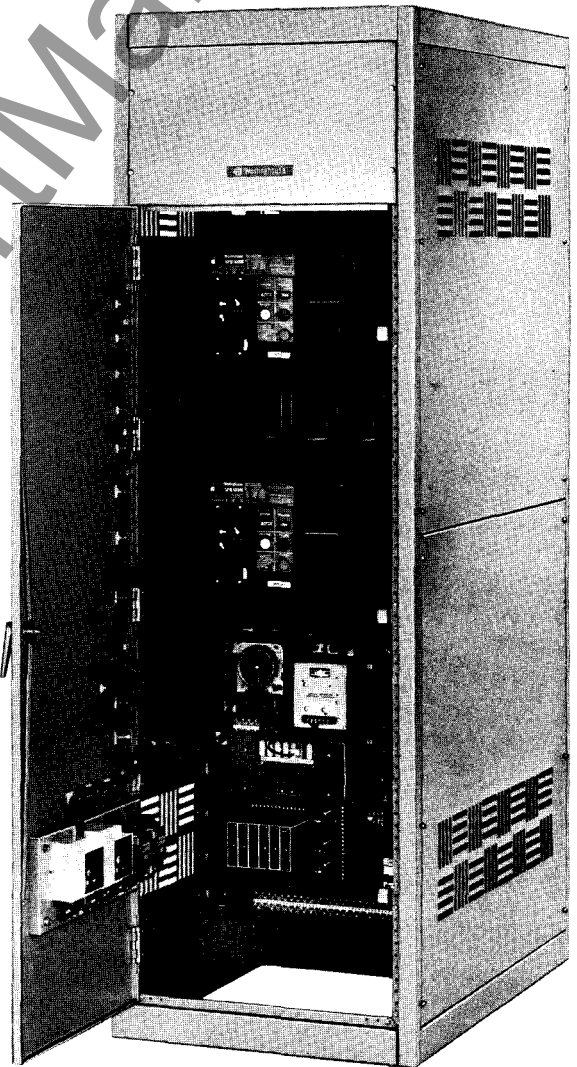
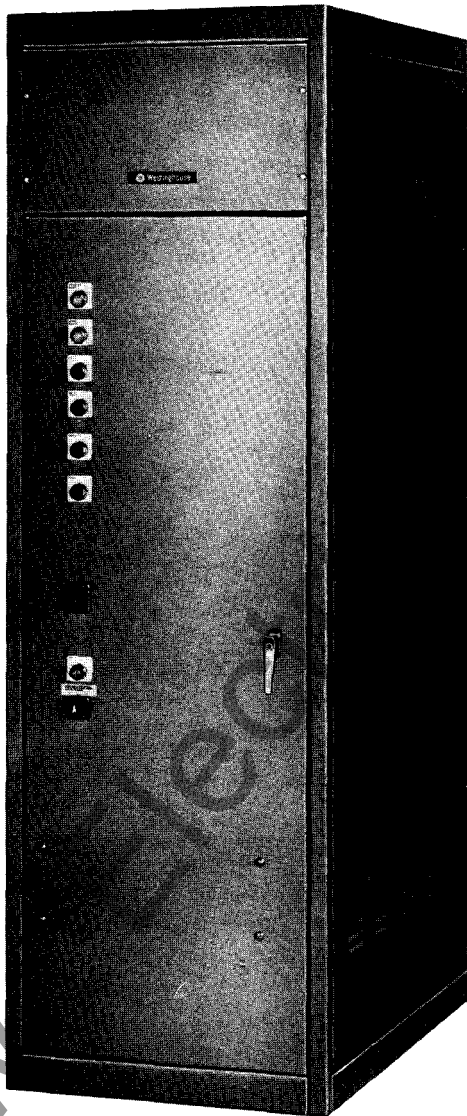




November 1984  
New Information  
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## Systems Pow-R Breaker Transfer Switches





## Systems Pow-R Breaker Transfer Switches

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### Introduction

The Westinghouse Systems Pow-R Automatic Transfer Switch is the newest member in the line of Westinghouse transfer switches. It represents the latest technology in circuit switching by utilizing the latest advances in circuit componentry. This technology helps the switch to achieve new standards in performance for switches in the ratings of 600 to 4000 amperes. This switch is ideally suited for transferring critical electrical loads in emergency/standby, dual generator, load shedding, peak shaving, and cogeneration control systems.

### Description/Function

Westinghouse automatic transfer switches are reliable, safe, rugged, versatile and compact assemblies for transferring essential loads and electrical distribution systems from one power source to another.

The intelligence/supervisory circuits on Westinghouse transfer switches constantly monitor the condition of both the normal and emergency power sources. These circuits automatically initiate an immediate transfer of power from the normal source to the emergency source when power fails or voltage levels drop below a preset value. Transfer back to the normal source is automatic upon return of the normal power source.

Monitoring of the power source is always performed on the line side of the source to which the switch is connected. Power to drive the transfer switch mechanism is taken from the side to which the load is being transferred. The normal power source is the preferred source which the switch will always seek when it is available.

Westinghouse automatic transfer switches are versatile. In addition to the normal power transfer functions, integral overcurrent protection can be added to either or both of the power switching breakers. A full line of factory and/or field installable accessories are available to satisfy the most demanding customer specifications.

