ENGINE GOVERNING SYSTEMS

AMBAC INTERNATIONAL

Supersedes EG 60-1
Issued December 1984

Actuator AGB 130

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INTRODUCTION

The AGB 130 actuator can be used with 12VDC, 24VDC, or 32VDC power supplies. See Page 5 for proper wiring diagrams.

The actuator is a linear electro-magnetic throttle positioning device. It positions the engine throttle, or fuel pump control, according to the amount of current flowing from the speed control unit through the actuator coils. The AGB 130 series Actuator is an ideal choice to govern engines with distributor type pumps (i.e. Roosa Master, CAV), small in-line fuel pumps with direct connections to fuel racks, small diameter balanced carburetors, and other low friction fuel pumps.

SPECIFICATIONS

AGB-130 ACTUATOR PERFORMANCE

—Work ..... 0.1 Joule (.07 ft - lbs)
—Available Torque ..... 1.356 Nm (1.0 lbF - ft)
—Maximum Operating Shaft Angular Travel ..... 15° CW or CCW

POWER INPUT

—Operating Voltage ..... 12, 24, or 32 VDC
—Normal Operating Current ..... 2A at 12 VDC
1.5A at 24 or 32 VDC
—Maximum Current (Instantaneous) ..... 6A at 12 VDC
3A at 24 or 32 VDC

ENVIRONMENTAL

—Temperature Range ..... −54° to + 95° C (−65° to + 200°F)
—Relative Humidity ..... up to 100%
—Case ..... Fungus proof and corrosion resistant

PHYSICAL

—Dimensions ..... See Figure 1
—Weight ..... 1.47 kgs (3.25 lbs)
—Mounting ..... Any position (See Installation Page 3)

RELIABILITY

—Tested 100%

MATING CONNECTORS

—Order ..... Part No. EC1249-2 (6 pins) per spec. MS3106R14S-6S

LEVERS

—LE673-1A ..... 4.3'' length - 3/16'' holes
—LE673-2A ..... 4.3'' length - ¼'' holes
—LE673-3A ..... 7.1'' length - 3/16'' holes

BALL BEARING ROD ENDS

—For a ¼-28 linkage rod and the hole to attach it to the lever is for a ¼'' bolt BG671
—For a 10-32 linkage rod and the hole to attach it to the lever is for a #10 bolt BG672

VARIATIONS

—AGB 130D5 ..... With temperature probe for droop applications. No lever
—AGB 130D6 ..... Standard actuator. No lever
—AGB 130C1 use AGB 130D5
—AGB 130D1 use AGB 130D6
—AGB 130D2 use AGB 130D6
—AGB 130D3 use AGB 130D5
—AGB 130D4 use AGB 130D5

