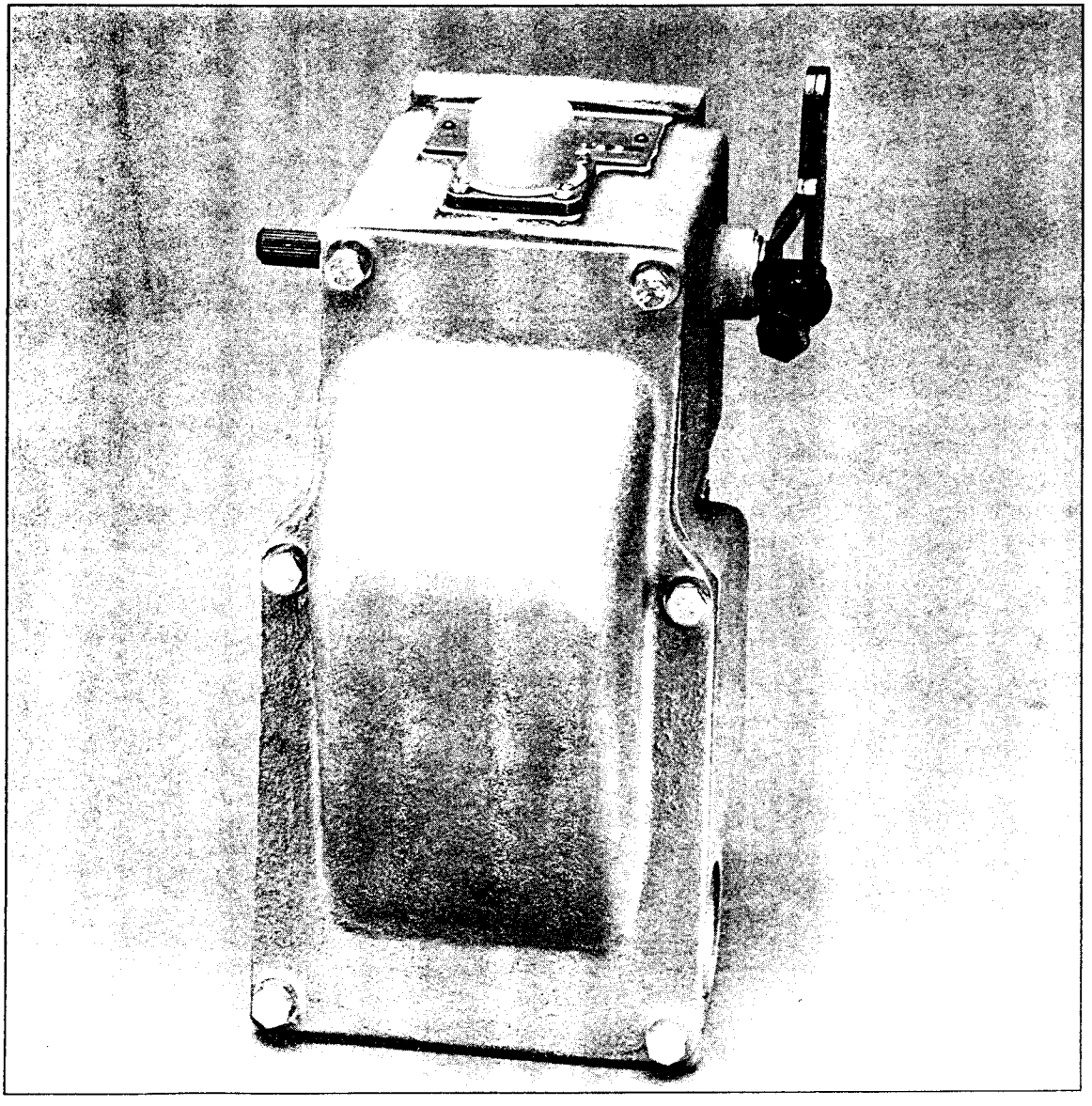
ENGINE
GOVERNING SYSTEMS

AMBAC INTERNATIONAL

AGB 270
AGB 280

Supersedes November 1990 Issue

ACTUATORS FOR BOSCH "P" MODEL PUMPS (including 3000, 7100, 8500 Series)



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AGB 270/280

INTRODUCTION

The AGB 270/280 actuators are linear electromagnetic throttle positioning devices which mount integral to Robert Bosch (RB) 3000, 7100, and 8500 series "P" model fuel injection pumps. They may also be utilized on other types of in-line fuel injection pumps with the use of an interface plate. They position the engine fuel throttle according to the amount of current flowing from the speed control unit through the actuator. An external fuel shutoff lever is available for emergency engine shutdown. The complete family of speed control units is suitable for use with the AGB 270/280 series actuators and will provide other governor system fail-safe features.

