



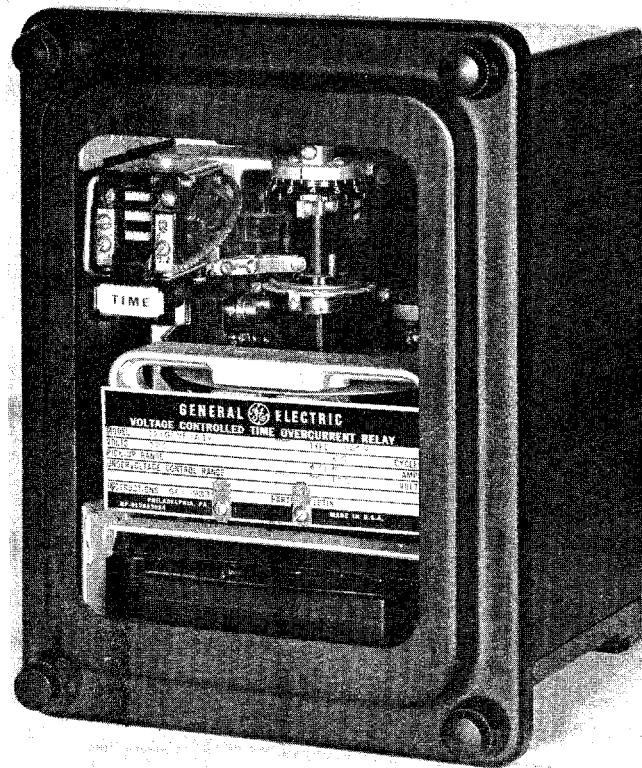
INSTRUCTIONS

GEI-98342A

SUPPLEMENT TO GEK-1753

SUPERSEDES GEI-98342

TIME OVERCURRENT RELAYS WITH VOLTAGE CONTROL



Type IGCV51A

GENERAL  ELECTRIC

GEI-98342 Time Overcurrent Relays With Voltage Control Type IGCV

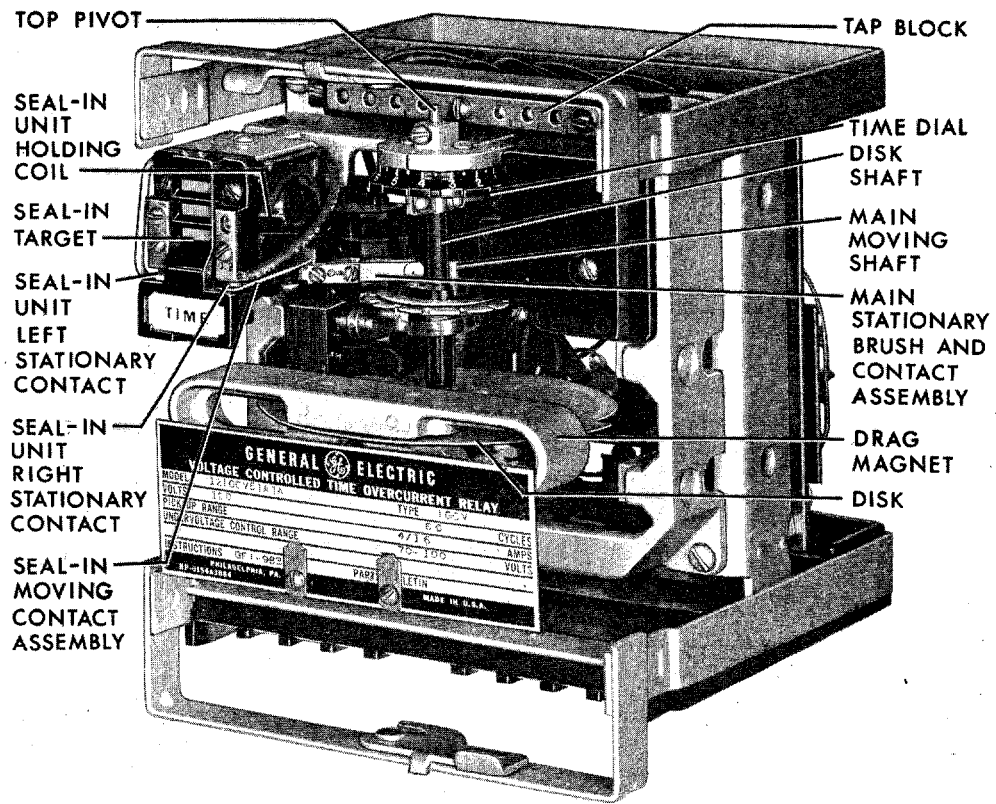


Fig. 1A (8035272) Type IGCV51A Removed From Case (Front View)

