



**INSTRUCTIONS**

GEI-74671C

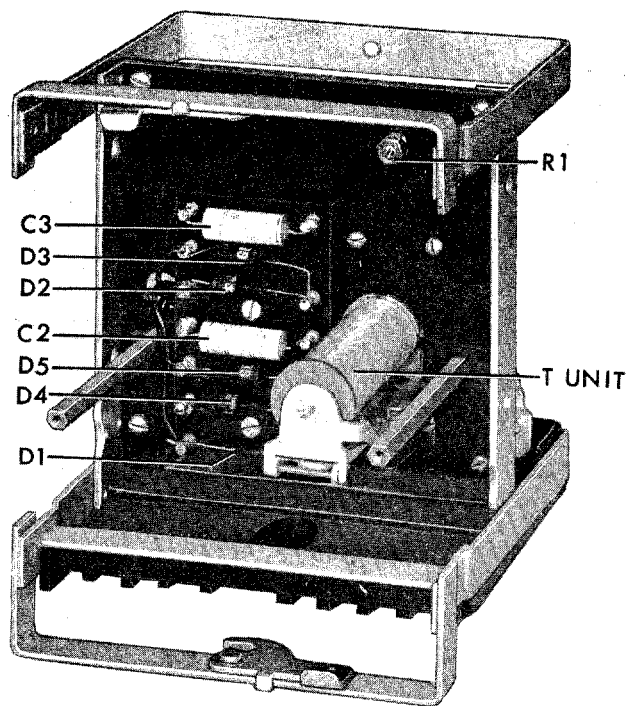
SUPERSEDES GEI-74671B

**DC TIMING RELAY**

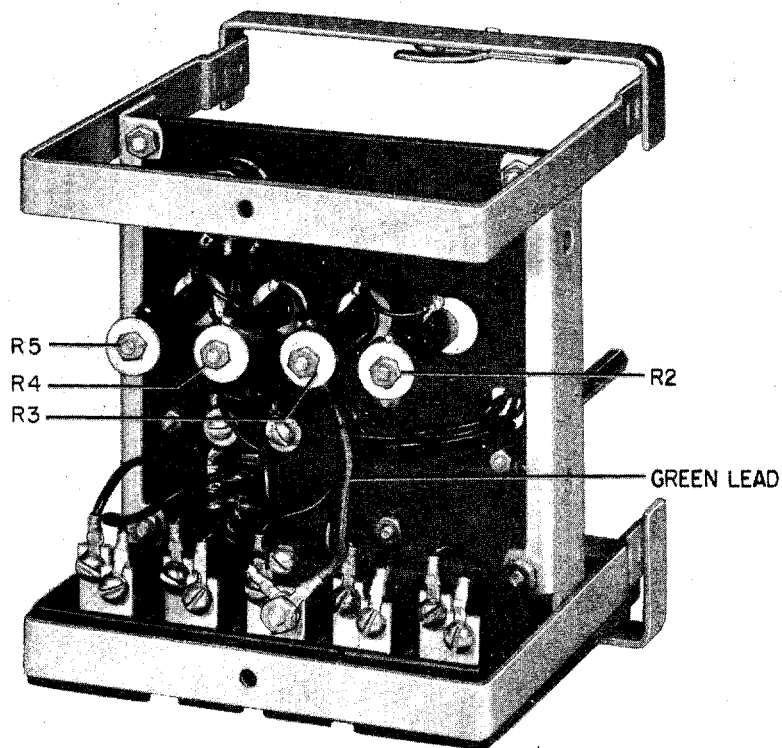
**NAM11A**



**GENERAL  ELECTRIC**



A. (8028728) Front View



B. (8028729) Back View

Fig. 1 NAM11A Relay Removed from Case

specified by the customer.

#### Model 12NAM11A4A

The pickup time delay may be set to the desired value within the range of 75-500 milliseconds. The relay as shipped from the factory will be set to pick up at  $400 \pm 25$  milliseconds if no pickup time is specified by the customer.

NOTE: Unless specified otherwise by customer, the 125/250 volt relay time will be set to operate at 250 volts. If the relay is to operate at 125 volts only the R<sub>1</sub> - R<sub>4</sub> circuit need be altered.

## LOCATION AND MOUNTING

The relay should be mounted on a vertical sur-

face in a location reasonably free from excessive heat, moisture, dust and vibration and well lighted to facilitate testing and inspection. Unless mounted on a steel panel which adequately grounds the relay case, it is recommended that the case be grounded through a mounting stud or screw with a conductor not less than #12 B & S gauge copper wire or its equivalent.

The outline and panel drilling diagram of the relay is shown in Fig. 7. The external capacitor outlines are shown in Figs. 4 and 5.

