

ASCO 7000 SERIES ATS Automatic Transfer Switches C–design 30–150A, E–design 260 & 400A, F–design 600 & 800A, G–design 1000–4000A and F–design 3000 & 4000A

Operator's Manual

381333-127 H
8/2016

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.

Refer to the outline and wiring drawings provided with your 7000 Series ATS 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.

Rating Label

Each automatic 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 ATS. 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.

An experienced licensed electrician must install the ATS.



G–design 1000–1200 ampere sizes

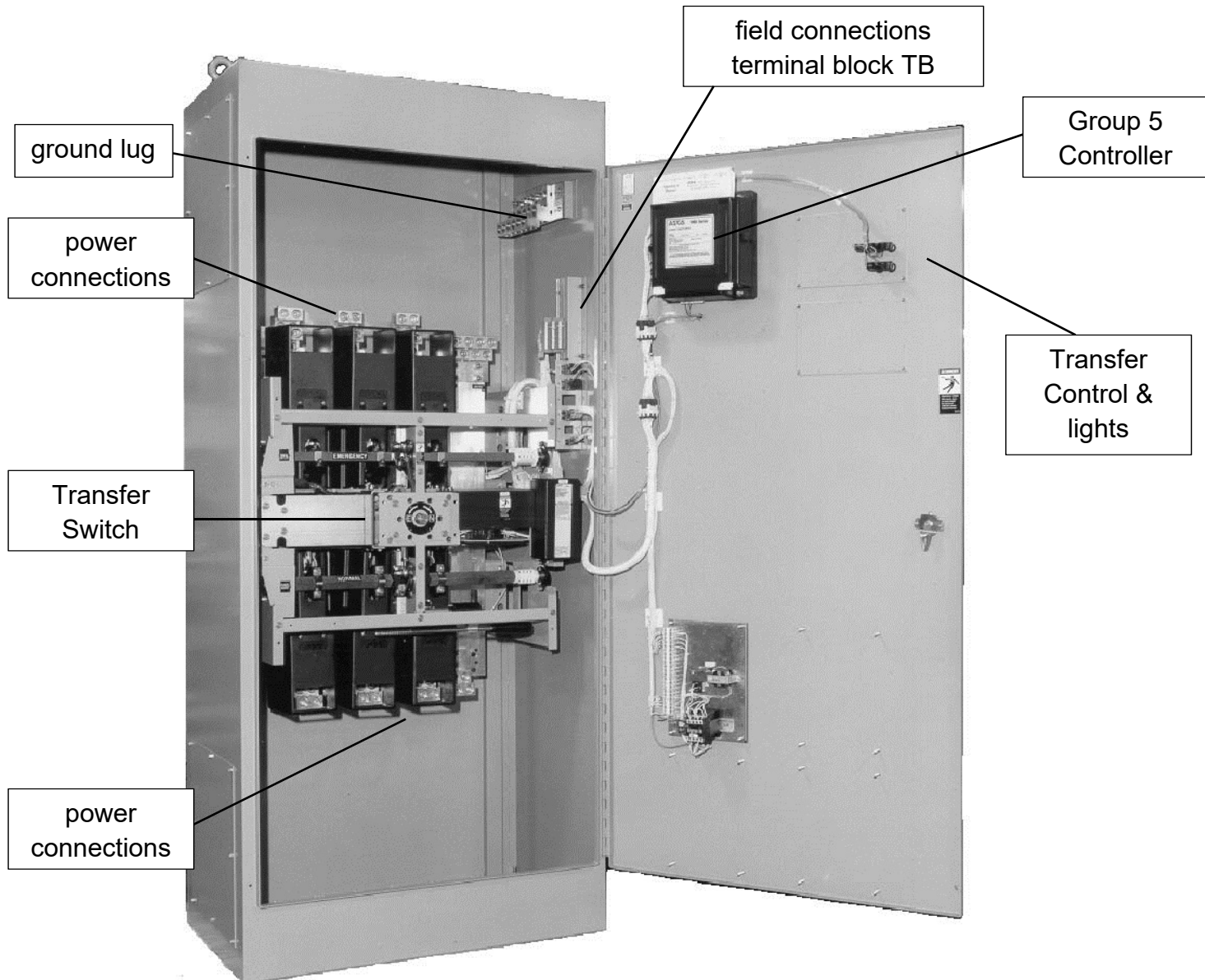
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Catalog Number Identification

