HANDBOOK OF INSTRUCTIONS

FOR THE

AGASTAT

ELECTRO-PNEUMATIC TIME DELAY RELAY

A·G·A

AMERICAN GAS ACCUMULATOR COMPANY

1027 Newark Avenue, Elizabeth 3, New Jersey

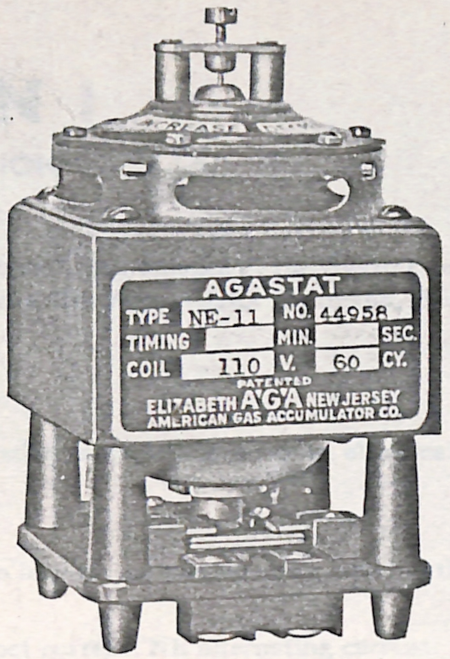


Figure 1

AGASTAT
TYPE NE-11
Alternating Cu

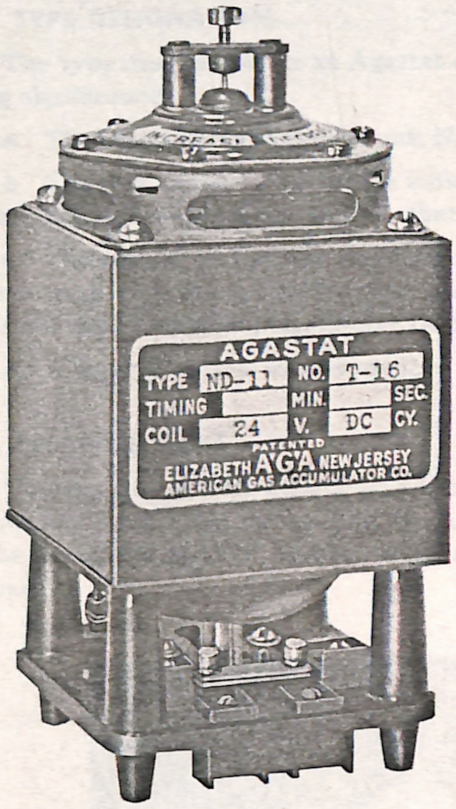


Figure 2

AGASTAT
TYPE ND-11
Direct Current

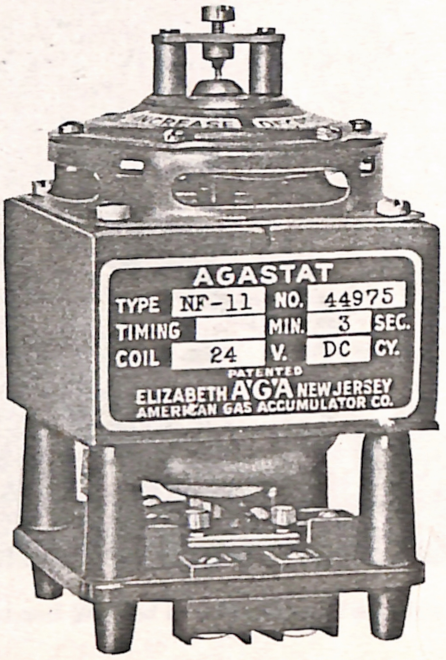


Figure 3

AGASTAT
TYPE NF-11
Direct Current

SECTION I

INTRODUCTION

1. GENERAL.

These instructions cover the installation, operation and maintenance of the Agastat, an electro-pneumatic time delay relay, manufactured by American Gas Accumulator Company, Elizabeth 3, New Jersey.

