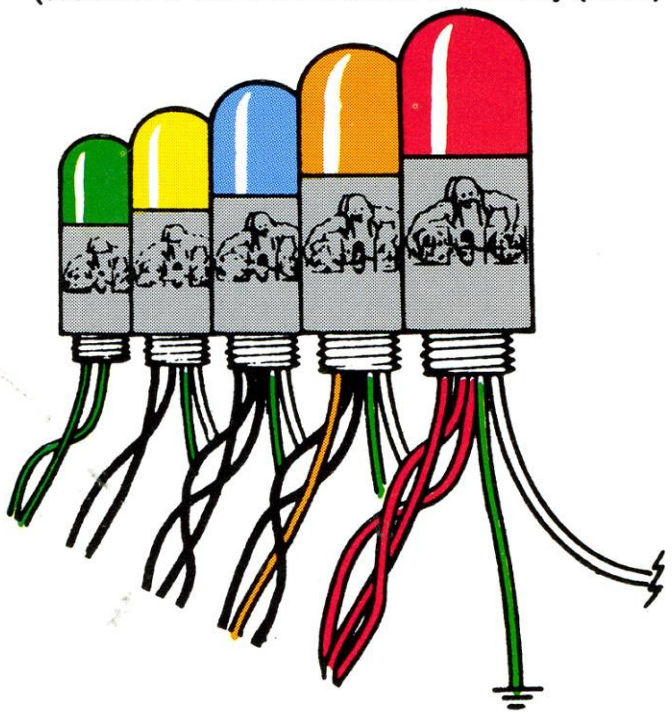
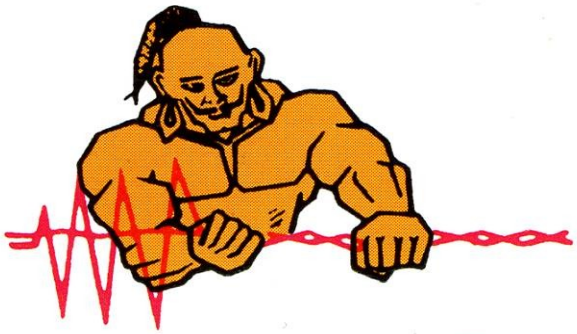
The most versatile products in the field of overvoltage elimination...

SILENT SLAVE® SYSTEMS

SLAVE: (slav); (definition 2d): A mechanical device which is directly responsive to another.
(Webster's 3rd International Dictionary (1976))



SYSTEM REQUIREMENTS
and
INSTALLATION GUIDELINES



Incorporating the Johnson Technology of Time and Distance Logic Engineering©

SILENT SLAVE SYSTEMS METHODOLOGY

The Slave is designed as a modular device. The effect of Slaves to the protected electrical environment is equal to the sum total of all Slave products installed. The values applied to protective ampacity and joules are accumulative. Cost effective employment of Slave technology is achieved using ''total system'' methodology in compliance with the Johnson Technology rules of Time and Distance Logic Engineering. This assures the protection of the electrical network by individual Slaves at isolated locations as well as simultaneous operation during catastrophic events.

For overall system protection, it is important to determine the type, location and number of Slaves to install. The simplest way to plan a system is to locate all main and sub-distribution panels, disconnects and contactors in the facility. List their voltage and ampacity. Compare this list with the ''Silent Slave System Requirements Chart'' on page 4. It is based upon electrical specifications of Slaves vs. network requirements and assumes that a total system format is to be implemented. Having done this for each of the locations you listed, it is a simple matter of addition to arrive at the total system parameters. The remaining task is the installation of the proper Slave models in locations listed. Follow ''Basic Installation Guidelines''.

An additional function of each Slave is identified as the ''Failsafe Sequence''—failsafe positive, failsafe negative and failsafe destruct. Subjected to continuous excessive voltages, the Slave may go into a final stage of failsafe destruct and open the electrical system's thermal protection (i.e. breakers and/or fuses). Should this occur, there will be a visible separation of the colored cap of the Slave from the body. This indicates that the Slave had performed as a voltage fuse for the affected phase or phases. Unaffected phases of this Slave, as well as all other system Slaves, will continue to operate in normal function. The destroyed phase (or phases) will go into a final spark gap mode and no longer function as a semiconductor at original specifications. This is the stage of failsafe destruct wherein the Slave should be replaced to maintain the contribution to total system protection. Slaves are designed to open their internal circuitry in this failsafe destruct mode so there is no dependence on replacement prior to re-energizing the electrical network.

PRIMARY BREAKOVER RANGES
AC Volts / DC Volts

Determine parameters of custom requirements by metering AC or DC voltage between circuit conductors (i.e. line/line, line/neutral, line/ground, neutral/ground, negative/positive, etc.). Select and install Slave model(s) with a breakover range of at least 115% of metered nominal operating voltage. An electrical network operating at 380Vac would require the Model 4803 Silent Slave. OEM or retro-fitted equipment requiring a 380Vac service in a standard U.S. 480Vac environment requires employment of the Model 4803 on line and load sides of the 480/380 stepdown transformer.

To insure the integrity of the total Slave system in electrical networks with unusually high energy and/or frequency of abnormal activity, it is advantageous to use Slave models with a higher breakover than normal, at the main service entrance. Such an example is the use of the Model 4803 on the high or wild phase of a 240Vac delta network. See illustration "J" on page 9.

