

Operator's Manual

ASCO® 7000 Series Medium-Voltage Automatic Transfer Switches 4.76, 15.0, 27 kV; 1200, 2000, 3000 ampere

DANGER

DANGER is used in this manual to warn of a hazard situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING is used in this manual to warn of a hazardous situation which, if not avoided, could result death or serious injury.

CAUTION

CAUTION is used in this manual to warn of a hazardous situation which, if not avoided, could result in minor or moderate injury.



Typical 7000 Series MV ATS, 1200 A

Refer to the outline and wiring drawings provided with your 7000 Series ATS for all installation and connection details and accessories.

Refer to the Group 5 Controller *User's Guide* 381333-126 for ATS status display messages, time delays, pickup & dropout settings, & adjustments.

ASCO 7000 Series Medium-Voltage Automatic Transfer Switches (ATS) are designed to ANSI C37.20.2 standard for metal-clad switchgear and are UL 1008A Listed.

Nameplate and Rating Label

The nameplate includes data for each specific automatic transfer switch. Use the ATS only within the limits shown on this nameplate. Each ATS has a rating label to define the loads, interrupting, short-time, and close & latch ratings. Refer to the label for specific values.

WARNING

Do not exceed the values on the rating label. Exceeding the rating can cause personal injury or serious equipment damage.

This equipment is designed for use with dangerous levels of power from multiple sources. Additionally, voltage transformers and standby control power sources (i.e. station battery system, UPS) included in the equipment must be disconnected when servicing this equipment. Persons installing, servicing, and operating this equipment must be trained, licensed appropriately, and familiar with medium voltage electrical power equipment and adhere to required apparel, protection, tools, controls, and procedures.

