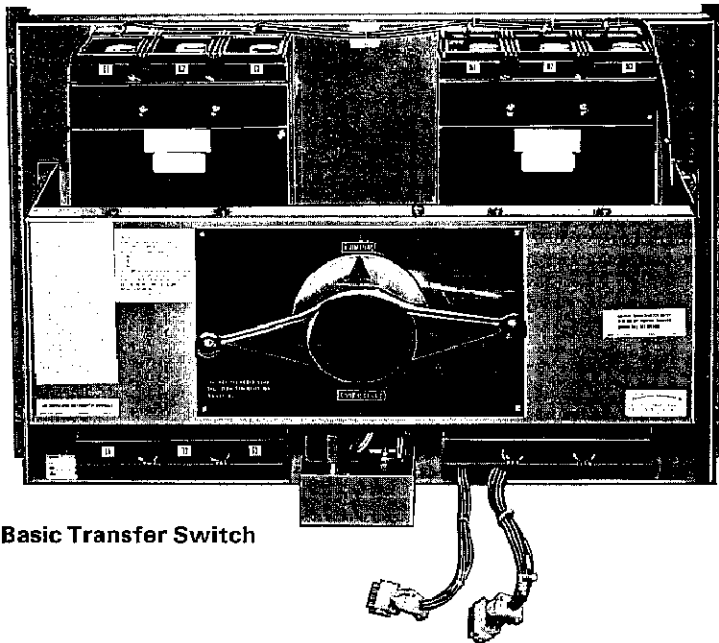




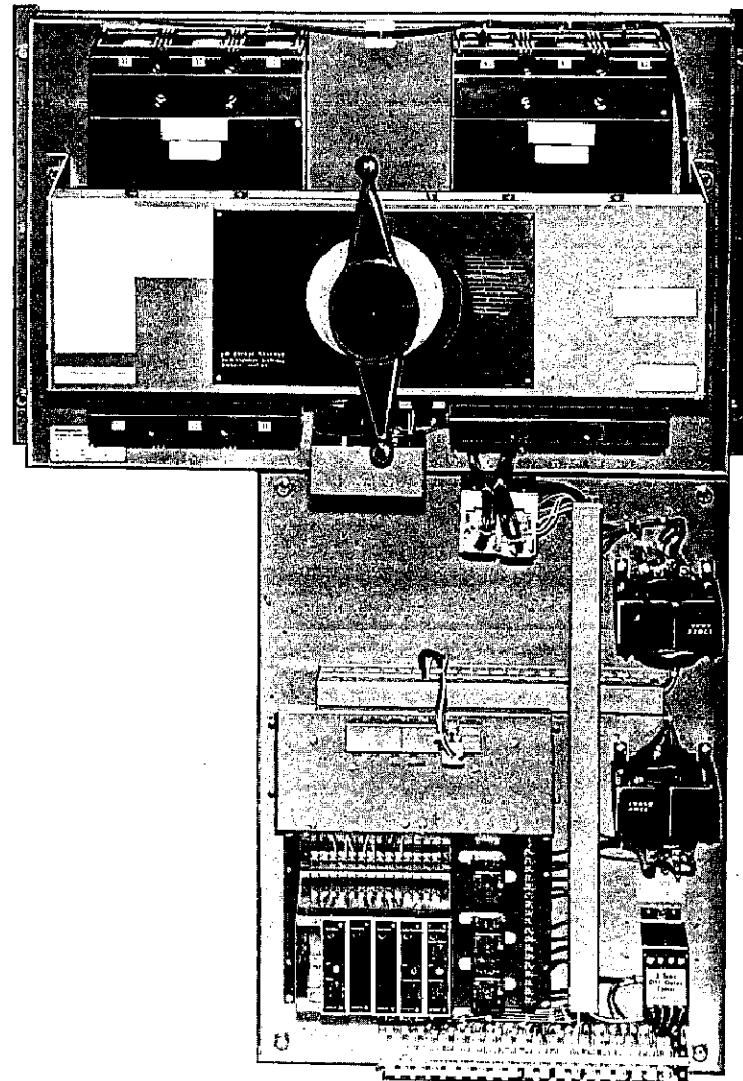
April, 1980  
Supersedes 29-926 T WE A, pages 1-20,  
dated March, 1979  
Mailed to: E, D, C/1915/PL, DB

Automatic, Basic and Manual Types

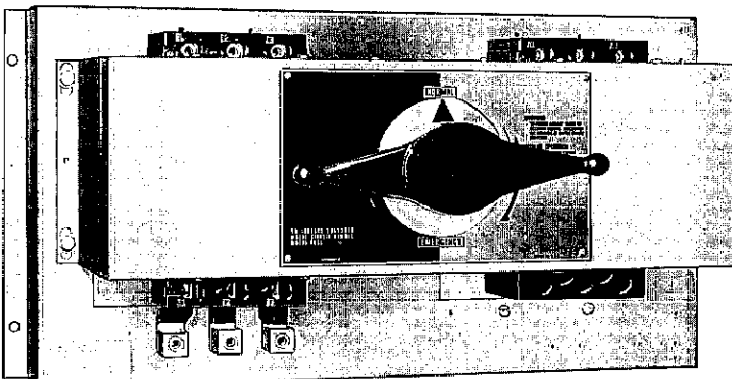
## Transfer Switches



Basic Transfer Switch



Automatic Transfer Switch



Manual Transfer Switch

**In This Publication**

| Subject                           | Page |
|-----------------------------------|------|
| Application .....                 | 2    |
| Selection Factors .....           | 2    |
| Selection Guide .....             | 4    |
| Catalog Number Explanation .....  | 6    |
| Switch Ordering Information ..... | 6    |
| Automatic Transfer Switches ..... | 7    |
| Basic Transfer Switches .....     | 8    |
| Manual Transfer Switches .....    | 9    |
| Options for Switches .....        | 10   |
| Switch Ratings .....              | 14   |
| Special Application .....         | 16   |
| Shipping Weights .....            | 17   |
| Wiring Terminal Data .....        | 18   |

**Transfer Switch Application**

Westinghouse transfer switches protect critical electrical loads against loss of power continuity by transferring the load to an emergency power source upon failure of the normal source. The load is transferred back to the normal source when power is restored.

They can be applied on systems having more than two power sources or where interlocking is required between transfer switches or other system components—i.e.; elevators—in fact, wherever it is necessary to protect against loss of electrical service. Potential applications include:

|                    |                     |
|--------------------|---------------------|
| Airports           | Power Generation    |
| Banks              | Plants              |
| Department Stores  | Radar Installations |
| Hospitals          | Railroad Signals    |
| Industrial Plants  | Ships (Maritime)    |
| Laboratories       | Shopping Centers    |
| Mines              | Subways             |
| Missile Ranges     | TV Studios          |
| Office Buildings   | Theaters            |
| Public Auditoriums | Tunnels             |

Transfer switches are extremely reliable, rugged, versatile, and compact Power Distribution Equipment units.

**Transfer Switch Selection Factors**

Automatic transfer switches are an integral part of an electrical distribution system and should be selected so that the end result is a unified, coordinated distribution system.

So that the transfer switch will do what the system designer requires, and will perform within the limitations of the electrical distribution system in which it is applied (system voltage, frequency, continuous current requirements, short circuit capabilities, etc.), the following should be considered:

- Functional circuit demands.
- System coordination.
- Environment/unusual operating conditions.

**A. Functional Circuit Demands**

Westinghouse transfer switches can provide either complete protection (standard) or partial protection (optional).

**Complete Protection** switches providing complete protection make use of voltage sensing relays (VSR's) which monitor each phase of the normal power supply. These are close differential relays, factory-adjusted to drop out when the monitored voltage drops below 70 percent of normal, and to pick up again at 90 percent of normal. With VSR's monitoring the circuit, if any phase of the normal power supply drops below the relay's dropout setting, the relay will cause the transfer switch to seek the standby power source. When line voltage is restored to the relay's pickup setting in all phases, the switch transfers back to the normal power supply.

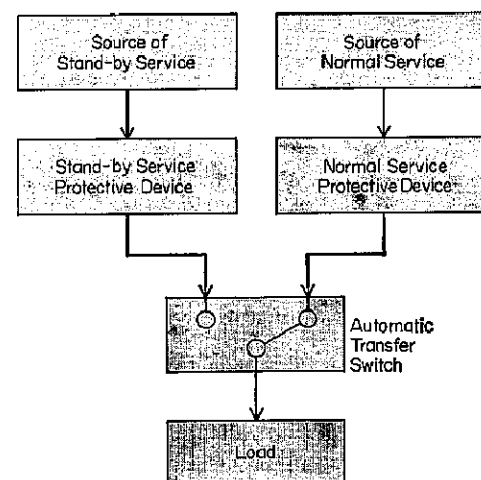
**Partial Protection** transfer switches providing partial protection monitor only one phase of the normal power supply. A single monitoring device is connected across one phase of the normal power source. The dropout value of this relay is 70 percent of normal voltage. Should the voltage of the phase being monitored fall below the dropout value, it will cause the transfer switch to seek the stand-by source.

The load is transferred back to the normal supply when line voltage is restored to 90 percent of the normal voltage. A switch providing partial protection only will not initiate transfer if an unmonitored phase fails, or if the monitored voltage, though lower than normal, does not drop below the dropout value of the relay.

**B. System Coordination**

The switch should be selected on the basis of the voltage, continuous current, frequency, short circuit capabilities, etc. of the electrical distribution system in which it is used. The switches' continuous current rating should be determined on the basis of both the normal and standby loads being supplied.

A typical electrical distribution system block diagram is shown in Figure 1.



**Figure 1**

The National Electrical Code (NEC) Article 90 describes in detail provisions considered necessary for safe operation of a transfer switch. Compliance with these provisions will result an installation essentially free from hazard.

Although the entire NEC is of interest to the Automatic Transfer Switch specifier, Articles 110, General; 210, Branch Circuits; 215, Feeders; 230, Services; 240, Over-current Protection; 517, Health Care Facilities; 700, Emergency Systems; and 750, Standby Power Generation, hold even greater interest for ATS application, with special interest in paragraphs 110-10, Circuit Impedance and Other Characteristics. The overcurrent protective devices, the total impedance and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit protective devices to clear a fault without extensive damage to the electrical components of the circuit. This fault may be assumed to be between two or more of the circuit conductors, or between any circuit conductor and the grounding conductor or enclosing metal raceway.

**110-9. Interrupting Capacity**

Devices intended to break current shall have an interrupting capacity sufficient for the voltage employed and for the current which must be interrupted.

230-98, Available Short-Circuit Current.



Service equipment and its overcurrent protective devices shall have short-circuit current rating equal to, or more than, the available short-circuit current at its supply terminal.

517-11 (f). All branches of the emergency system shall be so installed and connected to the alternate source of power that all lighting and equipment will be automatically restored to operation within 10 seconds after interruption of the normal source.

517-40 (f). The electrical characteristics of the transfer switches shall be suitable for the connected load. The capacity of transfer switches should be adequate to carry full-load currents, and to withstand the thermal and electromagnetic effects of short-circuit currents.

750-8, System Protection. Transfer equipment and wiring associated with the stand-by system shall be provided with suitably rated protective devices.

The preceding paragraphs are especially significant, since, under abnormal operating conditions where a fault condition existed between the ATS and the load, the switch could be subject to operation under three different conditions, requiring that the switch's withstand, closing, and interrupting ratings be considered in switch applications.

As shown in the block diagram, Figure 1, under fault conditions with the switch closed on Normal service, the transfer switch would be required to withstand the energy let-thru of the normal service protective device while that device interrupts the fault.

Also, in the event that line voltage falls below the voltage sensing relay's preset value, and if the alternate source is present, the switch could transfer before the normal service protective device clears the fault, thus requiring that the switch be capable of interrupting the protective device's let-thru current. This is especially true since the standby source can be available in less than 10 seconds. In addition, the switch would be required to close in on a fault, thus requiring a closing rating. Traditionally, interrupting ratings of switches not using breakers are not more than 6 times continuous current rating, closing ratings are not more than 20 times rating, and withstand values are in excess of 20 times rating. In order not to exceed the ability of the switch to operate safely under interrupting, closing in and withstand conditions, special circuitry may be necessary, or special application detail exerted to insure that the interrupting and closing ratings are never exceeded.

For these reasons, the standard Westinghouse switch incorporates a special magnetic trip element set very high so that it will trip only if the protective device ahead of it trips,

and closing and withstand ratings become the same value as the interrupting rating and no special application care need be taken to compensate for differences in these values. A switch incorporating this special trip operates in exactly the same manner as one that doesn't have this feature. In the event both devices trip (the breaker in the ATS and the upstream device), the switch (whether it had tripped or not) would initiate transfer to the alternate source. The transfer operation in going from normal to alternate, resets the normal breaker and vice versa. In fact, if the upstream device was reset before the switch initiated transfer, the switch would cycle (transfer to emergency and back to Normal) automatically, thus resetting the tripped switch breaker.

Circuit protective devices are either circuit breakers or switches and fuses. Inverse time current values for both are shown below:

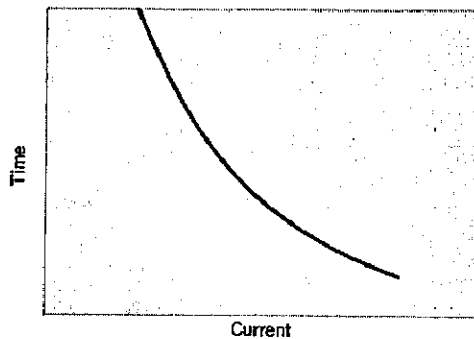


Figure 2: Fuse

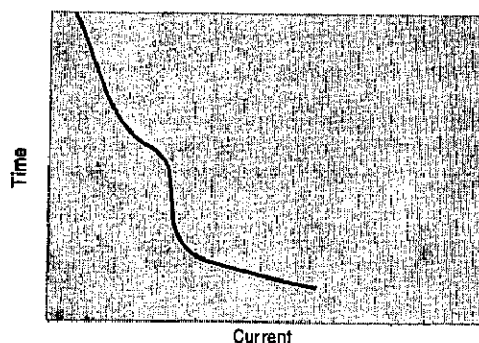


Figure 3: Circuit Breaker

The inverse time characteristic governs how the circuit protective device will protect downstream devices. In order that withstand, closing and interrupting ratings of the downstream transfer switch are not exceeded, the upstream device must be selected accordingly. Figure 4 illustrates the point ① where the current is equal to the available short circuit at the point of switch application.

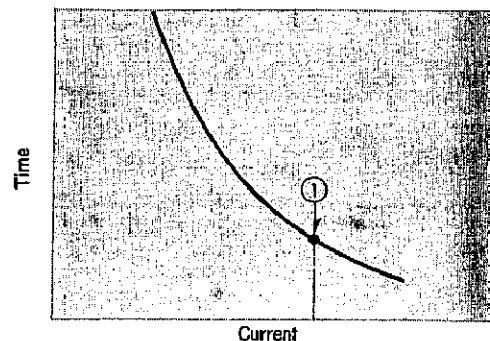


Figure 4

In order for the upstream protective device to protect the downstream transfer switch, the withstand, closing and interrupting ratings of the upstream device must be equal to or higher than point 1, such as point 2, Figure 5.

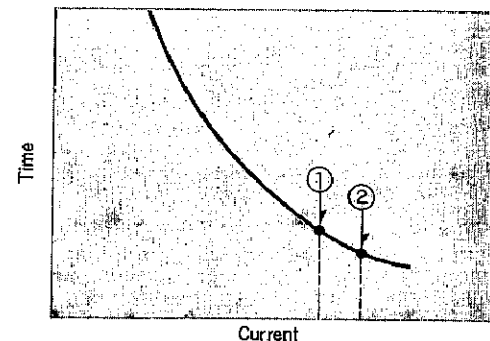


Figure 5

In the event any ATS rating is less than point 1, such as point 3 in Figure 6, precautions must be taken so that this rating is not exceeded. Therefore, the fault current or abnormal fault let-thru energy of the upstream protective device determines, along with the lowest transfer switch rating (either withstand, closing or interrupting), the maximum switch rating practical for the application, i.e., if the rating shown at point 3, Figure 6, is the switch interrupting rating, extreme care should be taken to insure that the switch does not interrupt any currents in excess of the point 3 value. Since currents could be in excess of the point 3 value because the available fault current is higher, additional current limiting devices or lockout relays must be added to reduce the effective short circuit current to a value below point 3, or to prevent the switch from transferring at currents higher than point 3.