Model 2401

A 

A	150Vac / 200Vdc	Line to Neutral
B	150Vac / 200Vdc	Line to Neutral
N	575Vac / 730Vdc	Neutral to Ground
G	725Vac / 930Vdc	Line to Ground

Model 2083

B 

A	150Vac / 200Vdc	Line to Neutral
B	150Vac / 200Vdc	Line to Neutral
C	150Vac / 200Vdc	Line to Neutral
N	575Vac / 730Vdc	Neutral to Ground
G	725Vac / 930Vdc	Line to Ground

NOTE:

LETTERS TO LEFT OF VARIOUS UNITS THROUGHOUT THIS FOLDER ARE REF. FOR USE IN COMMUNICATIONS BY PHONE OR FAX

Model 2403

C 

A	150Vac / 200Vdc	Line to Neutral
B	250Vac / 330Vdc	Line to Neutral
C	150Vac / 200Vdc	Line to Neutral
N	575Vac / 730Vdc	Neutral to Ground
G	725Vac / 930Vdc	Line to Ground (Phases A & C)
	825Vac / 1,060Vdc	Line to Ground (Phase B)

Model 4803

D 

A	320Vac / 420Vdc	Line to Neutral
B	320Vac / 420Vdc	Line to Neutral
C	320Vac / 420Vdc	Line to Neutral
N	575Vac / 730Vdc	Neutral to Ground
G	895Vac / 1,150Vdc	Line to Ground

SEE SILENT SLAVE SPECIFICATIONS—PAGE #5

SILENT SLAVE
BASIC INSTALLATION GUIDELINES

1. METER VOLTAGE AT ALL CONNECTION POINTS BEFORE ATTACHING ANY SILENT SLAVE CONNECTING LEADS!
2. Slaves must be attached to the LOAD side of a disconnect, breaker/fuse panel, etc. (See Fig. A, Page 10)
3. Slaves must be attached to the LINE side of a contactor or relay (except special applications). (See Fig. B, Page 10)
4. Begin actual installation by connecting the Ground lead first and the Neutral lead second.
5. Slave ground connecting leads may be attached to the electrical system neutral at the main panel or disconnect ONLY if the electrical system ground is already attached to the bonded neutral bar at that location.
6. If the existing electrical system has no neutral conductor, DO NOT USE THE WHITE or GREY NEUTRAL CONNECTING LEAD. Strip the end and cap with a suitable wire nut or other NEC approved device.
7. Basic Slave connecting lead attachments are as follows:

#2401 (Yellow)	#2083 (Blue)
Green - Ground	Green - Ground
White - Neutral	White - Neutral
Black - Phase A or B	Black - Phase A, B or C
Black - Phase A or B	Black - Phase A, B or C
	Black - Phase A, B or C
#2403 (Orange)	**#4803 (Red)**
Green - Ground	Green - Ground
White - Neutral	Grey - Neutral
Black - Phase A or C	Red - Phase A, B or C
Black - Phase A or C	Red - Phase A, B or C
Orange - Usually Phase B	Red - Phase A, B or C

NOTE: Orange lead ONLY must attach to the high or wild phase.

SILENT SLAVE SYSTEM REQUIREMENTS

Single Phase Main

200 amps or less	2 Silent Slaves
400 amps	4 Silent Slaves
600 amps	6 Silent Slaves

Single Phase Sub-Distribution

60 amps or less	1 Silent Slave
Over 60 amps to 200 amps	2 Silent Slaves

Three Phase Main

200 amps or less	3 Silent Slaves
400 amps	4 Silent Slaves
600 amps	6 Silent Slaves
1000 amps	10 Silent Slaves
1200 amps	12 Silent Slaves
1400 amps or over	15 Silent Slaves

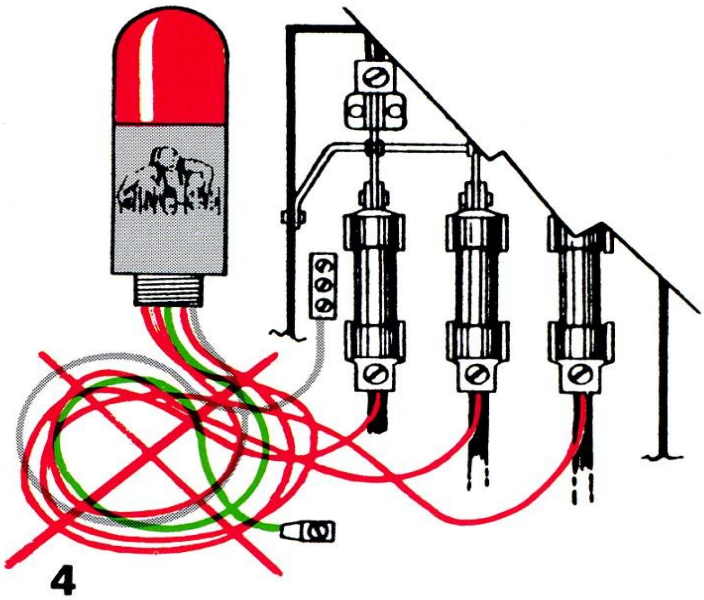
Three Phase Sub-Distribution

60 amps or less	1 Silent Slave
Over 60 amps to 200 amps	3 Silent Slaves

Add one (1) additional Silent Slave for each electric motor of fifty (50) horsepower or more. In this application, the Silent Slave must be attached to the line side of the motor's contactor or starter.

