

# Operator's Manual

## ASCO® 7000 Series ADTS Automatic Delayed-Transition Transfer Switches, H-design 400 amp. 4 pole, 600 through 1200 amp.

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



600–1000 amp. sizes



1200 amp. size

### DANGER

**DANGER** is used in this manual to warn of high voltages capable of causing shock, burns, or death.

### WARNING

**WARNING** is used in this manual to warn of possible personal injury.

### CAUTION

**CAUTION** is used in this manual to warn of possible equipment damage.

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

An experienced licensed electrician must install the ADTS.

## 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.

### **⚠ WARNING**

**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. A typical Catalog Number is shown on the next page with its elements explained.

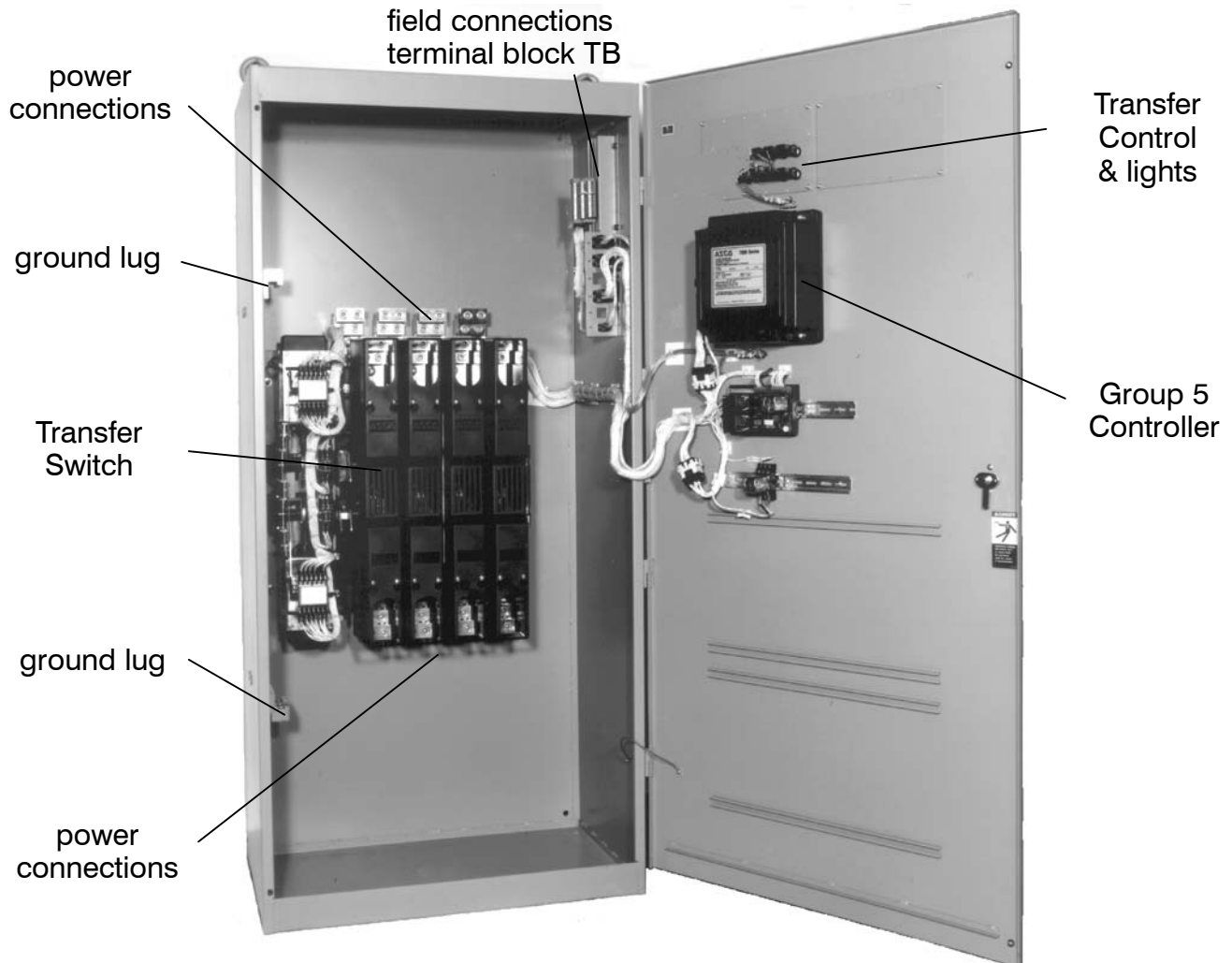
## Catalog Number Identification

Typical 7000 Series 7ADTS catalog no. for switched neutral, 3 pole, 600 amp, 480 V, ATS in Type 1 enclosure:

Neutral	Phase Poles	Amperes	Voltage		Controller	Enclosure
A – solid	2 – single Ø	600	C 208	K 415	5 – standard	C – type 1
B – switched	3 – three Ø	800	D 220	L 440	5X – if accessories ordered	F – type 3R
blank – none		1000	E 230	M 460		G – type 4 *
		1200	F 240	N 480		L – type 12 *
			G 277	P 550		blank – open type
			H 380	Q 575		
			J 400	R 600		

B 3 400 is used for 4 pole 400 amp. switches.

\* available 600–1000 amp. sizes only



800–1000 amp. sizes in typical enclosure with location of customer connections

## SECTION 1 INSTALLATION

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

### Remove the Shipping Skid (large ADTSs)

For large ADTSs, 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 be level and straight. Refer to the applicable enclosure outline drawing included with the switch 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 applicable enclosure outline drawing furnished with this switch and mount the automatic transfer switch according to details and instructions shown on diagram.

### Line Connections

Refer to the Wiring Diagram provided with the switch. 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.

### DANGER

**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.

### CAUTION

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

### 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.

### 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 controller by a plug-in harness (two plugs).

## INSTALLATION (continued)

### 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 1-1 and Table A.

Table A. Engine start connections.

When normal source fails	Terminals on Terminal Block TB
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 transfer switch terminal block TB as shown on the wiring diagram provided with this automatic transfer switch.

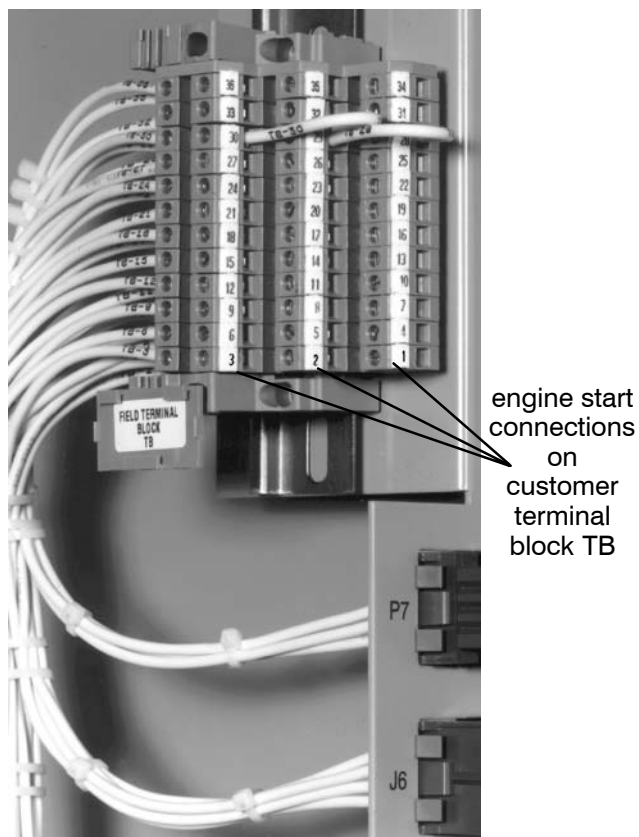


Figure 1-1. Customer terminal block on the top right side of the enclosure.

# INSTALLATION *(continued)*

## Functional Test

The Functional Test consists of three checks:

- 1 — Manual Operation Test, page 1-4
- 2 — Voltage Checks, page 1-5
- 3 — Electrical Operation, page 1-6

**⚠ CAUTION**

**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.

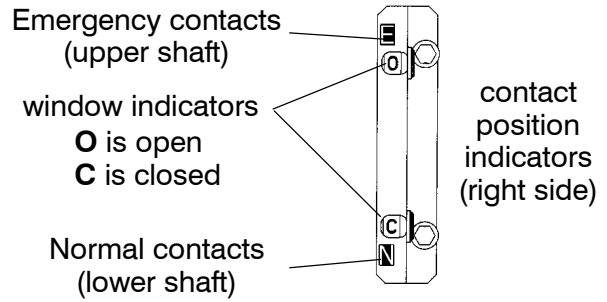


Figure 1-2. Contact position indicators. Shown with Emergency open and Normal closed.