## CONNECTIONS

The internal connection diagram of the NAM11A relay is shown in Fig. 3. The external connection diagram is shown in Fig. 2.

## MAINTENANCE

### PERIODIC TESTING

It is recommended that a mechanical inspection and an operational test be performed at least annually and if possible at the same time associated equipment is tested.

The interval of time may vary depending on the relative importance of individual protective equipment and their exposure to unfavorable conditions, such as extreme heat, moisture or fumes. Dust and dirt may contaminate the relay when the protective cover is removed.

Periodic inspecting consists of checking: the contacts for corrosion and pitting; the condition of the rectifiers; relay calibration.

### SERVICING

#### CONTACT CLEANING

For cleaning palladium contacts, a flexible BURNISHING TOOL should be used. This consists of a flexible strip of metal with an etched roughened surface, resembling in effect a superfine file. The polishing action is so delicate that no scratches are left, yet corroded material will be removed rapidly and thoroughly. The flexibility of the tool insures the cleaning of the actual points of contact.

Palladium contacts should not be cleaned with knives, files, or abrasive paper or cloth.

Knives or files may leave scratches which increase arcing and deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insulating abrasive material on the contacts.

#### CONTACT ADJUSTMENT

The T-unit contacts have been correctly ad-

justed at the factory. If these adjustments have been disturbed for any reason, they may be corrected as follows: The normally open contact gap should be at least 0.015 inch. With the T-unit picked up by hand, the normally open contacts should have at least 0.005 inch wipe. A CONTACT BRUSH ADJUSTER is recommended for use in bending the contact brushes a small amount to obtain the required gap and wipe.

#### RECTIFIER CHECK

The condition of any rectifier may be checked by first measuring and recording its blocking resistance. Then allow the NAM11A relay to perform its function on the installation and again measure and record the blocking resistance. If the two values of resistance are nearly the same, the rectifier is good.

#### RECALIBRATION

In order to change the operating time of the NAM11A relay from that set at the factory, an electronic timer or oscillograph must be used. Care should be exercised so that the relay is not left energized for too long a period because it is not continuously rated. Any pickup time may be obtained between 30 and 200 milliseconds by variation of the resistance of the R<sub>1</sub> - R<sub>4</sub> circuit.

To recalibrate the relay connect the external capacitor between terminals 7 and 8. Now jumper terminals 4, 5 and 6 and connect the timing device between terminals 1 and 2. Apply rated DC voltage across terminals 5 and 3, positive on terminal 5. Adjust R<sub>1</sub> and R<sub>4</sub> for the desired pickup time.

The longer times are obtained by adjustment of rheostat R<sub>1</sub> (green lead connected to upper screw at terminal 5). The shorter times are obtained by moving the green lead directly to terminal 5 (thus shorting R<sub>4</sub>) and adjusting rheostat R<sub>1</sub>. If longer time delays than 200 milliseconds are required, it is recommended that additional external capacitance be used. The use of additional

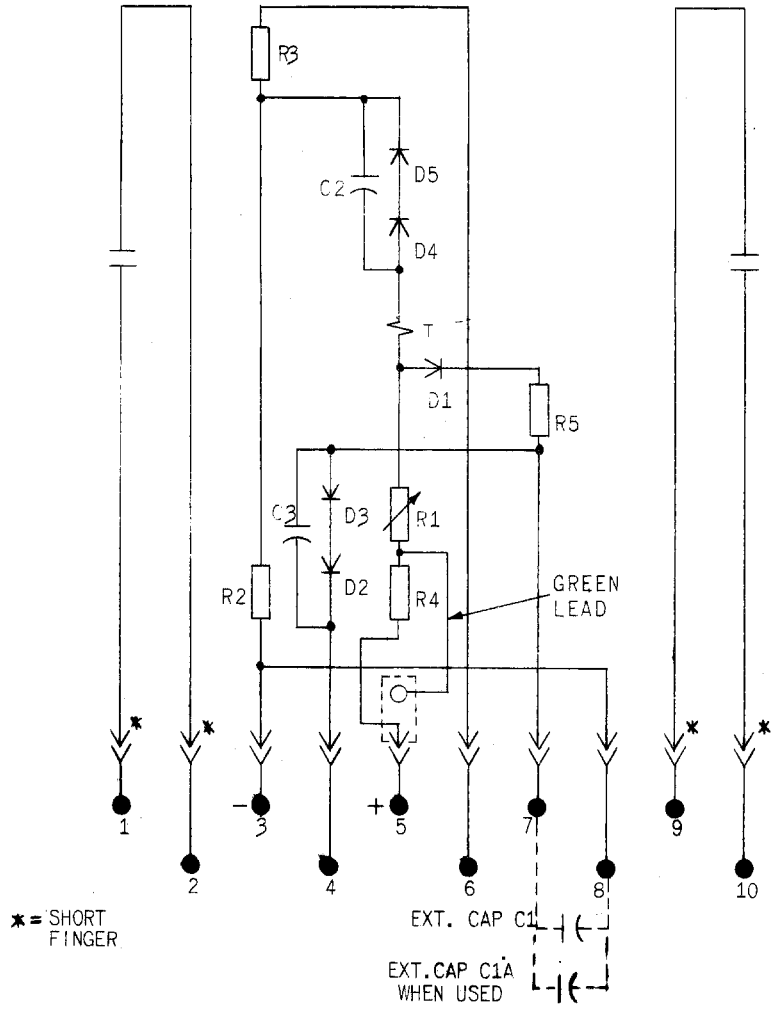
external capacitance will yield proportionally longer operating and capacitor discharging times.

