



INSTRUCTIONS

GEK- 45315
Insert Booklet GEK-45307

TRANSFORMER DIFFERENTIAL RELAY
WITH PERCENTAGE AND HARMONIC RESTRAINT

TYPE STD28C

6 RESTRAINT CIRCUITS

GENERAL  ELECTRIC

TRANSFORMER DIFFERENTIAL RELAY
WITH PERCENTAGE AND HARMONIC RESTRAINT

TYPE STD28C

INTRODUCTION

These instructions are a supplement to instruction book GEK-45307, which is attached. The combination of the two form the instructions for the Type STD28C.

DESCRIPTION AND APPLICATION

The STD28C relay is a single phase harmonic restrained transformer percentage differential relay for the protection of high voltage rectifier transformers. This relay is similar to the STD15C, except that the harmonic restraint is provided by the second harmonic only so that the normal odd harmonic flowing in a rectifier transformer will not reduce the relay sensitivity. This harmonic selection is accomplished by precisely tuned filters. However, the change in harmonic restraint does not change the application or setting calculation as outlined for the STD15, except the STD28 relay is so designed that the harmonic restraint may be set at 15% minimum.

Note that the STD28C relay have five (5) restraint windings as opposed to only three (3) as in the STD51C.

Figure 1 illustrates the outline and panel drilling for the STD28C(-)D drawout case.

Figure 2 illustrates the internal connections diagram for the STD28C.

Figure 3 illustrates the external wiring diagram for the STD28C relay.

Figure 4 illustrates the test circuit for the STD relays. Note polarity when connecting DC sources.

TESTING INSTRUCTIONS

The STD28C relay may be tested per the instructions in the attached instruction book. In addition, since the harmonic restraint can be set at 15% by adjusting R₂ such may be checked by adjusting the I₂(d-c) at 4.0 amps and the I₁(a-c) (current into relay) at 8.1 amperes per the test circuit illustrated in Figure 4 with S2 switch closed to position "A".

A tolerance of + 1% is acceptable, thus if the relay operated within 14 - 16% harmonic current restraint for the 15% calibration, no attempt should be made to obtain a more precise setting.

The following expression shows the relationship between the percent second harmonic, the d-c component, and the by-pass current.

$$\% \text{ SECOND HARMONIC} = \frac{.212 I_2 (d-c)}{.45 I_1 (a-c) + 0.5 I_2 (d-c)} \times 100$$

By setting the I₂(d-c) at 4.0 amps, and solving for the "% second harmonic" for 14 - 16%, the following by-pass current levels are required:

% H.R.	I ₁ (a-c)
14%	9.1
15%	8.1
16%	7.3

This matter is discussed in more detail in the attached instruction book under the paragraph "Harmonic Current Restraint".

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.