CAUTION!

The connecting leads of each Silent Slave are a minimum of 20 inches in length to accommodate the average installation. If you need less than 20 inches, cut the connecting lead the proper length from the Slave body. DO NOT LOOP CONNECTING LEADS!



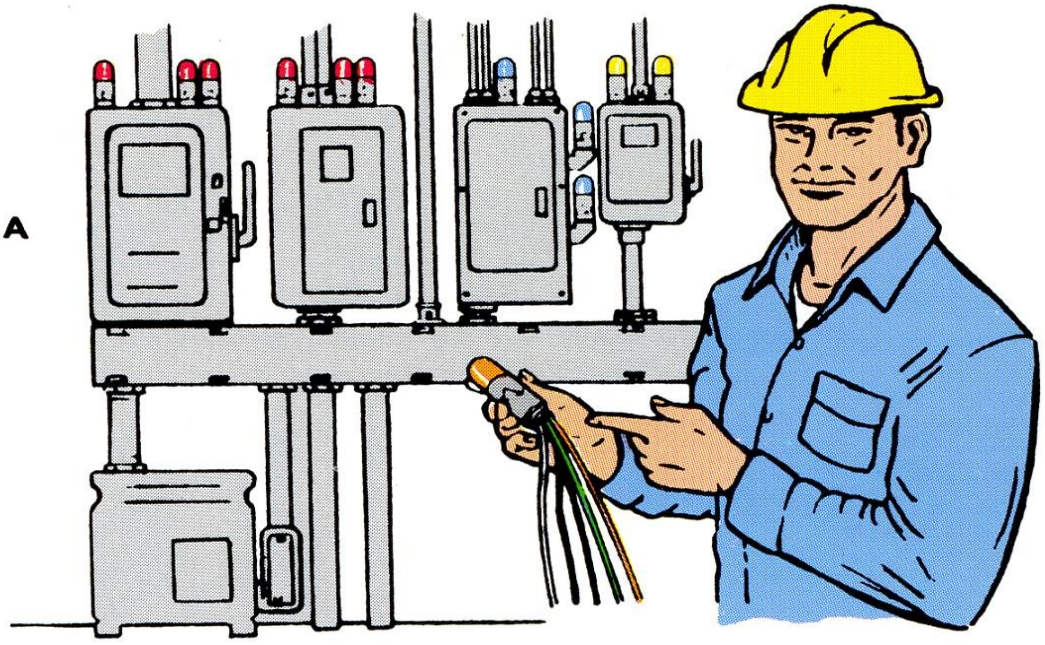
SILENT SLAVE SPECIFICATIONS

Model Cap Color Code	#2401 Yellow	#2083 Blue	#2403 Orange	#4803 Red
Standard Threshold Vrms	150 Vac 200 Vdc	150 Vac 200 Vdc	150 Vac 200 Vdc	320 Vac 420 Vdc
High Leg Threshold Vrms	—— ——	—— ——	250 Vac 330 Vdc	—— ——
Failsafe Threshold	ALL	UNITS	575 Vac	730 Vdc
Peak Pulse Ip at Primary Breakover	6,500a	6,500a	6,500a	4,500a
Peak Pulse Ip at Failsafe 8 x 20 us	11,000a	11,000a	11,000a	9,000a
Average Capacitance	1.6nF	1.6nF	1.6nF	.75nF
(Failsafe) Avg. Capacitance	.37nF	.37nF	.37nF	.37nF
Energy 10 x 100 us pulse	280j	360j	352j	390j
Total Ampacity	22,000a	33,000a	31,000a	27,000a
Response Time	<.6ns	<.6ns	<.6ns	<.6ns
Configuration	240 V 1Ph 4 wire	208 V 3PH 5 wire	240 V 3PH 5 wire	480 V 3PH 5 wire

Operating Ambient Temperature: -55 to +85 Degrees C.
Storage Temperature: -55 to +125 Degrees C.
Voltage Temperature Coefficient: -0.05% per Degree C.
Component Insulation Resistance: >1000Mohms
Operating Frequency: 50 to >400 Hz

