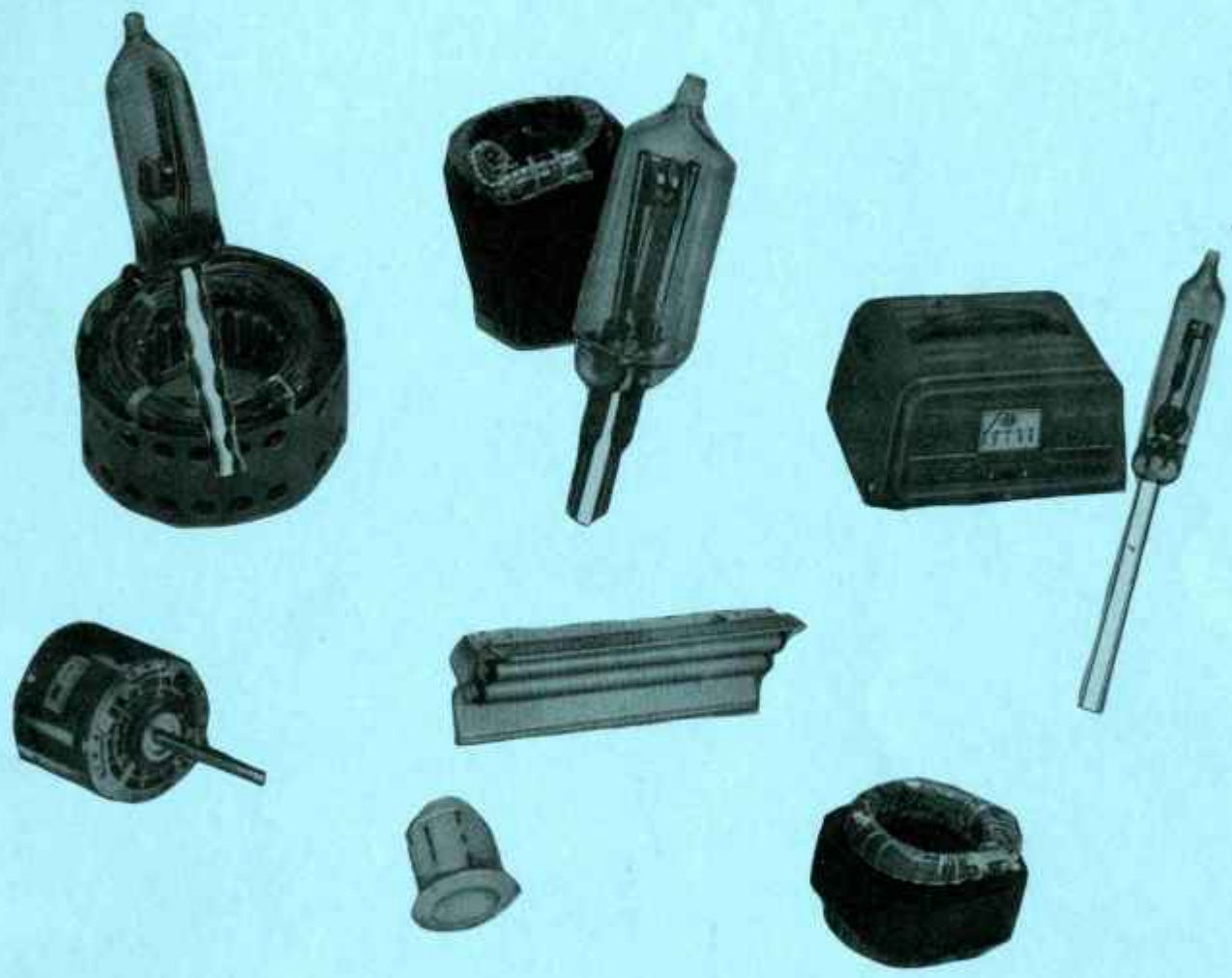


SYLVANIA

1970s Sylvania



Control Devices for ELECTRICAL EQUIPMENT



Bimetallic THERMO PROTECTORS

GTE Products Corporation
CONTROL DEVICES PLANT
STANDISH, MAINE 04084



CONTROL DEVICES

SYLVANIA | **GTE**

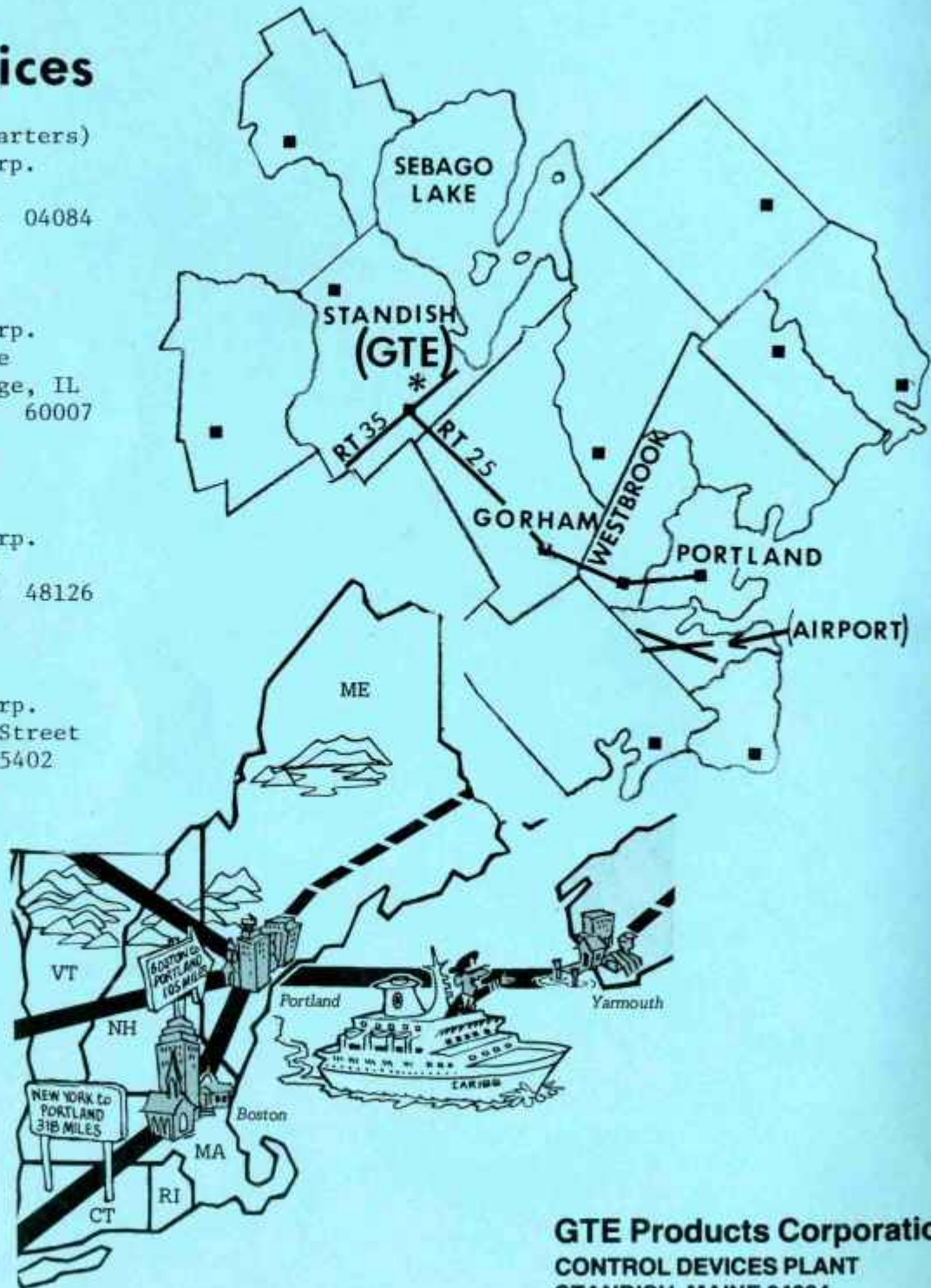
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GTE Products Corporation
CONTROL DEVICES PLANT
STANDISH, MAINE 04084



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GENERAL

GTE Thermo-Protectors are designed to provide the ultimate in low cost protection for the electrical equipment industry. The units are small, lightweight and are easily adaptable to any application.

Sylvania Thermo-Protectors include the SB, SL-SR and SW series.

The SB may be used as line break protection on small fractional horsepower motors with locked rotor ratings up to 12 amperes or as pilot duty protection when mounted on the windings and in series with the magnetic motor contactor coil.

The SB has in its family four different current sensitive protectors. They are the **ESB 700**

ESB 600
SB 700
SB 600

The ESB700 is the most sensitive to current while the SB600 is the least.

The SL-SR are used as protectors of motors with locked rotor currents up to 50 amps. The SL-SR has in its series the following types:

DSL 900 - DSL 600
SSL 900 - SSL 600
NSL 900 - NSL 600
SL 900 - SL 600
SR 600

The DSL900 is the most current sensitive while the SR is the least and rated for 50 amperes.

The SW is designed for motors with locked rotor current over 50 amperes and up to 130 amperes. These units are custom designed to each application.

(CONT)



The SB, SL-SR and SW are listed by:

U.L. - File 37501 and 28135
C.S.A. - File 20529 and 26828
B.S.I. Report No. 18421, 030841 & 037557
V.D.E. - Aklenzeichen 6806-451-1 Nr. 03 Blatt 1
 " 6806-451-2 Nr. 04 Blatt 1
 " 6806-B-4501-1001/A28 Nr. 03
SEMKO - Register Number 43-35 712 &
 43-34 713

The heart of each Thermo-Protector is a bimetal blade prestressed to provide snap action. The sensitivity to current is varied by four methods: 1) Change in the resistivity of the bimetal, 2) Change in the resistance of lead material, 3) Adding a copper shunt across the blade and 4) Lowering or increasing the opening temperature of the bimetal. This enables the breakers to carry higher or lower current and longer or shorter on times under fault conditions.

The glass cartridge provides a true seal to provide both maximum thermal response and greater contact life. The glass provides a strong, shock-resistance enclosure that requires no secondary insulation.

Fault conditions producing excessive current or heat will cause the bimetal to snap the contacts open. Opening and closing temperatures may be varied to maintain temperatures under specified limits during cycling conditions. The equipment being protected will resume normal operation when the fault condition is removed.

ENVIRONMENTAL TESTS

External Pressures

SB series can withstand pressures in excess of 5,000 P.S.I.

SL and SW up to 2,500 P.S.I.

(CONT)



Line Break Ratings (Continued):

<u>Type</u>	Current Capacity (115V)	Current Capacity (230V)
SR	50 amps	45 amps
SW	140 "	120 "

Various lead lengths, terminations, and insulation materials are available to meet customer specifications.