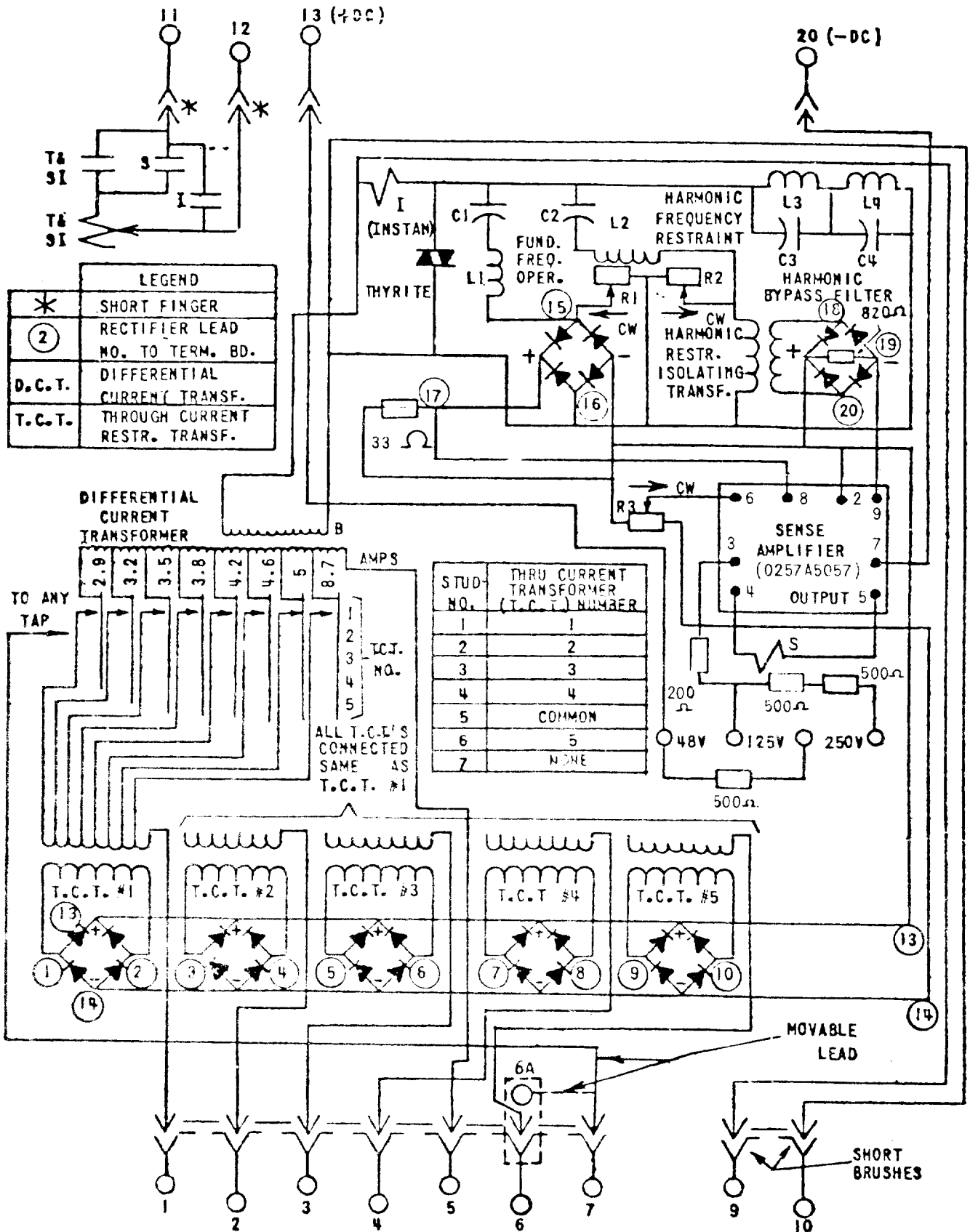


FIG. 2 (0257A5034-0) Internal Connections Diagram For The STD28C Relay (Front View)

