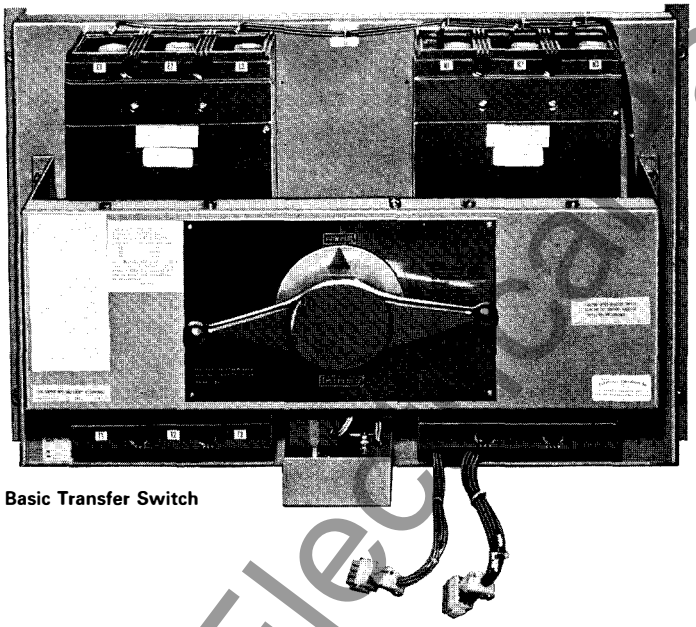
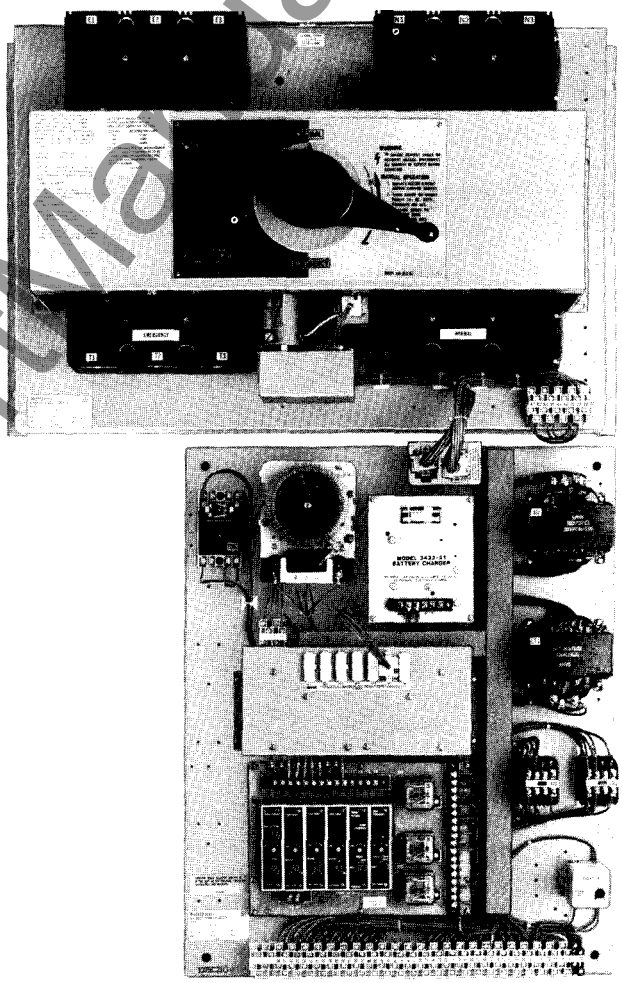
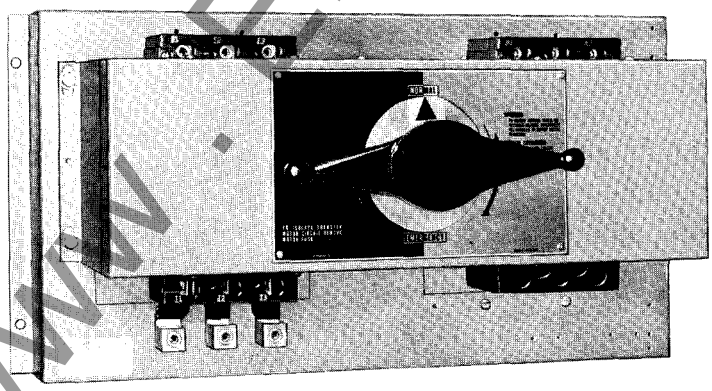
Transfer Switches 100 through 1000 Amperes



Basic Transfer Switch



Automatic Transfer Switch



Manual Transfer Switch – Single Handle

Transfer Switches
100-1000 Amperes

Basic Transfer Switches

Switches are UL, Inc. component recognized per UL Standard 1008. The basic transfer switch consists of a power transfer mechanism similar to the one supplied with automatic transfer switches. No intelligence panel is included. This switch is designed for use with customer furnished controls.

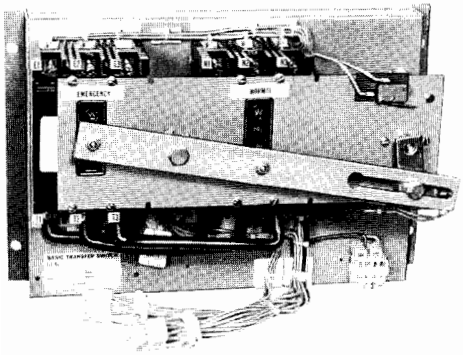


Fig. 4: 100 Amperes

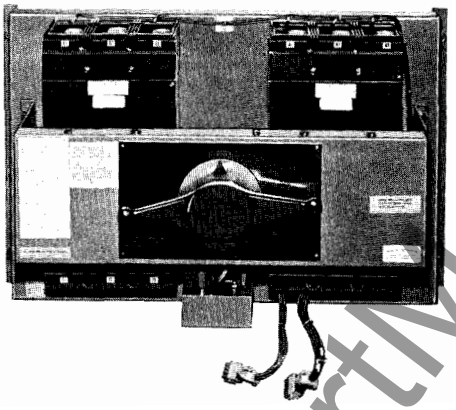


Fig. 5: 150-1000 Amperes

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

Basic transfer switches include:
- Two high instantaneous trip only circuit breakers
- Connections: Refer to Option 20, page 9. (Front connections standard)
  See table on page 20 for terminal sizes.
- Positive mechanical interlocking by means of a walking beam interlock.
- Common load bus.
- Auxiliary contacts, normal source, (2A/2B).
- Auxiliary contacts, emergency source, (2A/2B).
- Manual Operating Handle
- Position Indicator

Options
Refer to pages 7-10 for available control options. Terminal blocks instead of cable connectors can be furnished if specified on the order.

Ordering Information
Refer to page 6.

Manual Transfer Switches

Switches are UL, Inc. listed.

Westinghouse manually operated transfer switches are available with a single operating handle, type MTSS, or type MTSD, which is dual handle operated. Above 100 amp, 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. Manually initiated, electrically operated manual transfer switches are available for special applications. Contact Westinghouse for details.

Standard Voltages©
Application: 600 volts Ac Maximum
Options: Must be used on 120 volt Ac, 50/60 Hz only control circuit. Control transformers furnished by request only and subject to applicable upcharges.

Manual Transfer Switches include:
- Two high instantaneous trip only circuit breakers
- Connections: Refer to Option 20, page 9. See table on page 21 for terminal sizes.
- Positive mechanical interlocking by means of a walking beam interlock.
- Common load bus.
- Auxiliary contacts, normal source, (2A/2B).
- Auxiliary contacts, emergency source, (2A/2B).

Options©
Electrically-operated manual transfer switches are available on a special order basis. Contact Westinghouse for information.

Refer to pages 7-11 for other available options.

Ordering Information
Refer to page 6.

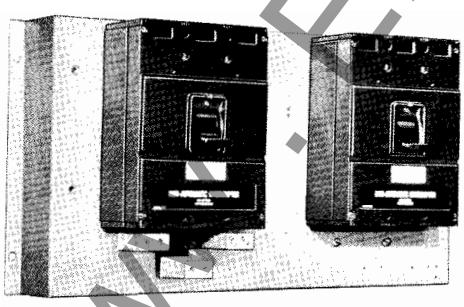


Fig. 6: Type MTSD, Dual Operating Handles① (100-1000A)

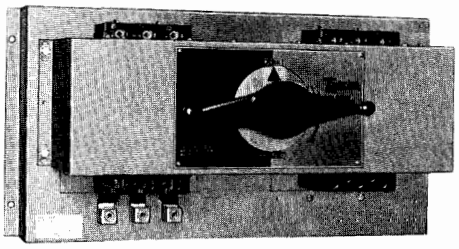


Fig. 7: Type MTSS, Single Operating Handle● (150-1000A)

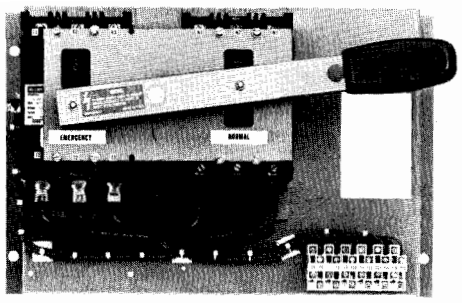


Fig. 8: Type MTSS, Single Operating Handle (100A)

① Wires are connected to terminal blocks (not shown).
© Changed or added since previous issue.

Transfer Switches
100-1000 Amperes

User Benefits of Westinghouse Transfer Switches

Accurate, Reliable Protection Each pole of every breaker is individually calibrated and tested in a controlled temperature to meet UL, Inc. Standard 489 requirements for molded case circuit breakers. Especially hardened, ground and polished trip latches assure continuous and accurate tripping characteristics.

Long Breaker Contact Life Quick-make, quick-break toggle mechanism, coupled with De-ion arc quenchers, assure long contact life with minimal burning and pitting of contact surfaces.

Reduced Downtime and Maintenance Costs Circuit breakers are long-lived devices designed for maintenance-free, repetitive duty without costly shutdowns. Easily maintained, all parts are front accessible.

Reduced Operation Cost Welded internal parts, high contact pressure, and silver alloy, butt-type contacts used in circuit breakers offer less resistance to electrical current than fuse clips, bolted joints and hinged joints of other devices. Thus lower watts loss means savings in the costs of electrical power.

Protection Against Single Phasing A fault or overload on any phase opens all poles of the breaker, eliminating the possibility of single-phasing polyphase motors. (Options 16 or 17 only.)

Maximum Personal Safety Molded case circuit breakers are dead front, operating personnel are not exposed to "live" parts. Load connecting bus is behind the panel on switches above 100 amperes.

Dual Protective Elements/Trip Units Magnetic trip elements operate the breaker instantly on dangerous fault currents. The breaker is trip-free, cannot be held closed under fault conditions. Withstand, closing and interrupting ratings are identical for simplified application. Overload protection can be provided by the addition of the thermal magnetic or solid state trip units to one or both of the circuit breakers.