prompt replacement of any that are worn, broken or damaged.

### RENEWAL PARTS

It is recommended that sufficient quantities of renewal parts be carried in stock to enable the

When ordering renewal parts, address the nearest Sales Office of the General Electric Company, specify quantity required, name of part wanted, and give complete nameplate data.



\* Fig. 3 (0127A9560-1 Sh. 1) Internal Connection Diagram for NAM11A Relay (Front View)

VOLTAGE RATINGS	R1 OHMS	R2 OHMS	R3 OHMS	R4 OHMS	R5 OHMS	C2-C3 MFD	C1 MFD	T-COIL OHMS	C1A MFP
125/250 FORM 1	0-5000	1000	1000	5000	25	0.1	20	2500	—
48	0-1500	500	500	1500	5	0.1	50	2500	—
110/220	0-5000	1000	1000	5000	25	0.1	20	2500	—
125/250 FORM 4	0-5000	1000	1000	5000	25	0.1	20	2500	30

\* Fig. 3 (0127A9560-2 Sh. 2) Internal Connection Diagram for NAM11A Relay (Front View)

# DC TIMING RELAY

## NAM11A

### DESCRIPTION

#### INTRODUCTION

The NAM11A Relay is a DC operated resistance-capacitance timing relay having fast reset characteristics and practically no overtravel. Because the operating unit of this relay is voltage compensated, it has a relatively constant operating time independent of variations in applied voltage, see Fig. 6. The relay comes in a size S-1 drawout case and is supplied with an externally mounted capacitor. Refer to Fig. 1 for identification of nomenclature used throughout the text.

#### APPLICATION

The NAM11A relay was specifically designed for application as a circuit breaker failure back up timer. The small variation in operating time with applied voltage, the negligible overtravel and the quick reset features make this relay ideal for such applications. It is important to note that reset time, in the case of the NAM11A relay is defined as the time required for the capacitor to discharge to 10 percent of the existing charge when potential is removed by the opening of the protective relay contacts. These reset times are listed in Table II for the different voltage ratings.

The external connections to the NAM11A are illustrated in Fig. 2.

\*NOTE: The NAM11A relay should not be operated by protective relays having seal-in units rated less than 0.6 amps.

#### OPERATING CHARACTERISTICS

\* Models 12NAM11A1A, 12NAM11A2A, and 12NAM11A3A have an adjustable time delay on pickup of 30 to 200 milliseconds. Typical time curves for the various voltage ratings are shown in Fig. 6. The particular pickup time within the 30-200 millisecond range will depend on how rheostat R<sub>1</sub> is set and whether R<sub>4</sub> is shorted.

\* Model 12NAM11A4A is similar to model 12NAM11A1A except it has an additional 30 uf external capacitor. This causes the time delay on pickup to be 75 to 500 milliseconds.

\* The approximate operating times obtained with R<sub>4</sub> shorted and R<sub>1</sub> set for maximum resistance are shown in Table I. For the relays with a 300-200 millisecond pickup time range.

TABLE I  
Operating Time With R<sub>4</sub> Shorted & R<sub>1</sub> Maximum

RELAY RATING (Volts)	OPERATING TIME (Milliseconds)
250	120
125	150
48	100

The maximum time required for the external capacitor to discharge to 10 percent of its initial charge is shown in Table II.

TABLE II  
DISCHARGE TIME OF EXTERNAL CAPACITOR

VOLTAGE RATING (Volts)	TIME TO DISCHARGE TO 10% FO Full Charge (Milliseconds)
48	115
125/250	92

The operation of the NAM11A may be understood by referring to Fig. 2. Closure of the protective relay contact initiates charging of the external capacitor through the rheostat R<sub>1</sub> and resistor R<sub>4</sub>. At the same time DC bus voltage, V<sub>B</sub> will appear across R<sub>2</sub> and R<sub>3</sub>. When the voltage across the external capacitor, R<sub>5</sub> and D<sub>1</sub> exceeds  $\frac{V_B}{2}$  by a sufficient amount, the operating unit, T will pickup to close its normally open contacts.