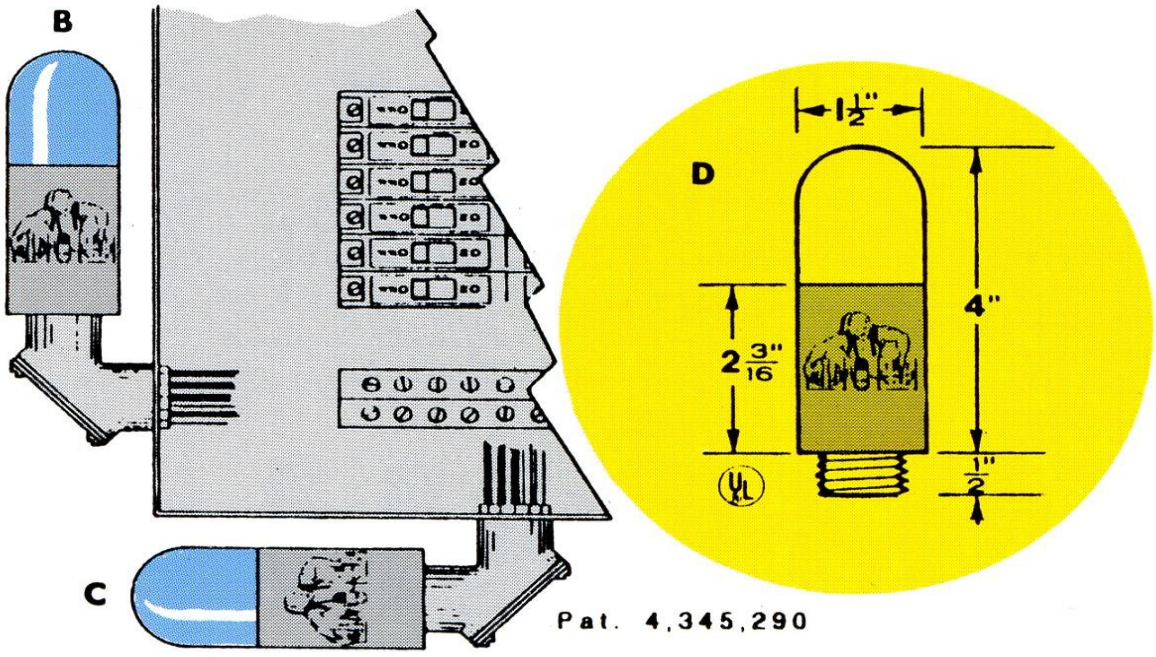
TEST	METHOD (MIL-750B)	DESCRIPTION
Thermal Life	1032.1	125 Degrees C, 24 hour bake
Thermal Shock	1051.1	Air-Air -55 to 125 Degrees C, 5 cycles
Constant Acceleration	2006	20,000 G
Burn-In	1038 Cond. B	72 hours, 85 degrees C at rated voltage
Resistance to Solvents	MIL-202E, Method 215	Marking permanance, three solvents
Flammability	MIL-202E, Method 111A	15 second torch, 10 second extinguish
Shock	2016.2	1500 G's, .5ms, 5 pulses
Variable Frequency Vibration	2056	20 G's, 100 to 2000Hz
Salt Atmosphere	1041	35 Degrees C, 25 hours, 10 - 50G/M^2/Dy
Humidity Life	No Equivelent	85 Degrees C, 85% RH, 168 hour exposure

A



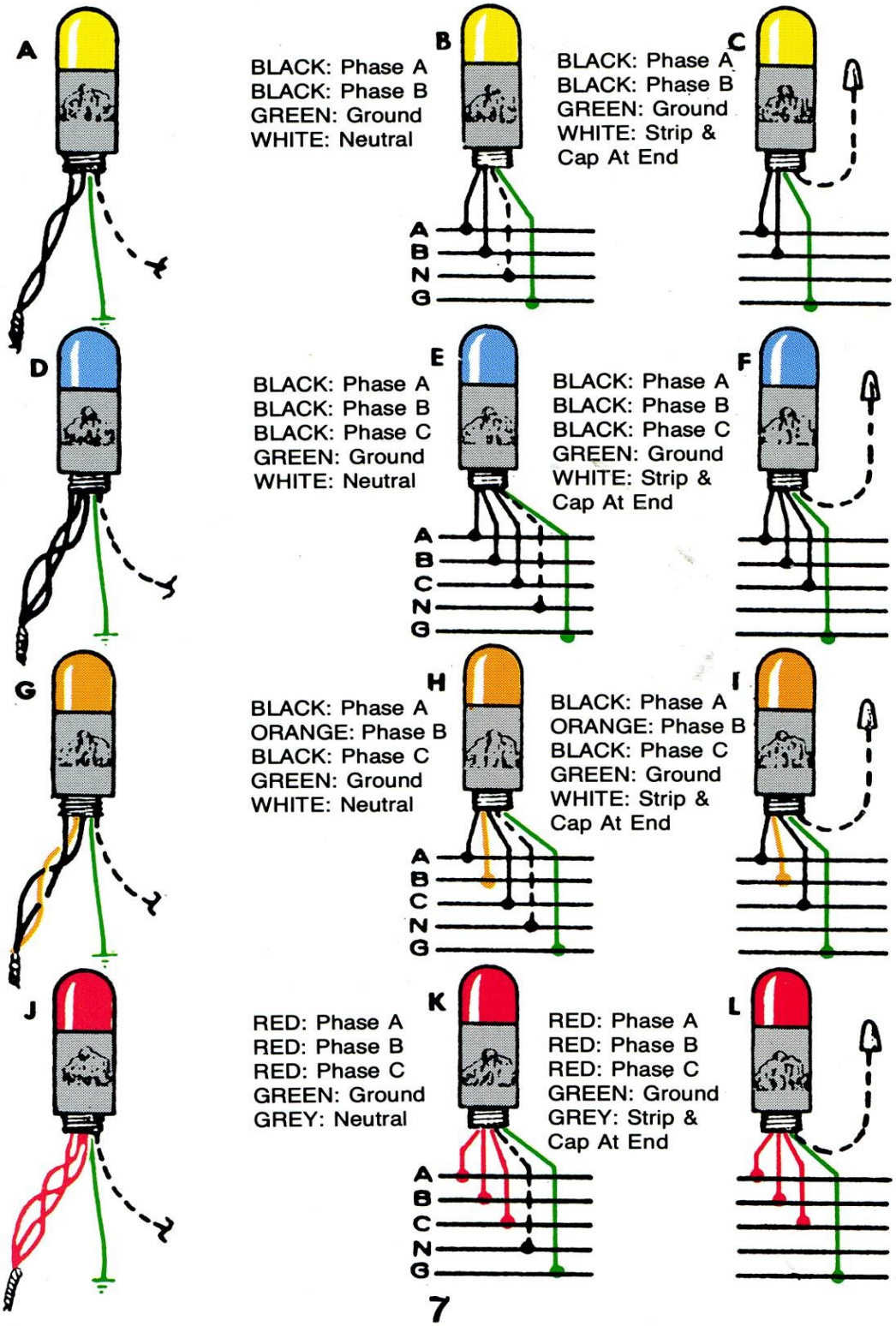
Dimensioned at 4½ inches long by 1½ inches in diameter and weighing only about 9 ounces, the Silent Slave has been designed for total versatility in any application.