Reduced Installation Cost Small size of switch requires less space in switchboards, or for its enclosure. In many cases, overload protection can be incorporated in the switch, eliminating additional cost of upstream protective devices.

Simplified Application The breaker trip enables the switch to have a withstand, close and interrupting rating equivalent to the breaker's interrupting rating for easy coordination with upstream protective devices.

Added Protection The breaker trip unit provides system back-up protection in the event of short circuits.

Simplified Stocking © Split panel construction facilitates stocking, since one intelligence panel is used on all switches.

Easily Modified and Serviced Removal of the inter-connection control plug completely isolates the intelligence panel for simple servicing or modifications. Many options can be added in the field with the retention of the UL label.

Solid state cards plug in to facilitate changing of timing, voltage and frequency characteristics.

External pilot devices are wired to terminal blocks on the lower portion of the intelligence panel.

Automatic transfer switches can be applied on various system voltages up to the maximum rating of the switch. Control voltage changes are easily made by unplugging the control power plug and re-inserting it into the receptacle for the desired voltage.

Most adjustments, when provided, are tamperproof and can be locked. Options 2, 30, 32 and 35 are exceptions. These are non-lockable, adjustable solid state timers.

Reduced Inventory Only one plug-in timing card for a given time delay range is necessary. It can be used interchangeably in all timing card positions (Options 1, 3, 4).

Only one plug-in voltage sensing card is necessary for a given type of monitoring. It can be used interchangeably in all voltage sensing card positions, either normal or emergency (Options 5 and 26).

Only one frequency sensing card is required for a given type of frequency monitoring, either 50 or 60 Hertz. It can be used either in emergency or normal sources in any voltage/frequency sensing plug-in position.

Non-Ventilated NEMA 1 Enclosures utilize heavy duty steel construction minimizing possibilities of distortion. All enclosures comply with most recent NEC requirements for cable bending space. Construction facilitates ease of customer installation. Cable entry can be made top, bottom, or side. All enclosures are supplied with keylock handles as standard to prevent tampering by unauthorized personnel.

© Changed or added since previous issue.

Transfer Switches
100-1000 Amperes

Transfer Switch Catalog Number Explanation

For Use Only in Explaining Catalog Numbers
Do Not Build a Catalog Number

Type Switch	Construction	No. of Switched Poles	Ampere Rating	Voltage	Enclosure
A TS	**B**	**M** **3**	**0225** ① ©	–	**K**
Transfer Switch	B – Circuit Breaker	2 – 2 Pole 3 – 3 Pole 4 – 4 Pole	0100 – 100 Amp 0150 – 150 Amp 0225 – 225 Amp 0400 – 400 Amp 0600 – 600 Amp 0800 – 800 Amp 1000 – 1000 Amp	A – 120/60 B – 208/60 W – 240/60 X – 480/60 E – 600/60 G – 220/50/60 M – 230/50 Z – 365/50 H – 380/50 N – 401/50 O – 415/50 K – 600/50	K – Open S – Nema 1 J – Nema 12 R – Nema 3R
A – Automatic B – Basic M – Manual	D – Dual (2) Operating Handles S – Single (1) Operating Handle	M – Mechanically Held			

Ordering Information

1. Order by description and catalog number.
   A. 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.

2. Specify:
   A. System voltage and frequency.
   B. Number of phases and wires.
   C. Current.

3. Select switch catalog number from listings at right. For automatic transfer switches, 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.

4. Select desired options and order by option number.

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

6. List Prices: Refer to Price List 29-920.

Switch Catalog Numbers, Open Switches ©

Ampere Rating	Switch Catalog Number 2 Poles	3 Poles	4 Poles
Mechanically Held, Automatic Transfer Switch			
100	ATSBM20100-K	ATSBM30100-K	ATSBM40100-K
150	ATSBM20150-K	ATSBM30150-K	ATSBM40150-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
Mechanically Held, Basic Transfer Switch			
100	BTSBM20100-K	BTSBM30100-K	BTSBM40100-K
150	BTSBM20150-K	BTSBM30150-K	BTSBM40150-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
Mechanically Held, Single Operating Handle Manual Transfer Switch			
100	MTSSM20100EK	MTSSM30100EK	MTSSM40100EK
150	MTSSM20150EK	MTSSM30150EK	MTSSM40150EK
225	MTSSM20225EK	MTSSM30225EK	MTSSM40225EK
400	MTSSM20400EK	MTSSM30400EK	MTSSM40400EK
600	MTSSM20600EK	MTSSM30600EK	MTSSM40600EK
800	MTSSM20800EK	MTSSM30800EK	MTSSM40800EK
1000	MTSSM21000EK	MTSSM31000EK	MTSSM41000EK
Mechanically Held, Dual (Two) Operating Handles Manual Transfer Switch			
100	MTSDM20100EK	MTSDM30100EK	MTSDM40100EK
150	MTSDM20150EK	MTSDM30150EK	MTSDM40150EK
225	MTSDM20225EK	MTSDM30225EK	MTSDM40225EK
400	MTSDM20400EK	MTSDM30400EK	MTSDM40400EK
600	MTSDM20600EK	MTSDM30600EK	MTSDM40600EK
800	MTSDM20800EK	MTSDM30800EK	MTSDM40800EK
1000	MTSDM21000EK	MTSDM31000EK	MTSDM41000EK

① See Technical Data 29-927 for Transfer Switches, 1200-4000 amps.

© Changed or added since previous issue.

Transfer Switches
100-1000 Amperes

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

Type Switch Used On	Description
	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.
Auto	①**1. Time Delay Normal to Emergency (TDNE)** Delays the transfer from normal to over-ride momentary power outages/voltage fluctuations. Timing begins when emergency source voltage appears. Does not affect initiation of engine start circuit. A. Adjustable 1 – 60 seconds B. Adjustable 0.1 – 10 minutes C. Adjustable 0.2 – 30 minutes
Auto	①**2. Time Delay on Engine Starting (TDES)**Ⓒ 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 voltage fluctuations. B. Adjustable .5 – 15 secondsⒸ C. Adjustable 4 – 120 secondsⒸ
Auto	①**3. Time Delay Emergency to Normal (TDEN)** 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, over-riding the time delay. A. Adjustable 1 – 60 seconds B. Adjustable 0.1 – 10 minutes C. Adjustable 0.2 – 30 minutes
Auto	①**4. Time Delay for Engine Cooloff (TDEC)** Permits the generator to run under a no-load condition after transfer to normal has been made. Timing begins when transfer is made. A. Adjustable 1 – 60 seconds B. Adjustable 0.1 – 10 minutes C. Adjustable 0.2 – 30 minutes D. Fixed, non-adjustable, five (5) minutes
Auto	①**5. Frequency/Voltage Relay for Emergency Source**Ⓒ Relay 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. Frequency monitoring relay is connected to one phase only of the emergency source, constantly monitoring that phase. Voltage sensing relay available for monitoring one phase only of the emergency source (5D and E) or all three phases (5F and G). (A maximum of three Emergency Source sensing options may be chosen at the same time.) A. Under frequency, adjustable 45 – 60 Hz (Drops out 2 Hz lower than setting). B. Under frequency/Under voltage, combines both functions in a single relay. Frequency adjustable 45 – 60 Hz (Drops out 2 Hz lower than setting). Voltage fixed non-adjustable set at 90% pickup, 70% drop-out, single phase sensing only. C. Over frequency, adjustable 50 – 65 Hz (Drops out 2 Hz above setting) D. Under voltage adjustable (nominally set at 90% pickup, 70% dropout), single phase sensing only. E. Over voltage, adjustable (nominally set at 115% drop-out, pick-up below 105%), single phase sensing only. F. Under voltage adjustable (nominally set at 90% pick-up, 70% drop-out) 3 phase sensing only G. Over voltage, adjustable (nominally set at 115% drop-out, pick-up below 105%), 3 phase sensing only.
Auto	①**6. Test Pushbutton (TPB)** 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. When selected, the standard maintain contact test selector switch is omitted. A. For separate mounting. B. In cover of enclosed switch.
Auto	①**7. Four-Position Selector Switch (FPSS)** Permits four modes of switch operation: "TEST", "AUTO", "OFF", "ENGINE 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. 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. C. For separate mounting. When selected, the standard test selector switch is omitted. D. In cover of enclosed switch. When selected, the standard test selector switch is omitted.
Auto	①**8. Bypass Pushbutton** 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. A. Bypass TDEN (PBEN) for separate mounting B. Bypass TDNE (PBNE) for separate mounting C. Bypass TDEN (PBEN) in cover of enclosed switch D. Bypass TDNE (PBNE) in cover of enclosed switch

Ⓒ Changed or added since previous issue.
① Not available on Manual or Basic switches.

Transfer Switches
100-1000 Amperes

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

Type Switch Used On	Description
Auto	①**9. Selector Switch, Maintenance (SSM)** "A and B" disconnects power to the transfer motor. Marked "On/Off". Manual disconnection is standard. Disconnection of motor plug connector 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. A. For separate mounting (2 Position Selector Switch) B. In cover of enclosed switch (2 Position Selector Switch)
Auto	①**10. Preferred Source Selector (PSS)** For use when normal and emergency sources 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. A. For separate mounting B. In cover of enclosed switch For use when normal and emergency source are engine generators. Two engine start contacts are provided. Marked Source 1/Source 2. C. For separate mounting D. In cover of enclosed switch.
Auto	**11. Circuit Breaker Reset** This option provides means of resetting thermal magnetic breakers (options 16A, D, E, F, 17A and B) when used in the transfer switch A. Manual (Standard when Options 16A, D, E, F, 17A and B selected) ①B. Normal Breaker Reset PB for separate mounting. ①C. Emergency Breaker Reset PB for separate mounting. ①D. Normal Breaker Reset PB in cover of enclosed switch ①E. Emergency Breaker Reset PB in cover of enclosed switch ①F. Circuit Breaker Lock-out: Prevents transfer if breaker trips (available only on standard high instantaneous trip breakers. Lock-out of thermal magnetic breakers standard)
Auto	②**12. Pilot Lights** Pilot lights can be furnished to indicate (1) switch position; (2) source condition; and, (3) tripped condition. **Switch Position:** Utilizes a 1A breaker auxiliary contact. A. Normal supply (green) for separate mounting marked Normal. B. Emergency supply (red) for separate mounting marked Emergency.
	C. Normal supply (green) in cover of enclosed switch marked Normal. D. Emergency supply (red) in cover of enclosed switch marked Emergency. **Source Condition:** Indicates whether or not source voltage is present. E. Normal supply (white) for separate mounting marked Normal Source. F. Emergency supply (white) for separate mounting marked Emergency Source. G. Normal supply (white) in cover of enclosed switch marked Normal Source. H. Emergency supply (white) in cover of enclosed switch marked Emergency Source. **Tripped Condition:** Available only with thermal-magnetic breakers, Option 16 and 17 (not available on 100 amp units) J. Normal supply (amber) for separate mounting marked Normal Tripped. K. Emergency supply (amber) for separate mounting marked Emergency Tripped. L. Normal supply (amber) in cover of enclosed switch marked Normal Tripped. M. Emergency supply (amber) in cover of enclosed switch marked Emergency Tripped.
Auto	②**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 Contacts
Auto Basic Manual	**16. Optional overcurrent protective device 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	X	10, 15, 25, 30, 40, 50, 60, 70, 90, 100
150	X	X	X	70, 90, 100, 125, 150
225	X	X	X	70, 90, 100, 125, 150, 175, 200, 225
400	X	X	X	250, 300, 350, 400
600	X	X	..	150, 175, 200, 225, 250, 300, 350, 400, 500, 600
600	..	..	X	600
800	X	X	X	600, 700, 800
1000	X	X	X	600, 700, 800, 900, 1000

Ⓒ Changed or added since previous issue.
① Not available on Manual or Basic switches.
② Available on Manual switches with special negotiation.