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## Systems Pow-R Breaker Transfer Switches

### Typical Applications

Automatic transfer switches are applied in electrical distribution systems where the continuity requires the availability of a normal and alternate power source. They may also be supplied and interlocked in systems where multiple power sources are required for more demanding load conditions. Typical applications would include the following:

Airports  
Banks  
Communication Facilities  
Department Stores  
Educational Facilities  
Entertainment Industry  
Hospitals  
Industrial Plants  
Laboratories  
Mines  
Military Installations  
Office Buildings  
Public Buildings  
Power Generation Plants  
Ships (Maritime)  
Shopping Centers  
Transportation Systems  
Tunnels

### Application Considerations

The following system characteristics should be identified to match properly the automatic transfer switch to the system requirement in accordance with NEC and other applicable codes or standards:

- A. System voltage
- B. Number of phases: single or three phase
- C. Number of wires: 2, 3 or 4
- D. Frequency: 50 or 60 Hz
- E. Number of switched poles: 2, 3 or 4
- F. Type of load: motor, electric heating, resistive, or a combination of types
- G. Load requirements: continuous current and/or horsepower
- H. Available fault current: at point of application in system
- I. Type of service: emergency, stand-by or service equipment
- J. Type of power sources: Two utilities, utility and generation, or two generators
- K. Type of protection required: separate, integral overcurrent, equipment ground fault
- L. Special environmental considerations: high ambient, high humidity, corrosive, elevation, etc.
- M. Special operational considerations: simultaneous disconnection of load from both power sources, or other
- N. Special options: as may be required to satisfy job specifications

Equipment descriptions, catalog identification details, list of available switch options, special application considerations and application tables are included with this technical data to enable a user to make the proper automatic transfer switch selection.

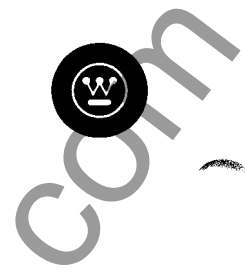
This guide assumes that the circuit protective devices provided on the source side of the automatic transfer switch have been properly applied in accordance with the requirements of the NEC. The fuse sizes shown in the application tables are based on the maximum "umbrella" values permitted for that size in the UL classification shown. Refer to Westinghouse for applications not shown.

Information on molded case circuit breaker application when used for source protective devices is given in Westinghouse publications AD 29-160, AD 29-161, AD 29-163, AD 29-164 and AD 29-861.

### Standards/Code Compliance

Westinghouse Automatic Transfer Switches are listed in File E38116 by Underwriters, Inc. under their standard UL 1008. This standard covers requirements for automatic transfer switches intended for use in ordinary locations to provide for lighting and power as follows:

- A. In emergency systems, in accordance with articles 517 and 700 in the National Electrical Code, ANSI/NFPA 70 and the National Fire Protection Association No. 99 and/or
  - B. In stand-by systems, in accordance with article 702 of the National Electrical Code and/or
  - C. In legally required stand-by systems in accordance with article 701 of the National Electrical Code.
- An automatic transfer switch for use in a legally required stand-by system is identical to that for emergency systems.



## Systems Pow-R Breaker Transfer Switches

### Features

The SPB Automatic Transfer Switch consists of two basic elements:

- 1) The power switching panel (Fig. 1), contains the main power contacts and transfer mechanism. The main power contacts connect and disconnect the load to and from the sources of power. The transfer operation is accomplished by the electrically driven, stored energy mechanism of the Systems Pow-R Devices.
- 2) The solid-state intelligence panel (Fig. 2) provides the intelligence/supervisory circuits which constantly monitor the condition of the power sources thus providing the intelligence necessary for the operation of the transfer switch.