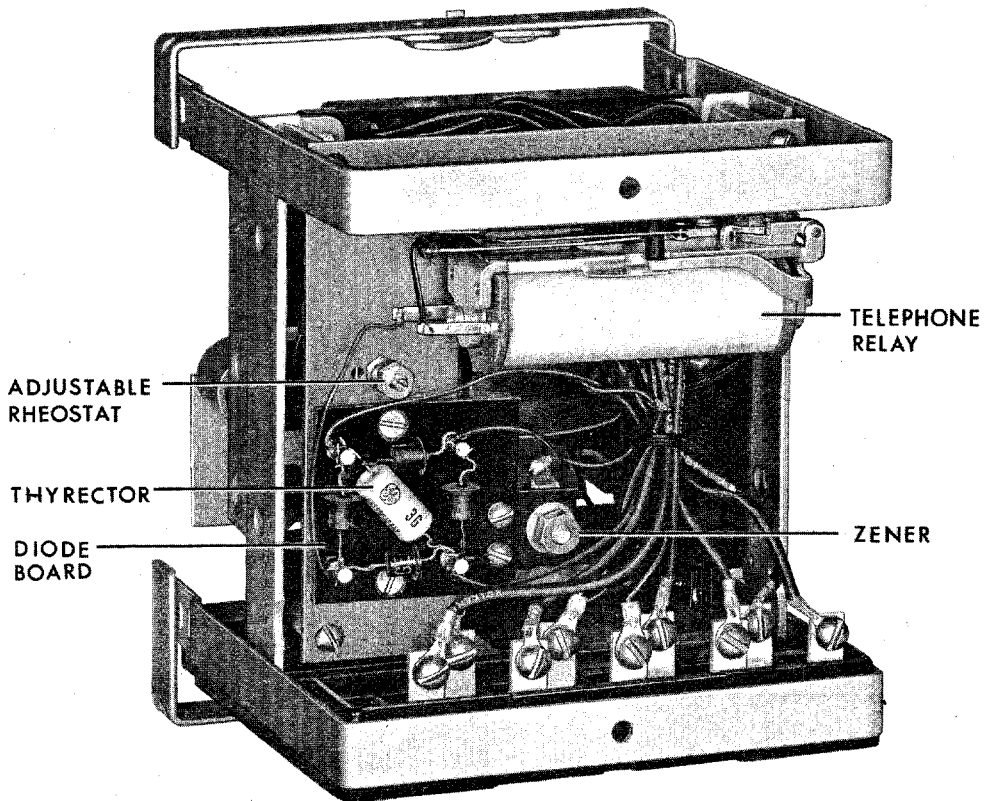


Fig. 1B (8035271) Type IGCV51A Removed From Case (Rear View)

TIME OVERCURRENT RELAYS WITH VOLTAGE CONTROL

TYPE IGCV

INTRODUCTION

These instructions are a supplement to Instruction Book GEH-1753 which is included in this book. The combination of the two form instructions for the IGCV51A relay.

The Type IGCV51A relays are drawout induction disk time overcurrent relays having voltage control. The time overcurrent unit is similar to an IAC51 relay but has wound shading coils on the driving U-magnet instead of solid shading rings.

The voltage control feature is accomplished by the shading coil circuit of the U-magnet completed by a contact of the undervoltage unit which closes on low voltage.

The undervoltage unit consists of a telephone type relay in series with a zener regulator connected across a full wave rectifier. A thyrector is connected across the rectifier A-C supply to protect the rectifiers from severe voltage surge. A rheostat is connected in series with the rectifier to provide pick-up adjustment.

Fig. 1 shows front and back views of the IGCV51A relay with its components identified.