GTE CODING SYSTEM



EXAMPLE

SB 601 A 1 A 1 A

- (8) denotes type and size of heater wire (HSW only)
- (7) denotes type of shunt (SR, HSW)
- (6) denotes no current closing temperature (designations A-ZZ)
- (5) denotes lead extension configuration (designations 1-999)
- (4) denotes no current opening tolerance (designations A-ZZ)
- (3) denotes no current opening temperature
- (2) denotes the type of bimetal used
- (1) denotes design series

- (1) Other design series are - ESB, DSL, SSL, NSL, SL, SR, and HSW
- (2) A 6, 7 or 9 may appear in this position indicating a difference in the resistivity of the bimetal used.
- (3) The 01 appearing here indicates a no current opening of 80°C. For each succeeding number add 5°C (i.e. 01 x 5°C = 5°C + 80 = 85°C thru 18 = 165°C opening temperature).
- (4) No current opening tolerances are designated as follows (in °C): (Example of the system is as follows:)

A ±5

C ±10

E ±15

B ±7

D ±12

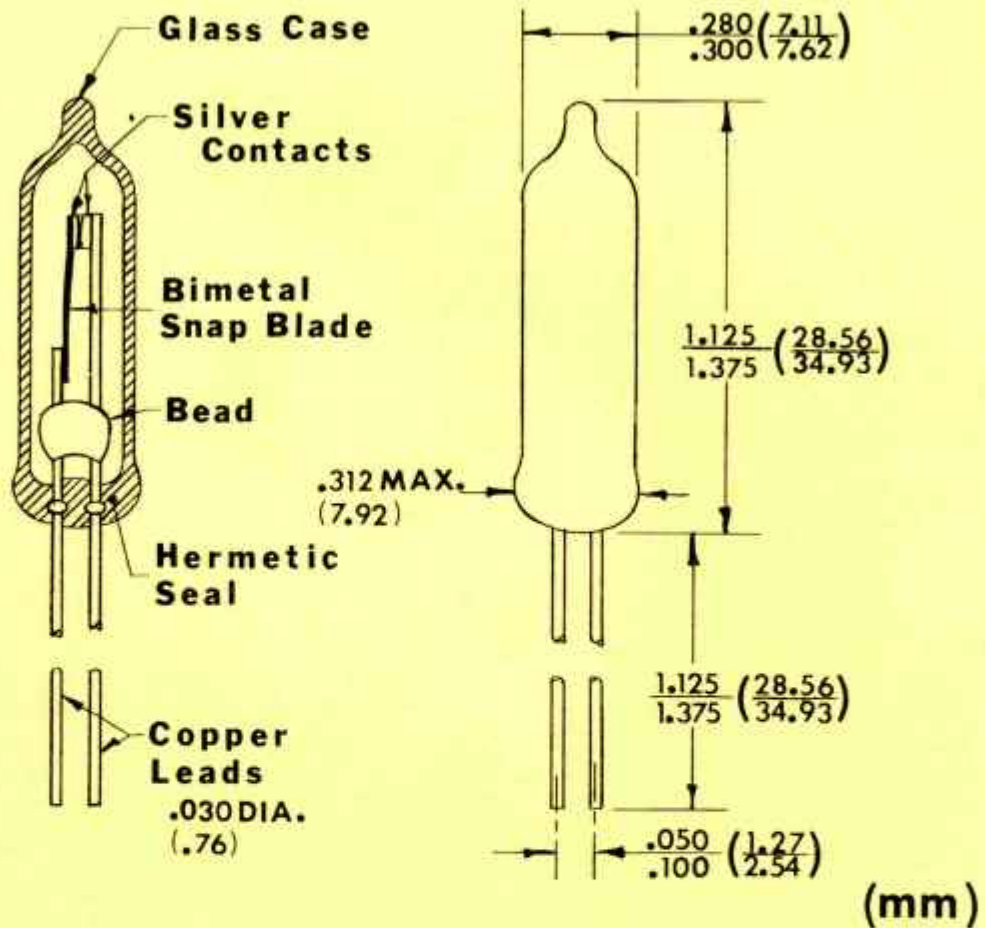
F ±20

Note: 1. Other opening tolerances are available upon request.

2. The coding tolerance changes for the three different sizes of protectors.

- (5) Lead extensions are specified by customer application requirements.
- (6) No current closing tolerances are designated in °C. Closing tolerances are available upon request.
- (7) Shunts are used in the HSW, SR design series only, for the purpose of increasing on times under fault conditions.
- (8) Denotes type and size of heater wire.

SB Series



Included in this series
are the

ESB700

ESB600

SB700

SB600



SB

THERMO-PROTECTOR

Sylvania's **SB** family of protectors has found its way into many items.

To guide you in selecting the correct protector, the following is a partial list of the past and present applications of these **SB'S**:

<u>TYPE</u>	<u>APPLICATION</u>	<u>COMMENTS</u>
ESB744	Speaker protection	Trip 2 amps 5 - 40 seconds
ESB701	Toy transformers	U.L. 506
ESB703AP		Trip 3 amps 10-60 seconds
ESB703	HID lamps	Filament switch
ESB709C	DC door lock protector	10 amps & 12 volts
ESB712C	Internal protector for compressors	0-5 amps & 240 volts
ESB714C	Internal protector for compressors	0-5 amps & 240 volts
ESB716C	P. M. motor	Protector on AC side
ESB604	Transformers	Hobby shops
ESB613C	Antenna motor	Automobiles
ESB614C	Internal protector for compressors	0-7 amps & 240 volts
SB707E	Mine safety helmets	Battery powered
SB717C	Trip 8 amps	10 - 60 seconds
SB715C	Cable television	5 amp. amplifier
SB604 - 608	Fan motors	U. L. 507
SB608 - 614	General purpose fan motors	U. L. 547
SB615C	Washing machine motor	230 V. and 10 amps
SB700 & SB600	Battery chargers	2-6 amps U.L. 1236
PSB600	Fluorescent ballast up to 600 V.	U. L. 873
SB600	Recessed fixtures Tungsten load 3 amp rating	U. L. 873/1571
ECO's	Gas hot water	Hi limit safety
SB606E	6 volt batteries	Short circuit protection
SB & ESB's	Cap start & PSC motors, split phase motor, shaded pole motor	U. L. 547

(CONT)

SB



THERMO-PROTECTOR

<u>TYPE</u>	<u>APPLICATION</u>	<u>COMMENTS</u>
SB606	Power pack	Glass trimmer
SB600	Light dimmer switch	120 V. AC
ESB700	Television protector	2 amp fuse replacement

The SB series protector, because of a matching in thermal expansion of both the leads and glass, has a water-tight seal. These units can be placed in oil to check for their opening and closing temperatures providing an easy and highly reliable means of quality control. The hermetic qualities of the device provide the following additional advantages:

1. The SB can be placed on a transformer or motor before the dip bake process. This gives the protector better thermal response to a fault condition and securely fastens the device.
2. The PSB can be placed in a ballast before the vacuum impregnation process, thus saving man hours of labor.
3. Being air tight has led to longer contact life and lower contact resistance during life test.

In applying these protectors to an application, the matching of the protector to the end item is done by three means:

1. Adjustment in the opening temperature
2. Change in resistance of the bimetal
3. Change in resistance of the internal lead wires

With these three variables, Sylvania's protector can be adjusted from thermostatic protectors (zero current) to a maximum current of 10 amperes at 120 or 240 volts, depending on life requirements.

The ESB's are the most current sensitive protectors for 2 to 6 amp. sensitivity.

The SB700 takes over for the range of protection for 5 to 7 amps.

The SB600 is used for up to the maximum current of 10 amps for extended life testing.



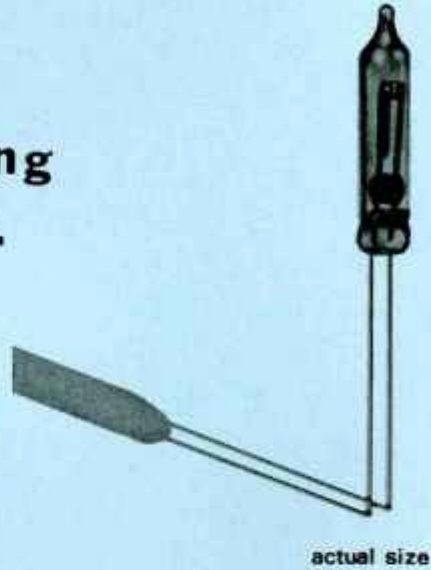
SYLVANIA | GTE
CONTROL DEVICES

ESB700 PROTECTOR
which requires fast tripping
in the 2 to 4 ampere range.

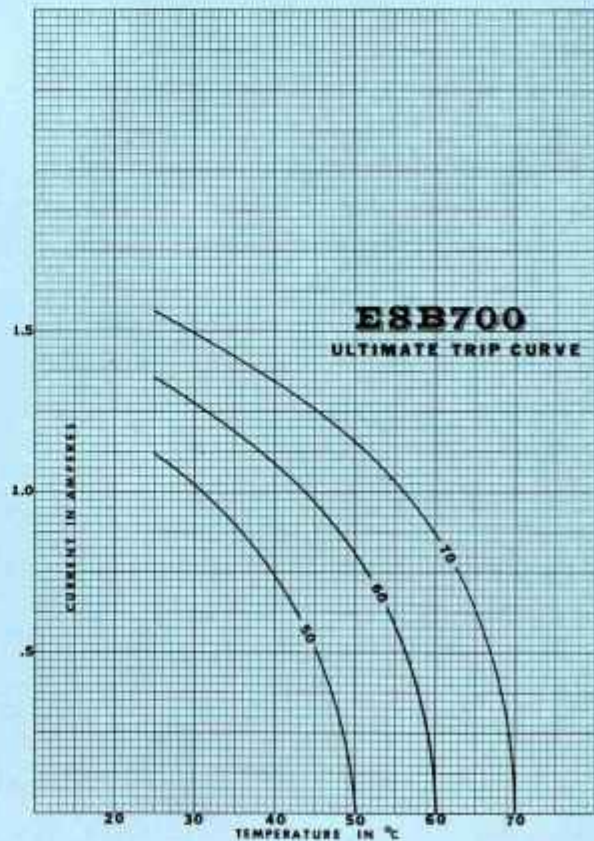
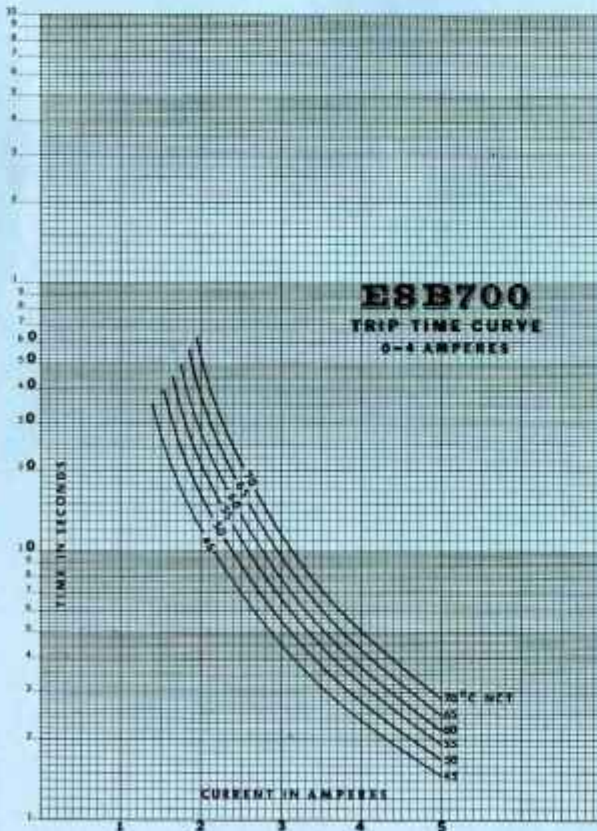
APPLICATION CURVES

These curves are to be used only as a guide in selecting a protector for a particular application. Factors such as distance from the heat source and the method of mounting should be considered in selecting a protector directly from the curves.

