

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

MILITARY STANDARD

SHIPYARD INSPECTION AND CLEANING  
PROCEDURES FOR SUBMARINES

PART 4

NAVIGATION CENTER  
SSBN 616 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 616 Class

MIL-STD-1682/4(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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## FOREWORD

This part provides inspection and cleaning procedures for the Navigation Center aboard SSBN 616 Class submarines.

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## 1. SCOPE

1.1 This part provides inspection and cleaning procedures for the Navigation Center (NC) aboard SSBN 616 Class submarines. In addition, it provides inspection and cleaning procedures for the Ventilation System cooling coil, ducts, jnd 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 shall be performed at the following time periods:

<u>Paragraph</u>	<u>Title</u>	<u>Frequency</u>
5.1	FBM NC inspection and cleaning	Daily and weekly
5.2	Check of differential pressure gage indication	Daily
5.3	Supplemental filter maintenance	Daily and weekly

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<u>Paragraph</u>	<u>Title</u>	<u>Frequency</u>
5.4	Filter replacement	Determined by 5.2
5.5	Inspection and cleaning of navigation ventilation system ducts	Monthly and once during conversion
5.6	Cooling coil and air-intake duct inspection and cleaning	Monthly and once during conversion
5.7	Fan inspection and cleaning	Determined by 5.4 and once during conversion

#### 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 retardant 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 (roll)
- (i) Thermometer
- (j) Fan cleaning kit (see figure 1)
- (k) Plastic sheet

### 5. INSPECTION, CLEANING, AND MAINTENANCE PROCEDURES

#### 5.1 FBM NC inspection and cleaning.

5.1.1 After landing first piece of navigation equipment and before equipment turn-on, proceed as indicated in 5.1.1.1 through 5.1.1.5 (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.

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The following cleaning tools are recommended for use by shipyards when conducting inplace 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: 2 1/4" DIA. X 6" LONG. OVERALL LENGTH IS 23"



NSN-7920-00-234-9317

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

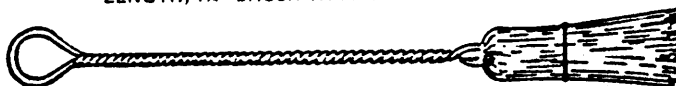


OVERHEAD PIPE SWAB-4 PLY

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.

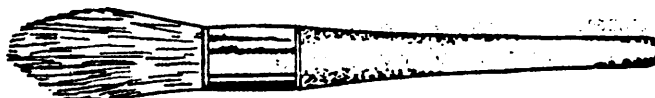
WARNING - DO NOT USE FLAMMABLE SOLVENT OR SOLVENT IN SPRAY FORM.

GREY HAIR AND POLYPROPYLENE 11 1/2" OVERALL LENGTH, 1 1/4" BRUSH TRIM AND 1 1/4" 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. 11 1/4" LONG.



WATER TOOL BRUSH

NSN-7920-00-252-4084

Figure 1. Cleaning kit



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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 heavy accumulations of 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

\*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 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 the NC by arranging coated cloth (fire retardant curtains) at the following locations:

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- (a) In port passageway separating the ship control center directly aft of the ballast control panel including the area formerly occupied by the Type XI periscope booth.
- (b) In aft passageway between bulkhead 58 and the workbench.

5.1.2.2 Rig coated cloth (fire retardant curtains) as much as practical in starboard passageway and aft from overhead to deck on starboard side of the workbench and extending forward in front of the various heater controllers, heaters, fan controllers, and ship's constant frequency power supply in starboard passageway to the nonstructural bulkhead that separates the ship control center from NC.

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

- (a) Install clean vacuum cleaner filter, and vacuum clean deck and protective coverings to remove accumulations of dust, dirt, or other foreign matter (daily).
- (b) Using wiping cloths and/or vacuum cleaner, remove dust from following, then dispose of cloths:
  - (1) Work surfaces, shelves, and equipment (daily).
  - (2) Readily accessible overhead areas, wire raceways, bulkheads, and passageways (weekly).

#### 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 using a sponge and an approved cleaning solvent as necessary 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 bags (daily).

