BPO.360.007 Ty

Sheet 1 of 21

I 2.077

ALBUM NO : 239

TECHNICAL DOCUMENTS

for article

84/0848711-03-75-40007

TECHNICAL SPECIFICATIONS

BPO.360.007 Ty

I 2.77

21

P.MURALIDHARAN

A.SLEESEREV

T.GIRI KUMAR 11.1.85

Verified by

24.2.95

B-2077

LIST OF CONTENTS OF ALBUM NO 56

CONVENTIONAL INDEX "84/08487:1-03-75-40007"

Sl No.	Drawings assmeblies articles	Description of document	No. of drawings/ technological chart	Number of sheets in one copy	Remarks
1	2	3	4	5	6
1.	Partial technical specifications.	Toggle switches type T1, T2 and T3	BPO.360.007Ty	16	
1.	Appendix			1	
3.	List of amendments			1	
			Total sheets :	18	

BPo.360.007 Ty

41

2077

Ty-11-77

Toggle switches types T1, T2 &T3

Particular technical specifications

BPO.360.007 Ty

(Supersedes BPO.360.007 Ty Edition 2-68)

Present particular technical specifications (ЧТУ) refer to switches with cut in contacts, types T1,T2 and T3(here in after referred to as toggle switches) intended for operation in DC and AC electric circuit in radio electronic equipment for manual operation.

These specifications on improvements and amendments of GOST B21271-75 toggle switch General technical specifications. Numbering of sections and sub-sections in the present particu lar technical specifications corespond to numbering of similar sectors and subsections of general technical specifications (OTY).

1. CLASSIFICATION CONVENTIONAL DESIGNATION.

1.1 Three types of toggle switches are manufactured in compliance with drawings 1,2 and 3 and table 1 and 2. Toggle switches of each type is manufactured with ordinary luminant knobs.

Table 1

Abbreviated designation	Set of design documents	Mass in gm not more than
T1	oy3.602.005-OCП	19
T1-C	oy3.602.005-OCП	19
T2	oy3.602.005-OCП	21
T2-C	oy3.602.005-OCП	21
T3	oy3.602.005-OCП	26
T3-C	oy3.602.005-OCП	26

In the abbreviated designation of toggle switch letter T means toggle switch, figure 1,2 and 3 means designation of modification, letter C after hyphen means designation of toggle switches with luminant knob.

1.2 Toggle switches are made in two climatic versions: for use in all climatic conditions and in temperate and cold climates.

1.3 Which ordering and in design documents conventional designation of toggle switches should consists of words "toggle switch", abbreviated designation of toggle switch, designation of all climatic verdions and number of present ЧТУ.

Example of conventional designation of toggle switch of all climatic versions is "toggle switch T1-C-B BPO.360.007 Ty"

Example of conventional designation of toggle switch for temperate and cold climate is "toggle switch T2 BPO.360.007 ty

2. TECHNICAL REQUIREMENTS.

Technical requirements are as per GOST B21271-75 (OTy) with additions and improvements laid down in the present secti-on.

Provisions laid down in items 2.4.6 and 2.4.7 of general technical specifications (OTY) do not refer to toggle switches manufactured as per present particular technical specificatio ns but items 2.3.1 of OTY is updated by present ЧТУ.

2.1 Design

2.1.1 For items 2.1.1 of OTY sets of design documents are given in table 1.

General view, overall mounting and connecting domensions are given in fig 1, 2 and 3.

2.1.2 For item 2.1.3 OTY Mass should not exceed the values specified in table 1.

2.1.3 For item 2.1.4 of OTY. Tensile force should not be less than 20N(2.0kgf).

2.1.4 For item 2.1.7 of OTY switching force is 5 to 16N (0.5 to 1.6 kgf).

2.1.5 For item 2.1.8 of OTY. Electrical conditions, test conditions and number of max switching cycles are given in table 2 of item 2.2.5 .