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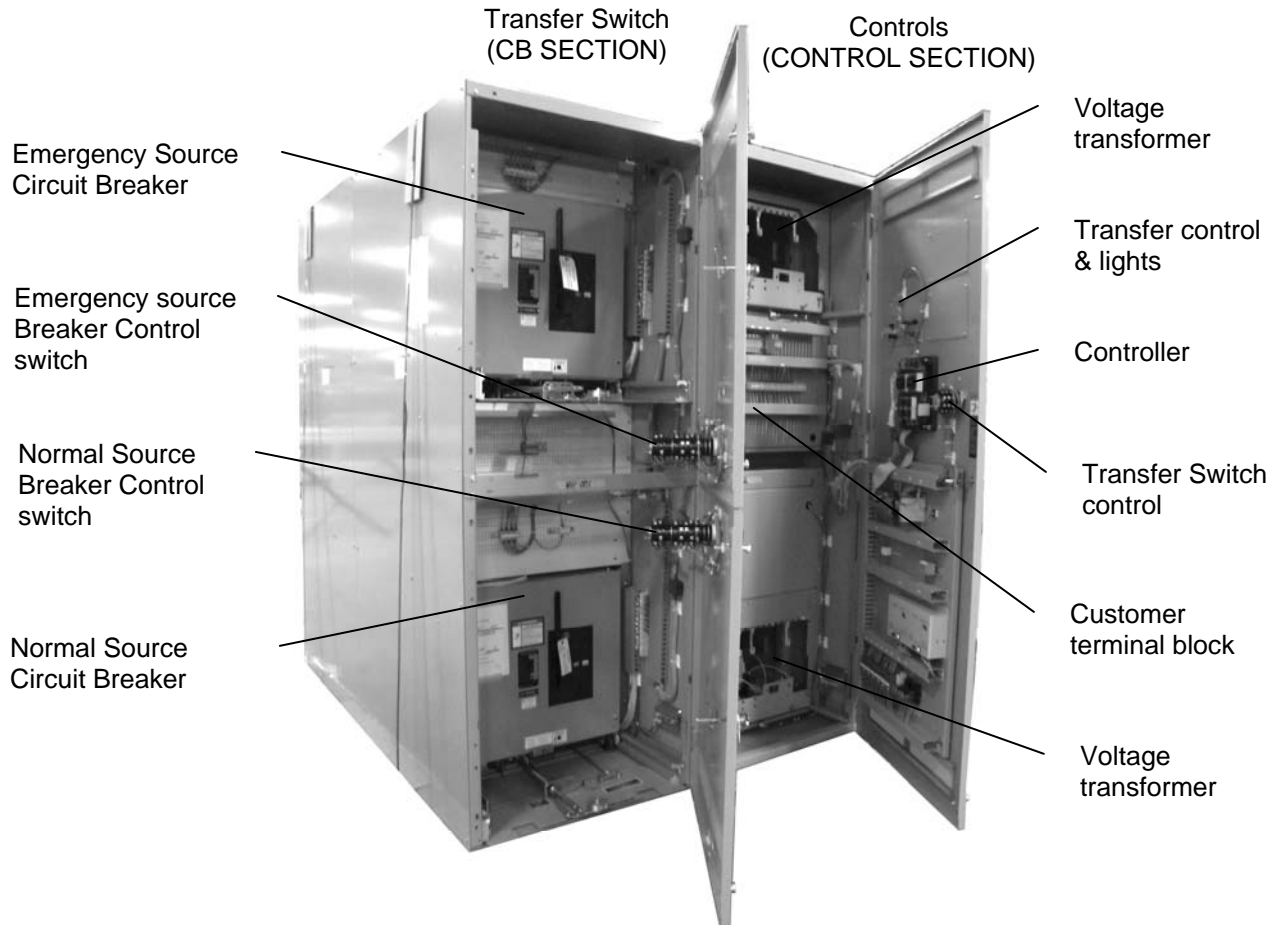
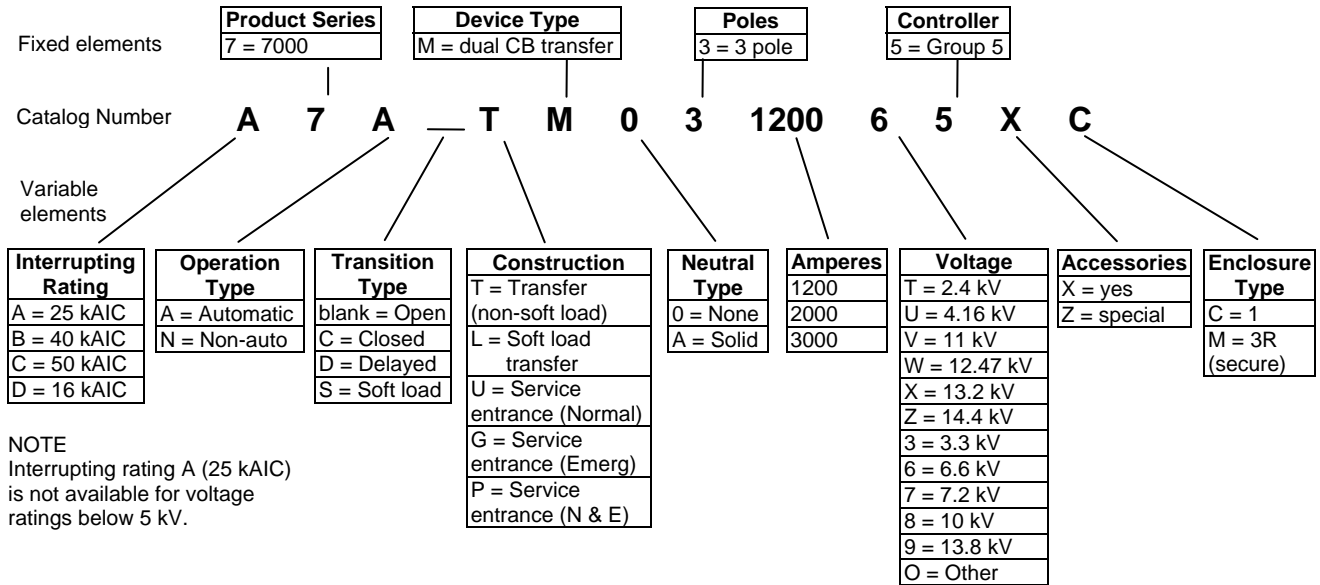


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381333-395

Catalog Number Identification

A typical Catalog Number is shown below with its elements explained. The example is for a 7000 Series Automatic Transfer Switch, class A interrupting rating, automatic, open-transition transfer, dual-circuit breaker, 3 pole, 1200 ampere, 6.6 kV 60 Hz, in a Type 1 enclosure.



Typical 7000 Series MV ATS with location of major components (1200 amp shown)

Installation

The ASCO 7000 Series Medium-Voltage Automatic Transfer Switch (ATS) is factory wired and tested.

Refer to the manual from the manufacturer of the metal-clad switchgear for section handling, installation, power connections, and testing.

Supporting Structure

The supporting foundation for the enclosure must be level and straight. Refer to the applicable enclosure outline drawing included with the transfer switch for all mounting details including door opening space.

Mounting

Refer to the outline and mounting diagram and mount the automatic transfer switch according to details and instructions shown on the diagram.

NOTICE

Protect the transfer switch from construction grit and metal chips to prevent malfunction or shortened life of the transfer switch.

Testing Power Conductors

Do not connect the power conductors to the transfer switch until they are tested. Installing power cables in conduit, cable troughs, and ceiling-suspended hangers often requires considerable force. The pulling of cables can damage insulation and stretch or break the conductor's strands. For this reason, after the cables are pulled into position, and before they are connected, they should be tested to verify that they are not defective or have been damaged during installation.

