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MIL-STD-1682/10(SH)
27 October 1976

MILITARY STANDARD

SHIPYARD INSPECTION AND CLEANING PROCEDURES FOR SUBMARINES

PART 10

NAVIGATION CENTER

SSBN 640 CLASS

FSC 1905

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DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND

WASHINGTON, D.C. 20362

Shipyard Inspection and Cleaning
Procedures for Submarines, Navigation
Center SSBN 640 Class

MIL-STD-1682/10(SH)

1. This Military Standard is approved for use by Naval shipyards during overhaul and conversion periods for submarines.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Ship Engineering Center, Center Building, SEC 6124, Prince George's Center, Hyattsville, Maryland 20782 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1. SCOPE

1.1 This part provides inspection and cleaning procedures for the Navigation Center (NC) aboard SSBN 640 Class submarines. In addition, it provides inspection and cleaning procedures for the Ventilation System cooling coil, ducts, and fans, and provides filter maintenance and replacement procedures. The basic standard and this part are to be considered as an integral single document.

2. REFERENCED DOCUMENTS

2.1 The issues of the following documents in effect on the date of invitation for bids form a part of this standard to the extent specified herein.

GOVERNMENTAL

SPECIFICATION

MIL-D-16791 - Detergents, General Purpose (Liquid, Nonionic)

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 Clean. Clean is being free of all loose scale, rust, grit, filings, and other foreign substances; and free of oil, grease, and other organic materials.

3.2 Cleaning solvent. Cleaning solvents as used in this standard refer to water-soluble (Type I) liquid detergent conforming to specification MIL-D-16791.

3.3 Dewpoint. The temperature at which condensation first occurs when a vapor is cooled.

3.4 Landing or landed. Physical placement of equipment in specified location.

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4. REQUIREMENTS

4.1 General requirement.

4.1.1 Waste solvents shall be discarded in a sanitary sewer system.

4.2 Safety and precautions.

Note: Listed below are warnings appearing in this procedure. All personnel involved in operating and maintaining equipment must fully understand the warnings.

4.2.1 Supplemental filter material used in this standard is a restricted use item and should be used only during construction and availability periods such as upkeep, conversion, and overhaul. Cyanide gas is generated when filter material burns; therefore, its use is prohibited at all other times.

4.2.2 Do not use flammable cleaning solvents or solvents in spray form.

4.2.3 Do not take MIL-D-16791 cleaning detergent internally. Keep out of eyes. If swallowed, induce vomiting and call a physician; for eyes, flush with plenty of water and get medical attention.

4.2.4 To avoid possibility of shock hazard, do not damp wipe areas around cable plugs and equipment jacks.

4.2.5 Ensure that proper warning tags are placed at power controller to prevent fans from being inadvertently energized during maintenance.

4.3 Inspection and cleaning intervals.

4.3.1 Inspection, cleaning, and maintenance functions shall be performed at the following time periods. The following are minimum requirements. Clean more frequently if inspections indicate additional cleaning is required.

Paragraph	Title	Inspection Frequency	Cleaning Frequency
5.1	FBM NC inspection and cleaning	Daily	Daily and weekly
5.2	Check of differential pressure gage indication	Daily	Not applicable

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Paragraph	Title	Inspection Frequency	Cleaning Frequency
5.3	Supplemental filter maintenance	Daily	Weekly
5.4	Filter replacement	Determined by 5.2	Determined by 5.2
5.5	Inspection and cleaning of navigation ventilation system ducts	Monthly	Once each conversion/ overhaul
5.6	Cooling coil inspection and cleaning	Monthly	Once each conversion/ overhaul
5.7	Fan inspection and cleaning	Determined by 5.2	Once each conversion/ overhaul
5.8	D/D converter ventilation inspection and cleaning	Monthly	Monthly

4.4 Materials.

4.4.1 Materials required to perform normal inspection, cleaning, and associated maintenance procedures are as follows:

(a) Containers for cleaning solution
(b) Cleaning solvent, MIL-D-16791 (NSN 7930-00-282-9699 or equivalent)
(c) Supplemental filter material (NSN 1G-9330-00-965-0481 or equivalent)
(d) Coated cloth: fire resistant curtains (NSN 8305-00-082-5586/5587 or equivalent)
(e) Portable vacuum cleaner (nonmetallic hose)
(f) Assortment of sponges and wiping cloths
(g) Lint-free cloth (NSN 7920-00-514-2420 or equivalent)
(h) Masking tape
(i) Thermometer
(j) Cleaning kit (see figure 1)

PRINCE GEORGES CENTER

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The following cleaning tools are recommended for use by shipyards when conducting in place or off location cleaning of the Navigation Cooling System fan and prewhirl. Equivalents may be used.

RADIATOR BRUSH-HORSEHAIR. TWISTED-IN-WIRE CONSTRUCTION. BRUSH AREA: 2¼" DIA. X 6" LONG. OVERALL LENGTH IS 23".

NSN-7920-00-234-9317

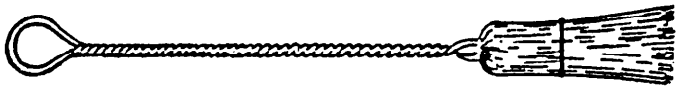
NOTE: To facilitate cleaning, suitable plastic tubing or wood extensions may be attached to these tools. Also, the wire handle brushes may be bent to a convenient angle to clean the fan blades.