The significant features of an engine governing system utilizing the integral actuator are the elimination of external fuel system control linkage and engine actuator brackets. The actuator requires no engine drive for hydraulic input. It is designed to have no sliding parts or gears, requires no maintenance and typically outlasts the life of the engine. The system provides the utmost in performance because the fuel injection pump rack is directly connected to the actuator, thus minimizing delays and ensuring fast response. It is completely self-contained except for the wires connecting it to the speed control unit.

SPECIFICATIONS

POWER INPUT

- Operating Voltage ..... 12, 24 or 32 VDC
- Normal Operating Current ..... 5 amps at 12 VDC
  2.5 amps at 24 or 32 VDC
- Maximum Current (Instantaneous) ..... 8 amps at 12VDC
  4 amps at 24 or 32 VDC

ENVIRONMENTAL

- Temperature Range ..... -54° to + 93°C (-65° to + 200°F)
- Relative Humidity ..... up to 100%
- Case ..... Fungus proof and corrosion resistant

PHYSICAL

- Dimensions ..... Metric design to match fuel pump (See Figure 1)
- Weight ..... 3.75 kgs (8.3 lbs)
- Mounting ..... Integrally mounted on the rear of the RB "P" model fuel injection pumps directly replacing the existing mechanical governor (See ASSEMBLY, Page 5)

MATING CONNECTOR

- For actuator only ..... EC 1249-2 (6 pins)
- Wiring harness to CU671C (includes both connectors prewired) CB679
- Harness to CU673C series speed control units CB6711A

OPTIONAL ACTUATORS

- AGB 270A1 ..... Bosch "P" model 7100/8500 series, with temperature probe (comprises Kits K6736 and KT 6737)
- AGB 270B1 ..... Bosch "P" model 7100/8500 series, without temperature probe (comprises Kits K6739 and KT 6737)
- AGB 280A1 ..... Bosch "P" model 3000 series, with temperature probe (comprises Kits K6736 and KT 6738)
- AGB 280B1 ..... Bosch "P" model 3000 series, without temperature probe (comprises Kits K6739 and KT 6738)

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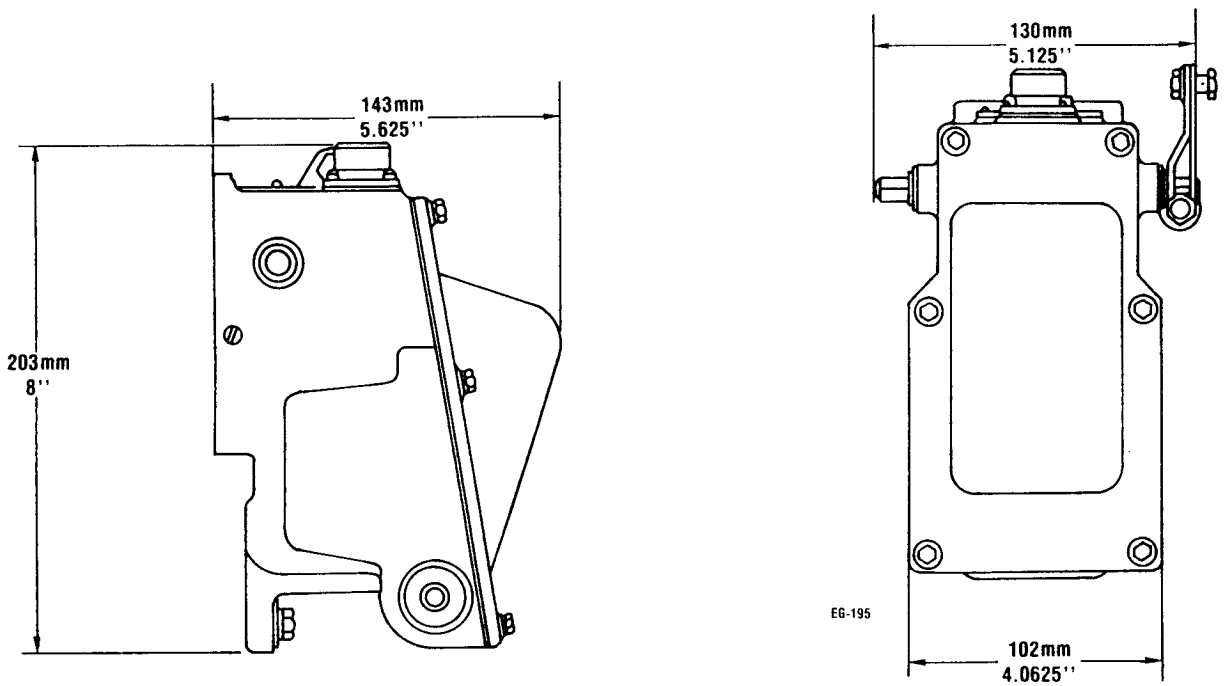