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
		up	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
		down	N = O lower contacts open

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

# INSTALLATION (continued)

## 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).

### **⚠ WARNING**

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

1. After deenergizing 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 1-3 through 1-5 and Table B (on page 1-2).

### **⚠ CAUTION**

**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 lobes on the weights prevent 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.

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

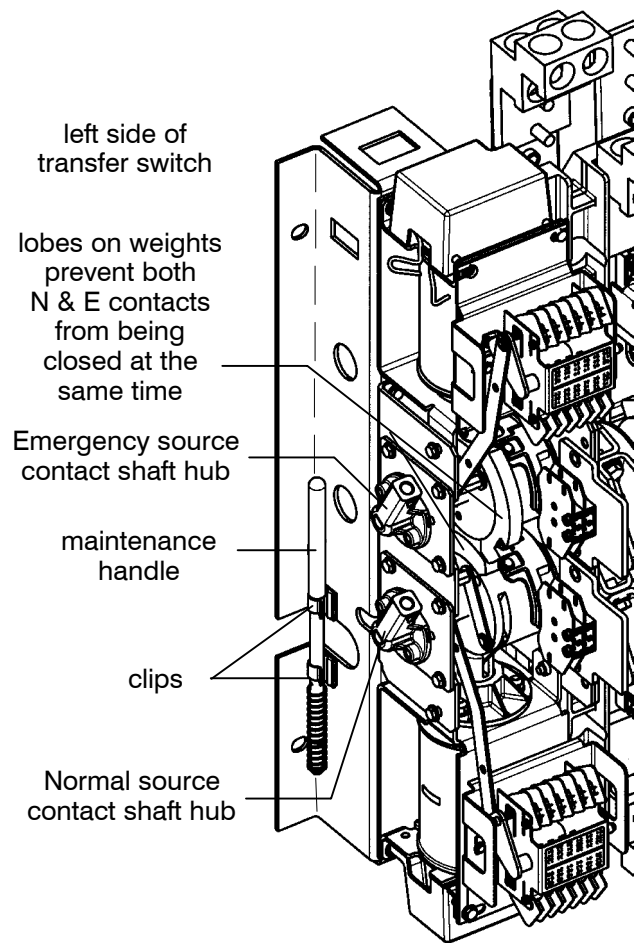


Figure 1-3. Maintenance handle storage location. Hubs shown with Normal closed & Emergency open.

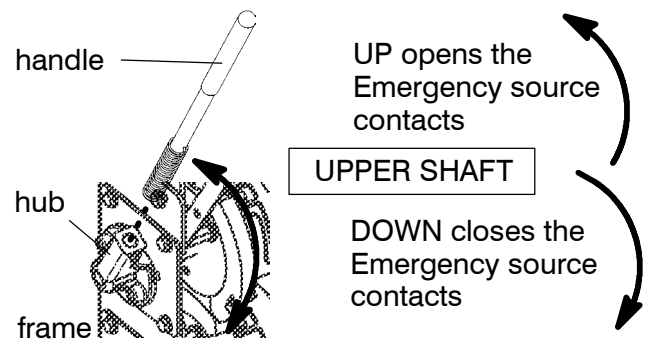


Figure 1-4. Emergency (upper shaft) operation.

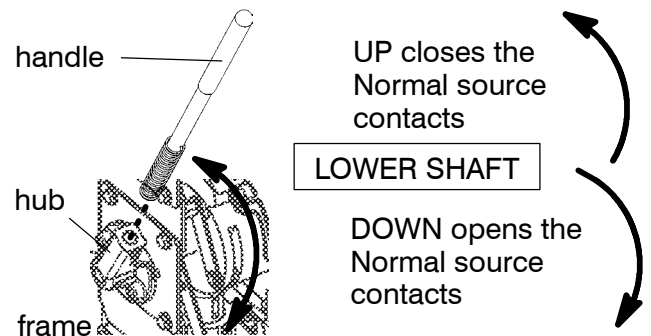


Figure 1-5. Normal (lower shaft) operation.