2. USE.

The Agastat is an instrument for introducing a predetermined time delay in electrical circuits.

3. TYPE DESIGNATION.

The type designation on an Agastat consists of two letters and two numbers, and has the following significance.

a. The letters indicate the current; ND and NF direct current: NE alternating current.

b. The first of the two numbers indicates the operating sequence; **1**, that the time delay starts after the coil is energized and, **2**, that the time delay starts after the coil is de-energized.

c. The second of the two numbers indicates the switching arrangement; **1**, double break contacts with one set normally open and one set normally closed (alternately single pole, double throw) and, **2**, double pole, double throw, single break.

d. A letter after the second number indicates a special type of mounting.

4. SHIPPING DATA.

The Agastat is fully assembled when shipped, cellophane wrapped, and packed in a reinforced fibre box 3 x 3 x 5⅛ inches. (See figure 4.) Name plate data are shown on the outside of the box. The boxed NE and NF Agastat weigh approximately 2 pounds; the ND Agastat weighs 2½ pounds boxed.



Figure 4 — *The Agastat is Cellophane Wrapped and Shipped in a Reinforced Fibre Box*

SECTION II

DESCRIPTION

1. GENERAL.

a. The Agastat is made in two types for direct current operation, and two corresponding types for alternating current operation. In addition, the direct current Agastats are made for momentary energization as well as continuous energization.

The two types are:

Type 1 — The time delay starts when the coil is energized.

Type 2 — The time delay starts when the coil is de-energized.

b. Each of the six models may, in turn, be equipped with either of two switching arrangements, thus making a total of twelve basic models.

c. The overall dimensions of an Agastat are 2½ x 2½ x 4¾ inches. (DC continuous energized overall dimensions 2½ x 2½ x 5¼ inches). It has four No. 8-32 mounting holes, tapped in the back, spaced 1¾ x ½ inches.

2. DETAILED.

The Agastat consists of a name plate, timing head assembly, coil assembly, core and spindle assembly, and terminal block and switch assembly.

a. NAME PLATE. — The name plate (see figures 1, 2 and 3), is mounted on the face of the instrument and is marked to show type, timing, coil voltage and serial number.

b. TIMING HEAD ASSEMBLY. — The principal components of the timing head assembly are an adjusting screw, a housing, a diaphragm, a valve and a spring.

(1) The adjusting screw is made of stainless steel and is tapered.

(2) On the outside of the top of the pressed steel housing an Esna self-locking nut holds the adjusting screw.

(3) The diaphragm is installed across a concavity in the pressed metal housing to form an air chamber above the diaphragm.

(*a*) The inlet to this air chamber is through a flat-seated valve in the diaphragm.

(*b*) The outlet from this air chamber is through an orifice in the housing.

A neoprene cap encases the housing. It is externally marked on top with INCREASE and DECREASE arrows to show direction of rotation of the screw to adjust the timing.

c. COIL ASSEMBLY. — The coil assembly consists of a coil, box and box cover.

(1) The following is a tabulation of **AGA** standard coils

CURRENT	CYCLE	VOLTAGE
Direct	—	6 12 24 48 115 230
Alternating	60	6 12 24 48 110 220 440

(2) The box and box cover totally enclose the coil, and are made of steel to form a part of the magnetic circuit.

d. CORE AND SPINDLE ASSEMBLY. — The assembly includes a magnetic core, operating springs, a spindle and collar.

(1) The upper end of the spindle is attached to the timing head diaphragm coupling.

(2) The spindle passes through the magnetic core.

(*a*) In an Agastat which operates after the coil is energized, the spindle moves freely in the core.

(*b*) In an Agastat which operates after the coil is de-energized, the spindle is permanently fixed to the core.

(3) The collar at the lower end of the spindle engages the switch.

e. TERMINAL BLOCK AND SWITCH ASSEMBLY. — The principal components of the terminal block and switch assembly are a base, a switch assembly and contacts.