5.1.2.4 Maintain NC within conditions stated in table II. Take psychrometer readings daily if NC relative humidity is 50% or less. If relative

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humidity is greater than 50%, take psychrometer readings every 4 hours. Each time psychrometer readings are taken, if any 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 the NC dewpoint, have temporary dehumidifiers and/or heaters installed in NC to lower dewpoint to ensure against condensation on navigation equipment or inside of an equipment if a drawer or cabinet is opened:

Navigation operation checkout console (NOCC)	A/D converter
Navigation control console (NCC)	D/D converter
Receiving Set, Sonar AN/BQN-3 recorder	SINS no. 1 or 2 console
Radio Navigation Set AN/BRN-3 receiver	CNC no. 1 or 2
LORAN sensor	SINS gyromonitor
Receiving Set, Loran AN/BRN-5 recorder	Magnetic tape unit (MTU)
	MARDAN spare

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
60 min**	18.30 min**	63	17.2

\*If dewpoint conditions stated are exceeded, temporarily install dehumidifiers and/or heaters in NC to bring the 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.

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

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 the 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.

## 5.2 Check of differential pressure gage indication.

5.2.1 Daily check (more frequently under extremely dirty conditions) that differential pressure gage VH-323-GA-10 indicates between 0.4 and 2.0 inches water. If differential pressure gage indicates below 0.4 inch water or above 2.0 inches water, replace differential pressure filters (refer to 5.4).

Notes: 1. For equipment configuration in NC, see figure 2.

### CAUTION

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

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

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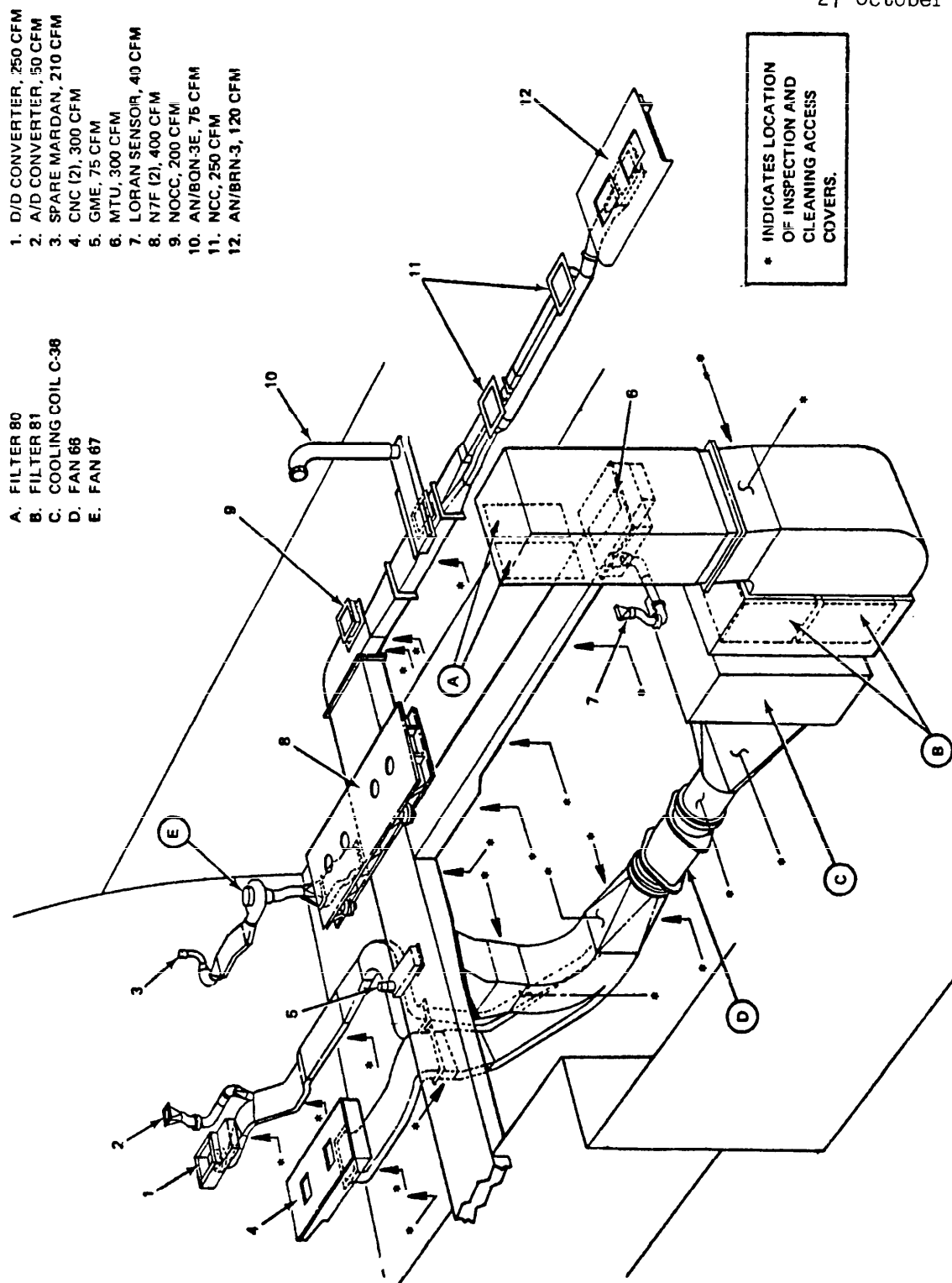