2.1.6 For item 2.1.9 of OTY switching force is 5 to 20N(0.5 to 2.0 kgf).

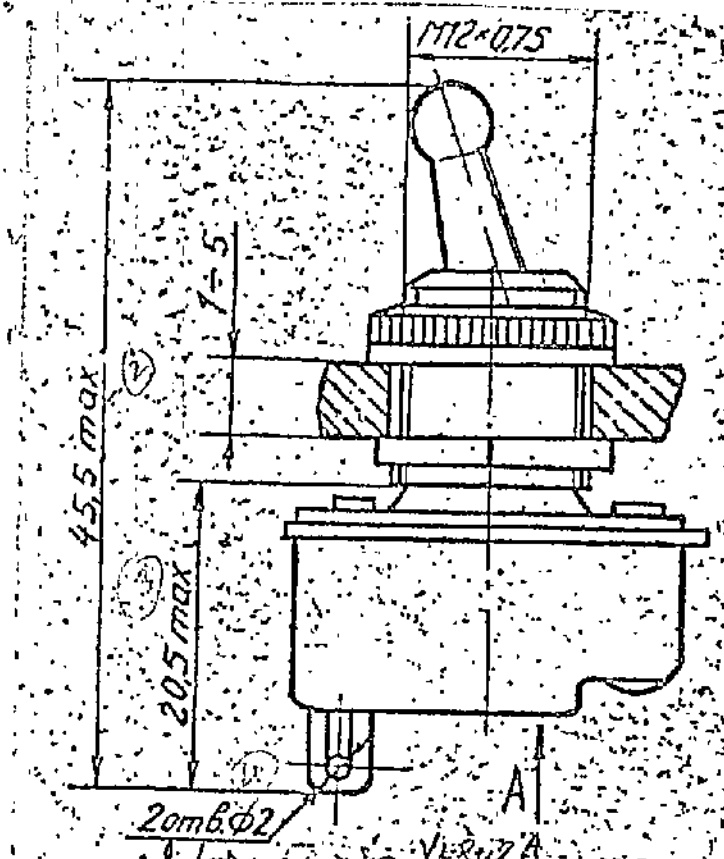
2.1.7 For item 2.1.10 of OTY switching force is 5 to 20 N (0.5 to 2.0 kgf).

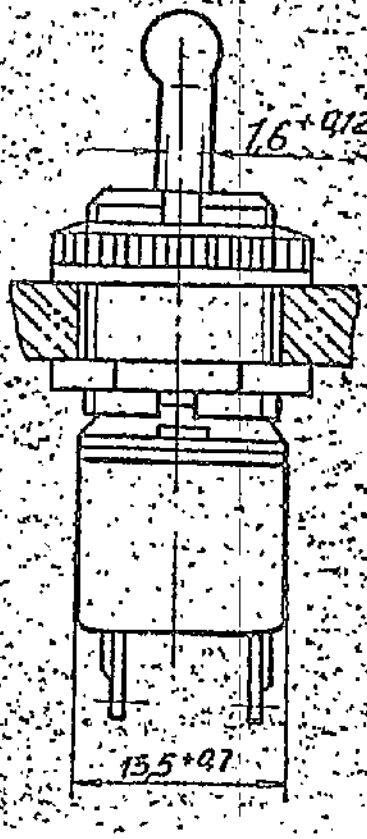
2.2 Electrical parameters and conditions.

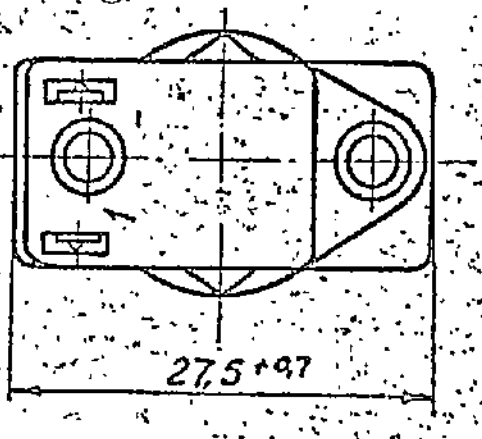
2.2.1 For joints of OTY.

Toggle switch T1, T1-C

I.2077



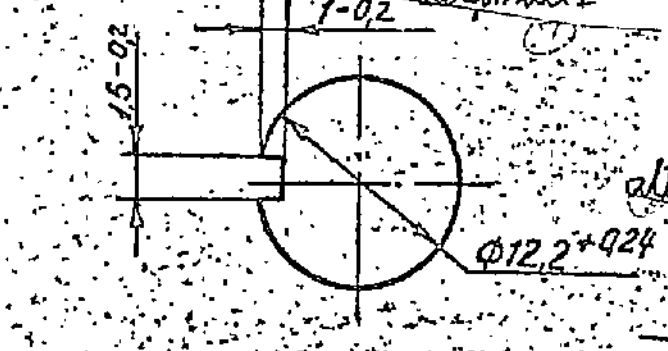




circuit diagram

Upon agreement with Customer, toggle switches can be supplied with 2 hexagon nuts (instead of wound one)

