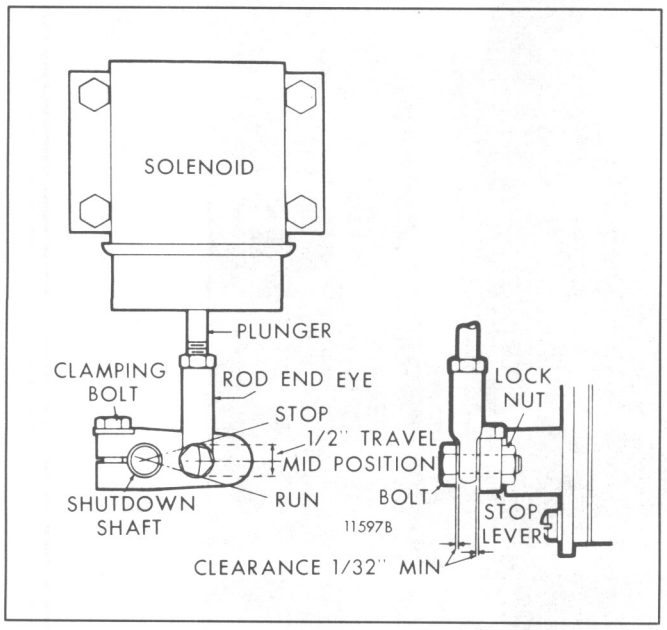


Fig. 7 – Typical Variable Speed Governor Lever Position

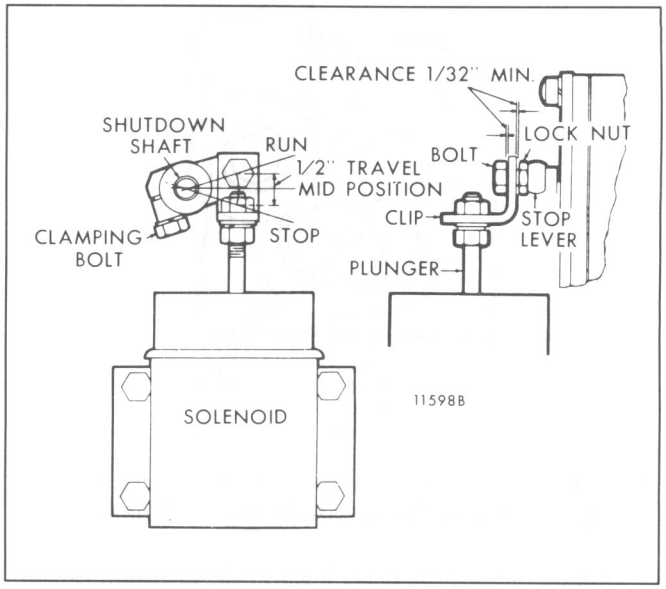


Fig. 8 – Typical Limiting Speed Governor Lever Position

When a governor shutdown solenoid is used on an engine equipped with a mechanical governor, the governor stop lever must be properly adjusted to match the shutdown solenoid plunger travel.

The solenoid plunger can be properly aligned to the governor stop lever as follows:

1. Remove the bolt connecting the rod end eye (variable speed governor) or the right angle clip (limiting speed governor) to the stop lever (Figs. 7 and 8). Align and clamp the lever to the shutdown shaft in such a way that, at its mid–travel position, it is perpendicular to the solenoid plunger. This assures that the linkage will travel as straight as possible. The solenoid plunger has available 1/2" travel which is more than adequate to move the injector control racks from the full–fuel to the complete no–fuel position and shut down will occur prior to attaining complete travel.

2. With the stop lever in the *run* position, adjust the rod end eye or right angle clip for minimum engagement on the solenoid plunger when the connecting bolt is installed. The oversize hole in the eye or clip will thereby permit the solenoid to start closing the air gap, with a resultant build–up of pull–in force prior to initiating stop lever movement.

3. The bolt through the rod end eye or the right angle clip should be locked to the stop lever and adjusted to a height that will permit the eye or clip to float vertically. The clearance above and below the eye or clip and the bolt head should be approximately 1/32" minimum.

   NOTICE: The locknut can be either on top of or below the stop lever.

4. Move the lever to the *stop* position and observe the plunger for any possible bind. If necessary, loosen the mounting bolts and realign the solenoid to provide free plunger motion.