NCT means No Current Trip Temperature.



actual size

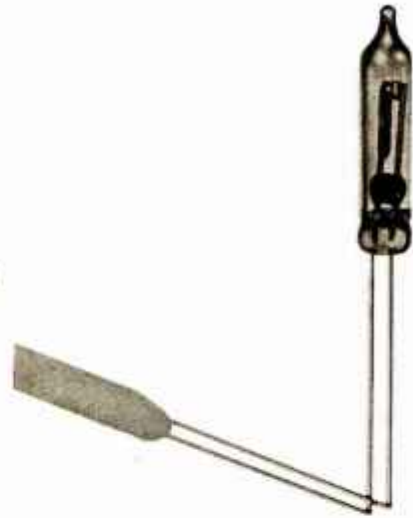


SYLVANIA | G13
CONTROL DEVICES

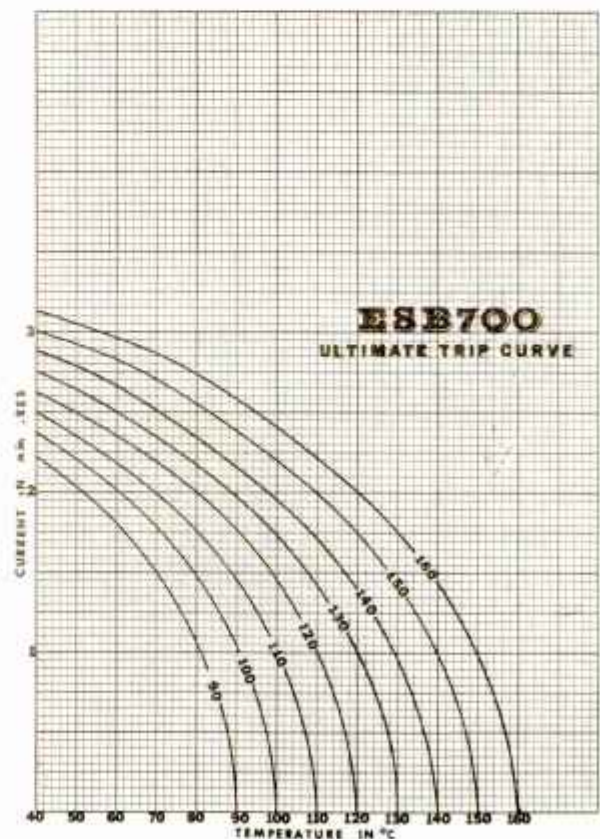
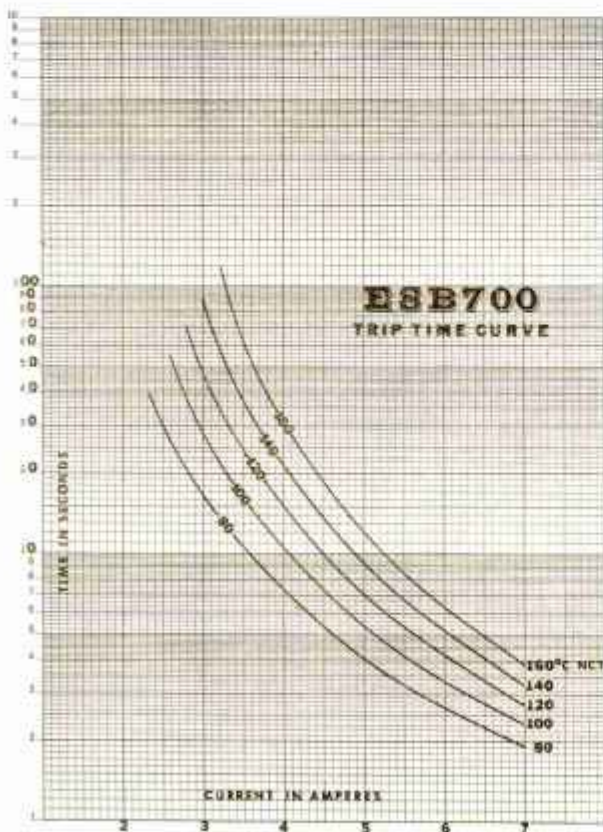
ESB700

APPLICATION CURVES

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actual size





SYLVANIA | GTE
CONTROL DEVICES

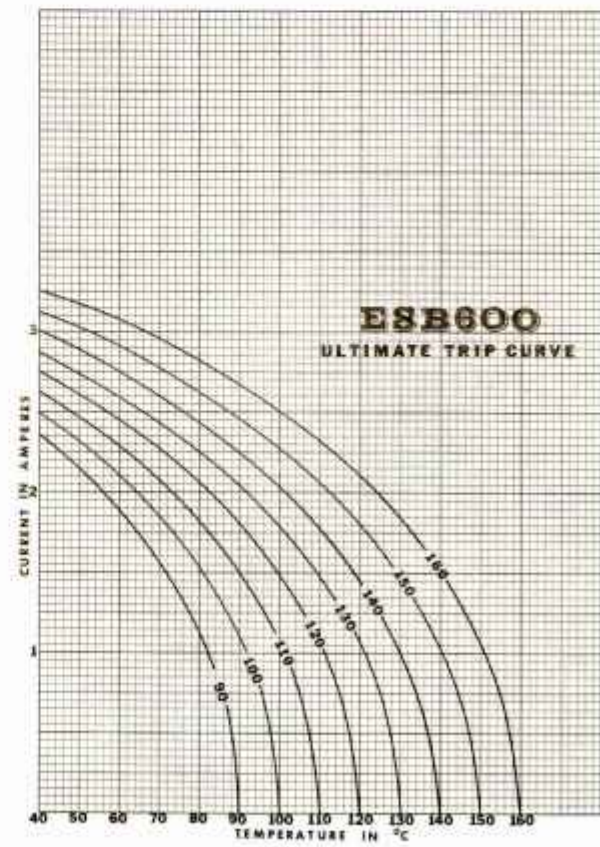
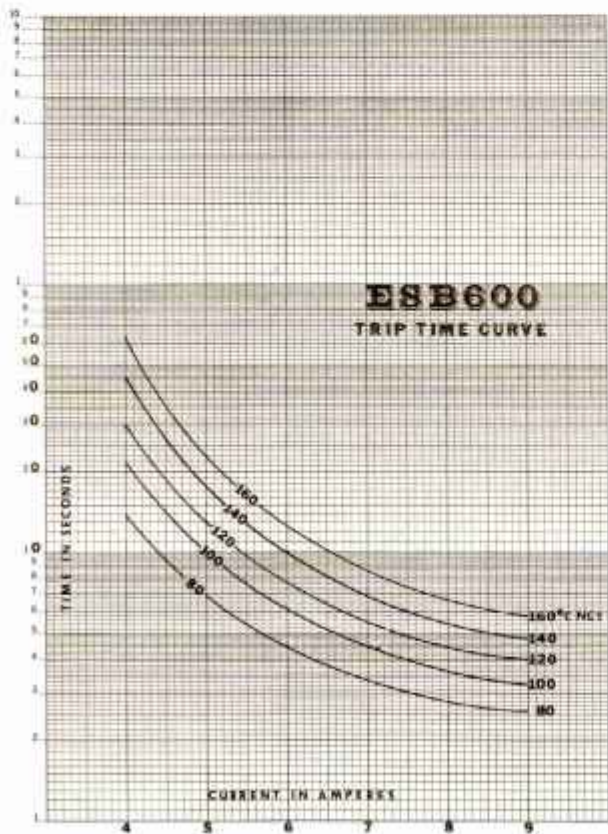
ESB600

APPLICATION CURVES

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actual size

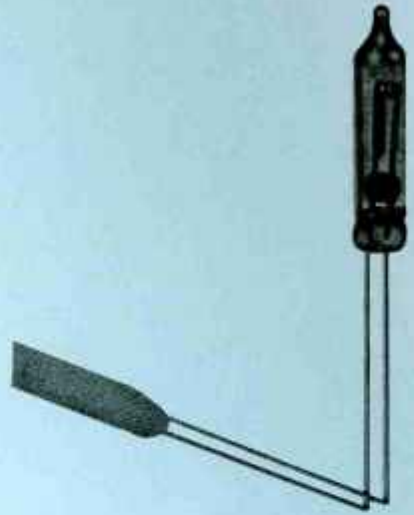


SYLVANIA | GTE
CONTROL DEVICES

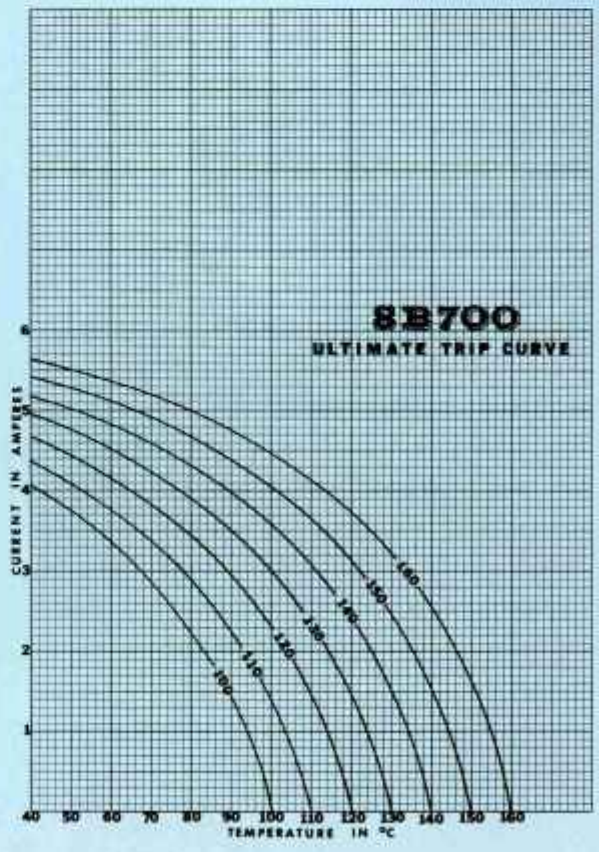
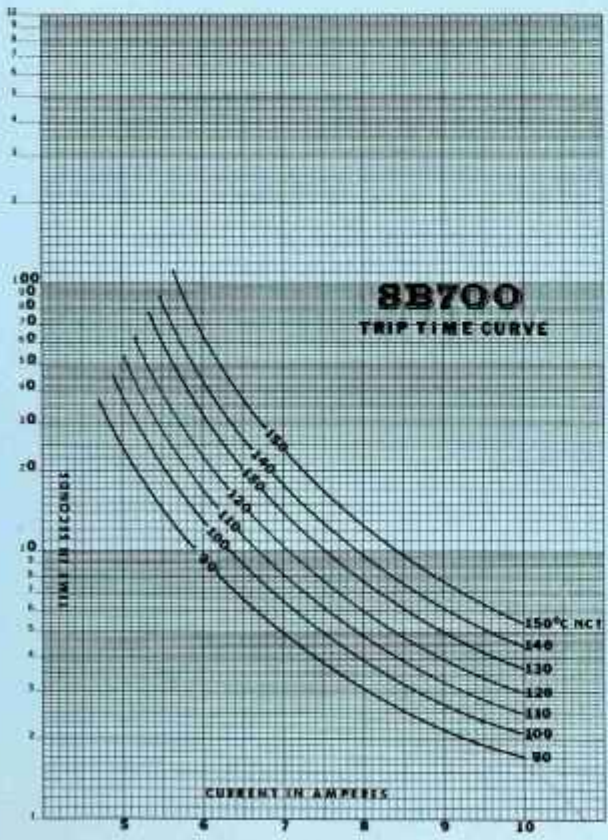
SB700

APPLICATION CURVES

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actual size





SYLVANIA | GTE
CONTROL DEVICES

SB600

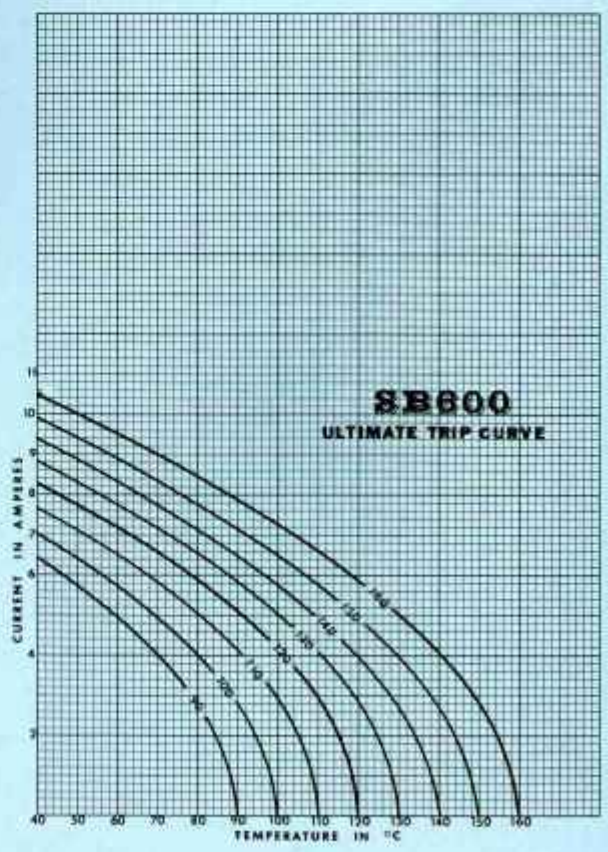
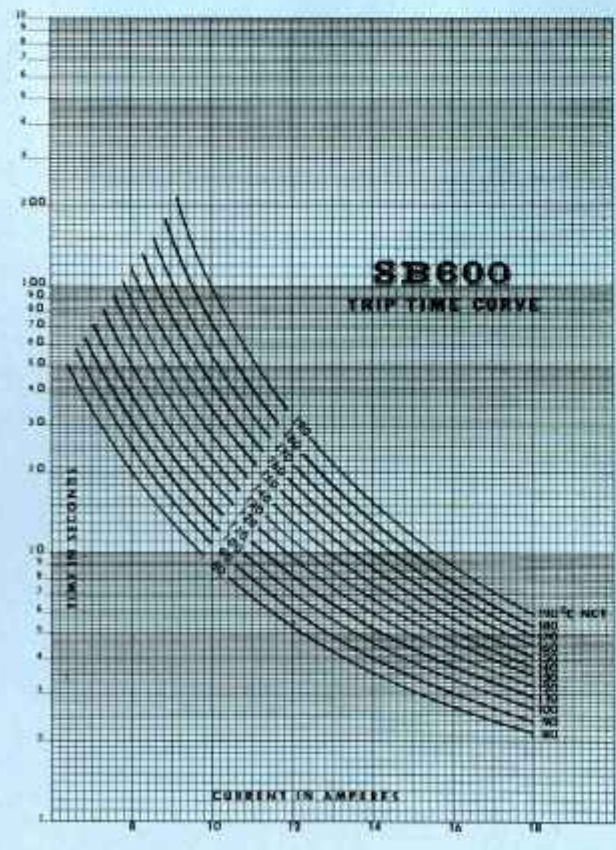
APPLICATION CURVES