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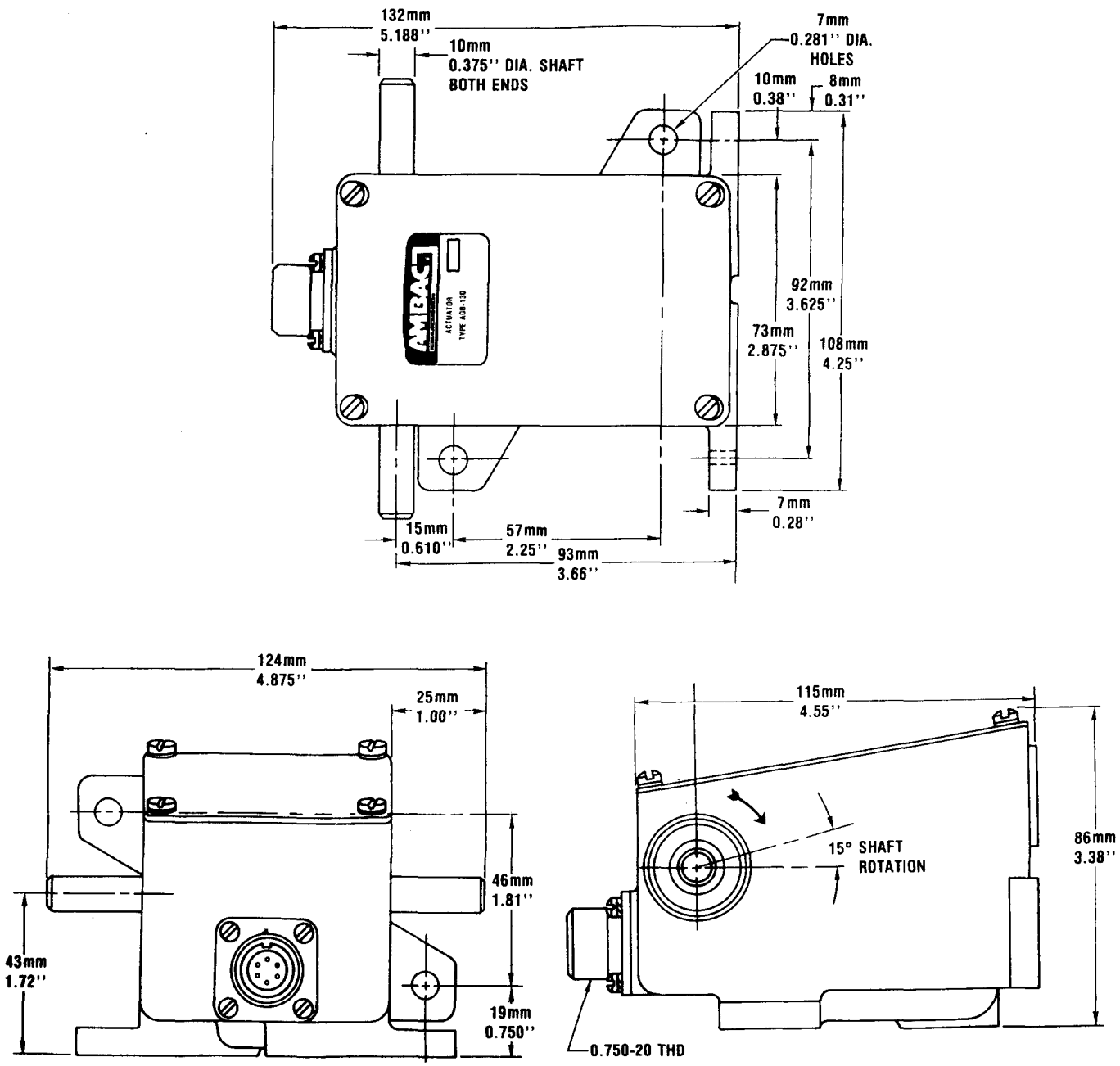

Figure 1. AGB 130 actuator dimensions

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DESCRIPTION

An AC frequency signal (proportional to speed) generated by the magnetic speed sensor is constantly fed into the speed control unit and compared with a preset frequency. If the frequencies do not remain identical, a change in current from the speed control unit changes the magnetic force in the actuator which, in turn, causes angular rotation of the actuator shaft. Shaft rotation is proportional to the amount of current flowing through the actuator and is counter-balanced by the internal springs. The actuator housing is sealed against engine environment with gaskets at all openings so steam or water will not affect the system's operation. **No maintenance is necessary.**

INSTALLATION

The actuator should be rigidly mounted as close as possible to the throttle lever on the pump. The lever on the actuator should be as nearly parallel to the throttle lever as possible at mid throttle position. The ball joints will accommodate a maximum of 10° misalignment. Low friction is mandatory and light weight linkage should be used to provide optimum control.

The proper setup of linkage is one of the most important adjustments of a total engine governing system. The speed control unit increases actuator current to control the engine in the full fuel direction and spring force acts to control the engine in the fuel shutoff direction. A proper linkage arrangement will allow the actuator to control the throttle at zero throttle and full throttle with some excess travel beyond these positions for shutoff and full fuel respectively.