COTTON YARN ON FLEXIBLE WIRE FRAME THAT CAN BE REFORMED TO DESIRED SHAPES. 3" DIA. WITH 5" PLASTIC HANDLE.

OVERHEAD PIPE SWAB-4 PLY

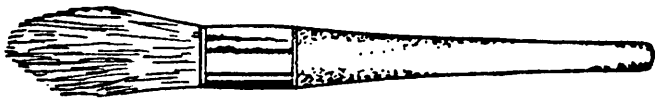
WARNING - DO NOT USE FLAMMABLE SOLVENT OR SOLVENT IN SPRAY FORM.

GREY HAIR AND POLYPROPYLENE 11½" OVERALL LENGTH, 1¾" BRUSH TRIM AND 1¾" BRUSH FLARE.



PAINTED STYLE, WIRE HANDLE, ROUND FERRULE

BRUSH DESIGNED FOR USE WITH APPROVED CLEANING SOLVENTS AND SOAP COMPOUNDS WITH WATER. SIZE 10 WITH FIBER FILLER OF RED MIX TAMPICO. 11¼" LONG.



WATER TOOL BRUSH

NSN-7920-00-252-4084

Figure 1. Cleaning kit

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5. INSPECTION, CLEANING, AND MAINTENANCE PROCEDURES

5.1 FBM NC ventilation system inspection and cleaning.

5.1.1 After landing first piece of navigation equipment and before equipment turn-on, proceed as follows (after equipment turn-on, proceed to 5.1.2).

5.1.1.1 Daily check that equipments exposed to possibility of damage, water leaks, hydraulic leaks, etc., are protected by suitable covers or padding.

5.1.1.2 Maintain environmental conditions to protect all navigation equipment against dust, dirt, moisture, or other foreign matter.

5.1.1.3 Ensure that wherever possible, access through NC is restricted to reduce traffic, dirt, and grime, using suitable local procedures.

5.1.1.4 Daily inspect NC and clean as required, but at least once each week, as follows:

(a) Remove dust, chips, etc., from work surfaces, exposed equipment, wire raceways, readily accessible areas of overhead, space above navigation equipment, bedplate, exposed foundations, deck, etc.,

(b) Empty refuse containers and splash pans.

5.1.1.5 Daily take psychrometer readings to maintain NC within conditions specified in table I.

Table I. Temperature and dewpoint limitations before equipment turn-on

DRY BULB READING		MAXIMUM DEWPOINT	
°FAHRENHEIT	°CELSIUS	°FAHRENHEIT	°CELSIUS
90*	32.2	81	27.2
85	29.4	78	25.6
80	26.7	75	23.9
75	23.9	71	21.7
70	21.1	68	20.0
65*	18.3	62	16.7

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*Do not allow NC temperature to go above 90°F (32.2°C) or below 65°F (18.3°C). Use coolers, dehumidifiers, or heaters to prevent NC from going outside temperature limitations or exceeding maximum dewpoint at the various temperatures.

5.1.2 After equipment turn-on, proceed as indicated in 5.1.2.1 through 5.1.2.5.

5.1.2.1 Isolate NC by arranging coated cloth (fire retardant curtains) at the following locations:

(a) In port passageway separating the ship's control center directly aft of ballast control panel.

(b) In aft passageway between bulkhead 58 and magnetic tape storage cabinet.

5.1.2.2 Rig coated cloth (fire retardant curtains) as much as it is practical in the starboard passageway and aft as follows:

(a) From overhead to deck on starboard side of magnetic tape storage cabinet and extending forward in front of various heater controllers, heaters, fan controllers, and ship's constant frequency power supply in starboard passageway to nonstructural bulkhead separating ship control center from NC.

(b) Over openings in the Type XI periscope booth.

5.1.2.3 Clean NC as indicated on an as required basis, but at least as often as shown below:

(a) Install clean vacuum cleaner filter and vacuum deck and any protective coverings to remove dust, dirt, or other foreign matter (daily).

(b) Remove dust from following using wiping cloths and/or vacuum cleaner, then dispose of cloths.

(1) Work surfaces, shelves, and equipment (daily).

(2) Readily accessible overhead areas, wire raceways, bulkheads, and passageways (weekly).

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WARNING

To avoid possibility of shock hazard, do not damp wipe areas around cable plugs and equipment jacks.

(c) Damp wipe equipment and work surfaces as necessary using a sponge and an approved cleaning solvent to remove dirt not removed by dusting or vacuuming (weekly). Follow with damp wiping using clean, fresh water. Do not wipe switches, indicators, and lights.

(d) Empty refuse containers and install replacement liner bag (daily).

5.1.2.4 Maintain NC within the conditions stated in table II. Take psychrometer readings daily if NC relative humidity is 50% or less. If relative humidity is greater than 50% take psychrometer readings every 4 hours. Each time psychrometer readings are taken, if any of the equipment listed below is operating, place a thermometer on one of the cabinets at its coldest point. If it appears that cabinet temperature will go below NC dewpoint, have temporary dehumidifiers and/or heaters installed in NC to lower dewpoint to ensure against condensation on the navigation equipment or inside of an equipment if a drawer or cabinet is opened.