Marking for fastening



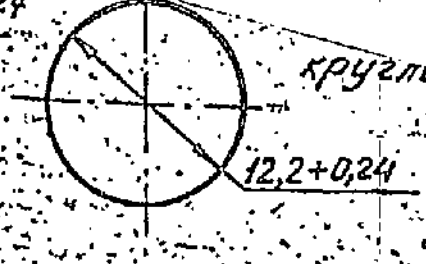
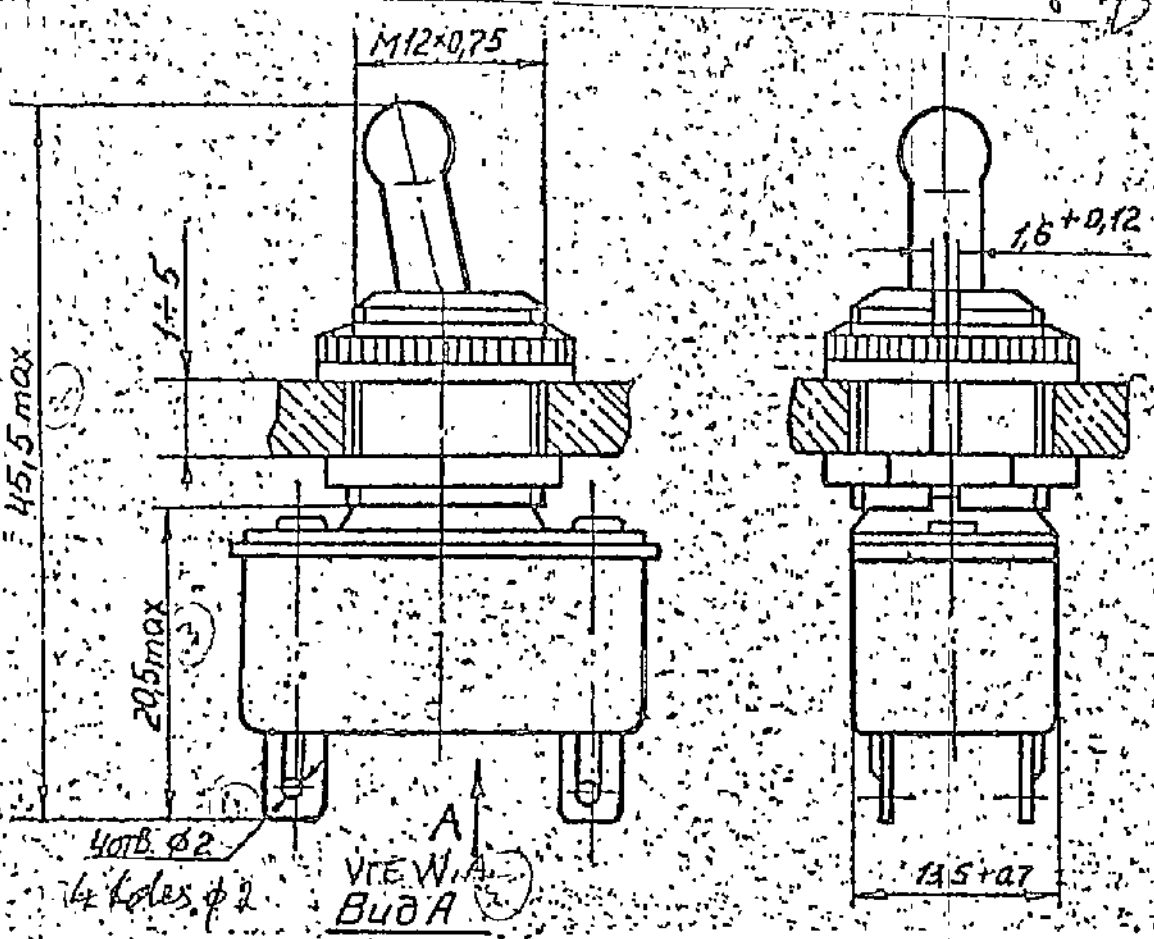
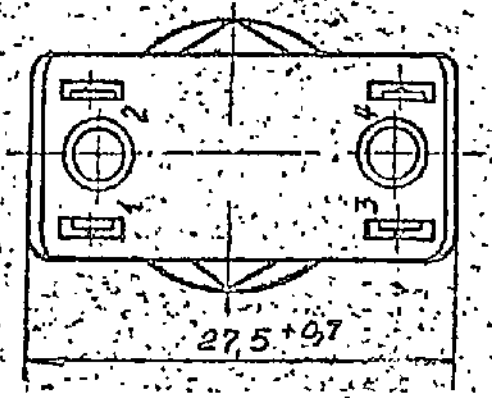


Рис.1
FIG.1

				ВРО.360.007 ТУ	Лист 4
Изм.	Кол.учет	Лист	№док.		