Typical 7000 Series catalog no. for G–design solid neutral, 3 pole, 1200 A, 480 V, ATS in Type 1 enclosure:

G7ATS	A	3	1200		N		5	C
Frame & Series	Neutral	Phase Poles	Amperes		Voltage		Controller	Enclosure
	A-solid	2-single	30	800	A 115	J 400	5- standard 5X- if accessories ordered	C- Type 1
	B-switched	3-three	70	1000	B 120	K 415		F- Type 3R
	C-overlapping		100	1200	C 208	L 440		G- Type 4
	blank- none		150	1600	D 220	M 460		L- Type 12
			260	2000	E 230	N 480		M- Type 3R secure
			400	3000	F 240	P 550		N- Type 4 secure
			600	4000	G 277	Q 575		P- Type 4X secure
				H 380	R 600	Q- Type 12 secure	blank- open type	



G–design 1200 ampere size in typical enclosure with location of customer connections

Installation

ASCO Series 7000 Automatic Transfer Switches 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 ATs)

For large ATs, 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 *Outline and Mounting Diagram* provided with the ATS; it shows all mounting details and instructions.

NOTICE

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

Mount the ASCO ATS vertically to a rigid supporting structure. Level all mounting points by using flat washers behind the holes to avoid distortion of the switch.

Transfer switches rated 260 and 400 ampere are mounted on an insulator backing piece (installed behind the transfer switch). If the transfer switch is removed from the cabinet and then reinstalled, this insulator piece must be placed behind the transfer switch. See Figure 1.

WARNING

Be sure that the insulator piece is behind the 260 and 400 ampere transfer switches.

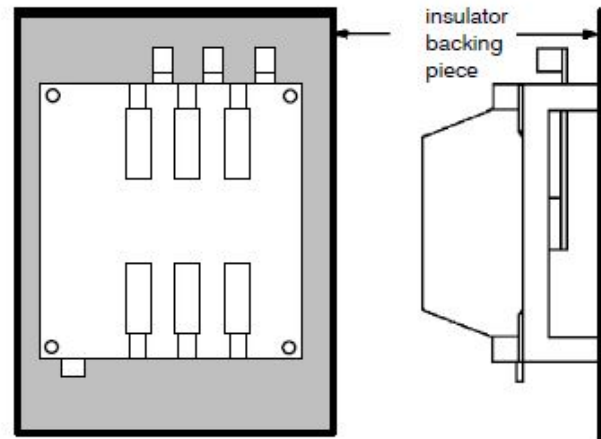


Figure 1. Insulator for 260 & 400 ampere switches

The controller is mounted on the cabinet door. An add-on DIN rail is provided for some optional accessories and is mounted below the controller on the door.

Line Connections

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

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.

Installation

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.

Three cable spacers are included with 150 ampere transfer switches. When installing power cables, run the cables through the cable spacers as shown in Figure 2. Position cable spacers within 1½ inches from lugs.



The cable spacers must be located as shown for 150 ampere transfer switches.