Line Connections

Refer to the wiring diagram provided with the transfer switch. All wiring must be made in accordance with the National Electrical Code and local codes.

! DANGER

De-energize all conductors, open all circuit breakers, and rack out all voltage transformers before making any connections. De-energize any UPS, station battery system, or any similar system providing standby control power. Be sure that the Normal and Emergency line connections are in proper phase rotation. Place the engine generator starting control in the OFF position. Make sure engine generator is not in operation.

Engine-Generator Control Connections

All customer connections, including the engine control contact connections, are located on terminal block TB. This terminal block is located on the interior left side of the control section. Refer to the wiring diagram provided with the automatic transfer switch. Connect the engine start wires to the appropriate terminals. See Figure 1-1 and Table A.

Table A. Engine-generator control contacts

When normal source fails	TB terminals
contact closes	TB1 and TB2
contact opens	TB1 and TB3

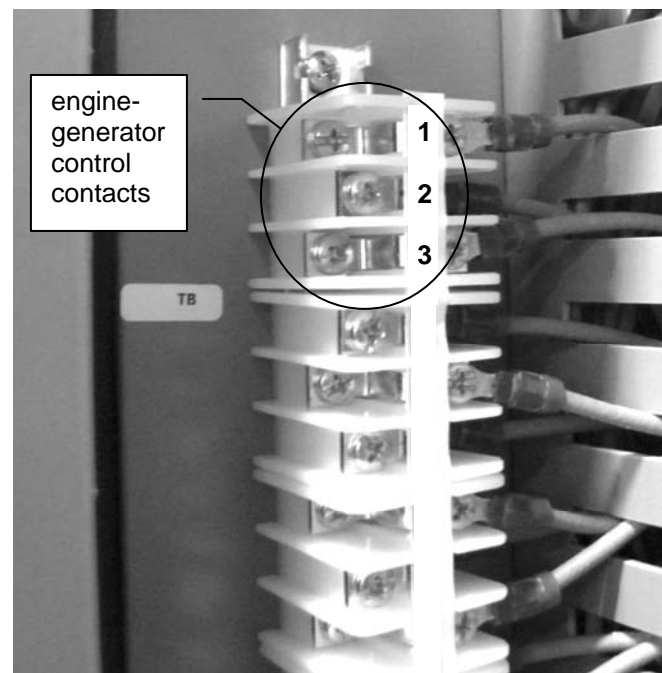


Figure 1-1. Customer terminal block TB in controls section.

Auxiliary Circuits

Connect auxiliary circuit wires to appropriate terminals on terminal block TB as shown on the wiring diagram provided with the automatic transfer switch.

Configuration of Shipped ATS

The MV ATS is shipped with the circuit breakers and controls in the following state:

ON CB SECTION(S) - Circuit Breakers, check these items

- Normal source circuit breaker (CBN) in the OPEN position with the closing spring discharged.
- Emergency source circuit breaker (CBE) in the OPEN position with the closing spring discharged.
- Normal source circuit breaker control switch (53CBN) in the TRIP position (green target displayed on control switch)
- Emergency source circuit breaker control switch (53CBE) in the TRIP position (green target displayed on control switch)

ON CONTROL SECTION – Controls, check this item

- Transfer Switch Auto-Man selector switch (53AM) in the MAN (manual) position.

Circuit breaker position lights
green=CB open
red=CB closed

Breaker control target indicator
green=tripped
red=closed



Figure 2-2. Control switches

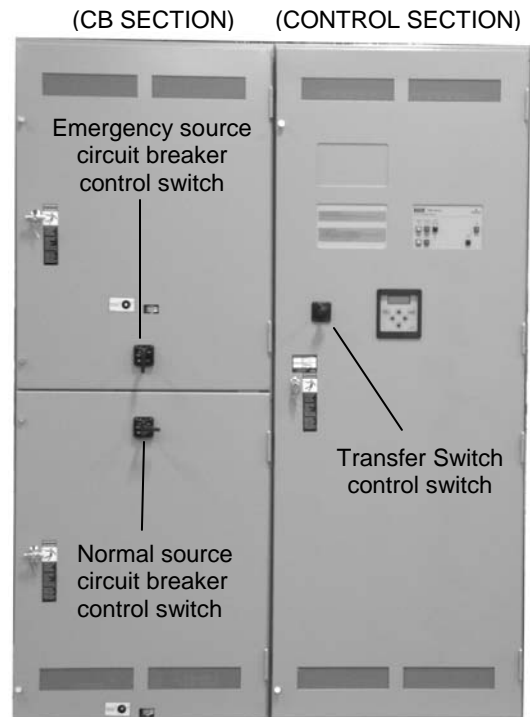


Figure 2-1. Location of control switches



Be sure to close both enclosure doors before proceeding to prevent personal injury in case of electrical system fault.

