

ASCO 7000 SERIES ADTS

Automatic Delayed-Transition Transfer Switches

H design 600-1200 A, P-design 600-800 A

Operator's Manual

381333-204 C
9/2016

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 in 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.

An experienced licensed electrician must install the ATS.

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

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



600-1000 A size



1200 A size

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Rating Label

Each automatic delayed-transition transfer switch contains a rating label to define the loads and fault circuit withstand / closing ratings. Refer to the label on the transfer switch for specific values.



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

Nameplate

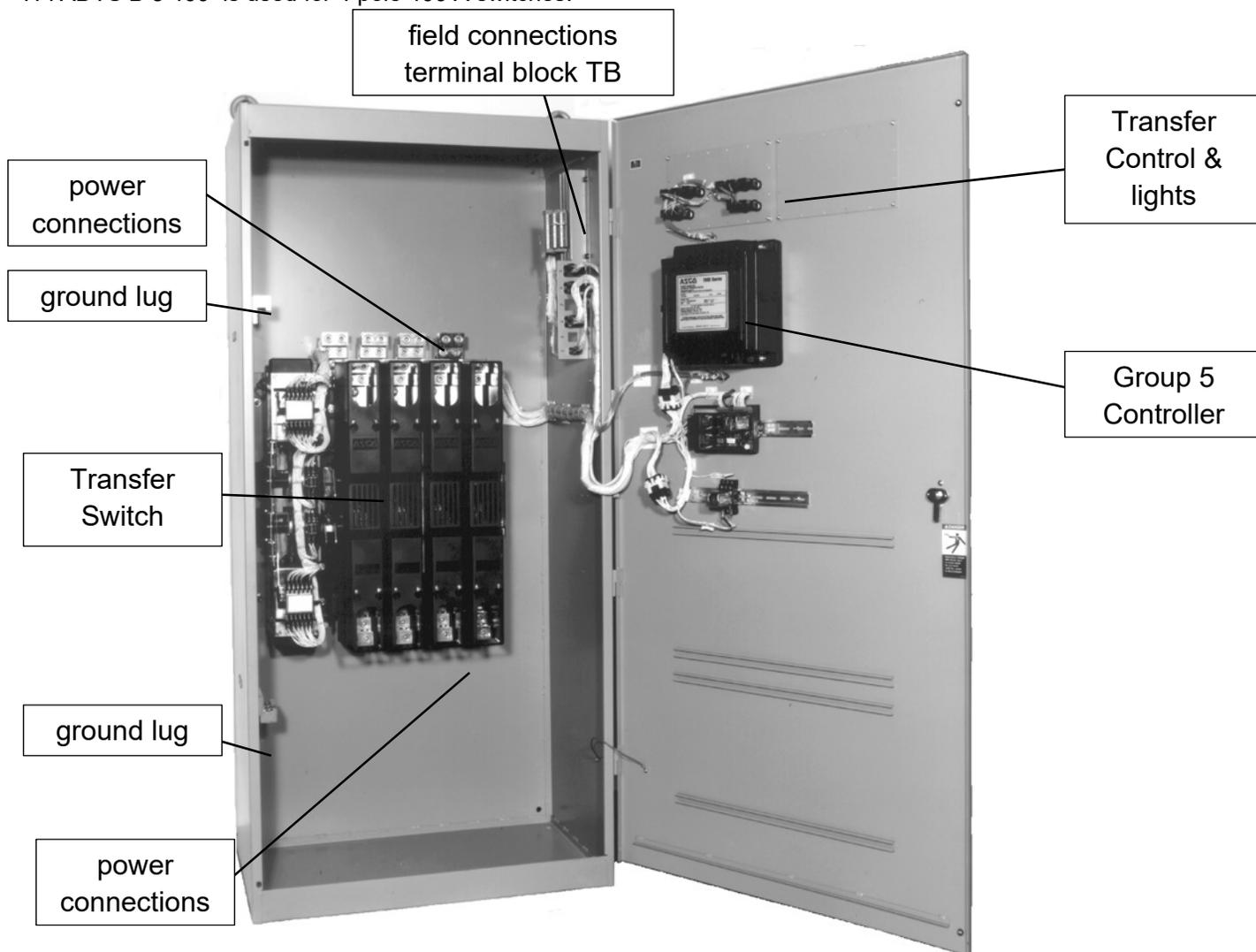
The Transfer Switch nameplate includes data for each specific 7000 Series ADTS. Use the switch only within the limits shown on this nameplate.

