METRIC
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COMMERCIAL ITEM DESCRIPTION

BUS TRANSFER SWITCHES, ELECTRIC POWER, AUTOMATIC, SHIPBOARD (NON-NUCLEAR APPLICATIONS)

The General Services Administration has authorized the use of this commercial item description, for all Federal agencies.

1. SCOPE - This Commercial Item Description (CID) covers alternating current (ac; 50, 60 or 400 Hz) and direct current (dc) electric power bus transfer switches, automatic, for shipboard use. Semiconductor (solid state) devices used for transfer switch control circuits and solid state (static) bus transfer switches are included.

2. CLASSIFICATION - Bus transfer devices shall be classified by type (see 2.1) and nominal full load ampere rating (see 3.1.3.1) as defined herein.

2.1 Type. The standard types of automatic bus transfer (ABT) switch are designated as follows:

ABT - 1: denotes an automatic bus transfer switch encompassing a built-in sensing and control circuit time delay of 1.0 to 2.0 milliseconds on power source failure (an undervoltage event of 60% of nominal) and less than 8.33 milliseconds during a transient undervoltage, with a switching or time-to-transfer delay of 500 microseconds, or less. This type is considered as being ‘instantaneous’ and is applicable for use in distribution systems that supply electronic and combat system loads. The control circuit shall contain the minimum time delay period between sensing the out-of-tolerance condition to initiation of a command-to-transfer to preclude inadvertent transfers occurring due to short time period line voltage fluctuations.

Beneficial comments, recommendations, additions, deletions, classifications, etc. and any other data which may improve this document should be sent to: Naval Sea Systems Command, Attn: SEA 03R42, 2531 Jefferson Davis Highway, Arlington, VA 22242-5106.

AMSC N/A FSC 5930

ABT- 2: denotes an automatic bus transfer switch encompassing a built-in sensing and control circuit time delay of 0.3 to 0.5 seconds and a short duration switching or time-to-transfer delay of 30.0 to 100.0 milliseconds. This type of automatic bus transfer switch is applicable for use in distribution systems that supply interior communication, general lighting and receptacle loads. The control circuit shall contain the minimum time delay period between sensing the out-of-tolerance condition to initiating a command to transfer to preclude inadvertent transfers occurring due to short time period line voltage fluctuations. The switch shall also contain the switching or time-to-transfer delay period measured as the actual time of interruption between power sources. This time period shall be factory set but field adjustable.

ABT- 3: denotes an automatic bus transfer switch encompassing a built-in sensing and control circuit time delay of 0.3 to 0.5 seconds and a long duration switching or time-to-transfer delay of 2.5 to 3.5 seconds. This type of automatic bus transfer switch is applicable for use in power distribution systems that supply transformer and/or motor loads. The control circuit shall contain the minimum time delay period between sensing the out-of-tolerance condition to initiating a command to transfer to preclude inadvertent transfers occurring due to short time period line voltage fluctuations. The switch shall also contain the switching or time-to-transfer delay period measured as the actual time of interruption between power sources. This time period shall be factory set but field adjustable.

Note: Time-to-transfer is the finite period of time required by the unit to disconnect from one input source and connect to another input source after receipt of a control circuit command.

Optional additional features for each type of transfer switch shall be available when specified, and are described in Table I, Bus Transfer Switch Operating Features/Options.

2.2 Part Identification. Part identification shall be assigned to automatic bus transfer based on the designators and the operating features selected from Table I, and shall be identified on the unit nameplate as follows:

Type Designator Voltage Frequency Current Rating

3. SALIENT CHARACTERISTICS

3.1 Automatic bus transfer (ABT) switch.

3.1.1 General. An automatic bus transfer switch as described in these requirements is a device that automatically transfers a common load from a normal supply to an alternate supply in the event of failure of the normal supply. The automatic transfer switch shall be provided with a selective/non-selective selector switch and logic control circuit that inhibits automatic operation of the device from returning to a normal supply when the selector switch is in the non-selective position except that the ABT shall revert to automatic operation upon loss of alternate power to the load. This switch shall be integral to the design of the ABT and shall be accessible only from the interior of the enclosure. A status indicator shall be provided on the exterior of the front panel to indicate switch position.