Navigation operation checkout console (NOCC)

Navigation control console (NCC)

Receiving Set, Sonar AN/BQN-3 recorder

Radio Navigation Set AN/BRN-3 receiver

LORAN C receivers

A/D converter

D/D converter

SINS no. 1 or 2 console

CNC no. 1 or 2

MARDAN spare

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SINS gyromonitor console

Magnetic tape unit (MTU)

5.1.2.5 Daily inspect NC to ensure that equipment exposed to dust, dirt, moisture, or other foreign matter is protected as follows:

(a) Equipments exposed to possibility of damage are protected by suitable covers or padding; welding and grinding activities are isolated from other sections of NC by suitable containment; and access through NC is restricted to reduce traffic, dirt, and grime.

(b) Machined surfaces, shock mounts, open connectors, ship's wiring terminations, open air conditioning penetration, open-end pipes, etc., exposed to dust, dirt, moisture, or other foreign matter are protected by suitable sealed coverings.

Table II. Temperature and dewpoint limitations after equipment turn-on

DRY BULB READING		MAXIMUM DEWPOINT* (with navigation equipment operating, utilizing cooling air from Navigation Equipment Cooling System)	
°FAHRENHEIT	°CELSIUS	°FAHRENHEIT	°CELSIUS
90 max**	32.2 max**	68	20
85	29.4	68	20
80	26.7	68	20
75	23.9	68	20
70	21.1	68	20
65 min**	18.30 min**	63	17.2

*If dewpoint conditions stated are exceeded, temporarily install dehumidifiers and/or heaters in NC to bring dewpoint condition within tolerance. Maintaining these conditions will ensure that ambient air coming in contact with navigation equipment or mixing with the cooling air will not cause condensation.

**Take corrective action, e.g., spot coolers, dehumidifiers, heaters, etc., if these conditions exceed indicated limits. If corrective action is not adequate, shut down navigation equipment until conditions return to the acceptable limits.

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5.1.3 Inspect the return air inlet in NC, port side, frame 49 as follows:

(a) Verify that lint or dust producing materials (such as rags) are not stored in the area.

(b) Verify that an area extending up to 2 feet in front of the inlet screen is clear of obstructions and stored materials.

5.2 Check of differential pressure gage indication.

Note: Numbers in parentheses are for SSBNs with improved Navigation Ventilation System.

5.2.1 Daily check (more frequently under extremely dirty conditions) in the navigation fan room, that differential pressure gage VH-323-GA-1 indicates between 0.4 (0.65) and 1.5 (2.0) inches water. If differential pressure gage indicates below 0.4 (0.65) inch water or above 1.5 (2.0) inches water, replace differential pressure filters (refer to 5.4).

CAUTION

Air flow must not be restricted by stored or loose materials or damage to navigation equipment may result.

Notes: 1. Gage indications below 0.4 (0.65) inch water indicate tears or leaks in differential pressure filters or a gage malfunction. Indications between 0.4 (0.65) and 1.5 (2.0) inches water indicate normal filtering action. Indications greater than 1.5 (2.0) inches water denote restricted air flow due to a clogged filter.

2. For equipment configuration, see figure 2 showing Navigation Ventilation System.

5.2.2 Daily inspect the main navigation equipment air conditioning room for the following.

5.2.2.1 Check that lint or dust producing materials (such as rags) are not stored in main navigation equipment air conditioning room.

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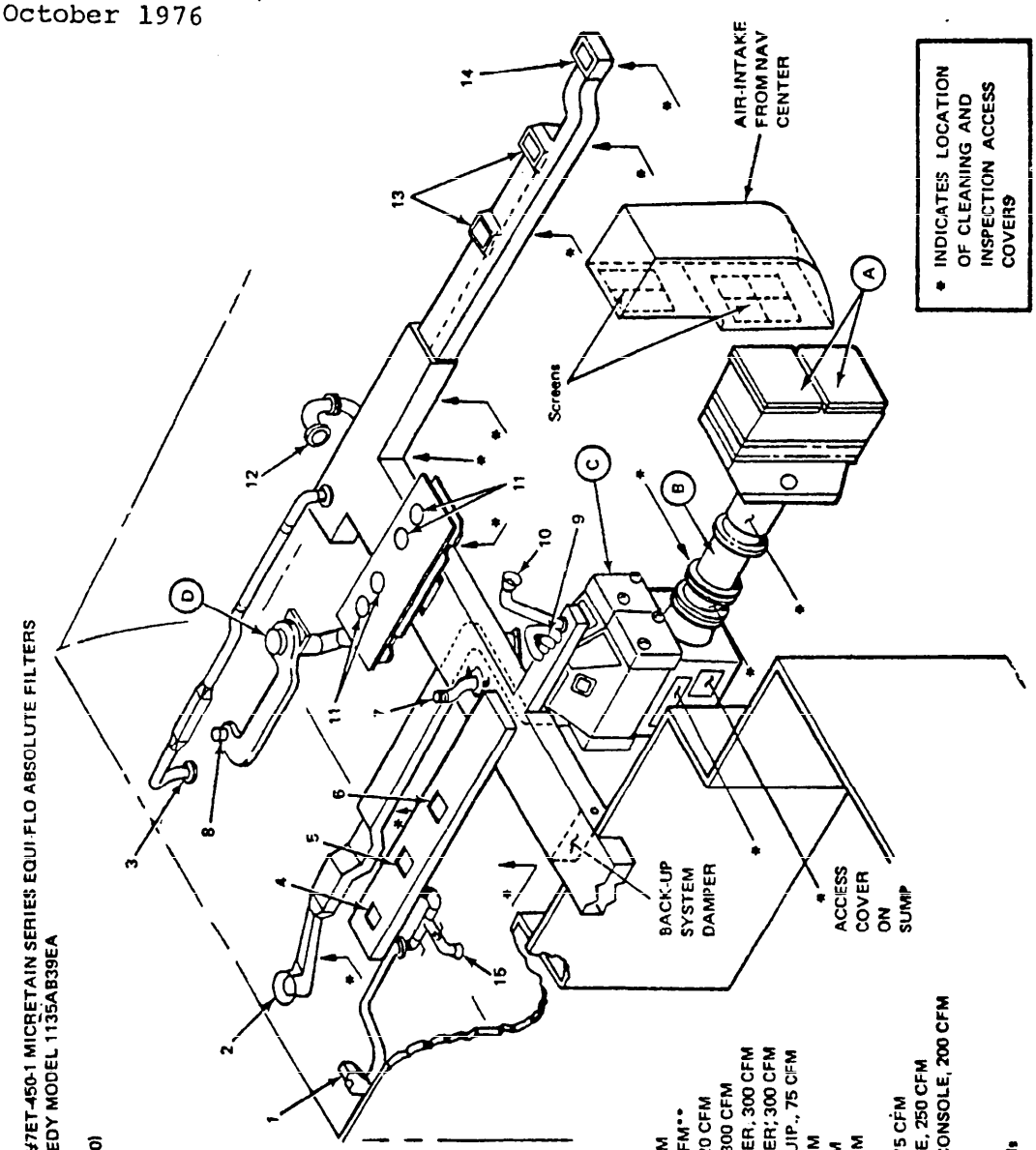