INSTALLATION COMPONENTS:
Actuators have internal springs against which the magnetic forces work to open the throttle. Standard springs for the AGB 130 actuator are SP 671-4. If the throttle has an appreciable force inherent, it may be desirable to substitute other springs. Available springs are:

Part No.	Rate lb/in.	Color Code
SP 671-1	1.3	Red
SP 671-2	1.0	Yellow
SP 671-3	0.8	Green
SP 671-4	1.5	Blue
SP 671-5	0.5	Purple
SP 671-6	2.0	Black
SP 671-7	2.3	White
SP 671-8	2.5	Red & White
SP 671-10	3.3	Red & Green

Spring Kit, KT 410064, has one each springs SP 671-2, 4, 5, 6 and 8.

THROTTLE BODIES (for Carbureted Engines).
Air flow through most original equipment carburetors creates some unbalanced force tending to lock the butterfly valve in one particular position. Considerable torque can be required to move the valve out of position. Engine manifold vacuum also creates heavy loading on the throttle shaft bearings resulting in friction. These characteristics must be minimized to obtain good governing and long life.

A series of throttle bodies which have ball bearings supporting the throttle shaft to reduce friction, and a small offset of the throttle blade to improve aerodynamic balance are available. These should be used on any carburetors with questionable loading and friction.

For 1-¼'' and 1-½'' SAE sizes, use TU 6710A.
For 1-¾'' and 2'' SAE sizes, use TU 674A.
For 2-½'' SAE sizes, use TU 675A.

Part numbers TU 674A, TU 675A, TU 6710A are normally interposed between the manifold and the original carburetor. The butterfly valve of the original carburetor should be locked full open.

The leads from the speed control unit to the actuator should be at least #18 wire for 24 volt and 32 volt and #16 wire for 12 volt operation.

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, E, & F to their respective terminals at the speed control unit (SEE TABLE A).

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, E, & F to their respective terminals at the speed control unit (SEE TABLE A).

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32 VOLT OPERATION

To use with 32 volt supply, wire the connector as for 24 volt operation but add a 2 ohm, 20 watt resistor or a 2 ohm, 50 watt adjustable resistor set to 2 ohms. Then wire the resistor in series with terminal A of the actuator (see Figure 4).

SPEED CONTROL UNIT	ACTUATOR TERMINALS			
			DROOP OPERATION	
	A	D	E	F
CU 671 SERIES	B	D	N	P
CU 673C SERIES	B	D	N	P
Terminals E & F are not used in conjunction with control units type ECD 67-2000 series and ECD 67-5000 series.				

Note: See Speed control unit literature specifications for proper operating voltage.

Table A
Wiring chart for AGB 130 actuators

ADJUSTMENTS

CAUTION:
THE ENGINE SHOULD BE EQUIPPED WITH AN INDEPENDENT OVERSPEED SHUTDOWN MECHANISM TO PREVENT RUNAWAY WHICH CAN CAUSE EQUIPMENT DAMAGE OR PERSONNEL INJURY.

1. Determine the total angular movement of the engine throttle lever. (The last 20° of opening on a carburetor throttle body results in very little change in flow and can be left unused. A non-linear linkage arrangement will result.) A maximum of 12° is the useful actuator travel.
2. Calculate the required ratio of linkage lever lengths to give adequate travel of the throttle. The fuel systems stops (shutoff and full fuel) should be used as fuel stops rather than the internal actuator stops.
3. Make the linkage rod length such that the actuator is slightly off its stop when the throttle lever is in the full shutoff position. This insures adequate spring force for actuator return.

It is desirable to approach linearity between engine power and actuator position as closely as possible. That is, the actuator position should be halfway between its no load and full load positions when the engine is delivering half power.

Ideally, the linkage arms should be perpendicular to the linkage rod when the actuator levers are in mid position. Be sure the linkage is free of any obstructions, friction, or binding. Before starting the engine, manually push the actuator to the full fuel position and release it. It should return instantly to the no fuel position. Re-check the installation to insure that all linkage and levers are securely fastened before operating the engine.