Energizing the Normal Source, Setting Automatic Operation Mode

After the MV ATS is installed, the Normal source can be energized. Then the controls can be set for automatic (standby) operation. The Normal and Emergency sources must be available. Follow this procedure:

ON CONTROL SECTION – Controls, check these items

- The transfer control indicator lights *Normal Source Accepted* and *TS Locked Out* should be on.
- The controller display should show that the transfer switch is **Locked Out**.

ON CB SECTION(S) - Circuit Breakers, check these items

- Normal source circuit breaker control switch should indicate that the circuit breaker is *OPEN* (green light).
- Emergency source circuit breaker control switch should indicate that the circuit breaker is *OPEN* (green light).

Energizing procedure

1. On Control Section, turn the Transfer Switch Auto-Man selector switch to the *AUTO* (automatic) position.
2. On CB Section, turn the Normal source circuit breaker control switch to *CLOSE* position (red target window).
3. On CB Section, turn the Emergency source circuit breaker control switch to the *CLOSE* position (red target).
4. On Control Section, press the transfer controls *Alarm Reset* button. Normal source circuit breaker should close.

The Normal source CB control switch should indicate that the circuit breaker is *CLOSED* (red light).

The ATS is now in an automatic (standby) operating mode. Proceed to transfer test.

Controller Settings for MV ATs

Refer to the Group 5 Controller *User's Guide* 381333-126 for ATS status display messages, time delays, pickup & dropout settings, & adjustments.

The Group 5 Controller is factory set for medium-voltage operation. These are the special settings:

Controller Voltage Jumper Blocks

The control voltage is typically stepped down to 120V, so the eight jumper blocks are factory arranged horizontally for 120 V input.

Controller Menu Settings

ATS Information Rating is 1200, 2000, or 3000 A

The ATS information rating setting is 1200A, 2000A, or 3000A.

ATS Information is Circuit Breaker Non Bypass

The ATS information type setting is BRKR NBPS.

What to do if a circuit breaker trips

1. Check the protective relay and determine the cause of the trip. Refer to device's instructions. After fault is cleared, reset the protective relay.
2. Reset the Lock-Out Relay by turning it to RESET.
3. Turn the Breaker Control switch to CLOSE.
4. Press the Alarm Reset button. The circuit breaker should close if its connected source is selected by the controller to serve the load.

Lock-Out Relay (optional)

If an optional protective relay (device) is ordered for the normal and/or emergency source circuit breaker, a Lock-Out Relay (LOR) is provided on the appropriate circuit breaker compartment door. The LOR responds to a signal from a protective relay and in turn trips the appropriate circuit breaker. The LOR locks out the circuit breaker until the fault is cleared and the protective relay and LOR has been reset. A red light and orange window shows tripped.

Lock-Out Relay status lights

green=ready to respond
red=trip signal sent to CB

Status window

black=ready to respond
orange=trip signal sent to CB

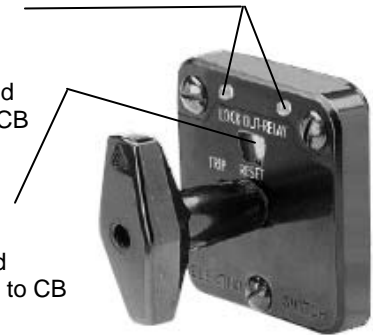


Figure 2-3. Lock-Out Relay

Breaker Control Tripped Light (opt.)

If an optional protective relay (device) is ordered, the BREAKER CONTROL switch has a center amber TRIPPED light. This light comes on if the CB has been tripped by the LOR.