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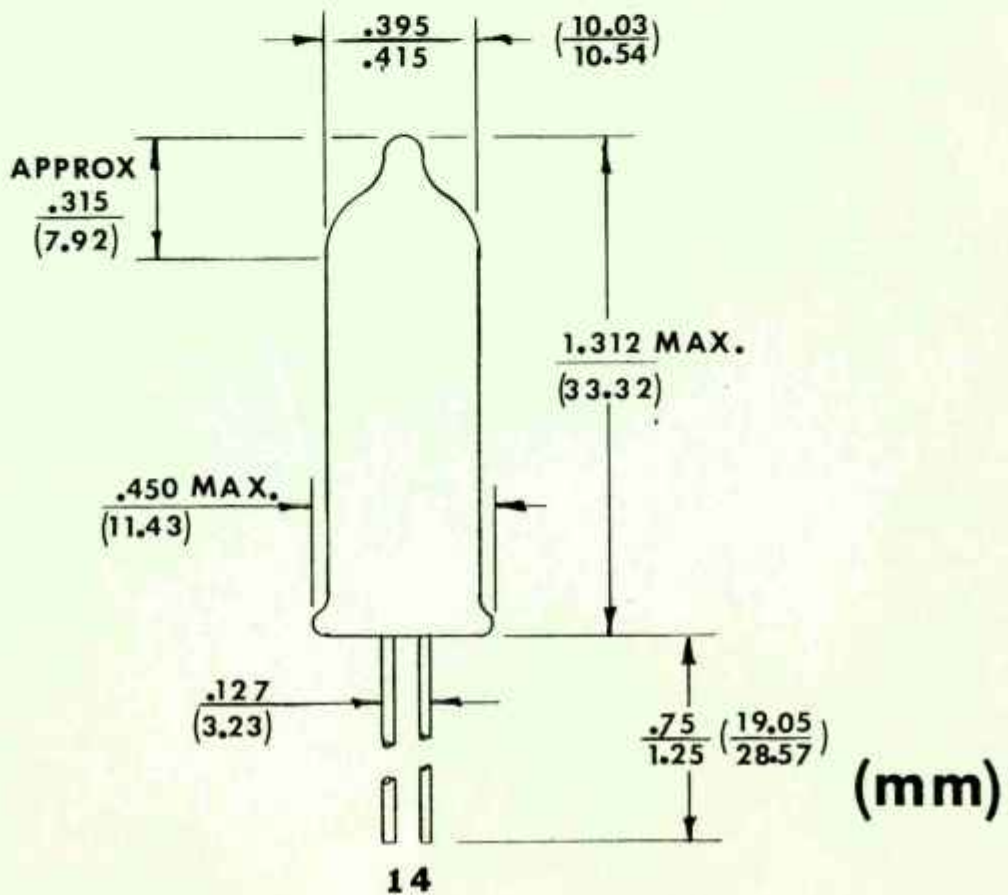
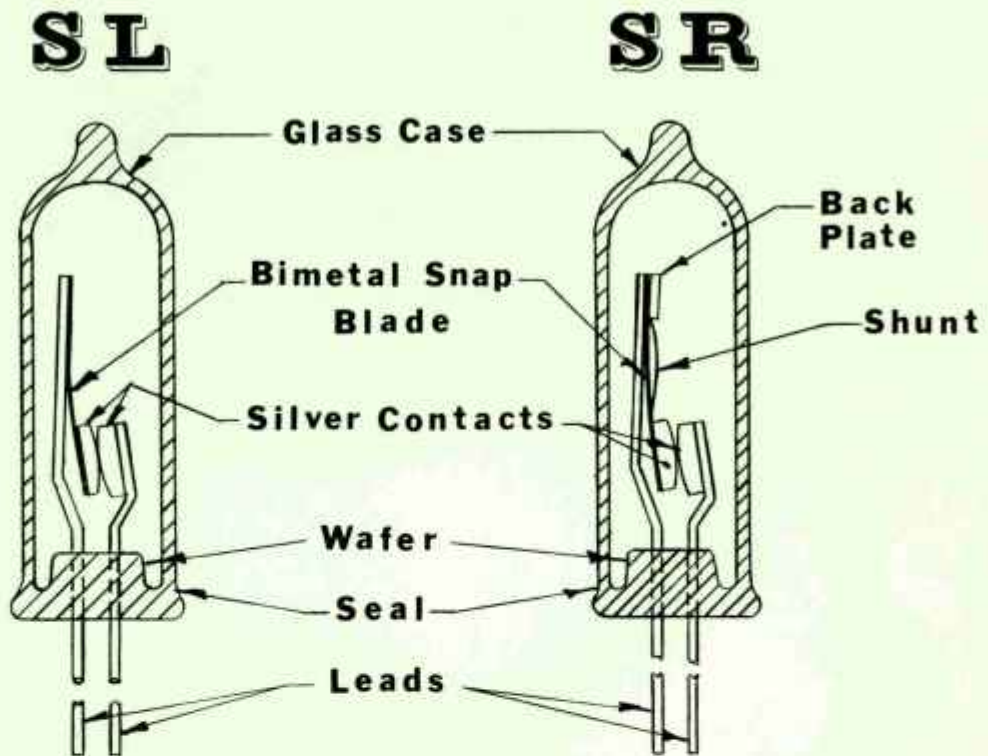
NCT means No Current Trip Temperature.



actual size



SL Series



SL



THERMO-PROTECTOR

This glass-enclosed protector was developed in the early '60's to protect Appliance Motors up to 1/2 Hp. at 120 volts AC. They are also capable of protecting 230 volt AC motors with a stall current up to 45 amperes.

Not only were they widely accepted for Appliance Motors, but because of their high reliability and exceptional long life capabilities, they have been used to internally protect compressor motors.

In many applications, these protectors provided twice the life as compared to previously applied protectors.

Because of this extended life capability and a void in market for a reliable protector, these motor manufacturers asked Sylvania to extend its line in this family of protectors.

This led to the development of the **DSL**, **SSL** and **NSL** protector to go along with the original **SL** and **SR**.

The following charts show where these protectors are used:

<u>Protector</u>	<u>Current</u>	<u>Application</u>
DSL900	7 to 12 amps	Compressors
DSL600	8 to 14 amps	Compressors
SSL900	10 to 20 amps	Compressors and open motors
SSL600	10 to 21 amps	Compressors and open motors
*NSL900	15 to 27 amps	Compressors and open motors
*NSL600	15 to 29 amps	Compressors and open motors

*Also capable of protecting against start switch failures in 1/3 Hp. motors.

(CONT)

SL



THERMO-PROTECTOR

<u>Protector</u>	<u>Current</u>	<u>Application</u>
SL900	20 to 32 amps	Compressors, open motors and pump motors
SL600	25 to 40 amps	General application
SR600	30 to 45 amps	General application

Not only are these protectors capable of protecting motors, but they are used to protect:

1. 8 to 15 amp battery chargers
2. Transformers with high short circuit current
3. Amplifiers for cable TV
4. 115 DC-PM motors with protector on the AC line

In order to keep the protector hermetic and still maintain its current capabilities, two dumet leads per pole were applied. Using this four wire concept, **SL** protectors achieved extended life capabilities.

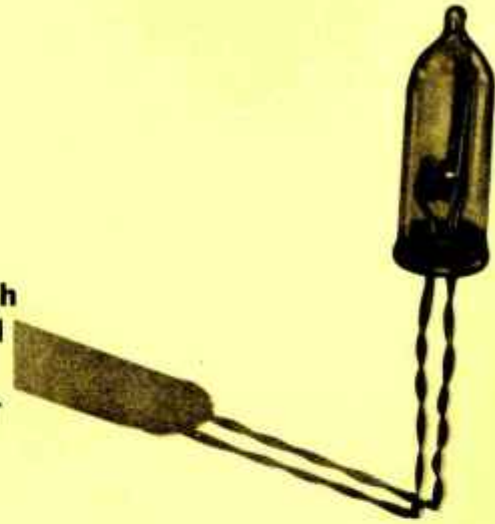
We hope you will join the growing family of companies using these protectors.