Transfer Switches
100-1000 Amperes

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

Type Switch Used On	Description
	B. Molded Case Switch, both sources D. SELTRONIC™ Circuit Breaker for both sources – Refer to Westinghouse. E. Thermal Magnetic Breaker, emergency source only. F. Thermal Magnetic Breaker, normal source only G. Molded Case Switch, emergency source only H. Molded Case Switch, normal source only I. SELTRONIC™ Circuit Breaker, emergency source only P. SELTRONIC™ Circuit Breaker, normal source only
Auto Basic Manual	①**17. MARK 75® Circuit Breakers** In place of standard high instantaneous trip breakers (Includes Option 11F) ①A. Thermal-Magnetic Mark 75®

Switch Rating Amps	Availability 2 Pole	3 Pole	4 Pole	Trip Ratings
100	X	X	..	Same as
150	X	X	..	Option
225	X	X	..	16A
400	X	X	..	
600	X	X	..	
800	X	X	..	
1000	X	X	..	

①B. SELTRONIC MARK 75 Circuit Breakers for both sources. Refer to Westinghouse.

Auto Basic Manual — **18. Special Enclosures**

A. Types●

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

Refer to Westinghouse for knockouts, hubs or oversize enclosures. Key lock on enclosure doors standard on all enclosures.

C. Three point vault-type door hardware, NEMA 12 enclosure only

①②④D. Provides enclosure UL Inc. listed as "Suitable for use as service equipment", available only on automatic switches 400 amps and above. Utilizes two individually motor operated circuit breakers providing manual operations without opening enclosure door (NEMA 1 only). Selection of this option requires overcurrent protection (Options 16A, 17A or B) for UL listing. Ground fault protection optionally available.

Type Switch Used On	Description
	②③E. Voltmeter mounted in cover (includes potential transformers and selector switch). ②③F. Ammeter mounted in cover (includes current transformers and selector switch). ②③G. Frequency Meter ②③H. Running Time Meter
Auto Basic Manual	①**19. Solid Neutral Bar Assembly.** Standard on automatic switches, optional on basic 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.

Switch Ampere Rating●

A. 100
B. 150, 225
C. 400
D. 600
E. 800
F. 1000

Auto Basic Manual — **20. Non-Standard Connections●**

Solderless lugs are furnished on all front connected units.

A. Rear Connections:
150-1000 amperes – optional on open units only (bus connections only)

Auto Basic Manual — **21. Non-Standard Terminals●**

A. Refer to wire terminal data, page 21 and specify terminal desired.

Auto — ①②④**22. Narrow Unit (3 pole breaker switches only)**

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.

A. Front connected, line and load.
B. Front cable-connected line, rear bus-connected load

Auto — ②⑤**23. Plant Exerciser (PE)●**

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 circuitry panel. Contact Westinghouse if 14 day exerciser required.

C. Without interrupting normal supply.
D. By simulation of power failure.
D10. Similar to option 23D except with failsafe feature. This feature provides an immediate transfer to the normal source if emergency source fails during exercising period.
G. Plant Exerciser with Selector Switch for choosing 23C or 23D or for bypassing exerciser.
G10. Similar to option 23G except with failsafe feature during simulation of power failure.

● Changed or added since previous issue.
① Not available in 4 pole switch.
② Not available on Manual or Basic switches.
③ Refer to Westinghouse if NEMA 3R enclosure is required with this option.
④ See page 18 for photo.
⑤ Supplied unmounted if Option 22 supplied.

Transfer Switches
100-1000 Amperes

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

Type Switch Used On	Description
Auto	①⑤**24. Battery Charger (BC)**Ⓒ The trickle charge Dc output is 12 or 24 volts. Units are panel mounted. Fixed high-low charge rate. An Ammeter read-out is standard C. 12 Volt D. 24 Volt
Auto	①④**26. Type of Protection (Normal Source)**Ⓒ Complete protection is standard. A voltage sensing relay monitors each phase of the normal power supply. Normally set at 70% dropout and 90% pickup. C. Overvoltage sensing relay – adjustable, nominally set at 115% dropout, pickup below 105%. 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. 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. 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	①**27. Non-Standard Voltages and Frequencies** A. Non-Standard Ac voltages and frequencies. 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 makes switches suitable for use on any intermediate voltage. Specify system voltage on order.
Auto	①**28. Intelligence Circuit Fuses** A. Provides fuses on all non-essential control circuitry
Auto	①**29. Type of Operation**Ⓒ 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.
	②B. 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. C. Pushbutton Return to Normal (Pushbutton for separate mounting). Automatic operation normal to emergency, pushbutton operation emergency to normal. This feature provides an immediate transfer to the Normal Source upon failure of the Emergency Source. ②D. Same as Option 29B, except pushbuttons in cover of enclosed switch. E. Same as Option 29C except pushbutton in cover of enclosed switch. ②F. 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. ②G. Same as option 29F except pushbuttons and selector switch mounted in cover of enclosed switch. H. Automatic/Pushbutton operation return to normal. Two position selector (marked Auto/Manual) permits selection of automatic or pushbutton operation emergency to normal, automatic normal to emergency. Includes option 29C which only operates to return to normal when the switch is in the manual mode. For separate mounting. J. Same as option 29H except pushbutton and selector switch mounted in cover of enclosed switch.
Auto	①③**30. Cranking Limiter**Ⓒ A. Adjustable 0-120 seconds. Interrupts engine start circuit if voltage does not appear within preselected time.
Auto	①**31. Audible alarm with silencing switch** Sounds alarm when switch is in the emergency position and emergency voltage is present. A. For separate mounting. B. Enclosure mounted. Sounds alarm when either breaker trips. Available only with options 16 and 17. C. Normal and emergency source for separate mounting D. Normal and emergency source, for enclosure mounting E. Normal source only, for separate mounting F. Normal source only, for enclosure mounting G. Emergency source only, for separate mounting H. Emergency source only, for enclosure mounting

Ⓒ Changed or added since previous issue.
① Not available on Manual or Basic switches.
② Not UL listed.
③ Timing ranges are recommended ranges only. Actual time settings can be adjusted from 0 seconds to 10 hours. All timers are factory set at 0 seconds.
④ A maximum of two Normal Source sensing Options from Options 26C, 26E, and 26F may be chosen at the same time.
⑤ Supplied unmounted if Option 22 is supplied.

Transfer Switches
100-1000 Amperes

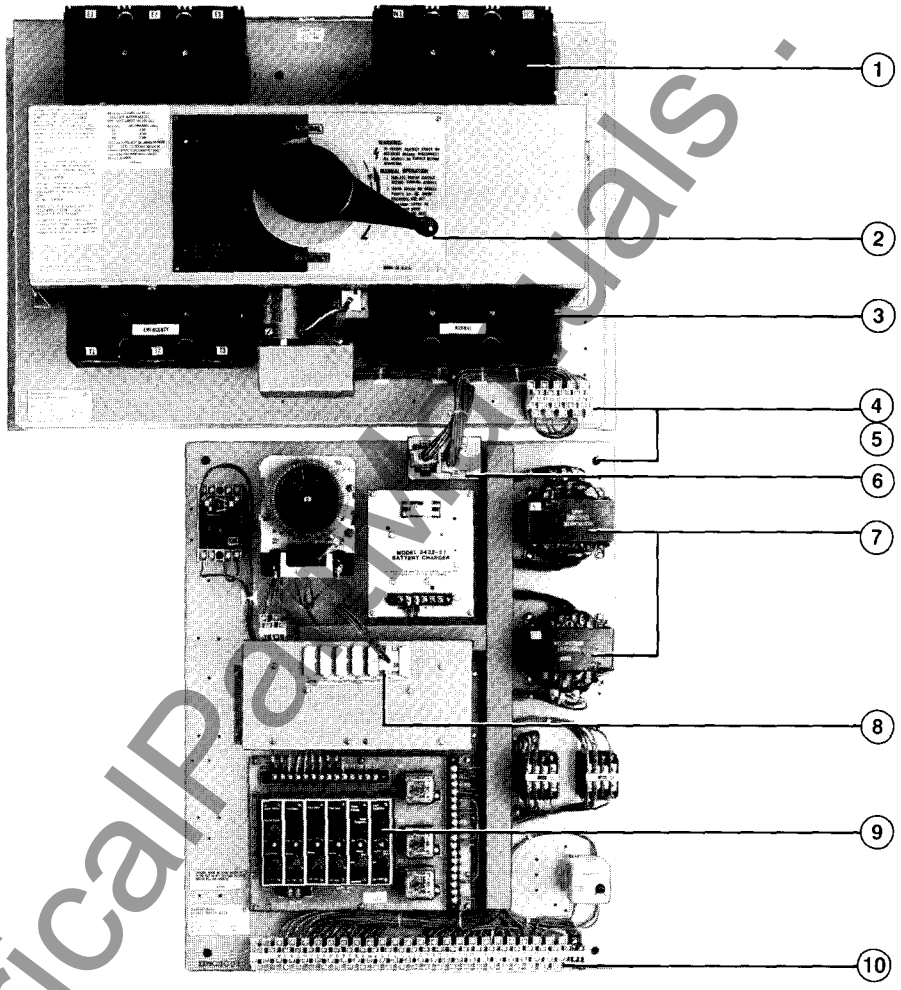
Options, List Price Additions, Continued
For List Prices, refer to Price List 29-920

Type Switch Used On	Description
Auto	①②**32. Time Delay Neutral**Ⓒ 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 inductive loads. Utilizes one normally open breaker contact. A. Adjustable 0-120 secondsⒸ
Auto Basic Manual	**33. Shunt Trip** Wired to terminal blocks for customer connection. Specify coil voltage desired. (120VAC standard) If shunt trip is required with standard magnetic only breakers, options 11F must also be supplied. A. Supplied in normal breaker B. Supplied in emergency breaker
Auto	①**34. Extender Cable** Permits remote mounting of intelligence circuitry to accommodate limited space applications. A. 48 inches B. 72 inches C. 96 inches D. 120 inches E. 144 inches (Special lengths available. Contact Westinghouse).
Auto	②**35. Pre-transfer Signal Device**Ⓒ Contacts open/close on a timed basis (adjustable 0-120 seconds) to allow the load to be de-energized prior to transfer in either direction. (Typically used in conjunction with elevator controls. A. Form C Contacts (2NO, 2NC) B. Isolated Contacts (2NO, 2NC)

Ⓒ Changed or added since previous issue.
① Not available on Manual or Basic Switches.
② Timing ranges are recommended ranges only. Actual time settings can be adjusted from 0 seconds to 10 hours. All timers are factory set at 0 seconds.