3.1.2 Performance. The ABT shall continuously monitor the voltage and, when specified, frequency (for ac units only) of the input power sources and interrupt the existing power source upon sensing an out of tolerance condition by automatically connecting the output load to an available alternate power source within a predetermined period of time. ABTs shall be of the continuous duty type. The requirements of UL1008 and IEEE Std 45 shall be adhered to in the design, manufacture and testing.

TABLE I. Bus transfer switch operating features/options.

DESIGNATOR		DESCRIPTION
S	Selective	SELECTIVE -A built-in function of the switch that allows an operator to have the device operate such that a transfer of power occurs upon loss of the pre-selected normal line source to the alternate source, and, after a purposeful time delay period, an automatic retransfer of power upon the re-establishment of correct electrical parameters in the normal or pre-selected power source.
NS	Non-Selective	NON-SELECTIVE - No automatic retransfer to the normal source shall occur. This switch shall hold position to the alternate source until a manual transfer is initiated or until a loss of power occurs on the alternate source.
PP	Phase Protection	The switch shall prevent transfer of input sources for all conditions of input power phase differentials greater than plus or minus 15 degrees at the time of connection to the second source. Both voltage and frequency sensing are required.
VS	Voltage Sensing	The switch shall possess the ability to continuously monitor the input power sources for all-phase voltage magnitudes.
SS	Solid State	The switch shall be constructed such that power transfers are accomplished with solid state power switching devices.
FS	Frequency Sensing	The switch shall possess the ability to continuously monitor the input power sources for all-phase frequency values.

3.1.2.1 Transfer voltage. ABTs , when operating at rated frequency (ac units only), shall dropout between 60 and 70 percent of normal operating voltage for transfer to the alternate input source and shall pickup between 85 and 95 percent of normal operating voltage for retransfer to the normal input source. Rated normal operating voltage shall be considered to be the line-to-line user voltage as specified in the contract or purchase order (see Section 7). For ABT-1 types supplied with voltage sensing, frequency sensing and phase protection, transfer to the alternate input source shall be initiated when the normal source decays below 80 to 85 percent of nominal voltage.

3.1.2.2 Transfer frequency. If frequency sensing is specified in the ordering requirement (see Section 7), an ac ABT shall have the ability to initiate a transfer when the source frequency falls 2.0 to 3.0 Hz below the normal operating source frequency.

3.1.3 Design and construction. The ABT shall be constructed as an enclosed electrical power device or an open device designed for installation in electrical equipment.

For bulkhead and deck mounted transfer switches, access, operation and maintenance shall be provided from the front facing panel only. Ventilation shall be provided in such a manner as to maintain internal temperature rises in accordance with the values stipulated in UL1008.

The ABT cabinet or enclosure shall provide maximum personnel protection in accordance with the requirements of UL1008. In addition the enclosure design shall meet the requirements of IEEE Std 45 with respect to environmental protection for specific applications onboard ship. Provision shall be made for manual operation of ABT style switches such that internal access to the enclosure is not required for operation in the manual mode.

3.1.3.1 Current Ratings. The following tables provide the continuous duty, full load operating current ratings for each size of bus transfer switch along with the maximum overall enclosure dimensions and the maximum per unit weight permitted for each rating.

TABLE II. Automatic bus transfer (abt) switches.

Current Rating	Maximum Ampere	Maximum Envelope (HxWxD) Dimensions in mm	Maximum Unit Weight (kg)
125	125	1170 X 610 X 502	100
250	250	1170 X 610 X502	120
400	400	1550 X 662 X 502	175
600	600	1860 X 662 X 526	225
800	800	2010 X 760 X 526	245
1200	1200	1880 X 975 X 760	360
1600	1600	2290 X 760 X 1270	750
2000	2000	2290 X 760 X 1270	750
3200	3200	2290 X 1220 X 1524	1000
4000	4000	2290 X 1220 X 1524	1000

TABLE III. Solid state abt switches.