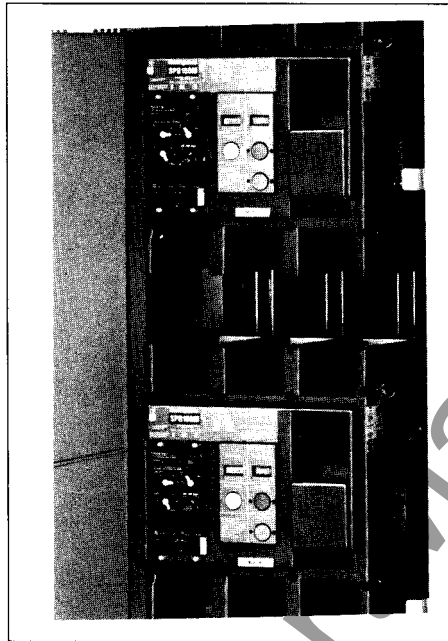


Fig. 1. Power Switching Panel

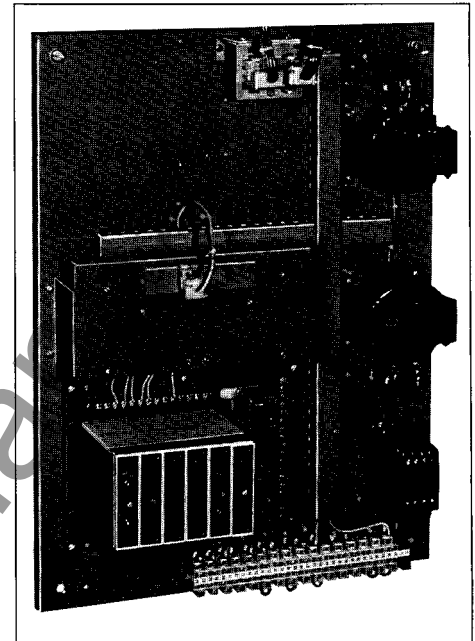


Fig. 2. Intelligence Panel

### Standard Features

- Plug-in solid state cards are provided for voltage sensing, frequency sensing and time delay functions. Each card has adjustment knobs which can be either screwdriver or finger adjusted. Captive screw locks positively lock the adjustment settings with a uniform force that does not alter the setting when it is tightened. All sensing cards are interchangeable. However, a timing card cannot be used in a voltage/frequency slot, or vice versa, since the cards are keyed to prevent improper insertion. Each card is held in place by two screws. Empty card slots are covered by blank covers. All cards have conformal coating for environmental protection.
- Adjustable voltage sensing protection on all phases of the normal power source.
- Automatic transfer operation.
- Wiring gutter space to meet code requirements.
- Safe manual operation.
- Test selector switch – test, auto.
- Solid neutral bar assembly.
- Engine start contact provided on a red colored terminal block. This contact closes upon a loss of normal power, thus initiating an engine start.
- Rear terminal connections, suitable for top or bottom cable.
- Wiring leads are clearly identified with hot ink stamped numbers.
- Common load bus conveniently located behind the power switching panel.
- Two mechanically interlocked, high withstand Systems Pow-R devices.
- High speed, stored-energy, switching mechanisms for fast transfer operation – less than five cycles.
- Mechanical interlocks prevent paralleling both power sources.
- Ventilated NEMA 1 enclosure with keylock handle.
- Split panel construction for ease of equipment maintenance.
- Transfer mechanism is powered from the source to which the load is being transferred.
- Transfer switches are 100% equipment rated in either open or enclosed mounting arrangements.
- Continuous rating for all classes of loads.
- Auxiliary contacts – three normally open and three normally closed for both normal and emergency switch positions.
- Integral multi-voltage transformer taps to satisfy any required application voltage. Selector plug provides quick-change capability to desired voltage rating.
- Intelligence panel disconnect between the power switching panel and the intelligence panel.
- UL listed or component recognized accessories are available for field installation.



