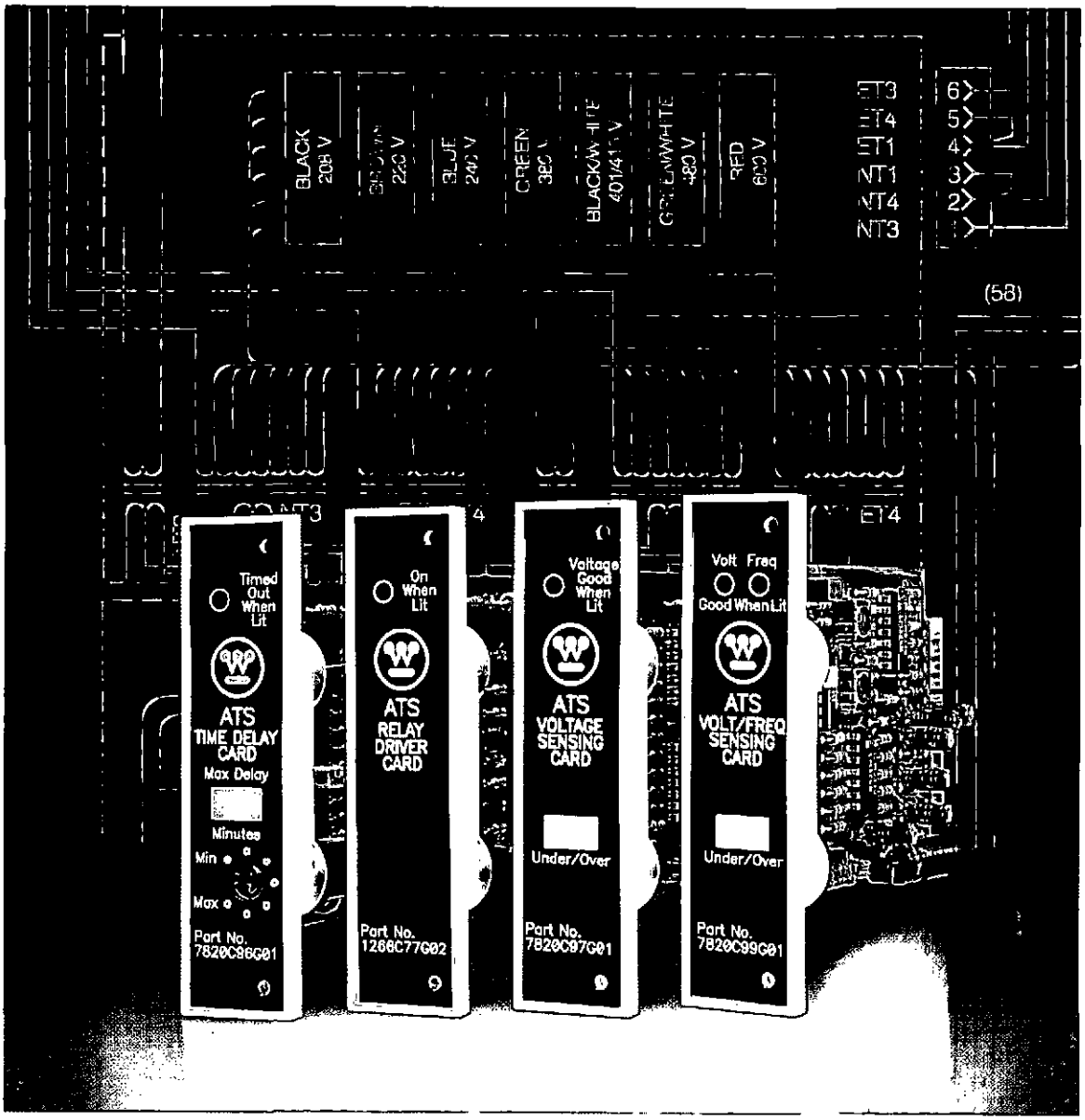
Westinghouse Transfer Switch Equipment

Solid State Logic

Our next-generation Solid State Logic achieves a new level of excellence in automated monitoring, control and transfer switch performance.