SYLVANIA | **GE**
CONTROL DEVICES

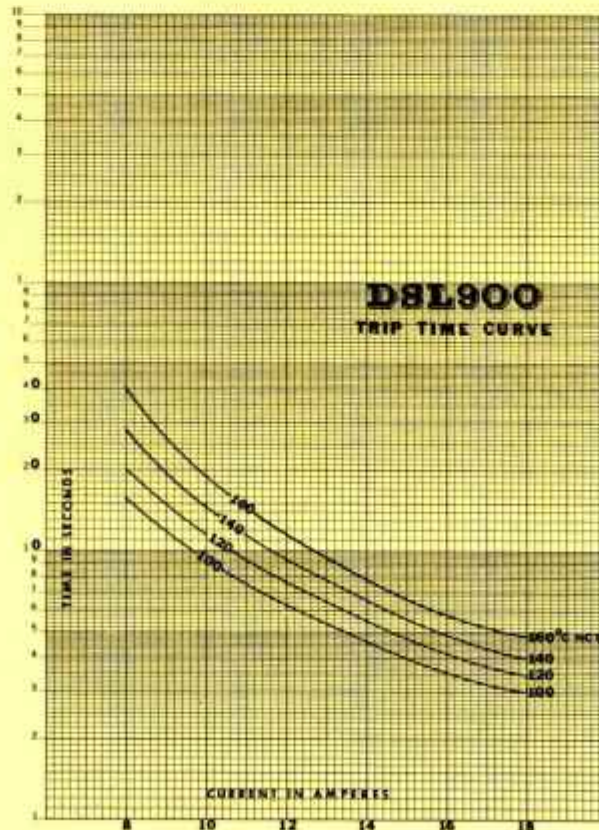
DSL900

APPLICATION CURVES

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actual size

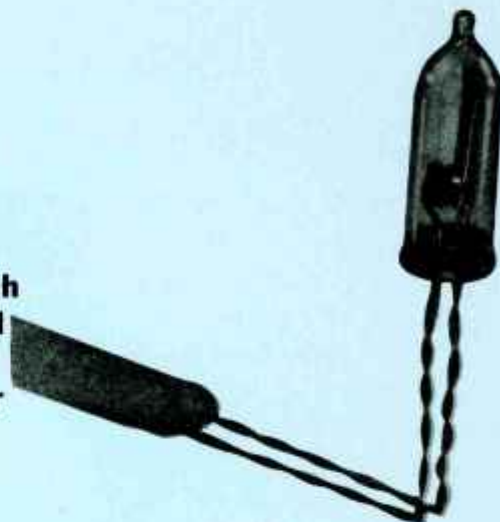


SYLVANIA | **GE**
CONTROL DEVICES

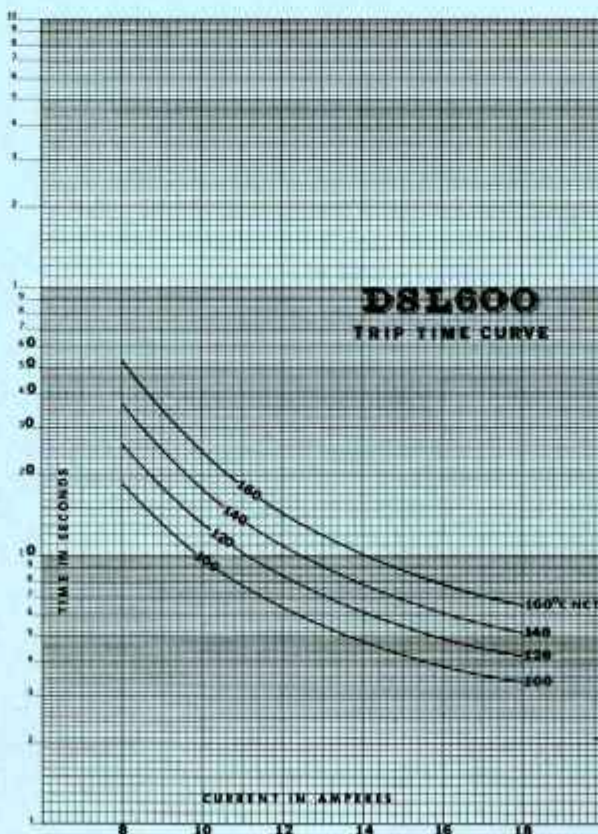
DSL600

APPLICATION CURVES

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actual size



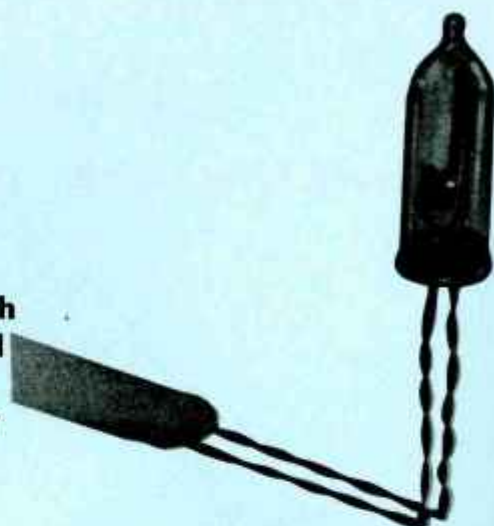
SYLVANIA | GTE
CONTROL DEVICES

SSL900

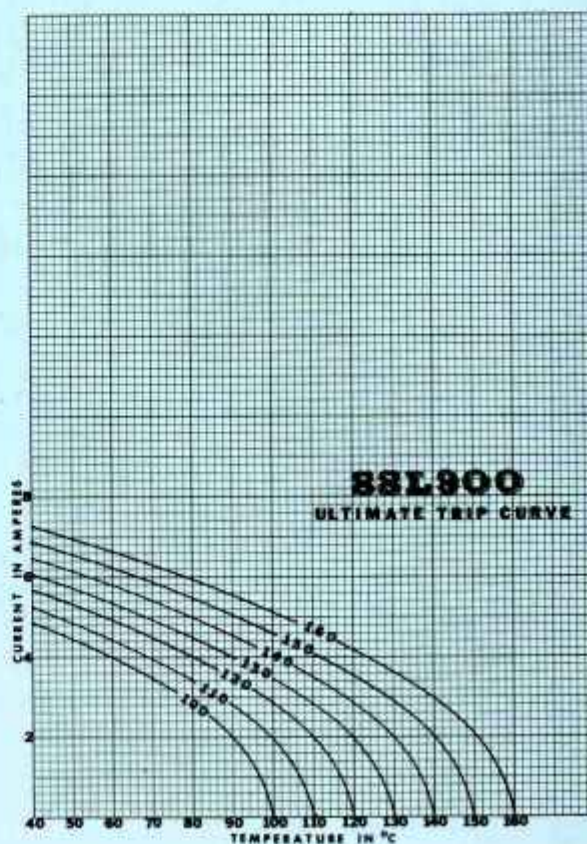
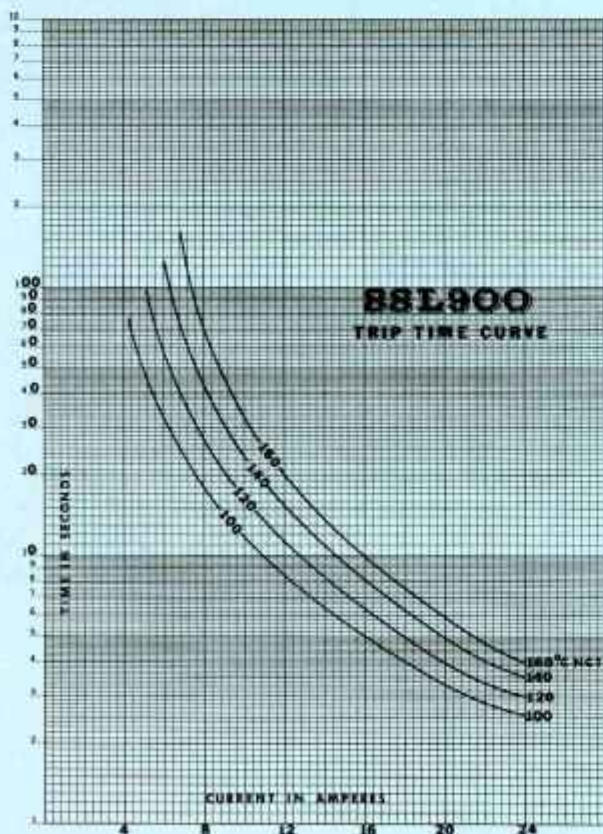
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actual size

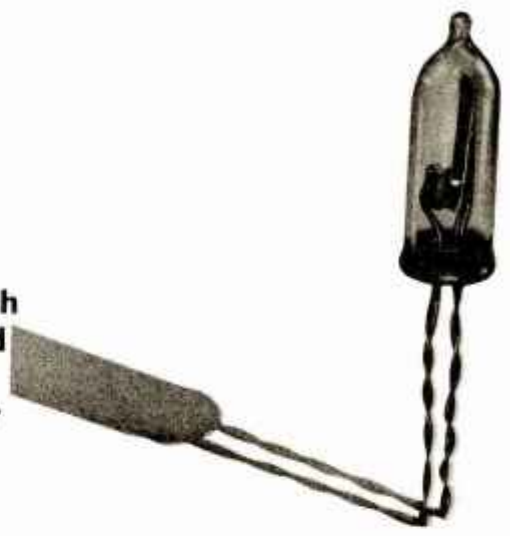


SYLVANIA | GIB
CONTROL DEVICES

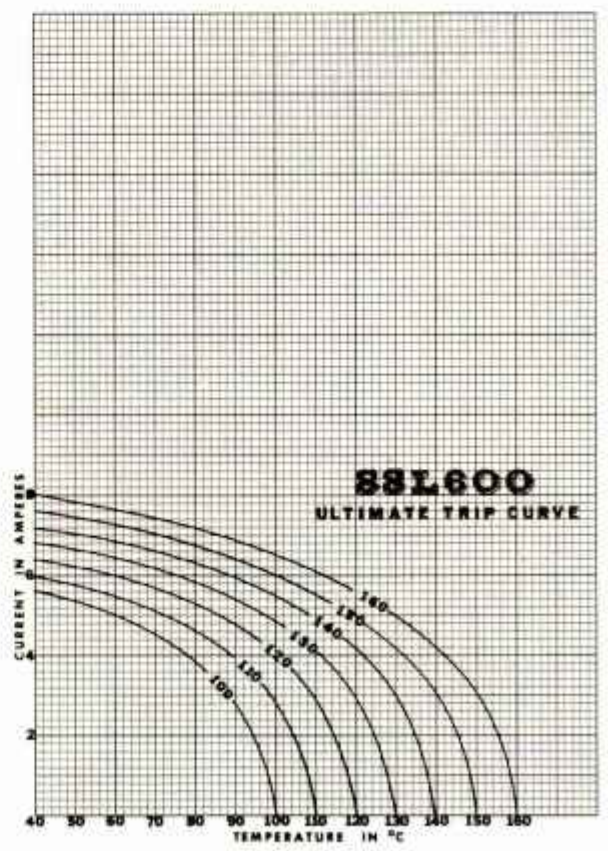
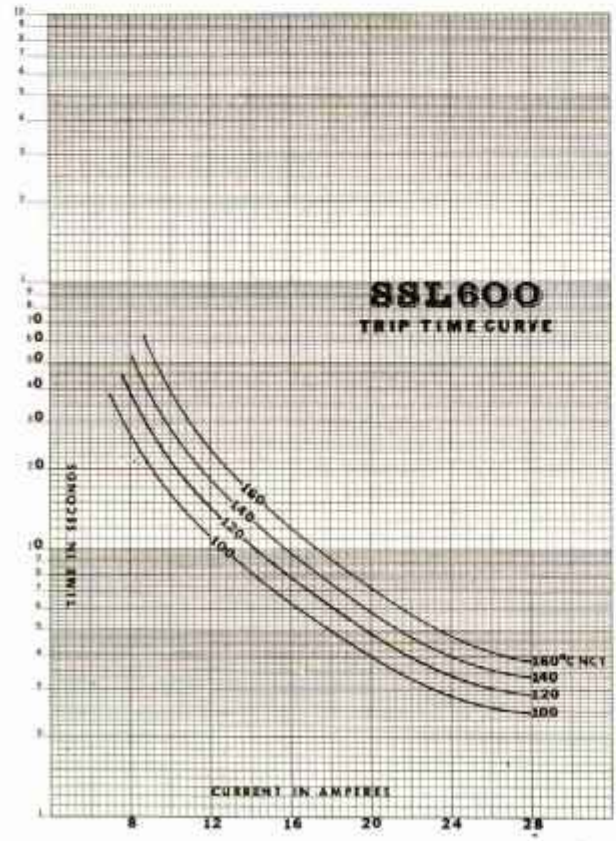
SSL600