Current Rating	Maximum Ampere	Maximum Envelope (HxWxD) Dimensions in mm	Maximum Unit Weight (kg)
125	125	1000 X 500 X 400	90
250	250	1220 X 500 X 400	135
400	400	1200 X 750 X 400	160
600	600	1400 X 750 X 500	180
800	800	1400 X 900 X 500	270
1200	1200	1500 X 900 X 1000	360
1600	1600	1800 X 900 X 1200	450
2000	2000	1800 X 900 X 1200	500
3200	3200	1800 X 900 X 1200	680
4000	4000	1800 X 900 X 1200	800

TABLE IV. Solid state abt switch bypass enclosure.
(if required as a separate enclosure to meet requirements of 3.1.3.7)

Current Rating	Maximum Envelope (HxWxD) Dimensions in mm	Maximum Unit Weight (kg)
125	610 X 406 X 610	80
250	864 X 610 X 610	118
400	864 X 610 X 610	127
600	864 X 610 X 610	136
800	1880 X 610 X 610	340
1200	1880 X 619 X 610	340
1600	2438 X 1067 X 914	727
2000	2438 X 1067 X 914	727
3200	2743 X 1778 X 1219	1091
4000	2743 X 1778 X 1219	1091

3.1.3.2 Test switches. The ABT shall be provided with test features to enable an operator to check the transfer function by source failure simulation of voltage or frequency as seen by the voltage sensing or frequency sensing (ac units only) devices.

3.1.3.3 Duty Rating. The transfer switches shall be designed for continuous electrical duty at full load current rating and nominal operating voltage and frequency (for ac units only).

3.1.3.4 Instantaneous ABT. Any ABT designated as an instantaneous transfer device shall have a total time-to-transfer not greater than 50.0 milliseconds. Closed transition type switches shall not be used. Solid state and high-speed mechanical ac ABTs shall have a field adjustable instantaneous time-to-transfer in the range between 1.2 and 50.0 milliseconds. The ABT shall be delivered with its time-to-transfer feature factory adjusted in accordance with the requirements in the ordering data (see section 7).

3.1.3.5 Time delay ABT. ABT types ABT-2 and ABT-3 shall purposely delay, for a predetermined time period, the actual transfer of power between the first input source and the second input source. The time-to-transfer delay period shall be factory pre-set for the type ordered, but shall be field adjustable.

3.1.3.6 Manual transfer override. The ABT shall incorporate a means of allowing an operator to override the automatic feature of the unit through the initiation of a purposeful manual transfer. This manual transfer may be initiated electrically or physically depending on the location of the operating device.

3.1.3.7 Bypass capability. A solid state ABT shall have the capability of providing continuous electrical power to the load during such conditions as maintenance and troubleshooting of control/indication circuits. The bypass function shall disable the switch's

ability to transfer power between sources and shall automatically activate safety interlock(s) to prevent inadvertent transfers from occurring. Bypass isolation circuits, if employed in the design, shall be electrically isolated from an operator in accordance with the requirements of UL1008 and may be contained in a separate enclosure. Refer to Table IV for bypass enclosure parameters. Repair shall be performed using standard tools provided to shipboard electricians. Special electrical test equipment required for maintenance and troubleshooting/repair shall be provided with the bus transfer switch.

3.1.3.8 Overload protection. The transfer switch shall not provide for electrical power system overload protection within the envelope of the device.

3.1.3.9 Short-circuit withstand. Transfer switches shall pass the short-circuit withstand tests as specified in UL1008. For transfer switches rated greater than 400 amperes, the tests shall be conducted as specified in UL1008 for short-circuit values not less than 35,000 amperes and as required in UL1008, or as otherwise specified in the contract or purchase order.