Cutler-Hammer

EATON

Westinghouse Transfer Switch Equipment

Solid State Logic is a highly reliable, flexible intelligence system designed to comply with your most demanding standby power application. This field-proven logic provides the ultimate in protection against power interruption by use of precision calibrated solid state components.

Solid State Logic is available on the following switches in 2, 3 and 4 poles:

SWITCH	*AMPERE RATING*
ATHS	(100)
ATVS	(150-4000)
NTHS	(100)
NTVS	(150-4000)
BIHS	(100-1000)
BIVS	(800-3000)

Westinghouse Solid State Logic offers several standard features:

- Engine contacts wired to red color-coded terminal blocks for easy identification of connections.
- Limitless combinations of options available for superior flexibility in demanding job applications.
- Logic panel interconnects with power switching panel via keyed plug connectors to permit total isolation of controls for maintenance purposes.
- All wiring is hot ink stamped to match the wiring diagram supplied with each unit.
- Wiring to external pilot devices and customer connections is brought out to clearly identified terminal blocks. Solid neutral bar is supplied as standard on all 2 and 3 pole units.

DESIGN HIGHLIGHTS

- Close Differential Sensing
- Plug-In Cards
- Multi-Tap Voltage Selection Plug
- Field Installable Kits

Features/Benefits

TRANSFER SWITCH FEATURES/ ACCESSORIES

The following features, benefits and options are available on the Solid State Logic units:

FEATURES

- Complete three phase, close differential undervoltage sensing of Normal Source is standard. Normally set at 80% Dropout, 90% Pickup and field adjustable for alternate settings.
- Most optional sensing and timing functions performed by plug-in printed circuit cards (Optional Accessories 1, 3, 4, 5 and 26).
- Solid state cards come equipped with programmable adjustments and L.E.D. indicators for ease of field setting and diagnostics. Sensing cards (voltage and frequency) and timing cards are interchangeable by function.
- Multi-tap transformer package permits line voltage selection of 208, 220, 240, 380, 415, 480 or 600 volts AC, 50 to 60 Hz, simply by proper insertion of voltage selection plug.
- Options 2, 30, 32 and 35 are performed by clearly marked solid state panel-mounted timers with 10A contact ratings.
- There is a wide range of field installable option kits available with retention of UL label.

BENEFITS

- Flexible adjustable settings for ease of applying specific application needs.
- Key interlocked cards to prevent improper insertion.
- Modular design eases preventive maintenance and simplifies adapting to new application requirements.
- Provides the ultimate in transient isolation protection and versatility in set-up. Meets IEEE surge withstand requirements.

OPTIONAL ACCESSORIES

Listed below are Optional Accessories that will allow you to customize a Westinghouse Automatic Transfer Switch to your particular application. All Features/Accessories are Underwriters Laboratories, Inc. listed unless noted otherwise. *(Note: If an Accessory is chosen that is not UL listed, the switch will not be supplied with a UL label.)*

1. TIME DELAY NORMAL TO EMERGENCY (TDNE)

Provides a time delay when transferring from the Normal Power Source to the Emergency/Standby Power Source. This Optional Accessory does not affect the engine starting circuit. Timing begins when the source voltage of the Emergency/Standby Power Source appears. Adjustable 1 second - 64 minutes.

2. TIME DELAY ENGINE START (TDES)

This Optional Accessory is for use when the Emergency/Standby Source is an engine generator. It delays initiation of the engine start circuit in order to override momentary power outages or voltage fluctuations of the Normal Power Source.

- ❑ 2B Adjustable .5-15 seconds
- ❑ 2C Adjustable 4-120 seconds

3. TIME DELAY EMERGENCY TO NORMAL (TDEN)

Delays the transfer from the Emergency/Standby Power Source to the Normal Power Source to permit stabilization of the Normal Power Source before retransfer is made. Timing begins when the Normal Power Source appears. If the Emergency/Standby Source fails during timing, transfer to the Normal Power Source is immediate, overriding the time delay. Adjustable 1 second-64 minutes.

4. TIME DELAY ENGINE COOLDOWN (TDEC)

Permits the generator to continue to run unloaded after retransfer to Normal has occurred. Timing begins when transfer is made. Adjustable 1 second-64 minutes.