APPLICATION CURVES

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actual size



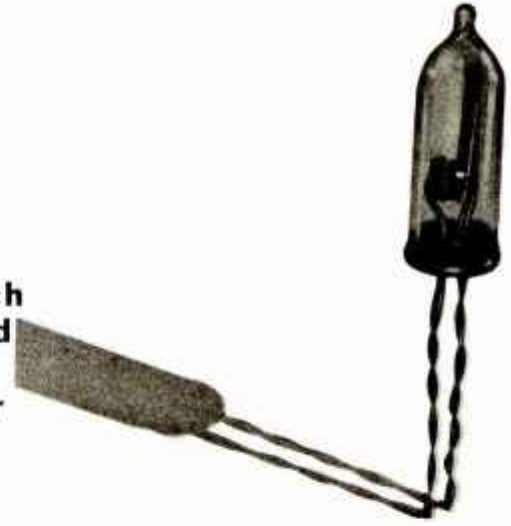
SYLVANIA | GIB
CONTROL DEVICES

NSL900

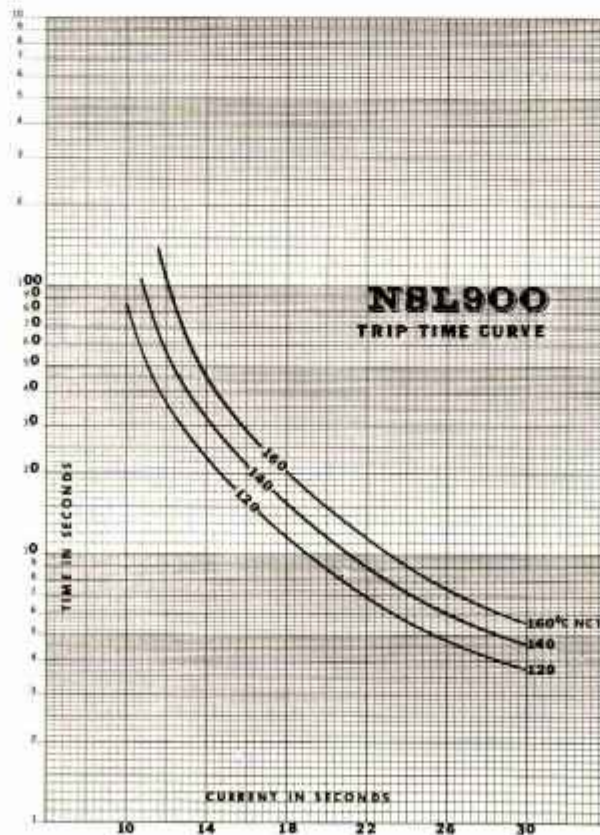
APPLICATION CURVES

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actual size

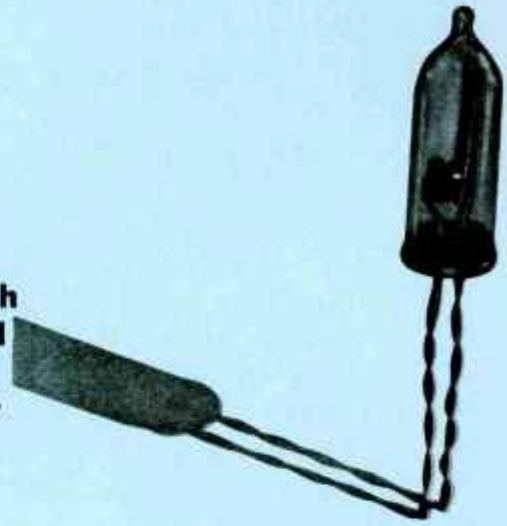


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CONTROL DEVICES

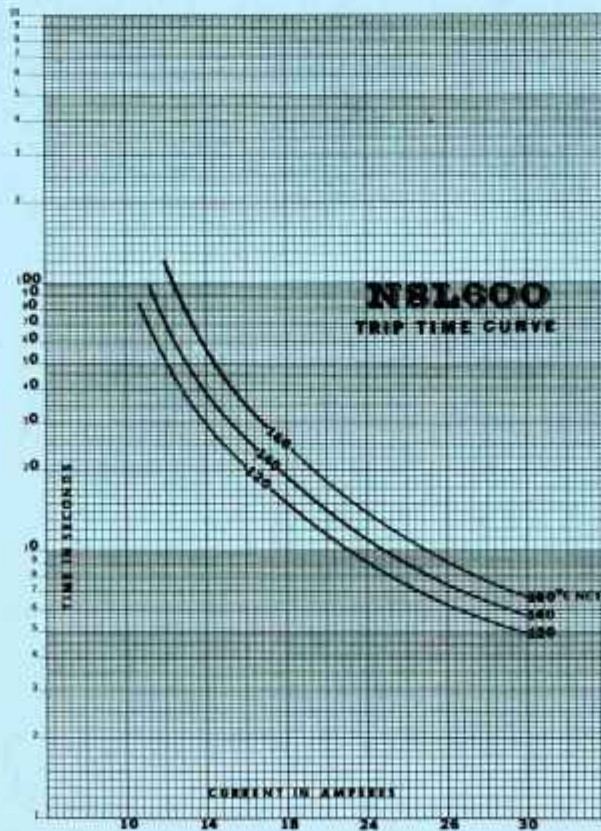
NSL600

APPLICATION CURVES

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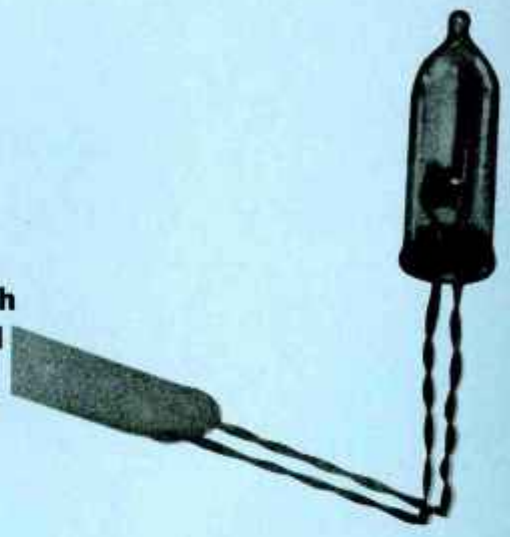


SYLVANIA | **GE**
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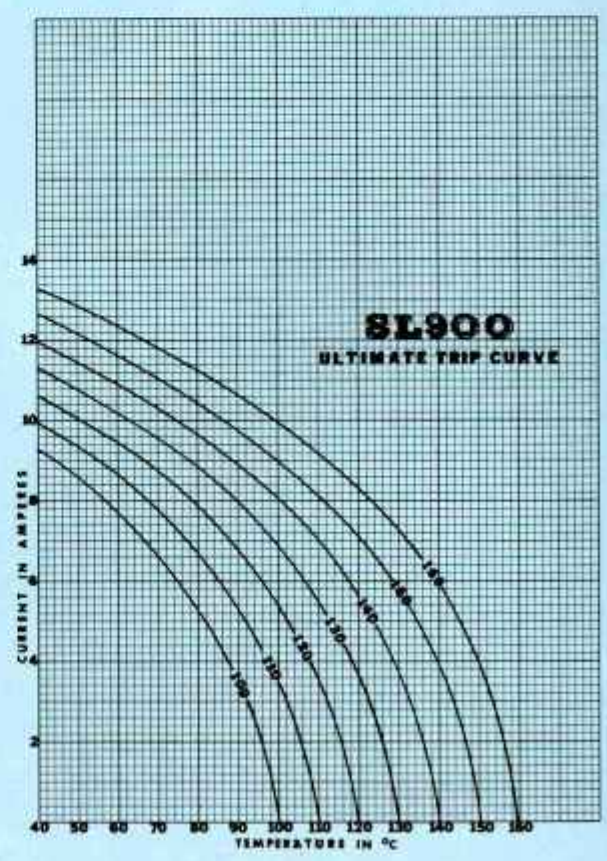
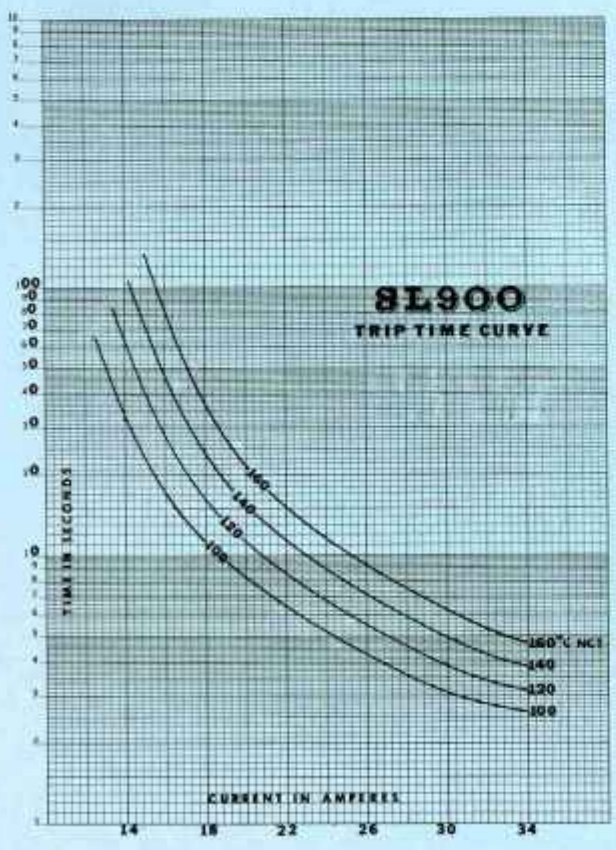
SL900

APPLICATION CURVES

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actual size



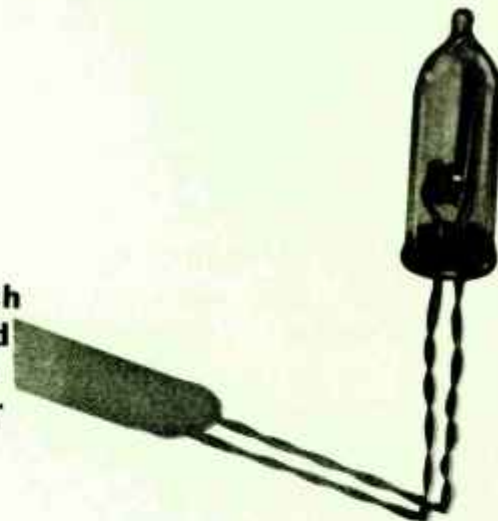


SYLVANIA | **613**
CONTROL DEVICES

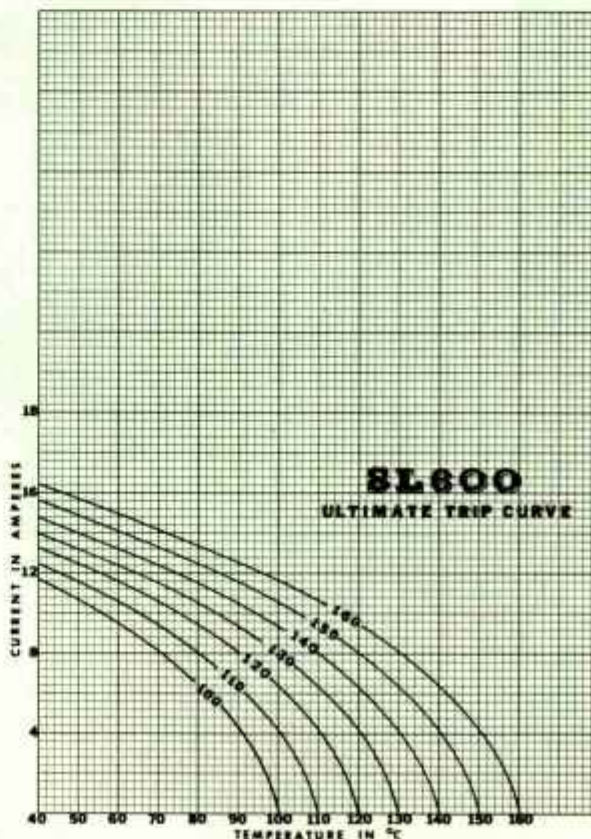
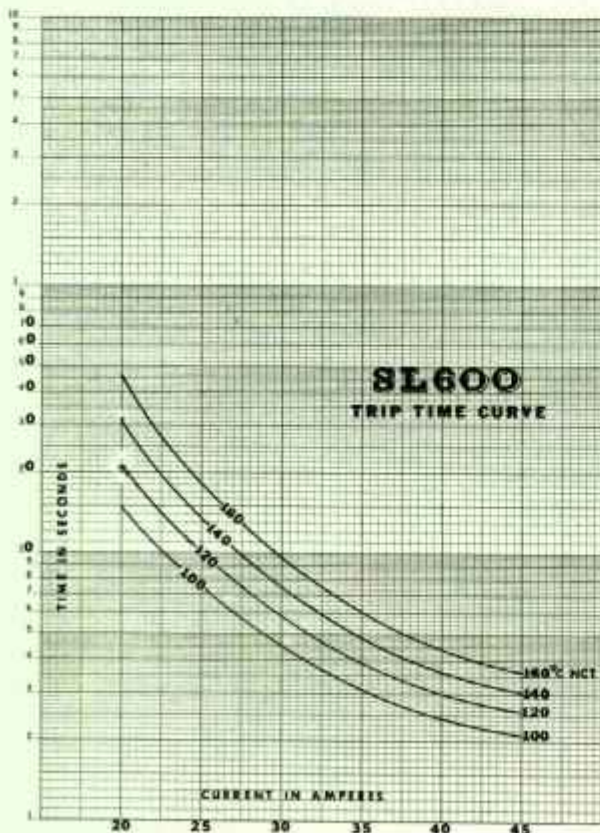
SL600