Transfer Switches
100-1000 Amperes

Design Features
Standard Catalog Numbered Switches



① **Molded Case AB De-Ion® Circuit Breakers** function as main contacts to transfer the load from normal to emergency and back. They assure dependable, reliable operation under all conditions. Continuous duty rated for all classes of loads, open or enclosed, they have high dielectric strength, heavy duty switching and withstand capabilities and high interrupting capacity.

The breakers incorporate a positive quick-make, quick-break toggle mechanism, Westinghouse-developed De-Ion® arc quenchers, and main contact arcing horns for long life and reduced contact surface pitting and burning. Current-carrying members between line and load bus utilize all-brazed construction.

② **Manual Operating Handle** is electrically "dead". Transfer switch position indicator is visible from the front and shows to which source the switch is connected. Operating handle is mechanically and electrically interlocked with no electric OFF or neutral position. A manual-only neutral position is provided for load circuit maintenance. Available only if disconnect link or plug connector is removed. Handle "free wheels"; if switch operates while it is being held, there is no discomfort to the individual.

③ **Single, Unidirection Gear Motor/Train Transfer Mechanism,** mechanically held and electrically interlocked to prevent an electrical neutral/OFF position, and to prevent both sources being connected to the load simultaneously. No clutch or friction drive.

④ **Rugged/Rigid Steel Base Plate.**

⑤ **Split Panel Construction:** Switching panel (top) and intelligence circuitry panel are separate. Breaker load side bus is behind panel on switches above 100 amperes.

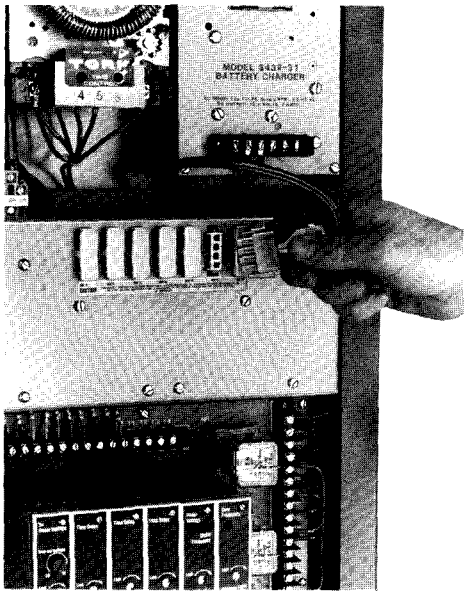
⑥ **Interconnection** between switching panel and intelligence panel is made by a control plug connector. Removal of plug completely isolates the intelligence panel.

⑦ **Control Transformers** reduce line voltage to 120 volts Ac or less for intelligence circuit. All are factory wired for specified voltage. All three and four pole automatic transfer switches have multi-tap primaries making them suitable for use with 208, 220, 240, 380, 415, 480, and 600 volts, 50/60 Hz. Two pole switches have single tap transformers for the system voltage.

⑧ **To Change Line Voltage** on three and four pole switches, remove plug and insert in the correct voltage socket.

⑨ **Adjustable Voltage Sensing** on all phases of the normal source. Emergency source monitoring (adjustable) on one phase or all phases. (Option 5).

⑩ **Terminal Blocks** easily accessible for speedy connection to external circuits. All customer wiring done at the bottom of the intelligence panel.



Line Voltage Plug and Receptacle

Transfer Switches
100-1000 Amperes

Additional Design Features — Circuit Breaker Switches

Factory Wired Field installation requires only the connection of power supply leads and leads from externally mounted pilot devices if furnished to the terminal blocks provided. All wiring terminals are numbered.

Components Front Mounted and Wired Few moving parts assure greater dependability and long life.

Field-Adjustable, Tamperproof Adjustments as opposed to fixed type, permit easy calibration should the setting requirement change. Adjustment can be done during service with no downtime.

Standard Breaker Accessories and modifications can be added.

Low Voltage Operation Transfer motor will transfer at lower line voltages than other methods.

The Switch will always seek a normal source when available; however, as long as power is available from any source, the switch will seek that source.

Rating is Continuous, either open or enclosed, for all classes of loads. If thermal magnetic trip units are used, the ampere rating is determined by the trip unit rating.

Low Transfer Current Drain The mechanically held transfer motor is energized only during transfer.

Circuit Provides Override of Time Delay Emergency to Normal relay in the event of emergency power source failure and normal source return. Switch will immediately transfer to normal without waiting for the time delay.

Quiet Operation Only the low-noise normal relay and voltage sensing relays are energized during normal operation.

Straight Through Wiring

Completely Self Contained No separate power source, battery or otherwise, required for operation.

The Common Load Connection of the breakers is located behind the panel. Load interconnections on 100 amp switches are accomplished by front cable connection.

Engine Start Contact Closes on normal source failure (Not illustrated).

Transfer Mechanisms

The function of the transfer mechanism is to provide an electrical means to transfer the switches' main contacts to the position indicated by the intelligence circuit. It also provides electrical and mechanical interlocks necessary for proper operation of the switch.

Transfer mechanisms utilize a motor-driven mechanism to toggle the circuit breaker handles, providing main contact closing and opening forces.

The transfer mechanism provides a positive mechanical interlock to prevent both breakers from being closed at the same time. It is designed to leave the breakers trip-free in the closed position, permitting overcurrent power protection to be incorporated in either or both breakers if required.

100 Ampere Switches
The transfer mechanism of the 100 ampere unit consists of a pivoting rocker-arm lever which operates the circuit breaker handles as the arm is moved by a rotating lever connected to the transfer motor. A slide pin engaging a pivot in the rotating lever converts rotary motion to linear motion.

150 – 1000 Ampere Switches
The transfer mechanism used in these units consists of a free-wheel, ratchet sprocket drive, a center drive gear, secondary spur gears and two cams which operate the breaker handles.

The conversion of rotary motion to linear motion is accomplished by a roller mounted eccentrically on each secondary gear, which drives its associated cam by riding in the cam's groove. The cams travel vertically on guide rods attached to a housing which enclose the entire mechanism.

A manual operating handle is supplied external to the mechanism housing. The free-wheel, ratchet sprocket drive permits disengagement of the gear train from the gear motor when the switch is being operated manually. During electrical operation of the transfer mechanism, the free-wheel feature enables the manual operation handle to remain stationary.

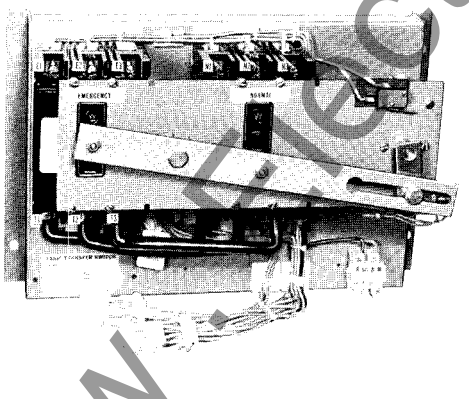


Fig. 9: Power Transfer Mechanism, 100 Ampere Switch

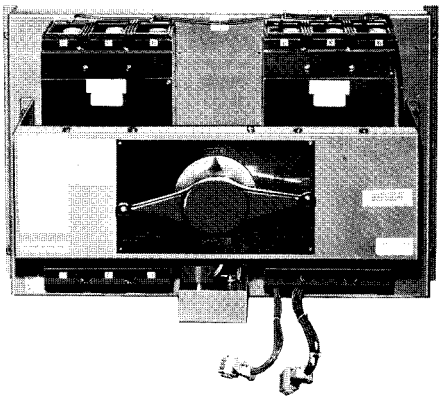


Fig. 10: Power Transfer Mechanism, 150-1000 Ampere Switches

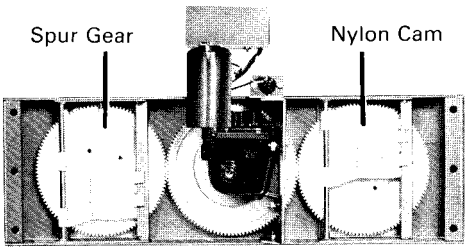


Fig. 11: Rear View, 150-1000 Ampere Switch Mechanism

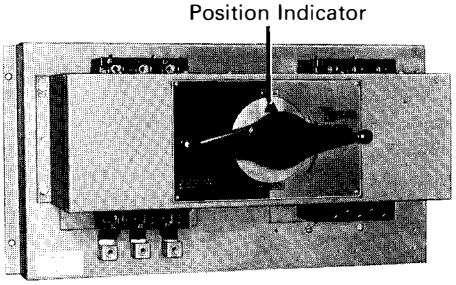


Fig. 12: Switch Position Indicator

Transfer Switches
100-1000 Amperes

Transfer Motors

100 Ampere Switches

This unit is a self-contained gearmotor and brake which utilizes a shaded pole motor. The brake is spring-set and is released by a magnetically operated armature only when the motor is energized.

150 – 1000 Ampere Switches

This unit is similar to that used in the 100 ampere switches, except that it uses a universal motor and gearbox. Brake pressure is spring-maintained and is released only when the motor is energized. The solenoid which operates the brake release is connected in parallel with the motor windings.

Motor Limit Switches

100 ampere transfer switches utilize limit switches mounted externally to the circuit breakers and operated by projections on the operating mechanism cam. Each switch is synchronized with its associated circuit breaker to open when its breaker closes.

150 ampere and larger transfer switches utilize auxiliary switches mounted in the circuit breakers and operated by the circuit breaker mechanism main contacts. Each switch opens when its associated breaker closes.