APPLICATION SECTION

System fault back-up protection should be provided at the source of fault current, the generator. Such protection should provide against the generator continuing to supply short-circuit current to a fault in an adjacent system element because the fault may not have been removed by other protective equipment. The Type IGCV relay was designed for the purpose of providing external-fault back-up protection for the generator.

Phase-fault protection should be provided for the generator by either 3 single-phase Type IGCV relays or by 3 single-phase distance relays and a timer. The choice between the two types of protective equipment should be governed by the type of system protective relaying with which the external-fault back-up relays are to be selective.

In general, Type IGCV relays should be used when the generator connects to a bus at generator voltage, because such relaying equipment is most selective with inverse-time overcurrent relaying that is generally used for lines connected to such a bus. The distance relays should generally be used with unit generator-transformer arrangements because the distance relays will be most selective with distance or pilot relaying that is generally used for high-tension lines. An inverse-time overcurrent relay should be used for ground-fault protection.

The current source for Type IGCV relays should be current transformers at the neutral end of the generator windings when such CT's are available. With these connections, in addition to external-fault back-up protection the relays will provide generator fault back-up protection even if the generator breaker is open or there are no other source of generation on the system. If the neutral CT's are not available, then line-side CT's should be used. With these connections Type IGCV relays will be operative as fault back-up protection for the generator only when the generator breaker is closed, and there is another source of generation on the system.

Phase-to-phase voltage should be obtained from the generator potential transformers. Loss of potential to the Type IGCV relay will cause the relay to trip if the generator load current, expressed in relay secondary amperes, is greater than the pickup current of the relay. An additional relay, the Type CFVB, is available for protection against false tripping due to this accidental loss of the relay's restraint voltage.

The voltage-restrained overcurrent phase relays and the inverse-time overcurrent ground relay should be arranged to trip a hand reset auxiliary relay that will trip the main and field breakers and operate an alarm. When the Type IGCV relay is used to provide both primary generator short-circuit protection as well as external-fault back-up protection, as in the case when there are no neutral CT's available for phase differential relaying, this equipment should also operate to shut down the prime mover.

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.

***CALCULATION OF SETTINGS**

Current pickup of the Type IGCV relay should generally be set between 50 percent and 60 percent of full load current on regulated generators, and between 40 percent and 50 percent full load current on unregulated generators.

The relay time setting is determined by system selectivity requirements. Though the current decrement curves of the generator must be taken into consideration to determine the actual operating time of the Type IGCV relay, simplifying assumptions can be made which facilitate application of the Type IGCV relay and yet maintain a satisfactory operating performance. The maximum fault current condition for which time-current coordination must be obtained should be based on the transient reactance of the generator.

CHARACTERISTICS

The characteristics of the overcurrent unit are in the attached instruction book.

The undervoltage unit is a hinged armature unit which drops out when the magnetic pull created by the ampere turns in the operating coil is less than the force of the opening spring. The dropout voltage is changed by adjusting the rheostat and the voltage range is given in Table A. The pickup voltage is 110 percent or less of the dropout voltage. On any dropout operation, the voltage range from the beginning of the action to its completion is about one percent of rated voltage.

TABLE A

RATED VOLTS	RANGE OF DROPOUT ADJUSTMENTS
69	40-58
120	70-100
208	121-173
240	140-200

The relay pickup time is approximately 2 cycles and the dropout characteristic (voltage against time) is shown in Fig. 2.

The burden of the voltage unit is at unity power factor and the values are given in Table B.

TABLE B

RATED VOLTS	MAXIMUM BURDEN WATTS
69	4.0
120	4.2
208	4.75
240	4.5

CONNECTIONS

The internal connection diagram is shown in Fig. 3.

Typical external connections are shown in Fig. 4. Since it may also be desirable to use the Type IGCV relay for external-fault back-up protection with unit generator-transformer equipments, Fig. 5 shows the choices of connections available to obtain the necessary protection. It should be noted that auxiliary potential transformers are required to obtain the proper phase relationship when using generator voltage to detect line-side faults.

