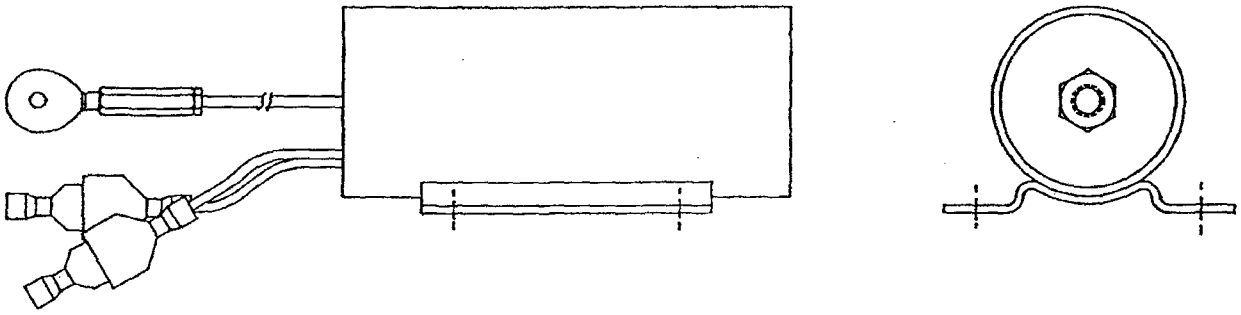
ENGINE GOVERNING SYSTEMS

AMBAC INTERNATIONAL

AGL 100
AGL 120

Supersedes Issue
Dated January 1993

Actuator



Uses:

- **Small engines, typically 10HP**
- **Isochronous speed control**
- **Avoiding power loss due to speed lug down under load**
- **Remote speed control**

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SPECIFICATIONS

ACTUATOR PERFORMANCE
- — Available Force ..... 4.4 Newtons (1 lb.)
- — Plunger Stroke ..... 0.60 Inches
- — Work ..... 0.03 Joules (.27 in-lbs.)

POWER INPUT
- — Operating Voltage ..... 12 or 24 VDC
- — Normal Operating Current ..... 4A at 12 VDC
  2A at 24 VDC
- — Maximum Current (Instantaneous) ..... 8A at 12 VDC
  4A at 24 VDC
- — Polarity ..... Case Isolated

ENVIRONMENTAL
- — Temperature Range ..... −40° to + 95°C (−40° to + 200°F)
- — Relative Humidity ..... Up to 100%

PHYSICAL
- — Dimensions ..... See Figure 1
- — Weight ..... 1.1 lbs.
- — Mounting ..... Any position

MATING CONNECTOR
- — Supplied with Actuator ..... EC 410494

VARIATIONS
- — AGL 100A1 ..... For 12 VDC Operation
- — AGL 120A1 ..... For 24 VDC Operation