(1) The base is phenolic and is molded with insulating barriers and brass inserts tapped to receive No. 6-32 terminal screws. It supports the switch assembly, and holds the terminals. (See figures 5 and 6).

(2) The switch assembly consists of a lever, (yoke), springs and contacts assembled to the terminal block. Switch springs are made of beryllium copper.

(3) Contacts are made of fine silver and have the following rated carrying capacity:

VOLTAGE	SINGLE BREAK	DOUBLE BREAK
0- 32 volts, direct current	2.5 amperes	5 amperes
32-220 volts, direct current	1 ampere	2 amperes
0-230 volts, 60 cycle	2.5 amperes	5 amperes
230-440 volts, 60 cycle	1 ampere	2 amperes

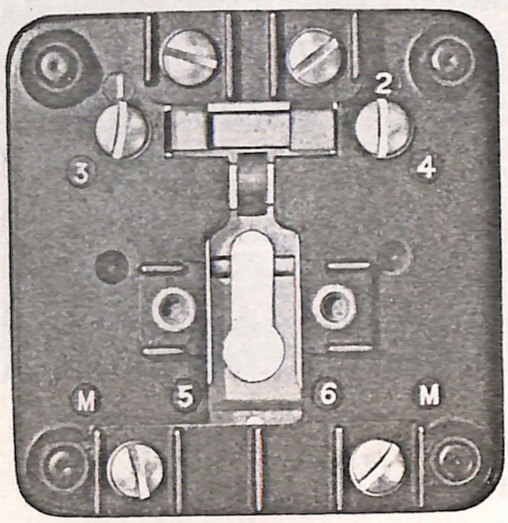


Figure 5 — *Terminals for Agastat, Types ND-11, NE-11, NF-11 ND-21, NE-21, NF-21*

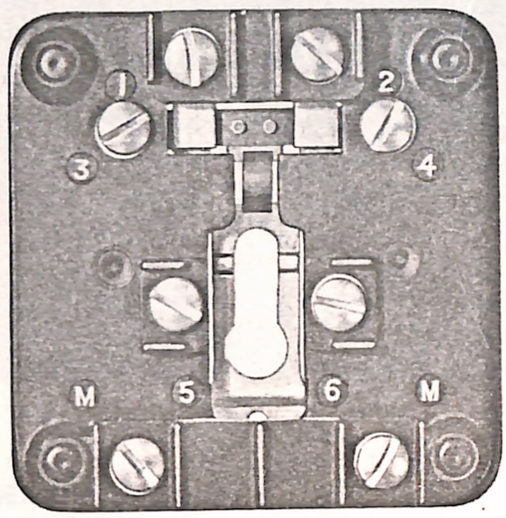


Figure 6 — *Terminals for Agastat, Types NE-12, ND-12, NF-12, ND-22, NE-22, NF-22*

SECTION III

PREPARATION FOR USE

1. GENERAL.

a. The Agastat is usually mounted directly on the panel. Special mounting plates are available if required.

b. The Agastat may be mounted either horizontally or vertically. Vertical mounting is preferable.