*Indicates Revision

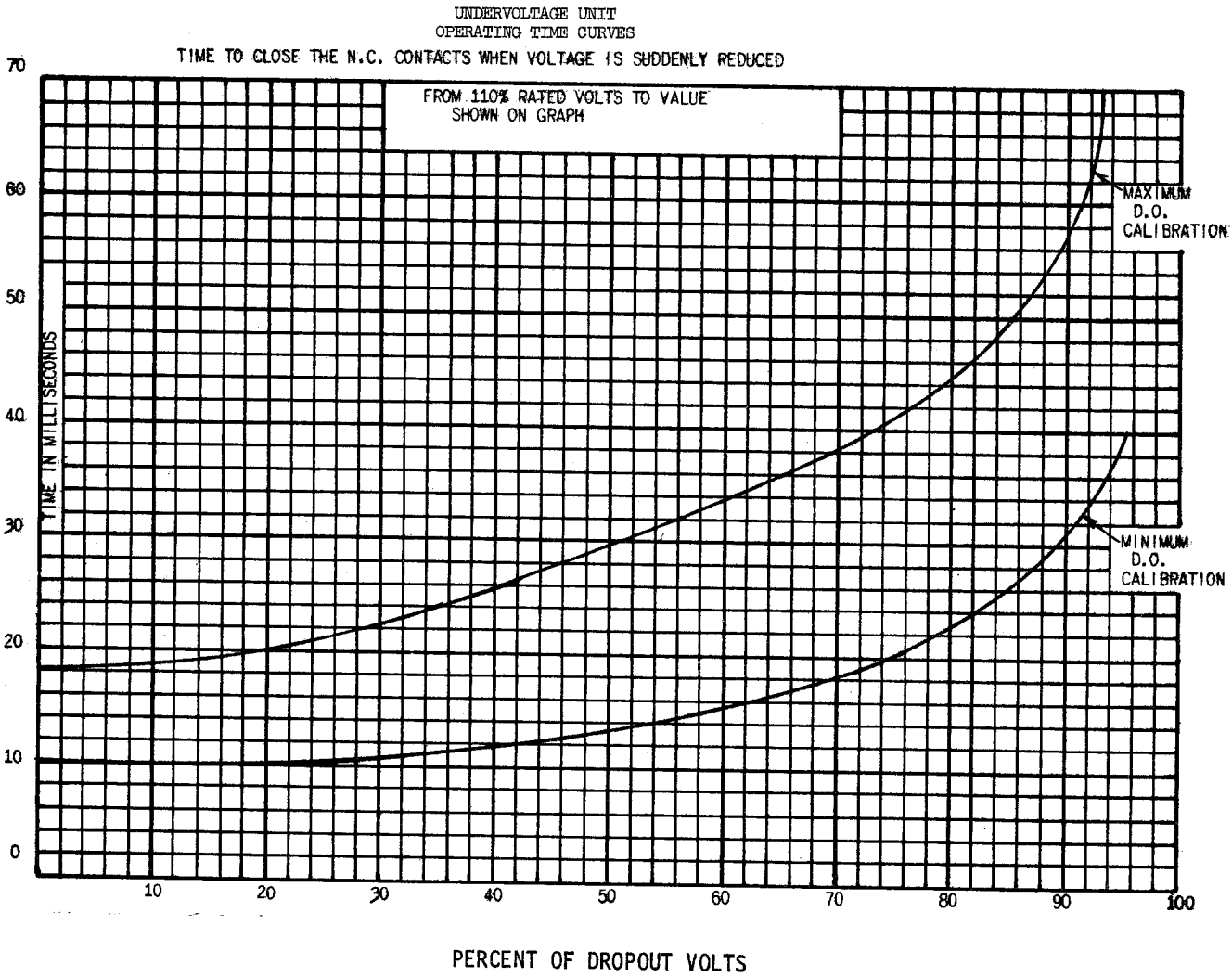