FUEL MODULATOR

The fuel modulator is mounted on the left–bank cylinder head between the No. 3 and No. 4 cylinders on 8V engines and and consists of a cast housing containing a cylinder, piston, cam and spring (Fig. 9). The modulator mechanism is installed on the left bank between the No. 2 and No. 3 cylinders on 6V engines. A lever and roller assembly which controls the injector rack is connected to the injector control tube. An air supply line runs from the turbocharger discharge on the air inlet housing to the modulator housing, providing pressure to activate the piston.

The fuel modulator maintains the proper fuel–to–air ratio in the lower speed ranges where the mechanical governor would normally act to provide maximum injector output. It operates in such a manner that, although the engine throttle may be moved into the full–fuel position, the injector racks cannot advance to the full–fuel position until the turbine speed is high enough to provide sufficient air for combustion.

The modulator tells the fuel system the maximum amount of fuel the engine can efficiently use based on turbocharger boost pressure. Increased pressure forces the piston and cam out of the cylinder, allowing the rack to move toward full fuel. The spring behind the piston is calibrated to the pressure characteristics of the engine.

Effective with engine serial number 8VF–077480, a fuel modulator is available on Federal and California certified 8V–92TA (turbocharged–aftercooled) vehicle engines rated at 355 horsepower at 1800 rpm.

NOTICE: Effective with unit number 6VF154264, the turbochargers and blower bypass valves on marine engine models 8062–3404 and 8062–7404 were changed to improve fuel combustion efficiency and reduce smoke levels at high rpm. Fuel modulators on these engines must be set at .454" for optimum performance.

Inspection

At major repair or overhaul, inspect the roller and piston outer diameter and the cylinder bore inner diameter for wear. Also, inspect the operating surfaces – the lever roller, the roller pins at the cam pivot and the cam attachment to the piston. Replace parts, as required.

For optimum operating efficiency, the engine fuel modulator *must* be checked periodically and reset if required.

Checking and resetting the fuel modulator:

- Ensures that the engine emission-related adjustments comply with EPA requirements.
- Ensures a regulated fuel/air ratio to prevent overfueling and smoke.
- Ensures smooth, free operation of the fuel modulator and linkage.
- Ensures proper adjustment of the modulator to DDC factory specifications, thereby eliminating any previously made incorrect adjustment.

Check Fuel Modulator Setting

To check the fuel modulator setting, proceed as follows:

1. With the engine stopped, insert the correct rack gage between the injector body rack recess and the shoulder on the injector rack (Fig. 10). Use the injector next to and forward of the fuel modulator assembly. Insert the gage so that the handle is at a 45 degree angle. Fuel modulator specifications and setting tools are as follows:

TOOL	SETTING
J 9509–C	.404"
J 33156	.465"
J 34080	.480"
J 33157	.490"
J 24889	.345"
J 23190	.454"
J 24882	.385"
J 35735	.430"

NOTICE: Rack gages are marked with the tool number and specific dimensions. Dimensional tolerances are ± .002".

2. Hold the governor speed control lever in the *maximum speed* position and the run/stop lever in the *run* position.
3. Insert a .005" feeler gage between the modulator roller and cam (Figs. 9 & 11). The rack gage *must* fall over. The rack gage should stand at a 45 degree angle by itself when the .005" feeler gage is removed.

Adjust Fuel Modulator

Before the fuel injector rack control levers are adjusted, the fuel modulator lever and roller assembly must be positioned free of cam contact. This is done by loosening the clamp screw.

After the injector rack control levers have been properly positioned, adjust the modulator, as follows:

1. With the engine stopped, insert the correct rack gage between the injector body rack recess and the shoulder on the injector rack (Fig. 10). Use the injector next to and forward of the fuel modulator assembly. Insert the gage so that the handle is at a 45 degree angle.

2. Hold the governor speed control lever in the maximum speed position and the run/stop lever in the *run* position. *The rack gage must stand up while being held in place by the rack.*

3. With clamp loose, push the air box fuel modulator lever assembly until the roller contacts the cam with sufficient force to take up the roller and cam pin clearances. Insert a 3/8" x 3" x .017" feeler gage between the cam and the roller (see Figs. 9 & 11). Make sure the cam is centered, and tighten the clamp screw until the gage falls. Replace the .017" thick feeler gage with a .004" thick gage and tighten the screw further until the gage falls again.