Figure 1. AGB 270/280 actuator dimensions

DESCRIPTION

The AGB 270/280 actuator controls the position of the fuel injection pump rack based on an input from the speed control unit. An AC frequency signal (proportional to speed) generated by the magnetic speed sensor is constantly fed into the speed control unit. The signal is compared with the present frequency (speed setting). If the frequencies are not identical, a change in current from the speed control unit changes the magnetic force in the actuator. The change causes an angular rotation of the actuator shaft and linear repositioning of the fuel injection pump racks.

Rack position is proportional to the amount of current flowing through the actuator coils and is counterbalanced by internal springs. A mechanical override of the fuel rack is provided through the shaft. This shaft can be connected to an external electric or pneumatic solenoid or a manually operated shutdown device to move the fuel rack to the no-fuel position and hence shut down the engine. The actuator housing is sealed against engine environment with gaskets at all openings so steam or other water based cleaning will not affect the system's operation. **No maintenance is necessary.**

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INSTALLATION AND ADJUSTMENTS

The leads from the speed control unit to the actuator should be at least #18 for 24 volt and 32 volt and #16 wire for 12 volt operation. Large gauge wire is necessary for long wire lengths to compensate for current losses.

12 VOLT OPERATION

Connect the following actuator terminals together with jumpers at the mating half of the connector (See Figure 2).

1. A to C
2. B to D
3. A & D to their respective terminals at the speed control unit. (See control unit instructions.)

24 VOLT OPERATION

Connect the following actuator terminals together with jumpers at the mating half of the connector (See Figure 3).

1. B to C
2. A & D to their respective terminals at the control unit. (See Control unit instructions.)

32 VOLT OPERATION

To use with 32 volt supply, wire the connector as for 24 volt operation but add a 1.5 ohm, 25 watt resistor or a 2 ohm, 50 watt adjustable resistor, set to 1.5 ohms. Then wire the resistor in series with terminal A of the actuator (see Figure 4).

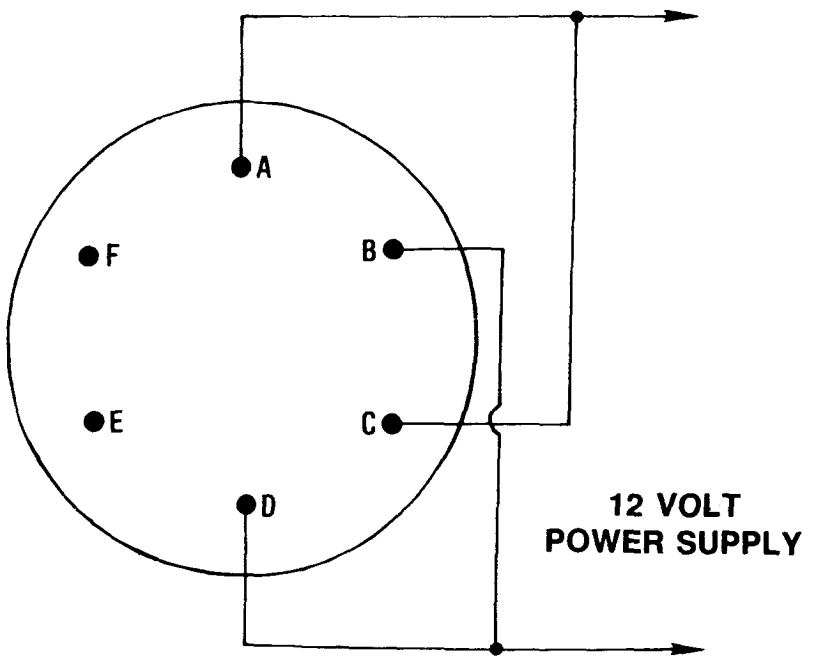

Figure 2. Wiring to AGB 270/280 actuator for 12 volt operation (Actuator coils connected in parallel)