Use of special high instantaneous trip breakers in Westinghouse transfer switches simplify switch application, since their withstand, closing and interrupting ratings are identical and are coordinated so that they look as shown in Figures 7 and 8. Refer to Trip Curve, page 8, for High Instantaneous values.

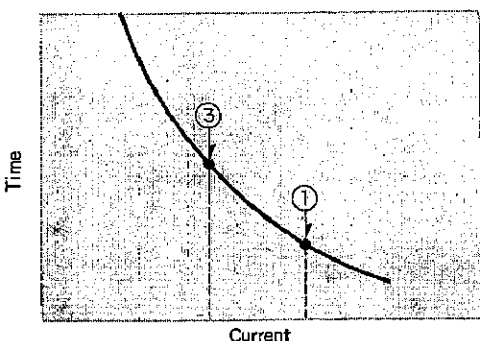


Figure 6

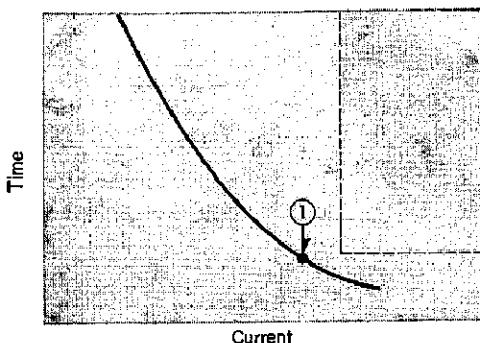


Figure 7

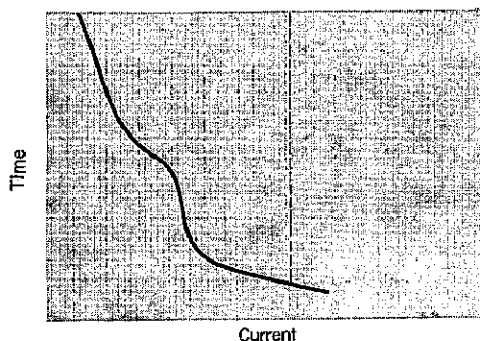


Figure 8

### C. Environment/Unusual Operating Conditions

Environmental conditions should be reviewed to see if a special enclosure, fungus proofing of breakers etc., is required.

Refer to AD 29-160 for further application information on molded case circuit breakers. Also refer to Rating and Special Application sections for additional information.

### Transfer Switch Selection Guide

Automatic transfer switches are selected in a manner similar to other components selected for application in an electrical distribution system. Thus, the following normal and alternate system characteristics should be identified in order to match properly the automatic transfer switch to the system requirements in accordance with NEC and other applicable codes or standards:

- a. Voltage
- b. Number of phases
- c. Number of wires
- d. Frequency
- e. Number of switched poles
- f. Type of load (motor, electric heating, etc. or a combination of types)
- g. Continuous current and/or horsepower requirements of the load
- h. Available fault current
- i. Whether for emergency or standby service
- j. Whether it is necessary to disconnect load from both power sources simultaneously
- k. Whether the switch is to be suitable for use as service equipment
- l. Whether the switch is to include integral overcurrent protection
- m. Special options

The maximum upstream source protective device can be selected by using tables on page 5. For example, if a 225 amp ATS-BM30225 switch were selected for a mixed load (less than 90% motor load), the upstream source protective device could be any rating up to a 200 ampere Class J, K5, or R fuse (Class L fuses are only available in ampere ratings of 601 and larger, Class J, K5, or R in ratings of 600 amperes or less), or any circuit breaker up to a CA, KB, JB, KA or JA frame (the circuit breaker frame size is significant, not the trip rating selected). The ATS-BM30225 could either be a standard catalog number switch (with hi-instantaneous breakers) or could be furnished with option 16B (non-automatic breakers). Options 1-15 and 18-30 may be added as required since they do not affect the values shown in this table.

If two different source protective devices are utilized, the proper switch selection is the largest size indicated by the protective devices, i.e., if the normal source indicates an ATS-BM30225, and the emergency indicates an ATS-BM30100, the proper switch is the larger ATS-BM30225.

This guide assumes proper application of the source protective device and the worst case conditions, i.e., zero impedance between the source protective device and the transfer switch and the short circuit currents would be those produced by a "bolted fault" connected directly to the switch's load terminals and

that the available fault current is maximum possible with source protective device selected. The fuses are listed based upon the maximum "umbrella" values permitted in the UL classification shown. Refer to Westinghouse for other applications.

Refer to AD 29-160 and AD 29-860 for further information on molded case and SCB breakers used as source protective devices.



**Table 1: Maximum Upstream Source Protective Device, All Classes of Loads**

| Switch<br>Contin-<br>uous<br>Amps. | ATS or BTS Cat. No.<br>Open or Enclosed <sup>ⓐ</sup><br>2 or 3 Pole<br>(3 Pole Shown) | Upstream Source Protective Device                |   |               |
|------------------------------------|---|--|---|---------------|
|                                    |   | Maximum Service<br>Circuit Breaker<br>Frame Size | Maximum Service UL Listed Fuse<br>Size, Amps, All Types From All<br>Manufacturers |               |
|                                    |   |  | Class J or L  | Class K5 or R |
| 100                                | ATS/BTS-BM30100   | EHB, FB, FB-P                                    | 100   | 100           |
| 100                                | ATS/BTS-BM30100, Option 17B   | HFB  | 100   | 100           |
| 225                                | ATS/BTS-BM30225   | CA, KB, JB, KA, JA                               | 225   | 225           |
| 225                                | ATS/BTS-BM30225, Option 17B   | HKA, LA-P  | 225   | 225           |
| 400                                | ATS/BTS-BM30400   | DA, LB, LBB, LA, LAB                             | 400   | 400           |
| 400                                | ATS/BTS-BM30400, Option 17B   | HLA, LA-P  | 400   | 400           |
| 600                                | ATS/BTS-BM30600   | LA, LAB, LA-P                                    | 600   | 600           |
| 600                                | ATS/BTS-BM30600, Option 17B   | HLA  | 600   | 600           |
| 800                                | ATS/BTS-BM30800   | MA, MC, NB-P                                     | 800   | ...           |
| 800                                | ATS/BTS-BM30800, Option 17B   | HMA, HMC   | 800   | ...           |
| 1000                               | ATS/BTS-BM31000   | NB, NC   | 1200  | ...           |
| 1000                               | ATS/BTS-BM31000, Option 17B   | HNB, HNC   | 1200  | ...           |
| 1200                               | ATS/BTS-BM31200   | NB, NC   | 1200  | ...           |
| 1200                               | ATS/BTS-BM31200, Option 17B   | HNB, HNC   | 1200  | ...           |
| 2000                               | ATS/BTS-BM32000   | PB, PC, PB-P                                     | 2000  | ...           |
| 600                                | ATS/BTS-BM30600, Option 16C   | SCB600   | 600   | 600           |
| 1000                               | ATS/BTS-BM31000, Option 16C   | SCB1200  | 1200  | ...           |
| 1200                               | ATS/BTS-BM31200, Option 16C   | SCB1200  | 1200  | ...           |
| 2000                               | ATS/BTS-BM32000, Option 16C   | SCB2000  | 2000  | ...           |

**Table 2: Maximum Upstream Source Protective Device, 90% or Larger Motor Load**

| Switch<br>Contin-<br>uous<br>Amps. | ATS or BTS Cat. No.<br>Open or Enclosed <sup>ⓐ</sup><br>2 or 3 Pole <sup>ⓐ</sup><br>(3 Pole Shown) | Upstream Source Protective Device   |   |               |
|------------------------------------|--|---|---|---------------|
|                                    |  | Maximum Service<br>Circuit Breaker<br>Frame Size  | Maximum Service Fuse Size,<br>Amps, All Types From All<br>Manufacturers |               |
|                                    |  |   | Class J or L  | Class K5 or R |
| 100                                | ATS-BM30100  | EHB, FB, HFB, FB-P,<br>LA-P (w/300LAP05)  | 300   | 100           |
| 225                                | ATS-BM30225  | CA, KA, JA, JB, KB, HKA,<br>LA, LAB, HLA, LB, LBB,<br>MA, NB, LA-P, NB-P<br>(w/1000 NBP14), MC,<br>NC |   |               |
| 400                                | ATS-BM30400  | LA, HLA, LA-P, LB,<br>LBB, MA, HMA, NB, HNB,<br>NB-P, MC, HMC, NC,<br>HNC                             | 600   | 400           |
| 600                                | ATS-BM30600  | MA, HMA, MC, HMC,<br>NB, NC, HNC, NB-P  | 1200  | 600           |
| 800                                | ATS-BM30800  | MA, HMA, NB, HNB,<br>NB-P, MC, NC, HMC,<br>HNC  | 1200  | ...           |
| 1000                               | ATS-BM31000  | NB, HNB, NC, HNC,<br>PB-P   | 1200  | ...           |
| 1200                               | ATS-BM31200  | NB, HNB, NC, HNC,<br>PB-P   | 1200  | ...           |
| 2000                               | ATS-BM32000  | PB, PB-P, PC  | 2000  | ...           |
| 600                                | ATS-BM30600, Option 16C  | SCB600  | 600   | ...           |
| 1000                               | ATS-BM31000, Option 16C  | SCB1200   | 1200  | ...           |
| 1200                               | ATS-BM31200, Option 16C  | SCB1200   | 1200  | ...           |
| 2000                               | ATS-BM32000, Option 16C  | SCB2000   | 2000  | ...           |

<sup>ⓐ</sup> If option 16B, G or H, non-automatic breakers, is selected, refer to Westinghouse for maximum upstream device.

# **Transfer Switch Catalog Number Explanation** For Use Only in Explaining Catalog Numbers Do Not Build a Catalog Number

| Type Switch        | Construction                    | No. of Switches Poles | Ampere Rating   | Voltage       | Enclosure   |
|--------------------|---------------------------------|-----------------------|-----------------|---------------|-------------|
| <b>A</b> <b>TS</b> | <b>B</b> <b>M</b>               | <b>3</b>              | <b>0225</b>     | <b>-</b>      | <b>K</b>    |
| Transfer Switch    | B - Circuit Breaker             | 2 - 2 Pole            | 0030 - 30 Amp   | A - 120/60    | K - Open    |
|                    |                                 | 3 - 3 Pole            | 0070 - 70 Amp   | B - 208/60    | S - Nema 1  |
|                    |                                 | 4 - 4 Pole            | 0100 - 100 Amp  | W - 240/60    | J - Nema 12 |
| A - Automatic      | C - Contactor                   |                       | 0225 - 225 Amp  | X - 480/60    | R - Nema 3R |
| B - Basic          |                                 |                       | 0400 - 400 Amp  | E - 600/60    |             |
| M - Manual         | D - Dual (2) Operating Handles  | M - Mechanically Held | 0600 - 600 Amp  | G - 220/50/60 |             |
|                    |                                 |                       | 0800 - 800 Amp  | M - 230/50    |             |
|                    |                                 |                       | 1000 - 1000 Amp | Z - 365/50    |             |
|                    |                                 |                       | 1200 - 1200 Amp | H - 380/50    |             |
|                    | S - Single (1) Operating Handle |                       | 2000 - 2000 Amp | N - 401/50    |             |
|                    |                                 |                       |                 | O - 415/50    |             |
|                    |                                 |                       |                 | K - 600/50    |             |

## Ordering Information

- Order by description and catalog number.
  - Type of System
    - 1 Phase, 2 Wire: Use 2 pole switch
    - 1 Phase, 3 Wire: Use 2 pole switch, plus, Option 19
    - 3 Phase, 3 Wire: Use 3 pole switch
    - 3 Phase, 4 Wire: Use 3 pole switch, plus, Option 19
 For other types, refer to Westinghouse

## Further Information

Description: 29-901 D WE A.

- Specify:
  - System Voltage and frequency.
  - No. of phases and wires.
  - Current
- Select switch catalog number from listings on pages 7, 8, 9, 10. For Automatic Transfer Switches on pages 7, 8, insert letter indicating voltage switch is to be wired for, from Catalog Number Explanation above. Example:  
Catalog Number ATSBM30225-K is to be wired for 480 volts, 60 Hz. Letter for 480/60 is X; therefore complete catalog number is ATSBM30225XK.
- Select desired options and order by option number.

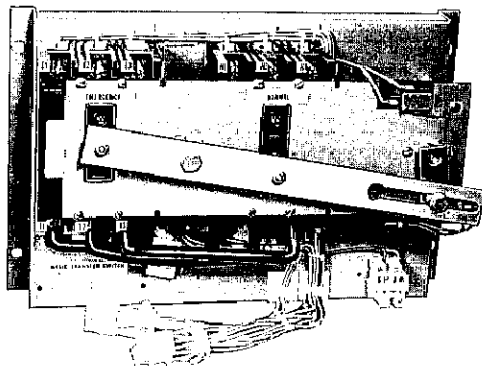
- Ordering example: Automatic Transfer Switch, Catalog Number ATSBM30225XK 480 volts, 60 Hz, 3-phase, 4-wire, 225 ampere, with Options 1A, 2A, 3C, 9A, and 19B.

- Westinghouse Personnel Only: Form 3448, Transfer Switch Work Sheet, is available for use. If it is to be submitted with the order do NOT use wired order entry — mail it attached to the order. If wired order entry is to be used, extract the applicable portions on the form and include them in the order write up; do not send the form by mail.

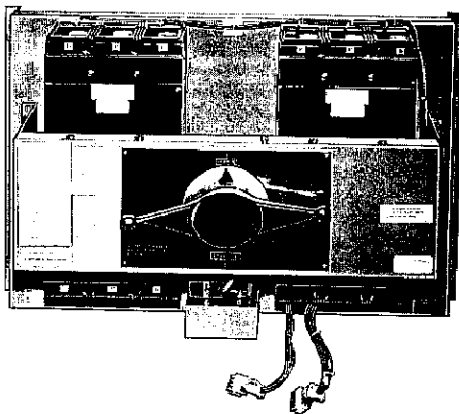
- List Prices: Refer to Price List 29-920



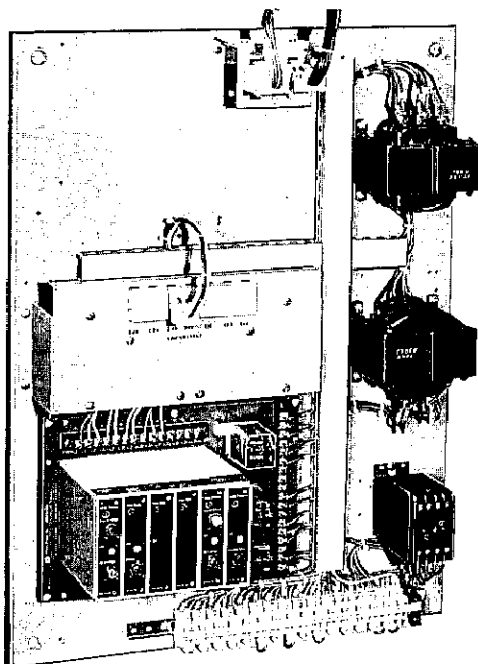
**Automatic Transfer Switches**  
*Switches are U.L. Inc. labeled per U.L. Std. 1008.*



Breaker Type, 100 Amperes



Breaker Type, 225-2000 Amperes



Intelligence Panel

Automatic transfer switches automatically perform the transfer function.

They consist of three basic elements:

1. Main contacts to connect and disconnect the load to and from the source of power.

2. Intelligence/supervisory circuits to constantly monitor the condition of the power sources and thus provide the intelligence necessary for the switch and related circuit operation.

3. Transfer mechanism to effect the transfer of the main contacts from source to source. To accomplish this, two AB De-ion® circuit breakers with a motor driven operating mechanism are employed. These are mounted on a steel base plate.