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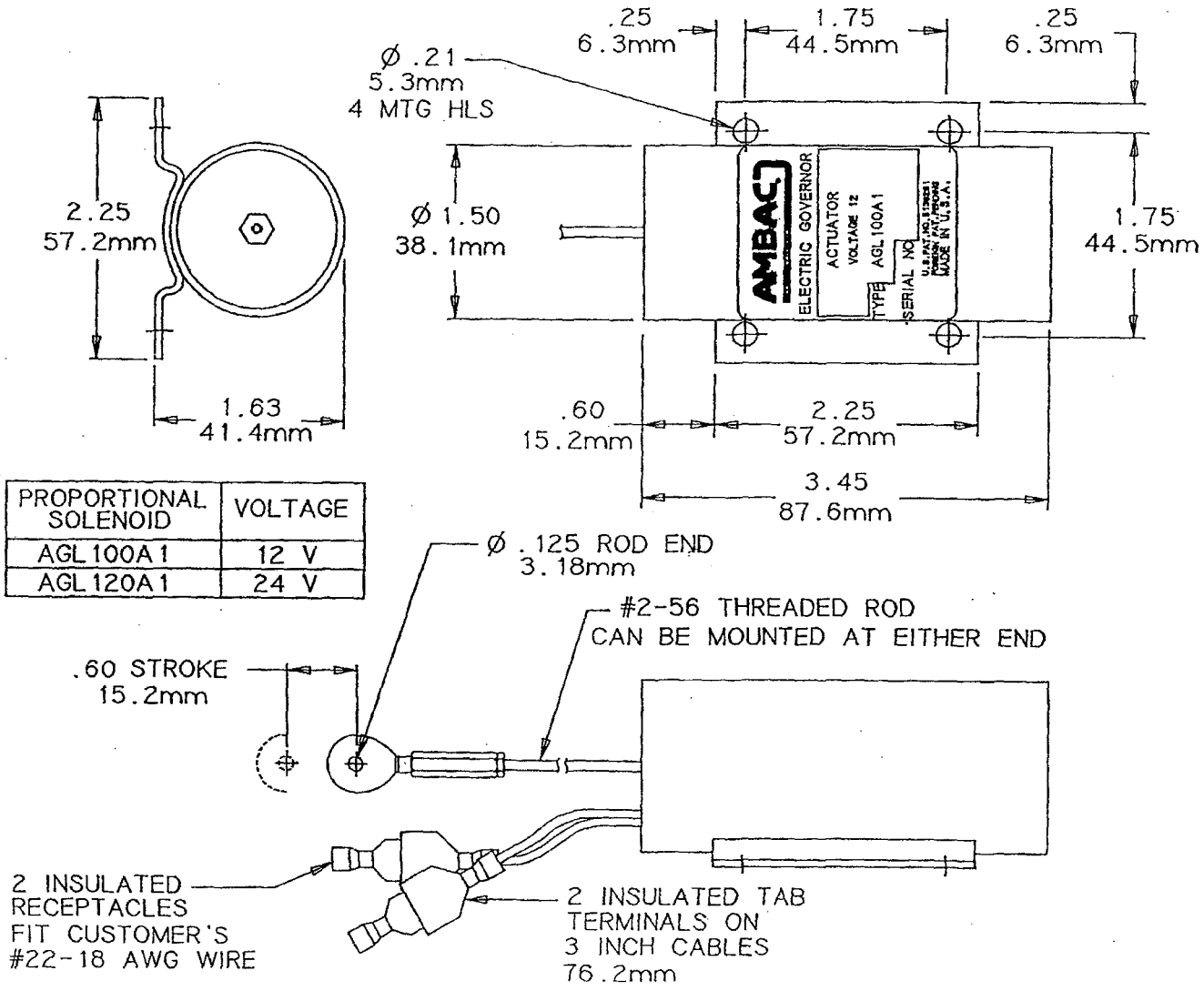

PROPORTIONAL SOLENOID	VOLTAGE
AGL100A1	12 V
AGL120A1	24 V

Figure 1. AGL 100 Actuator Dimensions

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INTRODUCTION

The actuator is a linear electro-magnetic throttle positioning device. It positions the engine throttle, or fuel pump, according to the amount of current flowing from the speed control unit through the actuator coils. The AGL 100 series actuator is an ideal choice to govern 10 HP engines. Hook up is typically achieved by connecting to the shutdown lever of small in-line diesel fuel pumps, or by connecting to the butterfly valve of small diameter balanced carburetors.

DESCRIPTION

An AC frequency signal (proportional to speed) 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, repositions the actuator plunger. Plunger displacement is proportional to the amount of current flowing through the actuator and is counterbalanced by an internal spring. Self-lubricating bearings are used. **No maintenance is necessary.**

INSTALLATION

The actuator should be rigidly mounted with the actuator rod end fastened to the fuel control lever on the engine. The length of the throttle lever should be selected such that, from fuel pump low idle stop to fuel pump full power stop, the actuator travel is 0.5 inches. This will allow 0.05 inches of free play in the actuator with the fuel pump at the low idle and maximum power stop positions.

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.

PROCEDURE:

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, i.e., 70° is the maximum requirement. Otherwise, an excessive non-linear linkage arrangement will result.) A maximum of 0.5 inches (13mm) is the useful actuator travel.
2. Calculate the radius at which to connect the actuator rod end to the linkage lever in order for the ½ inch actuator stroke. Typical gasoline and diesel applications are shown on Figure 2. Whereas a simple linear type connection to the shutdown lever is suitable for diesel engines, gasoline engines are more sensitive to changes in carburetor position at small opening. This results in the non-linear type connection being preferred since this has the reverse tendency.
3. The threaded throttle link provided is 5 inches long. This allows a lateral deflection of ± 0.1 at the rod end to accommodate the arc of travel of the throttle lever. Shortening this rod to below 4 inches will significantly reduce the permitted deflection and is not normally recommended for non-linear gasoline type applications.
4. The fuel system's stops (shutoff and full fuel) should be used as fuel stops rather than the internal actuator stops.

INSTALLATION COMPONENTS:

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.