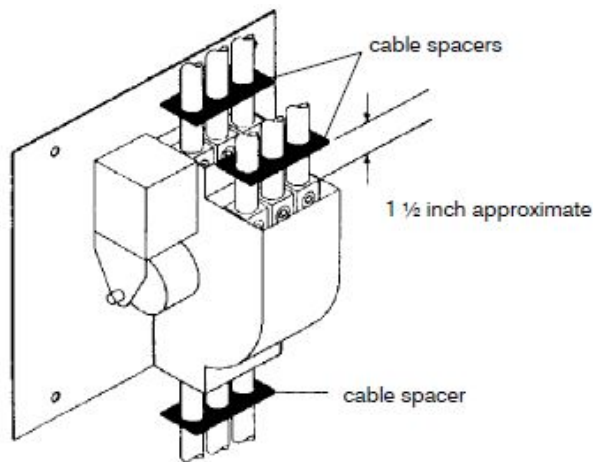


Figure 2. Cable spacer for C-design 150 ampere transfer switch

Do not run cables 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 30-400 ampere, 1 inch minimum over 400 ampere.

It is not necessary to remove the barriers from 30-400 ampere transfer switches to install cables. On 600-800 ampere Transfer Switches, you must remove the barriers to install the cables. See Figure 3. Be sure to reinstall the barriers carefully

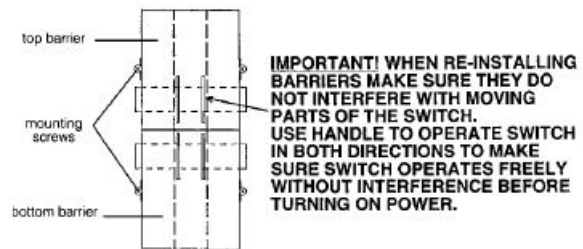


Figure 3.. Barriers on F-design 600 & 800 ampere transfer switches

Bus Connections

If bus connection is used, use SAE grade 5 hardware to connect bus to appropriate terminal plates on the transfer switch. Wipe off bus surfaces before they are joined. If bus is very dirty, gently clean surfaces with a non-flammable solvent. Avoid touching cleaned surfaces.



Do not breathe cleaning solvent vapors.

Use SAE grade 5 hardware and tighten the bolted joints to the torque specified in Table A.



The reliability of the connection depends on how clean and how tight the joint is.

Table A. Tightening torque values for bolted joints

Bolt Diameter (Grade 5 hardware) in inches	Recommended Tightening Torque in foot pounds
5/16	12
3/8	20
1/2	50
5/8	95
3/4	155

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

Engine Starting Contacts

The engine control contact connections (if used) are located on the transfer switch. Connect signal wires to appropriate terminals as specified in Table B and Table C and shown in Figure 4 and Figure 5.

Table B Engine start connections for C–design 30 – 150 ampere transfer switches

When normal source fails	Terminals on transfer switch
contact closes	TB14 and TB15
contact opens	TB14 and TB16

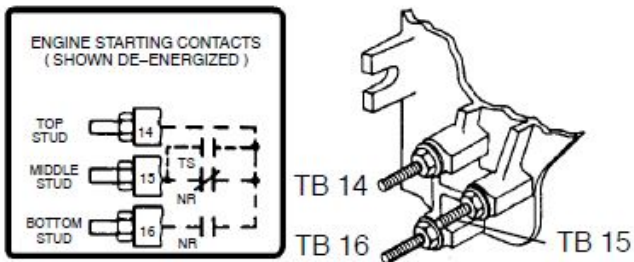


Figure 4. Engine starting contact label and location for C–design 30 – 150 ampere switches.