5. EMERGENCY/STANDBY SOURCE MONITORING

Provides more precise voltage and/or frequency monitoring of the Emergency/Standby Power Source. Relay prevents transfer from the Normal Power Source to the Emergency/Standby Power Source until that source is within a pre-selected range. In addition, when the switch is in the Emergency/Standby Position and that source falls outside the monitored parameters, a load transfer is initiated to the Normal Power Source if it is present.

- ❑ 5B Single Phase Under Voltage/Under Frequency Monitor – Provides single phase voltage/frequency sensing. Frequency sensing is set at 56 Hz Dropout and 58 Hz Pickup (60 Hz applications) and 46 Hz Dropout and 48Hz Pickup (50 Hz applications). Voltage sensing is set at 80% Dropout and 90% Pickup of nominal voltage. Frequency and voltage are adjustable over a wide range of settings.
- ❑ 5C Single Phase Over Voltage/Over Frequency Monitor – Provides single phase voltage/frequency sensing. Frequency sensing is set at 64 Hz Dropout and 62 Hz Pickup (60 Hz applications) and 54 Hz Dropout and 52 Hz Pickup (50 Hz applications). Voltage sensing is set at 115% Dropout and 110% Pickup of nominal voltage. Frequency and voltage are adjustable over a wide range of settings.
- ❑ 5D Under Voltage Monitor – Provides adjustable single phase voltage sensing, nominally set at 90% Pickup, 80% Dropout unless otherwise specified.
- ❑ 5E Over Voltage Monitor – Provides adjustable single phase voltage sensing, nominally set at 115% Dropout, 110% Pickup unless otherwise specified.
- ❑ 5F Under Voltage Monitor – Provides adjustable three phase voltage sensing, nominally set at 90% Pickup, 80% Dropout unless otherwise specified.
- ❑ 5G Over Voltage Monitor – Provides adjustable three phase voltage sensing, nominally set at 115% Dropout, 110% Pickup unless otherwise specified.
- ❑ 5H Phase Reversal – Provides protection from reversal of phases on the Emergency side.
- ❑ 5J Three Phase Under Voltage/Under Frequency – Provides three phase voltage/frequency sensing. Frequency sensing is set at 56 Hz Dropout and 58 Hz Pickup (60 Hz applications) and 46 Hz Dropout and 48 Hz Pickup (50 Hz applications). Voltage sensing is set at 80% Dropout and 90% Pickup of nominal voltage. Frequency and voltage are adjustable over a wide range of settings.
- ❑ 5K Three Phase Over Voltage/Over Frequency – Provides three phase voltage/frequency sensing. Frequency sensing is set at 64 Hz Dropout and 62 Hz Pickup (60 Hz applications) and 54 Hz Dropout and 52 Hz Pickup (50 Hz applications). Voltage sensing is set at 115% Dropout and 110% Pickup of nominal voltage. Frequency and voltage are adjustable over a wide range of settings.

6. ALTERNATE TEST OPERATORS

While all Westinghouse Automatic Transfer Switches are supplied with a Test Pushbutton as a standard feature, certain applications and customer preferences dictate the use of an alternate test operator. When one of the following alternatives is selected, the standard Test Pushbutton is omitted.

- ❑ 6D Test Selector Switch (TSS) – Provides a two-position maintained contact marked "Auto"/"Test". Tests operation of the Automatic Transfer Switch by simulating a loss of the Normal Power Source, causing the engine to start and initiate a load transfer to the Emergency/Standby Power Source.

❑ 6H Four-Position Test Selector Switch (FPSS) - Marked "Test", "Auto", "Engine Start", and "Off". Permits four modes of Transfer Switch operation. The "Test" position simulates a failure of the Normal Power Source and functions like the standard Test Selector Switch. The "Auto" position is the regular operational mode. The "Off" position de-energizes the control logic relays and opens the engine start circuit. The switch will not operate nor will the engine start upon failure of the Normal Power Source. A white pilot light is provided to indicate that the FPSS is in the "Off" position. The "Engine Start" position provides testing of the engine start circuit by closing the engine starting contacts and allowing the engine to run unloaded. The switch will not initiate a load transfer with the FPSS in the "Engine Start" position unless there is a failure of the Normal Power Supply.