When the protective relay contact is opened and DC bus voltage is removed, the external capacitor will discharge around the loop D<sub>3</sub>, D<sub>2</sub>, R<sub>3</sub> and R<sub>2</sub>.

*These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.*

*To the extent required the products described herein meet applicable ANSI, IEEE and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.*

### RATINGS

The NAM11A is available with intermittent DC \*voltage ratings of 48 volts, 110/220 volts and 125/250 volts.

The T unit contacts will make and carry 30 amperes for tripping duty. The contact interrupting abilities are listed in Table III.

TABLE III  
CONTACT INTERRUPTING ABILITY

VOLTAGE	INTERRUPTION	CURRENT (AMPS)
Volts	‡ Inductive	Non-Inductive
48 - DC	1.0	3.0
125 - DC	0.5	1.5
250 - DC	0.25	0.75
115-60 Cy.	0.75	2.0
230-60 Cy.	0.5	1.0

‡ Inductance of Average Trip Coil

### BURDENS

The burden of the NAM11A relay in watts depends on the setting of the variable resistor, R1. See Fig. 3 for a listing of the values for the various relay components.

### INTERNAL CONSTRUCTION

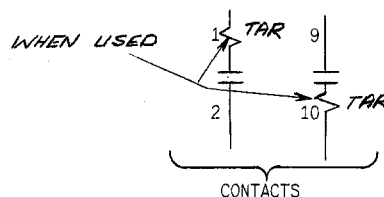
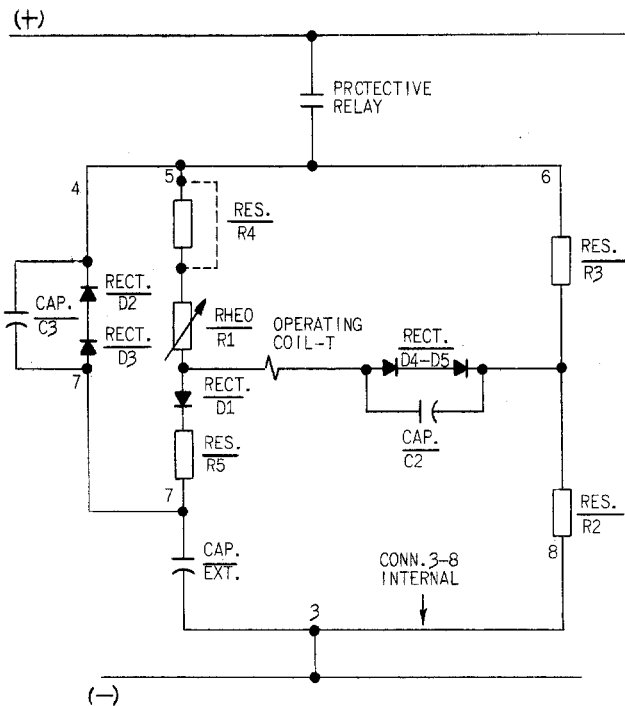
All of the NAM11A relay elements are mounted on a compound base plate which is fixed to the relay cradle. The screwdriver adjustment of rheostat R1 is accessible from the front of the relay when the cover is removed. Depending upon the pickup time required resistor R4 may be inserted or shorted out by reconnection of the green lead at terminal 5. Shorting out R4 by connecting the green lead directly to terminal 5 produces shorter pickup times. When the green lead is connected to the upper screw at terminal 5, longer pickup times are available. See Table I for an explanation as to when R4 should be shorted out.

## INSTALLATION

### RECEIVING

These relays, when not included as a part of a control panel will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it for any damage sustained in transit. If injury or damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Apparatus Sales Office.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured or the adjustments disturbed.