Optional circuit breaker tripped light

amber=CB tripped open



Figure 2-4. Breaker Control Tripped light

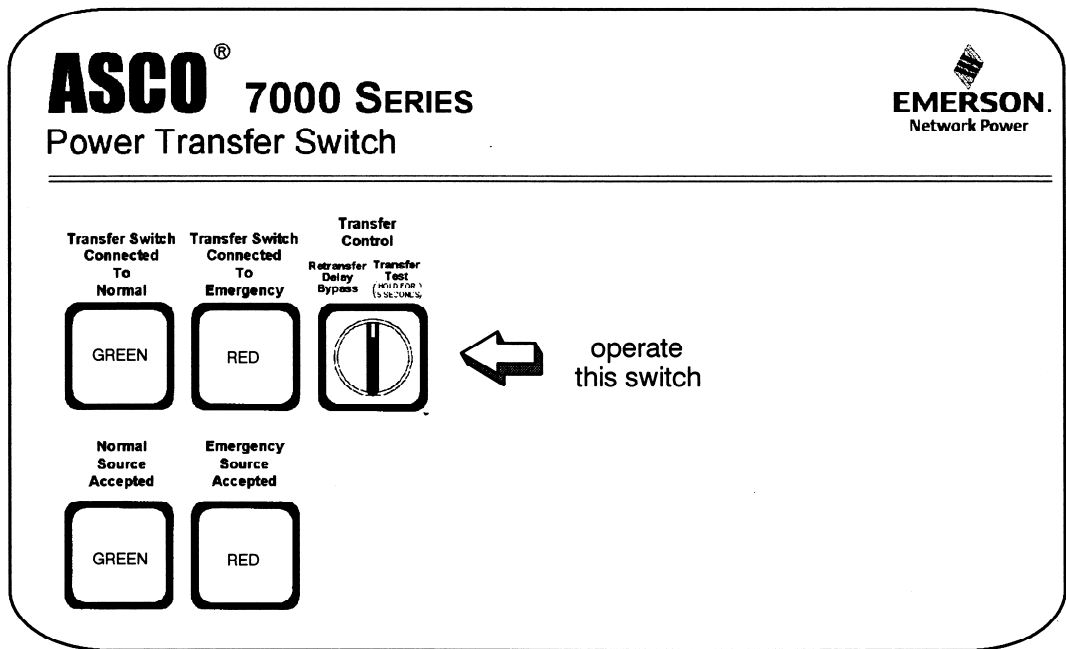


Figure 2-5. 7ATS controls and indicators.

ATS Electrical Operation

This procedure checks the electrical operation of the automatic transfer switch. See Figure 2-5.

Transfer Test

Both normal and emergency sources must be available and the emergency source generator (if used) must be capable of being started in this procedure.

Perform the steps at the right. Observe the status lights.

- Black square means light is on.
- White square means light is off.

<p>1 The <i>Transfer Switch Connected to Normal</i> and <i>Normal Source Accepted</i> lights should be on.</p>	
<p>2 Turn and <u>hold</u> the Transfer Control switch clockwise to <i>Transfer Test</i> until the engine starts and runs (within 15 sec.). The <i>Emergency Source Accepted</i> light should come on.</p>	
<p>3 The transfer switch will operate to the Emergency position after Feature 2B time delay. The <i>Transfer Switch Connected to Emergency</i> light should come on and <i>Load Connected to Normal</i> light goes off.</p>	
<p>4 The transfer switch will operate back to the Normal position after Feature 3A time delay. For immediate retransfer turn the Transfer Control counter-clockwise to <i>Retransfer Delay Bypass</i>.</p>	
<p>The <i>Transfer Switch Connected to Normal</i> light should come on; the <i>Transfer Switch Connected to Emergency</i> light should go off.</p>	
<p>5 The engine-generator will stop after the Feature 2E time delay (unloaded running engine cool-down). The <i>Emergency Source Accepted</i> light should go off.</p>	