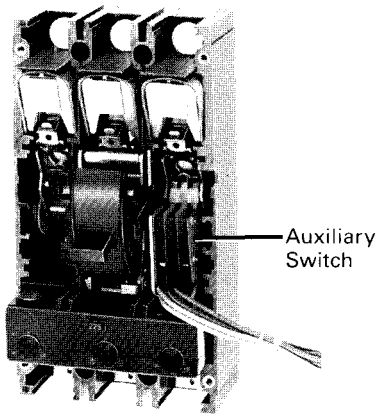


Fig. 13: Auxiliary Switch Mounted in Breaker

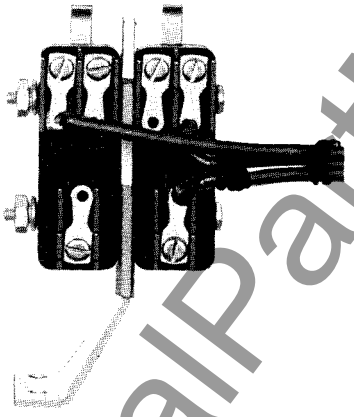


Fig. 14: Auxiliary Switch

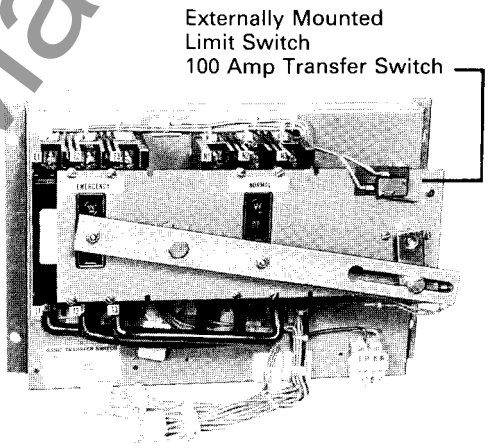


Fig. 15: Externally Mounted Limit Switch

Mechanical Interlocks

Westinghouse transfer switches utilize two separate and isolated mechanical interlocks to prevent both sources from being connected to the load circuit simultaneously. They are:

(1) Transfer mechanism which does not rely on clutches or friction drives. All parts, from normal breaker handle to emergency breaker handle, are in positive contact with all other parts through use of gear teeth, woodruff keys and slide pins.

(2) Walking beam interlock provides interlocking of both breakers so that only one may be closed, yet both may be open at any given time. This interlock mounts on panel at the rear of the breakers. When one breaker is closed, an insulated plunger extends into the opposite breaker to prevent it from closing. The closed breaker must open before the open breaker may be closed.

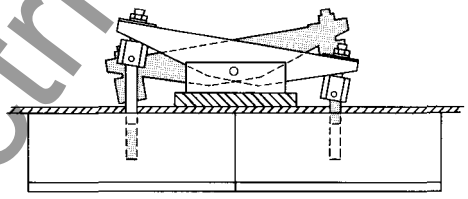


Fig. 16: Top View, Walking Beam Interlock Installed

Intelligence Circuitry

The intelligence circuit is mounted on the lower panel and is connected to the switching panel (upper panel) by means of cables from the upper panel terminating in keyed plugs, Fig. 17. Plugs are inserted in corresponding keyed sockets on the intelligence panel. An extender cable is available (option 34) to mount the intelligence panel a greater distance away from the switching panel than the standard cable allows.

All intelligence panels have two power transformers (one for normal, one for emergency source) and one logic transformer package (for monitoring both sources).

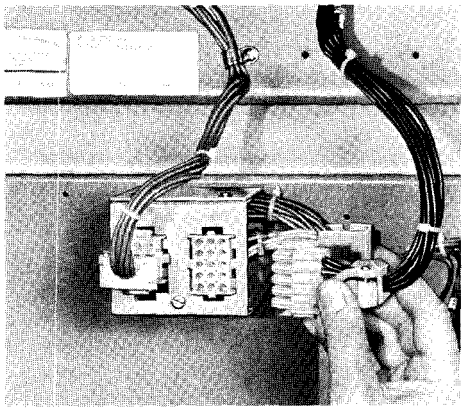
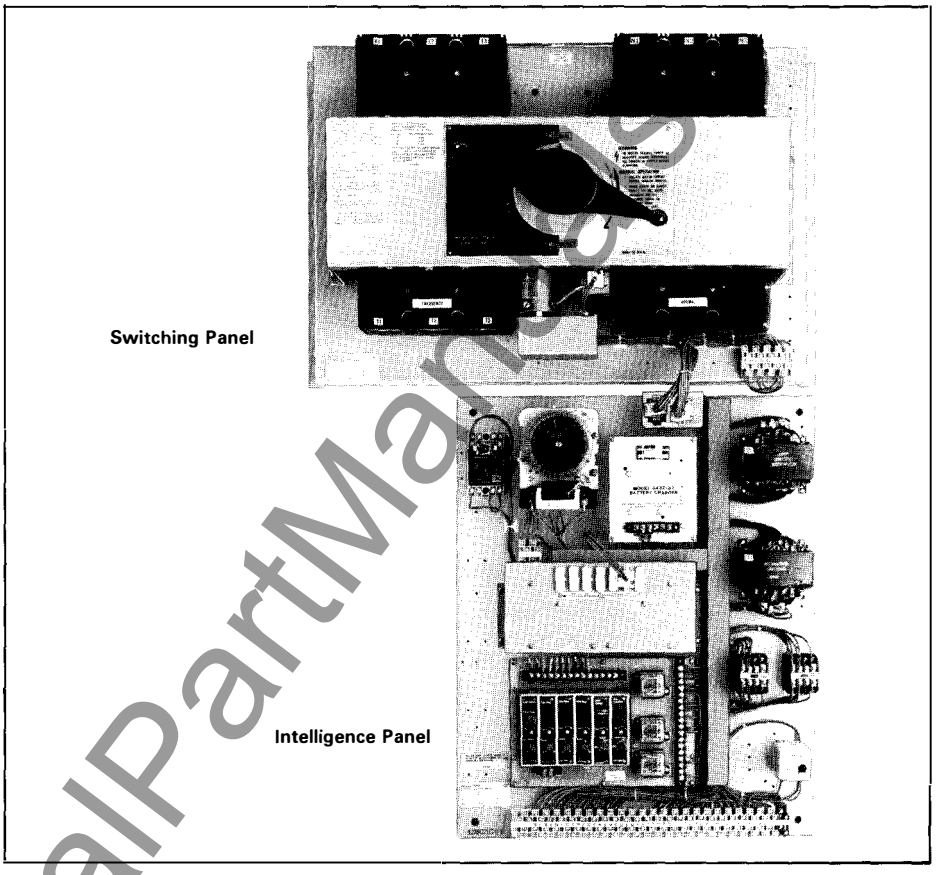


Fig. 17: Panel Interconnection Plugs



Transfer Switches
100-1000 Amperes

A solid state logic package capable of accommodating six or nine plug-in printed circuit cards (Fig. 18) is also mounted on the panel. The nine card version is used only when more than one normal source (option 26) and/or two emergency source (option 5) monitoring functions are required. The logic package also includes plug-in relays (Fig. 19) for output to the transfer controls.

Plug-in printed circuit cards (Fig. 20) are used for many of the optional sensing and timing functions (options 1,3,4,5, and 26). Each plug-in card has adjustment knobs that can be screwdriver or finger adjusted. In addition, each card has a captive, screwdriver lock that positively locks the adjustment setting by providing an even, uniform force that does not alter the setting when it is tightened. Voltage cards and frequency cards are interchangeable, as are timing cards; however, a timing card cannot be used in a voltage/frequency slot, or visa versa. They are key interlocked to prevent improper insertion. Each card is held in place by two screws. Empty card slots are covered by blank covers.

Each logic package is divided into sections for normal source and emergency source. Each source is further subdivided into sections for Voltage/Frequency and Timing. See Fig. 21. The standard catalog numbered switch without options has two driver cards (one in the normal and one in the emergency timing slot) which are required for operation. If timing options are selected, the drivers are omitted since either a driver or a timer is required on both the normal and emergency sources for operation.

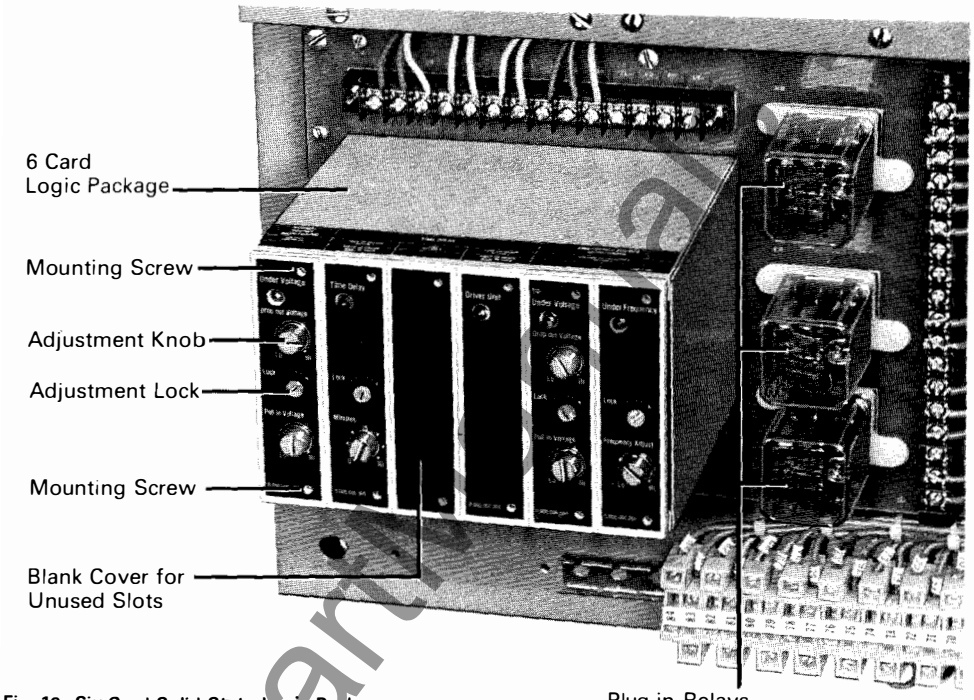


Fig. 18: Six Card Solid State Logic Package

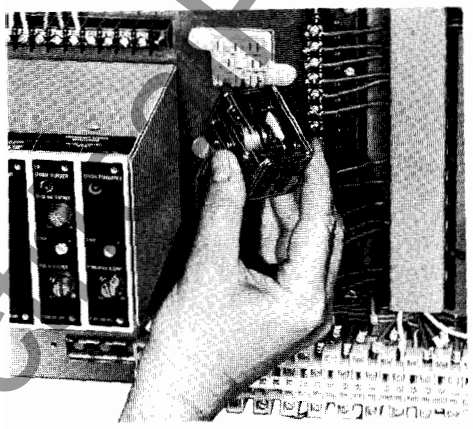


Fig. 19: Plug-in Relay

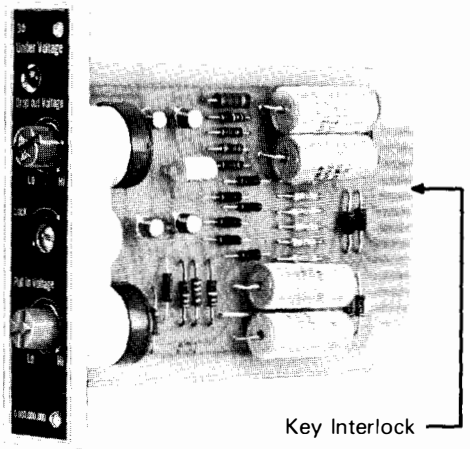


Fig. 20: Plug-in Card with Key Interlock

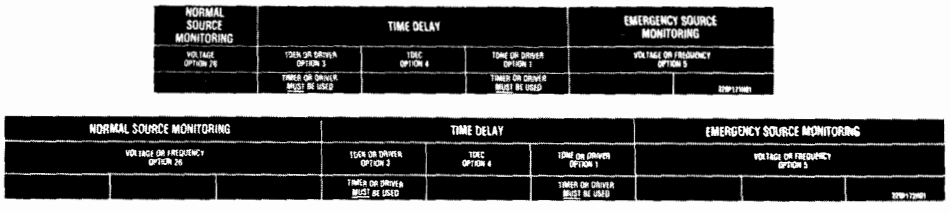
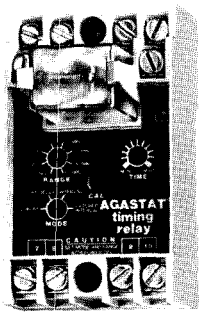


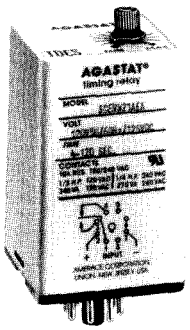
Fig. 21: Nameplates for 6 and 9 Card Solid State Logic Packages

Options Illustrated

Westinghouse transfer switches provide users with a wide range of options that permit switches to be customized to meet specific needs. Most can be field-installed without affecting the UL label.