Toggle switch T_2, T_2-C



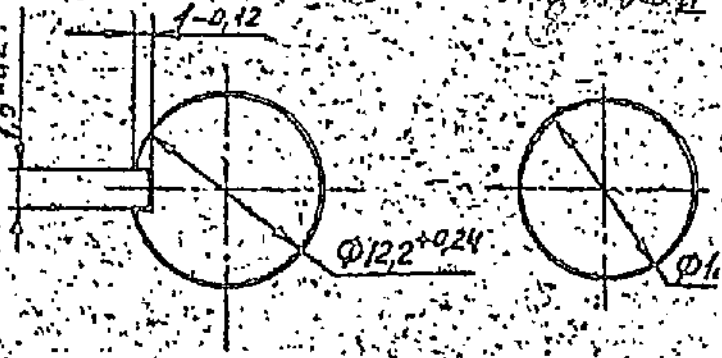


Circuit diagram

Marking for fastening

alternate I

alternate II



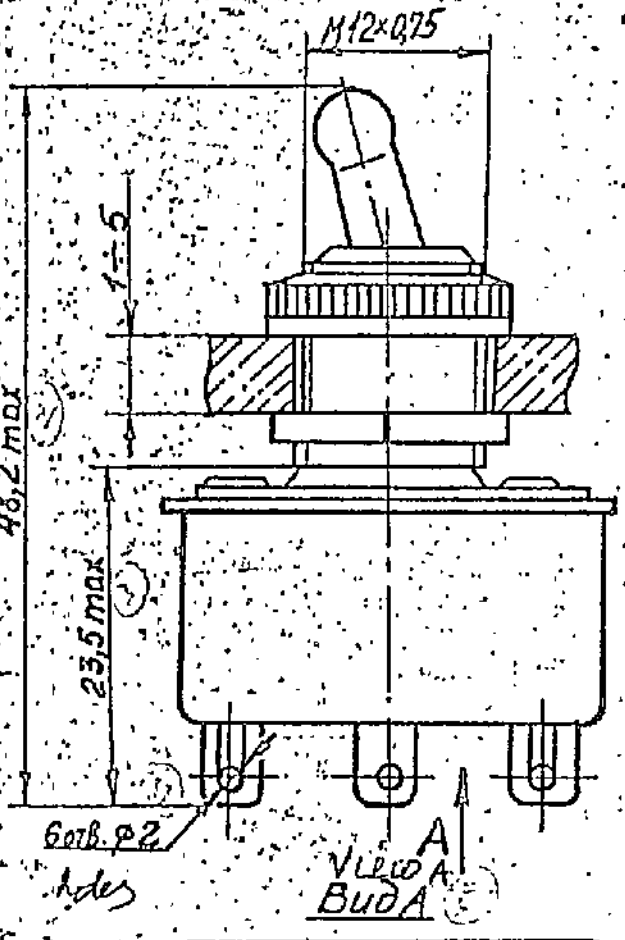
Upon agreement with Customer, toggle switches can be supplied with 2 hexagon nuts instead of roundon

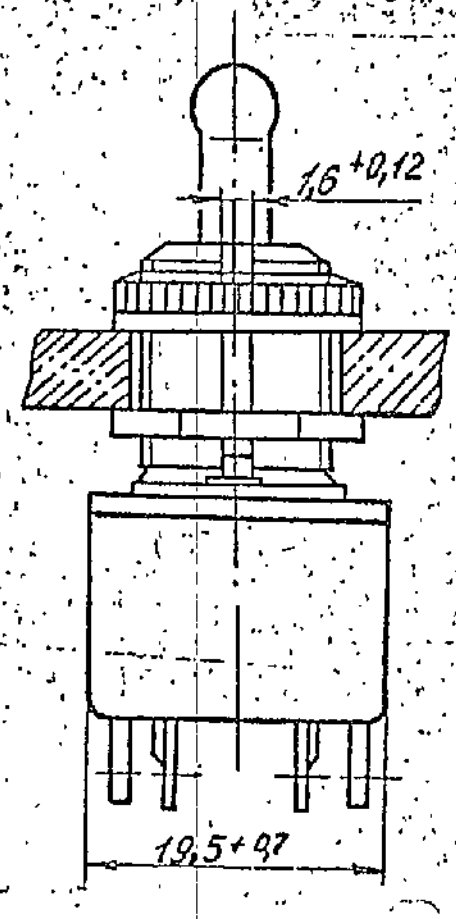
Fig. 2
Рис. 2

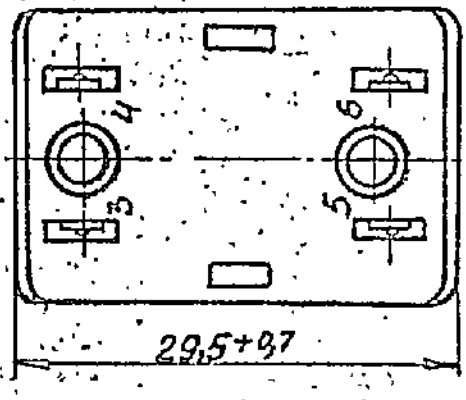
Изм.	№ докум.	Подп.	Дат.