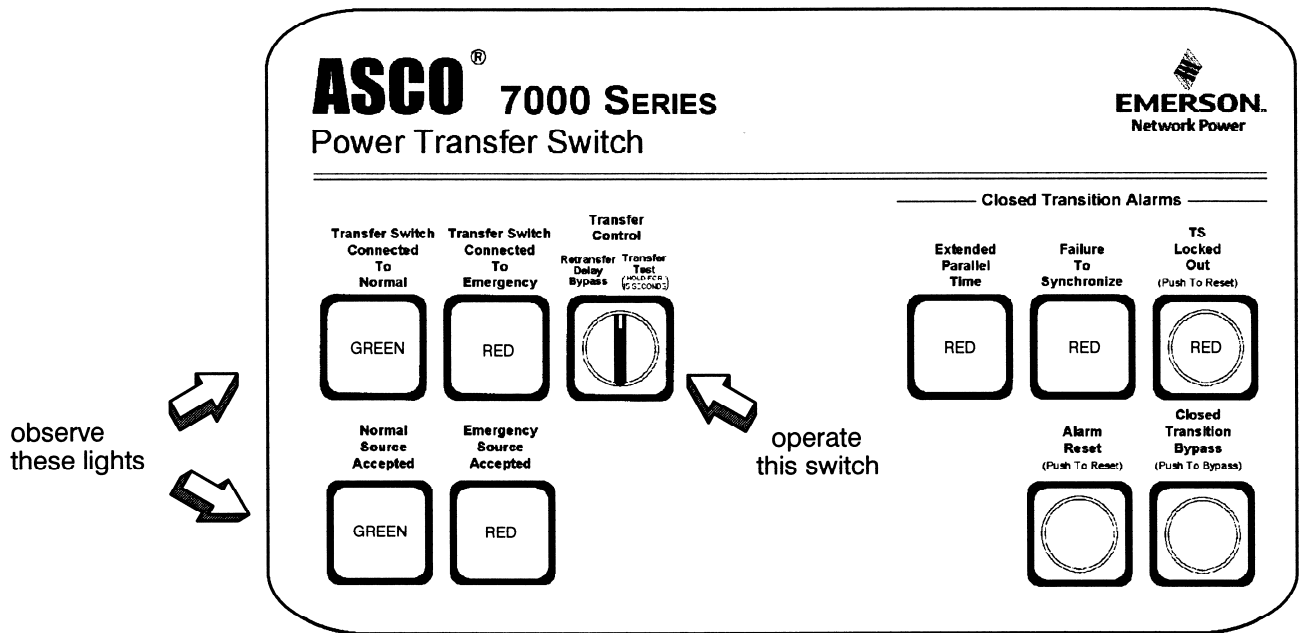


Figure 2-6. 7ACTS controls and indicators.

ACTS Electrical Operation

This procedure checks the electrical operation of the automatic closed-transition transfer switch. See Figure 2-6.

Transfer Test

Both normal and emergency sources must be available and the emergency source generator (if used) must be capable of being started in this procedure.

Perform the steps at the right. Observe the status lights.

- Black square means light is on.
- White square means light is off.

** If you do not want closed-transition transfer, press the **Closed Transition Bypass** pushbutton while the controller display shows *Waiting for In-Sync*. This action causes open-transition (momentary load interruption) transfer to the opposite source, if conditions permit. Also refer to the Group 5 Controller User's Guide 381333-126.

<p>1 The <i>Transfer Switch Connected to Normal</i> and <i>Normal Source Accepted</i> lights should be on.</p>	
<p>2 Turn and <u>hold</u> the Transfer Control switch clockwise to <i>Transfer Test</i> until the engine starts and runs (within 15 sec.). The <i>Emergency Source Accepted</i> light should come on.</p>	
<p>3 The transfer switch will operate to the Emergency position after Feature 2B time delay. The <i>Transfer Switch Connected to Emergency</i> light should come on and <i>Load Connected to Normal</i> light goes off. You might see and hear the brief overlap transfer.**</p>	
<p>4 The transfer switch will operate back to the Normal position after Feature 3A time delay. For immediate retransfer turn the Transfer Control counter-clockwise to <i>Retransfer Delay Bypass</i>.</p>	
<p>The <i>Transfer Switch Connected to Normal</i> light should come on; the <i>Transfer Switch Connected to Emergency</i> light should go off.</p>	
<p>5 The engine-generator will stop after the Feature 2E time delay (unloaded running engine cool-down). The <i>Emergency Source Accepted</i> light should go off.</p>	

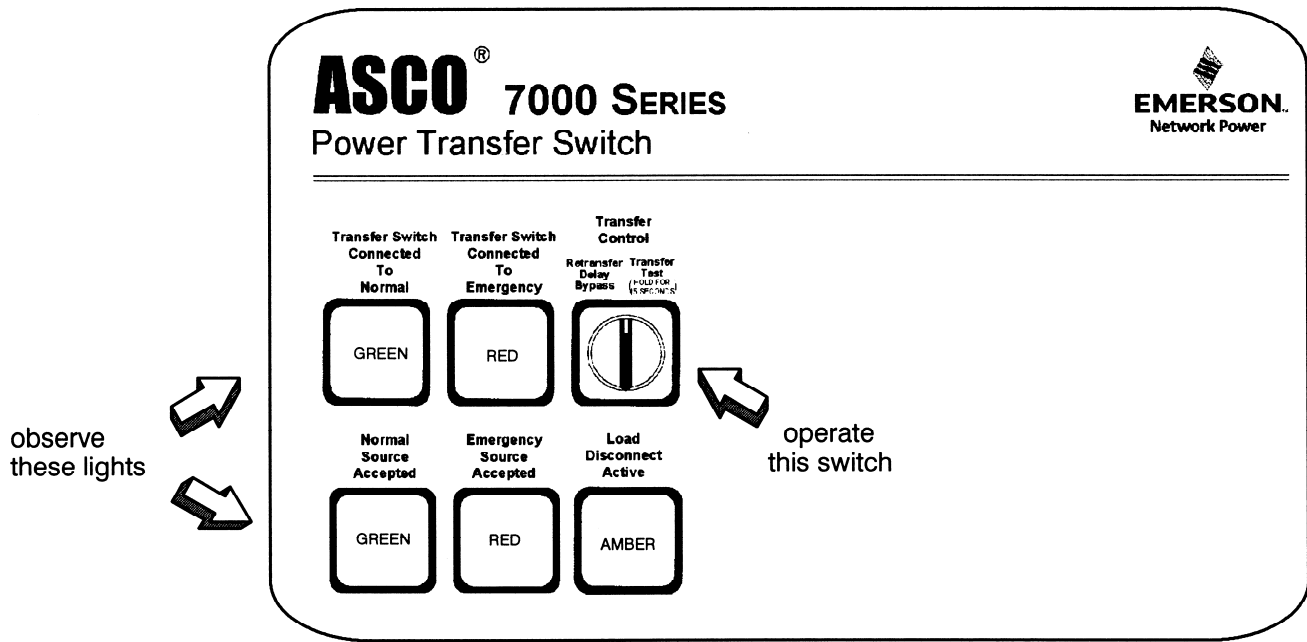


Figure 2-7. 7ADTS controls and indicators.