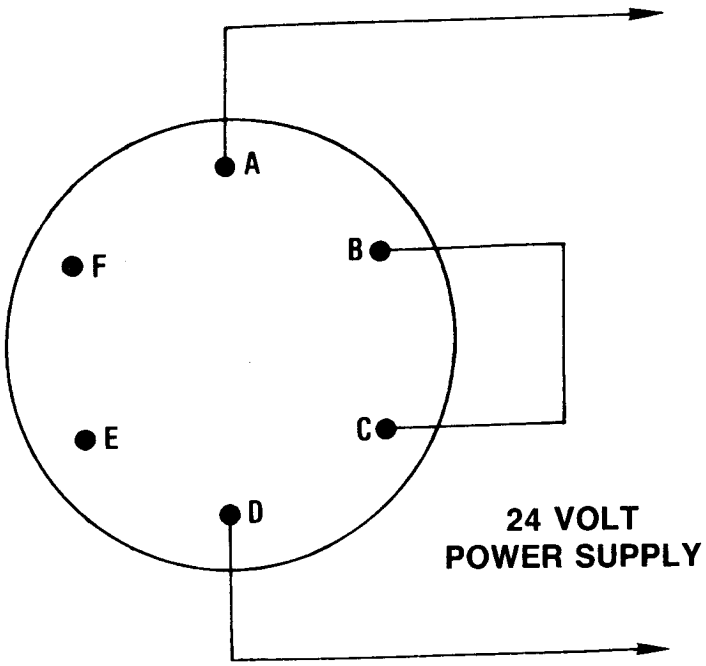

Figure 3. Wiring to AGB 270/280 actuator for 24 volt operation
(Actuator coils connected in series)

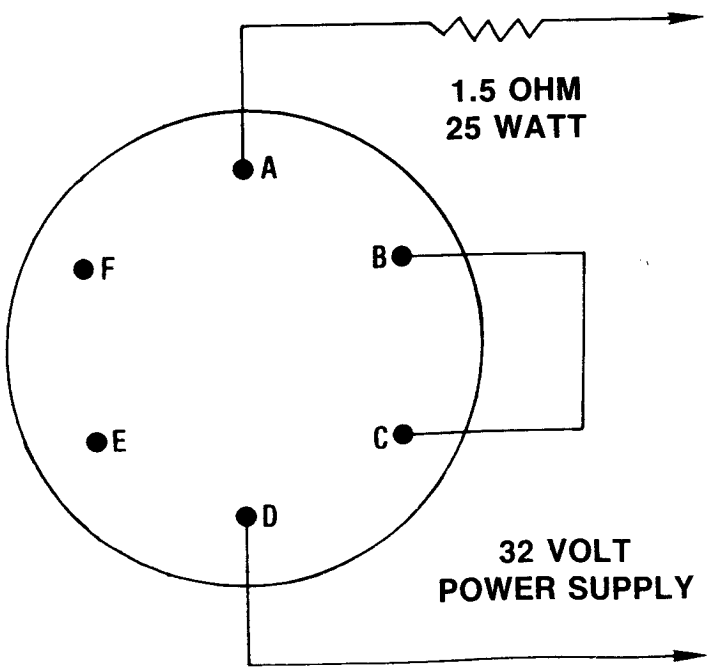

Figure 4. Wiring to AGB 270/280 actuator for 32 volt operation
(Actuator coils connected in series)

AGB 270 and AGB 280 ACTUATOR ASSEMBLIES

Note: (I) If fuel pump has a mechanical governor attached, consult Robert Bosch agent for removal instructions.

(II) In order to be compatible with the R. Bosch fuel pump this actuator is built with metric hardware.