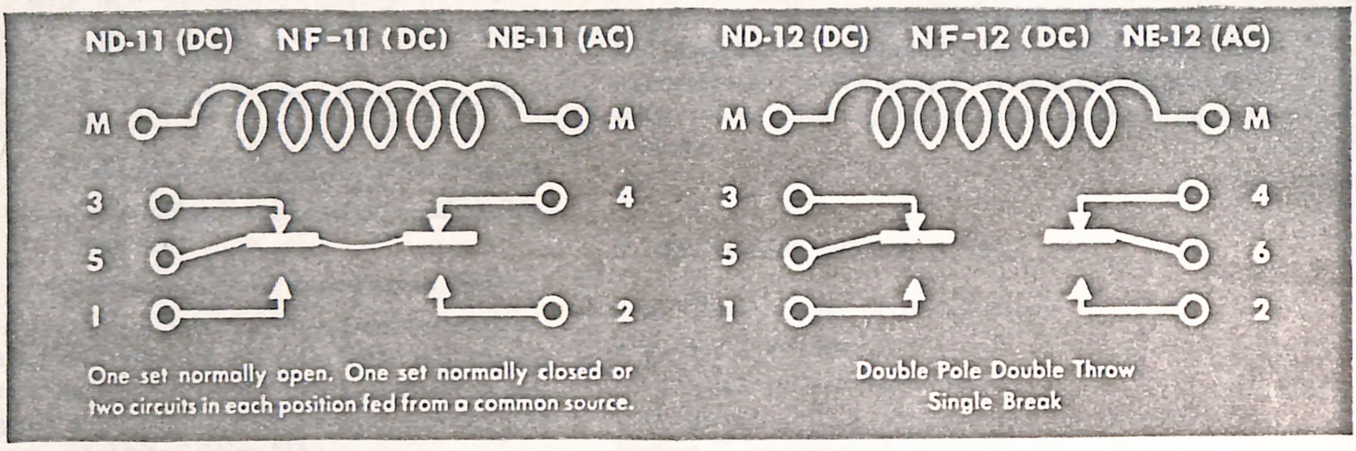
2. INSTALLATION.

a. Mount the Agastat in an upright position, using the four mounting holes tapped in back of the coil box.

b. Connect in the circuit.

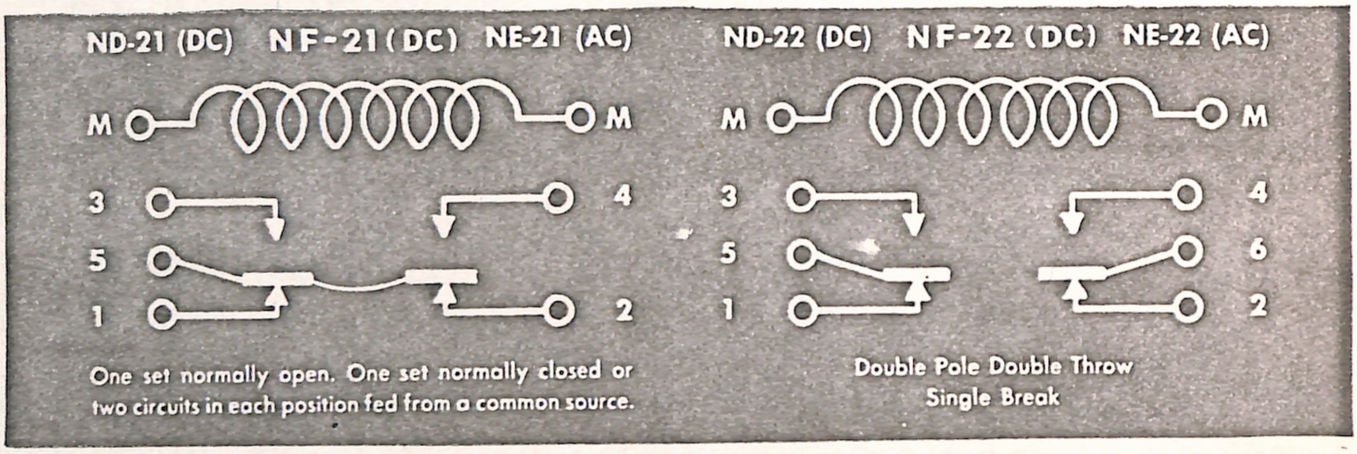
CONTACT ARRANGEMENT, TYPE 1

Time delay starts when coil is energized — control circuit closed



CONTACT ARRANGEMENT, TYPE 2

Time delay starts when coil is de-energized — control circuit opened



SECTION IV
OPERATION

1. PRINCIPLES OF OPERATION.

a. TIMING.