APPLICATION CURVES

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actual size



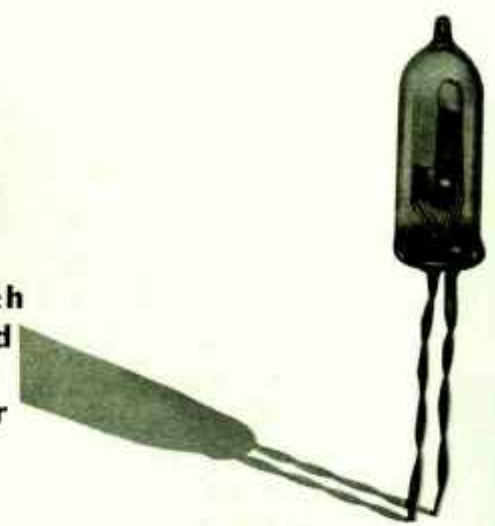


SYLVANIA | GTE
CONTROL DEVICES

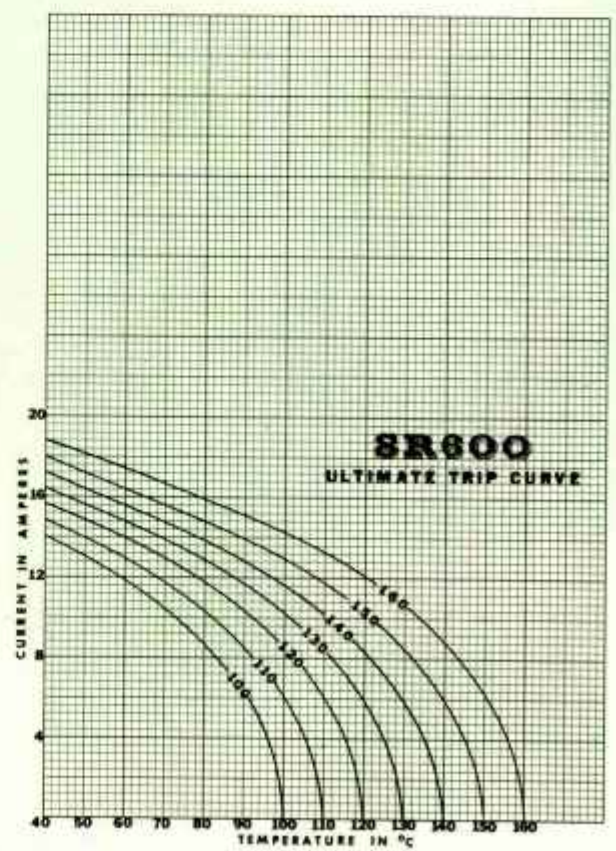
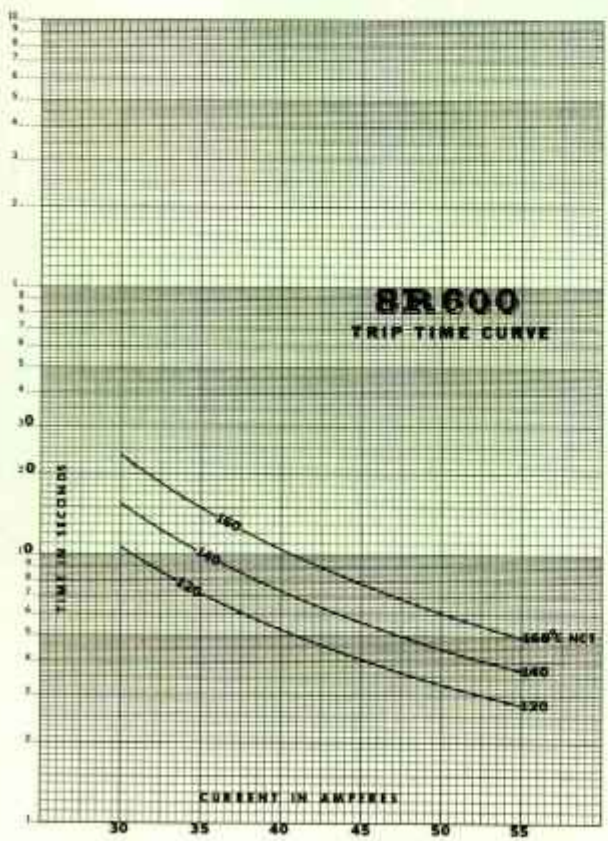
SR600

APPLICATION CURVES

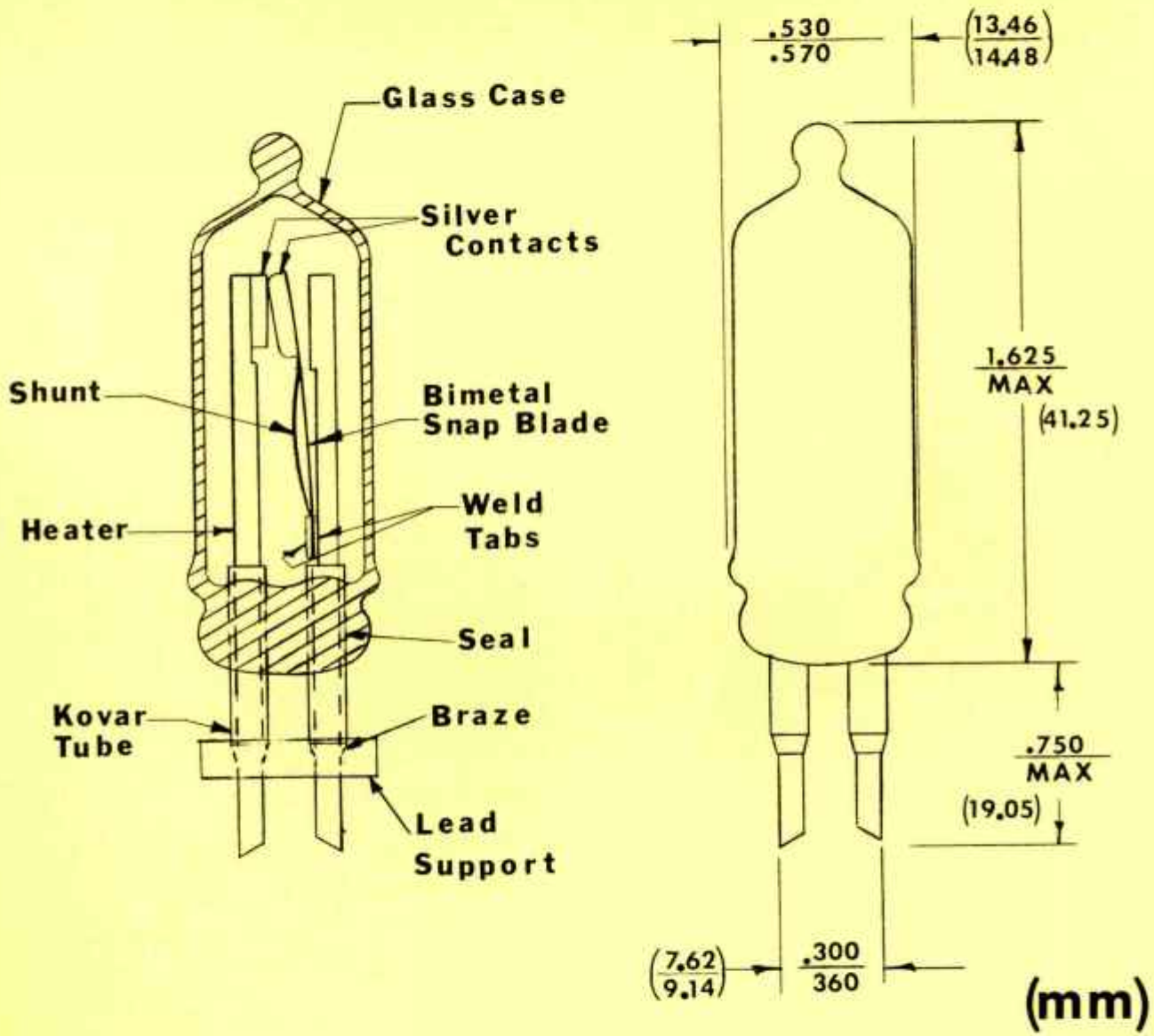
These curves are to be used only as a guide in selecting a protector for a particular application. Factors such as distance from the heat source and the method of mounting should be considered in selecting a protector directly from the curves. NCT means No Current Trip Temperature.



actual size



HSW Series



Included in this series
are the
 HSW type A
 HSW type C
 HSW type D
 HSW type E



HSW

THERMO-PROTECTOR

Sylvania's **HSW** has the same hermetic qualities as the **SB-SL** but uses different basic materials.

The envelope is made of hard glass. The glass is sealed to a matching expanding alloy called Kovar. The current carrying leads are brazed to the Kovar with a silver alloy.

These **HSW'S** are normally applied to Compressor Motors in the ratings from 18,000 BTU (1-3/4 Hp.) to 50,000 BTU (4 Hp.).

Reciprocal Compressors use the **HSW** with open temperatures of 90 to 130°C to provide the following features:

1. Voltage run down protection
2. Loss of charge protection
3. Light load protection

In Rotary Compressors, because of the high run ambient (100 to 130°C), an **HSW** with opening temperatures between 140 to 165°C is needed to provide protection and prevent nuisance trips.

The protector is matched to the compressor requirements by means of three built-in variables:

1. Change in opening temperature
 2. Change in copper shunt size
 3. Change in resistivity of the leads
- (1) At this time, the **HSW** is available in opening ranges of 90°C to 165°C incl.
- (2) The copper* shunt sizes are either:
- a. .150" wide x .002" thick
 - b. .250" wide x .002" thick
 - c. .250" wide x .004" thick
 - d. .350" wide x .004" thick
 - e. No shunt

*The increase in shunt sizes adds more current holding power and longer on times under locked rotor.

(CONT)



HSW

THERMO-PROTECTOR

(3) The leads are either:

- a. .075" dia. copper plated steel
- b. .075" dia., 40% conductivity, copper clad steel
- c. .075" dia., 70% conductivity, nickel clad copper
- d. .095" dia., 70% conductivity, nickel clad copper

The contacts are silver cadmium oxide for arc quenching. The bimetallic blade is restricted by a back post to help prevent arc tracking.

With these properties, along with the preceding material, the **HSW** will satisfy **U.L. & C.S.A.** requirements.

Terminations are available in either 1/4" copper plated steel spade terminals or with DMD wire in gages of #14 to #10 AWG. Lengths are from 2 inches to 3 feet maximum.

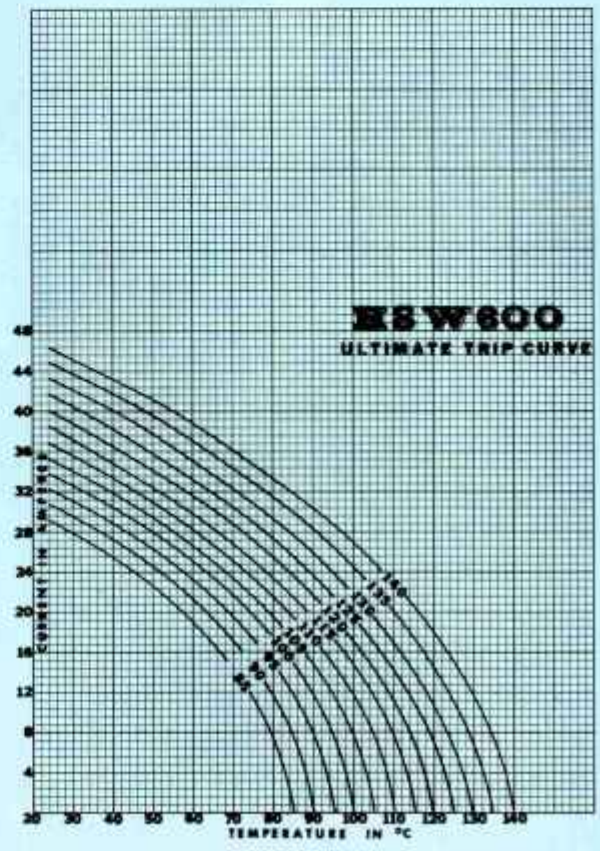
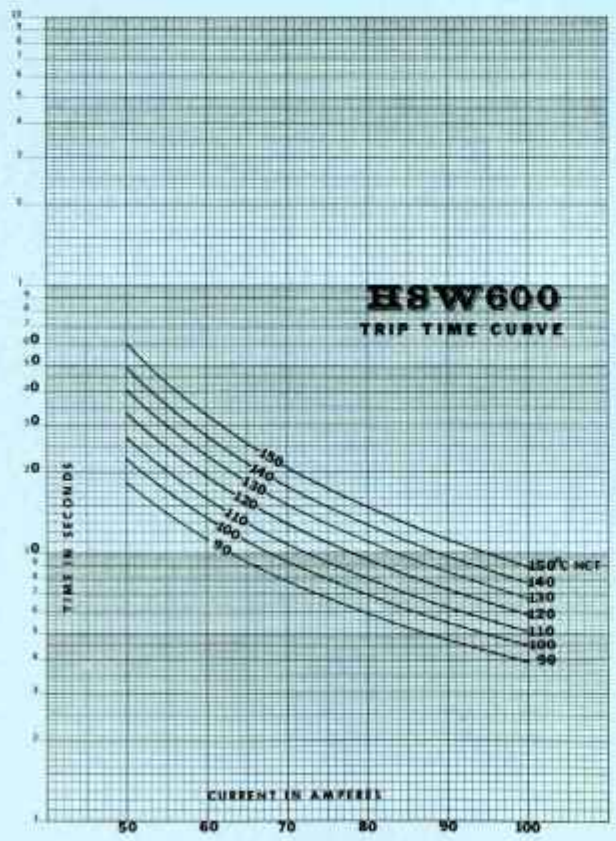
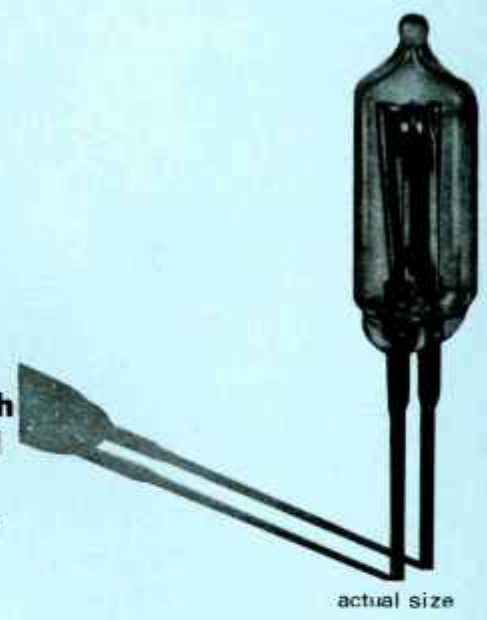


SYLVANIA | GTE
CONTROL DEVICES

HSW-Type A
.250 x.002 Shunt

APPLICATION CURVES

These curves are to be used only as a guide in selecting a protector for a particular application. Factors such as distance from the heat source and the method of mounting should be considered in selecting a protector directly from the curves. NCT means No Current Trip Temperature.