**Switch Catalog Numbers, Open Switches.**

Standard Voltages: 120, 208, 220, 240, 380, 415, 480, 600 Volts, 50/60 Hz. ©

| Ampere Rating            | Catalog Numbers |              |              |
|--------------------------|-----------------|--------------|--------------|
|                          | 2 Poles         | 3 Poles      | 4 Poles      |
| <b>Mechanically Held</b> |                 |              |              |
| 100                      | ATSBM20100-K    | ATSBM30100-K | ATSBM40100-K |
| 225                      | ATSBM20225-K    | ATSBM30225-K | ATSBM40225-K |
| 400                      | ATSBM20400-K    | ATSBM30400-K | ATSBM40400-K |
| 600                      | ATSBM20600-K    | ATSBM30600-K | ATSBM40600-K |
| 800                      | ATSBM20800-K    | ATSBM30800-K | ATSBM40800-K |
| 1000                     | ATSBM21000-K    | ATSBM31000-K | ATSBM41000-K |
| 1200                     | ATSBM21200-K    | ATSBM31200-K | ATSBM41200-K |
| 1600                     | ATSBM21600-K    | ATSBM31600-K | ATSBM41600-K |
| 2000                     | ATSBM22000-K    | ATSBM32000-K | ATSBM42000-K |
| 2500®                    | ATSBM22500-K    | ATSBM32500-K | ATSBM42500-K |
| 3000®                    | ATSBM23000-K    | ATSBM33000-K | ATSBM43000-K |

**Automatic Transfer Switches include:**

- Two High Instantaneous Trip Circuit Breakers
- Connections: Refer to Option 20 and table page 19 for details and wire sizes
 

|       |                 |
|-------|-----------------|
| Front | 100 — 1000 Amp  |
| Rear  | 1200 — 3000 Amp |
- Positive mechanical interlocking by means of a walking beam interlock
- Common load bus
- Option 11A Manual Circuit Breaker Reset
- Auxiliary Contacts, Normal Source, Option 15E
- Auxiliary Contacts, Emergency Source, Option 15F
- Test Selector Switch (Maintained Contact), Option 6C, Open Switch, or 6D, Enclosed Switch
- Complete Protection, Voltage Sensing on each phase on normal source, Option 26A
- Engine Start Contact, Option 13A
- Automatic Operation, Option 29A
- Intelligence panel disconnect, Option 9C
- Solid Neutral Bar Assembly
- Three and four pole switches have multi-tap transformers suitable for use on 208, 220, 240, 380, 415, 480 and 600 volts, 50/60 Hz without modification.

**Options**

Refer to pages 10-13 for available options.

Extender cables are available. When specified, refer to PL 29-920.

**Ordering Information**

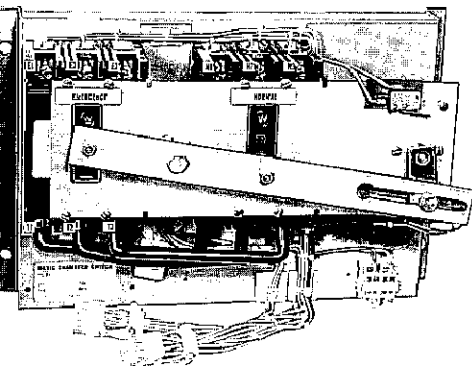
Refer to page 6. Pay particular attention to item 3 concerning insertion of letter designation of voltage in catalog number.

© Not Underwriters' Laboratories, Inc. listed.  
® For Dc voltage application, refer to Westinghouse.

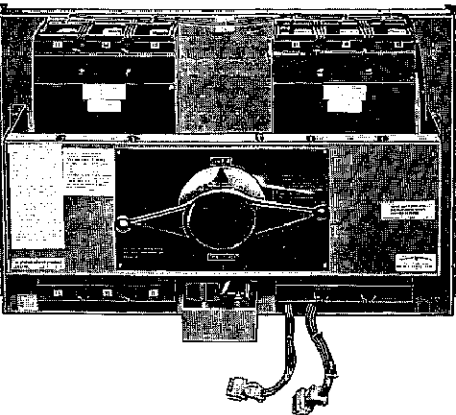
## Basic Transfer Switches

Switches are UL, Inc. Component Listed per UL Std. 1008.

### Mechanically Held



### Circuit Breaker Type, 100 Amperes



### Circuit Breaker Type, 225-2000 Amperes

This switch is designed for use with customer-furnished controls.

The basic transfer switch is similar to the automatic transfer switch except that the intelligence circuit is omitted, thus all automatic sensing devices and relays are omitted.

### Switch Catalog Numbers, Open Switches

Switches are UL, Inc. Component Listed Standard Voltages:

Application: 600 Volts Ac Maximum  
Operating Motor: 120 Volts, 50/60 Hz.

| Ampere Rating            | Switch Catalog Numbers |              |              |
|--------------------------|------------------------|--------------|--------------|
|                          | 2 Poles                | 3 Poles      | 4 Poles      |
| <b>Mechanically Held</b> |                        |              |              |
| 100                      | BTSBM20100-K           | BTSBM30100-K | BTSBM40100-K |
| 225                      | BTSBM20225-K           | BTSBM30225-K | BTSBM40225-K |
| 400                      | BTSBM20400-K           | BTSBM30400-K | BTSBM40400-K |
| 600                      | BTSBM20600-K           | BTSBM30600-K | BTSBM40600-K |
| 800                      | BTSBM20800-K           | BTSBM30800-K | BTSBM40800-K |
| 1000                     | BTSBM21000-K           | BTSBM31000-K | BTSBM41000-K |
| 1200                     | BTSBM21200-K           | BTSBM31200-K | BTSBM41200-K |
| 1600                     | BTSBM21600-K           | BTSBM31600-K | BTSBM41600-K |
| 2000                     | BTSBM22000-K           | BTSBM32000-K | BTSBM42000-K |
| 2500Ⓢ                    | BTSBM22500-K           | BTSBM32500-K | BTSBM42500-K |
| 3000Ⓢ                    | BTSBM23000-K           | BTSBM33000-K | BTSBM43000-K |

### Basic Transfer Switches include:

- Two High Instantaneous Trip Circuit Breakers
- Connections: Refer to Option 20 and table page 19 for details and wire sizes
  - Front 30-1000 Amp
  - Rear 1200-3000 Amp
- Positive mechanical interlocking by means of a walking beam interlock
- Common load bus
- Option 11A Manual Circuit Breaker Reset on circuit breaker units only
- Auxiliary Contact Normal Source, Option 15E
- Auxiliary Contact Emergency Source, Option 15F

### Options

Refer to pages 10-13 for available options. Terminal blocks instead of cable connector can be furnished if specified on the order.

### Ordering Information

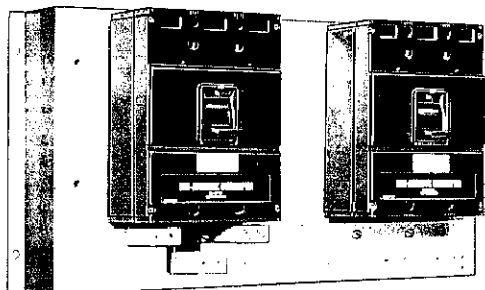
Refer to page 6.



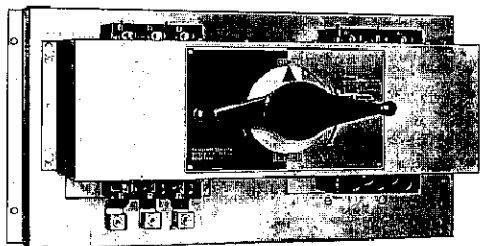


### Manual Transfer Switches

Switches are U.L. Inc. Component Listed



Type MTSD, Dual Operating Handles<sup>①</sup>



Type MTSS, Single Operating Handle<sup>①</sup>

Westinghouse manually-operated transfer switches are available with a single operating handle, Type MTSS, or the Type MTSD which is dual handle operated. Type MTSS utilizes a common operating mechanism with a single, free-wheeling handle mounted across the front of the two breakers for mechanically connecting and operating the individual breaker handles. With the Type MTSD, individual breaker handles are used for On-Off operation.

#### Switch Catalog Numbers, Open Switches

Standard Voltages

Application: 600 volts Ac Maximum

Options: Must be used on 120 volt Ac, 50/60 Hz only circuit. Control transformer not furnished.

| Ampere Rating  | Switch Catalog Numbers |              |              |
|--|------------------------|--------------|--------------|
|  | 2 Poles                | 3 Poles      | 4 Poles      |
| <b>Mechanically Held, Dual (Two) Operating Handles</b> |                        |              |              |
| 100  | MTSDM20100EK           | MTSDM30100EK | MTSDM40100EK |
| 225  | MTSDM20225EK           | MTSDM30225EK | MTSDM40225EK |
| 400  | MTSDM20400EK           | MTSDM30400EK | MTSDM40400EK |
| 600  | MTSDM20600EK           | MTSDM30600EK | MTSDM40600EK |
| 800  | MTSDM20800EK           | MTSDM30800EK | MTSDM40800EK |
| 1000   | MTSDM21000EK           | MTSDM31000EK | MTSDM41000EK |
| 1200   | MTSDM21200EK           | MTSDM31200EK | MTSDM41200EK |
| 1600   | MTSDM21600EK           | MTSDM31600EK | MTSDM41600EK |
| 2000   | MTSDM22000EK           | MTSDM32000EK | MTSDM42000EK |
| 2500 <sup>②</sup>                                      | MTSDM22500EK           | MTSDM32500EK | MTSDM42500EK |
| 3000 <sup>②</sup>                                      | MTSDM23000EK           | MTSDM33000EK | MTSDM43000EK |
| <b>Mechanically Held, Single Operating Handle</b>      |                        |              |              |
| 100  | MTSSM20100EK           | MTSSM30100EK | MTSSM40100EK |
| 225  | MTSSM20225EK           | MTSSM30225EK | MTSSM40225EK |
| 400  | MTSSM20400EK           | MTSSM30400EK | MTSSM40400EK |
| 600  | MTSSM20600EK           | MTSSM30600EK | MTSSM40600EK |
| 800  | MTSSM20800EK           | MTSSM30800EK | MTSSM40800EK |
| 1000   | MTSSM21000EK           | MTSSM31000EK | MTSSM41000EK |
| 1200   | MTSSM21200EK           | MTSSM31200EK | MTSSM41200EK |
| 1600   | MTSSM21600EK           | MTSSM31600EK | MTSSM41600EK |
| 2000   | MTSSM22000EK           | MTSSM32000EK | MTSSM42000EK |
| 2500 <sup>②</sup>                                      | MTSSM22500EK           | MTSSM32500EK | MTSSM42500EK |
| 3000 <sup>②</sup>                                      | MTSSM23000EK           | MTSSM33000EK | MTSSM43000EK |

#### Manual Transfer Switches include:

- Two High Instantaneous Trip Circuit Breakers
- Connections: Refer to Option 20 and table page 19 for details and wire sizes
  - Front 100-1000 Amps
  - Rear 1200-3000 Amps
- Positive mechanical interlocking by means of a walking beam interlock
- Common load bus
- Auxiliary Contact, Normal Source, Option 15E<sup>②</sup>
- Auxiliary Contact, Emergency Source, Option 15F<sup>②</sup>

#### Options

Refer to pages 10-13 for available options.

#### Ordering Information

Refer to page 6.

<sup>①</sup> Wires are connected to terminal blocks (not shown).  
<sup>②</sup> Not Underwriters' Laboratories, Inc. component listed.

**Options, List Price Additions**

For List Prices, refer to Price List 29-920

| Type<br>Switch<br>Used On | Description  | Type<br>Switch<br>Used On | Description  |
|---------------------------|--|---------------------------|--|
| Auto                      | <p>The following options are Underwriters' Laboratories, Inc. listed, except as noted, when supplied on UL Listed switches. NOTE: If an option is selected that is not UL listed, the switch will not have a UL label.</p> <p><b>1. Time Delay Normal to Emergency (TDNE)</b><br/>Delays the transfer from normal in order to over-ride momentary power outages/fluctuations. Timing begins when Emergency source appears. Does not affect initiation of engine start circuit. Should the Normal power source fail, the engine start contact will immediately transfer and, if connected to an engine generator, will initiate engine start-up.<br/>A. Adjustable 1-60 seconds.<br/>B. Adjustable 0.1-10 minutes.<br/>C. Adjustable 0.2-30 minutes.</p> <p><b>2. Time Delay on Engine Starting (TDES)</b><br/>This option is for use only where the emergency source is an engine generator. It delays initiation of the engine start circuit in order to over-ride momentary power outages or fluctuations. Does not affect ability of the switch to transfer from Normal to Emergency source.<br/>A. Fixed non-adjustable 2.5 seconds.<br/>B. Adjustable 1 to 10 seconds.<br/>C. Adjustable .2 to 50 seconds.</p> <p><b>3. Time Delay Emergency to Normal (TDEN)</b><br/>Delays the transfer from emergency to permit stabilization of the normal power source before retransfer is made. Timing begins when the normal source appears. If the Emergency source fails during timing, transfer to Normal source is immediate, overriding the time delay.<br/>A. Adjustable 1-60 seconds.<br/>B. Adjustable 0.1-10 minutes.<br/>C. Adjustable 0.2-30 minutes.</p> <p><b>4. Time Delay for Engine Cooloff (TDEC)</b><br/>Permits the generator to run under a no-load condition after transfer to Normal has been made. Timing begins when transfer is made.<br/>A. Adjustable 1 to 60 seconds.<br/>B. Adjustable 0.1 to 10 minutes.<br/>C. Adjustable 0.2 to 30 minutes.<br/>D. Fixed, non-adjustable, five (5) minutes.</p> <p><b>5. Frequency/Voltage Relay for Emergency Source</b><br/>Relay is connected to 1 phase only of the Emergency source, constantly monitoring that phase. Prevents transfer from Normal to Emergency until the engine generator has reached its operating frequency or voltage. When switch is in the Emergency position and the Emergency source is outside the relay setting, the switch will initiate transfer to the Normal position if the Normal source is present. When voltage frequency monitoring is required, use 5A and 5D. If less precise voltage sensing is required, i.e., anything over approx. 50%, use only 5A as the intelligence circuit relays will provide this level of voltage sensing.<br/>A. Under frequency, adjustable 45-60 Hz (Drops out 2 Hz lower than setting).<br/>C. Over frequency, adjustable 50-65 Hz (Drops out 2 Hz above setting).<br/>D. Under voltage adjustable (nominally set at 90% pick-up, 70% drop-out).<br/>E. Over voltage, adjustable (nominally set at 115% drop-out, pick-up below 105%).</p> <p><b>6. Test Switch</b><br/>Provides test operation of the transfer switch by simulating a loss of normal power. Engine starting will be initiated and transfer to Emergency source will occur.</p> | Auto                      | <p><b>Momentary Contact (Pushbutton) (TPB)</b><br/>A. For separate mounting.<br/>B. In cover of enclosed switches.</p> <p><b>Maintain Contact (Selector Switch) (TSS)</b><br/>C. For separate mounting (std.)<br/>D. In cover of enclosed switch (std.)</p> <p><b>7. Four-Position Selector Switch</b><br/>Permits four modes of switch operation: "TEST", "AUTO", "OFF", and "ENGINES START". The "OFF" position de-energizes the control relays and opens the engine start circuit. The switch will not operate nor will the engine start on power failure. A white light is also furnished that lights only when the switch is in the off position.<br/>The "TEST" position simulates power failure. Engine starting is initiated and the switch will transfer when emergency voltage appears. The "AUTO" position returns the transfer switch to Normal operation. The "ENGINE START" position retains the transfer switch at normal and initiates the engine start circuit. The switch will not transfer unless the normal source fails.<br/>C. For separate mounting. When selected, 6C (Std.) omitted.<br/>D. In cover of enclosed switch. When selected, 6D (Std.) omitted.</p> <p><b>8. Bypass Pushbutton</b><br/>Provides a by-pass on the TDNE (Option 1) or TDEN (Option 3) relay, permitting switch to be transferred to Normal or Emergency source without time delay. Option is normally used in testing when it is not desirable to wait for the timers to finish their timing sequence.<br/>A. Bypass TDEN (PBEN) for separate mounting.<br/>B. Bypass TDNE (PBNE) for separate mounting.<br/>C. Bypass TDEN (PBEN) in enclosure cover.<br/>D. Bypass TDNE (PBNE) in enclosure cover.</p> <p><b>9. Selector Switch, Maintenance</b><br/>"A and B" disconnects power to the transfer motor. Marked "Off/Auto". "C" Consists of two plug connectors. Manual disconnection electrically isolates the intelligence circuit from the basic transfer switch. Subsequent manual operation of the transfer switch isolates the transfer switch load circuit from either source.<br/>A. For separate mounting. (2 Pos. Sel. Switch)<br/>B. In cover of enclosed switches. (2 Pos. Sel. Switch)</p> |
| Auto                      |  | Auto                      | <p><b>10. Preferred Source Selector</b><br/>For use when Normal and Emergency Source are both commercial power, or when the Normal Source is commercial power and the Emergency is engine generator. Option permits selection of either source as the preferred source to which the switch will always transfer if the source is available. Marked Source 1/Source 2.<br/>A. For separate mounting.<br/>B. In cover of Enclosed Switch.<br/>For use when Normal and Emergency Source are engine generators. Two Engine Start contacts are provided. Marked Source 1/Source 2.<br/>C. For separate mounting.<br/>D. In cover of enclosed switch.</p>  |
| Auto                      |  | Auto                      | <p><b>11. Automatic Circuit Breaker Reset</b><br/>This option provides means of resetting thermal magnetic breakers when used in the transfer switch.</p>  |

**Options, List Price Additions, Continued**  
For List Prices, refer to Price List 29-920Type      Description  
Switch  
Used On

- A. Manual (Standard)  
B. Normal Breaker Reset PB for separate mounting.  
C. Emerg. Breaker Reset PB for separate mounting.  
D. Normal Breaker Reset PB in cover of Encl. Switch.  
E. Emerg. Breaker Reset PB in cover of Encl. Switch.  
F. Circuit Breaker Lock-out: Prevents transfer if breaker trips (supplied as standard with options 16A, 16C, 16D, 16E, 16F and 17).
- 12. Pilot Lights**  
Pilot lights can be furnished to indicate (1) switch position; (2) source condition; and, (3) tripped condition.