Catalog Number Identification

A typical Catalog Number is shown below with its elements explained. The example is for a 7000 Series 7ADTS with switched neutral, 3 pole, 600 amp, 480 V, in a Type 1 enclosure:

H or P 7ADTS	B	3	600	N		5	C
Frame & Series	Neutral	Phase Poles	Amperes	Voltage		Controller	Enclosure
	A-solid	2-single	400	C 208	K 415	5- standard 5X- if accessories ordered	C- Type 1 F- Type 3R G- Type 4** L- Type 12** blank- open type ** available 600-1000 A sizes only
	B-switched	3-three	600	D 220	L 440		
			1000*	E 230	M 460		
	blank-none		1200*	F 240	N 480		
				G 277	P 550		
			*H design only	H 380	Q 575		
				J 400	R 600		

*** H 7ADTS B 3 400 is used for 4 pole 400 A switches.



800-1000 A sizes in typical enclosure with location of customer connections

Installation

ASCO Series 7000 Automatic Delayed–Transition Transfer Switches (ADTSs) are factory wired and tested. Field installation simply requires mounting and connection of service cables, and auxiliary control circuits (if required).

Remove the Shipping Skid (large ADTSs)

For large switches, open the front door and remove the four lag screws (2 in front, 2 in rear) securing enclosure to the wood skid.

Supporting Foundation

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

If bottom cable entry is used, the foundation must be prepared so that the conduit stubs are located correctly. Refer to the enclosure outline drawing for specified area and location. Provide cable bending space and clearance to live metal parts. When a concrete floor is poured, use interlocking conduit spacer caps or a wood or metal template to maintain proper conduit alignment.

Mounting

Refer to the outline and mounting diagram provided with the ADTS; it shows all mounting details and instructions.

Line Connections

A *Wiring Diagram* is furnished with the ASCO Series 7000 ADTS (separate from this manual). Refer to this drawing. All wiring must be made in accordance with the National Electrical Code and local codes.

It is unnecessary to remove pole covers from the transfer switch. If you do remove them, reinstall them carefully.



De–energize the conductors before making any line or auxiliary circuitry connections. Be sure that Normal and Emergency line connections are in proper phase rotation. Place engine generator starting control in the OFF position. Make sure engine generator is not in operation.

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.



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

Connecting Power Conductors

After the power cables have been tested, connect them to the appropriate terminal lugs on the transfer switch as shown on the wiring diagram provided with the switch. Make sure the lugs provided are suitable for use with the cables being installed. Standard terminal lugs are solderless screw type and will accept the wire sizes listed on the drawings provided with the switch. Be careful when stripping insulation from the cables; avoid nicking or ringing the conductor. Remove surface oxides from cables by cleaning with a wire brush. When aluminum cable is used, apply joint compound to conductors. Tighten cable lugs to the torque specified on rating label.

Do not run cables in front of or behind the switch. Cables can be bundled on the right side of the switch. Maintain proper electrical clearance between the live metal parts and grounded metal: ½ inch minimum for 150–400 amps, 1 inch minimum over 400 amps.

It is not necessary to remove the barriers from the transfer switches to install the cables. If you do remove them, however, be sure to reinstall the barriers carefully.

Controller Ground

A grounding wire must be connected to the controller's lower left mounting stud. Because the controller is mounted on the enclosure door, a conductive strap must be used between the enclosure and the door. This connection provides proper grounding which does not rely upon the door hinges.

Harnesses

The transfer switch is connected to the left side of the control panel by a plug-in harness (two plugs).

Installation

Engine Starting Contacts

All customer connections, including the engine control contact connections, are located on terminal block TB which is mounted on the top right side of the enclosure. Refer to the wiring diagram provided with the automatic transfer switch and connect the engine start wires to the appropriate terminals. See Figure 1 and Table A.

Table A. Engine start connections

When normal source fails	Terminals on transfer switch
contact closes	TB1 and TB2
contact opens	TB1 and TB3

Note: To temporarily disable engine control from the automatic transfer switch you can unplug J3 from the small P3 receptacle at the bottom of the assembly. Be sure to reconnect plug J3 to the P3 receptacle for automatic transfer switch operation.