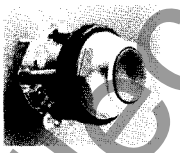
- Options 1, 3, 4, 5, 26C, E and F are performed by printed circuit cards. Three timing cards (1-60 seconds, 0.1-10 minutes, and 0.2-30 minutes) are used interchangeably in options 1, 3, 4 (option 4 also lists a fixed, five minute timing card; if it is desired, it can be used on options 1 or 3 also); cards for undervoltage, overvoltage, underfrequency and overfrequency are used interchangeably in options 5 and 26. Photo on page 15 shows typical cards. Use nameplate pictures to identify card types.
- Options 2, 30, 32 and 35 use state-of-the-art universal solid state timing relays rated for 10 ampere contacts. ©



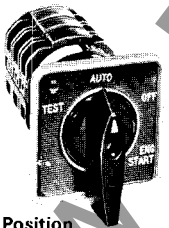


- Options 6, 7, 8, 9, 10, 11B – 11E, 12, 29 are performed by industrial-type pilot devices.

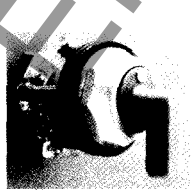
Indicating Light



Pushbutton

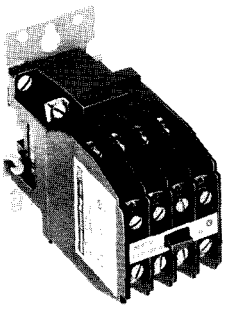


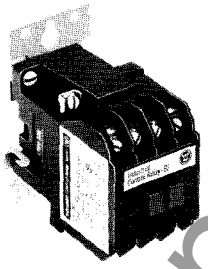
4 Position Selector Switch



2 Position Selector Switch

- Options 14C, D, and 26D use heavy duty relays featuring self-wiping, 10 ampere contacts.

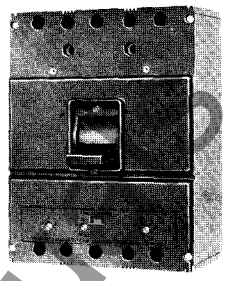




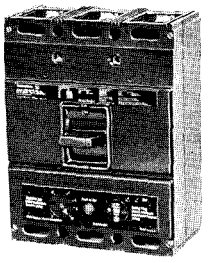
- Options 11F, 16A, D, E, F, I, J, 17A, B incorporate bell alarm contacts actuated only when the breaker trips, not when it is turn ON and OFF in normal operation.

The standard Westinghouse transfer switch utilizes a high instantaneous, magnetic only trip which gives the switch protection from short circuit current. This standard mag-only trip is set as high as possible to allow upstream protective devices to clear any faults prior to the tripping of the transfer switch breaker. Should any upstream device fail, the Westinghouse transfer switch will clear the fault thus protecting itself and downstream wiring from costly damage and downtime.

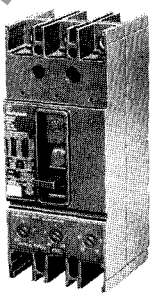
- Options 16 and 17 allow the selection of various combinations of Westinghouse breakers to be incorporated in the transfer switch in lieu of the standard mag-only breakers. Options 16A, D, E, F, I, P, and 17A, B incorporate thermal magnetic breakers in the switching panel thus adding overload protection to the transfer switch. In many applications, incorporating overload protection into the transfer switch eliminates the extra expense of a separately mounted overcurrent device and reduces the time and labor required in wiring such devices. These optional overcurrent devices are available with conventional thermal magnetic trips (16A, E, and F) or with solid state trip monitoring (16D, I, P, 17B). When specific applications require higher withstand, closing, and interrupting ratings, option 17A and B, Mark 75 breakers can be selected to comply with most requirements. Option 16B, G, H, provides non-automatic molded case switches in applications requiring no tripping functions.



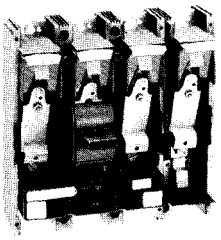
Thermal Magnetic Breaker



SELTRONIC™ Breaker

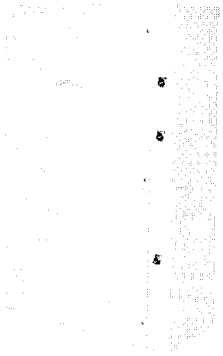


MARK 75®



4 Pole 400 Amp Breaker (Cover Removed)

- Option 18 covers enclosures and their modifications, service entrance provisions, and metering functions.



Key locks are standard on all enclosure doors, and three-point vault hardware is available on NEMA 12 enclosures. NEMA 3R enclosures use galvannealed steel.

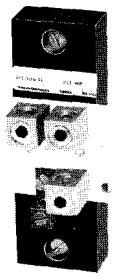
© Changed or added since previous issue.

Transfer Switches
100-1000 Amperes

Options Illustrated, *Continued*

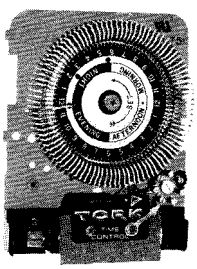
- Option 18D provides a transfer switch suitable for use as service equipment and is available on automatic switches 400 amps and above. The enclosed service entrance transfer switch utilizes motor operators on both breakers which allows manual switching of the device without opening the specially designed enclosure door. Ground fault protection is optionally available on service entrance switches rated 400 – 1000 amps. When 18D is selected, options 16 or 17 must also be selected to incorporate breakers with overcurrent protection required in service entrance applications. Service entrance transfer switches are also available as open devices to be incorporated in customer supplied equipment. When ordering, specify if enclosure is required.

- Option 19 covers insulated, groundable neutrals, 100% rated, with provision for normal, emergency and load connections.

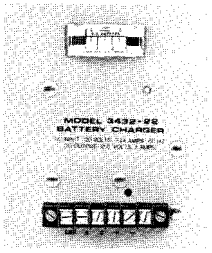


Insulated Groundable Neutral, 225 Amp.

- Option 20 provides rear connections for 100-1000 amp switches.
- Option 21 Non-Standard Terminals – Refer to Westinghouse.
- Option 22 changes the constructional design of the transfer switch. The standard split panel construction is replaced with a long, narrow panel which incorporates the switching device and intelligence circuitry on a single, rigid steel baseplate. This narrow design may be highly desirable when mounting the device in switchboards, motor control centers, or other customer equipment in which space requirements necessitate a more compact switch design. See Dimensional Data 29-970.
- Option 23, Plant Exerciser, is a 168 hour clock timer which permits automatic test operation of the plant at least once a week at pre-selected intervals. Timer is adjustable from 0-168 hours in multiples of 15 minutes, and is mounted on the intelligence panel.
- Option 24, Battery Charger, provides trickle charge Dc output of 12 or 24 volts. Mounted on the intelligence panel.



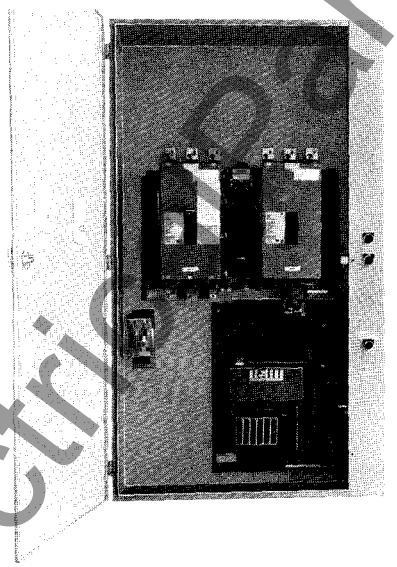
Plant Exerciser



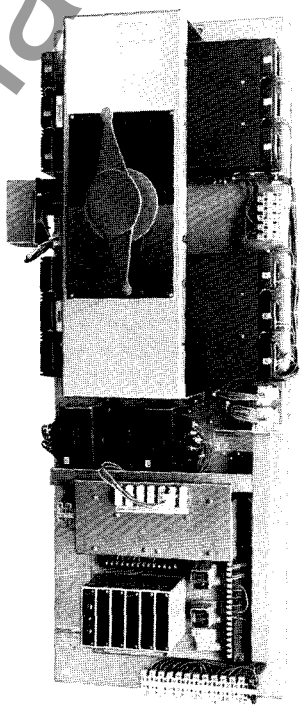
Battery Charger

- Option 27 Non-Standard Voltages and Frequencies. Multi-tap transformers for 208, 220, 240, 380, 415, 480 and 600 volts are furnished for 3 and 4 pole switches. Single voltage transformers are furnished for two pole switches.

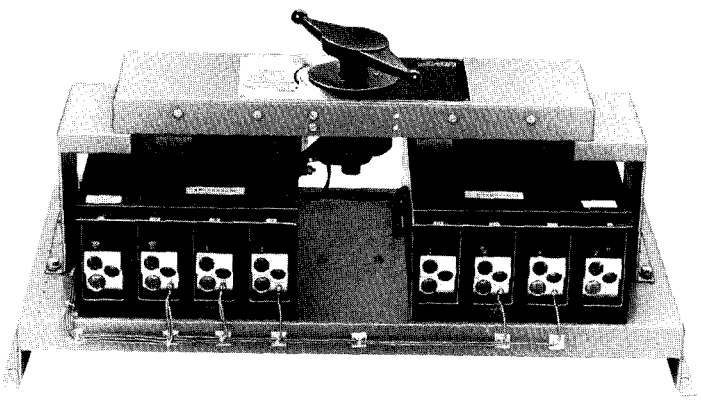
- In many applications incorporating sophisticated GFP (Ground Fault Protection) equipment, it may be desirable to switch the neutral conductor, as well as the power conductors, to preserve the integrity of the GFP system. The entire range of Westinghouse four pole transfer switches has synchronous contact operation and the contact rating as well as ampere capacity of the fourth pole (neutral) is identical to that of the power poles. The neutral is supplied with the same reliable arc quenching capabilities as the current carrying poles used on the Westinghouse three pole transfer switch design. These design features make the Westinghouse four pole transfer switch a highly reliable device for complete protection against system switching transients and any possible ground fault conditions.