Figure 2. Ventilation system - Navigation Center 640 Class

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5.2.2.2 Check that an area extending 2 feet in front of prefilters (76) is clear of all obstructions and stored materials.

CAUTION

Ensure that any loose articles that might be drawn into differential pressure filters are kept well clear of intake.

5.2.2.3 Check that all air inlets to the navigation equipment air conditioning room are clear of obstruction and stored materials. (Not applicable to SSBNs with improved Navigation Ventilation System.)

5.3 Supplemental filter maintenance.

WARNING

Supplemental filter material used in this standard is a restricted use item and should be used only during construction and availability periods such as upkeep, conversion, and overhaul. Cyanide gas is generated when filter material burns; therefore, its use is prohibited at all other times.

5.3.1 Ventilation System - Before using the Navigation Ventilation System, supplemental filter material should be taped in place at the below listed locations. This material is to be replaced daily throughout this test period.

(a) Navigation fan room - Cover each door or bulkhead ventilated core grille (not applicable to SSBNs with improved Navigation Ventilation System) in the middle level operations compartment and cover each of the air-intake prefilter assemblies inside the fan room.

(b) On SSBNs with improved Navigation Ventilation System, cover air intake.

(c) Crews' mess - Where installed, cover air-intake grille on fans 45 and 52.

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5.3.2 Navigation subsystem equipment - Before starting operational testing of below listed equipment, supplemental filter material is to be used in place over external filters located on below listed equipments. This material is to be inspected daily and replaced weekly.

Radio Navigation Set AN/BRN-3 data processor	Radio Navigation Set AN/BRN-3 computer-writer adapter
Frequency-Time Standard AN/BSQ-2 oscillator rack	Frequency-Time Standard AN/BSQ-2 60-Hz amplifiers (2)
Frequency-Time Standard AN/BSQ-2 10-KHz amplifiers (2)	Navigation computers (2)
D/D converter	Magnetic tape unit (MTU)
A/D converter	

Note: Supplemental filter material described above may be reused after cleaning in a water/detergent solution, rinsed in clean water, and air dried.

5.4 Filter replacement.

Notes: 1. On SSBNs with the improved Navigation Ventilation System, prefilter and differential filter cleaning and filter replacement is accomplished only when fan 39 is secured. Therefore, this work must be scheduled for a time when no testing is in progress and navigation equipment is secured or when the backup system is available to supply cooling air.

2. Numbers in parentheses are applicable to SSBNs with improved Navigation Ventilation System.

5.4.1 Ensure that the main air conditioning room is maintained in the operating condition specified in (a) through (c) until the Navigation Ventilation System is returned to the normal supply from fan 39.

(a) Verify that supply fans 2, 47, 48, 49, and 50 are operating on FAST.

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(b) Verify that exhaust fans 5, 6, 7, 28, 30, and 35 are operating on FAST.

(c) If operable, verify that the following precipitators are operating.

EP no. 1, upper level exhaust, in main air conditioning room.

EP no. 2, lower level exhaust, in main air conditioning room.

EP no. 3, galley exhaust, in galley.

EP no. 8, battery air supply, in crews' lounge.

5.4.2 Navigation fan room - When the Ventilation System differential pressure gage, described in 5.2, indicates below 0.4 (0.65) or above 1.5 (2.0) inches water, replace system filter assemblies as described in 5.4.2.1.

Note: Paragraph 5.4.2.1 applies to SSBNs with or without the improved Navigation Ventilation System.

5.4.2.1 If no system testing is in progress and equipment can be shut down, deenergize individual equipments and perform (a) through (e) after noting the warning.

WARNING

Ensure that proper warning tags are placed at power controller to prevent fans from being inadvertently energized during maintenance.