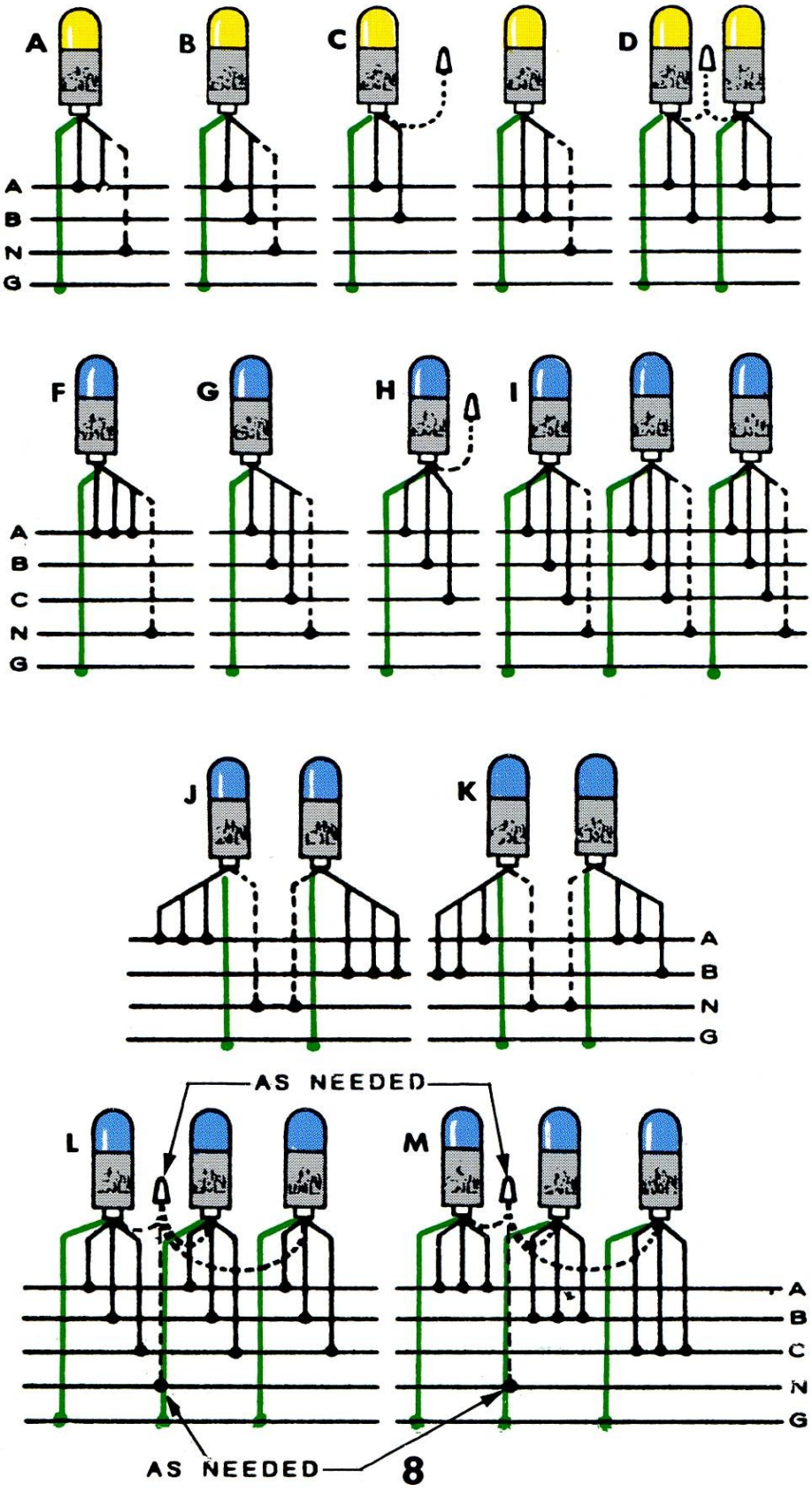
B



A heavy load hung inadvertently on the installed device could result in damage to the mounting extension. For this reason, side mounting is not recommended without the use of a street ell which facilitates vertical mounting.