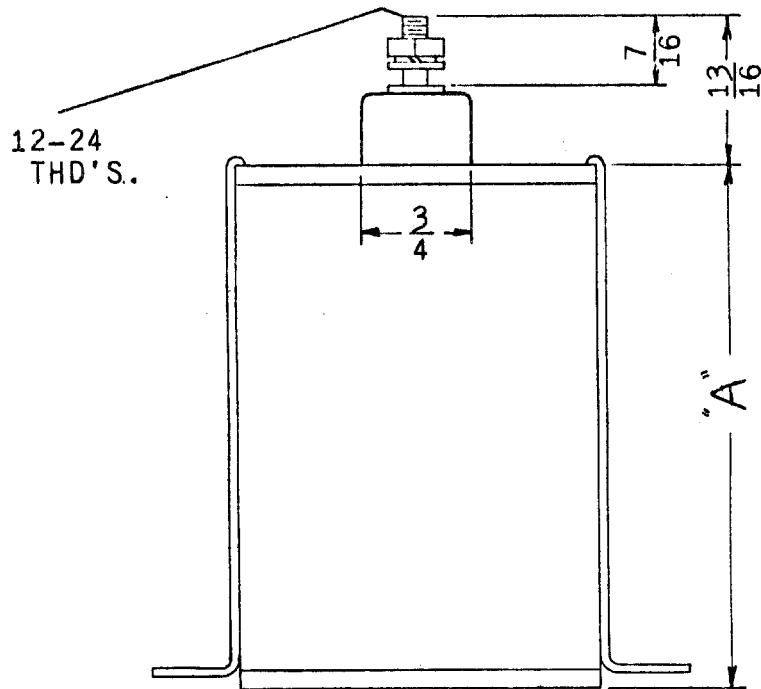
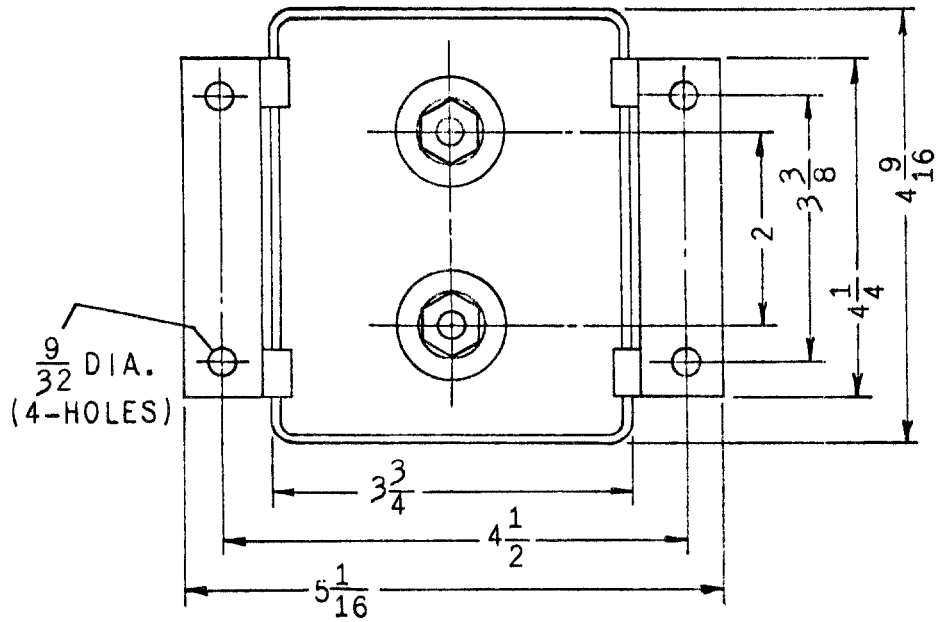
\* Fig. 2 (0127A9597-3) External Connections of NAM11A Relay

The circuitry of the NAM11A relay is so designed that the pickup time depends upon a relative voltage difference rather than the DC bus voltage.

### SETTINGS

\* Models 12NAM11A1A, 12NAM11A2A, 12NAM11A3A

The pickup time delay may be set to the desired value within the range of 30-200 milliseconds. The relay as shipped from the factory will be set to pick up at 167 ± 10 milliseconds if no pickup time is