ASSEMBLY PROCEDURE:

***Measurements* (Ref. Assembly Drawings Figures 5, 6 & 7)**

1. Assemble the bearing cover (201) to the fuel pump *without* the sealing gasket (202) or the shims (203)-(206), using the two top mounting capscrews (211) only.
2. Assemble the housing assembly (1) and sealing gasket (114) to the fuel pump using the two top mounting capscrews (110) and the two bottom mounting capscrews (112). Torque capscrews progressively to 7-9 Nm (9.5-12.3 lbs. ft.).
3. Measure the gap 'D' between the pump bearing cover (201) and the actuator housing (1). The supplied mounting shims may be used for this purpose.
4. Set aside the shims (207)-(210) determined in step (3) for later use.
5. With the actuator rotor not connected to the fuel pump rack, measure the gap between actuator rotor and the actuator housing 'E' as shown on Figure 5. Note for later reference.
6. Remove the actuator housing (1), gasket (114) and bearing cover (201) from the fuel pump.
7. Measure the depth of the bearing cavity 'A' in the bearing cover (201). **Note:** This is from the tips of the 4 pump contacting feet. Ref. Fig. 7.
8. Measure the protrusion of the fuel pump camshaft bearing 'B' from the pump face. Ref. Fig. 6.
9. Subtract 'B' from 'A'. This is the amount of shims needed for zero clearance between the bearing cover and the bearing. Select a combination of supplied shims (203)-(206) to make up this value.

Assembly

10. Mount the gasket (202) and bearing cover (201) complete with shims (203)-(206) to the fuel pump using the two top capscrews (211). Torque to 7-9 Nm (9.5-12.3 lbs. ft.).
11. Secure the rack connecting link (102) to the fuel pump rack using two capscrews (108) and lockwashers (107).
12. Assemble the actuator housing assembly (1), 'o' ring (104) and sealing gasket (114) to the fuel pump using the two top mounting capscrews (110) and lockwashers (111) loosely fitted.
13. With the shims (204) from step (4) held in place, align the locating hole in the actuator housing (1) with the pin in the bearing cover (200) and fasten the lower mounting capscrews (112) and washers (113) in place. Torque the lower and upper mounting capscrews progressively to 7-9 Nm (9.5-12.3 lbs. ft.).
14. Locate spring adjuster (106) and shutdown stop (105) in link (103) to the retracted position.
15. With spring (109) installed, clamp link (102) and rod end (24) to rack connecting link (103) with capscrew (116). Access for the socket headed capscrew is through the ¼ inch pipe plug hole as shown. **Note:** A lockwasher is not required for capscrew (116), the threads in link (103) are self-locking.
16. Check that the linkage slides (freely without any binding. *This is important,* binding could cause loss of control and engine damage.

Adjustments

17. With the fuel pump rack pushed to its full fuel position towards the front of the fuel pump, measure the gap 'E' between the actuator rotor and the housing.
18. Check that this gap is .25 (.010 inches) to 1.0mm (.040 inches) greater than that measured in step (5), i.e., rack travel is not restricted.
19. The gap can be adjusted by removing capscrew (25), loosening rod end locknut (26) and rotating the outer half of the rod end assembly (8) in steps of half a turn. Check to be sure that the rod end bearings are properly aligned to avoid binding when the actuator moves and lock in this position using locknut (26).
20. With the fuel pump rack pushed in to the full fuel position, adjust the shutdown stop screw (105) so that shutdown lever (10) can be rotated against its return spring with approximately ¼mm (.010 inches) of free play.
21. This ensures that the full power fuel pump rack travel is not restricted. If required, for specific applications, the screw (105) can be turned clockwise to limit maximum fuel delivery.

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22. A low fuel stop screw (117) is also available to limit the fuel rack cut-off position if required. After adjustment, lock the screw with nut (118). Torque to 2 Nm (2.7 lbs. ft.).
23. The linkage may be further optimized after the complete governor system is installed and wired by temporarily inserting an ammeter is one of the wires between the speed control unit and the actuator. Measure the actuator current at no load and at full load. The current required for any governing condition indicates the actuator position to satisfy that condition. It is desirable to have more than 1 amp current difference indicating actuator movement, no load to full load. A suggested range of current values are given below which will ensure adequate current spread to ensure stable governor operation. The current values correspond to 8° of actuator travel.