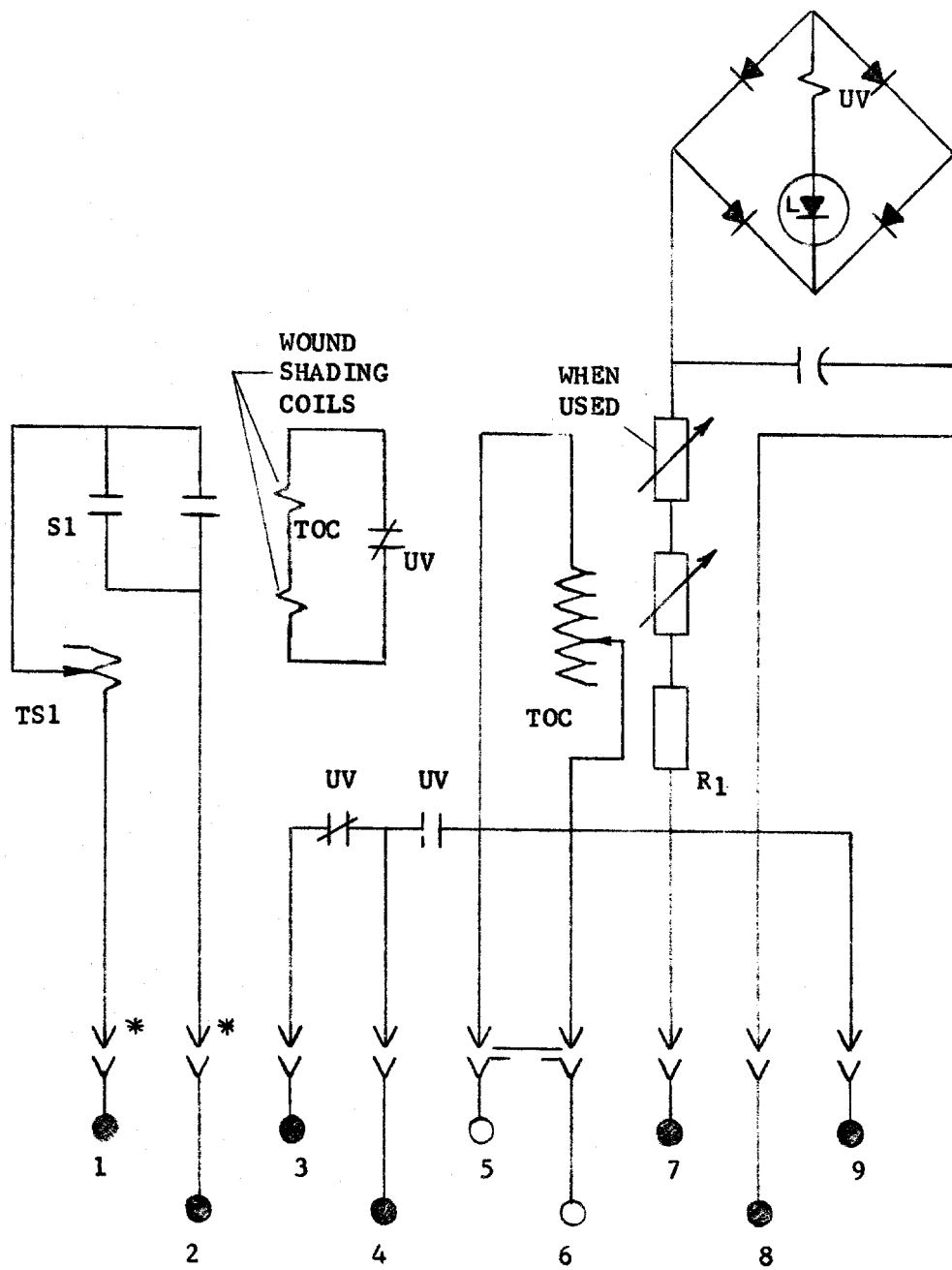