(1) The rate of air flow establishes the time delay.

(2) Air drawn through the inlet into the air chamber is forced out of the chamber through an orifice the size of which is constant for any given timing. The adjusting screw operates as a needle valve.

b. MAGNETIC IMPULSION and SWITCHING — The coil together with the core and spindle assembly functions as a solenoid.

(1) The Agastat is made in two basic types. These two types are:

Type 1 — Time delay starts when coil is energized.

Type 2 — Time delay starts when coil is de-energized.

(2) The type 1 AGASTAT functions as follows:

When the control circuit is energized, solenoid action takes place, starting the time delay. At the expiration of the delay interval a switch transfer occurs, breaking one set of contacts and making another. (See contact arrangements Section III.)

The switch remains in this transferred position until the control circuit is de-energized, at which time an instantaneous switch transfer takes place, restoring the contacts to their original position.

(3) The type 2 AGASTAT functions as follows:

When the control circuit is energized, solenoid action causes an instantaneous switch transfer, breaking one set of contacts and making another. (See contact arrangements Section III.)

The switch remains in this transferred position as long as the control circuit is energized. When the control circuit is de-energized, the time delay starts. At the expiration of this delay interval a switch transfer takes place, restoring the contacts to their original position.

2. OPERATING INSTRUCTIONS.

a. Check voltage of control circuit.

b. Apply voltage.

c. Check operation and timing.

d. Adjust timing, if necessary, as described in Section V, paragraph 3, *a*.

SECTION V

SERVICE INSPECTION, MAINTENANCE AND LUBRICATION

1. SERVICE TOOLS REQUIRED.

There are no special service tools required. Due to the restricted area in which adjustments have to be made, it is desirable to have the following tools available in a thickness less than 1/8-inch: open-end, straight wrenches in 15/64, 5/16 and 1/4 inch sizes; 6-inch, long-nose gas pliers; and, a screw driver.

2. SERVICE INSPECTION.

The only service inspection required is that customarily given to all electrical apparatus.

3. MAINTENANCE.

a. Timing adjustment. — To increase the time delay turn the regulating screw as marked by the arrow INCREASE. To decrease the time delay turn the screw as marked by the arrow DECREASE.

b. Replacement of parts.

(1) TIMING HEAD ASSEMBLY.

(*a*) Disassembly.

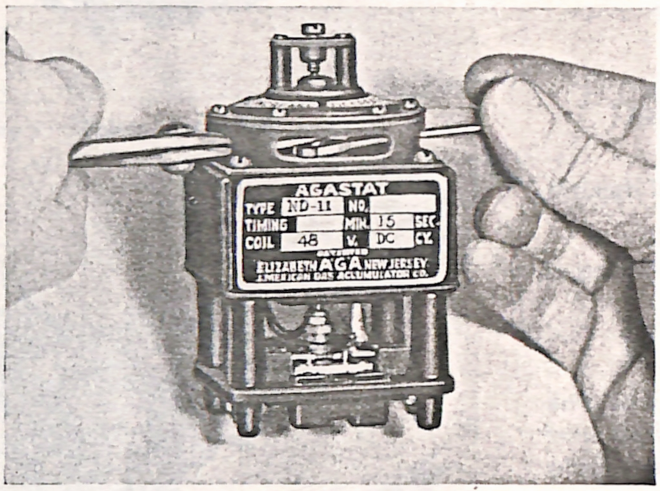


Figure 7 — *Loosen Lock Nut to Disassemble Timing Head*

1. Hold timing head coupling with wrench or pliers: Loosen lock nut. (See figure 7).

2. Remove four holding screws.

3. Turn timing head assembly counterclockwise until disengaged.

(*b*) Reassembly.