AGB 250 Actuator

	12 Volt	24 Volt
No Load	2.0 amps	1.0 amps
Full Load	5.0 amps	2.5 amps

The current can be adjusted by turning adjusting screw (106). Turning the screw counter-clockwise will reduce the current flow and vice versa.

24. Assemble cover (2) and gasket (3) to the actuator using two drilled hex head screws (30) and lockwasher (5) at cover top locations.

Note: Drilled heads provide for lockwiring a seal to screws after the actuator is assembled and adjusted. Complete cover assembly using four hex head screws (4) and lockwashers (5). Torque all six screws to 4-5 Nm (5.5-6.75 lb. ft.).

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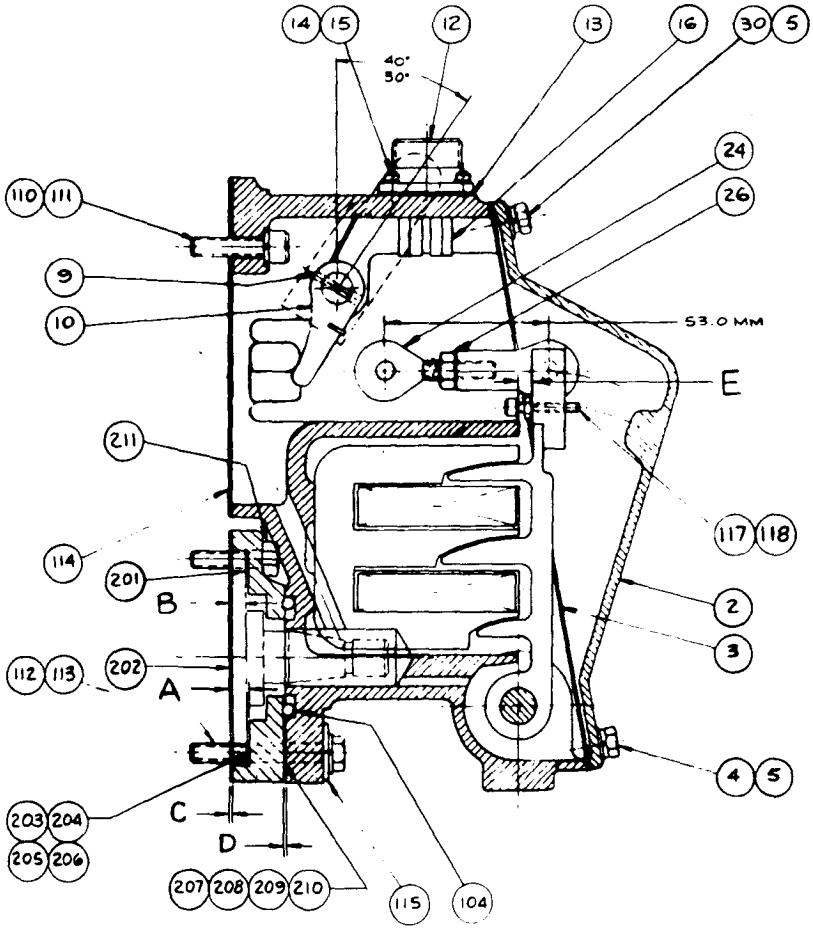