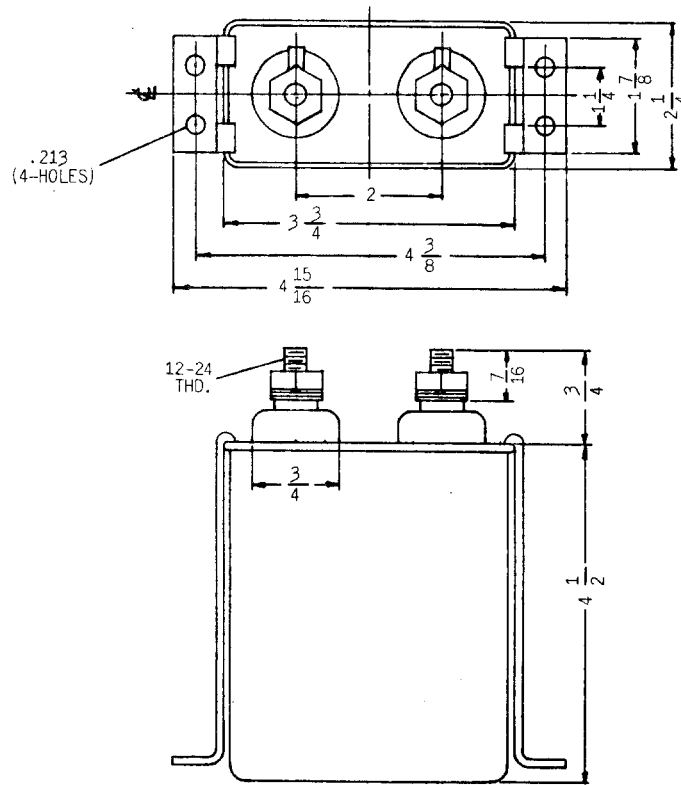


OUTLINE

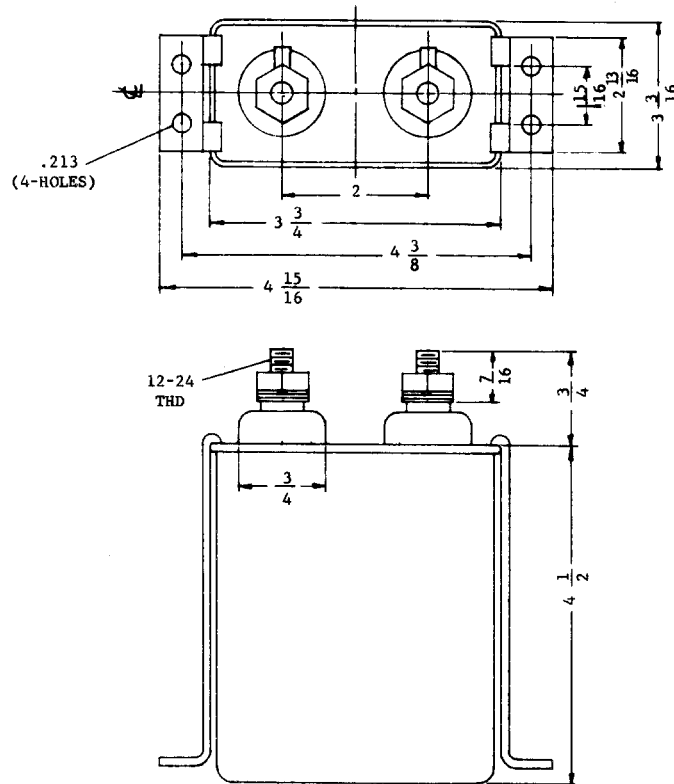
CAPACITOR NO.	"A" DIM.
23F713 G-102	5 1/8
23F1067 G-102	4 3/4

\* Fig. 4 (0402A0945-3) Outline of External 50uf Capacitor for Use with 48 Volt NAM11A Relay