Table C Engine start connections for 260 – 4000 ampere transfer switches

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

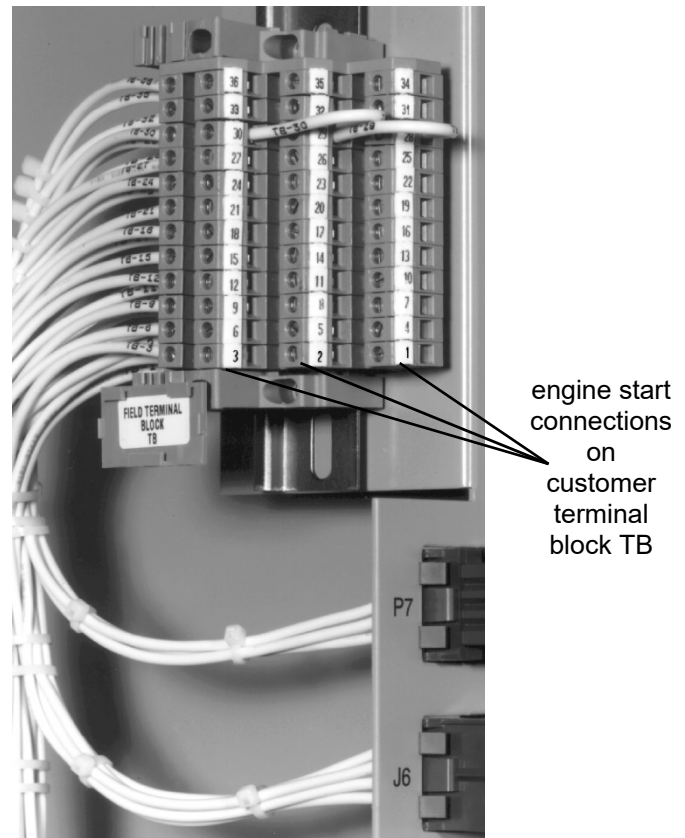


Figure 5. Customer terminal block on the top right side of enclosure on 260–4000 ampere switches

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.

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 ATS.

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.

Continue to **1 – Manual Operation Test** on next page.

Installation

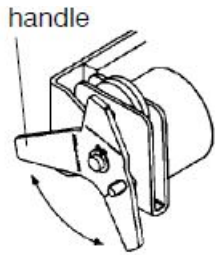


Figure 6
30 – 150 ampere
C–design
transfer switches

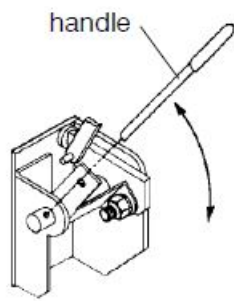


Figure 7
260 & 400 ampere
E–design
transfer switches

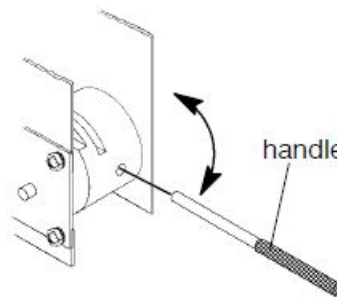


Figure 8
600 & 800 ampere
F–design
transfer switches

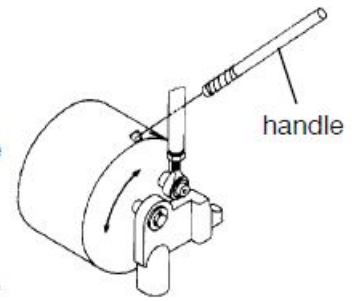


Figure 9
3000 & 4000 ampere
F–design
transfer switches

1 – Manual Operation Test

A maintenance handle (detachable on 260–4000 ampere sizes) is provided on the transfer switch **for maintenance purposes only**. Manual operation of the 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. Select the appropriate switch ampere size / design and follow the directions for installing the handle:

30 – 150 ampere C–design See Figure 6.
Grasp attached manual handle (left side of the operator) and turn it with thumb and fingers.

260 and 400 ampere E–design See Figure 7.
Insert the manual handle into the hole in the shaft, left side of the operator.

600 and 800 ampere F–design See Figure 8.
Insert the manual handle into the hole in the weight.

1000 – 4000 ampere G–design See Figure 10.
Install the hub onto the center operator shaft and insert the manual firmly into the hole in the side of the hub (spring fully compressed).

3000 and 4000 ampere F–design See Figure 9.
Insert the manual handle into the hole in the weight.

2. Move the handle as shown to manually operate the Transfer Switch. The switch should operate smoothly without binding. If it does not, check for shipping damage or construction debris.
3. Return the transfer switch to the *N* (normal) position. Remove manual operator handle (if detachable) and store it on the transfer switch in the place provided.