3.1.3.10 Insulation resistance. The insulation resistance of transfer switches shall not be less than 10 megohms when tested in accordance with UL1008.

3.1.3.11 Dielectric withstanding voltage. Transfer switches shall pass the dielectric withstanding voltage tests of UL1008.

3.1.3.12 Line phases. Unless otherwise specified bus transfer switches shall operate in ungrounded three-phase circuits.

3.1.3.13 Diagnostics and Remote Indication. Solid-state automatic bus transfer switches shall incorporate self-checking diagnostics capable of monitoring the electronic circuits and relating the status of the switch to the operator both locally at the unit and, where specified, remotely through the use of an electronic interface circuit. The network interface method shall be provided as required by the purchase order or contracting documentation. As a minimum non-solid-state automatic bus transfer switches shall be provided with remote status indication capability.

3.1.3.14 Endurance and Overload. Bus transfer switches shall pass the endurance and overload tests as specified in UL1008.

3.1.3.15 Maintainability. The design of bus transfer switches shall emphasize self-diagnostics and shall also emphasize minimum need for maintenance. The switches shall be constructed to provide complete accessibility for the performance of maintenance and repair from the front or face of the unit where modularized construction is employed, access shall be provided to all securing devices used in positioning these modules.

3.2 Automatic bus transfer switches for switchboards.

3.2.1 General. Automatic bus transfer switches used in conjunction with automatic starting of an emergency or standby ship service generator set or for alternate source load center switchboards shall be of the open mounting type designed for dead front switchboard mounting. The automatic bus transfer switches shall be two or three-way, as specified.

Three-way automatic bus transfer switches shall automatically transfer between two ship service sources and an emergency source. On the loss of both normal ship service supplies, the generator prime mover shall start automatically and enable a transfer by the ABT to the generator source when the generator output is within nominal operating voltage range. Retransfer to the ship service source shall be done manually except on loss of emergency power. A two-way switchboard automatic bus transfer switch shall operate the same as a three-way bus transfer switch except there will be only one normal ship service input.

3.3 Electrical interface. System electrical parameters for normal operating voltage, number of phases (ac units only), normal operating frequencies (ac units only), power quality and utilization voltages shall be those referenced in IEEE Std 45.

3.4 Mounting interface. ABTs with individual enclosures shall be designed for bulkhead or deck hard mounting directly to the ship structure or structural foundation structure provided; or shall be designed for bulkhead or deck mounting through the use of helical spring (or equivalent) shock and vibration mitigating mounts external to the enclosure where the unit is required by the contract or purchase order to comply with MIL-S-901 or MIL-STD-167.

3.5 Weight. The weight of an individual switch shall be minimized and consistent with the Current Rating level described in 3.1.3.1.

3.6 Cabling. Bus transfer switches shall be designed to provide an electric power interface through the use of stranded copper shipboard cabling rated at 90 degrees C insulation temperature and ampacities, with cable end terminations being accomplished through the use of crimp type terminal lugs. All terminals, bus bars and internal wiring shall be copper. Bus transfer switches shall also include at least two auxiliary contacts for each switch position to provide remote indication interfaces with shipboard control and indication systems.

3.7 Interoperability. When specified, the control of solid-state type automatic bus transfer switches shall be automatic from within and have the capability of remote manual control from a ship control system.

3.8 Human factors. The automatic bus transfer switches shall be designed and constructed such that the unit can be operated and maintained by a single operator. Each ABT shall include a wiring diagram, a schematic diagram and a description of operation. The information shall be protected and attached to the inside of the enclosure in a manner suitable for use by maintenance personnel. Wiring diagrams shall include wire numbers, component identification and terminal numbering/conductor color coding.

3.9 Design standards.

3.9.1 Continuity of electrical power. The ABT shall be designed to provide continuous power between source and load during periods not requiring transfer operations.