## Systems Pow-R Breaker Transfer Switches

### Design Features

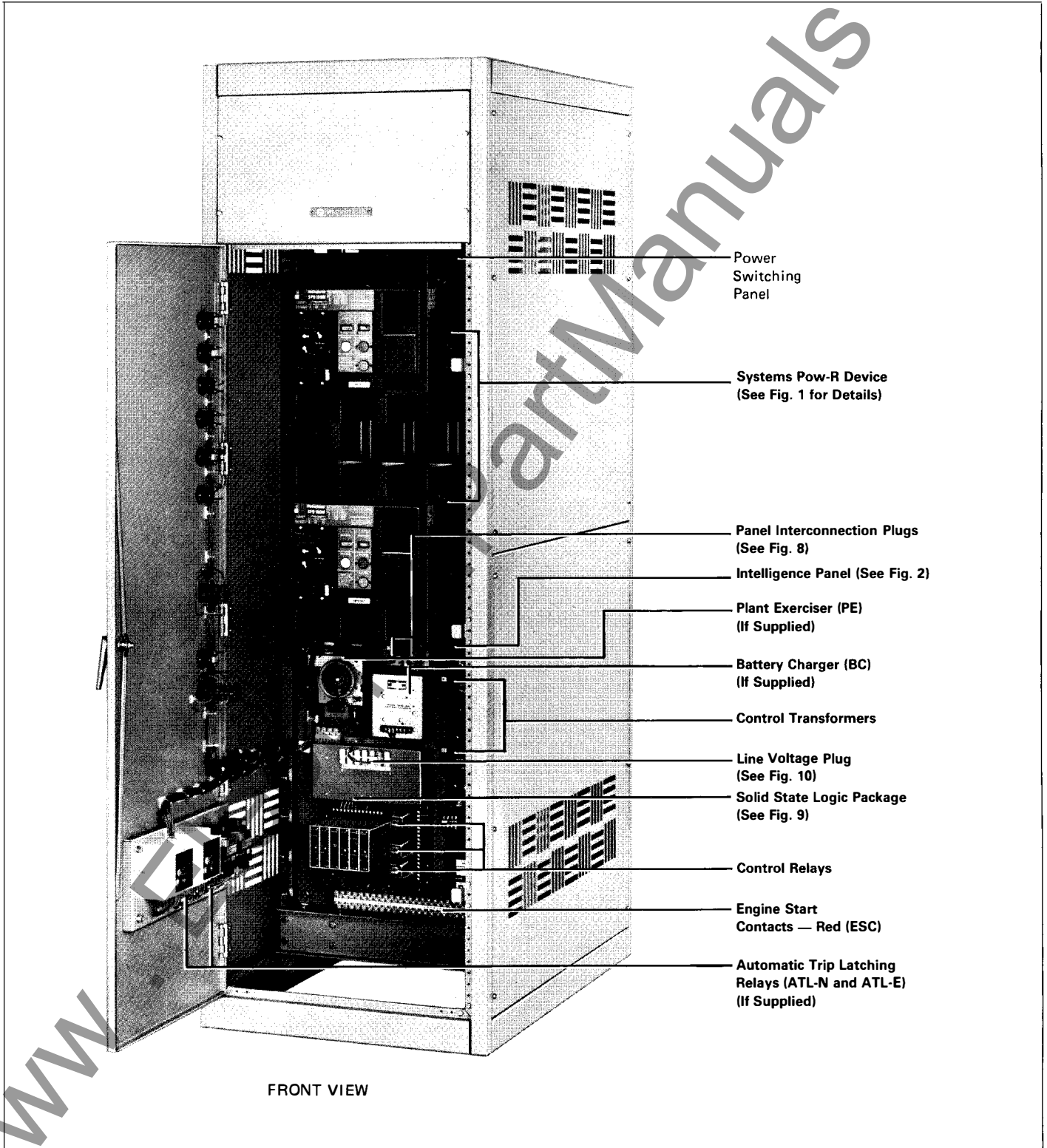


Fig. 3. Systems Pow-R Breaker Automatic Transfer Switch



## Systems Pow-R Breaker Transfer Switches

### Main Components

#### Stored Energy Mechanism

The transfer mechanism is energized electrically from the available source and both breakers read "charged" indicating transfer switch is ready for transfer operation. The transfer switch is prepared for the next operation after electrical charging which takes only three seconds after transfer. Manual charging is available if for any reason the transfer switch is not energized. This is done by making either four full strokes on the charging handle, or several partial inching strokes. (Fig. 4) The transfer switch then can be manually operated.

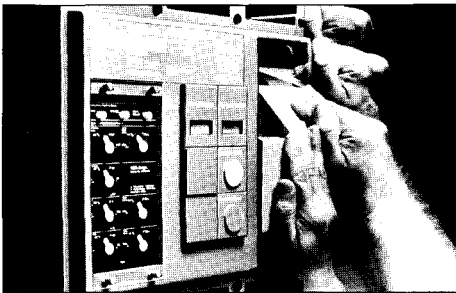


Fig. 4. Manual Charging of SPB Breaker

#### Automatic Tripping Mechanism

The Pow-R Trip-7 trip unit (Fig. 5) is available when overcurrent circuit protection is required. Please note that overcurrent protection is not provided in the standard SPB-automatic transfer switch, which uses type SPBNH molded case switches.

If Pow-R Trip-7 trip units are chosen, adjustable overcurrent protection and long time delay are provided with optional trip unit "packages" which cover such functions as adjustable short time delay and pickup, instantaneous trip, selective override, ground fault with zone interlocking, and built in indicators for short circuit, overload or ground fault trip. See option 16 for optional overcurrent protection devices.

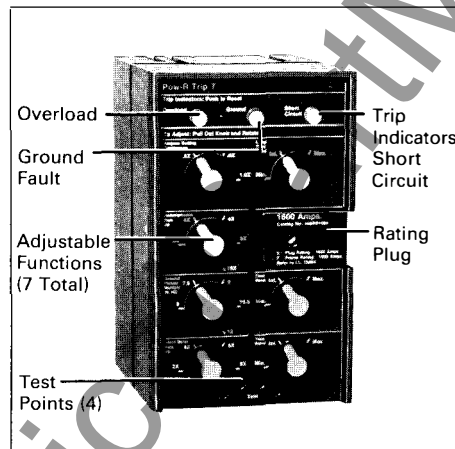


Fig. 5. Pow-R Trip 7 Trip Unit

#### Auxiliary Switches

Auxiliary switches (Fig. 7) are used in remote control circuits for interlocks, indicating lights, and signal contacts to indicate the open or closed position of the breaker main contacts.

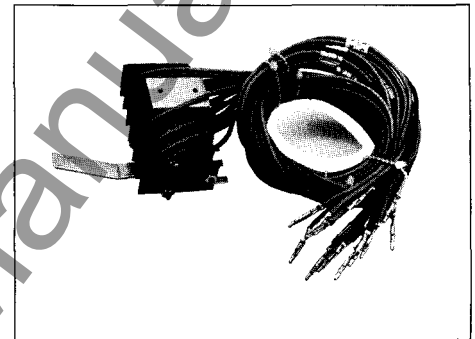


Fig. 7. Auxiliary Switch

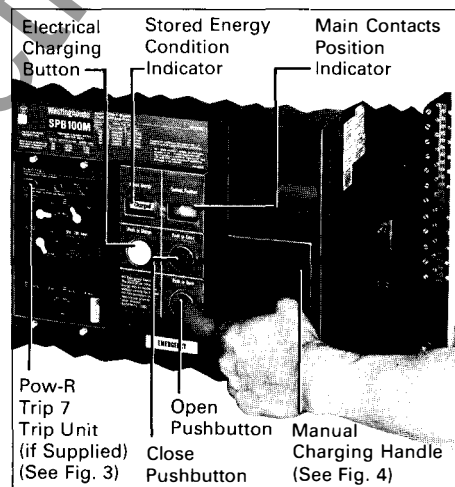


Fig. 6. Systems Pow-R Breaker



## Systems Pow-R Breaker Transfer Switches

### Intelligence Circuitry

The intelligence circuitry is mounted on the lower panel and is connected to the switching panel by means of cable from the breakers terminating in a plug. For open mounted units, an extender cable is offered if it is desired to mount the intelligence panel a greater distance away from the power switching panel than the standard cable allows.