# INSTALLATION (continued)

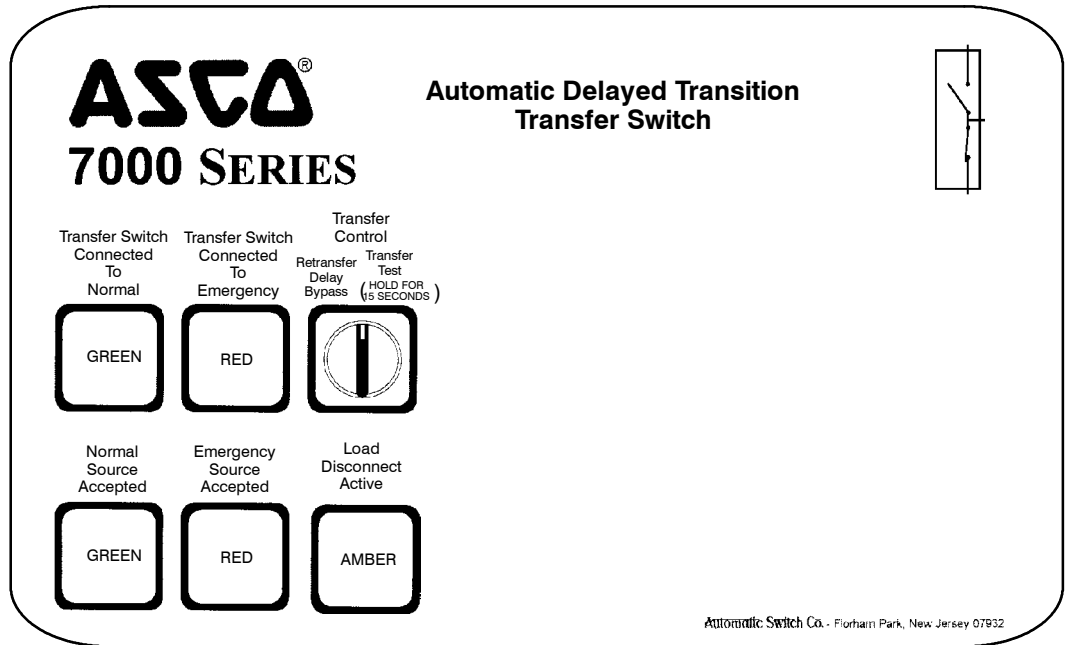


Figure 1-6. Standard controls and indicators.

## 2 – Voltage Checks

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

**⚠ WARNING**

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

**⚠ CAUTION**

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

**⚠ DANGER**

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 rights. Observe the status lights. See Figure 1–6.

- 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 Delayed–Transition Transfer Switch will respond only to the rated voltage specified on the Transfer Switch nameplate.

Now continue to 3 – Electrical Operation on next page.

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.	
2	Use an accurate voltmeter to check phase to phase and phase to neutral voltages present at the transfer switch normal source terminals.	
3	Close the emergency source circuit breaker. (Start generator, if necessary.) The <i>Transfer Switch Connected To Normal &amp; Emergency Source Accepted</i> lights should come on.	
4	Use an accurate voltmeter to check phase to phase and phase to neutral voltages present at the transfer switch emergency source terminals.*	
5	Use a phase rotation meter to check phase rotation of emergency source; it must be the <u>same</u> as the normal source.	
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.	

