

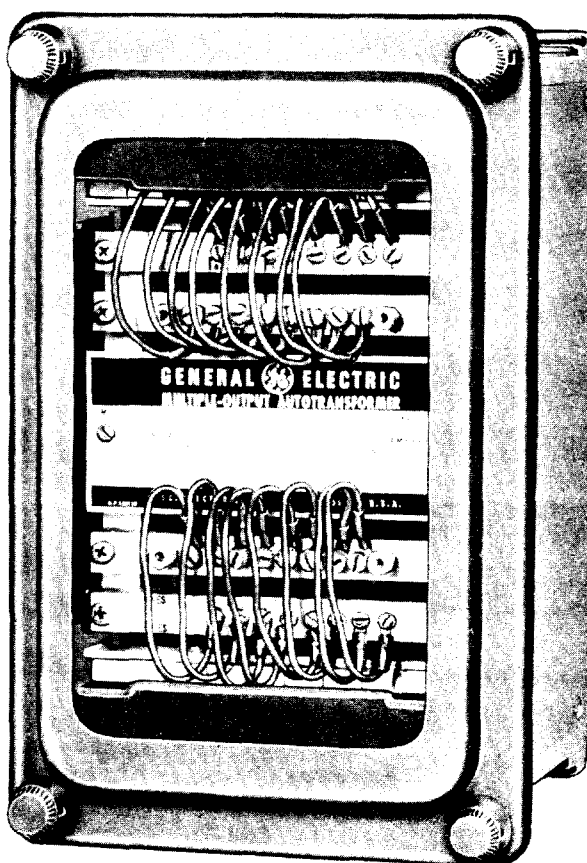


INSTRUCTIONS

GEI-23944B

AUTOTRANSFORMER

**TYPE XJA11A
XJA11B**



GENERAL  **ELECTRIC**

AUTOTRANSFORMER TYPE XJA11

INTRODUCTION

The Type XJA11 relay is a tapped autotransformer unit designed primarily as a reach adjusting element for use with distance relays, Type GCX or Type GCY. It is used to adapt one terminal of stand-by Type GCX or Type GCY relays for use as replacement for any one of several different relays on lines of different lengths without changing the internal reach settings of the relays. The relay consists of an autotransformer and four terminal blocks which are used for setting the different restraint voltages for the several lines with which it is to be used.

APPLICATION

Three Type XJA11 relays with suitable selector switches are used with one set of three distance relays on a bus tie breaker or on a spare circuit breaker which is used to replace any one of several circuit breakers that are on lines of different lengths. The proper tap settings are pre-set in the Type XJA relay. When the relays associated with the Type XJA relay are required to protect a particular line, the operation of the Type SB-1 selector switch to the proper position will select the necessary tap settings for protecting the selected line. This arrangement permits the switching of a single set of distance relays with their associated circuit breaker so as to maintain protection on any one of the several lines originating in a particular power station while the regular equipment is out of service for maintenance reasons.

OPERATING CHARACTERISTICS

For the purpose of protecting more than one length of line the stand-by distance relays associated with the Type XJA transformer would be set to operate on the shortest line, i.e., the line that requires the largest restraint voltage. As the distance relay is switched into lines of longer lengths, the pre-set taps on the Type XJA transformer are selected by means of the selector switch so as to supply less voltage to the autotransformer of the distance relay. Since the tap settings of the autotransformer of the distance relays have not been

changed, the reduction of voltage across the autotransformer by means of the Type XJA transformer results in less restraint voltage in the relay coils. The relay therefore has the equivalent of a different tap setting so that it will protect the longer length of line without changing its internal tap block setting.

As an example, three lines of different lengths are to be protected by one terminal of stand-by distance relays. The distance relays are therefore set to protect the shortest line and therefore are connected through the selector switch to studs 10 and 20 of the Type XJA relay so as to receive the full potential transformer voltage. To protect the next longer line, the distance relays will be connected to various studs of the Type XJA relay through the selector switch so that a reduced voltage will be supplied to the relay. The amount of the necessary reduction in voltage is accomplished by the tap setting of the Type XJA relays to its transformer. In the same manner the connections can be made so that the stand-by terminal of distance relays will be set to protect three other lines of different lengths. Thus, with this arrangement, five lines of different lengths may be protected with one terminal of stand-by distance relays employing the Type XJA11 autotransformers and suitable selector switches.