Service Entrance Transfer Switch 800 Amp (Option 18D)



Narrow Unit, 600 Amp (Option 22)



4 Pole Power Switching Panel 600 Amp

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 1, 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.

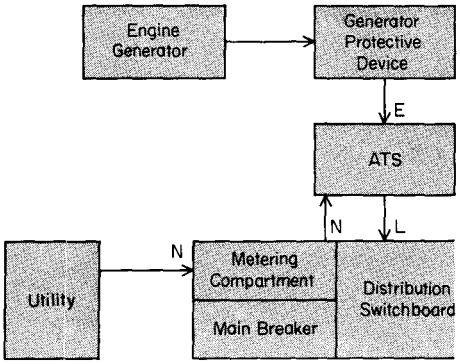


Figure 1

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 2. Thus only three interconnections are required, but the switchboard becomes larger by the amount of space taken by the Automatic Transfer Switch.

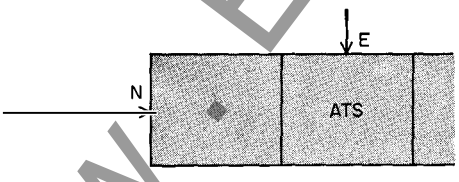


Figure 2

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 interconnections from five to three and saving the space in the switchboard formerly required by the main as shown in Figure 3.

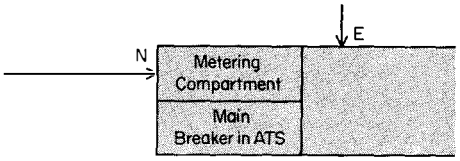


Figure 3

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 4.

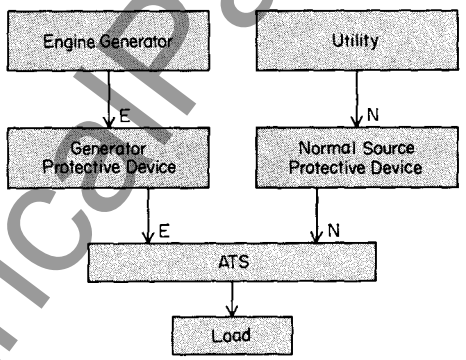


Figure 4

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 5.

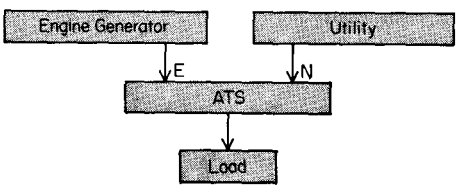


Figure 5

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 4.

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 6.

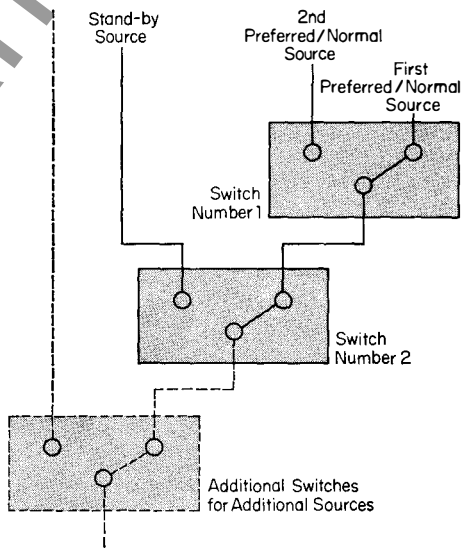


Figure 6

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.

C. Uninterruptible Power Systems (UPS)

Where continuity of electric service cannot be interrupted for even a cycle duration, UPS is used. See Figure 7. 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.

Transfer Switches
100-1000 Amperes

Special Applications, *Continued*

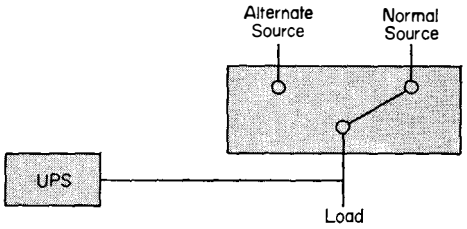


Figure 7

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. Non-Preferred Source
In many applications, both the primary source of power and the alternate source of power are utility supplied. The primary source (A) is utilized under normal operational conditions and the alternate utility source (B) only assumes the load when source (A) fails. Most utility rate structures incorporate minimum connect charges into their rate structures. When failure of source (A) requires switching to the source (B) power supply, it becomes economically desirable to remain connected to this alternate source for an extended length of time in order to make most efficient use of this minimum connect rate structure. By incorporating a non-preferred source design to the ATS, the load will remain indefinitely connected to source (B) regardless of the condition of the primary source (A) until retransfer to (A) is accomplished by means of pushbutton or similar manual controls. However, should source (B) fail, the switch will automatically retransfer to source (A) if available. This special application provides complete protection against loss of power to critical loads while allowing considerable savings on utility costs.

F. Customized Engine Control Contacts
Westinghouse Automatic Transfer Switches provide a normally closed (closed when normal source fails) engine start contact as a standard feature. This contact configuration is sufficient in most engine start applications. The rather extensive number of engine generator manufacturers and their varied products often require different control contacts for automatic starting/stopping of their specific equipment. Three wire engine control circuits or other special contact arrangements are easily incorporated into the Westinghouse ATS. Contact Westinghouse should special engine control contacts be necessary.

G. Shunt Trips
It is sometimes desirable and often necessary to instantaneously disconnect a critical load from its power source without reconnecting it to the alternate power supply until that source is stable enough to assume the load. An example of such an application would be when a time delay for engine starting is required to avoid nuisance starting of the engine while the load consists of large motors or compressors. Phase failure or extended periods of low voltage on any phase of such loads can often cause damage to expensive equipment. Positioning of the ATS contacts in a "neutral" position is not possible with many contactor type design automatic transfer switches which typically utilize single solenoid transfer mechanisms. The Westinghouse ATS can be supplied with shunt trips in one or both breakers which when energized instantaneously trip the breaker and place the ATS in the neutral position. In the above described example, the TDES function could be accomplished without fear of damaging critical equipment as a result of remaining connected to a sub-standard power supply. Control voltage for operating the shunt trips can be obtained from a separate feeder circuit (120VAC) or directly from the existing generator set battery (12VDC or 24VDC). Shunt trips are also valuable control elements when used with externally supplied monitoring devices such as energy monitoring systems, phase imbalance relays, etc.

H. Signals to Peripheral Equipment
The Westinghouse ATS can be modified to provide signals to peripheral equipment such as elevator controllers, motors, remote alarm devices, etc., prior to transferring load circuits. Such signalling is now required in many building codes where elevator equipment is installed. Advance signalling allows the elevator to stop at floor levels before momentary power interruption occurs during the transfer period (See option 35, page 11).

I. Load Shedding
During periods of operation on emergency power sources, it is often desirable to shed non-essential loads which would tend to overload the generator. The Westinghouse ATS can be modified to accommodate customer supplied signalling for shedding of such non-essential loads or our equipment can be designed to perform this function exclusive of external monitoring. This load shedding function can also be used to drop selected loads in cases of failure of a single generator in a multiple synchronized generator system.

J. Load Sequencing
When transferring mixed loads from utility power to emergency generator power, it is critical that the generator is capable of assuming the load. It may be necessary to restart and assume the loads of various types of equipment on a sequential basis. The sequential picking up of loads is usually based on the significance of each specific load (life safety, primary lighting, and etc.). This sequencing function may be necessary to avoid excessive inrush current associated with total and immediate load assumption. Such large inrush currents can result in generator failure requiring difficult, and many times futile, restarting efforts. The Westinghouse ATS can be supplied with appropriate controls to accomplish sequential time delayed startup of equipment when transferring the load to either source. This special modification insures that all loads are brought on line in a safe, efficient manner without undue overloading of the generator.

K. Peak Shaving
Due to the constantly increasing cost of utility power, many industrial facilities are incorporating energy management systems into their electrical distribution equipment. The purpose of such systems is to constantly monitor the use of utility power in an effort to ascertain the most cost efficient usage of such energy. The Westinghouse ATS has been used as a critical component of such energy management systems by providing timely switching functions to alternative power sources thus reducing utility peak demand charges.

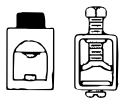
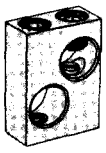
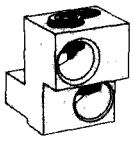
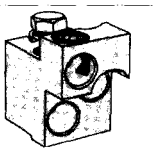
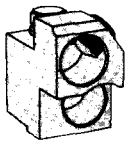
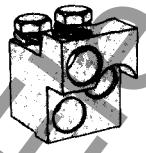
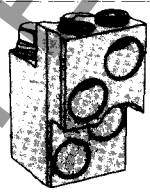
L. Other
The flexible design of the Westinghouse ATS lends itself to an inexhaustible number of special applications. Other applications include special enclosure modifications, special monitoring and instrumentation, bus tie systems, and special paint schemes. For any special application for an automatic transfer switch, do not hesitate to contact Westinghouse.

Transfer Switches
100-1000 Amperes

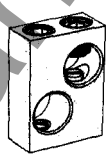
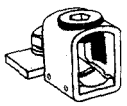
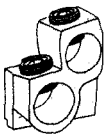
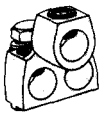
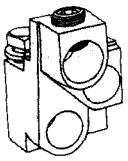
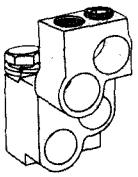
Wiring Terminal Data

Terminals listed as "standard" are included with the switches listed on pages 3, 4. Optional terminals are available, but must be specified.

Standard Terminals©

Switch Rating, Amps	Option	Aluminum Terminal	Wire Range	No. of Cables	Type of Conductor
100	Standard		#6-1/0	1	Cu/Al
150, 225	Standard		#6-350 MCM or #4-350 MCM	1 1	Cu/Al
400	Standard		250-500 MCM	2	Cu/Al
400	Optional		3/0-300 MCM	2	Cu/Al
600	Standard		#1-500 MCM	2	Cu/Al
600	Optional		3/0-400 MCM	3	Cu/Al
600	Optional		500-750 MCM	2	Cu/Al
800 1000	Standard©		3/0-400 MCM	3 3	Cu/Al
800 1000	Optional©		4/0-500 MCM	4 4	Cu/Al
800 1000	Optional©		500-750 MCM	3 3	Cu/Al

Optional Terminals©

Switch Rating, Amps	Option	Copper Terminal	Wire Range	No. of Cables	Type of Conductor
150, 225	Option 21A		#6-350 MCM	1	Cu
400	Option 21A		250-500 MCM	2	Cu
600	Optional		#1-600 MCM	1	Cu
600	Option 21A		2/0-500 MCM	2	Cu
600	Optional		3/0-300 MCM	3	Cu
800 1000	Option 21A©		3/0-500 MCM	3 3	Cu
800 1000	Optional©		3/0-400 MCM	4 4	Cu

© Changed or added since previous issue.