Auxiliary Circuits

Connect auxiliary circuit wires to appropriate terminals on the transfer switch. Note the control features that are furnished on this switch. Make the necessary auxiliary connections by referring to the Wiring Diagram.

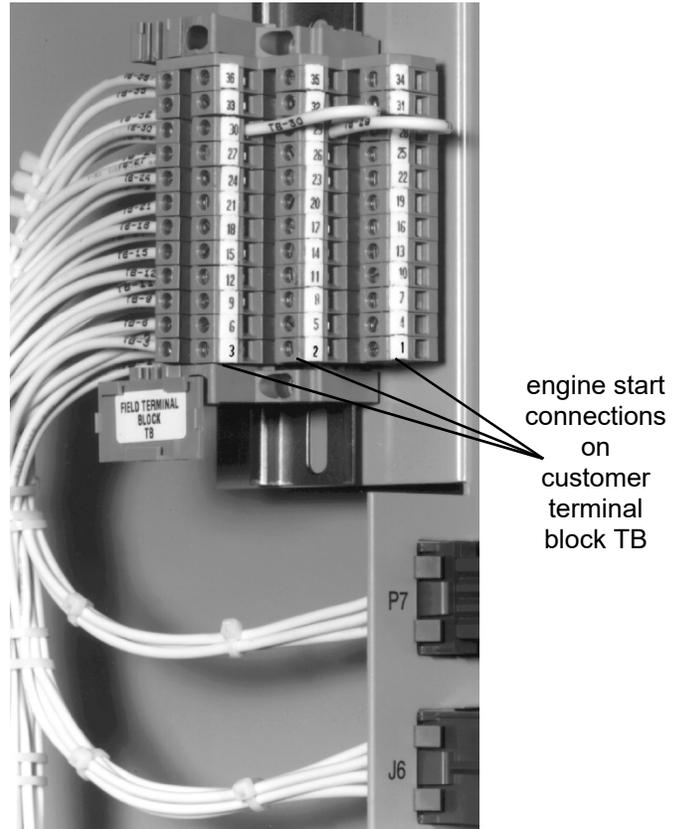


Figure 1. Customer terminal block on the top right side of enclosure

Installation

Functional Test

The Functional Test consists of three checks:

- 1 - Manual Operation Test, page 7
- 2 - Voltage Checks, page 8
- 3 - Electrical Operation, page 9



Do these checks in the order presented to avoid damaging the ADTS.

Read all instructions on the Wiring Diagram and labels affixed to the automatic transfer switch. Note the control features that are provided and review their operation before proceeding.

Note the position of the contact shafts as shown below.

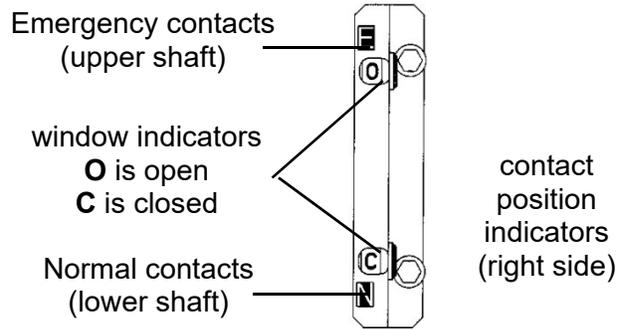


Figure 2. Contact position indicators. Shown with Emergency open and Normal closed

Continue to 1 – Manual Operation Test on next page.

Table B. Maintenance Handle positions.

Transfer Switch Position		Interlocked Weights Lobes prevent closing both N & E contacts	Maintenance Handle	Shaft Indicators
Normal			up	E = O upper contacts open
			down	N = C lower contacts closed
Load Disconnected			up	E = O upper contacts open
			down	N = O lower contacts open
Emergency			down	E = C upper contacts closed
			up	N = O lower contacts open

Note: If Normal and Emergency connections are reversed this operation is also reversed.

Installation

1 – Manual Operation Test

A detachable maintenance handle is provided on the frame of the Transfer Switch for maintenance purposes only. Manual operation of the transfer switch should be checked before it is energized (operated electrically).



Do not manually operate the transfer switch until both power sources are disconnected: open both circuit breakers.