(a) Deenergize fan 39 at START/STOP pushbuttons in NC.

(b) Verify that differential pressure gage VH-323-GA-1 indicates 0.

(c) Remove the two prefilters and perform the following:

(1) Inspect prefilters for accumulations of dirt, or other foreign matter.

(2) Remove small accumulations of dirt by vacuuming.

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(3) Clean prefilters, if necessary, in ultrasonic cleaner. Do not oil. Dry by application of low-pressure air.

(d) Remove differential pressure filters.

(e) Remove any dirt or dust exposed after removal of prefilters and differential pressure filters inside filter casing, using vacuum cleaner or a clean, lint-free cloth. Inspect fan prewhirl and fan blades for verification of cleanliness. If cleaning is required, proceed to 5.7.

CAUTION

Handle new differential pressure filters with care to prevent damage. Prevent any foreign matter from dropping into filters or filter casing.

(f) Install new differential pressure filters. Ensure that each filter is seated on the rubber gasket in the filter casing.

(g) Install two prefilters and tape in place supplemental filter material (refer to 5.3.).

(h) Energize fan 39 at START/STOP pushbuttons in NC.

(i) Verify that differential pressure gage VH-323-GA-1 indicates greater than 0.4 (0.65) inch water.

Note: Paragraph 5.4.2.2 applies only to SSBNs that have not had the Ventilation System converted to the improved Navigation Ventilation System.

5.4.2.2 When system testing precludes shutting down the system fan and backup (standby) cooling is not available, perform filter replacement as follows.

(a) Isolate as many individual equipments as testing activities will permit to minimize total system flow. This reduces velocity through individual elements and prevents filter unloading.

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CAUTION

Care must be exercised when inserting the guillotine damper assembly to avoid compressing filter assembly.

(b) Remove cover plate from fan room filter case assembly and insert guillotine damper provided for isolating filter elements.

(c) Remove isolated prefilter and perform the following:

(1) Remove any dirt or dust exposed after prefilter removal using vacuum cleaner or a clean, lint-free cloth.

(2) Remove differential pressure filter.

(3) Remove dirt or dust exposed after removing prefilters and differential pressure filters in filter case using vacuum cleaner or a clean, lint-free cloth.

CAUTION

Handle new differential pressure filters with care to prevent damage. Prevent any foreign matter from dropping into filters.

(4) Install new differential pressure filters. Ensure that each filter is seated on rubber gasket in filter casing.

(5) Install a clean, spare prefilter and tape in place supplemental filter material (refer to paragraph 5.3.1).

(d) Carefully remove guillotine damper and replace cover plate over the filter case opening.

(e) Repeat 5.4.2.2(b) through 5.4.2.2(d) for the alternate filter assembly.

(f) Verify that differential pressure gage VH-323-GA-1 indicates greater than 0.4 inch water. If not, shift to backup ventilation system and perform corrective action to eliminate bypass of air around differential pressure filters or access covers.

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Note: This step applicable only to SSBNs with the improved Navigation Ventilation System.

5.4.2.3 When system testing precludes shutdown of the system fan and the backup system is available, perform filter replacement as follows:

(a) Ensure fans 2, 5, 6, 7, 28, 30, 47, 48, 49, and 50 are operating in FAST mode.

(b) Check that galley exhaust, battery supply, upper levels forward exhaust and lower levels forward exhaust precipitators are operating.

WARNING

Supplemental filter material used in this standard is a restricted use item and should be used only during construction and availability periods such as upkeep, conversion, and overhaul. Cyanide gas is generated when filter material burns; therefore, its use is prohibited at all other times.

(c) Ensure that CNCs, MTU, and A/D and D/D converters are isolated from the Navigation Ventilation System. For the A/D converter, shut ventilation duct damper, tape supplemental filter material over air intake vent in the bottom of cabinet and check that the fan switch is ON. On CNCs and D/D converter, place coding mode lever on blower assembly to BLOWER AIR position and tape supplemental filter material over air intake. For MTU, install blower assembly as follows:

(1) Take fan enclosure assembly and six hinge screws out of storage.

(2) Loosen 16 captive screws at top and bottom of air conditioning duct.

(3) Remove and store air conditioning duct.

(4) Place cover (part number 2656717) over deck hole and secure by tightening eight captive screws.

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(5) Place fan enclosure assembly in bottom of cabinet. Secure by replacing six rear hinge mounting screws and by turning two captive front locking screws clockwise one-quarter turn.

(6) Connect blower power wires according to tagging or color coding at terminals 7, 8, and 9 of TB 5.

(7) Tape supplemental filter material over blower assembly intake from underneath cabinet.

(d) Shut control air valve 69 and open CAC-68.

(e) Secure fan 39.

(f) Shut Navigation Equipment Cooling System damper

(g) Open backup system isolation damper.

(h) Adjust thermostat CAC-315-TX-245 to lowest temperature setting.

(i) Repeat 5.4.2.1(c) through 5.4.2.1(g).

(j) Close backup system damper.

(k) Open Navigation Equipment Cooling System damper.

(l) Energize fan 39.

(m) Shut control air valve CAC-68 and open valve 69.

(n) Readjust thermostat CAC-315-TX-245 to original setting.