The intelligence panel has two power transformers (one for normal, one for emergency source) and one logic transformer package (for monitoring both sources). A solid state logic package consisting of six or nine plug-in printed circuit cards is also mounted on the panel. A plug-in relay for outputting from the logic is part of the package. Each plug-in card has adjustment knobs that can be screwdriver or finger adjusted. In addition, each card has a captive, screw 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 vice 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. 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.

### Mechanical Interlocks

The switching devices are interlocked to prevent them from being closed at the same time. This is done by means of two mechanical interlocks. (Fig. 12) Each interlock is connected between the tripping (opening) mechanism of one device and the latching (closing) mechanism of the other device. Therefore if one device is closed its interlock will prevent the other from latching and closing. Both devices cannot be simultaneously connected to the load by either electrical or manual means.

### Terminals

Screw pressure type terminals are supplied as standard. Terminals are supplied as rear terminal connections (Fig. 12) and on the neutral bar. Reference page 11 for available terminals.

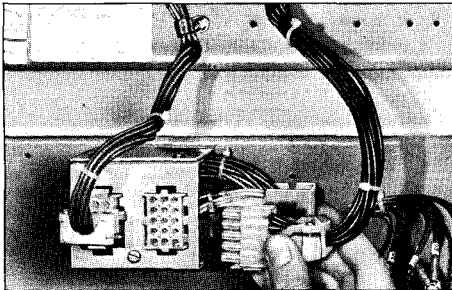


Fig. 8. Panel Interconnection Plugs

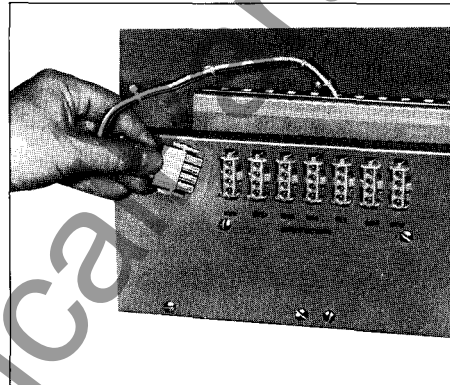


Fig. 10. Line Voltage Plug

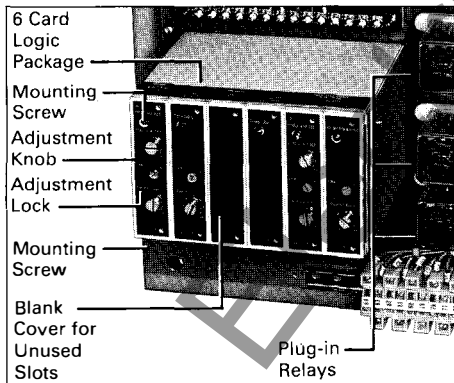


Fig. 9. Solid State Logic Package

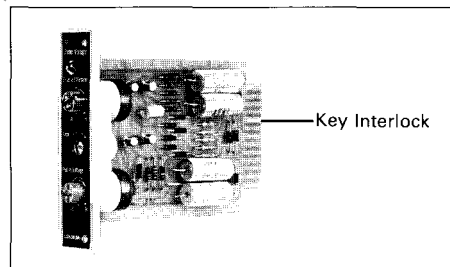


Fig. 11. Plug-in Card with Key Interlock

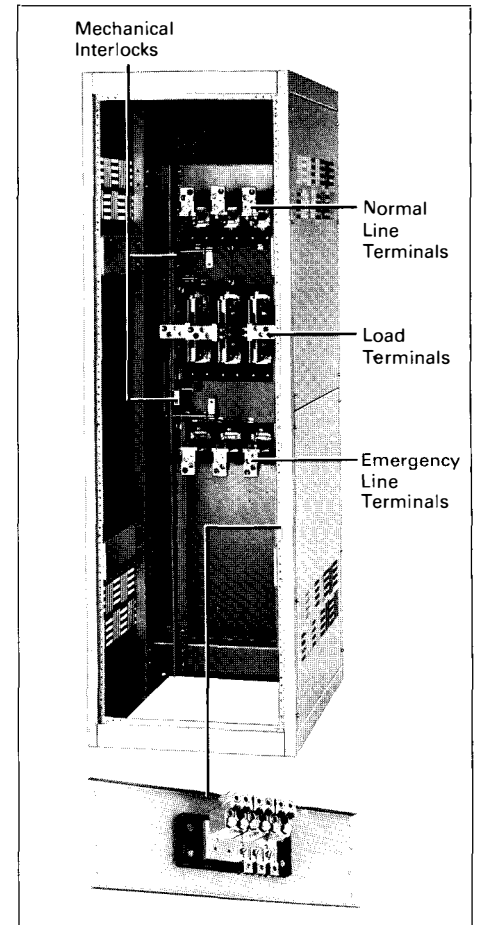


Fig. 12. Rear View, Systems Pow-R Automatic Transfer Switch



## Systems Pow-R Breaker Transfer Switches

### Automatic Trip Latching Relay

On transfer switches equipped with automatic trip devices, one automatic trip latching relay (ATL) is supplied with each Pow-R Trip-7 trip unit. The ATL provides visual trip indication, alarm and lockout interlocking circuitry following a breaker automatic tripping operation. Should the breaker on line trip, the ATL prevents transfer to the other source. This is a safety feature to prevent transferring the alternate source into a faulted condition.