1. After de-energizing both power sources, open the enclosure door. Locate and remove the maintenance handle from the clips on the left side of the transfer switch frame. Insert the handle into the hole in the molded hub on the left side of the operator. See Figures 3, 4, 5 and Table B.(on page 6).



Do not try to close both Normal and Emergency contacts at the same time.

2. Move the maintenance handle up or down as shown to manually operate the transfer switch.* The transfer switch should operate smoothly without binding. If it does not, check for shipping damage or construction debris. Operate both upper and lower contact shafts.

* **Note:** This operation can be performed only on the emergency contacts if the normal contacts are open, or only on the normal contacts if the emergency contacts are open. Do not try to close both normal and emergency contacts; the interlock mechanism between the contact shafts prevents it.

3. Return the transfer switch to the Normal position. Observe that the window indicators (right side) show the upper shaft **O** (Emergency open) and the lower shaft **C** (Normal closed). Remove the maintenance handle and store it on the frame in the clips provided.

Note: If Normal and Emergency connections are reversed this operation is also reversed.

Now continue to **2 – Voltage Checks** on next page

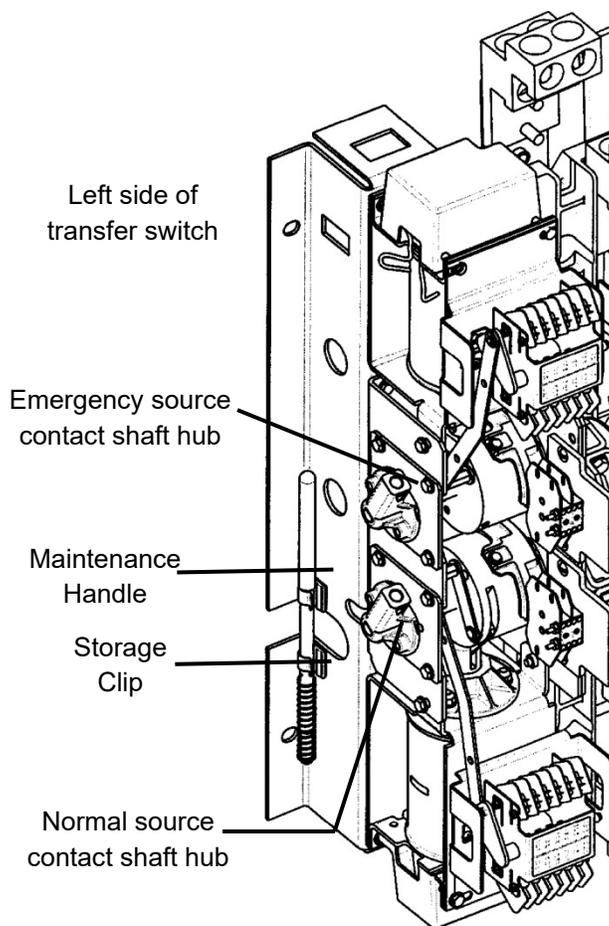


Figure 3 Maintenance handle storage location. Hubs shown with Normal closed & Emergency open