Transfer Switches
100-1000 Amperes

Dimensions and Weights①②④Ⓒ
Not to be used for construction purposes unless approved.

Open and Enclosed Switches

Switch Amps.	Open Switches										Enclosed Switches									
	Breaker Panel								Approx. Ship. Wt.										Approx. Ship. Wt.	
	Height		Width				Depth				Height		Width				Depth			
			2, 3 Poles		4 Poles								2, 3 Poles		4 Poles					
	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.
Automatic Switches																				
100	11	279	17	432	17	432	$6\frac{11}{16}$	170	91	41	$44\frac{1}{2}$	1130	27	686	27	686	$9\frac{7}{16}$	240	225	102
150, 225	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$12\frac{23}{32}$	323	267	121	$53\frac{1}{2}$	1359	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	450	205
400	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$13\frac{27}{32}$	352	306	139	$53\frac{1}{2}$	1359	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	475	216
600	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$13\frac{31}{32}$	353	332	151	$63\frac{1}{2}$	1613	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	540	245
800-1000	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$15\frac{3}{32}$	383	390	177	$63\frac{1}{2}$	1613	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	575	261
Basic Switches																				
100	11	279	17	432	17	432	$6\frac{11}{16}$	170	26	12	$44\frac{1}{2}$	1130	27	686	27	686	$9\frac{7}{16}$	240	170	77
150, 225	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$12\frac{23}{32}$	323	202	92	$53\frac{1}{2}$	1359	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	295	134
400	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$13\frac{27}{32}$	352	241	109	$53\frac{1}{2}$	1359	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	330	150
600	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$13\frac{31}{32}$	353	267	121	$63\frac{1}{2}$	1613	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	420	191
800-1000	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$15\frac{3}{32}$	383	325	147	$63\frac{1}{2}$	1613	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	445	202
Manual Single Handle Switches																				
100	11	279	17	432	17	432	$6\frac{3}{16}$	157	17	8	$17\frac{1}{2}$	445	27	686	27	686	$9\frac{7}{16}$	240	150	68
150, 225	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$12\frac{23}{32}$	323	169	77	$34\frac{1}{4}$	870	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	275	125
400	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$13\frac{27}{32}$	352	208	94	$34\frac{1}{4}$	870	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	310	141
600	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$13\frac{31}{32}$	353	234	106	$47\frac{5}{8}$	1210	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	400	182
800-1000	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$15\frac{3}{32}$	383	293	133	$47\frac{5}{8}$	1210	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	425	193
Manual Dual Handle Switches																				
100	11	279	17	432	17	432	$5\frac{29}{32}$	151	20	9	$17\frac{1}{2}$	445	27	686	27	686	$9\frac{7}{16}$	240	120	55
150, 225	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$8\frac{17}{32}$	217	156	71	$34\frac{1}{4}$	870	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	245	111
400	$14\frac{5}{8}$	371	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$9\frac{3}{16}$	233	195	88	$34\frac{1}{4}$	870	38	965	$43\frac{1}{2}$	1105	$15\frac{1}{4}$	387	280	127
600	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$9\frac{25}{32}$	248	221	100	$47\frac{5}{8}$	1210	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	370	168
800-1000	19	483	$29\frac{3}{4}$	756	$35\frac{1}{4}$	895	$10\frac{29}{32}$	277	280	127	$47\frac{5}{8}$	1210	38	965	$43\frac{1}{2}$	1105	$16\frac{3}{4}$	425	395	180

Control Logic Panel③

Dimensions						Approx. Ship. Wt.	
Height		Width		Depth			
In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.
26	660	21	533	7	178	60	27

① Dimensions and weights listed are for standard switches (no options). Certain options may affect both dimensions and weights.
② Dimensions in both inches and millimeters; weights shown in pounds and kilograms.
③ Control panel dimensions must be added to breaker panel on open automatic switches for total dimensions.
④ See Dimension Sheet 29-970 for detailed dimensions.
Ⓒ Changed or added since previous issue.

Transfer Switches
100-1000 Amperes

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, 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
150, 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

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

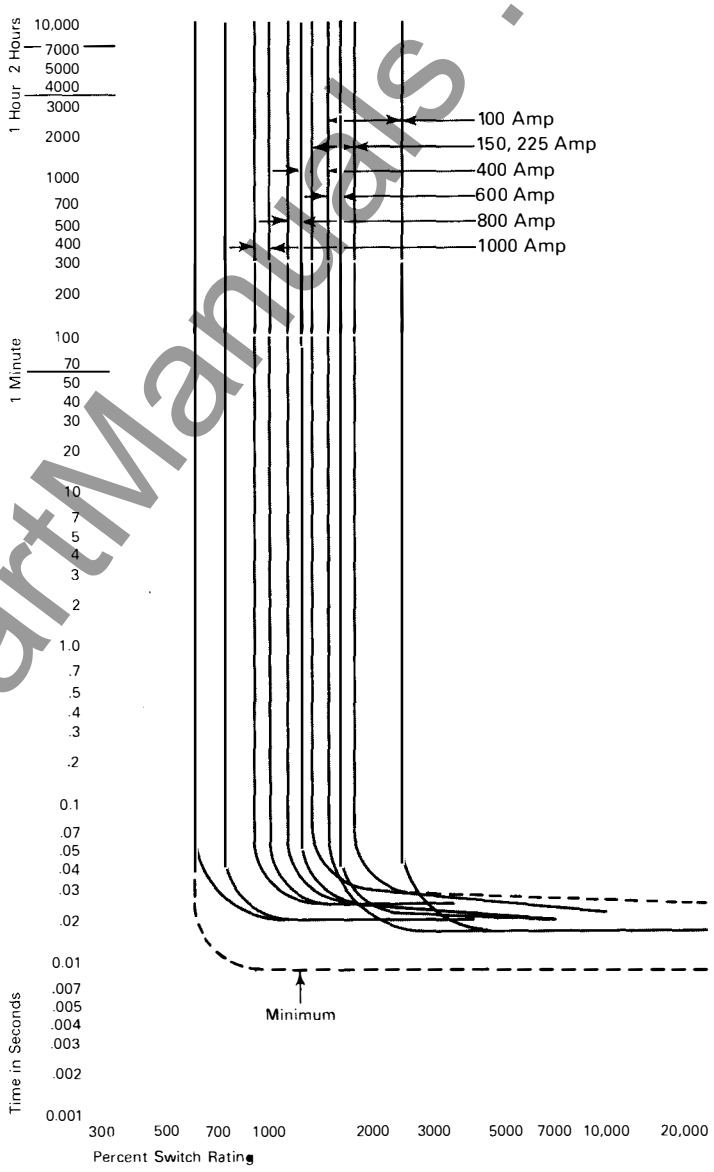
Switch Rating, Amperes	Interrupting, Closing and Withstand Rating, Amps.					
	120, 208, 240 Volts Ac		480 Volts Ac		600 Volts Ac	
	Asym.	Sym.	Asym.	Sym.	Asym.	Sym.
Standard MARK 75 Breakers						
100	75,000	65,000	30,000	25,000	20,000	18,000
150 thru 1000	75,000	65,000	40,000	35,000	30,000	25,000
SELTRONIC™ MARK 75 Breakers						
300 thru 600	75,000	65,000	40,000	35,000	30,000	25,000
600 thru 1000	75,000	65,000	58,000	50,000	30,000	25,000

Table 1: Withstand Current Ratings When Used With Type J, RK1, L Current Limiting Fuses.

Available Symmetrical Amperes RMS at 480 Volts Ac

Switch Rating	Withstand Current Rating	Maximum Fuse Size (Amps)
100	200,000	200
150	200,000	400
225	200,000	400
400	200,000	600
600	200,000	800
800	200,000	1000
1000	200,000	1600

B. High Instantaneous Trip Curve.



Further Information

Prices: Price List 29-920
Dimensions: DS 29-970
1200-4000 Amp. Switches: TD 29-927

Transfer Switches
100-1000 Amperes

Automatic Transfer Switch Typical Specification

1.0 General
Furnish and install where indicated an Automatic Transfer Switch having the ratings, options, enclosures, etc. indicated on the drawings or noted herein. The automatic transfer switch shall be fully rated to protect all types of loads, inductive and resistive, from loss of continuity of power, without derating, either open or enclosed.

The transfer switch shall automatically transfer its load circuit to an emergency or alternate power source upon failure of its normal or preferred source.

The transfer switch shall provide complete protection with field adjustable solid state voltage sensing logic to monitor each phase of the normal power supply. The close differential adjustment shall be factory set to drop out when the monitored voltage drops below 70% of normal and initiate load transfer when the alternate stand-by source becomes available. Upon restoration of the normal source to a pickup level of 90%, the logic shall initiate automatic re-transfer of the load circuits to the normal power source. The transfer switch shall obtain its operating current from the source to which the load is being transferred.

The transfer switch shall have withstand, closing and interrupting ratings sufficient for voltage of the system and the available short circuit at the point of application on the drawings.

2.0 Construction
The transfer switch shall be a device utilizing fully enclosed contact assemblies. These contacts shall be mechanically interlocked and operated by a transfer mechanism to provide double-throw switching action.

The transfer mechanism shall be electrically operated by a single unidirectional gearmotor/train with all parts in positive contact at all times. The mechanically held transfer mechanism shall be energized only momentarily during transfer. The switch shall be capable of being operated manually under load and shall have suitable provisions for readily disengaging the gearmotor when necessary. The transfer switch shall be mechanically and electrically interlocked so that a neutral position shall not be possible when under electrical operation unless a time delay neutral option is required.

It shall not be possible for load circuits to be connected to normal and alternate sources simultaneously, regardless of whether the switch is electrically or manually operated. The switch shall have a manual neutral position for load circuit maintenance. A transfer switch position indicator shall be visible from the front to show to which source the switch is connected.

The logic circuit shall utilize solid state components mounted on printed circuit boards to accomplish proper operation, wherever practical, to accomplish functions such as timing, voltage, and frequency monitoring. LED's shall be furnished to indicate the operation of each function furnished. Construction shall be such that functions are individually replaceable without requiring replacement of the complete solid state package. Plug-in modifications shall be available for field installation while retaining the UL label.

The transfer switch shall be suitable for operation on any voltage from 208 through 600 volts Ac, 50 or 60 Hertz, by placing the voltage selection plug in the desired position. Covers shall be used to block off the unused positions.

A hand held test kit shall be provided for field test and calibration of all plug-in timing and monitoring cards, as well as the output relays from the solid state logic.

All pilot devices and relays shall be of the industrial type rated 10 amperes with self-cleaning contacts.

The transfer switch and options (where permissible) shall be Underwriter's Laboratories, Inc. listed per Standard 1008.

Transfer switches and options shall be Type ATS as manufactured by the Westinghouse Electric Corporation.

Westinghouse Electric Corporation
Distribution and Control Business Unit
Commercial Division – Components
London, Kentucky 40741

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