GEI-74671 DC Timing Relay Type NAM

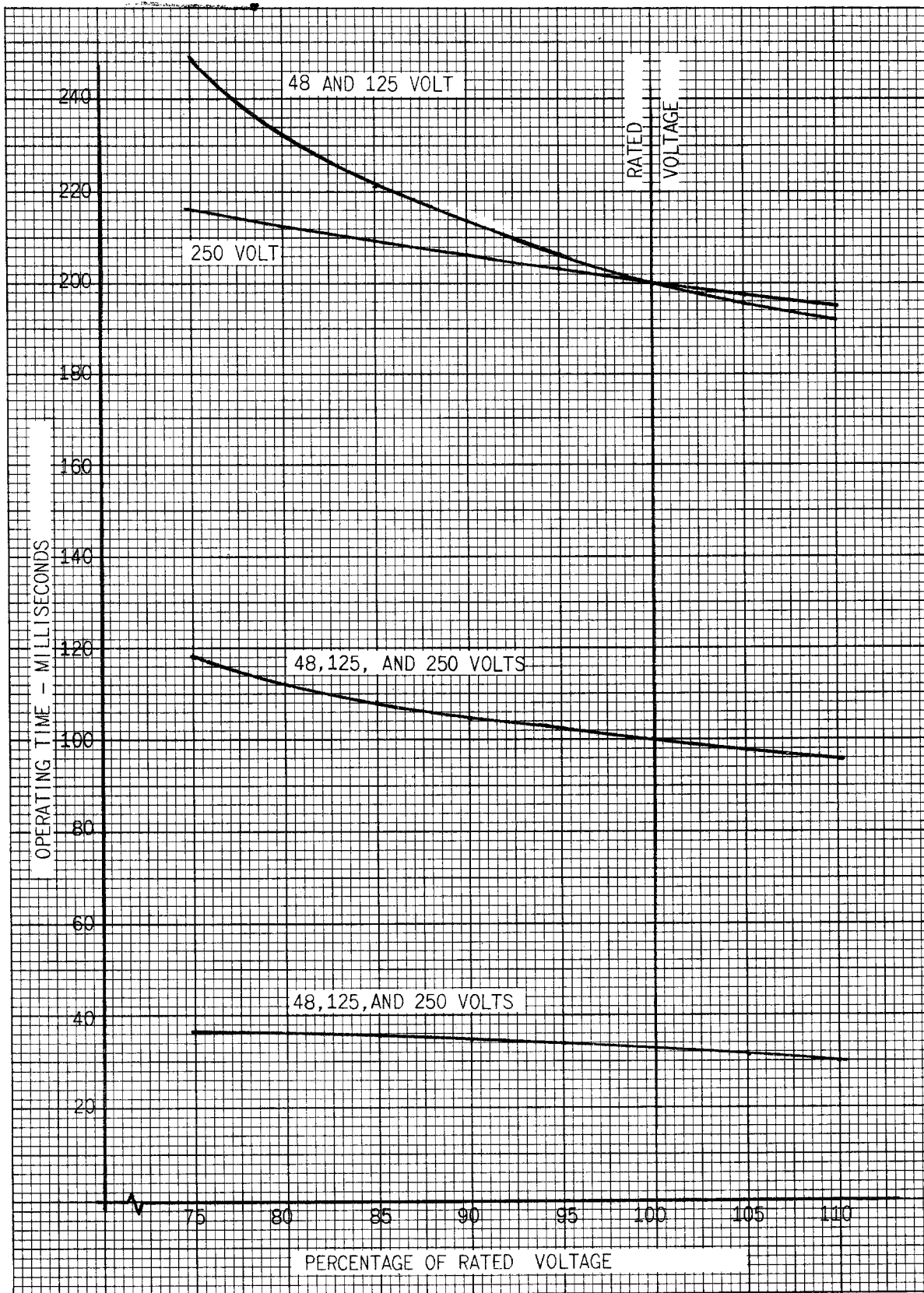


\* Fig. 5A (0127A9561-1) Outline of External 20uf Capacitor for Use with 125/250 Volt NAM11A Relay