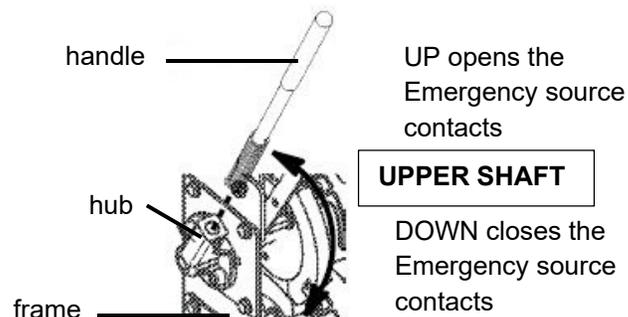


Figure 4. Emergency (upper shaft) operation

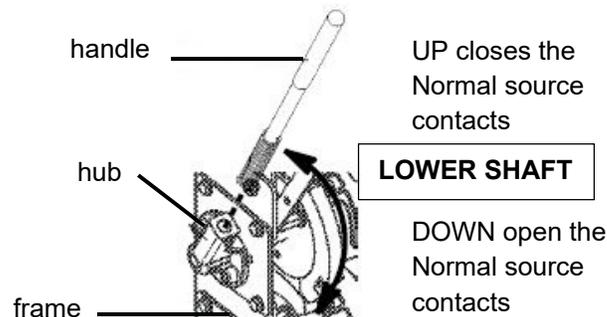
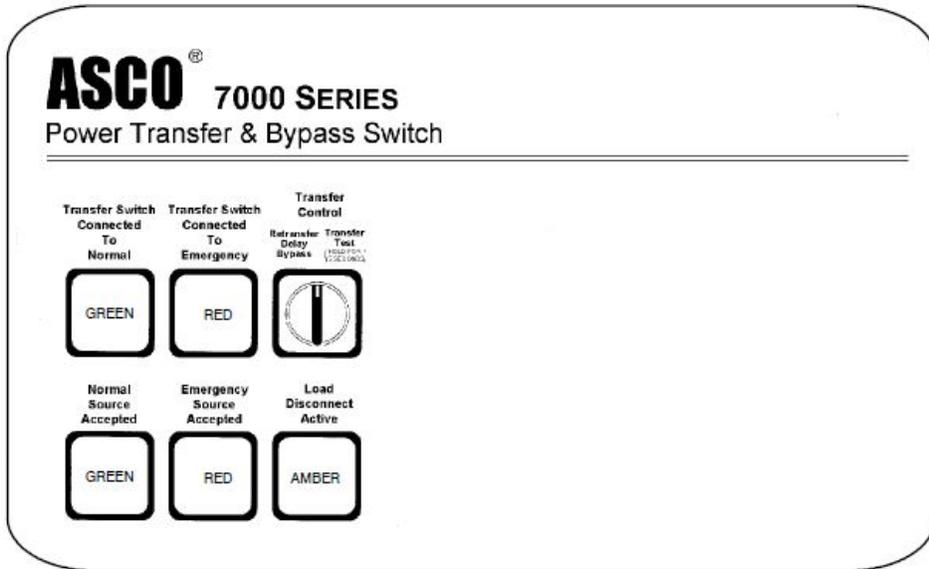


Figure 5. Normal (lower shaft) operation.

Installation



observe these lights



Figure 6 Standard controls and indicators.

2 – Voltage Checks

First check nameplate on transfer switch; rated voltage must be the same as normal and emergency line voltages.



Before energizing the switch check to be sure that both normal and emergency contacts are not left in the closed position.



Verify that the feeders have been connected to the proper lugs.



Use extreme caution when using a meter to measure voltages. Do not touch power terminals; shock, burns, or death could result!

Perform steps 1 through 6 at the right. Observe the status lights. See Figure 6.

■ Black square means light is on.

□ White square means light is off.

* If necessary, adjust voltage regulator on the generator according to the manufacturer's recommendations. The Automatic Transfer Switch will respond only to the rated voltage specified on the Transfer Switch nameplate.

Note: Refer to Section 3 of *Group 5 Controller User's Guide* 381333-126 for how to display the Status of the ATS and the Voltage and Frequency of each source.

Now continue to **3 – Electrical Operation** on next page.

<p>1 Close the normal source circuit breaker. The <i>Transfer Switch Connected To Normal</i> and the <i>Normal Source Accepted</i> lights should come on.</p>	
<p>2 Use an accurate voltmeter to check phase to phase and phase to neutral voltages present at the transfer switch normal source terminals.</p>	
<p>3 Close the emergency source circuit breaker. (Start generator, if necessary.) The <i>Transfer Switch Connected To Normal & Emergency Source Accepted</i> lights should come on.</p>	
<p>4 Use an accurate voltmeter to check phase to phase and phase to neutral voltages present at the transfer switch emergency source terminals.*</p>	
<p>5 Use a phase rotation meter to check phase rotation of emergency source; it must be the <u>same</u> as the normal source.</p>	
<p>6 Shut down the engine-generator, if applicable. The <i>Emergency Source Accepted</i> light should go off. Then put the starting control selector switch (on the generator set) in the <i>automatic</i> position. Close enclosure door.</p>	