3.9.2 Safety grounding. The ABT shall be designed to provide for electrical safety grounding in accordance with the requirements of UL1008.

3.9.3 Cable entrance. The ABT shall allow for power and signal cable entrance and interior routing in such a manner as not to violate the enclosure's defined envelope integrity nor interfere with the operation of the interior components. Cable entry shall be through the bottom or lower half of either side. Cable and individual conductor securing methods shall be provided at the entrance and within the enclosure along with allowances for input power circuit and output power circuit conductor layout and retention. Dripproof and watertight enclosures above 400 A shall have removable cable entrance plates. The plates shall be sealed to the level of effectiveness of the enclosure.

3.9.4 Material. Transfer switches shall be suitable for marine environment. Each transfer switch shall be constructed using materials and methods as required in IEEE Std 45 and ABS.

4. REGULATORY REQUIREMENTS - The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulations (FAR).

5. QUALITY ASSURANCE PROVISIONS - The product shall be certified by a nationally recognized testing laboratory (NRTL) accredited for ABT certification by the occupational safety and health administration (OSHA), U.S. Department of Labor for compliance with UL1008 and the requirements specified herein. Where the requirements of MIL-S-901 and MIL-STD-167 are specified, the units shall be subjected to the tests required by these specifications.

5.1 Product Conformance. The products provided shall meet the salient characteristics of this commercial item description, conform to the product's own drawings, specifications, standard and quality assurance practices, and be the same product offered for sale in the commercial market. The government reserves the right to require proof of such conformance.

5.2 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspections, examinations, and test requirements specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections, or tests set forth in this description, where such inspection, examinations, and test are deemed necessary to ensure supplies and services conform to prescribed requirements.

5.3 Data requirements. The manufacturer shall provide a technical data package consisting of technical manuals, provisioning technical documentation, drawings, schematics, parts lists, spares allotments, and test and inspection reports in accordance with the requirements stipulated in the contract or order. In addition, point-to-point wiring diagrams and complete electrical schematics shall be provided in detail as defined in ABS Rules for Building and Classing Steel Vessels. Where requirements of MIL-S-901 and MIL-STD-167 are specified, laboratory certified test reports, including the results of the testing, for MIL-S-901 and MIL-STD-167 shall be provided.

6. PACKAGING - Preservation, packaging, packing, labeling and marking shall be as specified in the contract or order (see Section 7).

7. ORDERING DATA - Ordering documents shall specify the following:

a. Title, number and date of this commercial item description.
b. Current Rating required (see 3.1.3.1).
c. Type and operating features required (see 2.1).
d. Normal operating voltage (see 3.1.2.1).
e. Normal operating frequency (for ac units) (see 3.1.2.2).
f. ABT time-to-transfer setting (see 3.1.3.4).
g. Bypass isolation circuit (see 3.1.3.7).
h. Short-circuit withstand rating required (see 3.1.3.9).
i. Remote indication (see 3.1.3.13).
j. Shock and vibration requirements (see 3.4).
k. Enclosure type (see 3.1.3).
l. Packaging requirements (see 6.0).

8. SOURCE OF SUPPLY - A suggested list of manufacturers providing bus transfer switches qualified to UL1008 is provided below:

Vendor CAGE number	Vendor name and address
04845	Automatic Switch Company Florham Park, NJ 07932
000F6	Cutler-Hammer One Tuscarawas Road Beaver, PA 15009
2X715	PDI 510 Eastpark Court Sandston, VA 23150
04801	Power Systems Group Power Paragon Company 901 East Ball Road Anaheim, CA 92805
63743	Ward Leonard 31 South Street Mount Vernon, NY 10550
96474	Zenith Controls, Inc. 830 W. 40th Street Chicago, IL 60609

MILITARY INTERESTS:

Custodians:
Army - CR
Navy - SH
Air Force - 85

Preparing Activity:
Navy - SH
(Project 5930-1647)