VARIABLE CONNECTIONS

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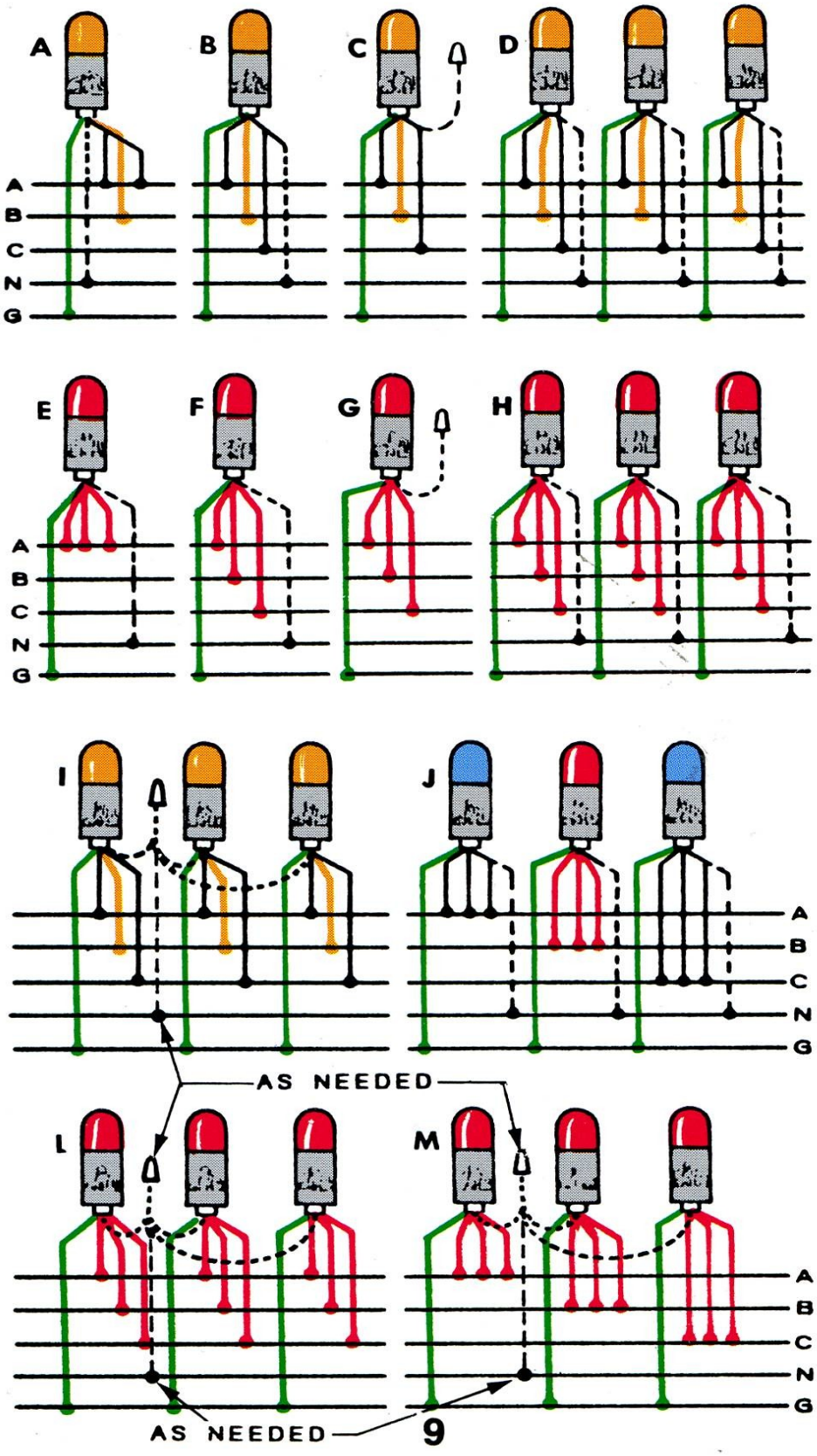
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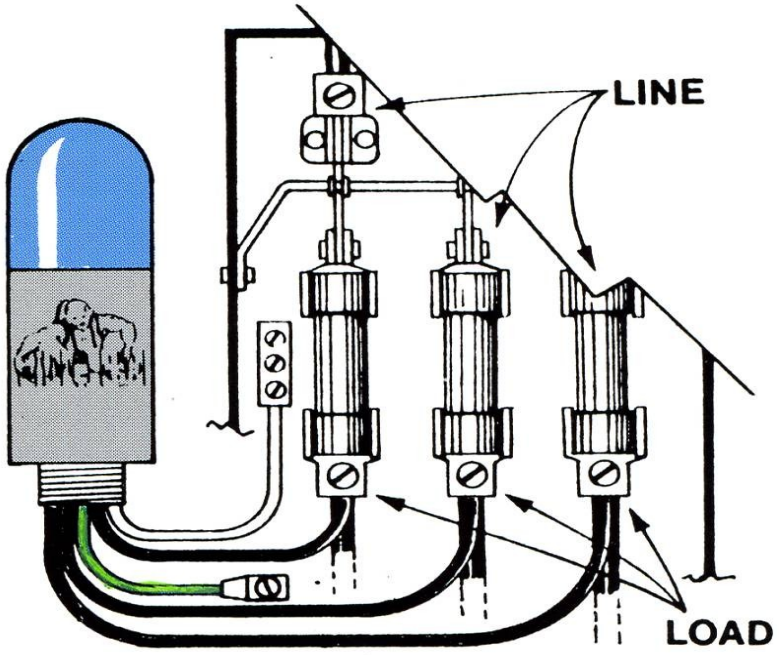
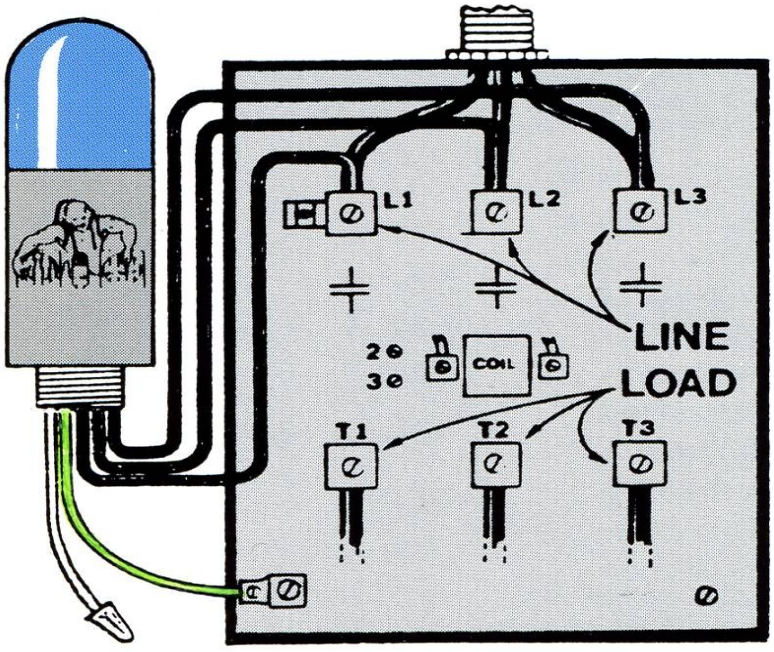
Attach Silent Slaves to the **LOAD** side of Disconnects and to the **LINE** side of Contactors, Relays, Starters, etc.