ВРО.360.007 - ТУ

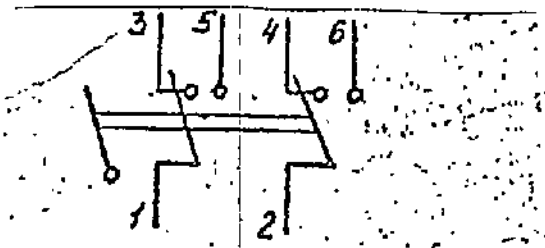
Toggle switch Т3, Т3-С



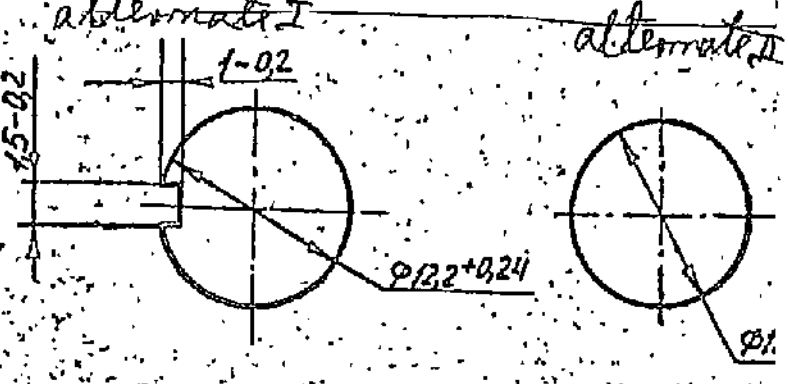




Circuit diagram



Marking for fastening



upon agreement with customer toggle switches can be supplied with 2 hexagon nuts (instead of round one)

Fig. 3
Рис. 3

Изм.	№ докум.	Подп.	Дат.	ВРО.360.007 ТУ	

2.2.1.1 For item 2.2.1.1 OTY Electric contact resistance (CR) should not exceed 0.02 Ω.

2.2.1.2 For item 2.2.1.2 of OTY testvoltage is 1100V.

2.2.2 For item 2.2.2 of OTY. Electric contact resistance should not exceed 0.4 ohms. Insulation resistance should not be less than 100 megohms. Test voltage is 550V.

2.2.3 For item 2.2.3 of OTY. Electric contact resistance should not exceed 0.4 ohms. Insulation resistance should not be less than 100 megohms. Test voltage is 660V.

2.2.4 For item 2.2.4 of OTY. Electric contact resistance should not exceed 0.2 ohms. Insulation resistance should not be less than 2 megohms. Test voltage is inconformity with item 2.2.1.2.

2.2.5 For item 2.2.5 of OTY, limiting value of permissible electric operating conditions is given in table 2.

Values of cos ψ should not be less than 0.5, time constant (τ) is not more than 0.01 sec.

Table 2.

Abbreviated designation of toggle switch	Switching conditions							Number of switching cycles		
	Type of current	Type of load	Voltage V		Current A		Maximum switch over power (W)	conditions of switching		
			min	max	min	max		Normal climatic conditions	Increased temperature +100°C	Increased temperature +85°C
T1	DC	resistive	1.6	220	0.05	3	660	-	-	-
T1-C	"	"	1.6	27	0.05	5	135	10000	1000	2000
T2	"	Inductive	1.6	27	0.05	5	135	-	-	-
T2-C	AC	resistive	-	220	0.2	3	660	10000	1000	2000
T3	"	"	-	127	0.2	5	635	-	-	-
T3-C	"	inductive	-	127	0.2	5	317	-	-	-

2.2.6 For item 2.2.6 of OTY. Current 10A, current folowing time is not more than 60 sec.

2.3 Resistance against mechanical effects.

2.3.1 For item 2.3.1 of OTY. Value of mechnical loads are as follows:

a. Vibration with the frequency range of 1 to 600Hz with acceleration upto 98.1 m/s^2 (10g).

b. multiple impacts with acceleration 392m/s^2(40g) when the impact duration is 1 +80ms.

c. single impacts with acceleration 4905m/s^2 (500g) when impact duration 1+10ms.

d. Linear (centrifugal) loads with acceleration 981m/s^2 (100g).

e. Acoustic noise within the frequency range of 50 to 1000 OHz with sound pressure of upto 130 dB (decibel).