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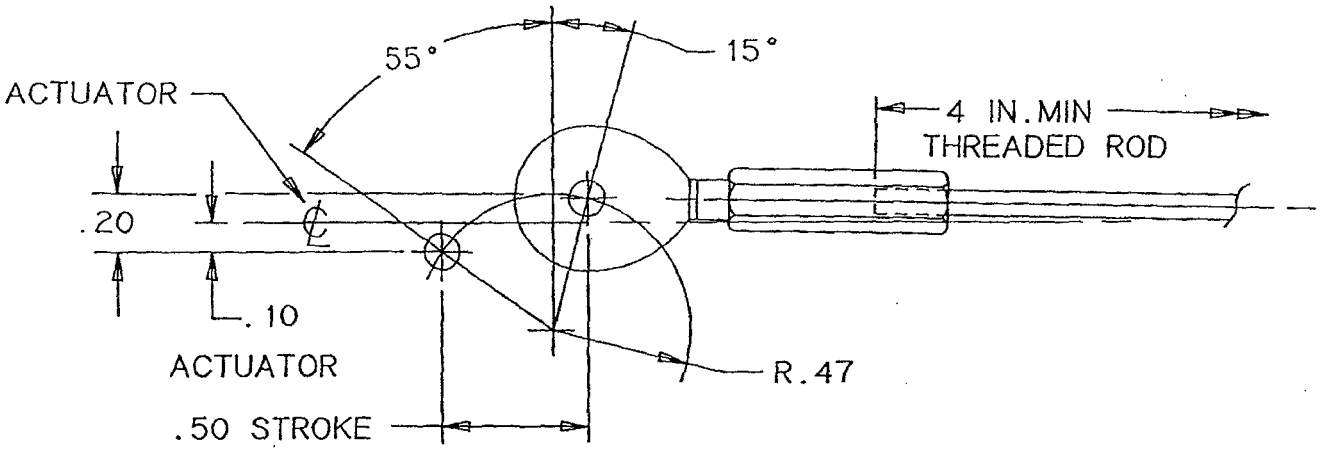
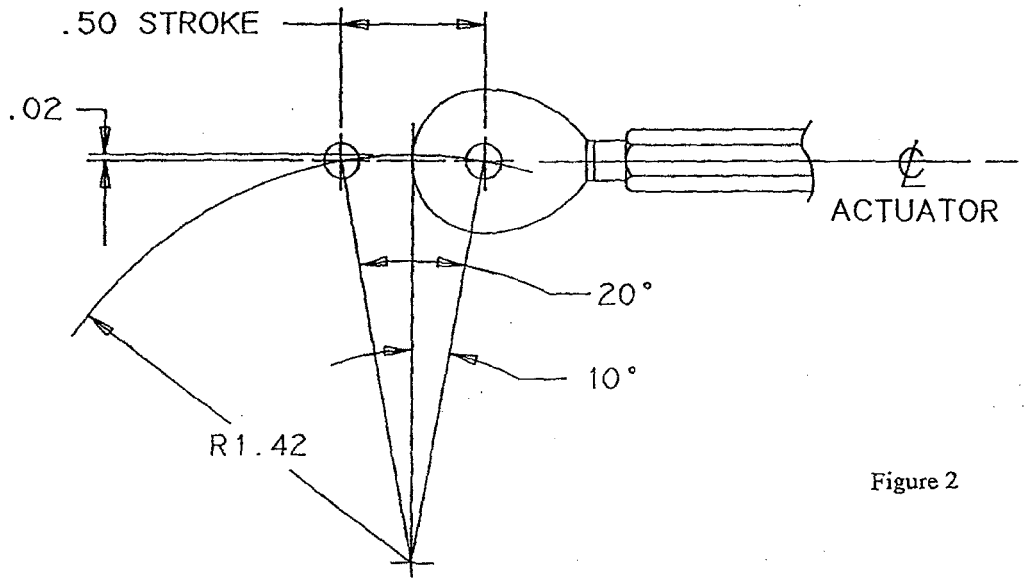


TYPICAL
GASOLINE LINKAGE
(NON-LINEAR)



TYPICAL
DIESEL LINKAGE
(LINEAR)

Figure 2

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ADJUSTMENTS

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

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 ensure that all linkage and levers are securely fastened before operating the engine.

To avoid any chance of overspeed before calibration, the engine should initially be started while manually holding the engine throttle lever.

After the engine has been started and is under governor control at the set speed (see electronic speed controller instructions), 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 rod end is connected to the fuel system lever at too small a radius, 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 actuator travel to permit movement of the throttle through its full stroke. Suggested current and voltage values are given below which will ensure stable speed control unit operation. The values correspond to about 0.5 inch of actuator travel. Varying the effective length of the throttle link will permit the no load value to be adjusted to the stated value.

AGL 100 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