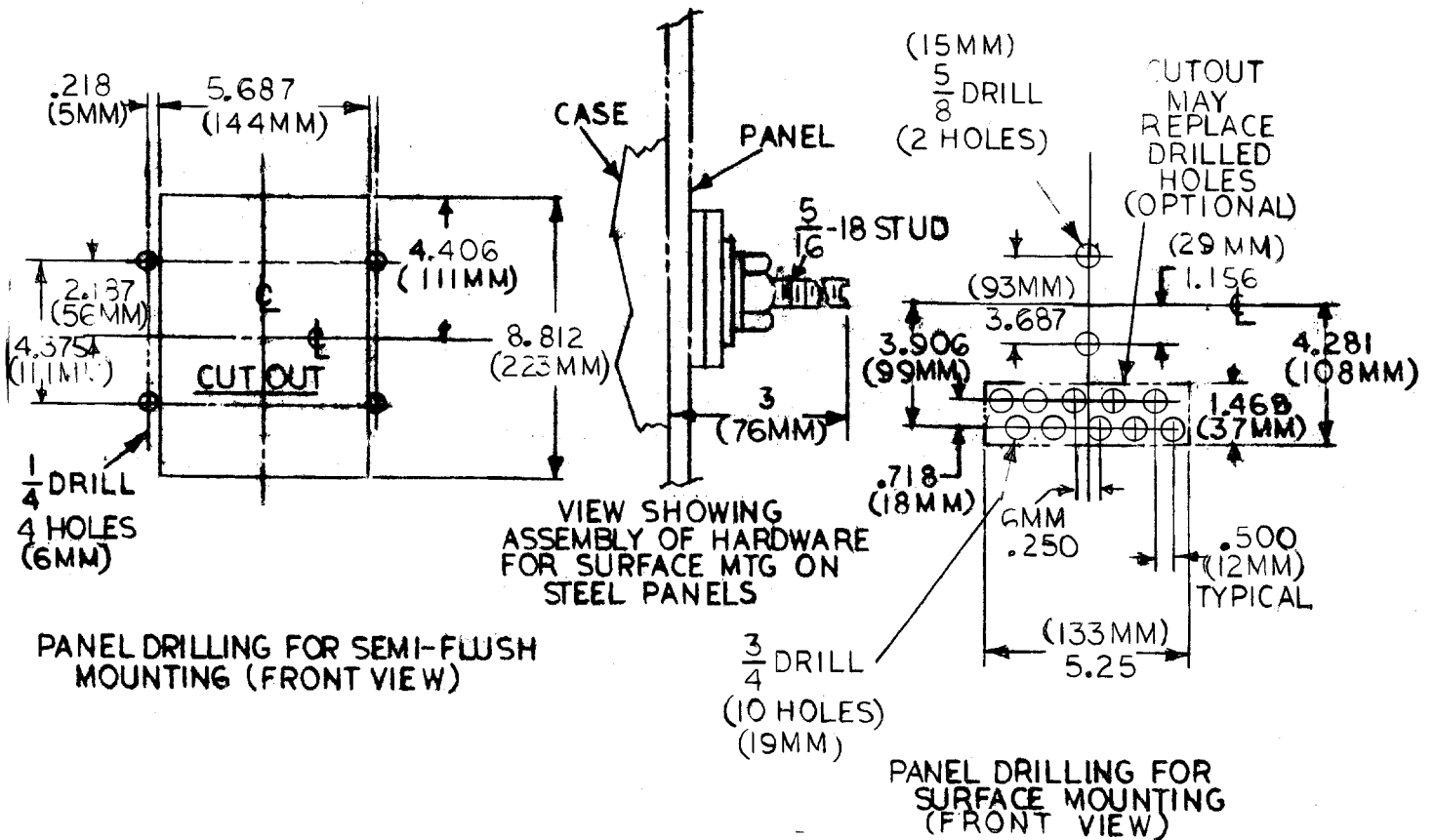
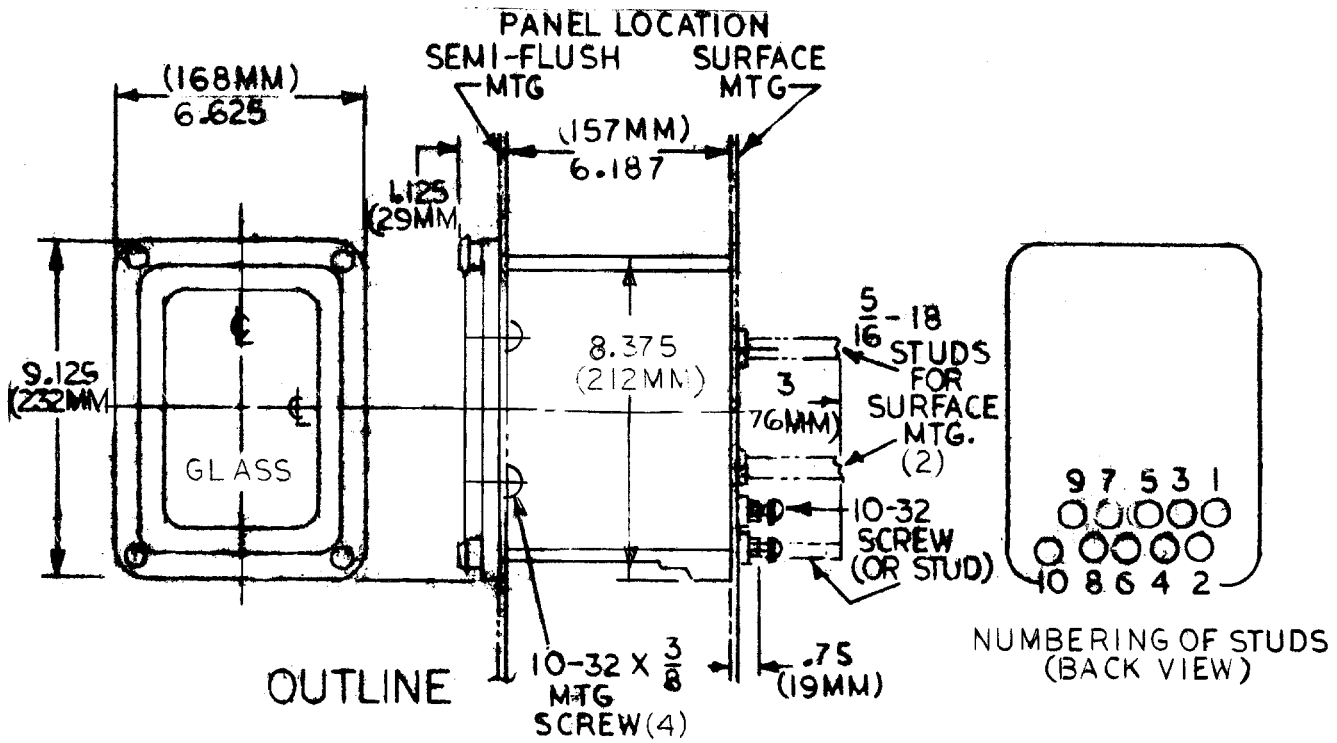
\* Fig. 5B (0178A8024-0) Outline of External 30uf Capacitor for Use with 125/250 Volt NAM11A Relay





TYPICAL OPERATING TIME CURVES FOR NAM11A RELAY

Fig. 6 (0148A3962-0) Typical Operating Time-Voltage Curve



\* Fig. 7 (6209271-5) Outline and Panel Drilling Diagram for the NAM11A Relay