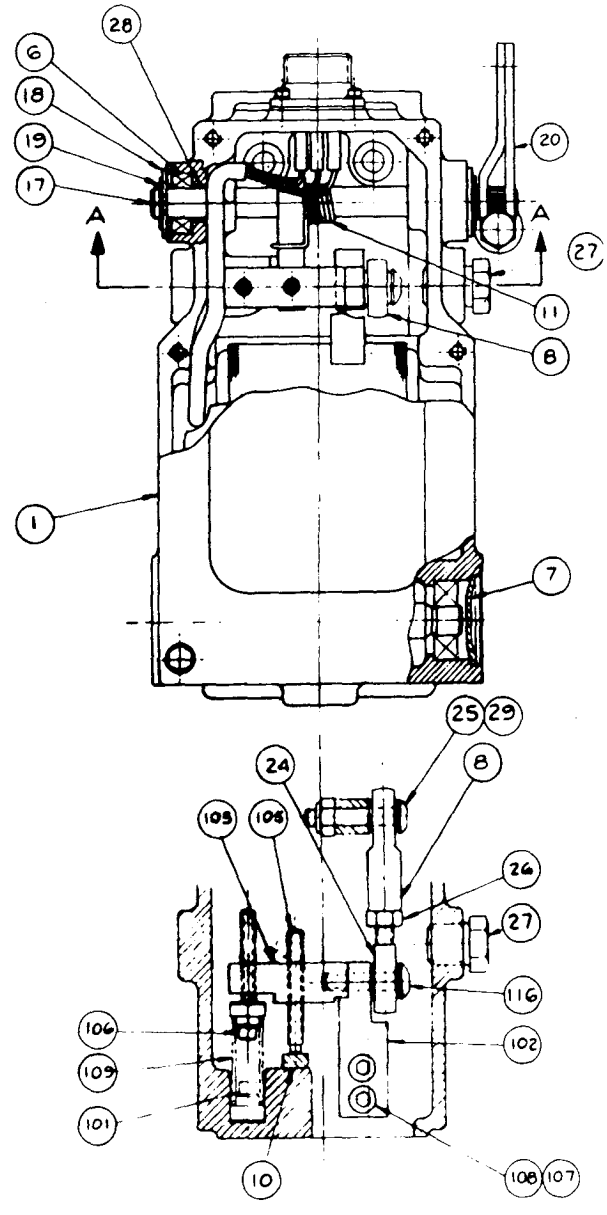

AGB 270 and AGB 280 ACTUATORS

Figure 5.

Section "A" - "A"

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Pos.	Name	Qty.	Drawing No.
118	NUT, HEX	1	NT403241
117	SCREW, SOC. HD.	1	SC403242
116	SCREW, BUTTON HD.	1	SC410598
115	WASHER, FLAT	2	WA403175
114	GASKET	1	GA410454
113	LOCKWASHER	2	WA407649
112	SCREW, HEX HD.	2	SC403165
111	LOCKWASHER	2	WA2012-6M
110	SCREW, SOC. HD.	2	SC406508
109	SPRING	1	SP403228
108	SCREW, SOC. HD.	2	SC406494
107	LOCKWASHER	2	WA2012-5M
106	SCREW, SPRING ADJUST	1	SC410450
105	SCREW, HEX SOCKET	1	SC410434
104	'O' RING	1	GA410588
103	HOLDER ASSY.	1	HP410445
102	LINK, RACK CONNECTING	1	LK410641
101	SEAT, SPRING	1	GU410438

LOOSE PARTS FOR MOUNTING HOUSING ASSEMBLY TO THE FUEL PUMP

HOUSING ASSEMBLY KITS

KT 6736 and KT 6739 (Ref. Figure 5)

Note: Actuator assembly consists of housing assembly kit plus bearing cover kit (see SPECIFICATIONS on Page 1)

TABULATION

Kit Number	Housing Assy.	For Actuator
KT 6736	HG 410082	AGB270A1 / AGB280A1
KT 6739	HG 412131	AGB270B1 / AGB280B1

Pos.	Name	Qty.	Drawing No.
30	SCREW, HEX HD.	2	SC403031
29	NUT, LOCKING	1	NT410607
28	BEARING	2	BG410587
27	PLUG, PIPE	1	PG400718
26	NUT, HEX	1	NT406736
25	SCREW, BUTTON HD.	1	SC410597
24	BEARING, ROD END	1	BG410416
23			
22	SOLDER	AR	BM403010
21	CLEANER	AR	BM403011
20	LEVER ASSY., SHUT OFF	1	LE410413
19	RING, RETAINING	2	RG403067
18	WASHER, PLAIN	2	WA410417
17	SHAFT, LEVER	1	SH410451
16	TUBING, .625 LG.	4	TU403133
15	LOCKWASHER	4	WA406091
14	SCREW	4	SC403096
13	GASKET	1	GA403094
12	CONNECTOR	1	EC403089
11	SPRING, STOP LEVER	1	SP410472
10	LEVER, INNER, STOP	1	LE410471
9	ROLLPIN	1	PN400008
8	BEARING, ROD END	1	BG410415
7	PLUG, EXPANSION	2	PG410440
6	SEAL OIL	2	SE410412
5	LOCKWASHER	6	WA407648
4	SCREW, HEX HD.	4	SC403020
3	GASKET, COVER	1	GA403234
2	COVER	1	CV403015
1	HOUSING ASSY.	1	See "Tabulation"