The ATL also provides an indication when control power is available.

### Ordering Information

Order by catalog number, description and options.

- Specify:
  - System voltage and frequency.
  - Number of phases and wires.
  - Continuous current.
- Select switch catalog number from below.
- Select desired options and order by option number. Reference pages 9 through 11.

4. Ordering example: Automatic transfer switch catalog number ATSRM32000XS 480 volts, 60 Hz, 3 phase, 4 wire, 2000 amperes with options 1A, 2C, 3C, 4D, 5A, 5D, 12C, and 12D.

5. List prices: Refer to Price List 29-923.

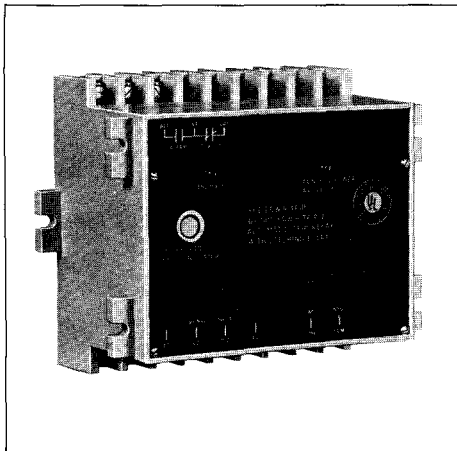


Fig. 13. Automatic Trip Latching Relay

### 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	R M	3	3000	X	S
Transfer Switch Systems Pow-R						
A - Automatic		3 - 3 Pole	1200-1200 Amp	A - 120/60/50	K - Open	
		4 - 4 Pole	1600-1600 Amp	B - 208/60/50	S - Nema 1	
			2000-2000 Amp	W - 240/60/50		
			2500-2500 Amp	X - 480/60/50		
		M - Mechanically Held	3000-3000 Amp	E - 600/60/50		
			4000-4000 Amp	G - 220/50/60		
				H - 380/50/60		
				P - 415/50/60		

① 4 pole switch  
Maximum Rating - 3000A





## Systems Pow-R Breaker Transfer Switches

### Options

Westinghouse provides an extensive list of options available for the transfer switch. Below is a brief description of their functions. Many of these options can be field mounted to the transfer switch to allow modifications to the switch as the customer's needs develop and change. For this reason, it is essential that the electrical diagrams sent with the ATS be retained for future reference.

#### 1. Time Delay Normal to Emergency (TDNE)

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.

- A. Adjustable 1 to 60 seconds.
- B. Adjustable .1 to 10 minutes.
- C. Adjustable .2 to 30 minutes.

#### 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 fluctuations.

- A. Fixed 2 seconds.
- B. Adjustable 1 to 10 seconds.
- C. Adjustable 5 to 50 seconds.

#### 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, overriding the time delay.

**CAUTION:** WHERE LARGE MOTOR LOADS ARE INVOLVED, A DELAYED RETURN TO NORMAL IS DESIRED TO AVOID SYNCHRONIZING PROBLEMS. SEE OPTION 32.

- A. Adjustable 1 to 60 seconds.
- B. Adjustable .1 to 10 minutes.
- C. Adjustable .2 to 30 minutes.

#### 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 to 60 seconds.
- B. Adjustable .1 to 10 minutes.
- C. Adjustable .2 to 30 minutes.
- D. Fixed five (5) minutes.

#### 5. Frequency/Voltage Relay for Emergency Source

Relay is connected to and is constantly monitoring the phases. Prevents transfer from normal to emergency until the

engine generator has reached its operating frequency and 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.

- A. Under frequency, adjustable 45-60 Hz (drops out two Hz lower than setting).
- B. Under voltage/under frequency, voltage is fixed at 90% pick-up, 70% drop-out and frequency is adjustable 45-60 Hz (drops out two Hz lower than setting).
- C. Over frequency, adjustable 50-65 Hz (drops out two Hz above setting).
- D. Under voltage, adjustable 70%-100%, (nominally set at 90% pick-up 70% drop-out).
- E. Over voltage, adjustable 100%-115%, (nominally set at 115% drop-out, pick-up below 105%).
- 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.

#### 6. Test Switch

Provides test operation of the transfer switch by simulating a loss of normal power. Engine starting will be initiated and transfer to the emergency source will occur.

#### Momentary Contact (Pushbutton) (TPB)

- A. For separate mounting.
- B. In cover of enclosed switch.

#### Maintained Contact (Selector Switch) (TSS)

- C. For separate mounting (standard).
- D. In cover of enclosed switch (standard).

#### 7. Four Position Selector Switch (FPSS)

Permits four modes of switch operation: "TEST", "AUTO", "OFF", and "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 in normal and initiates the engine start circuit. The switch will not transfer unless the normal source fails.

- C. For separate mounting. When selected, 6C is omitted.
- D. In cover of enclosed switch. When selected, 6D is omitted.

#### 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.

#### 9. Control Circuit Disconnect

Disconnects power from motor control circuit.

"A and B" provides a selector switch, used for maintenance, which disconnects power to the transfer motors. Marked "OFF/ON".

- A. For separate mounting. (two position selector switch)
- B. In cover of enclosed switch. (two position selector switch)
- 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 load circuit from either source. See manual operation.