2.4 Resistance against climatic effects.

2.4.1 For item 2.4.1 of OTY. Operating conditions are as per group 2 of OTY Ambient temperature is upto +100°c (373k).

Atmospheric pressure is upto 666Pa (upto 5m Hz).

2.4.2 For item 2.4.2 of OTY, Higher value of temperature is +100°c.

2.5 Resistance against special effects.

2.5.1 For item 2.5.1 of OTY. Special effects using standard HO.005.058 as per group III of item 2, table 1.

2.6 Reliability.

2.6.1 For item 2.6.1 of OTY. Minimum operating item is 5000 hrs. During the specified minimum operating time toggle switches should withstand the number of switching cycles specified in table 2.

2.6.2 For item 2.6.2 of OTY, storage life of toggle switches is 12 years.

2.7 MARKING

2.71 For item 2.7.1 of OTY. Designation of all-climatic version (letter "B") is marked in one line after abbreviated designation of toggle switch toggle switches should have marking only as per items a,b,c,d,e,f.

2.8 PACKING

2.8.1 For item 2.8.1 of OTY. Nuts and washers are packed separetly in bulk and supplied together with toggle switches.

3. CHECKING OF QUALITY

Quality is checked as per GOST B21271-75 (OTY) with additions and clarifications laid down in the present section.

Provisions laid down in items 3.3.4.1.10, and 3.3.4.1 11 of OTY do not refer to toggle switches manufectured as per present ЧTy but items 3.3.4.1.5, 3.3.6.1.1 and 3.3.6.1. 2 of OTY on updated by present ЧTy.

3.2 ACCEPTANCE RULES.

3.2.2 Qualifications test.

3.2.2.1 For item 3.2.2.1 of OTY. Tests are not carried out as per groups K-7(item2) +K-11 and K-14. Manufacturer guarantees conformity of toggle switches to the requirements of increased air pressure, fungus resistance, resistance against see fog, to the effect of acoustic noises, resistance against special effects and to the effect of solar radiation on the basis of data, recieved during development of the articles.

3.2.4 Periodical tests.

3.2.4.1 For item 3.2.4.3 of OTY. Samples are made:

- for groups П-1 from toggle switches T-3, test results are refer to toggle switches of any type and climatic versions.
- for groups П-2 for each design group as per table 3.

Table 3

Design group No	Composition of design group	Type, on which tests are conducted
1.	T1, T1-C, T2 T2-C, T3, T3-C	T3
2.	T1B, T1-CB, T2B, T2-CB, T3B, T3-CB	T3B

- for groups П-3 from toggle switches of any type and climatic version.

Test results are applicable to all types of toggle switches, of any climatic version.

3.2.4.2 For item 3.2.4.4 of OTY, sample size n=30 pieces; acceptance number C=0.

3.2.4.3 for item 3.2.4.5 of OTY, sample size n1=15pieces; n2=15 pieces, acceptance number ~~11=12=0~~. $C_1 = C_2 = 0$

3.2.5 Test for durability.

3.2.5.1 For item 3.2.5.3 of OTY, sample size n=20 pieces; acceptance number C=0.

3.3 TEST METHODS

List of testing and measuring equipment is given in the appendix.

3.3.1 Checking of design

3.3.1.1 for item 3.3.1.4 of OTY, Method 109-1 as per GOST 16962-71.

3.3.1.2 for 3.3.1.5 of OTY, characteristics of soldering iron.
power-25 to 60W
length of tip of soldering bit- not less than 25m
temperature of soldering bit- 300 to 350 °C (573÷623K).

Solder, grade ПОС-61 as per GOST 1499-70 and non-acidous flux as per stan ard HO.054.063 are used for testing. Soldering iron and solder should contact the terminal fur not more then 5 sec.

Distance from the toggle switch body to the solder should be atleast 1m.

3.3.1.3 For item 3.3.1.6 of OTY. Checking of presence of electrical contact is carried out by light or pointer-type indicator.

3.3.1.4 For item 3.3.1.8 of OTY. Toggle switches oare rested in the following electrical conditions:
direct current-5A, voltage 27V, and resistive load.
alternating current -%A voltage 220V and resistive load.
switching frequency is 12 to 15 cycles of switching per minute. Number of cycles of switching is in compliance with table 2 of item 2.2.B.

Parameters after testing the wear resistance are in compliance with table 4.

Table 4.