WARNING

Verify that the maintenance handle has been removed (260–4000 ampere size transfer switches) before proceeding!

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

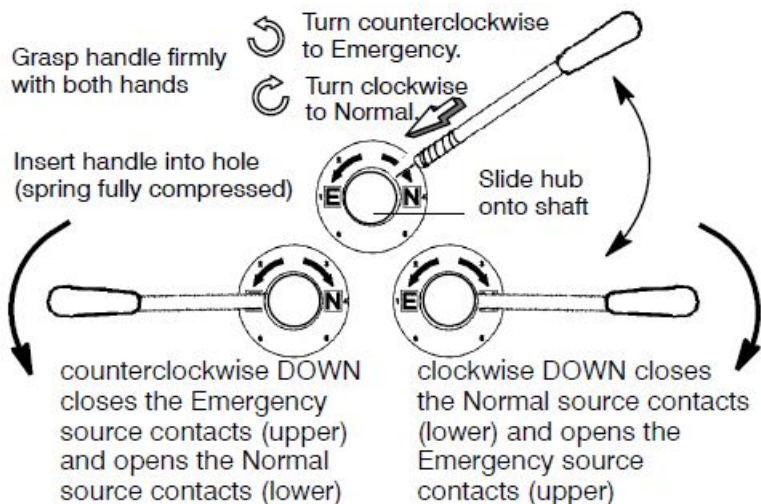
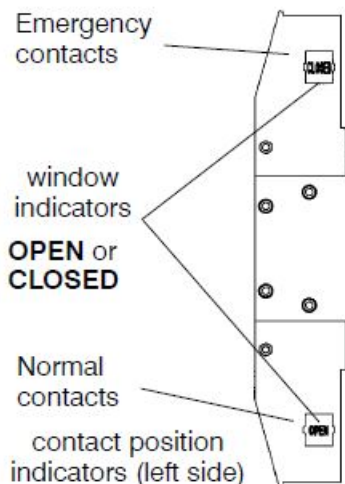


Figure 10. 1000 – 4000 ampere G design transfer switches

Installation

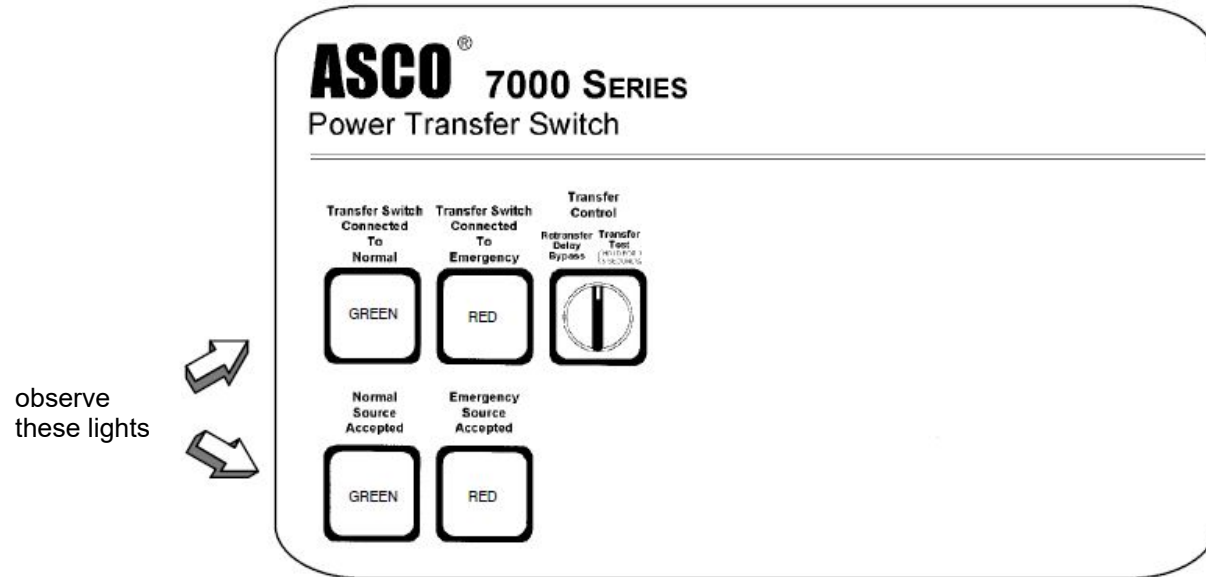


Figure 11. Standard controls and indicators.