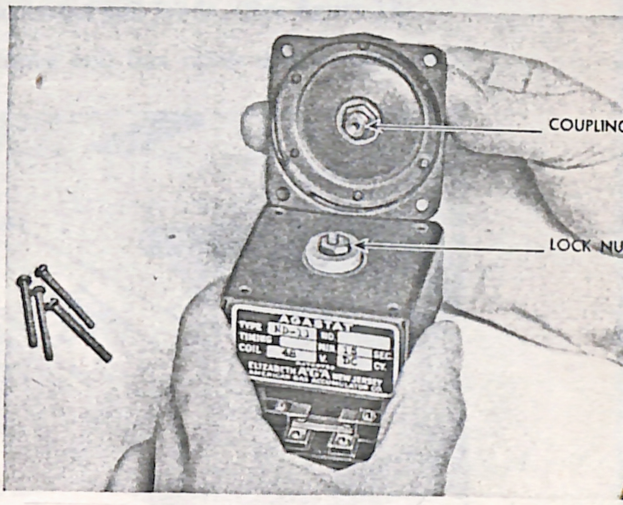


Figure 8 — *Timing Head Coupling and Lock Nut*

1. Pull new timing head coupling all way down.

2. Place timing head assembly in posit (see figure 8), and turn it clockwise to engage thre Continue to turn until the bottom of the coupl touches the lock nut.

3. Replace four holding screws. Tighten.

4. Adjust the spindle.

a. Release regulating screw to permit f flow of air through orifice. (See figure 9).

b. Trip switch in both positions by pu ing spindle up and pulling spindle down. (See fig 10).

c. Repeat adjustment if necessary.

d. Tighten lock nut.

CAUTION: *Timing head coupling must be h securely with wrench or pliers to prevent tu ing when lock nut is tightened.*

e. Reset timing.

(2) COIL ASSEMBLY.

(*a*) Disassembly.