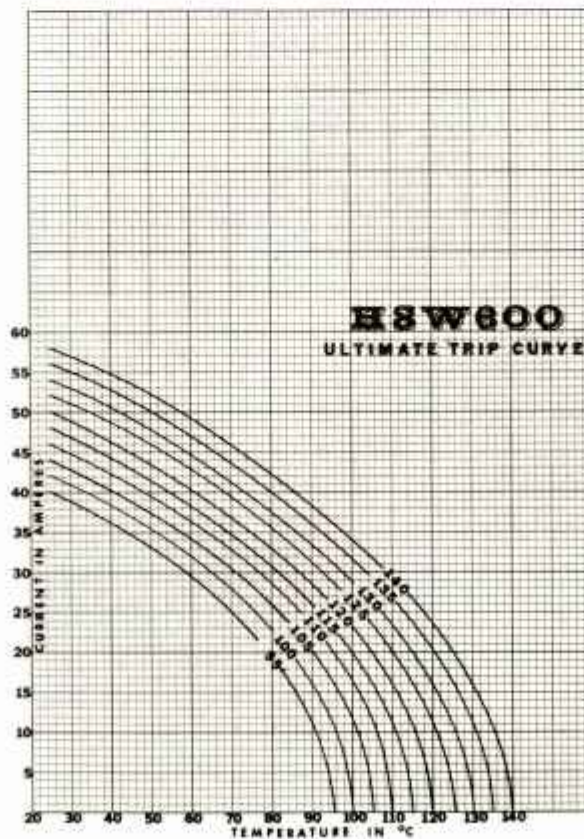


SYLVANIA | GTE
CONTROL DEVICES

HSW-Type C
.250 x.002 Shunt

APPLICATION CURVES

These curves are to be used only as a guide in selecting a protector for a particular application. Factors such as distance from the heat source and the method of mounting should be considered in selecting a protector directly from the curves.
NCT means No Current Trip Temperature





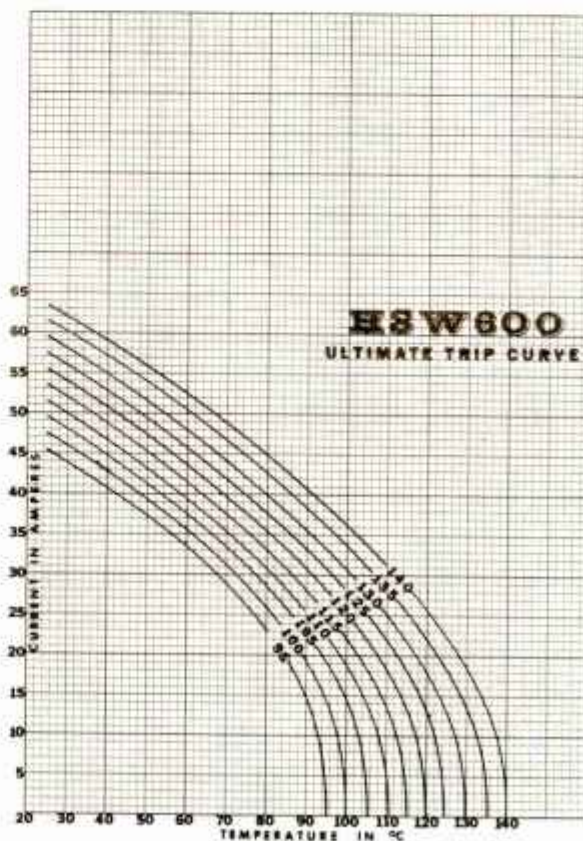
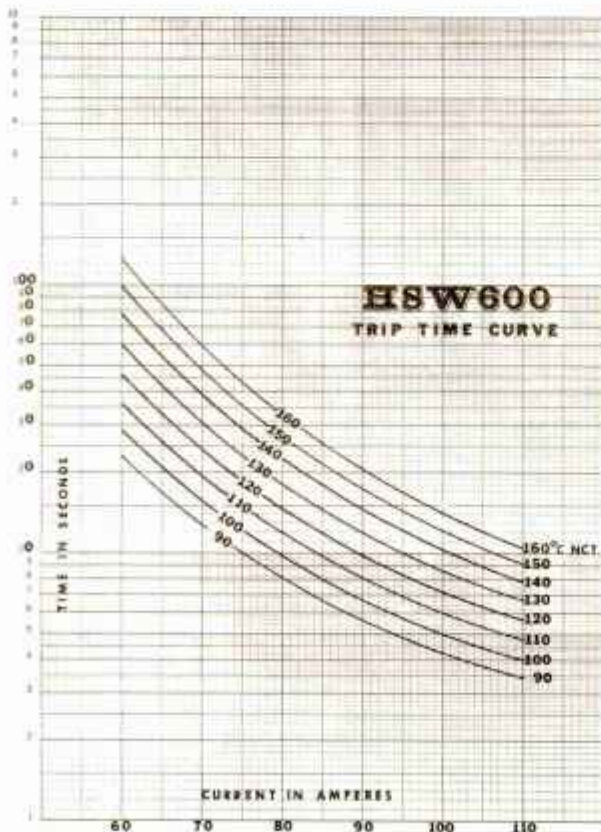
SYLVANIA | GTE
CONTROL DEVICES

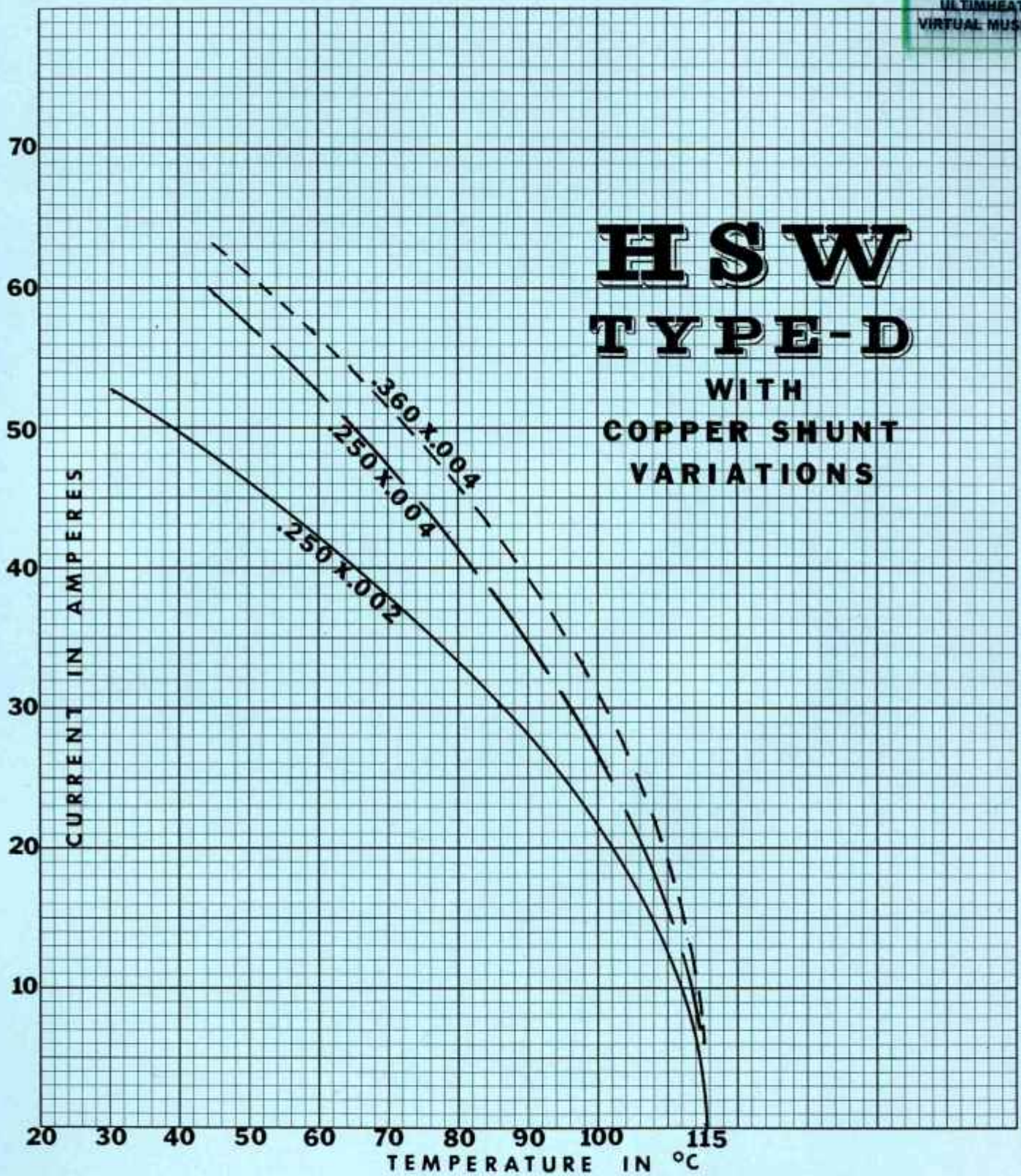
HSW-Type D

.250 x .002 Shunt

APPLICATION CURVES

These curves are to be used only as a guide in selecting a protector for a particular application. Factors such as distance from the heat source and the method of mounting should be considered in selecting a protector directly from the curves. **NCT** means No Current Trip Temperature.





ADDITIONAL PRODUCTS

THERMAL TIME-DELAY RELAYS



FLASHERS CORNERING RELAYS TURN SIGNALS



POSITIVE TEMPERATURE COEFFICIENT DEVICES (PTC)



AUTOMOTIVE BIMETALLIC CIRCUIT BREAKERS



ELECTRIC CHOKES





REQUEST FOR APPLICATION ASSISTANCE

GENERAL

1. Type of device to be protected
- a.) Voltage b.) Cycles c.) AC d.) DC..
2. Normal operating ambient
3. Ambient at time of overload
4. Operating current
5. Must hold current
6. Must trip current
7. Class of insulation A.) B.) C.) Other
8. Standard being tested under at U.L. and/or C.S.A.

FAULT PARAMETERS

1. Locked rotor or short circuit current cold/hot
2. Rate of rise in C/Sec
3. Minimum on time required under locked rotor or short circuit
4. Maximum allowable winding temperature

LEAD EXTENSIONS

1. Type of insulation
2. Length of wire (in inches or fractional portions thereof)
3. Type: Stranded Solid

Estimated yearly volume

Number of samples desired

Comments or additional information
.
.
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Name
Telephone Number
Company
Address
.

Position
Ext.
Zip Code



Send to:

**GTE Products Corporation
Control Devices
Route 35
Standish, Maine 04084
ATTENTION: Sales Dept.**



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VIRTUAL MUSEUM