(o) If CNCs, MTU or A/D converter and D/D converter are operating, restore navigation equipment cooling air to this equipment. For CNCs and D/D converter, place cooling mode lever on BLOWER ASSEMBLY in the SHIP's AIR position. For the A/D converter, close air-intake vent at bottom of cabinet and set fan switch to OFF. Remove blower assembly from MTU by reversing the instructions in 5.4.2.3(c).

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5.4.2.4 (This step is applicable only to SSBNs with a separate D/D converter cooling package.) Inspect and clean mechanical filter 69 in D/D converter Ventilation System as follows:

(a) Place lever on blower assembly in BLOWER AIR position. This opens louvers to navigation room air and energizes the D/D converter internal ventilating fan.

(b) Deenergize fans 45 and 52 at Navigation Cooling System alarm panel.

(c) Remove supplemental filter material and the mechanical filter 69 from cooling coil C-26.

(d) Remove any dirt or dust exposed after removal of mechanical filter using vacuum cleaner or a clean, lint-free cloth.

(e) Inspect mechanical filter for accumulations of dirt, grease, or other foreign matter.

(f) Remove small accumulations of dirt by vacuuming.

(g) Clean mechanical filter in ultrasonic cleaner if necessary. Do not oil. Dry by application of low-pressure air.

(h) Install mechanical filter and tape supplemental filter material in place.

(i) Energize fans 45 and 52 at Navigation Cooling System alarm panel.

(j) Open D/D converter equipment isolation damper. This shuts louvers to navigation room air and deenergizes the D/D converter internal ventilating fan.

5.4.2.5 Ensure that main air conditioning room return filter 1 in fan room bulkhead and filters 70, 71, 72, 73, 74, and 75 on the supply plenum are clean and properly installed.

5.4.2.6 Verify that main air conditioning room return filter 1 in the NC is clean and properly installed.

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5.5 Inspection and cleaning of navigation ventilation system ducts.

5.5.1 Monthly inspect FBM Navigation Ventilation System ducts for cleanliness at the following locations:

(a) In crews' mess, open overhead to gain access to one inspection plate in structural trunk. Remove fastening screws, plate, and inspect trunk. (If testing status does not permit securing fan 39 for this inspection, inspect only at location specified in (b), (c), and (d) below.)

(b) In NC - Radio Navigation Set AN/BRN-3 base plenum.

(c) In NC - D/D base plenum.

(d) In NC - CNC no. 2 supply at base of unit.

5.5.2 At least once during the conversion after equipment turn-on, clean or perform a demonstration of cleaning as follows.

5.5.2.1 Ensure all cabinets cooled by Navigation Ventilation System are secured.

5.5.2.2 Deenergize fan 39 at STOP/START pushbutton.

5.5.2.3 Perform the following to open the Ventilation System as much as possible:

(a) Remove the three access covers in structural trunk and the three access covers in the plenum supplying NCC and NOCC in overhead of crews' mess.

(b) Open backup air trunk access located in overhead of passageway.

(c) Open equipment doors to gain access to duct and or supply plenums.

Radio Navigation Set AN/BRN-3 receiver

D/D

CNC no. 1 and no. 2

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(d) Remove flexible ducts from LORAN C Indicator AN/BQN-3 and spare MARDAN.

(e) Remove D/D duct section from cooling coil discharge access plate, two access plates in the D/D supply duct, and removable section that dips below ceiling.

(f) Close main Ventilation System duct damper.

5.5.2.4 Clean all accessible system ducting using a clean, lint-free cloth dampened in detergent and warm water solution. Use flexible wire or other suitable extension to facilitate wipe-down of maximum duct area. Wipe dirt from all access plates and openings. Wipe ducting dry with clean, lint-free cloth.

5.5.2.5 Verify that all equipment dampers are shut.

CNC (2 units)

MTU input/output unit

A/D converter

D/D converter

Navigation operation checkout console (NOCC)

LORAN C (2 units)

Receiving Set, Sonar AN/BQN-3

Navigation control console (NCC)

Radio Navigation Set AN/BRN-3

SINS navigation console

Gyromonitor electronics

MARDAN spare

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5.5.2.6 Install D/D duct sections, the aftmost D/D duct access cover, and first access plate (below SINS) on main structural trunk.

5.5.2.7 Open main ventilation damper at discharge of cooling coil, energize fan 39. Discharge air through openings for several minutes.

5.5.2.8 Secure fan. Close all access covers except at NOCC, open damper to LORAN C, spare MARDAN, and AN/BQN-3 indicator. (Do not install flexible duct.) At each CNC and the D/D converter remove blower assembly. Open damper to MTU. To prevent cooling air from entering CNCs, D/D converter, and MTU, arrange a deflector around the vent opening in the bottom of the cabinets that will deflect air into the NC when fan 39 is energized. Reenergize fan. Operate until ducts are dry and have been blown clear. Secure fan and reinstall blower assembly at each CNC and the D/D converter.

5.5.2.9 Restore all ducting to normal except do not reconnect flexible duct to LORAN Cs, spare MARDAN, and AN/BQN-3.

5.5.2.10 Due to inaccessibility, ducts to AN/BRN-3 receiver, spare MARDAN, LORAN C, A/D converter, and AN/BQN-3 will be cleaned as follows:

(a) Check that all equipments cooled by the Navigation Ventilation System are secured. Check that all equipment dampers are shut (refer to 5.5.2.5).

(b) Open AN/BRN-3 receiver doors and remove filter in bottom of each cabinet. To prevent cooling air from entering equipment, arrange a deflector around the ventilation opening that will deflect cooling air into NC when fan 39 is energized. Attach cheesecloth windsock to deflector to preclude blowing dust into NC.