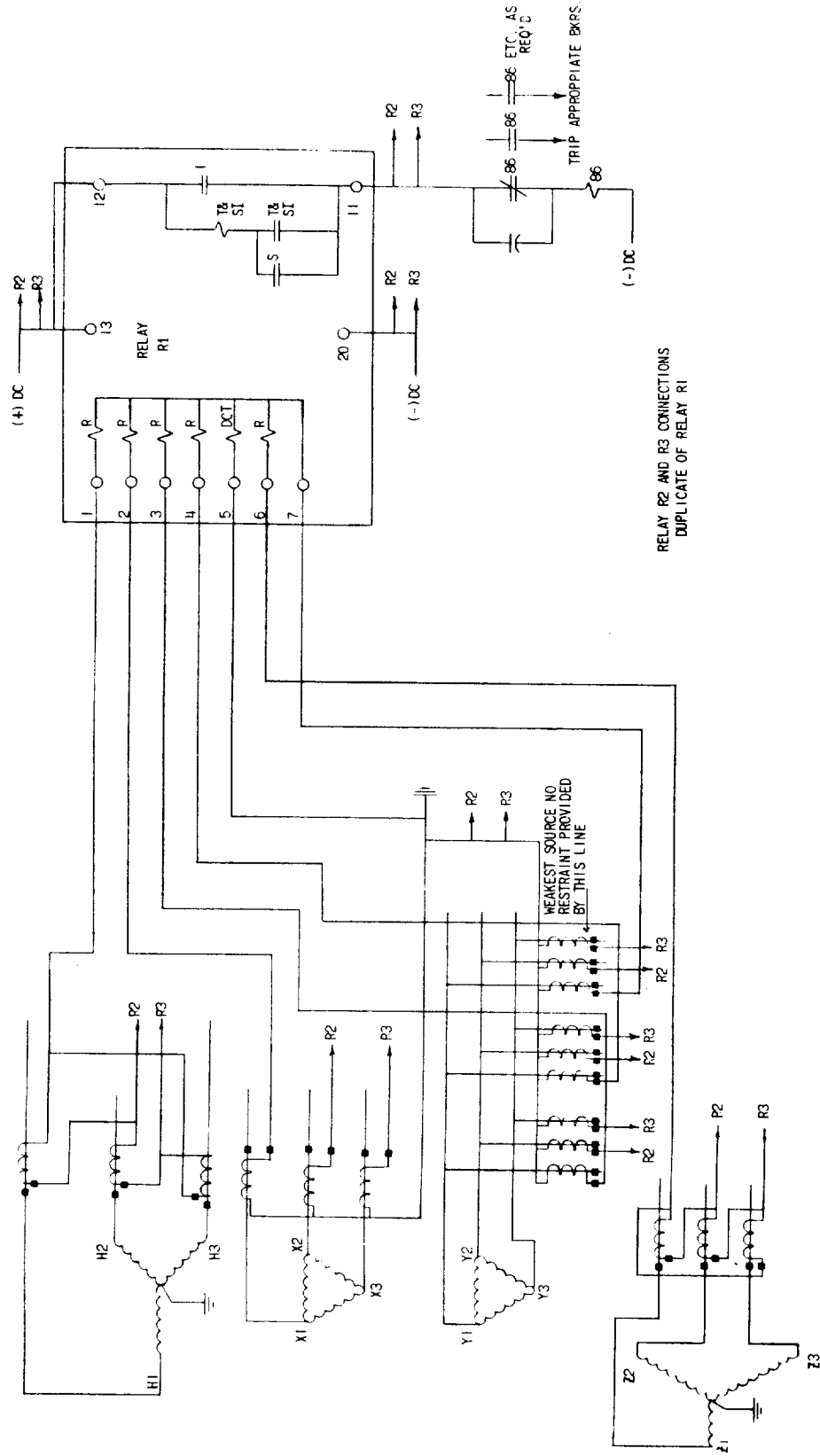


FIG. 3 (0165B2678-1) External Connections Diagram For The ST128 Relay

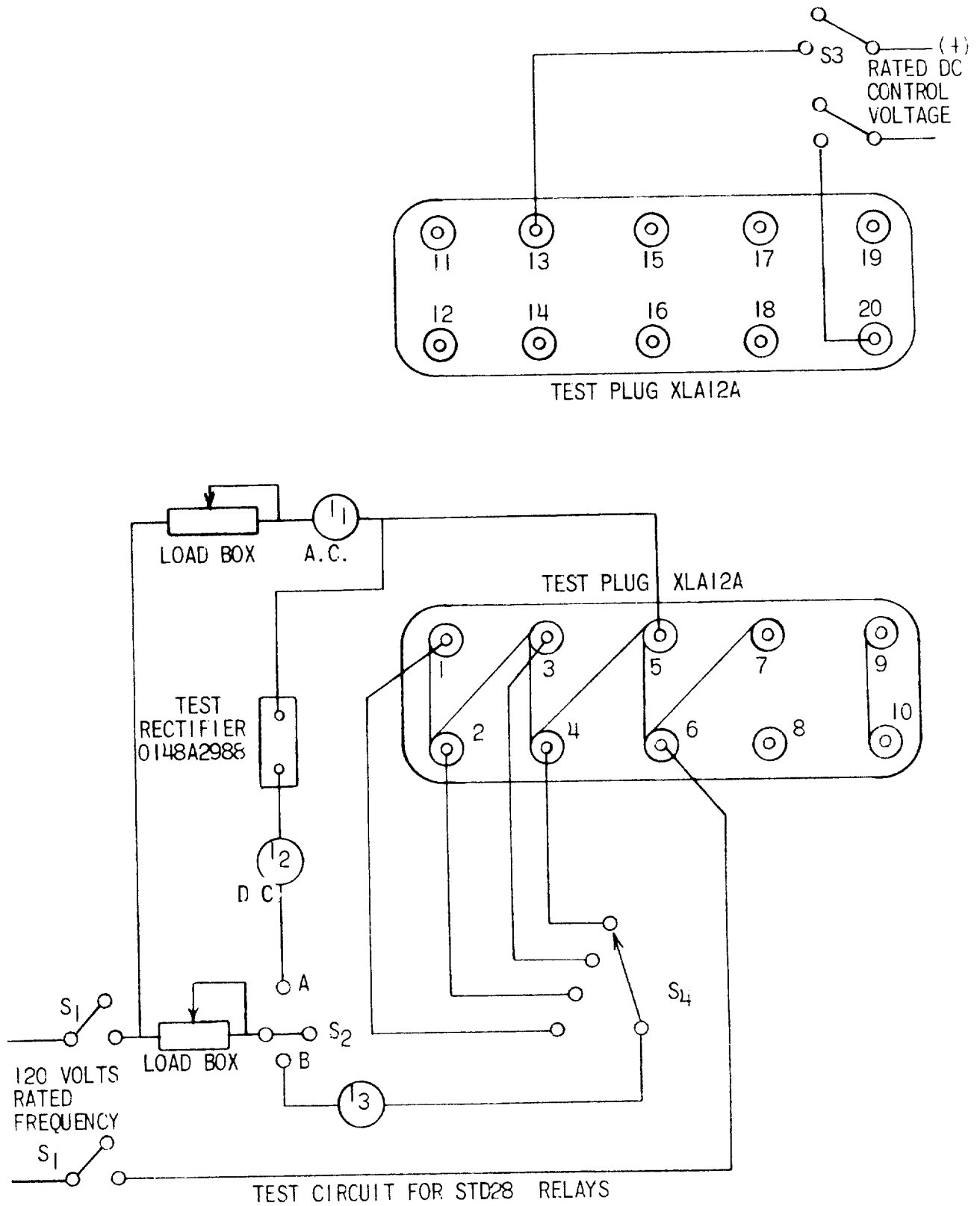


FIG. 4 (0246A6970-1) Test Circuit For The STD28 Relay



GE Power Management

**215 Anderson Avenue
Markham, Ontario
Canada L6E 1B3
Tel: (905) 294-6222
Fax: (905) 201-2098
www.ge.com/indsys/pm**