A



Fused Disconnect

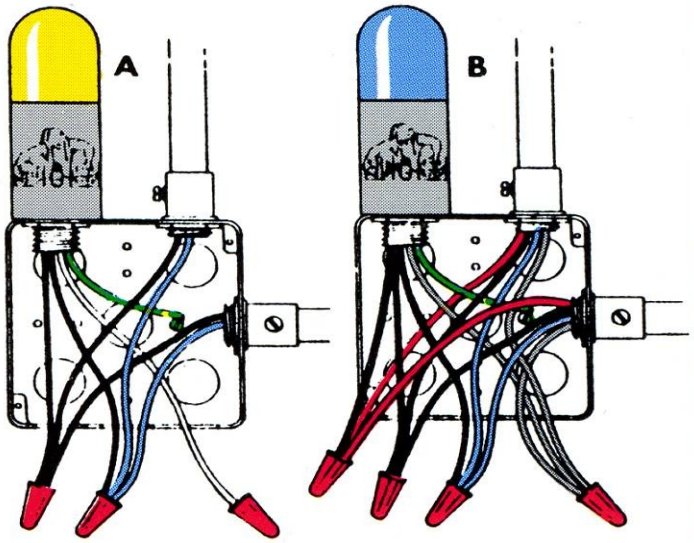
B



Contactor, Relay, Starter, etc.