4. While holding the governor lever in the maximum speed position, check the setting by verifying that the rack gage stands at a 45 degree angle by itself. Then, insert a .005" feeler gage between the modulator roller and cam. If the rack gage falls, the setting is correct.

5. Remove the gage.

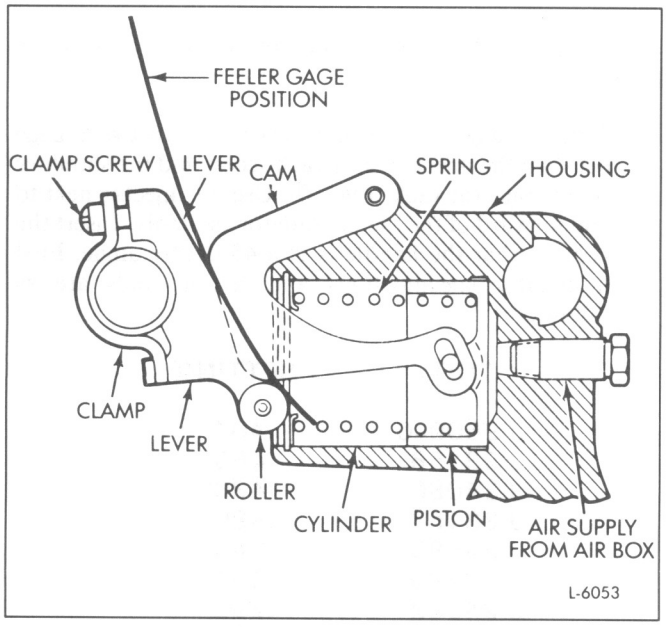


Fig. 9 – Fuel Modulator Assembly

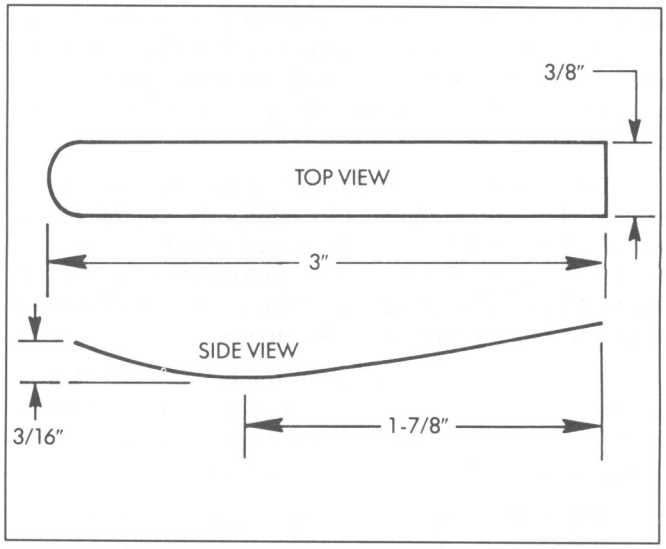


Fig. 11 – Rework of .017" and .004" Feeler Gage Stock

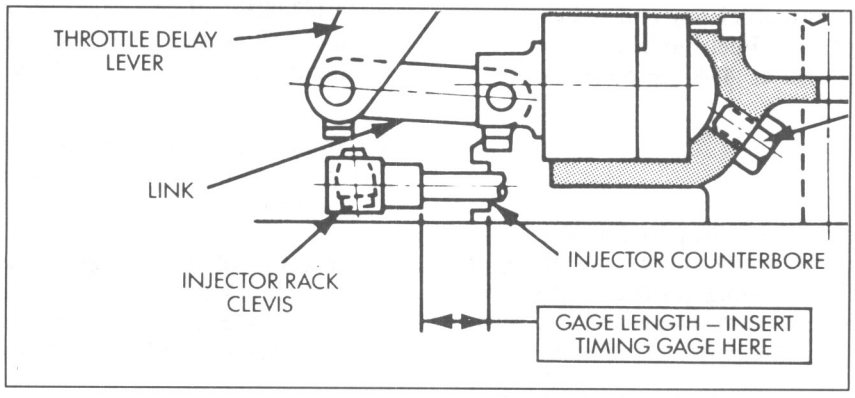


Fig. 10 – Rack Gage Position