Auto  
Manual**Switch Position:** Utilizes a 1A breaker auxiliary contact from Option 15E and/or 15F.

- A. Normal Supply (green) for separate mounting.  
B. Emergency Supply (red) for separate mounting.  
C. Normal Supply (green) in cover of enclosed switch.  
D. Emergency Supply (red) in cover of enclosed switch.

**Source Condition:** Indicates whether or not source voltage is present.

- E. Normal Supply (white) for separate mounting  
F. Emergency supply (white) for separate mounting  
G. Normal supply (white) in cover of enclosed switch  
H. Emergency supply (white) in enclosure cover

**Tripped Condition:** Available only with thermal-magnetic breakers, Options 16 and 17. Uses Option 15C and/or 15D.

- J. Normal supply (amber) for separate mounting  
K. Emergency supply (amber) for separate mounting  
L. Normal supply (amber) in enclosure cover  
M. Emergency supply (amber) in enclosure cover

Auto

**13. Engine Start Contacts**

Initiates engine starting. Provides a contact closure when the normal source fails.

Auto

- A. 1 NC (closed when normal power fails) . . . . . Standard

**14. Relay Auxiliary Contact**

The Normal source relay is energized only when the switch is in the Normal position and Normal power is present. The Emergency source relay is energized whenever the Emergency source is present.

- C. Normal Source: Provides 2 NO and 2 NC contacts.  
D. Emergency Source: Provides 2 NO and 2 NC.

Auto  
Basic  
Manual**15. Auxiliary Contact or Bell Alarm Contact**

**Auxiliary Switch:** Indicates only which source the load is connected to, whether or not there is power on the system.  
E. Normal Source: Provides a DPDT (2A & 2B) Contact that operates with the breaker mechanism . . . . . Standard  
F. Emergency Source: Provides a DPDT (2A & 2B) Contact that operates with the breaker mechanism . . . . . Standard

**Bell Alarm Contacts.** Only 1 can be furnished. Not available for customer use when Options 12J - 12M or 31C, D are selected. Indicates when breaker is tripped. Available only with thermal magnetic breakers, Options 16 and 17. Contact closes when tripped.

- C. Normal source: 1A contact  
D. Emergency Source: 1A contact

① Standard breaker switches are used. If the switch ratings (6 amps inductive) are not exceeded, parallel terminal blocks can be provided, saving the cost of extra switches, if separate switches are not required.

② Not UL Inc. listed.

③ Not available in 4 pole.

Type      Description  
Switch  
Used On**Auto  
Basic  
Manual**      **16. Thermal Magnetic, Non-Automatic or SCB-II Breakers in Place of Standard High Instantaneous Trip Breakers**

Use of this option can, in many cases, eliminate the need for separate upstream overcurrent/short circuit protection, thus enabling code requirements to be met with a device that takes up less space and requires less wiring. Either the Normal or Emergency breaker, or both, may be replaced. Includes Option 11F except for Options 16B, G, H. Four pole switches have trip units only in three poles.

A. Thermal Magnetic: Switch ratings and trip ratings available.

| Switch Rating | 2 Pole | 3 Pole | 4 Pole | Trip Ratings Available                                 |
|---------------|--------|--------|--------|--|
| 100           | X      | X      |        | 10, 15, 25, 30, 40, 50, 60, 70, 90, 100                |
| 225           | X      | X      | X      | 70, 90, 100, 125, 150, 175, 200, 225                   |
| 400           | X      | X      | X      | 250, 300, 350, 400                                     |
| 600           | X      | X      | X      | 150, 175, 200, 225, 250, 300, 350                      |
|               |        |        |        | 400, 500, 600  |
| 800           | X      | X      | X      | 700, 800   |
| 1000          | X      | X      | X      | 700, 800, 900, 1000                                    |
| 1200          | X      | X      | X      | 600, 700, 800, 900, 1000, 1200                         |
| 1600          | X      | X      | X      | 600, 700, 800, 900, 1000, 1200, 1600                   |
| 2000          | X      | X      | X      | 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000 |
| 2500          | X      | X      | X      | 2500   |
| 3000          | X      | X      | X      | 3000   |

**B. Non-Automatic Breakers**

- ② ③ C. SCB-II Systems Circuit Breakers standard breakers with long delay and instantaneous trip; specify switch rating, monitor rating. Sensors are available with long delay, short delay, instantaneous, ground fault trip, etc. Refer to TD 29-820 for further details. Specify type required. Available in 3 pole only.

| Switch Rating | Current Monitor Ratings.   |
|---------------|----------------------------|
| 400           | 250, 400                   |
| 1000          | 250, 400, 600, 800, 1000   |
| 1200          | 600, 800, 1000, 1200       |
| 2000          | 600, 800, 1000, 1200, 2000 |
| 2500          | 2500                       |
| 3000          | 3000                       |

- ② ③ D. SELTRONIC™ Circuit Breaker—Refer to Westinghouse

- E. Thermal Magnetic breaker, Emergency source only.  
F. Thermal Magnetic Breaker, normal source only  
G. Non-Automatic Breakers, emergency source only  
H. Non-Automatic Breakers, normal source only.

Auto  
Basic  
Manual**17. MARK 75 Circuit Breakers in Place of Standard High Instantaneous Trip Breakers (Includes Option 11F)**

A. Thermal Magnetic MARK 75®: Specify rating and trip from next page.

**Options, List Price Additions, Continued**  
For List Prices, refer to Price List 29-920

| Type Switch Used On               | Description  | Type Switch Used On | Description  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
|-----------------------------------|--|---------------------|--|--------------------|------------|-----------------------------------|-----|---|---|-----------|--------------------|-----|-----|------------|----|-----|-----|----------------------|----------------------|--------|--------|--------|---------|--------|---------|--------|---------|------|--|---|----|------|---|
|                                   | <table><tr><th>Switch Rating Amps</th><th>Availability 2 Pole</th><th>3 Pole</th><th>4 Pole</th><th>Trip Ratings</th></tr><tr><td>100</td><td>X</td><td>X</td><td>..</td><td rowspan="6">Same as Option 16A</td></tr><tr><td>225</td><td>X</td><td>X</td><td>..</td></tr><tr><td>400</td><td>X</td><td>X</td><td>..</td></tr><tr><td>600</td><td>X</td><td>X</td><td>..</td></tr><tr><td>800</td><td>X</td><td>X</td><td>..</td></tr><tr><td>1000</td><td>X</td><td>X</td><td>..</td></tr></table>   | Switch Rating Amps  | Availability 2 Pole  | 3 Pole             | 4 Pole     | Trip Ratings                      | 100 | X | X | ..        | Same as Option 16A | 225 | X   | X          | .. | 400 | X   | X                    | ..                   | 600    | X      | X      | ..      | 800    | X       | X      | ..      | 1000 | X  | X | .. | Auto | <b>22. Narrow Unit (3 Pole Breaker Switches Only)</b><br>A narrow, single panel for use primarily in motor control centers. There is no provision to mount Options 23, 24 on the panel. If selected, they are furnished for separate mounting.<br>A. Front connected, line and load.<br>B. Front cable-connected line, rear bus-connected load. |
| Switch Rating Amps                | Availability 2 Pole  | 3 Pole              | 4 Pole   | Trip Ratings       |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 100                               | X  | X                   | ..   | Same as Option 16A |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 225                               | X  | X                   | ..   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 400                               | X  | X                   | ..   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 600                               | X  | X                   | ..   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 800                               | X  | X                   | ..   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 1000                              | X  | X                   | ..   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| Auto Basic Manual                 | <b>ⓐB. SELTRONIC MARK 75 Circuit Breakers</b><br>Refer to Westinghouse.<br><b>18. Special Enclosures</b><br>A. Types<br><table><tr><th>Switch Rating</th><th>Enclosure Availability Suffix Letter (Omit K from Cat. No. &amp; Substitute) J (NEMA 12)</th><th>R (NEMA 3R)</th><th>S (NEMA 1)</th></tr><tr><td>Circuit Breaker Type Construction</td><td></td><td></td><td></td></tr><tr><td>100-1000A</td><td>Yes</td><td>Yes</td><td>Yes</td></tr><tr><td>1200-2000A</td><td>No</td><td>No</td><td>Yes</td></tr></table><br>Refer to Westinghouse for knockouts or hubs or oversize enclosures.<br>B. Key Lock on Enclosure Doors, NEMA 1 100-1000 amp. only. Standard on all other enclosures.<br>C. Three point vault-type door hardware, NEMA 12 enclosure only.<br>D. Provides enclosure UL Inc. Listed as "Suitable for use as service equipment", available on automatic switches only. Utilizes two individually motor operated circuit breakers providing manual operations without opening enclosure door 400, 600, 800, 1000, 1200 or 2000 Amps (NEMA 1 only)<br>E. Voltmeter mounted in cover (includes potential transformers and selector switch).<br>F. Ammeter mounted in cover (includes current transformers and selector switch).<br>G. Frequency Meter<br>H. Running Time Meter<br><b>19. Solid Neutral Bar Assembly</b><br>Standard on automatic switches, optional on basis and manual switches. Provides insulated and groundable panel mounted neutral bar. Connections for Normal, Emergency and load. Shipped loose with open switches, mounted on enclosed switches.<br><table><tr><th>Switch Ampere Rating</th><th>Switch Ampere Rating</th></tr><tr><td>A. 100</td><td>E. 800</td></tr><tr><td>B. 225</td><td>F. 1000</td></tr><tr><td>C. 400</td><td>G. 1200</td></tr><tr><td>D. 600</td><td>H. 2000</td></tr></table> | Switch Rating       | Enclosure Availability Suffix Letter (Omit K from Cat. No. & Substitute) J (NEMA 12)   | R (NEMA 3R)        | S (NEMA 1) | Circuit Breaker Type Construction |     |   |   | 100-1000A | Yes                | Yes | Yes | 1200-2000A | No | No  | Yes | Switch Ampere Rating | Switch Ampere Rating | A. 100 | E. 800 | B. 225 | F. 1000 | C. 400 | G. 1200 | D. 600 | H. 2000 | Auto | <b>ⓐ23. Plant Exerciser</b><br>168-hour clock timer provides for automatic test operation of the plant for pre-selected intervals (adj. 0-168 hrs. in multiples of 15 minutes) at least once a week, mounted on intelligence circuit.<br>C. Without interrupting normal supply.<br>D. By simulation of power failure.<br>Note: Both C and D are connected to the load bus.<br>G. Plant Exerciser with Selector Switch for choosing 23C or 23D. |   |    |      |   |
| Switch Rating                     | Enclosure Availability Suffix Letter (Omit K from Cat. No. & Substitute) J (NEMA 12)   | R (NEMA 3R)         | S (NEMA 1)   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| Circuit Breaker Type Construction |  |                     |  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 100-1000A                         | Yes  | Yes                 | Yes  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| 1200-2000A                        | No   | No                  | Yes  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| Switch Ampere Rating              | Switch Ampere Rating   |                     |  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| A. 100                            | E. 800   |                     |  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| B. 225                            | F. 1000  |                     |  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| C. 400                            | G. 1200  |                     |  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| D. 600                            | H. 2000  |                     |  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
|                                   |  | Auto                | <b>ⓐ24. Battery Charger</b><br>The trickle charge Dc output is 12 or 24 volts. Units are panel mounted. Fixed high-low charge rate.<br>Ammeter<br>C. 12 volt<br>D. 24 volt   |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| Auto Basic Manual                 |  | Auto                | <b>26. Type of Protection (Normal Source)</b><br>A. Complete protection is standard. A voltage sensing relay monitors each phase of the Normal power supply. Normally set at 70% dropout and 90% pickup.<br>C. Overvoltage Sensing Relay-adjustable, nominally set at 115% dropout, pickup below 105% (normally used with Option 26A).<br>D. Area protection connections with override circuit. Provides two terminal blocks for connection of one or more NO (open when there is no voltage) area protection contacts; these terminal blocks are wired in the same manner as the test switch and when the NO area protection contact opens, the switch will initiate engine start and will transfer to emergency. In the event that the NO area protection contact remains open and the emergency source fails when the switch is in the emergency position, an over-ride circuit will retransfer the switch to the normal source if it is available.<br>E. Under frequency, adjustable 45-60 Hz (Drops out 2 Hz lower than setting). A frequency sensing relay is connected to 1 phase only of the Normal source constantly monitoring that phase.<br>F. Over frequency, adjustable 50-65 Hz (Drops out 2 Hz above setting). A frequency sensing relay is connected to 1 phase only of the Normal source constantly monitoring that phase. |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| Auto Basic Manual                 |  | Auto                | <b>27. Non-Standard Voltages and Frequencies</b><br>A. Non-standard Ac Voltages and Frequencies.<br>Three and four pole breaker type switches are suitable for use on 208, 220, 240, 380, 415, 480 and 600 volts, 50/60 Hz without modification through the use of multi-tap transformers. VSR adjustment capability make switches suitable for use on any intermediate voltage. Specify system voltage on order.  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |
| Auto Basic Manual                 |  | Auto                | <b>ⓐ28. Intelligence Circuit Fuses</b><br>A. Provides fuses on all non-essential control circuitry.  |                    |            |                                   |     |   |   |           |                    |     |     |            |    |     |     |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |      |   |

ⓐ Not UL Inc. listed  
ⓐ28. Intelligence Circuit Fuses

ⓐ Not UL Inc. listed

ⓐ Supplied unmounted if Option 22 supplied.