RATINGS AND BURDENS

The Type XJA relay is rated for 115 volts, 50 or 60 cycles and has a rated maximum total output of 0.75 amperes. The burden imposed on each potential transformer in a three-phase terminal of three Type XJA relays at 115 volts 60 cycles is:

R	X	Z
5600	9350	10850

This corresponds to:

Watts	Vars	Volt-amps	P.F.
0.63	1.05	1.22	0.52

RECEIVING, HANDLING AND STORAGE

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 un-

packing the relay in order that none of the parts are injured or the adjustments disturbed.

If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust and metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed and cause trouble in the operation of the relay.

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.

DESCRIPTION

CASE

The case is suitable for either surface or semiflush panel mounting and an assortment of hardware is provided for either mounting. The cover attaches to the case and also carries the reset mechanism when one is required. Each cover screw has provision for a sealing wire.

The case has studs or screw connections at both ends or at the bottom only for the external connections. The electrical connections between the relay units and the case studs are made through spring backed contact fingers mounted in stationary molded inner and outer blocks between which nests a removable connecting plug which completes the circuits. The outer blocks, attached to the case, have the studs for the external connections, and the inner blocks have the terminals for the internal connections.

The relay mechanism is mounted in a steel framework called the cradle and is a complete unit with all leads being terminated at the inner block.

This cradle is held firmly in the case with a latch at the top and the bottom and by a guide pin at the back of the case. The cases and cradles are so constructed that the relay cannot be inserted in the case upside down. The connecting plug, besides making the electrical connections between the respective blocks of the cradle and case, also locks the latch in place. The cover, which is fastened to the case by thumbscrews, holds the connecting plug in place.

To draw out the relay unit the cover is first removed, and the plug drawn out. Shorting bars are provided in the case to short the current transformer circuits. The latches are then released, and the relay unit can be easily drawn out. To replace the relay unit, the reverse order is followed.

A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel either from its own source of current and voltage, or from other sources. Or, the relay unit can be drawn out and replaced by another which has been tested in the laboratory.

INSTALLATION

LOCATION

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

MOUNTING

The relay should be mounted on a vertical surface. The outline and panel drilling diagram is shown in Fig. 3.

CONNECTIONS

The internal connection diagram for the Type XJA11 relay is shown in Fig. 1. The desired output voltage for each line to be protected can be obtained by connecting the appropriate taps of the center terminal blocks to the output selector blocks. The 10 per cent taps are connected to points on the upper output selector block, while the one per cent taps are connected to points on the lower output selector block.

Note that the circuit through relay terminals 1 and 11 is connected in series with the circuit-breaker trip circuit. Thus tripping of the breaker is blocked if either the top or bottom connecting plug is removed.

One of the mounting studs or screws of each relay case should be permanently grounded by a conductor of not less than No. 12 B & S gage copper wire or its equivalent.

The external connections for the Type XJA11

relay are shown in Fig. 2. Connection A is used when the three zone settings can always be made in the same ratio. This connection can be used with one set of distance relays to provide stand-by protection for nine lines of different lengths. Connection B is used when the third zone setting must be made independently of the first and second zone settings. When so connected, the Type XJA11 relay can be used with one set of distance relays to provide stand-by protection for up to five lines of different lengths.