Description of parameter	Standard
	conditions of switching
	Normal climatic conditions
Electrical contact resistance (Ohms) not exceeding	0.2
Insulation resistance (megohms)	100
Test voltage (V)	550
Switching force, N(kgf)	from 5 to 18(0.5 to 1.8)

3.3.2 Checking of electrical parameters.

3.3.2.1 For item 3.3.2.1.1 OTY Measuring conditions:Current 0.1A, voltage (electromotive force) 6V.

3.3.2.2 For item 3.3.2.1.2 of OTY. It is allowed to use methods of accelerated tests of electric insulation strength.

3.3.2.3 For item 3.3.2.1.3 of OTY. Measuring conditions voltage 250 to 500V.

3.3.2.4 For item 3.3.2 of OTY. Alternating current 10A. voltage 220V, test time 60 sec.

Electric contact resistance not more than 0.05 ohms
Insulation resistance not less than 100 megohms
Switching force 5 to 16N(0.5 to 1.6kgf).

3.3.3 Checking of resistance against mechanical effects.

3.3.3.1 For item 3.3.3.1 of OTY. Operating force in in compliance with item 2.1.4; Electric contact resistance is not more than 0.02 ohms switching force and electric contact resistance are measured once after all types of mechanical tests.

3.3.3.2 For item 3.3.3.1.1 of OTY. Degree of rigidity 1x as per GOST 16962-71.

3.3.3.3 For ite 3.3.3.1.2 of OTY. Method 103-1.1 degree of rigidity 1x as per GOST 16962-71.

3.3.3.4 For item 3.3.3.1.3 OTY. Degree of rigidity II and impact duration 1 to 80 ms as per GOST 16962-71.

3.3.3.5 For item 3.3.3.1.4 of OTY, degree of rigidity II as per GOST 16962-71.

3.3.3.6 For item 3.3.3.1.5 of OTY. Degree of rididity Y as per GOST 16962-71.

3.3.3.7 For 3.3.3.1.6 of OTY Degree of rigidity [illegible] as per GOST 16962-71.

3.3.3.8 For 3.3.3.1.7 of OTY. Method 108-2, and degree of rigidity K as per GOST 16962-71.

3.3.4 Checking of resistance against climatic effects.

3.3.4.1 For item 3.3.4.1.1 of OTY. Method 201-1 as per GOST 16962-71.

Higher value of temperature $+100^{\circ}\pm3^{\circ}$C(373±3K).
Electric contact resistance should not exceed 0.2 ohms
Insulation resistance should not be less than 100 megohms
Test voltage is 700V
Switching force is in conformity with item 2.1.4

3.3.4.2 For item 3.3.4.1.2 of OTY electric load; current 0,1A, ac and Dc voltage of 6V .

Measuring instruments: Ammeter, type M-4200, voltmeter type M-4200. Checking the presence of electric contact for 3 minutes from the moment of taking out the toggle switches from the chamber.

Electric contact resistance should not exceed 0,05 ohms Test voltage is 700V switching force is in compliance with item 2.1.4.

3.3.4.3 For item 3.3.4.1.3 of OTY. Temperatur e -60±3°c(213±3k) and +100±3°c(373±3k)

Electric contact resistance should not exceed 0,05 ohms Insulation resistance should not be less than 100 megohm Switching force is in conformity with item 2.1.4.

3.3.4.4 For item 3.3.4.1.4 of OTY AC voltage of 220V.

3.3.4.5 For item 3.3.4.1.5 of OTY. Electric contact resistance should not exceed 0.05ohms.

Insulation resistance should not be less than:

- 5megohms during shot-time test. Test time for short term effect is 10 days (for toggle switches of temperate and cold climatic versions).

- 2megohms during longterm test.

Total voltage is 660V

Switching force is in conformity with item 2.1.4

Change ~~xxxx~~ is in of colour and appearance of spot corrosion on metallic fastening parts are allowed.

3.3.4.6 For item 3.3.4.1.6 of OTY. Air pressure in the chamber is 533±133Pa(4±1mHg).

Test voltage is 350V

3.3.4.7 For item 3.3.4.1.8 of OTY. Duration of test is 2 days. 50% of the toggle switches in the chamber are placed in verticle position and 50% in vertically turned-down position.

Change of coating colour and appearance of spot corrosion on metallic parts are allowed.

3.3.4.8 For item 3.3.4.1.9 of OTY. Method 214-1 is as per GOST 16962-71.

3.3.4.9 For item 3.3.4.1.12 of OTY. Appearance of toggle-switches should conform to item 2.1.2 of OTY.

3.3.5 Checking of resistance against special effects.

3.3.5.1 For item 3.3.5.1 of OTY. Electric contact resistance insulation resistance and test voltage are in confirmity with item 2.2.4.