**Options, List Price Additions, Continued**  
For List Prices, Refer to Price List 29-920

| Type<br>Switch<br>Used On | Description  | Type<br>Switch<br>Used On | Description  |
|---------------------------|--|---------------------------|--|
| Auto                      | <b>29. Type of Operation</b><br>A. Automatic operation is standard. Provides for automatic transfer and retransfer from source to source as dictated by the reset values of the transfer switch intelligence circuits.<br>①B. Pushbutton Operation Only (Pushbuttons for separate mounting). Includes two pushbuttons for operating the transfer switch from normal to emergency and from emergency to normal. No automatic operation is included.<br>①C. Pushbutton Return to Normal (Pushbutton for separate mounting). Automatic operation normal to emergency, pushbutton operation emergency to normal.<br>①D. Same as Option 29B, except pushbuttons in cover of enclosed switch.<br>①E. Same as Option 29C except pushbutton in cover of enclosed switch.<br>①F. Automatic/Manual Operation. Two position selector (marked Auto/Manual) permits selection of automatic or manual operation. Includes Option 29B which only operates when the switch is in the manual mode. For separate mounting.<br>①G. Same as Option 29F except pushbuttons and selector switch mounted in cover of enclosed switch. | Auto                      | <b>30. Cranking Limiter</b><br>A. Adjustable 20-200 seconds. Interrupts motor start circuit if voltage does not appear within pre-selected time.   |
|                           |  | Auto                      | <b>31. Audible alarm with silencing switch</b><br>Sounds alarm when switch is in the emergency position and emergency voltage is present.<br>A. For separate mounting.<br>B. Enclosure mounted.<br><br>Sounds alarm when either breaker trips. Use Option 15C and/or D. Available only with Options 16 and 17.<br>C. Normal & Emergency Source for separate mounting<br>D. Normal & Emergency Source for enclosure mounted<br>E. Normal Source Only, for separate mounting<br>F. Normal Source Only, for enclosure mounted<br>G. Emergency Source Only, for separate mounting<br>H. Emergency Source Only, for enclosure mounted |
|                           |  | Auto                      | <b>32. Time Delay Neutral</b><br>Provides a time delay in the Neutral position when the load is transferred in either direction to prevent excessive inrush currents due to out-of-phase switching of large motor loads. Utilizes a 1A Breaker auxiliary contact from Option 15E and 15F.<br>A. Adjustable .2 to 50 seconds  |
|                           |  | Auto<br>Basic<br>Manual   | <b>33. Shunt Trip</b><br>Wired to terminal blocks for customer connection.<br>Specify coil voltage desired.<br>A. Supplied in Normal breaker.<br>B. Supplied in Emergency breaker.<br><b>50. CSA Listing</b><br>Includes necessary bi-lingual nameplates.  |

① Not UL Listed.

**Transfer Switch Ratings****A. Transfer Switch Interrupting, Closing and Withstand Ratings.**

1. For standard catalog number ATS, MTS or BTS switches.

(High Magnetic Trip Breakers), or standard catalog numbered switches with Option 16A (Thermal Magnetic Breakers), and Option 16D (SELTRONIC Breakers).

| Switch Rating,<br>Amperes | Interrupting, Closing and Withstand Rating, Amps. |         |              |         |              |         |
|---------------------------|---|---------|--------------|---------|--------------|---------|
|                           | 120, 208, 240 Volts Ac                            |         | 480 Volts Ac |         | 600 Volts Ac |         |
|                           | Asym.   | Sym.    | Asym.        | Sym.    | Asym.        | Sym.    |
| 100 (600 V. Max.)         | 20,000  | 18,000  | 15,000       | 14,000  | 15,000       | 14,000  |
| 225                       | 30,000  | 25,000  | 25,000       | 22,000  | 25,000       | 22,000  |
| 400                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 600                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 800                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 1000                      | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 1200                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 1600                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2500                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 3000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |

2. Standard catalog numbered ATS, BTS or MTS switches with Option 17A (Mark 75® Breakers).

| Switch Rating,<br>Amperes   | Interrupting, Closing and Withstand Rating, Amps. |        |              |        |              |        |
|-----------------------------|---|--------|--------------|--------|--------------|--------|
|                             | 120, 208, 240 Volts Ac                            |        | 480 Volts Ac |        | 600 Volts Ac |        |
|                             | Asym.   | Sym.   | Asym.        | Sym.   | Asym.        | Sym.   |
| Standard MARK 75 Breakers   |   |        |              |        |              |        |
| 100                         | 75,000  | 65,000 | 30,000       | 25,000 | 20,000       | 18,000 |
| 125 thru 1000               | 75,000  | 65,000 | 40,000       | 35,000 | 30,000       | 25,000 |
| SELTRONIC® MARK 75 Breakers |   |        |              |        |              |        |
| 100 thru 1000               | 75,000  | 65,000 | 58,000       | 50,000 | 30,000       | 25,000 |

3. Standard Catalog numbered ATS, BTS and MTS switches with Option 16C, SCB-II breakers.

| Switch Rating,<br>Amperes | Interrupting, Closing and Withstand Rating, Amps. |         |              |         |              |         |
|---------------------------|---|---------|--------------|---------|--------------|---------|
|                           | 120, 208, 240 Volts Ac                            |         | 480 Volts Ac |         | 600 Volts Ac |         |
|                           | Asym.   | Sym.    | Asym.        | Sym.    | Asym.        | Sym.    |
| 400                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 600                       | 75,000  | 65,000  | 58,000       | 50,000  | 30,000       | 25,000  |
| 1200                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 1600                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2500                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 3000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |

**B. Trip Current Ratings of Systems Circuit Breakers**

| Current<br>Monitor<br>Ratings | Long-time Pick-up<br>Range, Amperes® |      | Instantaneous Pick-up<br>Range, Amperes |       | Short-time Delay Pick-<br>up Range, Amperes® |       | Ground Current Pick-<br>up Range, Amperes® |       |
|-------------------------------|--------------------------------------|------|---|-------|--|-------|--|-------|
|                               | Min.                                 | Max. | Min.                                    | Max.  | Min.   | Max.  | Min.                                       | Max.  |
| 250                           | 125                                  | 300  | 250                                     | 3000  | 250  | 1750  | 50   | 250   |
| 400                           | 200                                  | 480  | 400                                     | 4800  | 400  | 2800  | 80   | 400   |
| 600                           | 300                                  | 720  | 600                                     | 7200  | 600  | 4200  | 120  | 600®  |
| 800                           | 400                                  | 960  | 800                                     | 9600  | 800  | 5600  | 160  | 800®  |
| 1000                          | 500                                  | 1200 | 1000                                    | 12000 | 1000   | 7000  | 200  | 1000® |
| 1200                          | 600                                  | 1440 | 1200                                    | 14400 | 1200   | 8400  | 240  | 1200® |
| 1600                          | 800                                  | 1920 | 1600                                    | 19200 | 1600   | 11200 | 320  | 1200  |
| 2000                          | 1000                                 | 2400 | 2000                                    | 24000 | 2000   | 14000 | 400  | 1200  |
| 2500                          | 1250                                 | 3000 | 2500                                    | 30000 | 2500   | 17500 | 500  | 1200  |
| 3000                          | 1500                                 | 3600 | 3000                                    | 36000 | 3000   | 21000 | 600  | 1200  |

® Long-time delay adjustable from 2 to 20 sec. at 600% rating.

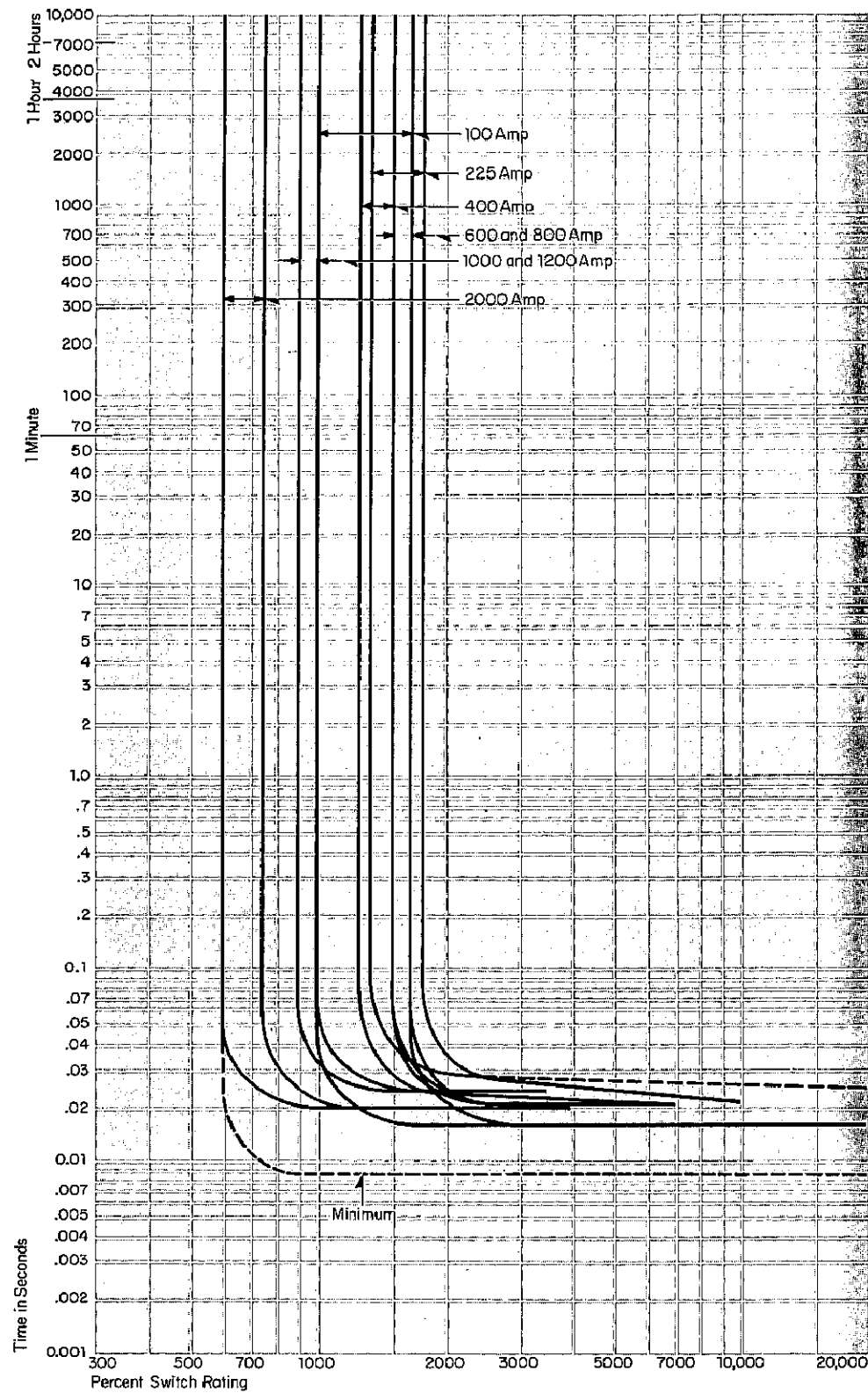
Short-time delay adjustable from 2 to 10 cycles at 600% rating.

Ground current trip time adjustable from 0.1 (6 cycles) to 0.5 (30 cycles) sec.

When used with 1200, 2000, 2500 or 3000 amp switches, these monitors have maximum ground current trip of .6X monitor rating.

### Ratings, Continued

#### B. High Instantaneous Trip Curve.



## Special Applications

### A. Use of Thermal Magnetic Circuit Breakers.

Increasing technology in fields such as hospital life-support systems, demand more reliable sources of power than have ever been required before. Power outages due to electrical storms, etc., cannot be tolerated.

Whenever emergency/standby power is generated there is always an engine generator, generator circuit protective device, automatic transfer switch, and probably a distribution switchboard. These items must be connected together in the manner shown in Figure 9, a total of five runs of bus duct or conduit and cables. If these items are physically separated from each other, the cost of interconnection can be appreciable.

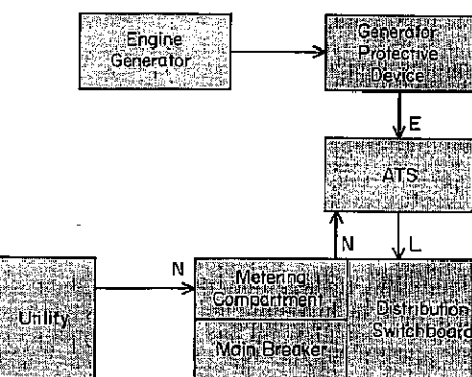


Figure 9

The greater the distance, the greater the cost. The engine generator, generator protective device, and ATS could be on the roof and the switchboard in the basement. Conceivably, the cost of interconnection could be the major factor in the selection of these items. A common method of reducing the cost of emergency/standby power installation is to incorporate the Automatic Transfer Switch into the distribution switchboard as shown in Figure 10. Thus only three interconnections are required, but the switchboard becomes larger by the amount of space taken by the Automatic Transfer Switch.



Figure 10

The versatility of circuit breakers can be most effectively utilized in Automatic Transfer Switch construction. The main in the distribution switchboard, if it is a breaker, can be physically placed in the Automatic Transfer Switch, reducing the number of intercon-

nections from five to three and saving the space in the switchboard formerly required by the main as shown in Figure 11.

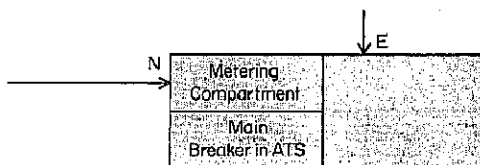


Figure 11

In many cases, the space required by the main is identical to the space required by the switch, and the best of both worlds can be realized, reduced interconnections and no increase in switchboard size. If the generator circuit protective device is a breaker and distances are proper, it can also be physically placed in the Automatic Transfer Switch thus achieving the ultimate in reduced interconnections and reduced switchboard space.

The versatility of circuit breakers can be effectively utilized even when an incoming distribution switchboard is not used. If the installation is that shown in Figure 12.

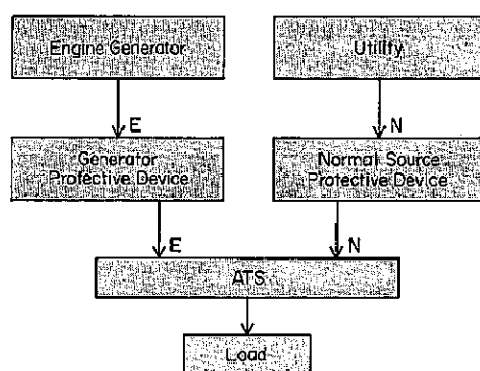


Figure 12

Two Protective Devices (generator & normal source) have to be provided, mounted and wired. All in all 5 interconnections are necessary. In many cases the protective devices can be mounted in the ATS as shown in Figure 13.

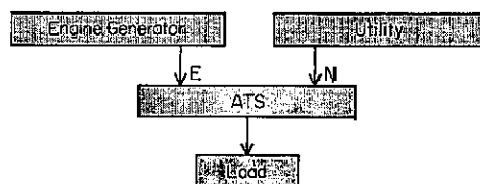


Figure 13

Thus the cost of interconnection has been reduced from 5 to 3. An additional saving is that it is not necessary to mount and wire the two protective devices.

If it is not possible to incorporate both protective devices in the ATS, either one or the other can be incorporated thus reducing the installed cost over that shown in Figure 12.

Refer to Option 11 for details on circuit breaker resetting and lockout.

### B. Multiple Sources of Power

Automatic Transfer Switches can be connected in the following manner to provide continuous load service from more than two power sources, Figure 14.

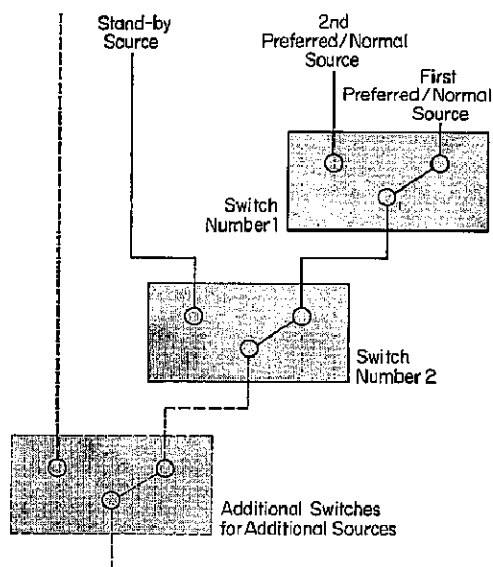


Figure 14

The operation is as follows: Should the first preferred source fail, Automatic Transfer Switch 1 will transfer to the second preferred source, and Automatic Transfer Switch 2 will remain in the position it was in. Should the second preferred source fail, Automatic Transfer Switch 2 will transfer to the emergency source. Upon restoration of either preferred source, the transfer switches will seek that source. Various options can be incorporated into the Automatic Transfer Switches to provide time delays before the switches transfer, to override momentary power outages, or to allow stabilization of a power source before retransfer is made, etc. Standard transfer switches can be used without modification.





## Special Applications, Continued

### C. Uninterruptible Power Systems (UPS)

Where continuity of electric service cannot be interrupted for even a cycle duration, UPS is used. See Figure 15. UPS can be used in conjunction with standby power generation and an Automatic Transfer Switch as shown in the following figure in order to reduce the UPS battery requirement, reducing the total UPS system cost.