ADJUSTMENTS

Assume that there are three lines (A, B, and C) to be protected by one set of the standby distance relays, Type GCY. Their ohmic lengths, and three zone settings are as follows:

	Line Length Ohms, Phase- to-Neutral	First Zone Setting Ohms	Second Zone Setting Ohms	Third Zone Setting Ohms
Line A	4	3.6	6	12
Line B	5	4.5	5.5	7
Line C	6	5.4	8.5	16

Since no one line has the lowest settings for all three zones, the relay should be set for the lowest of each of the three zones. The Type GCY relay has a minimum ohmic reach of 3 ohms phase-to-neutral on all three zones.

$$\text{Relay Zone 1 } \frac{3}{3.6} = 83 \text{ per cent}$$

$$\text{Zone 2 } \frac{3}{5.5} = 55 \text{ per cent}$$

$$\text{Zone 3 } \frac{3}{7} = 43 \text{ per cent}$$

The Type XJA relay settings are as follows:

For Line A:

Zones 1 and 2 = $\frac{3.6}{3.6} = 100$ per cent. This gives a second zone setting of 5.5 ohms instead of the required 6 ohms. Since zones 1 and 2 are not separated in the Type XJA transformer, a compromise to 5.8 ohms or even to the 6 ohms required for Line A may be necessary. This will also affect the zone 2 setting for Line B as shown below.

Zone 3 will be set in accordance with the ratio of the required setting to the relay setting.

$$\text{Zone 3} = \frac{7}{12} = 58 \text{ per cent}$$

For Line B:

Zones 1 and 2 = $\frac{3.6}{4.5} = 80$ per cent. This gives a second zone setting of 6.9 ohms. Taking the zone 2 setting into account, a compromise may again be necessary to shorten the zone 2 reach for Line B.

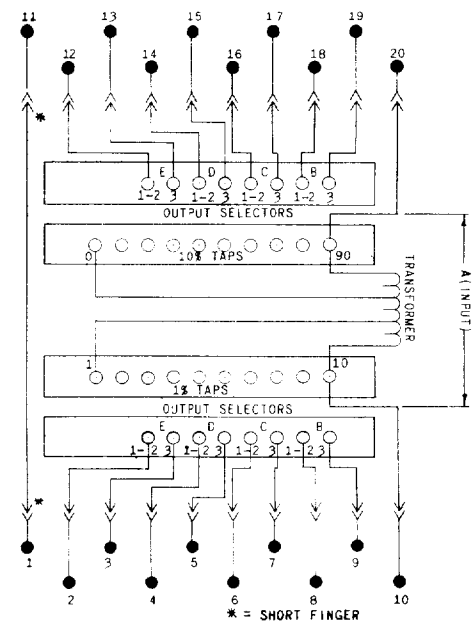
$$\text{Zone 3} = \frac{7}{7} = 100 \text{ per cent}$$

For Line C:

Zones 1 and 2 = $\frac{3.6}{5.4} = 67$ per cent. This gives a second zone setting of 8.2 ohms which is very close to the required setting.

$$\text{Zone 3} = \frac{7}{16} = 43 \text{ per cent}$$

The actual Type XJA relay settings that are to be set are then:



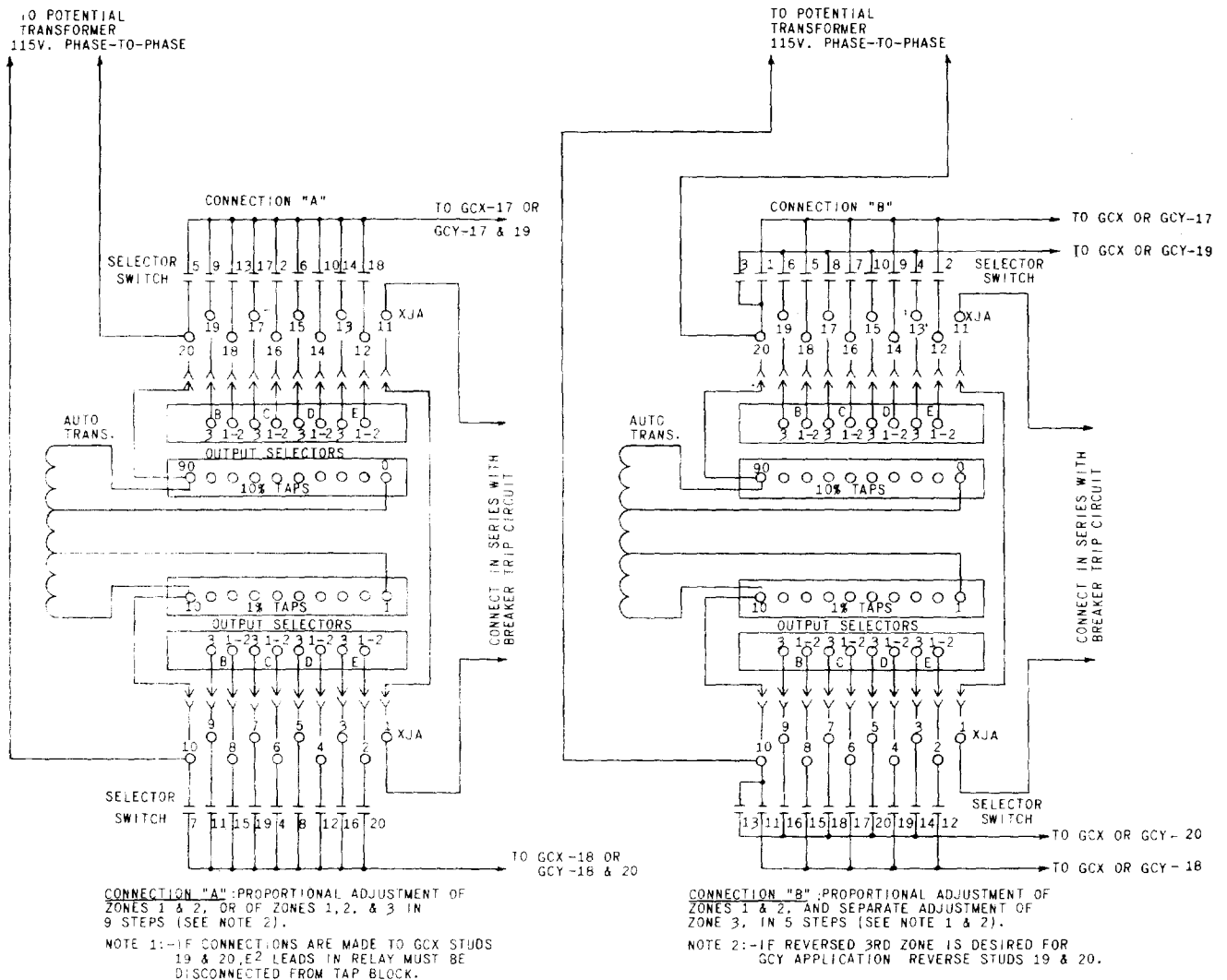
* Fig. 1 (K-6400593 11) Internal Connections for Type XJA11A Relay (Front View)

	First Zone Setting		Second Zone Setting		Third Zone Setting	
	Ohms	%	Ohms	%	Ohms	%
Line A	3.6	100	5.5	100	12	58
Line B	4.5	80	6.9	80	7	100
Line C	5.4	67	8.2	67	16	43

Do not reduce the per cent input tap setting below 90 per cent in any attempt to make closer calibration settings.

When making the tap setting on the Type XJA autotransformer, care should be exercised to be certain that any tap leads are not touching other tap leads, tap holes or any of the metallic parts of the relay so as to short circuit a portion of the transformer.

GEI-23944 Type XJA11 Autotransformer



CONTACTS		POSITIONS "BACK VIEW"									
HANDLE	END	10	9	8	7	6	5	4	3	2	1
1	2	1									X
1	2	1									X
3	4										X
4	5										X
5	6										X
6	7										X
7	8										X
8	9										X
9	10										X
10	11										X
11	12										X
12	13										X
13	14										X
14	15										X
15	16										X
16	17										X
17	18										X
18	19										X
19	20										X