1. Hold timing head coupling with wre or pliers and loosen lock nut.

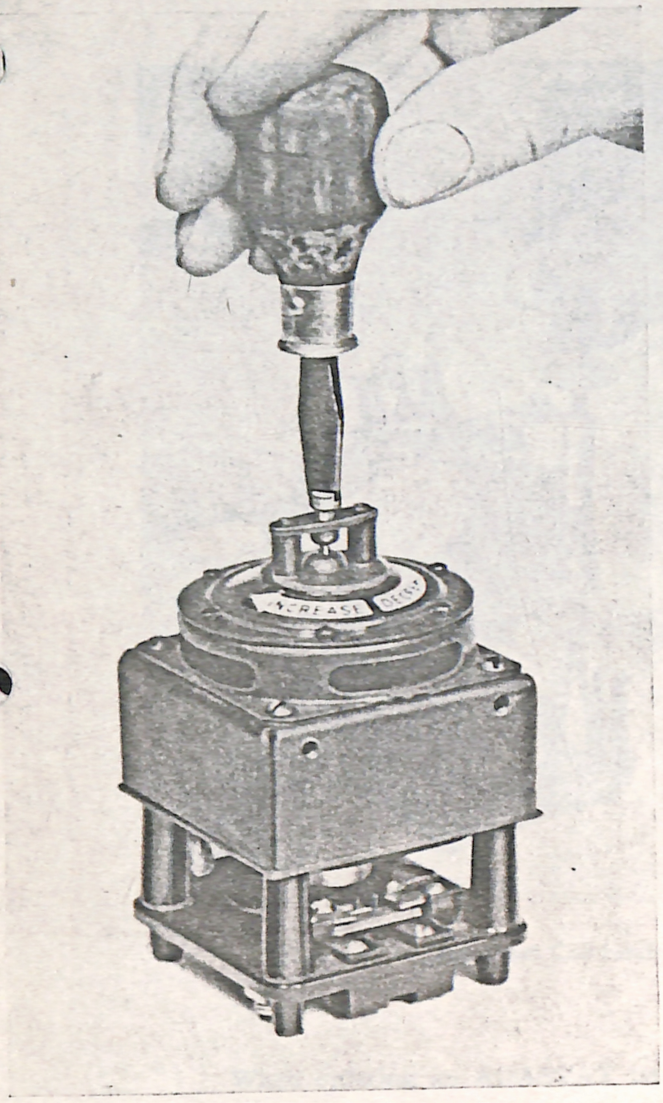


Figure 9 — *Release Regulating Screw*

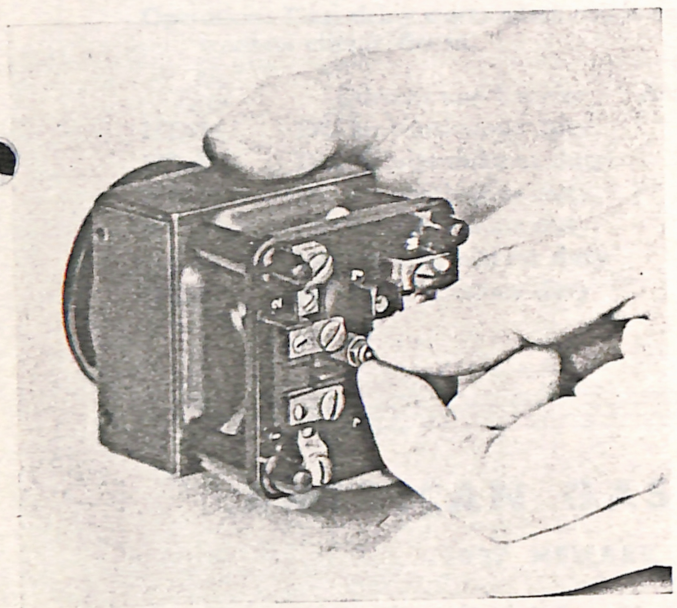


Figure 10 — *Push Spindle Up and Pull Spindle Down*

2. Remove four holding screws.

3. Turn timing head counterclockwise until disengaged.

4. Move terminal block and switch assembly so that the coupling collar on the spindle comes free of yoke (lever) without damaging switch. (See figure 11).

5. Disconnect coil leads. (See figure 12).

6. Remove coil box cover and remove coil.

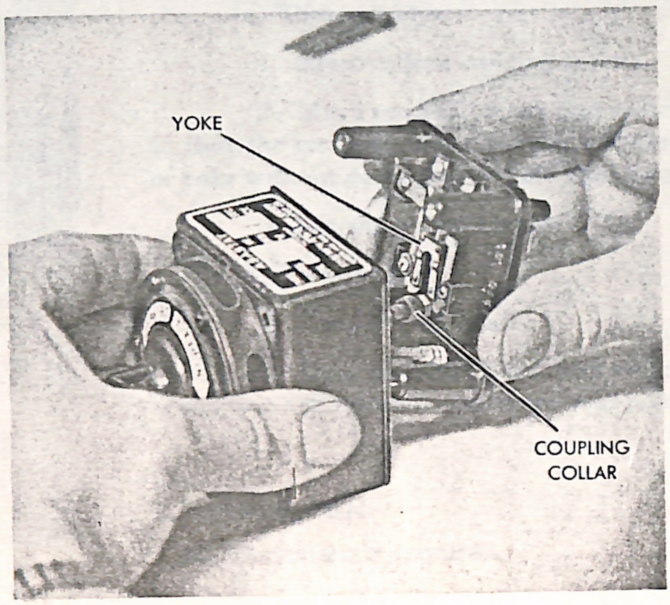


Figure 11 — *Coupling Collar on Spindle Free of Yoke (lever)*

(*b*) Reassembly.

1. Place new coil in coil box. Pull coil leads through hole in coil box cover.

2. Place terminal block and switch assembly in position and connect coil leads.

3. Pull timing head coupling all way down.

4. Place timing head assembly in position and turn it clockwise to engage thread. Continue to turn until bottom of coupling touches lock nut. Replace four holding screws. Tighten.