3.3.6 Checking of reliability.

3.3.6.1 For item 3.3.6.1.1 of OTY. Toggle switches are subjected to tests in conditions and using the procedure given in table 5.

Table :5

Effective factors and their order	Duration of effect (hour)	Number of switching cycles.	Electrical conditions
Wear resistance in normal climatic conditions	15	7000	10 toggle switches are tested at direct current 5A.Voltage 27V and resistive load 10 at alternating current 3A,voltage 220V, resistive load. 10 at direct or alternating current 0.05A, voltage 1.6V resistive load.
Relative humidity 95±3% when temperature is +40°c±2°c (313±2k)	48	-	Deenergized condition.
Normal climatic conditions	2	6	Deenergized condition.

BPo.360.0077y

18 2077

Effective factors and their order	duration of effect (hour)	Number of switching cycles.	Electrical conditions
Highest value of temperature +85±2°c (358±2k)	430	2000	10 toggle switches are tested at direct current 5A, voltage 27V and resistive load, 10-at alternating current 3A, voltage 220V, and resistive load and 10-at direct or laternating current 0,05A voltage 1.6V resistive load.
Higher value of temperature +100°c (373k)	5	1000	-do-

Electric contact resistance, insulation resistance and test voltage amelinconformity with item 2.2.2.

Switching force is in conformity with item 2.1.6

3.3.6.2 For item 3.3.6.1.2. Testing time is 5000 hours. Conditions and order of tests within the same cycle on given in table 6.

Table:6

Effective factors and their sequence	Duration oftest (hour)	Number of switching cycles.	Electrical conditions
Normal climatic conditions	750	1400	7toggle switches are tested at direct current of 5A voltage 27V resistive load and 7 alternating current of 3A at voltage of 220V and resistive load and 6-at direct current 0.05A, voltage 1.6V and resistive load.

Effective factors and their sequence	Duration of test (hour)	Number of switching cycles	Electrical conditions
Relative humidity 95±3% at temperature 40±2°c (313 ±2k)	48	-	Deenergized condition
Normal climatic conditions	2	-	Deenergized condition.
Highest value of temperature +85±2°c (358±2k)	199	400	7 toggle switches are tested at direct current 5A, voltage 27V and resistive load. 7-at alternating current 3A, voltage 220V and resistive load and 6-at direct or alternating current 0.05A voltage 1.6V and resistance load.
Highest value of temperature +100±2°c (373±2k)	1	200	-"-

Movement of connection points, cover and gaskets within the design clearances change, of colout of parts and mechanical damages which do not affect the operation of toggle switches are allowed.

3.3.6.3 For item 3.3.6.1.3 of OTY. Electric contact resistance. insulation resistance and test voltage are in conformity with item 2.2.3. Switching force is in conformity with item 2.1.7

3.3.8 Checking of packing

3.3.8.1 For item 3.3.8.1 of OTY. Method of 3.3.8.1 OTY.

БИО.360.007ТУ

4. TRANSPORTATION AND STORAGE.

Requirements for transportation and storage conditions are as per GOST B21271-75 (OTY).

5. OPERATING INSTRUCTIONS.

Operating instructions are as per GOST B21271-75 (OTY) with a dditions, laid down in the present section.

5.1 For 5.2.2 of OTY varnish ФЛ-582 Ту6-10-1236-72 or a similar one. Distance from the toggle switch body to the solder should not be less than 1mm.

5.2 While mounting, see that no dust particles, moisture and other foreign bodies get inside the toggle switchos.

5.3 Never open the toggle switches to rectify the defects.

5.4 Toggle switches may be used when relative humidity ofair is kept upto 98% and temperature +40°c(313k) without condensation of moisture.

6. REFERENCE DATA.

6.1 For item 6.2 of OTY in conditions specified in OTY and ЧТУ 95% of service life is equal to 7500 hours and 1.5 switching cycles specified in table 2. Value of γ-percent service life is to be specified in series production as per production as permethod durability tests.

7. SUPPLIERS GUARANTEE

Suppliers guarantee is a s per GOST B 21271-75 (OTY).

Appnedix
Recommneded

LIST OF TESTING AND MEASURING INSTRUMENTS.

1. Electrodynamic vibration stand, type By.5/5000
2. Impact test set type cy-1
3. Centrifugal, type Ц -5/300
4. Heating and moisture chamber type KXTB
5. Voltmeter type M-4200
6. Ammeter type M-4200
7. Teraammeter, type TO-3
8. Universal breakdown test set, type, УПУ-1М
9. Thermal vacuum chamber, type KБ

NOTE: In the absence of above mentioned testing and measuring instruments similar testing and measuring instruments of the same or higher accuracy class or other testing instruments can be used.