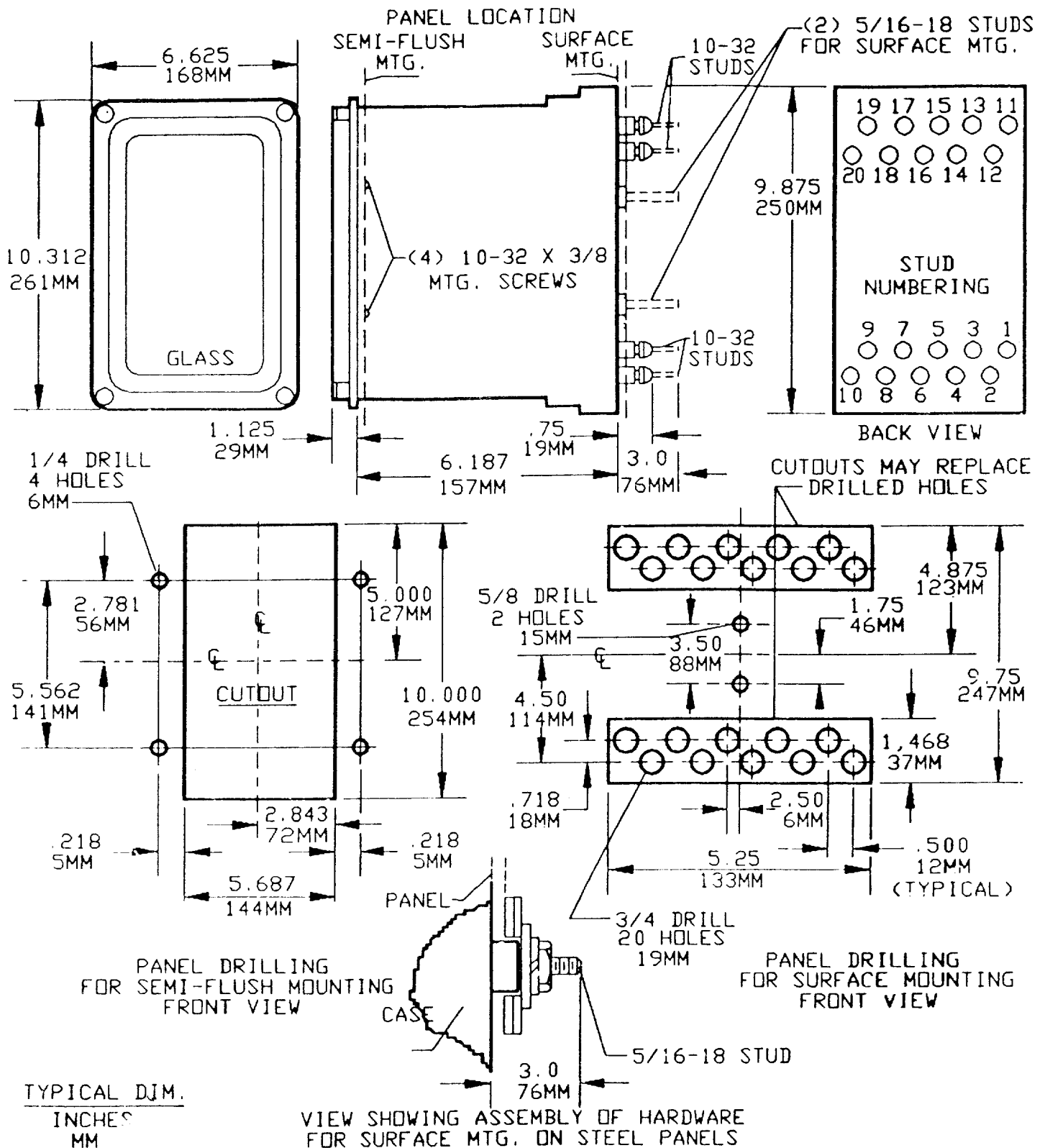
SELECTOR SWITCH 16SB11A002SRM

CONTACTS		POSITIONS "BACK VIEW"									
HANDLE	END	5	4	3	2	1					
1	2	1									X
1	2	1									X
3	4										X
4	5										X
5	6										X
6	7										X
7	8										X
8	9										X
9	10										X
10	11										X
11	12										X
12	13										X
13	14										X
14	15										X
15	16										X
16	17										X
17	18										X
18	19										X
19	20										X

SELECTOR SWITCH 16SB11D504SSM

BACK VIEW OF XJA TERMINAL STUDS

* Fig. 2 (237C702 [2]) External Connections for Type XJA11 Relay



*Fig. 3 (K-6209272 [6]) Outline and Panel Drilling Dimensions for Type XJA11 Relay

* Indicates Revision



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