5. Adjust spindle.

a. Release regulating screw to permit free flow of air through orifice.

b. Push spindle UP.

c. Pull spindle DOWN.

d. If switch does not trip in both positions repeat adjustment.

e. Tighten lock nut.

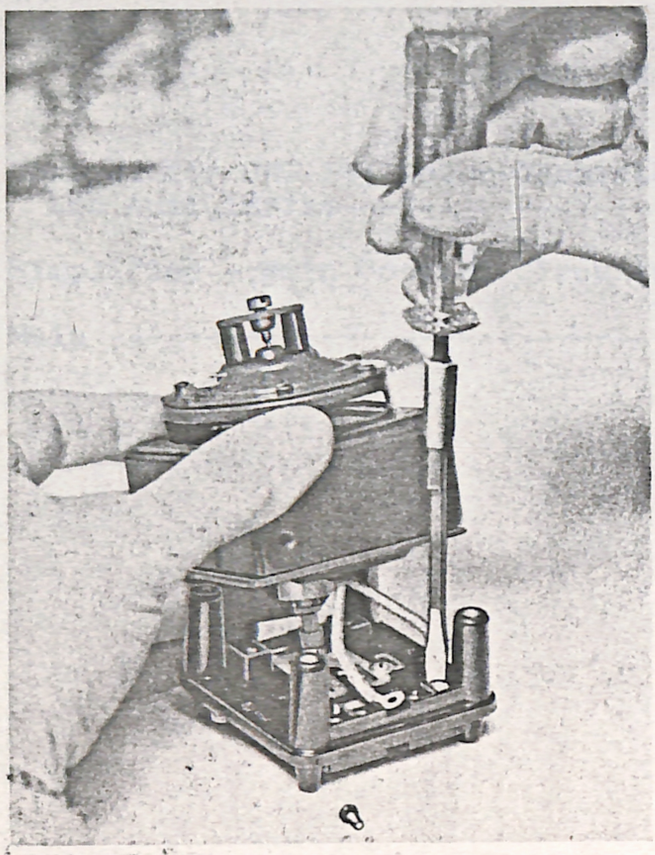


Figure 12 — *Disconnect Coil Leads*

CAUTION: *Timing head coupling must be held securely with wrench or pliers to prevent turning when lock nut is tightened.*

f. Reset timing.

(3) TERMINAL BLOCK AND SWITCH ASSEMBLY.

(*a*) Disassembly.

1. Remove four holding screws.

2. Move terminal block and switch assembly so that the coupling collar on the spindle comes free of yoke without damaging switch. (See figure 11).

3. Disconnect coil leads.

(*b*) Reassembly.

1. Connect coil leads.

2. Place terminal block and switch assembly in position and fasten by replacing four holding screws.

4. LUBRICATION.

No lubrication is required.

When ordering an AGASTAT be sure to specify type designation, voltage and time setting.

TYPE 1

Operation: Time delay starts when coil is energized — (control circuit closed)

Type	Current and Service	Contact Arrangement
ND-11	DC for continuous duty	SPDTDB
NF-11	DC for intermittent duty	SPDTDB
NE-11	AC for continuous duty	SPDTDB
ND-12	DC for continuous duty	DPDTSB
NF-12	DC for intermittent duty	DPDTSB
NE-12	AC for continuous duty	DPDTSB

TYPE 2

Operation: Time delay starts when coil is de-energized — (control circuit opened)

Type	Current and Service	Contact Arrangement
ND-21	DC for continuous duty	SPDTDB
NF-21	DC for intermittent duty	SPDTDB
NE-21	AC for continuous duty	SPDTDB
ND-22	DC for continuous duty	DPDTSB
NF-22	DC for intermittent duty	DPDTSB
NE-22	AC for continuous duty	DPDTSB

A·G·A

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CONNECTION DIAGRAMS

Control for GMG-153 Motor-Generator Set and Auxiliaries ---------- LL-8835444

Simplified - Main Control Circuits ---------- LL-8835419

Main ---------- T-8852004