2 – Voltage Checks

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



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 11.

- 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.

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 & 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

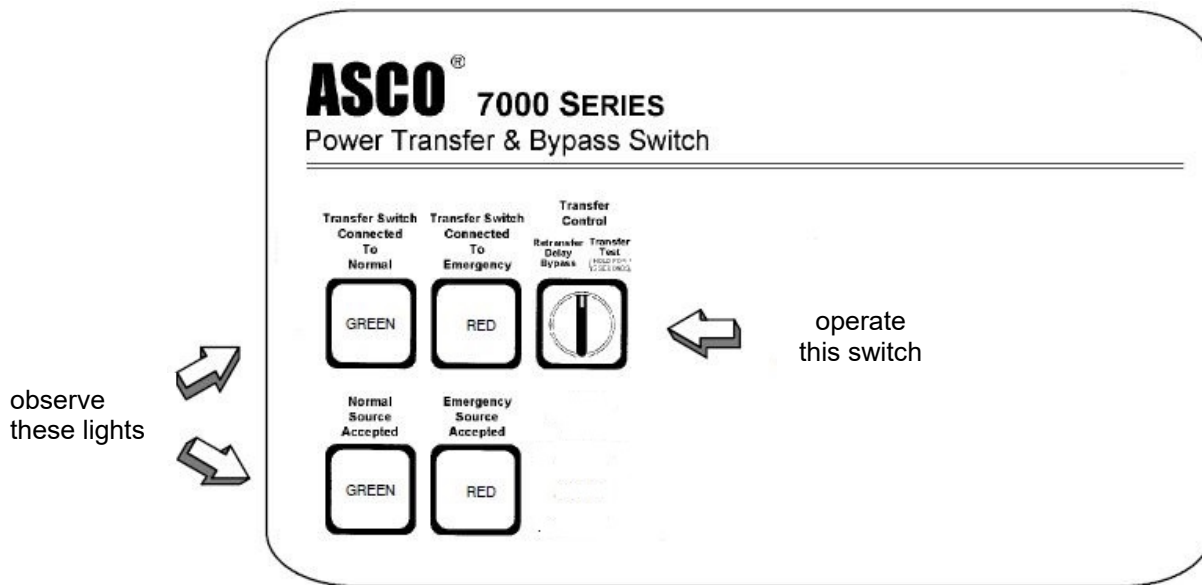


Figure 12. Standard controls and indicators.

3 – Electrical Operation

This procedure will check the electrical operation of the Automatic Transfer Switch. See Figure 12.



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 ATS.

1	The <i>Transfer Switch Connected To Normal</i> and <i>Normal Source Accepted</i> lights should be on.	
2	Turn and <u>hold</u> Transfer Control switch clockwise to <i>Transfer Test</i> until the engine starts and runs (within 15 sec.). <i>Emergency Source Accepted</i> light should come on.	
3	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.	
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 ATS 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 ATS. 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 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. Re-lubricate the solenoid operator if the TS coil is replaced. Do not use oil; order **lubrication 625550-001** (Castrol *EndurexR* 4000 lubricant) for 30-400 amp., or order **lubrication kit 75-100** for 600-4000 amp. size.

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.

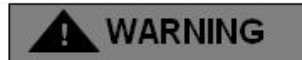
Disconnecting the Plugs



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. 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 automatic transfer switch (ATS) and review their operation. Refer to any separate drawings and/or instructions that may be packed with the ATS.



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 on customer terminal block TB. Verify that the 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.) *	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 (if used)	-	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).
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.	-

* 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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