8. TRANSFER TIME DELAY BYPASS

Provides a manual pushbutton operated bypass on the TDNE (Optional Accessory 1) and/or the TDEN (Optional Accessory 3) permitting the switch to be transferred to either Power Source without a time delay. This Optional Accessory is normally used during routine testing of the Emergency/Standby system when it is not desirable to wait for the respective timers to complete their timing sequence before transfer.

❑ 8C Bypass TDEN pushbutton (PBEN)

❑ 8D Bypass TDNE pushbutton (PBNE)

9. MAINTENANCE SELECTOR SWITCH (MSS)

Marked "Off"/"On". Provides selector switch disconnection of control power to the Transfer Motor circuit thus allowing testing of the Transfer Switch Control logic circuitry without initiating load transfer. (Manual disconnection is standard on all Westinghouse Automatic Transfer Switches.) Positioning the MSS in the "Off" position isolates the control logic circuit from the Transfer Motor, permitting manual operation of the Transfer Switch or testing of logic circuitry without load transfer.

❑ 9B Maintained Contact MSS

10. PREFERRED SOURCE SELECTOR SWITCH (PSSS)

Permits the selection of either source as the "preferred" source which the Automatic Transfer Switch will always seek if that source is available. Marked "Source 1", "Source 2".

❑ 10B PSSS for use on systems composed of Dual Utility or Utility/Engine Generator power sources.

❑ 10D PSSS for use on systems composed of Dual Engine Generator power sources. (Dual Engine starting circuits are provided when Optional Accessory 10D is selected.)

12. INDICATING LIGHTS

SWITCH POSITION

❑ 12C Green Pilot Light (NL) indicates that the load is connected to the Normal Power Source marked "Normal". Switch utilizes 1 Ampere Power Switching Device auxiliary contact from the respective power sources.

❑ 12D Red Pilot Light (EL) indicates that the load is connected to the Emergency/Standby Power Source marked "Emergency". Switch utilizes 1 Ampere Power Switching Device auxiliary contact from the respective power sources.

SOURCE AVAILABILITY

❑ 12G White Pilot Light (SN) indicates voltage is present on the line side of the Normal Power Source marked "Normal".

❑ 12H White Pilot Light (SE) indicates voltage is present on the line side of the Emergency/Standby Power Source marked "Emergency".

TRIPPED CONDITION

(Available only when integral overcurrent protection is selected - Optional Accessory 16.) A common trip indicator light is provided as standard on SPB type switches when supplied with Optional Accessory 16.

❑ 12L Amber Pilot Light (TN) indicates overcurrent trip condition on Normal side main contacts.

❑ 12M Amber Pilot Light (TE) indicates overcurrent trip condition on Emergency side main contacts.

14. RELAY AUXILIARY CONTACTS

Three Form C contacts are provided on all Automatic Transfer Switches utilizing solid state logic sensing.

❑ 14C Normal Source Relay Auxiliary Contacts (NRA) – Energized when the load is connected to the Normal Power Source power supply and normal voltage is present.

❑ 14D Emergency/Standby Source Relay Auxiliary Contacts (ERA) – Energized whenever Emergency/Standby Source voltage is present.

16. INTEGRAL OVERCURRENT PROTECTION

Provides overcurrent protection integral to the Power Switching Device(s). Use of this Optional Accessory can, in many cases, eliminate the need for separate upstream overcurrent/short circuit protection and provide significant material, labor and space savings over other system layouts. In addition to overcurrent protection, for safety purposes, selection of this Optional Accessory also includes a lock-out function that prevents further automatic transfer operation until the appropriate source is manually reset.

Note: 4 pole transfer switches include overcurrent protection only on the three power poles. SPB units will be supplied with an amber indicating light marked "Tripped Condition" indicating an overcurrent trip status. See Optional Accessories 12L and 12M for trip lights on units 1000 Amperes and below. For detailed information regarding integral overcurrent protection, contact the factory.