ADTS Electrical Operation

This procedure checks the electrical operation of the automatic delayed-transition transfer switch. See Figure 2-7.

Transfer Test

Both normal and emergency sources must be available and the emergency source generator (if used) must be capable of being started in this procedure.

Perform the steps at the right. Observe the status lights.

- Black square means light is on.
- White square means light is off.

<p>1 Turn and <u>hold</u> the Transfer Control switch clockwise to <i>Transfer Test</i> until the engine starts and runs (within 15 sec.). The <i>Emergency Source Accepted</i> light should come on.</p>	
<p>2 CBN opens and the <i>Transfer Switch Connected to Normal</i> light should go off and the <i>Load Disconnect Active</i> light should come on. Both CBN and CBE contacts are now open.</p>	
<p>3 After the delay transition time delay, CBE closes. The <i>Transfer Switch Connected to Emergency</i> light should come on and the <i>Load Disconnect Active</i> light goes off.</p>	
<p>4 CBN closes after Feature 3A time delay. For immediate retransfer turn the Transfer Control counter-clockwise to <i>Retransfer Delay Bypass</i>. The <i>Transfer Switch Connected to Normal</i> light should come on; the <i>Transfer Switch Connected to Emergency</i> light should go off.</p>	
<p>5 The engine-generator will stop after the Feature 2E time delay (unloaded running engine cool-down). The <i>Emergency Source Accepted</i> light should go off.</p>	

Troubleshooting for MV ATS



Refer to the Group 5 Controller *User's Guide* 381333-126 for ATS status display messages, time delays, pickup & dropout settings, & adjustments.

Hazardous voltage capable of causing shock, burns, or death is used in the switch. Do not touch the power or load terminal of the transfer switch!

Problem	Check in Numerical Sequence		
	1 Operation	2 Gen-Set	3 Voltage on Display
Gen-Set does not start when the Transfer Control switch is turned and held in <i>Transfer Test</i> position or when the normal source fails.	Hold Transfer Test switch 15 seconds or the outage must be long enough to allow for Feature 1C time delay plus engine cranking and starting time.	Starting control must be in the automatic position. Batteries must be charged and connected. Check wiring to engine starting contacts on customer terminal block TB. Verify on the controller that small plug J3 is connected to receptacle P3.	
Transfer switch does not transfer the load to the emergency source after the engine-generator set starts.	Wait for Feature 2B time delay to time out (if used).	Generator output circuit breaker must be closed. Generator frequency must be at least 95% of nominal (57 Hz for a 60 Hz system.)	Emergency voltage on controller display should read at least 90% of nominal phase to phase voltage.
Transfer switch does not transfer the load to normal source when normal returns or when the Transfer Control switch is released.	Wait for Feature 3A time delay to time out (if used).		Normal voltage on controller display should read at least 90% of nominal phase to phase voltage.
Engine-generator set does not stop after load retransfer to the normal source.	Wait for Feature 2E time delay to time out (if used).	Starting control must be in the automatic position.	
Circuit breaker trips (on an ATS <u>without</u> protective relay)	Check the controller display for error messages and determine the cause of the trip. After the fault is cleared, turn the Breaker Control switch to <i>CLOSE</i> . Press the Alarm Reset button. The CB should close.		
Circuit breaker trips (on an ATS <u>with</u> a protective relay)	Check the protective relay and determine the cause of the trip (refer to device's instructions). After fault is cleared, reset the protective relay. Then reset the Lock-Out Relay by turning it to <i>RESET</i> . Next turn the Breaker Control switch to <i>CLOSE</i> . Press the Alarm Reset button. The CB should close.		

Troubleshooting for MV ACTS



Refer to the Group 5 Controller *User's Guide* 381333-126 for ATS status display messages, time delays, pickup & dropout settings, & adjustments.

Hazardous voltage capable of causing shock, burns, or death is used in the switch. Do not touch the power or load terminal of the transfer switch!