PRE-ASSEMBLED HOUSING

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213	SCREW-DRIVE	2	SC150-3BL
212	NAMEPLATE	1	NP410442
211	SCREW-HEX HD.	2	SC403162
210	SHIM — PLATE	1	SR410098
209	SHIM — PLATE	1	SR410097
208	SHIM — PLATE	2	SR410096
207	SHIM — PLATE	2	SR410095
206	SHIM — BEARING	3	SR6715-4
205	SHIM — BEARING	1	SR6715-3
204	SHIM — BEARING	3	SR6715-2
203	SHIM — BEARING	2	SR6715-1
202	GASKET	1	GA410435
201	BEARING COVER	1	CV410091
Pos.	Name	Qty.	Drawing No.

BEARING COVER KIT KT 6738

For Robert Bosch 3000 Series "P" Model Fuel Pumps* (Ref: Figure 5)

**A typical number on the nameplate of this type of pump would read as follows:*

"P" SIZE DESIGNATION

PES 6P 110A 720/3 RS3036

(Note: This does not include 7100 and 8500 series which uses Kit KT 6737).

213	SCREW — DRIVE	2	SC150-3BL
212	NAMEPLATE	1	NP410441
211	SCREW — HEX HD.	2	SC403162
210	SHIM — PLATE	1	SR410098
209	SHIM — PLATE	1	SR410097
208	SHIM — PLATE	2	SR410096
207	SHIM — PLATE	2	SR410095
206	SHIM — BEARING	3	SR410429
205	SHIM — BEARING	1	SR410428
204	SHIM — BEARING	3	SR410427
203	SHIM — BEARING	2	SR410426
202	GASKET	1	GA410436
201	BEARING COVER	1	CV410090
Pos.	Name	Qty.	Drawing No.

BEARING COVER KIT KT 6737

For Robert Bosch 7100 and 8500 Series "P" Model Fuel Pumps* (Ref: Figure 5)

**A typical number on the nameplate of this type of pump would read as follows:*

"P" SIZE DESIGNATION "7100" SERIES DESIGNATION

PES 6P 110A 720/3 R S7136

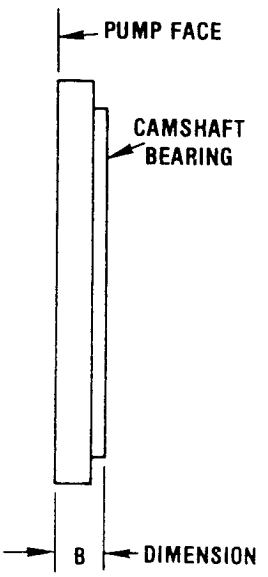

Figure 6. Protrusion measurement of Pump Cam Bearing

NOTE: MEASURE FROM TOP OF FOUR CONTACTING FEET

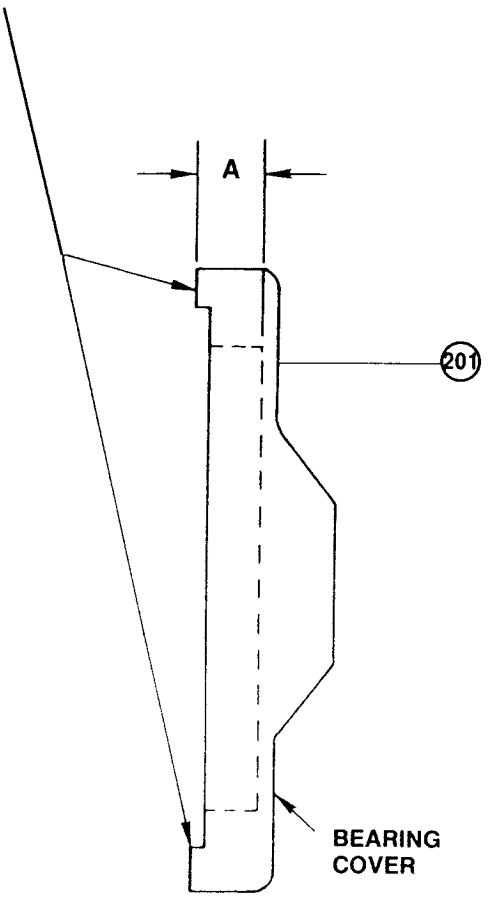

Figure 7. Depth measurement