TRANSFER SWITCHES RATED 600-4000 AMPERES (SPB)

Digitrip RMS Microprocessor Overcurrent Protection

Digitrip RMS provides true RMS sensing in lieu of conventional bimetal trip elements allowing the ultimate in selectivity and system coordination, and can be supplied with integral ground fault protection, energy monitoring, and/or remote communication capabilities. Contact the factory for further information on this Westinghouse Transfer Switch exclusive feature.

The specifier and/or user has a choice of several protection function combinations as shown in Table 16-1 below. Please specify the particular combination. (Note: If a combination is not specified, the Digitrip RMS will be provided with Long Time/ Instantaneous Protection.)

Table 16-1

	DESIGNATION	
Protection Function	W/O GFP	W/GFP
Long Time/Instantaneous	LI	LIG
Long Time/Short Time	LS	LSG
Long Time/Short Time/ Instantaneous	LSI	LSIG

TRANSFER SWITCHES RATED 100-1000 AMPRERES (NON-SPB)

Thermal Magnetic Overcurrent Protection

- ❑ 16B Overcurrent Protection on Both Power Sources.
- ❑ 16E Overcurrent Protection on the Emergency/Standby Power Source only.
- ❑ 16N Overcurrent Protection on the Normal Power Source supply only.

17. ALTERNATE HIGH WITHSTAND POWER SWITCH

- ❑ 17C Increases Withstand from 65kA to 100kA @ 480V for 800 through 1200 Amperes. (Available on SPB type switches only.)

18. METERING AND COMMUNICATIONS

Westinghouse IQ Meters

The Westinghouse IQ Family of microprocessor based digital meters offers the latest technological advances in metering and communications functions for today's complex system designs. Line side voltage is monitored phase-to-phase and phase-to-neutral with +/-1% accuracy, and current is monitored from each phase of the connected load with +/-1% accuracy. Frequency is monitored from the line side of the source with +/-.5% accuracy. The entire IQ Family is also available with remote monitoring and communications capabilities via the Westinghouse IMPACC System. Consult the factory for applications requiring remote monitoring/communications.

IQ GENERATOR

The IQ Generator is a microprocessor based monitoring device that provides simultaneous current, voltage and frequency metering. In one compact standard package, the IQ Generator provides an alternative to individually mounted and wired ammeters, voltmeters, ammeter and voltmeter switches and frequency meters. The IQ Generator provides +/-1% accuracy on voltmeter and ammeter function and +/-.5% on frequency. Includes CTs, PTs and power module required for operation and can be supplied on the Normal Power Source, the Emergency/Standby Power Source, or with a selector switch allowing reading for both power sources (Please specify).

- ❑ 18I Normal
- ❑ 18J Emergency
- ❑ 18K Both N and E

IQ DATA PLUS II

The IQ Data Plus II is a microprocessor based monitoring device that provides complete electrical metering and energy monitoring. In one compact, standard package, the IQ Data Plus II provides an alternative to individually mounted and wired ammeters, voltmeter, ammeter, ammeter and voltmeter switches, watt meter, watthour meters and more. This device provides +/-1% accuracy on voltmeter and ammeter functions, +/-.5% accuracy on frequency, +/-2% accuracy on watts, watt demand, watt hours, and vars, and +/-4% accuracy on power factor readings. It will also provide indication on phase loss, phase unbalance, phase reversal, over voltage and under voltage.

The IQ Data Plus II includes the CTs, PTs and power module required for operation and can be supplied on the Normal or Emergency/Standby Power Source (Please specify).

- ❑ 18L Normal
- ❑ 18M Emergency
- ❑ 18N Both N and E
- ❑ 18P IMPACC Communications – Refer to factory for applications requiring remote monitoring and/ or communications capabilities.

20. REAR BUS PROVISIONS

Standard 30-1200 Ampere Westinghouse Transfer Switches are assembled with front connected solderless lugs. Standard 1600-4000 Ampere Switches are assembled with rear connected solderless lugs.