Installation

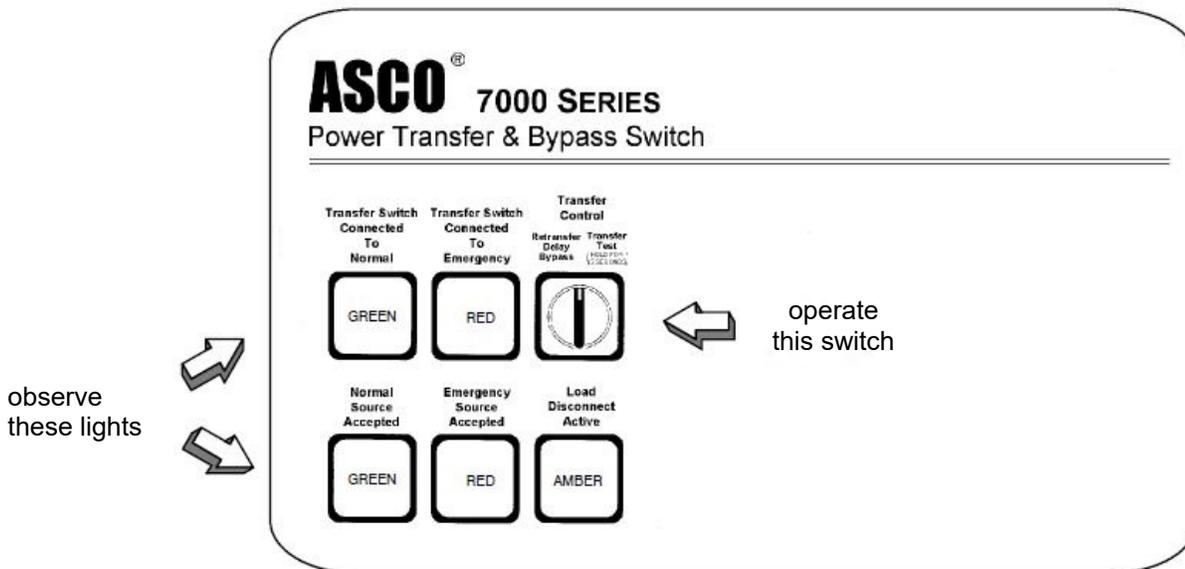


Figure 7. Standard controls and indicators.

3 – Electrical Operation

This procedure will check the electrical operation of the Automatic Delayed–Transition Transfer Switch. See Figure 7.



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

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 steps 1 through 5 at the right. Observe the status lights.

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

This completes the Functional Test of the ADTS.

1	Turn and <u>hold</u> 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.	
2	Transfer switch CN 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 CN & CE contacts are now open.	
3	After the delay transition time delay, the CE Transfer switch will operate to the Emergency position. The <i>Transfer Switch Connected To Emergency</i> light should come on and <i>Load Disconnect Active</i> light goes off.	
4	Transfer switch will operate back to Normal position after Feature 3A time delay. For immediate retransfer turn Transfer Control counterclockwise to <i>Retransfer Delay Bypass</i> . The <i>Transfer Switch Connected To Normal</i> light should come on; <i>Transfer Switch Connected to Emergency</i> light should go off.	
5	The engine–generator will stop after the Feature 2E time delay (unloaded running engine cooldown). The <i>Emergency Source Accepted</i> light should go off.	

Testing & Service

TRANSFER TEST

Operate the 7000 Series ADTS at least once a month by following the five-step **Electrical Operation Transfer Test** procedure on page 9.

PREVENTIVE MAINTENANCE

Reasonable care in preventive maintenance will insure high reliability and long life for the 7000 Series ADTS. An annual preventive maintenance program is recommended

ASCO Power Services, Inc. is ASCO Power Technologies service organization for the United States and Canada. Call 1-800-800-2726 (ASCO) to request a service call and information on preventive maintenance agreements.

Annual Inspection Checklist



Hazardous voltage capable of causing shock, burns, or death is used in this switch. Deenergize both Normal & Emergency power sources before performing inspections!

- **Clean the ADTS enclosure.** De-energize all sources, then brush and vacuum away any excessive dust accumulation. Remove moisture with a clean cloth.
- **Check the transfer switch contacts.** De-energize all sources, then remove the transfer switch barriers and check contact condition. The non-replaceable main contacts are designed to last the life of the transfer switch. Reinstall the barriers carefully.
- **Maintain transfer switch lubrication.** If the transfer switch is subjected to severe dust or abnormal operating conditions, renew factory lubrication on all movements and linkages. Relubricate the solenoid operator if the TS coil is replaced. Do not use oil; order **lubrication kit 75-100**.