(c) Open AN/BRN-3 ventilation damper.

(d) Energize fan 39.

(e) After operating fan 39 for several minutes, check cheesecloth for dirt accumulation. If dirt is accumulating, shut down fan 39, replace cheesecloth with clean cheesecloth, and reenergize fan 39. Continue this process until there is no noticeable further accumulation of dirt on cheesecloth.

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(f) Repeat 5.5.2.10(a) through 5.5.2.10(e) for the A/D converter, LORAN Cs, AN/BQN-3, and spare MARDAN, each time assuring that only the damper for the unit in question is open. For LORAN Cs, AN/BQN -3, and spare MARDAN, tape cheesecloth over the open end of the flexible hose (energize spare MARDAN fan when cleaning the spare MARDAN duct).

5.5.2.11 Deenergize fan 39, spare MARDAN fan, and restore equipment and ducting to normal.

Note: This step applicable only to SSBNs with improved Navigation Ventilation System.

5.5.2.12 Clean air-intake ductwork as follows:

(a) Remove the four screens in the Navigation Ventilation System fan room on air-intake ductwork between the NC and fan room. Also, remove the two screens on the air-intake in NC.

(b) Vacuum all accessible portions of air-intake ductwork.

(c) Clean accessible portions of air-intake ductwork using a clean, lint-free cloth dampened in a detergent and warm water solution. Use flexible wire or other suitable extension to facilitate wipe-down of maximum duct area. Wipe ducting dry with clean, lint-free cloth.

(d) Vacuum, then use a detergent and warm water solution to clean screens.

(e) Use 20-psi air to dry screens and air-intake ductwork.

(f) Reinstall screens.

5.6 Cooling coil inspection and cleaning.

Note: At least once during conversion, cooling coils should be cleaned or a demonstration of cleaning performed.

5.6.1 Monthly, in the navigation fan room, open the access plate on the sump located below cooling coils and inspect cooling coils (it will be necessary to remove the access cover to the sump in the fan room passageway bulkhead

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first). If cleaning the coils is necessary, proceed as indicated in 5.6.1.1 through 5.6.1.18.

5.6.1.1 Ensure all cabinets cooled by the Navigation Equipment Ventilation System are secured or that the backup system is lined up to supply air to operating equipments.

WARNING

Ensure that proper warning tags are placed at power controller to prevent fans from being inadvertently energized during maintenance.

5.6.1.2 Deenergize fan 39 at START/STOP pushbuttons.

5.6.1.3 Deenergize and tag out power switches to fan 39 at switchboards 5SA and 6SA. Shut damper at cooling coil outlet.

5.6.1.4 Shut chilled water isolation valves CW-287 and CW-290.

5.6.1.5 Remove the following system access covers:

CAUTION

Removing D/D supply duct requires checking to see if orifice plate is installed. If so, mark it for exact replacement during reassembly.

(a) The cover upstream of cooling coils C-24 and C-25. (Remove D/D duct section on vessels having D/D air supply from main system.)

(b) The cover downstream of cooling coils C-24 and C-25 (SSBNs with improved Navigation Ventilation System have two covers).

5.6.1.6 Inspect cooling coil fins and accessible system ducting for accumulation of dirt or other foreign matter.

Note: A film of dirt or other foreign matter can adversely affect fan or cooling coil performance.

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CAUTION

Use care to prevent fin damage when using scrub or paint brush to loosen dirt or other foreign matter from cooling coil fins.

5.6.1.7 Carefully loosen any dirt or other foreign matter on intake side of cooling coil fins using a scrub or paint brush.

5.6.1.8 Vacuum intake side of cooling coils.

5.6.1.9 Blow 20-psi air through cooling coils from discharge side and then vacuum intake side of cooling coils again.

5.6.1.10 Inspect cooling coil fins for grease or other foreign matter. If necessary, clean as follows using a dishwashing detergent and warm water solution.

(a) Block off the duct with a plastic sheet. Using a fine spray, saturate the entire cooling coil fin surface area. Spray solution into coil from the air discharge side. Allow solution to remain on coil approximately 5 minutes.

(b) Adjust bleed for high velocity spray and wash coil from the air discharge side using clean water, to ensure that dirty water does not enter the ventilation supply duct.

(c) Wipe away any solution remaining in the cooling coils and botto of sump. If necessary, 20-psi air may be used from the air discharge side of the cooling coil.

5.6.1.11 Clean cooling coil drip pan using solution of dishwashing deter gent.

5.6.1.12 Remove tag installed in 5.6.1.3 and energize power switches to fan 39 at switchboards 5SA and 6SA. Install access plate(s) on sump below cooling coils.

5.6.1.13 Energize fan 39 at START/STOP pushbuttons in NC.

5.6.1.14 Allow system air to discharge through open access cover until residual cleaning water is removed.

5.6.1.15 Deenergize fan 39 at START/STOP pushbuttons in NC.

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5.6.1.16 Install remaining system access covers (or D/D duct section).