Problem	Check in Numerical Sequence		
	1 Operation	2 Gen-Set	3 Voltage on Display
Gen-Set does not start when the Transfer Control switch is turned and held in <i>Transfer Test</i> position or when the normal source fails.	Hold Transfer Test switch 15 seconds or the outage must be long enough to allow for Feature 1C time delay plus engine cranking and starting time.	Starting control must be in the automatic position. Batteries must be charged and connected. Check wiring to engine starting contacts on customer terminal block TB. Verify on the controller that small plug J3 is connected to receptacle P3.	
Transfer switch does not transfer the load to the emergency source after the engine-generator set starts.	Wait for Feature 2B time delay to time out (if used).	Generator output circuit breaker must be closed. Generator frequency must be at least 95% of nominal (57 Hz for a 60 Hz system.)	Emergency voltage on controller display should read at least 90% of nominal phase to phase voltage.
Transfer switch does not transfer the load to normal source when normal returns or when the Transfer Control switch is released.	Wait for Feature 3A time delay to time out (if used).		Normal voltage on controller display should read at least 90% of nominal phase to phase voltage.
Engine-generator set does not stop after load retransfer to the normal source.	Wait for Feature 2E time delay to time out (if used).	Starting control must be in the automatic position.	
<i>Failure to Synchronize</i> light comes on.	Conditions of normal or emergency sources not suitable for closed transition transfer. Recheck voltage and frequency of both sources. Press Alarm Reset .		
<i>Extended Parallel Time</i> light comes on.	CBN and CBE contacts are closed longer than setting in the controller. Open the disconnected source CB, then call ASI for assistance.		
<i>TS Locked Out</i> light comes on.	Transfer lockout operation has occurred; transfer switch is disabled from automatic operation. Open the disconnected source circuit breaker, then call ASI.		
Circuit breaker trips (on an ATS <u>without</u> protective relay)	Check the controller display for error messages and determine the cause of the trip. After the fault is cleared, turn the Breaker Control switch to <i>CLOSE</i> . Press the Alarm Reset button. The CB should close.		
Circuit breaker trips (on an ATS <u>with</u> a protective relay)	Check the protective relay and determine the cause of the trip (refer to device's instructions). After fault is cleared, reset the protective relay. Then reset the Lock-Out Relay by turning it to <i>RESET</i> . Next turn the Breaker Control switch to <i>CLOSE</i> . Press the Alarm Reset button. The CB should close.		

Troubleshooting for MV ADTS



Refer to the Group 5 Controller *User's Guide* 381333-126 for ATS status display messages, time delays, pickup & dropout settings, & adjustments.

Hazardous voltage capable of causing shock, burns, or death is used in the switch. Do not touch the power or load terminal of the transfer switch!

Problem	Check in Numerical Sequence		
	1 Operation	2 Gen-Set	3 Voltage on Display
Gen-Set does not start when the Transfer Control switch is turned and held in <i>Transfer Test</i> position or when the normal source fails.	Hold Transfer Test switch 15 seconds or the outage must be long enough to allow for Feature 1C time delay plus engine cranking and starting time.	Starting control must be in the automatic position. Batteries must be charged and connected. Check wiring to engine starting contacts on customer terminal block TB. Verify on the controller that small plug J3 is connected to receptacle P3.	
Transfer switch does not transfer the load to the emergency source after the engine-generator set starts.	Wait for Feature 2B time delay to time out (if used).	Generator output circuit breaker must be closed. Generator frequency must be at least 95% of nominal (57 Hz for a 60 Hz system.)	Emergency voltage on controller display should read at least 90% of nominal phase to phase voltage.
Transfer switch does not transfer the load to normal source when normal returns or when the Transfer Control switch is released.	Wait for Feature 3A time delay to time out (if used).		Normal voltage on controller display should read at least 90% of nominal phase to phase voltage.
Engine-generator set does not stop after load retransfer to the normal source.	Wait for Feature 2E time delay to time out (if used).	Starting control must be in the automatic position.	
<i>Load Disconnect Active</i> light comes on.	Wait for load disconnect time delay to time out.	Explanation: Transfer switch in delayed-transition transfer mode. Load disconnect time delay is adjustable from 0 to 5 min. 59 sec.	
<i>Load Disconnect Active</i> light stays on longer than 6 min..	Check load disconnect time delay setting. Call ASI.	Explanation: Transfer switch contacts are open longer than 5 min. 59 sec (maximum setting). Load remains disconnected.	
Circuit breaker trips (on an ATS <u>without</u> protective relay)	Check the controller display for error messages and determine the cause of the trip. After the fault is cleared, turn the Breaker Control switch to <i>CLOSE</i> . Press the Alarm Reset button. The CB should close.		
Circuit breaker trips (on an ATS <u>with</u> a protective relay)	Check the protective relay and determine the cause of the trip (refer to device's instructions). After fault is cleared, reset the protective relay. Then reset the Lock-Out Relay by turning it to <i>RESET</i> . Next turn the Breaker Control switch to <i>CLOSE</i> . Press the Alarm Reset button. The CB should close.		

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