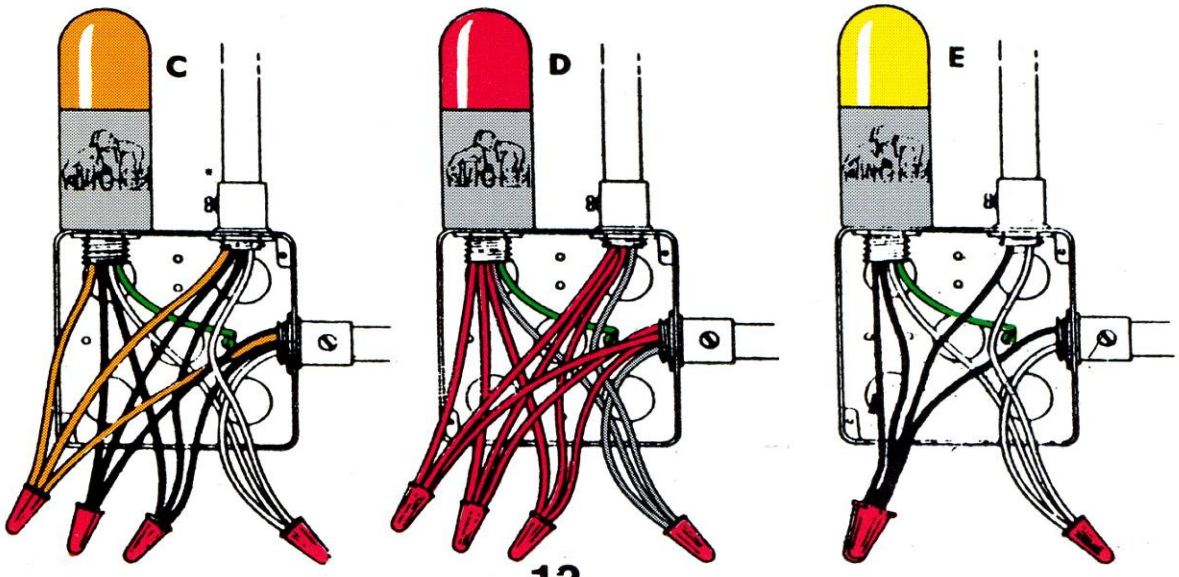
JUNCTION BOX CONNECTIONS

Attach GREEN connecting lead to or under bonding device. For dedicated ground, remove wire nut or other device from circuit grounding leads, attach green connecting lead to conductors.



Attach WHITE connecting lead. Remove wire nut or other device from circuit neutral, wrap or twist stripped end of connecting lead around circuit neutral conductors, replace wire nut or other device. If existing circuit contains no neutral conductor, strip end of white connecting lead and cap with suitable wire nut. DO NOT ATTACH WHITE CONNECTING LEAD TÓ CIRCUIT IF NO NEUTRAL IS PRESENT!

Attach each phase connecting lead by removing wire nut or other device from the phase A, B and/or C circuit conductors, wrap or twist stripped end of connecting lead around circuit conductors and replace wire nut or other device.

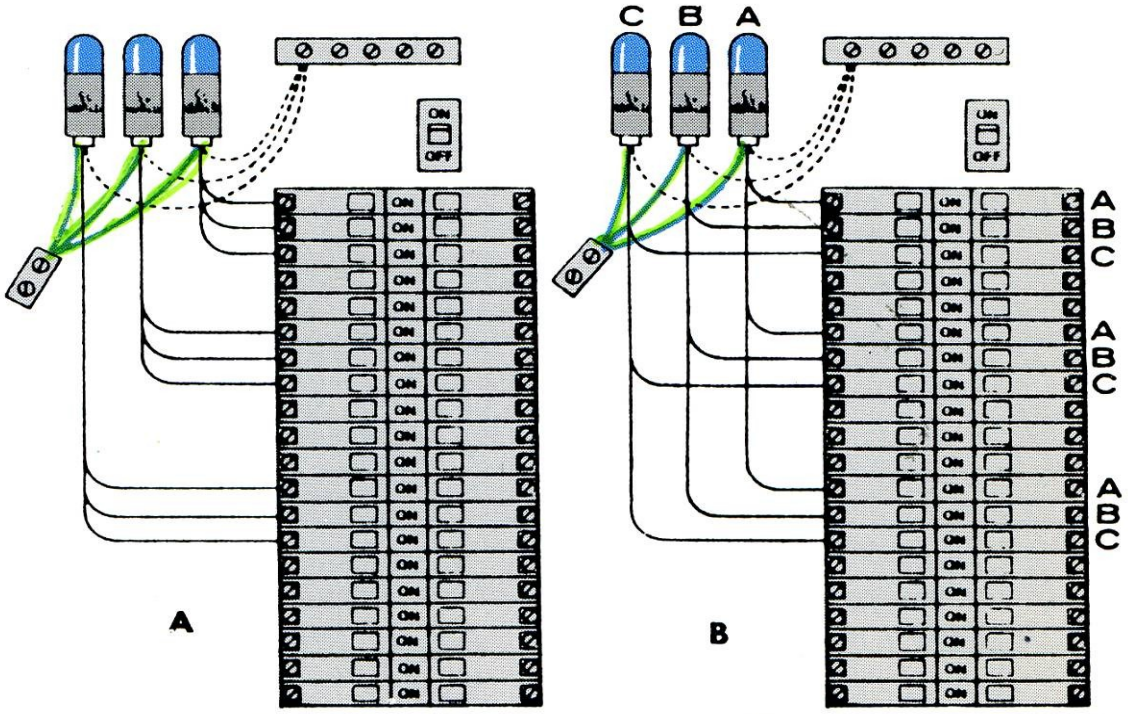


FANNED CONNECTION INSTALLATION METHOD

(Circuit Breaker Panel)

Single Silent Slave Site

Attach the ground and neutral connecting leads in accordance with the Basic Installation Guidelines. Attach one of the phase connecting leads to the top or uppermost circuit breaker on either the left or right side of the buss in the panel. Attach another phase connecting lead to the circuit breaker immediately below the first and attach the remaining phase connecting lead to the third circuit breaker immediately below the second. This applies protection to phases A, B and C equally. (Phases A and B in a single phase panel.)



Ref. to L, Page 8

Ref. to M, Page 8

Multiple Silent Slave Site

Follow the Single Site method, above, for each Slave to be installed in the breaker panel. The first Slave's phase connecting leads will be attached to the uppermost three circuit breakers. The remaining Slaves will be spread evenly down the buss using the same ''successive three circuit'' fashion as the first.

(Single phase panel is a ''successive two breaker'' fashion.)

WARNING! DO NOT attach black connecting leads to the high or wild phase if you are working a 240 Volt three phase network!