- ❑ 20A *Rear Bus Provisions – Provide* separate bus stabs extending to the rear from the line side of the Normal and Emergency/Standby Power Switching Devices as well as common load stabs, allowing the installer to connect the bus to the transfer switch. Available only on open switches from 150-1000 Amperes, and on open or enclosed 1200-4000 Ampere switches. (Not available on 30-100 Ampere switches.)

21. OPTIONAL TERMINALS

- ❑ 21A Refer to Wire Terminal Data, TB 29-925 to make the appropriate selection for your application.

23. PLANT EXERCISER (PE)

Solid state digital clock timer with long-life lithium battery backup provides means for automatic testing of the Emergency/Standby Power Plant. This device is programmable to allow a maximum of 10 programs of automatic testing per week. Run time is fully adjustable with set points from 1 second-168 hours.

- ❑ 23C Engine Start/Run Only – Starts Emergency/Standby Power Plant and runs engine without load transfer. However, if the Normal Power Supply fails during the Exercise period, load transfer will occur.
- ❑ 23D Exercise With Load Transfer – Starts Emergency/Standby Power Plant and initiates load transfer. Automatically transfers back to the Normal Power Source at the end of the Exercise period.

- ❑ 23G Exercise With or Without Load Transfer – Programmable to allow selection of Engine Start/Run only, Exercise With Load Transfer, or a complete bypass of the Exercise system. Includes selector switch marked "Engine Run", "Bypass", "Load Transfer".
- ❑ 23I Exercise With Load Transfer and Fail-safe Feature – Similar to Optional Accessory 23D except with Fail-safe Feature. This feature provides an immediate transfer to the Normal Power Source if the Emergency/Standby Power Source fails during the Exercise period.
- ❑ 23J Exercise With or Without Load Transfer and Fail-safe Feature – Similar to Optional Accessory 23G except with Fail-safe Feature. If the Emergency/Standby Power Source should fail while Exercising in the "Load Transfer" mode, immediate retransfer to the Normal Power Supply will occur.

24. BATTERY CHARGER (BC)

Fully automatic 5 Ampere float battery charger for engine cranking batteries. Uses ferroresonant transformer technology which is self-regulating and completely devoid of any complicated switching circuits. The charger comes in its own #304 stainless steel housing for separate mounting and includes a DC Ammeter allowing instant visual identification of charger output status. Unit requires a separate 100-135 VAC/60 Hz power supply for hookup.

(Contact the factory for applications requiring a 220VAC/50 Hz power supply.)

- ❑ 24C Battery Charger with 12 VDC output
- ❑ 24D Battery Charger with 24 VDC output

26. TYPE OF PROTECTION

(Normal Source) Full phase protection is standard. A voltage sensing relay monitors each phase of the normal power supply. Normally set at 80% Dropout and 90% Pickup.

- ❑ 26C Over Voltage Monitor – Provides three phase voltage sensing. Set at 115% Dropout and 110% Pickup of nominal voltage. Adjustable over a wide range of settings.
- ❑ 26D Area Protection Connections With Override Circuit – Provides two terminal blocks for connection of one or more Normally Closed (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 Normally Closed area protection contact opens, the switch initiates engine start and will transfer to Emergency Power Source. In the event that the Normally Closed area protection contact remains open and the Emergency Source fails when the switch is in the Emergency position, an override circuit will retransfer the switch to the Normal Source if it is available.
- ❑ 26E Under Frequency, adjustable 45-60 Hz (Drops out 2 Hz lower than setting) – A frequency sensing relay is connected to one phase only of the Normal Source, constantly monitoring that phase.
- ❑ 26F Over Frequency, adjustable 50-65 Hz (Drops out 2 Hz above setting) – A frequency sensing relay is connected to one phase only of the Normal Source, constantly monitoring that phase.
- ❑ 26H Phase Reversal – Provides protection from reversal of phases on the Normal side.

28. INTELLIGENCE CIRCUIT FUSES

- ❑ 28A Provides fuses on all non-essential control circuitry.

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.