After the engine has been started and is under governor control, the linkage adjustments can be optimized by temporarily inserting an ammeter in one of the wires between the speed control unit and the actuator or by measuring the voltage output to the actuator. Measure the actuator current or the voltage at no load and full load. The current required for any governing condition indicates the actuator position to satisfy that condition. If the ratio of actuator lever length to throttle length is too large, there will be very little actuator movement (no load to full load), adjustments will be critical, and the speed control unit will tend to be less stable.
It is desirable to have an appreciable current difference, 2 amps at 12 volts, indicating actuator movement, no load to full load. The limiting condition is sufficient linkage ratio to permit movement of the throttle through its full stroke. Suggested current and voltage values are given below which will insure stable speed control unit operation. The values correspond to about 8° of actuator travel. Varying the effective length of the throttle link will permit the no load value to be adjusted to the stated value.

AGB 130 ACTUATOR

	12 VOLT	24 VOLT
No Load	2 amps, 5 volts	1 amp, 10 volts
Full Load	4 amps, 11 volts	2 amps, 20 volts

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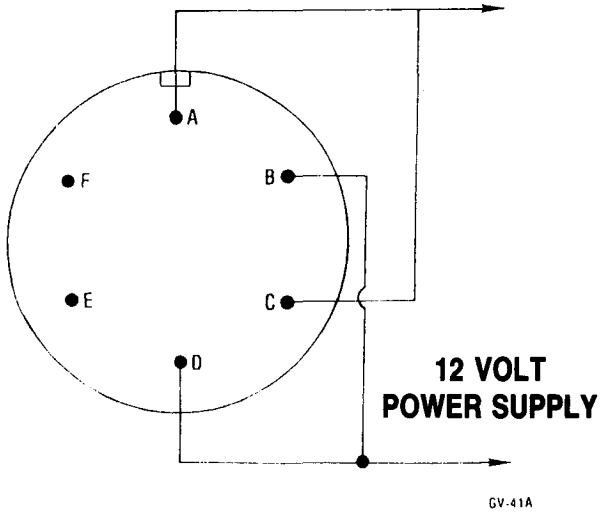

Figure 2. Wiring to AGB 130 actuator for 12 volt operation

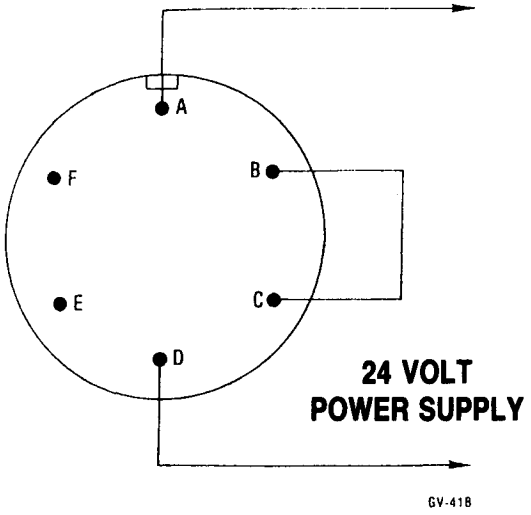

Figure 3. Wiring to AGB 130 actuator for 24 volt operation

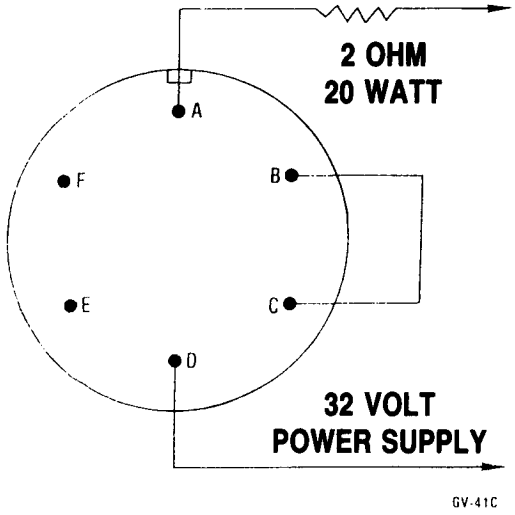

Figure 4. Wiring to AGB 130 actuator for 32 volt operation