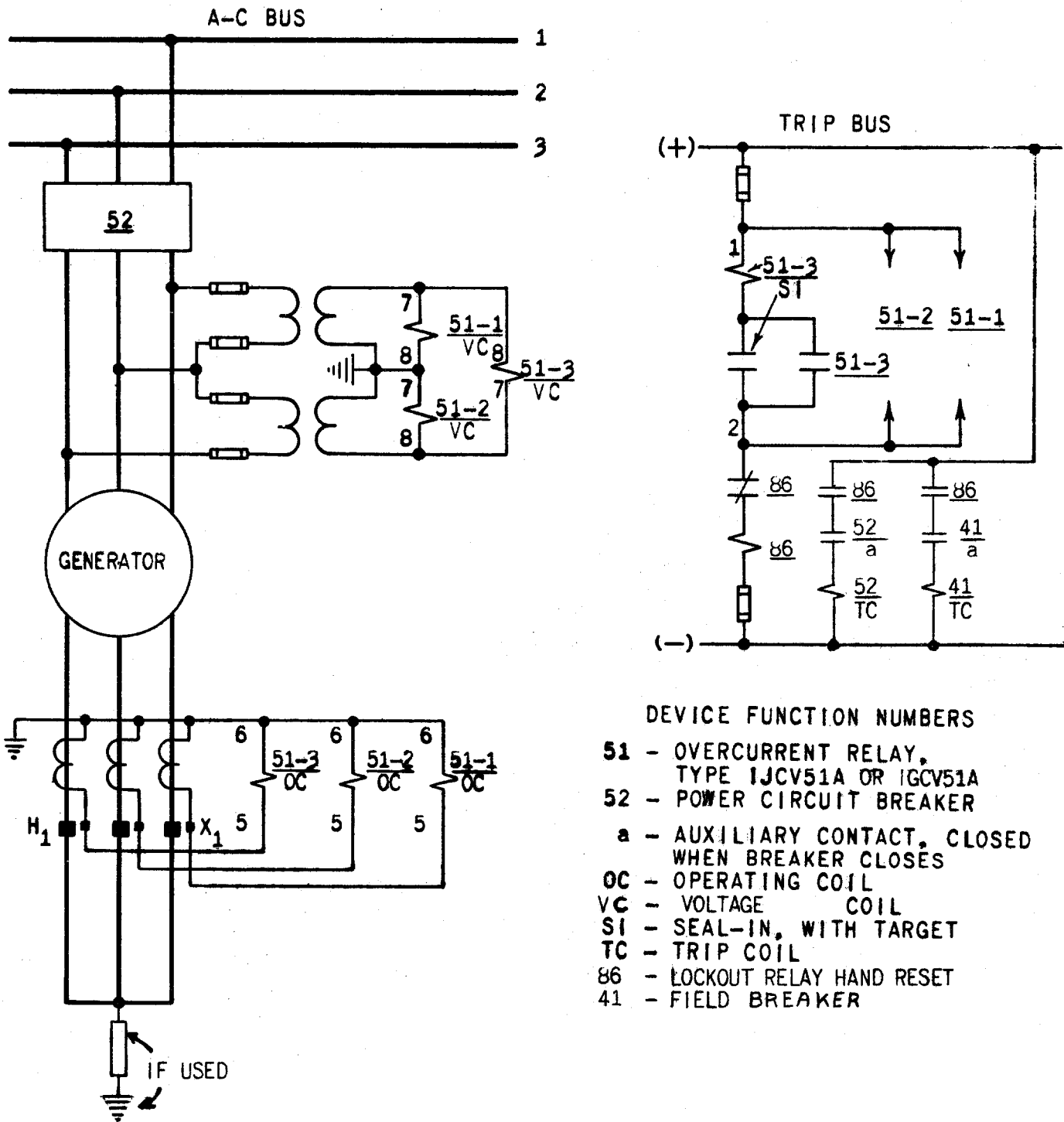