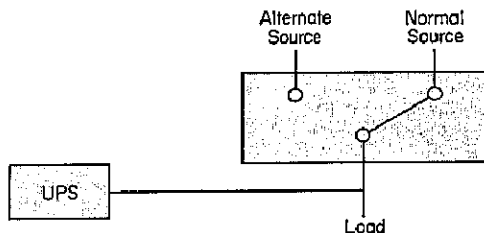


Figure 15

### D. Area Protection

In many cases it is desired to monitor the voltage in more locations than at the ATS's line terminals, such as school corridors which are fed from a lighting panelboard and have the total emergency load connected to the ATS load circuit. Thus if any of the area's being monitored lose power, i.e. due to a lighting breaker tripping, the entire emergency circuit would be fed from the standby source even though the ATS normal voltage was still present. Monitoring is done by VSR's either individually mounted or several mounted in a single box whose contacts are connected so that the ATS is provided a NO contact when any relay fails. See Options 26D and E.

**E. Other** – For applications having load shedding, bus tie systems, multiple power generation with essential and non-essential loads, etc. refer to Westinghouse.

### Approximate Shipping Weights

Weights listed below are approximate and are for switches packaged for shipment. Weights are for standard catalog numbered switches and will be increased by the weight of options selected.


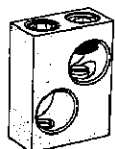
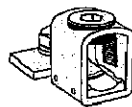
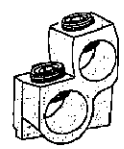

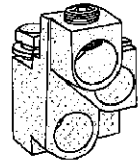
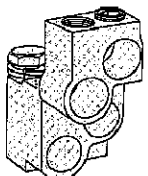
#### Circuit Breaker Switches, 2, 3, 4 Poles

| Amperes | Approximate Shipping Weights, Lbs. |       |                |       |                 |       |               |       |
|---------|------------------------------------|-------|----------------|-------|-----------------|-------|---------------|-------|
|         | Automatic Switches                 |       | Basic Switches |       | Manual Switches |       |               |       |
|         | Open                               | Encl. | Open           | Encl. | Dual Handle     |       | Single Handle |       |
|         |                                    |       |                |       | Open            | Encl. | Open          | Encl. |
| 100     | 70                                 | 150   | 20             | 100   | 13              | 93    | 15            | 95    |
| 225     | 205                                | 325   | 155            | 275   | 130             | 250   | 120           | 240   |
| 400     | 235                                | 450   | 185            | 400   | 160             | 475   | 150           | 465   |
| 600     | 255                                | 475   | 205            | 420   | 180             | 395   | 170           | 385   |
| 800     | 300                                | 550   | 250            | 500   | 225             | 475   | 215           | 465   |
| 1000    | 350                                | 600   | 300            | 550   | 250             | 500   | 225           | 500   |
| 1200    | 650                                | 1350  | 600            | 1300  | 625             | 1200  | 615           | 1200  |
| 2000    | 700                                | 1400  | 650            | 1350  | 650             | 1350  | 650           | 1250  |
| 2500    | 800                                | 1550  | 750            | 1500  | 750             | 1500  | 750           | 1500  |
| 3000    | 900                                | 1700  | 850            | 1650  | 850             | 1650  | 850           | 1650  |

# Wiring Terminal Data

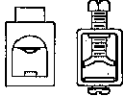

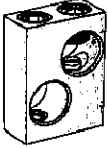
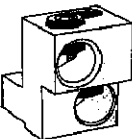
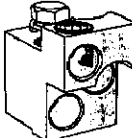
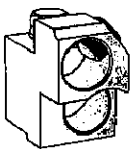
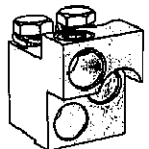
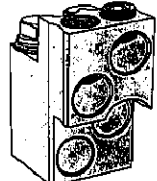
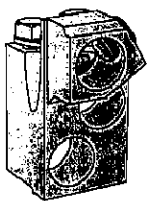
Terminals listed as "standard" are included with the switches listed on pages 7, 8, 9. Optional terminals are available, but must be specified.

## Optional Terminals

| Switch Rating, Amps | Option     | Copper Terminal   | Used With Breaker                        | Catalog No. | Wire Range  | No. of Cables | Type of Conductor |  |  |  |  |
|---------------------|------------|---|--|-------------|-------------|---------------|-------------------|--|--|--|--|
| 225                 | Option 21A |    | KA, HKA                                  | T225LA      | #6-350 MCM  | 1             | Cu                |  |  |  |  |
| 400                 | Option 21A |    | LA, HLA, LC, HLC, SPCB 600 (600 A Frame) | T600LA      | 250-500 MCM | 2             | Cu                |  |  |  |  |
| 600                 | Optional   |    | MA, HMA MC, HMC                          | T350MA      | #1-600 MCM  | 1             | Cu                |  |  |  |  |
| 600                 | Option 21A |   | MA, HMA MC, HMC                          | T600MA1     | 2/0-500 MCM | 2             | Cu                |  |  |  |  |
| 600                 | Optional   |  | MA, HMA MC, HMC                          | T800MA1     | 3/0-300 MCM | 3             | Cu                |  |  |  |  |
| 800<br>000          | Option 21A |  | NB, HNB, NC, HNC, SPCB 1200              | T1000NB1    | 3/0-500 MCM | 3             | Cu                |  |  |  |  |
| 200                 | Optional   |   |  |             |             | 3             |                   |  |  |  |  |
| 600                 |            |   |  |             |             | 6             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 6             |                   |  |  |  |  |
| 500                 |            |   |  |             |             | 9             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 9             |                   |  |  |  |  |
| 800<br>000          | Optional   |  | NB, HNB, NC, HNC SPCB 1200               | T1200NB1    | 3/0-400 MCM | 4             | Cu                |  |  |  |  |
| 200                 | Option 21A |   |  |             |             | 4             |                   |  |  |  |  |
| 600                 |            |   |  |             |             | 4             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 8             |                   |  |  |  |  |
| 500                 |            |   |  |             |             | 8             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 12            |                   |  |  |  |  |
|                     |            |   |  |             |             | 12            |                   |  |  |  |  |



### Standard Terminals

| Switch Rating, Amps                                 | Option               | Aluminum Terminal   | Used With Breaker                                | Catalog No. | Wire Range                     | No. of Cables                     | Type of Conductor |
|---|----------------------|---|--|-------------|--------------------------------|-----------------------------------|-------------------|
| 100   | Standard             |    | FB   |             | #6-1/0                         | 1                                 | Cu/Al             |
| 225   | Standard             |    | KA, HKA  | TA225LA1    | #6-350 MCM<br>or<br>#4-350 MCM | 1<br>1                            | Cu/Al             |
| 400   | Standard             |    | LA, HLA<br>LC, HLC<br>SPCB 600<br>(600 A. Frame) | TA600LA     | 250-500 MCM                    | 2                                 | Cu/Al             |
| 600   | Standard             |   | MA, HMA<br>MC, HMC                               | TA700MA1    | #1-500 MCM                     | 2                                 | Cu/Al             |
| 600   | Optional             |  | MA, HMA<br>MC, HMC                               | TA800MA2    | 3/0-400 MCM                    | 3                                 | Cu/Al             |
| 600   | Optional             |  | MA, HMA<br>MC, HMC                               | TA801MA     | 500-750 MCM                    | 2                                 | Cu/Al             |
| 800<br>1000<br>1200<br>1600<br>2000<br>2500<br>3000 | Standard<br>Optional |  | NB, HNB<br>NC, HNC<br>SPCB 1200                  | TA1000NB1   | 3/0-400 MCM                    | 3<br>3<br>3<br>6<br>6<br>9<br>9   | Cu/Al             |
| 800<br>1000<br>1200<br>1600<br>2000<br>2500<br>3000 | Optional<br>Standard |  | NB, HNB<br>NC, HNC<br>SPCB 1200                  | TA1200NB1   | 4/0-500 MCM                    | 4<br>4<br>4<br>8<br>8<br>12<br>12 | Cu/Al             |
| 800<br>1000<br>1200<br>1600<br>2000<br>2500<br>3000 | Optional             |  | NB, HNB<br>NC, HNC<br>SPCB 1200                  | TA1201NB1   | 500-750 MCM                    | 3<br>3<br>3<br>6<br>6<br>9<br>9   | Cu/Al             |

### Further Information

Prices: Price List 29-920

Prices: Price List 29-921

Description: DB 29-901

Dimensions: DS 29-970



Printed in USA

**Options, List Price Additions, Continued**  
For List Prices, refer to Price List 29-920Type      Description  
Switch  
Used On

- A. Manual (Standard)  
B. Normal Breaker Reset PB for separate mounting.  
C. Emerg. Breaker Reset PB for separate mounting.  
D. Normal Breaker Reset PB in cover of Encl. Switch.  
E. Emerg. Breaker Reset PB in cover of Encl. Switch.  
F. Circuit Breaker Lock-out: Prevents transfer if breaker trips (supplied as standard with options 16A, 16C, 16D, 16E, 16F and 17).
- 12. Pilot Lights**  
Pilot lights can be furnished to indicate (1) switch position; (2) source condition; and, (3) tripped condition.

Auto  
Manual**Switch Position:** Utilizes a 1A breaker auxiliary contact from Option 15E and/or 15F.

- A. Normal Supply (green) for separate mounting.  
B. Emergency Supply (red) for separate mounting.  
C. Normal Supply (green) in cover of enclosed switch.  
D. Emergency Supply (red) in cover of enclosed switch.

**Source Condition:** Indicates whether or not source voltage is present.

- E. Normal Supply (white) for separate mounting  
F. Emergency supply (white) for separate mounting  
G. Normal supply (white) in cover of enclosed switch  
H. Emergency supply (white) in enclosure cover

**Tripped Condition:** Available only with thermal-magnetic breakers, Options 16 and 17. Uses Option 15C and/or 15D.

- J. Normal supply (amber) for separate mounting  
K. Emergency supply (amber) for separate mounting  
L. Normal supply (amber) in enclosure cover  
M. Emergency supply (amber) in enclosure cover

Auto

**13. Engine Start Contacts**

Initiates engine starting. Provides a contact closure when the normal source fails.

Auto

- A. 1 NC (closed when normal power fails) . . . . . Standard

**14. Relay Auxiliary Contact**

The Normal source relay is energized only when the switch is in the Normal position and Normal power is present. The Emergency source relay is energized whenever the Emergency source is present.

- C. Normal Source: Provides 2 NO and 2 NC contacts.  
D. Emergency Source: Provides 2 NO and 2 NC.

Auto  
Basic  
Manual**15. Auxiliary Contact or Bell Alarm Contact**

**Auxiliary Switch:** Indicates only which source the load is connected to, whether or not there is power on the system.  
E. Normal Source: Provides a DPDT (2A & 2B) Contact that operates with the breaker mechanism . . . . . Standard  
F. Emergency Source: Provides a DPDT (2A & 2B) Contact that operates with the breaker mechanism . . . . . Standard

**Bell Alarm Contacts.** Only 1 can be furnished. Not available for customer use when Options 12J - 12M or 31C, D are selected. Indicates when breaker is tripped. Available only with thermal magnetic breakers, Options 16 and 17. Contact closes when tripped.

- C. Normal source: 1A contact  
D. Emergency Source: 1A contact

① Standard breaker switches are used. If the switch ratings (6 amps inductive) are not exceeded, parallel terminal blocks can be provided, saving the cost of extra switches, if separate switches are not required.

② Not UL Inc. listed.

③ Not available in 4 pole.

Type      Description  
Switch  
Used On**Auto  
Basic  
Manual**      **16. Thermal Magnetic, Non-Automatic or SCB-II Breakers in Place of Standard High Instantaneous Trip Breakers**

Use of this option can, in many cases, eliminate the need for separate upstream overcurrent/short circuit protection, thus enabling code requirements to be met with a device that takes up less space and requires less wiring. Either the Normal or Emergency breaker, or both, may be replaced. Includes Option 11F except for Options 16B, G, H. Four pole switches have trip units only in three poles.

A. Thermal Magnetic: Switch ratings and trip ratings available.

| Switch Rating | 2 Pole | 3 Pole | 4 Pole | Trip Ratings Available                                 |
|---------------|--------|--------|--------|--|
| 100           | X      | X      |        | 10, 15, 25, 30, 40, 50, 60, 70, 90, 100                |
| 225           | X      | X      | X      | 70, 90, 100, 125, 150, 175, 200, 225                   |
| 400           | X      | X      | X      | 250, 300, 350, 400                                     |
| 600           | X      | X      | X      | 150, 175, 200, 225, 250, 300, 350                      |
|               |        |        |        | 400, 500, 600  |
| 800           | X      | X      | X      | 700, 800   |
| 1000          | X      | X      | X      | 700, 800, 900, 1000                                    |
| 1200          | X      | X      | X      | 600, 700, 800, 900, 1000, 1200                         |
| 1600          | X      | X      | X      | 600, 700, 800, 900, 1000, 1200, 1600                   |
| 2000          | X      | X      | X      | 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000 |
| 2500          | X      | X      | X      | 2500   |
| 3000          | X      | X      | X      | 3000   |

**B. Non-Automatic Breakers**

- ② ③ C. SCB-II Systems Circuit Breakers standard breakers with long delay and instantaneous trip; specify switch rating, monitor rating. Sensors are available with long delay, short delay, instantaneous, ground fault trip, etc. Refer to TD 29-820 for further details. Specify type required. Available in 3 pole only.

| Switch Rating | Current Monitor Ratings.   |
|---------------|----------------------------|
| 400           | 250, 400                   |
| 1000          | 250, 400, 600, 800, 1000   |
| 1200          | 600, 800, 1000, 1200       |
| 2000          | 600, 800, 1000, 1200, 2000 |
| 2500          | 2500                       |
| 3000          | 3000                       |

- ② ③ D. SELTRONIC™ Circuit Breaker—Refer to Westinghouse

- E. Thermal Magnetic breaker, Emergency source only.  
F. Thermal Magnetic Breaker, normal source only  
G. Non-Automatic Breakers, emergency source only  
H. Non-Automatic Breakers, normal source only.