Check all cable connections & retighten them.

REPLACEMENT PARTS

Replacement parts are available in kit form. When ordering parts provide the Serial No., Bill of Material No. (BOM), and Catalog No. from the transfer switch nameplate. Contact your local ASCO Power Technologies Sales Office or ASCO Power Services, Inc.

In the United States and Canada

call 1 – 800 – 800 – ASCO (2726)

DISCONNECTING THE CONTROLLER

The harness disconnect plugs are furnished for repair purposes only and should not have to be unplugged. If the controller must be isolated, follow these steps.

Disconnecting the Plugs



Do not unplug the controller until steps 1a or 1b is completed.

1. Observe the position of the transfer switch.
 - a. If the transfer switch is in the *Normal* position, first place standby engine starting control in the *off* position. Second, then open the emergency source circuit breaker. Third, open the normal source circuit breaker.
 - b. If the transfer switch is in the *Emergency* position, first open the normal source circuit breaker. Second, place the engine starting control in the *test* or *run* position. Third, open the emergency source circuit breaker.
2. Separate the two quick disconnect plugs by squeezing the latches. Do not pull on the harness wires.

Reconnecting the Plugs



Do not unplug the controller until steps 1a or 1b is completed.

1. Observe the position of the transfer switch.
 - a. If the transfer switch is in the *Normal* position, first be sure that both normal and emergency source circuit breakers are open. Second, be sure that the standby engine starting control is still in the *off* position.
 - b. If the transfer switch is in the *Emergency* position, first be sure that both normal and emergency source circuit breakers are open.
2. The two harness plugs and sockets are keyed. Carefully align the plugs with the sockets and press straight in until both latches click. **Close the door!**
3. Restore the two sources in sequence as follows:
 - a. If the transfer switch is in the *Normal* position, first close the normal source circuit breaker. Second, close the emergency source circuit breaker. Third, place the standby engine starting control in the *automatic* position.
 - b. If the transfer switch is in the *Emergency* position, first close the emergency source circuit breaker. Second close the normal source circuit breaker.

Testing & Service

MANUAL LOAD TRANSFER

This procedure will manually transfer the load if the controller is disconnected.



Do not manually operate the transfer switch until both power sources are disconnected (all conductors deenergized).

1. Deenergize both the normal and emergency source conductors (remove fuses or open circuit breakers.)

2. Use the maintenance handle to manually operate the transfer switch to the opposite source. First open the closed contacts, then close the other contacts. Do not leave both closed. See *Manual Operation* on page 7
3. Then remove the maintenance handle. See page 7.



Verify that the maintenance handle has been removed before proceeding!

4. If the transfer switch is in the Emergency position manually start the engine generator and then install emergency source fuse or close the circuit breaker.

TROUBLE-SHOOTING

Note any optional accessories that may be furnished on the ADTS and review their operation. Refer to any separate drawings and/or instructions that may be packed with the ADTS.



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

Table D. Trouble-Shooting Checks.

PROBLEM	CHECK IN NUMERICAL SEQUENCE		
	1 OPERATION	2 GEN-SET	3 VOLTAGE
Engine-generator set does not start when the Transfer Control switch is turned and held in <i>Transfer Test</i> position or when normal source fails.	Hold <i>Transfer Test</i> 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	-
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.	Generator output circuit breaker must be closed. Generator frequency must be at least 95% of nominal (57 Hz for a 60 Hz system.) *	Voltmeter should read at least 90% of nominal phase to phase voltage between transfer switch terminals EA and EC (or EL1 and EL2 for 2 pole switches). *
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,	-	Voltmeter should read at least 90% of nominal phase to phase voltage between transfer switch terminals NB and NC, NC and NA, and NA and NB (or NL1 and NL2 for 2 pole switches).
Gen. does not stop after load retransfer to normal source.	Wait for Feature 2E time delay to time out.	Starting control must be in the automatic position.	-

* These are factory settings. Refer to the **Group 5 Controller User's Guide**.

If the problem is isolated to circuits on the controller or the transfer switch, call your local ASCO Power Technologies sales office or ASCO Power Services, Inc.: in the United States or Canada, call 1-800-800-2726. Furnish the Serial No., Catalog No., and Bill of Material (BOM) No. from the transfer switch nameplate.

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