Fig. 2 (0165A7560-0) Operating Time Curves For The IGCV Relay



* = SHORT FINGERS

*Fig. 3 (0195A9114-0) Internal Connections for the Type IGCV Relay (Front View)



- DEVICE FUNCTION NUMBERS
- 51 - OVERCURRENT RELAY, TYPE IJCV51A OR IGCV51A
 - 52 - POWER CIRCUIT BREAKER
 - a - AUXILIARY CONTACT, CLOSED WHEN BREAKER CLOSSES
 - OC - OPERATING COIL
 - VC - VOLTAGE COIL
 - SI - SEAL-IN, WITH TARGET
 - TC - TRIP COIL
 - 86 - LOCKOUT RELAY HAND RESET
 - 41 - FIELD BREAKER

Fig. 4 (6400786-9) External Connections For Relay Type IGCV51A

GEI-98342 Time Overcurrent Relays With Voltage Control Type IGCV

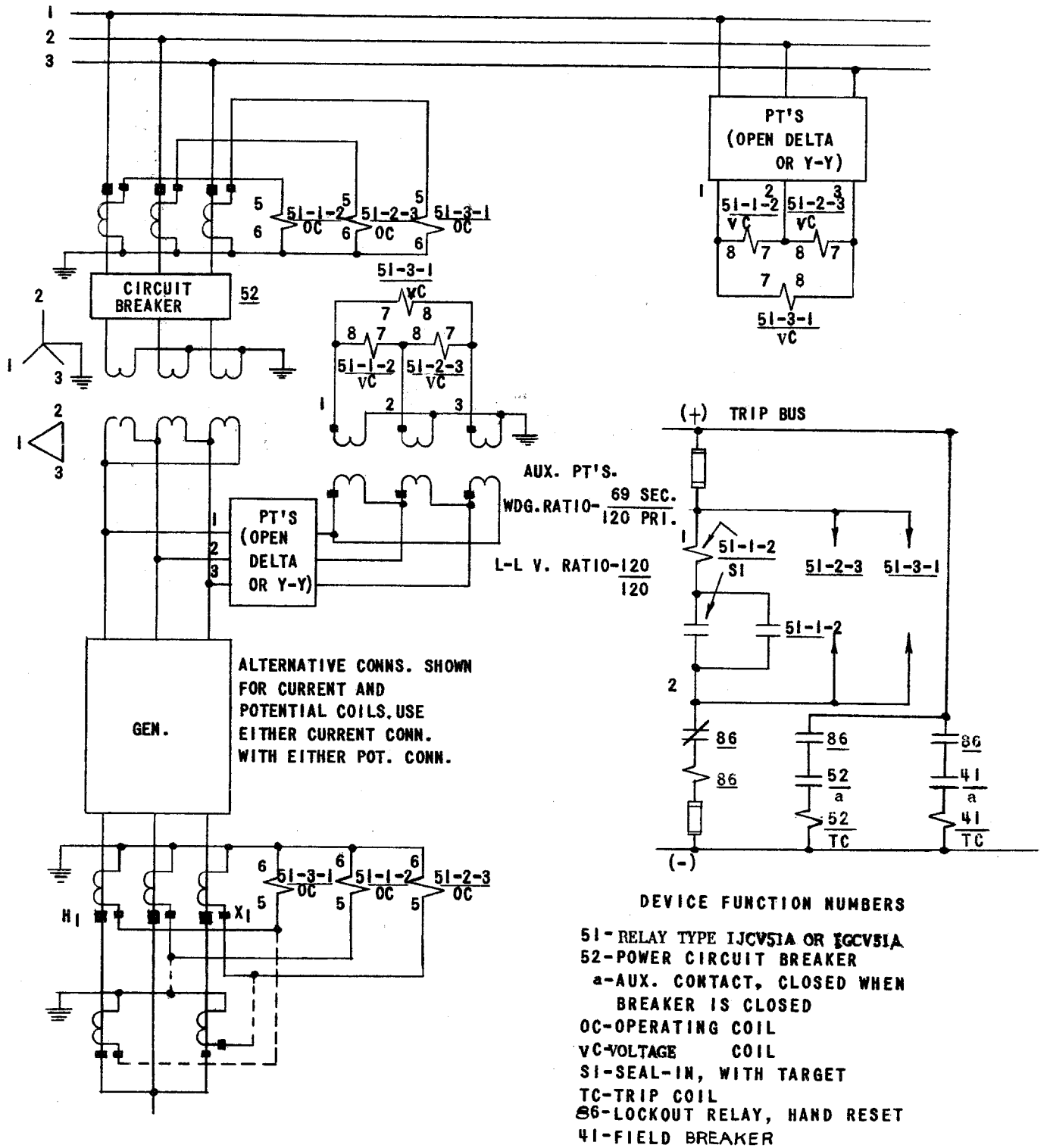


Fig. 5 (418A710-6) External Connections Of Relay Type IGCV51A For Protection Against Faults On High Side Of Wye-Delta Bank