Auto  
Basic  
Manual**17. MARK 75 Circuit Breakers in Place of Standard High Instantaneous Trip Breakers (Includes Option 11F)**

A. Thermal Magnetic MARK 75®: Specify rating and trip from next page.

**Options, List Price Additions, Continued**  
For List Prices, refer to Price List 29-920

| Type Switch Used On               | Description   | Type Switch Used On | Description  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
|-----------------------------------|---|---------------------|--|-----------------------------------|--------|--------------|-----|------------|----|----------------------|----------------------|--------|--------|--------|---------|--------|---------|--------|---------|------|--|---|----|-----|---|---|----|------|---|---|----|------|---|
|                                   | <table><tr><th>Switch Rating Amps</th><th>Availability 2 Pole</th><th>3 Pole</th><th>4 Pole</th><th>Trip Ratings</th></tr><tr><td>100</td><td>X</td><td>X</td><td>..</td><td rowspan="6">Same as Option 16A</td></tr><tr><td>225</td><td>X</td><td>X</td><td>..</td></tr><tr><td>400</td><td>X</td><td>X</td><td>..</td></tr><tr><td>600</td><td>X</td><td>X</td><td>..</td></tr><tr><td>800</td><td>X</td><td>X</td><td>..</td></tr><tr><td>1000</td><td>X</td><td>X</td><td>..</td></tr></table>  | Switch Rating Amps  | Availability 2 Pole  | 3 Pole                            | 4 Pole | Trip Ratings | 100 | X          | X  | ..                   | Same as Option 16A   | 225    | X      | X      | ..      | 400    | X       | X      | ..      | 600  | X  | X | .. | 800 | X | X | .. | 1000 | X | X | .. | Auto | <b>22. Narrow Unit (3 Pole Breaker Switches Only)</b><br>A narrow, single panel for use primarily in motor control centers. There is no provision to mount Options 23, 24 on the panel. If selected, they are furnished for separate mounting.<br>A. Front connected, line and load.<br>B. Front cable-connected line, rear bus-connected load. |
| Switch Rating Amps                | Availability 2 Pole   | 3 Pole              | 4 Pole   | Trip Ratings                      |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 100                               | X   | X                   | ..   | Same as Option 16A                |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 225                               | X   | X                   | ..   |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 400                               | X   | X                   | ..   |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 600                               | X   | X                   | ..   |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 800                               | X   | X                   | ..   |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 1000                              | X   | X                   | ..   |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Auto Basic Manual                 | <b>ⓐB. SELTRONIC MARK 75 Circuit Breakers</b><br>Refer to Westinghouse.<br><b>18. Special Enclosures</b><br>A. Types<br><table><tr><th>Switch Rating</th><th>Enclosure Availability Suffix Letter (Omit K from Cat. No. &amp; Substitute) J (NEMA 12) R (NEMA 3R) S (NEMA 1)</th></tr><tr><td>Circuit Breaker Type Construction</td><td></td></tr><tr><td>100-1000A</td><td>Yes</td></tr><tr><td>1200-2000A</td><td>No</td></tr></table><br>Refer to Westinghouse for knockouts or hubs or oversize enclosures.<br>B. Key Lock on Enclosure Doors, NEMA 1 100-1000 amp. only. Standard on all other enclosures.<br>C. Three point vault-type door hardware, NEMA 12 enclosure only.<br>D. Provides enclosure UL Inc. Listed as "Suitable for use as service equipment", available on automatic switches only. Utilizes two individually motor operated circuit breakers providing manual operations without opening enclosure door 400, 600, 800, 1000, 1200 or 2000 Amps (NEMA 1 only)<br>E. Voltmeter mounted in cover (includes potential transformers and selector switch).<br>F. Ammeter mounted in cover (includes current transformers and selector switch).<br>G. Frequency Meter<br>H. Running Time Meter<br><b>19. Solid Neutral Bar Assembly</b><br>Standard on automatic switches, optional on basis and manual switches. Provides insulated and groundable panel mounted neutral bar. Connections for Normal, Emergency and load. Shipped loose with open switches, mounted on enclosed switches.<br><table><tr><th>Switch Ampere Rating</th><th>Switch Ampere Rating</th></tr><tr><td>A. 100</td><td>E. 800</td></tr><tr><td>B. 225</td><td>F. 1000</td></tr><tr><td>C. 400</td><td>G. 1200</td></tr><tr><td>D. 600</td><td>H. 2000</td></tr></table> | Switch Rating       | Enclosure Availability Suffix Letter (Omit K from Cat. No. & Substitute) J (NEMA 12) R (NEMA 3R) S (NEMA 1)  | Circuit Breaker Type Construction |        | 100-1000A    | Yes | 1200-2000A | No | Switch Ampere Rating | Switch Ampere Rating | A. 100 | E. 800 | B. 225 | F. 1000 | C. 400 | G. 1200 | D. 600 | H. 2000 | Auto | <b>ⓐ23. Plant Exerciser</b><br>168-hour clock timer provides for automatic test operation of the plant for pre-selected intervals (adj. 0-168 hrs. in multiples of 15 minutes) at least once a week, mounted on intelligence circuit.<br>C. Without interrupting normal supply.<br>D. By simulation of power failure.<br>Note: Both C and D are connected to the load bus.<br>G. Plant Exerciser with Selector Switch for choosing 23C or 23D. |   |    |     |   |   |    |      |   |   |    |      |   |
| Switch Rating                     | Enclosure Availability Suffix Letter (Omit K from Cat. No. & Substitute) J (NEMA 12) R (NEMA 3R) S (NEMA 1)   |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Circuit Breaker Type Construction |   |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 100-1000A                         | Yes   |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| 1200-2000A                        | No  |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Switch Ampere Rating              | Switch Ampere Rating  |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| A. 100                            | E. 800  |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| B. 225                            | F. 1000   |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| C. 400                            | G. 1200   |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| D. 600                            | H. 2000   |                     |  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Auto Basic Manual                 | <b>20. Non-Standard Connections</b><br>Solderless lugs are furnished as standard on:<br>100-2000 ampere enclosed switches, 100-1000 ampere open switches.<br>A. Rear Connections: Standard on 1200-2000 amperes, 100-1000 amperes open units only.<br>B. Front Connections: Standard on 100-1000 amperes, 1200-2000 amperes open switch only.   | Auto                | <b>ⓐ24. Battery Charger</b><br>The trickle charge Dc output is 12 or 24 volts. Units are panel mounted. Fixed high-low charge rate.<br>Ammeter<br>C. 12 volt<br>D. 24 volt   |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Auto Basic Manual                 | <b>21. Non-Standard Terminals</b><br>A. Refer to wire terminal data, pages 18, 19, and specify terminal desired.  | Auto                | <b>26. Type of Protection (Normal Source)</b><br>A. Complete protection is standard. A voltage sensing relay monitors each phase of the Normal power supply. Normally set at 70% dropout and 90% pickup.<br>C. Overvoltage Sensing Relay-adjustable, nominally set at 115% dropout, pickup below 105% (normally used with Option 26A).<br>D. Area protection connections with override circuit. Provides two terminal blocks for connection of one or more NO (open when there is no voltage) area protection contacts; these terminal blocks are wired in the same manner as the test switch and when the NO area protection contact opens, the switch will initiate engine start and will transfer to emergency. In the event that the NO area protection contact remains open and the emergency source fails when the switch is in the emergency position, an over-ride circuit will retransfer the switch to the normal source if it is available.<br>E. Under frequency, adjustable 45-60 Hz (Drops out 2 Hz lower than setting). A frequency sensing relay is connected to 1 phase only of the Normal source constantly monitoring that phase.<br>F. Over frequency, adjustable 50-65 Hz (Drops out 2 Hz above setting). A frequency sensing relay is connected to 1 phase only of the Normal source constantly monitoring that phase. |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Auto Basic Manual                 |   | Auto                | <b>27. Non-Standard Voltages and Frequencies</b><br>A. Non-standard Ac Voltages and Frequencies.<br>Three and four pole breaker type switches are suitable for use on 208, 220, 240, 380, 415, 480 and 600 volts, 50/60 Hz without modification through the use of multi-tap transformers. VSR adjustment capability make switches suitable for use on any intermediate voltage. Specify system voltage on order.  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |
| Auto Basic Manual                 |   | Auto                | <b>ⓐ28. Intelligence Circuit Fuses</b><br>A. Provides fuses on all non-essential control circuitry.  |                                   |        |              |     |            |    |                      |                      |        |        |        |         |        |         |        |         |      |  |   |    |     |   |   |    |      |   |   |    |      |   |

ⓐ Not UL Inc. listed

ⓐ Supplied unmounted if Option 22 supplied.

ⓐ Not UL Inc. listed

ⓐ Supplied unmounted if Option 22 supplied.



**Options, List Price Additions, Continued**  
For List Prices, Refer to Price List 29-920

| Type<br>Switch<br>Used On | Description  | Type<br>Switch<br>Used On | Description  |
|---------------------------|--|---------------------------|--|
| Auto                      | <b>29. Type of Operation</b><br>A. Automatic operation is standard. Provides for automatic transfer and retransfer from source to source as dictated by the reset values of the transfer switch intelligence circuits.<br>①B. Pushbutton Operation Only (Pushbuttons for separate mounting). Includes two pushbuttons for operating the transfer switch from normal to emergency and from emergency to normal. No automatic operation is included.<br>①C. Pushbutton Return to Normal (Pushbutton for separate mounting). Automatic operation normal to emergency, pushbutton operation emergency to normal.<br>①D. Same as Option 29B, except pushbuttons in cover of enclosed switch.<br>①E. Same as Option 29C except pushbutton in cover of enclosed switch.<br>①F. Automatic/Manual Operation. Two position selector (marked Auto/Manual) permits selection of automatic or manual operation. Includes Option 29B which only operates when the switch is in the manual mode. For separate mounting.<br>①G. Same as Option 29F except pushbuttons and selector switch mounted in cover of enclosed switch. | Auto                      | <b>30. Cranking Limiter</b><br>A. Adjustable 20-200 seconds. Interrupts motor start circuit if voltage does not appear within pre-selected time.   |
|                           |  | Auto                      | <b>31. Audible alarm with silencing switch</b><br>Sounds alarm when switch is in the emergency position and emergency voltage is present.<br>A. For separate mounting.<br>B. Enclosure mounted.<br><br>Sounds alarm when either breaker trips. Use Option 15C and/or D. Available only with Options 16 and 17.<br>C. Normal & Emergency Source for separate mounting<br>D. Normal & Emergency Source for enclosure mounted<br>E. Normal Source Only, for separate mounting<br>F. Normal Source Only, for enclosure mounted<br>G. Emergency Source Only, for separate mounting<br>H. Emergency Source Only, for enclosure mounted |
|                           |  | Auto                      | <b>32. Time Delay Neutral</b><br>Provides a time delay in the Neutral position when the load is transferred in either direction to prevent excessive inrush currents due to out-of-phase switching of large motor loads. Utilizes a 1A Breaker auxiliary contact from Option 15E and 15F.<br>A. Adjustable .2 to 50 seconds  |
|                           |  | Auto                      | <b>33. Shunt Trip</b><br>Wired to terminal blocks for customer connection.   |
|                           |  | Basic                     | Specify coil voltage desired.  |
|                           |  | Manual                    | A. Supplied in Normal breaker.<br>B. Supplied in Emergency breaker.  |
|                           |  |                           | <b>50. CSA Listing</b><br>Includes necessary bi-lingual nameplates.  |

① Not UL Listed.

**Transfer Switch Ratings****A. Transfer Switch Interrupting, Closing and Withstand Ratings.**

1. For standard catalog number ATS, MTS or BTS switches.

(High Magnetic Trip Breakers), or standard catalog numbered switches with Option 16A (Thermal Magnetic Breakers), and Option 16D (SELTRONIC Breakers).

| Switch Rating,<br>Amperes | Interrupting, Closing and Withstand Rating, Amps. |         |              |         |              |         |
|---------------------------|---|---------|--------------|---------|--------------|---------|
|                           | 120, 208, 240 Volts Ac                            |         | 480 Volts Ac |         | 600 Volts Ac |         |
|                           | Asym.   | Sym.    | Asym.        | Sym.    | Asym.        | Sym.    |
| 100 (600 V. Max.)         | 20,000  | 18,000  | 15,000       | 14,000  | 15,000       | 14,000  |
| 225                       | 30,000  | 25,000  | 25,000       | 22,000  | 25,000       | 22,000  |
| 400                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 600                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 800                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 1000                      | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 1200                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 1600                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2500                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 3000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |

2. Standard catalog numbered ATS, BTS or MTS switches with Option 17A (Mark 75® Breakers).

| Switch Rating,<br>Amperes   | Interrupting, Closing and Withstand Rating, Amps. |        |              |        |              |        |
|-----------------------------|---|--------|--------------|--------|--------------|--------|
|                             | 120, 208, 240 Volts Ac                            |        | 480 Volts Ac |        | 600 Volts Ac |        |
|                             | Asym.   | Sym.   | Asym.        | Sym.   | Asym.        | Sym.   |
| Standard MARK 75 Breakers   |   |        |              |        |              |        |
| 100                         | 75,000  | 65,000 | 30,000       | 25,000 | 20,000       | 18,000 |
| 125 thru 1000               | 75,000  | 65,000 | 40,000       | 35,000 | 30,000       | 25,000 |
| SELTRONIC® MARK 75 Breakers |   |        |              |        |              |        |
| 100 thru 1000               | 75,000  | 65,000 | 58,000       | 50,000 | 30,000       | 25,000 |

3. Standard Catalog numbered ATS, BTS and MTS switches with Option 16C, SCB-II breakers.

| Switch Rating,<br>Amperes | Interrupting, Closing and Withstand Rating, Amps. |         |              |         |              |         |
|---------------------------|---|---------|--------------|---------|--------------|---------|
|                           | 120, 208, 240 Volts Ac                            |         | 480 Volts Ac |         | 600 Volts Ac |         |
|                           | Asym.   | Sym.    | Asym.        | Sym.    | Asym.        | Sym.    |
| 400                       | 50,000  | 42,000  | 35,000       | 30,000  | 25,000       | 22,000  |
| 600                       | 75,000  | 65,000  | 58,000       | 50,000  | 30,000       | 25,000  |
| 1200                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 1600                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 2500                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |
| 3000                      | 150,000   | 125,000 | 115,000      | 100,000 | 115,000      | 100,000 |

**B. Trip Current Ratings of Systems Circuit Breakers**

| Current<br>Monitor<br>Ratings | Long-time Pick-up<br>Range, Amperes® |      | Instantaneous Pick-up<br>Range, Amperes |       | Short-time Delay Pick-<br>up Range, Amperes® |       | Ground Current Pick-<br>up Range, Amperes® |       |
|-------------------------------|--------------------------------------|------|---|-------|--|-------|--|-------|
|                               | Min.                                 | Max. | Min.                                    | Max.  | Min.   | Max.  | Min.                                       | Max.  |
| 250                           | 125                                  | 300  | 250                                     | 3000  | 250  | 1750  | 50   | 250   |
| 400                           | 200                                  | 480  | 400                                     | 4800  | 400  | 2800  | 80   | 400   |
| 600                           | 300                                  | 720  | 600                                     | 7200  | 600  | 4200  | 120  | 600®  |
| 800                           | 400                                  | 960  | 800                                     | 9600  | 800  | 5600  | 160  | 800®  |
| 1000                          | 500                                  | 1200 | 1000                                    | 12000 | 1000   | 7000  | 200  | 1000® |
| 1200                          | 600                                  | 1440 | 1200                                    | 14400 | 1200   | 8400  | 240  | 1200® |
| 1600                          | 800                                  | 1920 | 1600                                    | 19200 | 1600   | 11200 | 320  | 1200  |
| 2000                          | 1000                                 | 2400 | 2000                                    | 24000 | 2000   | 14000 | 400  | 1200  |
| 2500                          | 1250                                 | 3000 | 2500                                    | 30000 | 2500   | 17500 | 500  | 1200  |
| 3000                          | 1500                                 | 3600 | 3000                                    | 36000 | 3000   | 21000 | 600  | 1200  |

® Long-time delay adjustable from 2 to 20 sec. at 600% rating.

Short-time delay adjustable from 2 to 10 cycles at 600% rating.

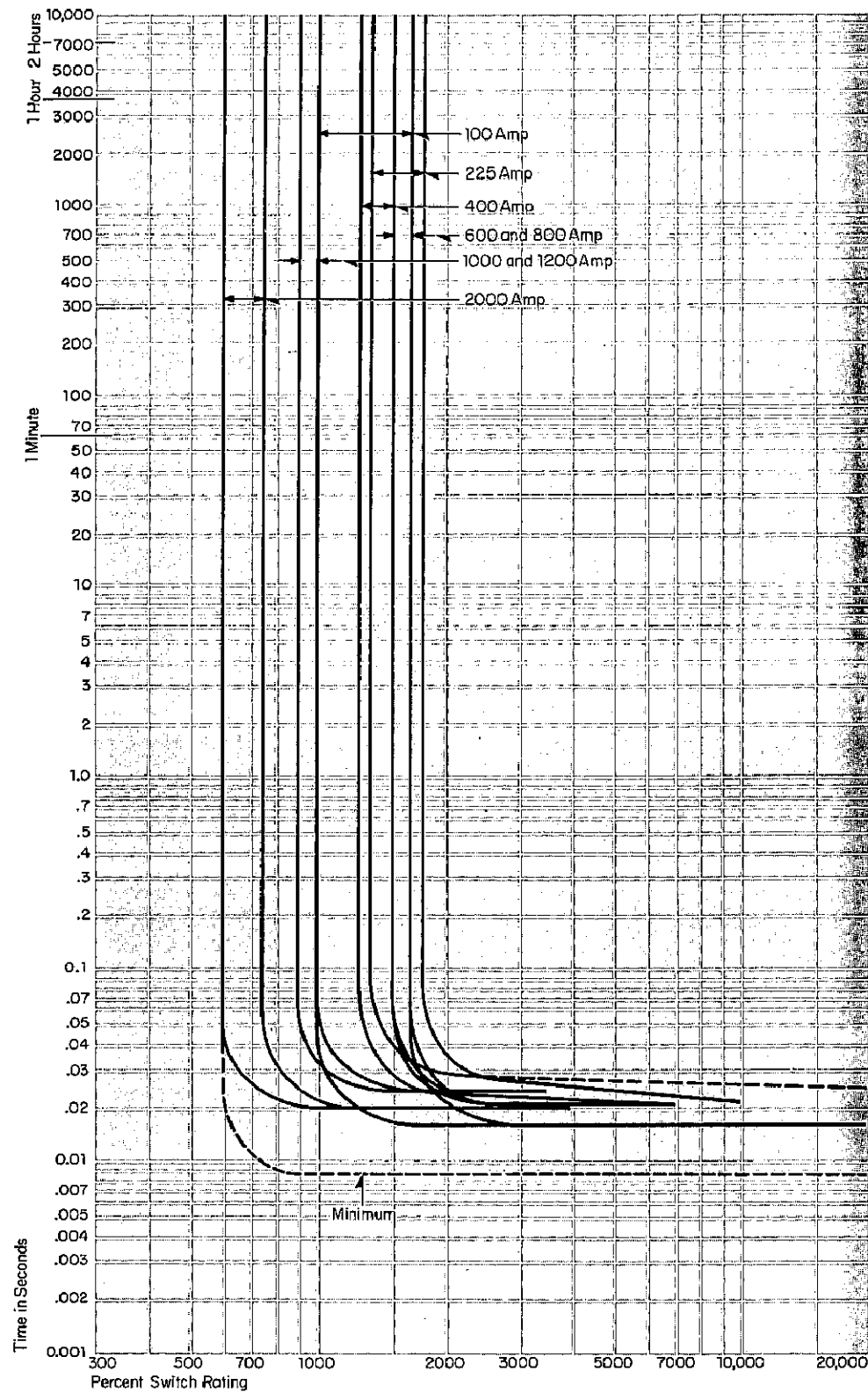
Ground current trip time adjustable from 0.1 (6 cycles) to 0.5 (30 cycles) sec.