- ❑ 29E Pushbutton Return to Normal – Automatic operation Normal to Emergency. Pushbutton operation Emergency to Normal. Includes fail-safe feature providing immediate retransfer to Normal if Emergency fails while in that position.
- ❑ 29G* Automatic/Manual Operation – Two-position selector switch (marked "Auto"/"Manual") permits selection of automatic or manual operation. Includes pushbuttons for manual operation when selector switch is in the "Manual" position.
- ❑ 29J 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 Optional Accessory 29E which only operates to return to Normal when the switch is in the "Manual" mode.

*Automatic Transfer Switch cannot be UL labeled if selected.

30. CRANKING LIMITER

- ❑ 30A Adjustable 0-120 seconds. Interrupts engine start circuit if voltage does not appear within pre-selected time.

32. DELAYED TRANSITION TIMER

- ❑ 32A Provides a time delay in the Neutral ("Off") 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.

33. SHUNT TRIP

Wired to terminal blocks for customer connection. Specify coil voltage desired (120VAC standard).

- ❑ 33A Supplied on Normal side
- ❑ 33B Supplied on Emergency side

34. EXTENDER CABLE

Permits remote mounting of intelligence circuitry to accommodate limited space applications.

- ❑ 34A 48 inches
- ❑ 34B 72 inches
- ❑ 34C 96 inches
- ❑ 34D 120 inches
- ❑ 34E 144 inches

(Special lengths available. Contact Cutler-Hammer.)

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.

- ❑ 35A Form C contacts (2NO, 2NC)

36. LOAD SHED FROM EMERGENCY

Provides for accepting customer supplied external dry contact closure which will initiate a transfer operation from the connected Emergency position to a both-off position for as long as customer signal is permitted. This option is often desirable where multiple engines are feeding a common emergency bus.

37. SERVICE ENTRANCE RATED TRANSFER SWITCHES

- ❑ 37A Service Entrance Rated without Ground Fault Protection
- ❑ 37B Service Entrance Rated with Ground Fault Protection

Optional Accessory 37 requires Optional Accessory 16B to be provided. Not available on 4 pole automatic transfer switch.