#### 10. Preferred Source Selector

For use when normal and emergency source are both commercial power, or when the normal source is commercial power and the emergency is an 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 Source1/Source 2.
- C. For separate mounting.
- D. In cover of enclosed switch.

#### 11. Circuit Breaker Reset

This option provides means of resetting the overcurrent protective device (option 16) when supplied in the transfer switch.

- A. Manual circuit breaker reset is supplied as standard with option 16. Reset pushbuttons are located on



## Systems Pow-R Breaker Transfer Switches

the automatic trip relay (s) inside the cover of the switch. For the normal breaker the relay is marked ATR-N and emergency breaker is marked ATR-E. The reset pushbutton for the breaker must be depressed after the breaker has tripped to continue automatic operation.

- F. Circuit breaker lock-out: Prevent transfer if breaker trips (supplied as standard with option 16J-16O).

### 12. Pilot Lights

Pilot lights can be furnished to indicate (1) switch position; (2) source condition; and (3) tripped condition.

**Switch Position:** Utilizes one normally open breaker auxiliary contact(s) 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 cover of enclosed switch.

**Tripped Condition:** Available only with overcurrent protection, option 16. 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 cover of enclosed switch.
- M. Emergency supply (amber) in cover of enclosed switch.

### 13. Engine Start Contacts (ESC)

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

- A. One normally closed (NC) contact.

### 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 two normally open (NO) and two normally closed (NC) contacts. (NRA)

- D. Emergency source: Provides two normally open (NO) and two normally closed (NC) contacts. (ERA)

### 15. Auxiliary Contact or Bell Alarm Contact

Bell alarm contacts: Only one can be furnished. Not available for customer use when Options 12J – 12M are selected.

Indicates when breaker is tripped. Available only with thermal magnetic breakers, Option 16. Contact closes when breaker is tripped.

- C. Normal source (ATL-N): one normally open (NO) contact.

- D. Emergency source (ATL-E): one normally open (NO) contact.

Auxiliary Switch:

- E. Normal source: Provides three normally open and three normally closed contacts that operate with the normal breaker (standard).

- F. Emergency source: Provides three normally open and three normally closed contacts that operate with the emergency breaker (standard).

For additional contacts please refer to Westinghouse.

### 16. Optional Overcurrent Protective Device in Place of Standard Molded Case Switches

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.

- J. Normal and Emergency Breakers Pow-R Trip 7 trip device with adjustable ampere, adjustable long time delay, and adjustable instantaneous trip settings. (Available settings shown in table).
- K. Emergency Breaker Only otherwise same as option 16J
- L. Normal Breaker Only otherwise same as option 16J
- M. Normal and Emergency Breakers Pow-R Trip 7 trip device with adjustable ampere, adjustable long time delay, short delay pick-up and time delay and selective override. (Available settings shown in table).
- N. Emergency Breaker Only otherwise same as option 16M
- O. Normal Breaker Only otherwise same as option 16M

### Pow-R Trip-7 Available Trip Settings

Function	Adjustment Range	
	3000 A. Max.	4000 A. Max.
Ampere setting	① 0.8, 0.9, 1.0	② 0.8, 0.9, 1.0
Long Delay	2.2, 7, 24 sec.	2.2, 7, 24 sec.
@ 6 times		
Plug rating		
Instantaneous Pickup	① 2, 4, 6, 8, 10	② 2, 3, 4, 5, 6
Short Delay Pickup	① 2, 4, 6, 8	② 2, 3, 4, 5
Short Delay Time	6, 12, 18 cycles	6, 12, 18 cycles

① Times installed plug rating.

### Optional Available Rating Plugs (For use with Pow-R Trip 7)

Switch Rating (Amps)	Rating Plug (Amps)
1200	600, 800, 1000, 1200
2000	1600, 2000
2500	2500
3000	3000
4000	2000, 2500, 3000, 4000

### 18. Enclosures and Instrumentation

- A. NEMA 1 enclosure.
- E. Voltmeter mounted in cover (includes selector switch).
- F. Ammeter mounted in cover (includes current transformers and selector switch).
- G. Frequency Meter
- H. Running Time Meter

### 19. Neutral Bar

### 20. Non-Standard Connections

- Rear connected solderless lugs are furnished as standard on all enclosed switches.
- C. Rear bus connections on Line and Load.

### 21. Non-Standard Terminals

Refer to page 11 for available terminals.

### 23. Plant Exerciser

- 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.
- C. Without interrupting normal supply.
- D. By simulation of power failure.
- G. Plant exerciser with selector switch for choosing 23C, 23D, or for bypassing exerciser. Contact Westinghouse about 14 day timer.
- I. Similar to option 23D except with fail safe feature. This feature provides an immediate transfer to the normal source if emergency source fails during exercising period.



## Systems Pow-R Breaker Transfer Switches

J. Similar to option 23G except with fail safe feature during simulation of power failure.

### 24. Battery Charger (BC)

The trickle charge Dc output is 12 or 24 volts. Units are panel mounted. Automatic high-low charge rate with 2 amp high rate maximum.

- C. 12 volt
- D. 24 volt

### 26. Type of Protection (Normal Source)

Complete protection is standard. A solid state voltage sensing card monitors each phase of the normal power supply. Card is adjustable 70%-100% (nominally set at 70% dropout and 90% pickup).