When used with 1200, 2000, 2500 or 3000 amp switches, these monitors have maximum ground current trip of .6X monitor rating.



### Ratings, Continued

#### B. High Instantaneous Trip Curve.



## Special Applications

### A. Use of Thermal Magnetic Circuit Breakers.

Increasing technology in fields such as hospital life-support systems, demand more reliable sources of power than have ever been required before. Power outages due to electrical storms, etc., cannot be tolerated.

Whenever emergency/standby power is generated there is always an engine generator, generator circuit protective device, automatic transfer switch, and probably a distribution switchboard. These items must be connected together in the manner shown in Figure 9, a total of five runs of bus duct or conduit and cables. If these items are physically separated from each other, the cost of interconnection can be appreciable.

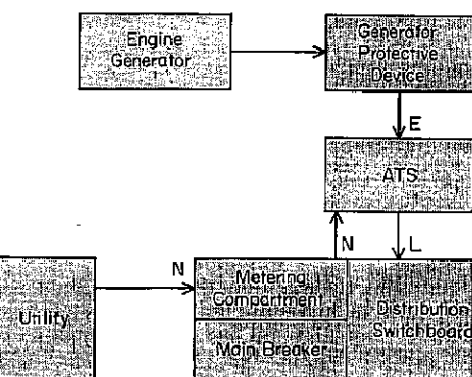


Figure 9

The greater the distance, the greater the cost. The engine generator, generator protective device, and ATS could be on the roof and the switchboard in the basement. Conceivably, the cost of interconnection could be the major factor in the selection of these items. A common method of reducing the cost of emergency/standby power installation is to incorporate the Automatic Transfer Switch into the distribution switchboard as shown in Figure 10. Thus only three interconnections are required, but the switchboard becomes larger by the amount of space taken by the Automatic Transfer Switch.



Figure 10

The versatility of circuit breakers can be most effectively utilized in Automatic Transfer Switch construction. The main in the distribution switchboard, if it is a breaker, can be physically placed in the Automatic Transfer Switch, reducing the number of intercon-

nections from five to three and saving the space in the switchboard formerly required by the main as shown in Figure 11.

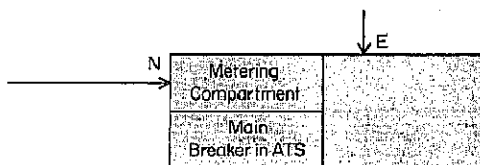


Figure 11

In many cases, the space required by the main is identical to the space required by the switch, and the best of both worlds can be realized, reduced interconnections and no increase in switchboard size. If the generator circuit protective device is a breaker and distances are proper, it can also be physically placed in the Automatic Transfer Switch thus achieving the ultimate in reduced interconnections and reduced switchboard space.

The versatility of circuit breakers can be effectively utilized even when an incoming distribution switchboard is not used. If the installation is that shown in Figure 12.

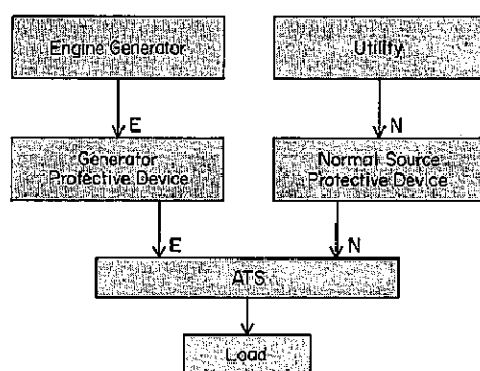


Figure 12

Two Protective Devices (generator & normal source) have to be provided, mounted and wired. All in all 5 interconnections are necessary. In many cases the protective devices can be mounted in the ATS as shown in Figure 13.

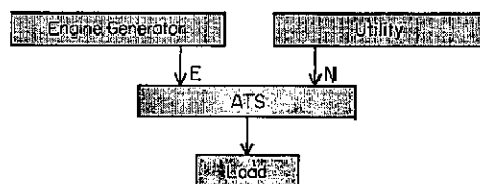


Figure 13

Thus the cost of interconnection has been reduced from 5 to 3. An additional saving is that it is not necessary to mount and wire the two protective devices.

If it is not possible to incorporate both protective devices in the ATS, either one or the other can be incorporated thus reducing the installed cost over that shown in Figure 12.

Refer to Option 11 for details on circuit breaker resetting and lockout.

### B. Multiple Sources of Power

Automatic Transfer Switches can be connected in the following manner to provide continuous load service from more than two power sources, Figure 14.

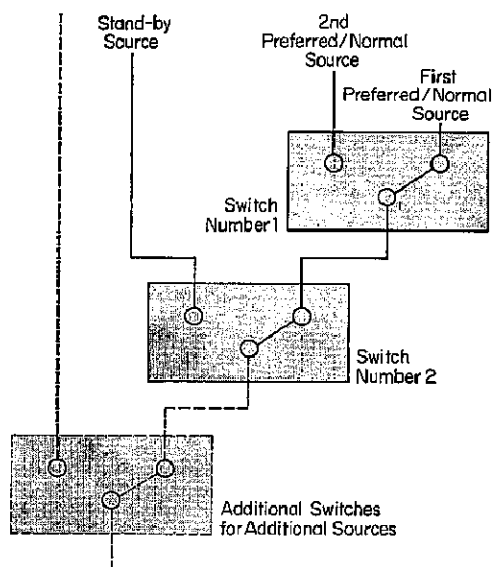


Figure 14

The operation is as follows: Should the first preferred source fail, Automatic Transfer Switch 1 will transfer to the second preferred source, and Automatic Transfer Switch 2 will remain in the position it was in. Should the second preferred source fail, Automatic Transfer Switch 2 will transfer to the emergency source. Upon restoration of either preferred source, the transfer switches will seek that source. Various options can be incorporated into the Automatic Transfer Switches to provide time delays before the switches transfer, to override momentary power outages, or to allow stabilization of a power source before retransfer is made, etc. Standard transfer switches can be used without modification.



## Special Applications, Continued

### C. Uninterruptible Power Systems (UPS)

Where continuity of electric service cannot be interrupted for even a cycle duration, UPS is used. See Figure 15. UPS can be used in conjunction with standby power generation and an Automatic Transfer Switch as shown in the following figure in order to reduce the UPS battery requirement, reducing the total UPS system cost.

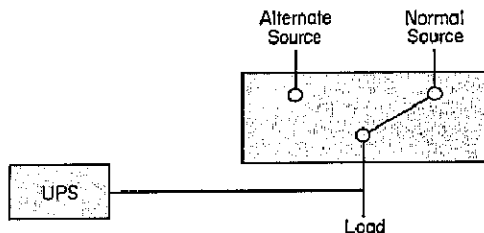


Figure 15

### D. Area Protection

In many cases it is desired to monitor the voltage in more locations than at the ATS's line terminals, such as school corridors which are fed from a lighting panelboard and have the total emergency load connected to the ATS load circuit. Thus if any of the area's being monitored lose power, i.e. due to a lighting breaker tripping, the entire emergency circuit would be fed from the standby source even though the ATS normal voltage was still present. Monitoring is done by VSR's either individually mounted or several mounted in a single box whose contacts are connected so that the ATS is provided a NO contact when any relay fails. See Options 26D and E.

**E. Other** – For applications having load shedding, bus tie systems, multiple power generation with essential and non-essential loads, etc. refer to Westinghouse.

### Approximate Shipping Weights

Weights listed below are approximate and are for switches packaged for shipment. Weights are for standard catalog numbered switches and will be increased by the weight of options selected.


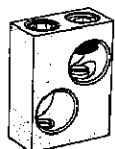
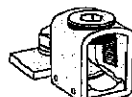
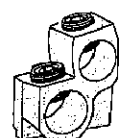
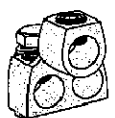
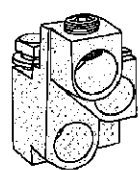
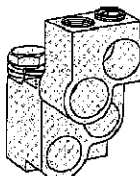
#### Circuit Breaker Switches, 2, 3, 4 Poles

| Amperes | Approximate Shipping Weights, Lbs. |       |                |       |                 |       |               |       |
|---------|------------------------------------|-------|----------------|-------|-----------------|-------|---------------|-------|
|         | Automatic Switches                 |       | Basic Switches |       | Manual Switches |       |               |       |
|         | Open                               | Encl. | Open           | Encl. | Dual Handle     |       | Single Handle |       |
|         |                                    |       |                |       | Open            | Encl. | Open          | Encl. |
| 100     | 70                                 | 150   | 20             | 100   | 13              | 93    | 15            | 95    |
| 225     | 205                                | 325   | 155            | 275   | 130             | 250   | 120           | 240   |
| 400     | 235                                | 450   | 185            | 400   | 160             | 475   | 150           | 465   |
| 600     | 255                                | 475   | 205            | 420   | 180             | 395   | 170           | 385   |
| 800     | 300                                | 550   | 250            | 500   | 225             | 475   | 215           | 465   |
| 1000    | 350                                | 600   | 300            | 550   | 250             | 500   | 225           | 500   |
| 1200    | 650                                | 1350  | 600            | 1300  | 625             | 1200  | 615           | 1200  |
| 2000    | 700                                | 1400  | 650            | 1350  | 650             | 1350  | 650           | 1250  |
| 2500    | 800                                | 1550  | 750            | 1500  | 750             | 1500  | 750           | 1500  |
| 3000    | 900                                | 1700  | 850            | 1650  | 850             | 1650  | 850           | 1650  |

# Wiring Terminal Data

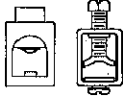

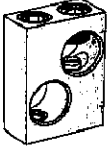
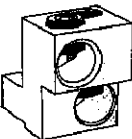
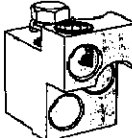
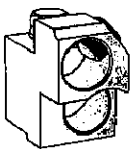
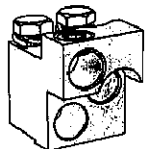
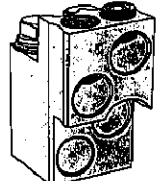
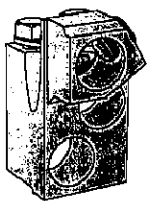
Terminals listed as "standard" are included with the switches listed on pages 7, 8, 9. Optional terminals are available, but must be specified.

## Optional Terminals

| Switch Rating, Amps | Option     | Copper Terminal   | Used With Breaker                        | Catalog No. | Wire Range  | No. of Cables | Type of Conductor |  |  |  |  |
|---------------------|------------|---|--|-------------|-------------|---------------|-------------------|--|--|--|--|
| 225                 | Option 21A |    | KA, HKA                                  | T225LA      | #6-350 MCM  | 1             | Cu                |  |  |  |  |
| 400                 | Option 21A |    | LA, HLA, LC, HLC, SPCB 600 (600 A Frame) | T600LA      | 250-500 MCM | 2             | Cu                |  |  |  |  |
| 600                 | Optional   |    | MA, HMA MC, HMC                          | T350MA      | #1-600 MCM  | 1             | Cu                |  |  |  |  |
| 600                 | Option 21A |   | MA, HMA MC, HMC                          | T600MA1     | 2/0-500 MCM | 2             | Cu                |  |  |  |  |
| 600                 | Optional   |  | MA, HMA MC, HMC                          | T800MA1     | 3/0-300 MCM | 3             | Cu                |  |  |  |  |
| 800<br>000          | Option 21A |  | NB, HNB, NC, HNC, SPCB 1200              | T1000NB1    | 3/0-500 MCM | 3             | Cu                |  |  |  |  |
| 200                 | Optional   |   |  |             |             | 3             |                   |  |  |  |  |
| 600                 |            |   |  |             |             | 6             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 6             |                   |  |  |  |  |
| 500                 |            |   |  |             |             | 9             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 9             |                   |  |  |  |  |
| 800<br>000          | Optional   |  | NB, HNB, NC, HNC SPCB 1200               | T1200NB1    | 3/0-400 MCM | 4             | Cu                |  |  |  |  |
| 200                 | Option 21A |   |  |             |             | 4             |                   |  |  |  |  |
| 600                 |            |   |  |             |             | 4             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 8             |                   |  |  |  |  |
| 500                 |            |   |  |             |             | 8             |                   |  |  |  |  |
| 000                 |            |   |  |             |             | 12            |                   |  |  |  |  |
|                     |            |   |  |             |             | 12            |                   |  |  |  |  |



### Standard Terminals

| Switch Rating, Amps                                 | Option               | Aluminum Terminal   | Used With Breaker                                | Catalog No. | Wire Range                     | No. of Cables                     | Type of Conductor |
|---|----------------------|---|--|-------------|--------------------------------|-----------------------------------|-------------------|
| 100   | Standard             |    | FB   |             | #6-1/0                         | 1                                 | Cu/Al             |
| 225   | Standard             |    | KA, HKA  | TA225LA1    | #6-350 MCM<br>or<br>#4-350 MCM | 1<br>1                            | Cu/Al             |
| 400   | Standard             |    | LA, HLA<br>LC, HLC<br>SPCB 600<br>(600 A. Frame) | TA600LA     | 250-500 MCM                    | 2                                 | Cu/Al             |
| 600   | Standard             |   | MA, HMA<br>MC, HMC                               | TA700MA1    | #1-500 MCM                     | 2                                 | Cu/Al             |
| 600   | Optional             |  | MA, HMA<br>MC, HMC                               | TA800MA2    | 3/0-400 MCM                    | 3                                 | Cu/Al             |
| 600   | Optional             |  | MA, HMA<br>MC, HMC                               | TA801MA     | 500-750 MCM                    | 2                                 | Cu/Al             |
| 800<br>1000<br>1200<br>1600<br>2000<br>2500<br>3000 | Standard<br>Optional |  | NB, HNB<br>NC, HNC<br>SPCB 1200                  | TA1000NB1   | 3/0-400 MCM                    | 3<br>3<br>3<br>6<br>6<br>9<br>9   | Cu/Al             |
| 800<br>1000<br>1200<br>1600<br>2000<br>2500<br>3000 | Optional<br>Standard |  | NB, HNB<br>NC, HNC<br>SPCB 1200                  | TA1200NB1   | 4/0-500 MCM                    | 4<br>4<br>4<br>8<br>8<br>12<br>12 | Cu/Al             |
| 800<br>1000<br>1200<br>1600<br>2000<br>2500<br>3000 | Optional             |  | NB, HNB<br>NC, HNC<br>SPCB 1200                  | TA1201NB1   | 500-750 MCM                    | 3<br>3<br>3<br>6<br>6<br>9<br>9   | Cu/Al             |

### Further Information

Prices: Price List 29-920

Prices: Price List 29-921

Description: DB 29-901

Dimensions: DS 29-970



Printed in USA