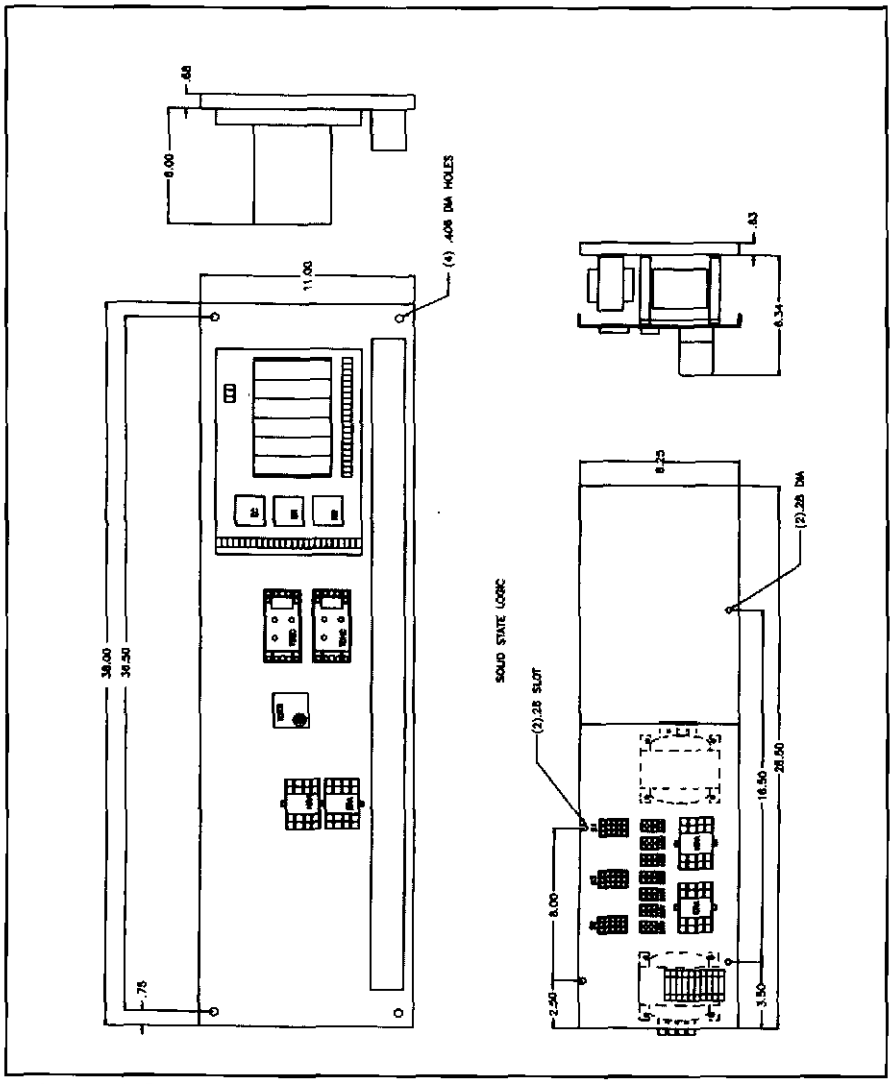
38. HAND-HELD TEST KIT

Self-contained test kit used for calibration and testing of printed circuit cards and output relays used in the solid state logic units. Works on standard 120VAC wall outlet.

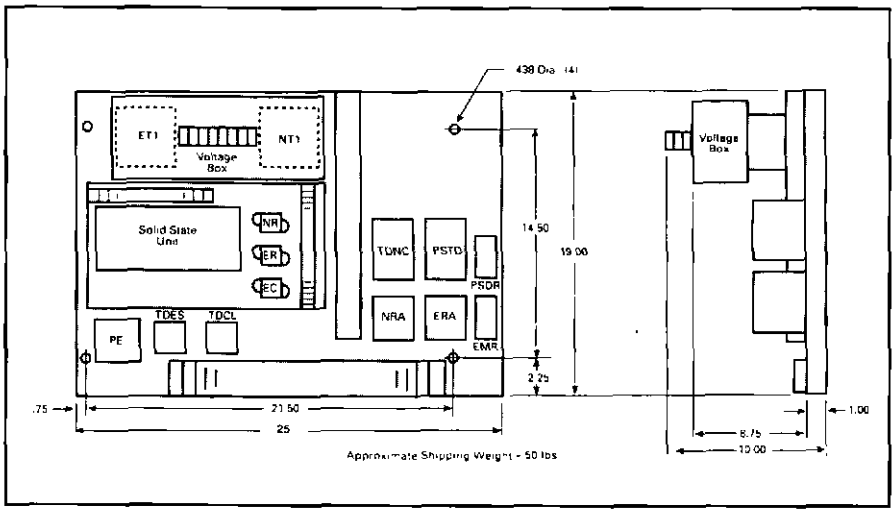
41.SPACE HEATER WITH THERMOSTAT

- ❑ 41A 100 Watts
- ❑ 41B 200 Watts
- ❑ 41C 400 Watts

Dimensions are approximate and should not be used for construction purposes.



Typical Logic Panel used on ATVS- and NTVS- Transfer Switches



Typical Logic Panel used on ATHS-, ATVSSP-, NTHS-, NTVSSP-, BIHS- and BIVSSP-Transfer Switches

FOR ADDITIONAL INFORMATION ON WESTINGHOUSE TRANSFER SWITCHES:

Bypass Isolation Transfer Switches 800-3000 Amperes	B 1221
Mini-SPB Transfer Switches 600-1200 Amperes	B 1222
ATS Relay Logic	SA 12076
ATS Renewal Parts Catalog	SA 12077
Automatic, Manual, Non-Automatic Transfer Switches Vertical Design 150-1000 Amperes	B 1223
Automatic, Manual, Non-Automatic Transfer Switches 30-4000 Amperes	PL 29-920
Automatic, Manual, Non-Automatic Transfer Switches 30-4000 Amperes	TB 29-925
ATS Renewal Parts Price List	PL 29-995
Combination Bypass Isolation and Automatic Transfer Switches 100-1000 Amperes	SA 11844
Drawout Transfer Switches 800-4000 Amperes	SA 11873

Cutler-Hammer
Westinghouse &
Cutler-Hammer Products
Five Parkway Center
Pittsburgh, PA 15220
(412) 937-6100

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