5.6.1.17 Open chilled water isolation valves CW-287 and CW-290, open damper at cooling coil discharge.

5.6.1.18 Restore navigation equipment and ventilation system to pretest conditions.

5.7 Fan inspection and cleaning.

5.7.1 The navigation fan is to be inspected for cleanliness during differential filter replacement when the fan is deenergized. Also, clean the fan or perform a demonstration of cleaning at least once during conversion. Cleaning of fan is necessary to assure that system flow will not fall below specified minimum. On those SSBNs with improved Navigation Ventilation System, clean the fan in place using brushes and solvent shown in figure 2. For SSBNs that do not have the improved Navigation Ventilation System, remove the fan for cleaning.

5.7.1.1 In-place cleaning of fan:

(a) Ensure all cabinets cooled by Navigation Equipment Ventilation System are secured or that backup system is lined up to supply air to operating equipments.

(b) Deenergize and tag out power to fan 39 at switchboards 5SA and 6SA.

(c) Remove prefilter and differential filters and removable frame inside filter case.

(d) Remove fan room bulkhead access which provides access to fan 39 and transition ducting to chiller.

(e) Remove two access plates on transition duct, thereby gaining access to fan 39 diffuser and after end of fan 39, and the access on transition piece just upstream of fan.

(f) Clean prewhirl and fan blades using brushes (see figure 1), inspection mirror, and soapy water working from the differential filter casing and through the access plate in the transition piece just upstream of fan. Clean motor support fans on after end of fan 39, diffuser, and transition duct working through access gain in (e), above.

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(g) Swab all surfaces with clean, fresh water to remove solvent residue.

(h) Carefully inspect to ensure all cleaning material or other objects from fan and ducting are removed. Leave access plates open, and energize fan to dry moisture residue (damper to navigation ducting remains shut). After no more than 5 minutes, secure power to fan.

(i) Reinstall transition duct access plates and fan room bulkhead access plate.

(j) Install removable filter case frame and new differential filter elements. Clean prefilter (SSBNs with a separate cooling package for the D/D converter do not have a prewhirl) and supplemental filter material. Remove tag-out from fan power switch.

(k) Energize fan 39 and verify proper filter differential pressure.

5.7.1.2 Fan removal for cleaning (applicable to SSBNs with or without improved Navigation Ventilation System):

(a) Proceed as indicated in 5.7.1.1(a) through 5.7.1.1(d) (there is no removal frame on those SSBNs without improved Navigation Ventilation System).

(b) Unbolt filter housing from deck and move to forward corner of fan room.

(c) Unbolt transition piece from prewhirl and remove from fan room.

(d) Disconnect supply wiring to fan motor.

(e) Unbolt fan and diffuser from after transition duct.

(f) Unbolt fan from foundation and rig chainfall to raise and move fan forward.

(g) Clean prewhirl (SSBNs with a separate cooling package for the D/D converter do not have a prewhirl), fan, and diffuser using soapy water and brush. Swab with fresh water to remove soap residue.

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(h) Reassemble fan, ducting and filter housing. Carefully inspect to ensure all cleaning materials, tools, etc., are removed.

(i) Install new differential filter, clean prefilter, and supplemental filter material. Remove tag-out from fan switch.

(j) Energize fan 39. Verify proper filter differential pressure.

5.8 D/D converter ventilation inspection and cleaning.

Note: This procedure should be conducted monthly and is applicable only to SSBNs with the separate D/D cooling package.

5.8.1 Deenergize and tag out power switch to fans 45 and 52 at Navigation Cooling System alarm panel.

5.8.2 Shut chilled water isolation valves CW-372 and CW-373.

5.8.3 Remove mechanical filter 69 from cooling coil C-26.

5.8.4 Remove rubber boots from fans 45 and 52.

5.8.5 Inspect inside of fan housing, cooling coil fins, and accessible system ducting for accumulation of dirt or other foreign matter.

Notes: 1. A thin film of dirt or other foreign matter can adversely affect fan or cooling coil performance.

2. If necessary, fans can be removed from foundation for accessibility.

5.8.6 Clean fans 45 and 52 using a clean, lint-free cloth dampened in a solution of mild soap and warm water.

(a) Wipe the inside of the fan housing clean.

(b) Clean guide vanes and slotted blades.

(c) Dry components by wiping with a clean, lint-free cloth and by applying 20-psi low-pressure air.

5.8.7 Open access plates to cooling coil C-26.

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CAUTION

When using wire brush to loosen dirt or other foreign matter from cooling coil fins, use care to prevent fin damage.

5.8.8 Perform 5.6.1.7 through 5.6.1.10.

(a) Using a fine spray, saturate entire cooling coil fin surface area. Spray solution into coil from air discharge side. Allow solution to remain on coil approximately 5 minutes.

(b) Adjust bleed for high velocity spray and wash coil from air discharge side using clean water. To ensure that dirty water does not enter supply duct, block off duct with plastic sheet.

(c) Wipe away any solution remaining in cooling coils. If necessary, 20-psi air may be used from air discharge side of cooling coil. Clean cooling coil drains.

(d) When cooling coils are dry, install access plates.

5.8.9 Clean all accessible system ducting using a clean, lint-free cloth dampened in a mild soap and warm water solution. Dry ducting with a clean, dry, lint-free cloth. Remove D/D converter blower assembly for access to ventilation plenum below the equipment cabinet.

5.8.10 If removed, reinstall fan 45 and 52 and reinstall rubber boots.

5.8.11 Install mechanical filter 69.

5.8.12 Open chilled water isolation valves CW-372 and CW-373.

5.8.13 At navigation cooling system alarm panel, remove tag installed in 5.8.1.

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