# INSTALLATION (continued)

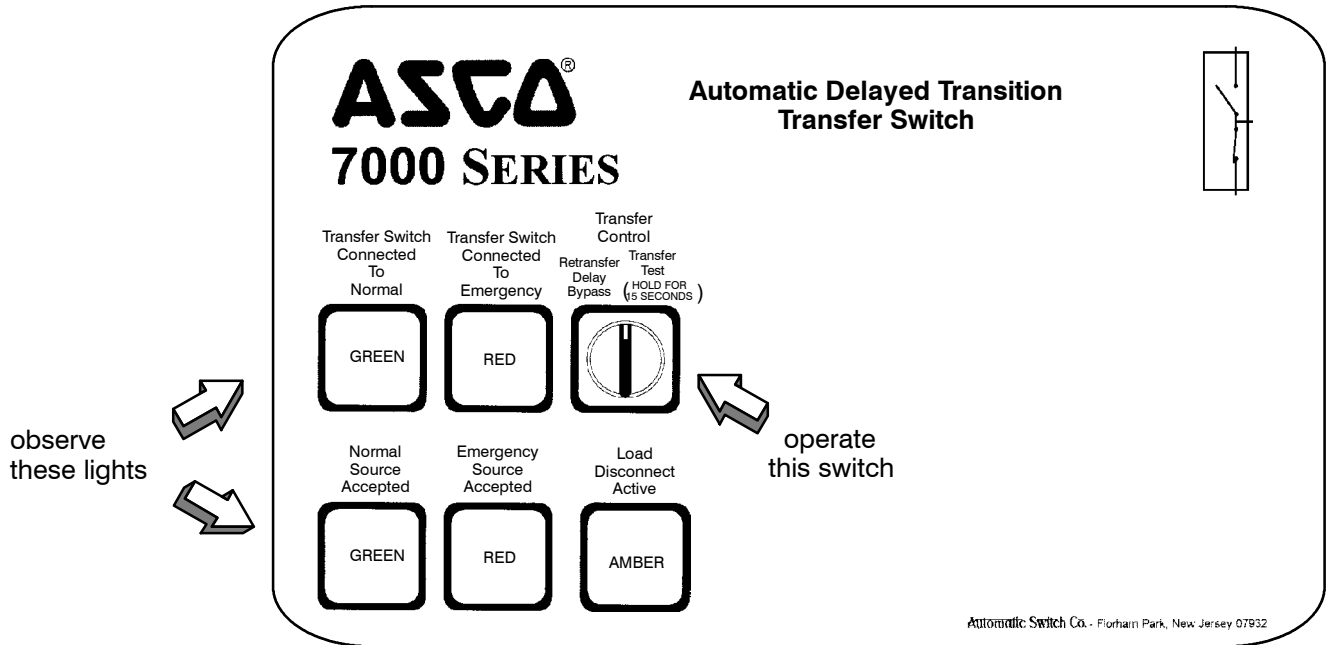


Figure 1-7. Standard controls and indicators.

## 3 – Electrical Operation

This procedure will check the electrical operation of the Automatic Delayed-Transition Transfer Switch. See Figure 1-7.

**WARNING**

**Close the enclosure door first.**

### 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> <b>Transfer Control</b> 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 <b>Transfer Control</b> 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 cool-down). The <i>Emergency Source Accepted</i> light should go off.	

## SECTION 2 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 1-6.

### 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 Services, Inc. (ASI) is ASCO Power Technologies's national service organization. In the US ASI can be contacted at 1-800-800-2726 for information on preventive maintenance agreements.

### Checklist for Yearly Inspection

#### DANGER

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

- Clean the ADTS enclosure.** Brush and vacuum away any excessive dust accumulation. Remove any moisture with a clean cloth.
- Check the transfer switch contacts.** Remove the transfer switch barriers and check contact condition. Replace the contacts if they become pitted or worn excessively. 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 ASI:

#### In the United States

call 1 – 800 – 800 – ASCO ( 2726 )

#### In Canada

call 1 – 888 – 234 – 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

#### WARNING

**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

#### WARNING

**Do not reconnect 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 (continued)

### MANUAL LOAD TRANSFER

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

#### **WARNING**

**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 try to close both Normal and Emergency contact. See *Manual Operation* on page 1-3 and 1-4.

3. Then remove the maintenance handle. See page 1-4.

#### **WARNING**

**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.

#### **DANGER**

**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 2-1. Trouble-Shooting Checks.

PROBLEM	CHECK IN NUMERICAL SEQUENCE		
	1 OPERATION	2 GEN-SET	3 VOLTAGE
Engine-generator set does not start when the <b>Transfer Control</b> switch is turned and <u>held</u> 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.	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 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 <b>Transfer Control</b> 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 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 **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 ASI: in the United States, call 1-800-800-2726 or in Canada call 1-888-234-2726. Furnish the Serial No., Catalog No., and Bill of Material (BOM) No. from the transfer switch nameplate.

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in the U.S call 1-800-800-2726

in Canada call 1-888-234-2726

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