C. Over voltage, adjustable 100%-115% (nominally set at 115% drop-out, pick-up below 105%). A solid state voltage sensing card monitors each phase of the normal power supply.

D. Area protection connections with override circuit. Provides two terminal blocks for connection of one or more normally open (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 area protection contact opens, the switch will initiate engine start and transfer to emergency. In the event that the 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 two Hz lower than setting). A solid state frequency sensing card is connected to one phase only of the normal source constantly monitoring that phase.

F. Over frequency, adjustable 50-65 Hz (drops out two Hz above setting). A solid state frequency sensing card is connected to one phase only of the normal source constantly monitoring that phase.

### 27. Non-standard Voltages and Frequencies

A. Non-standard Ac voltages and frequencies. Three and four pole 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. Please specify system voltage on order.

### 28. Intelligence Circuit Fuses

A. Provides fuses on all non-essential control circuitry.

### 30. Cranking Limiter

A. Adjustable 20-200 seconds. Interrupts motor start circuit if voltage does not appear within pre-selected time.

### 31. Audible Alarm With Silencing Switch (AL)

Sounds alarm when switch is in the emergency position and emergency voltage is present.

- A. For separate mounting.
- B. Enclosure mounted.

### 32. Time Delay Neutral (TDNC)

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. Timers are marked TDNC-N and TDNC-E.

- A. Adjustable 5 to 50 seconds.

### 34. Extender Cable

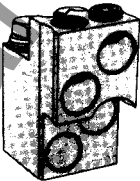
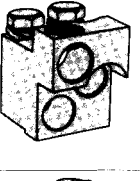
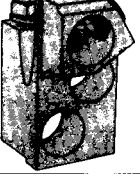
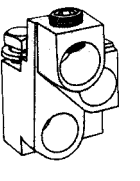
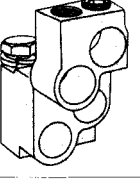
- A. 42 Inch.
- B. 72 Inch.
- C. 96 Inch.
- D. 120 Inch.
- E. 144 Inch.

### 40. Special Paint

Contact Westinghouse factory or sales representative for available colors and paint specification requirements.

### Wiring Terminal Data

Terminals listed as "standard" are included with the switches. Terminals are available, but must be specified.

Switch Rating, Amps	Option	Aluminum Terminal	Wire Range	No. of Cables	Type of Conductor
1200 1600 2000 2500 3000 4000	Standard		4/0-500 MCM	4	Cu/Al
				4	
				8	
				8	
				12	
				12	
1200 1600 2000 2500 3000 4000	Optional		3/0-400 MCM	3	Cu/Al
				3	
				6	
				6	
				9	
				9	
1200 1600 2000 2500 3000 4000	Optional		500-750 MCM	3	Cu/Al
				3	
				6	
				6	
				9	
				9	
1200 1600 2000 2500 3000 4000	Optional		3/0-500 MCM	3	Cu
				3	
				6	
				6	
				9	
				9	
1200 1600 2000 2500 3000 4000	Optional		3/0-400 MCM	4	Cu
				4	
				8	
				8	
				12	
				12	



## Systems Pow-R Breaker Transfer Switches

**Table I**  
Maximum UL Listed Withstand Ratings  
Standard Switch With No Internal Overcurrent Protection

Basic Switch Continuous Current Rating Amperes	Basic Switch Withstand Rating <sup>①</sup> Amperes	Withstand Current Rating <sup>②</sup> 480 VAc Max	Maximum Fuse Size Amperes
1200	51,000	200,000	2000
2000	51,000	200,000	3000
3000	51,000	200,000	4000
4000	85,000	200,000	4000

- ① One second maximum.  
② When used with Class L Current Limiting Fuses.

**Table II**  
Maximum UL Listed Switch Ratings  
With Internal Overcurrent Protection – Option 16

Basic Switch Continuous Current Rating Amperes	Optional Continuous Current Ratings	Maximum System Withstand Rating When Applied With Upstream Class L Fuses Maximum Ac Volts 480	Max. Class L Upstream Fuse Rating Amperes	Max. Interrupting Rating When Applied With No Upstream Protection Maximum Ac Volts			Short-time Ratings <sup>②</sup> When Supplied With Short Time Protection, Options 16M, N, O 240/480/600V
				RMS Symmetrical Amperes	480	600	
1200	600	200,000	2000	100,000	100,000	85,000	51,000
	800	200,000	2000	100,000	100,000	85,000	51,000
	1000	200,000	2000	100,000	100,000	85,000	51,000
	1200	200,000	2000	100,000	100,000	85,000	51,000
2000	1600	200,000	3000	100,000	100,000	85,000	51,000
	2000	200,000	3000	100,000	100,000	85,000	51,000
2500	2500	200,000	4000	100,000	100,000	85,000	51,000
3000	3000	200,000	4000	100,000	100,000	85,000	51,000
4000	2000	200,000	5000 <sup>③</sup>	100,000	100,000	85,000	85,000
	2500	200,000	5000 <sup>③</sup>	100,000	100,000	85,000	85,000
	3000	200,000	5000 <sup>③</sup>	100,000	100,000	85,000	85,000
	4000	200,000	5000 <sup>③</sup>	100,000	100,000	85,000	85,000

- ① Pow-R Trip 7, or Digitrip.  
② Maximum short delay setting 18 cycles (or 0.3 seconds).  
③ Westinghouse Class L Fuses Only.

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