Figure 2. Ventilation system - Navigation Center 616 Class

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5.2.2 Daily inspect the navigation equipment cooling fan room for the following indicated in 5.2.2.1 and 5.2.2.2.

5.2.2.1 Check that lint or dust producing materials (such as rags) are not stored in the navigation equipment cooling fan room.

CAUTION

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

5.2.2.2 Check that an area extending 2 feet in front of prefilters (no. 80) is clear of all obstructions and stored materials.

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 it burns; therefore, filter material is prohibited at all other times.

5.3.1 Ventilation System - Before using the Navigation Ventilation System, tape supplemental filter material on the cover of each NC and intake prefilter assemblies. This material is to be replaced daily throughout the test period.

5.3.2 Navigation Subsystem Equipment - Before starting operational testing of the below listed equipment, place supplemental filter material over external equipment filters. This material is to be inspected daily and replaced weekly.

Radio Navigation Set AN/BRN-3 data processor (intake and exhaust)	D/D converter
Radio Navigation Set AN/BRN-3 computerwriter adapter	Magnetic tape unit (MTU)
Precision frequency standard	A/D converter
	Navigation computers (2)

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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.

5.4.1 When the Ventilation System differential pressure gage observed in 5.2 indicates below 0.4 or above 2.0 inches water, replace the system filter assemblies as indicated in 5.4.1.1 and 5.4.1.2.

Note: Prefilter and differential filter cleaning and replacement can only be accomplished when fan 66 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.

5.4.1.1 Inspect access door to filter casing in crews' mess area for the following:

- (a) Verify that access door is free of obstructions to allow access to filter casing.
- (b) Verify that the immediate area in crews' mess to be used in changing filters is free of loose materials or dirt which could be carried into filter casing when inserting new filters.

5.4.1.2 If no system testing is in progress and navigation equipment can be secured, deenergize individual equipments and perform the following:

- (a) At Navigation Cooling System control panel in NC, deenergize fan 66.
- (b) Verify that differential pressure gage VH-323-GA-10 indicates 0.
- (c) Remove the two prefilters (no. 80) and perform the following:
  - (1) Inspect prefilters for accumulations of dirt, grease, or other foreign matter.
  - (2) Remove small accumulations of dirt by vacuuming.
  - (3) If necessary, clean prefilters in ultrasonic cleaner. Do not oil. Dry by applying low-pressure air.

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- (d) Remove differential pressure filters (no. 81).
- (e) Using vacuum cleaner or a clean, lint-free cloth, remove dirt or dust exposed after removal of the prefilters and differential pressure filters inside filter casing. Remove access cover on the circular duct just upstream of fan 66 and prewhirl. 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.

- (f) Install new differential pressure filters. Ensure that each filter is seated properly in the filter casing.
- (g) Install two prefilters and tape in place supplemental filter material. (Refer to 5.3.1.)
- (h) Energize fan 66 at the Navigation Cooling System control panel in NC.
- (i) Verify that differential pressure gage VH-323-GA-10 indicates greater than 0.4 inch water.

Note: Verify that differential pressure gage VH-323-GA-10 indicates greater than 0.4. If not, shift to backup ventilation system and perform corrective action to eliminate bypass of air around differential pressure filters or access covers.

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

- (a) Ensure fans 2, 5, 6, 7, 28, 33, 41, 60, 61, 62, and 63\* are operating in FAST.
- (b) Check that galley exhaust, battery supply, upper levels forward exhaust and lower levels forward exhaust precipitators are operating.



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- (c) Ensure that CNCs, MTU, and A/D and D/D converter 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 bottom of the cabinet, and check that fan switch is positioned to ON. On CNCs and D/D converter, place cooling mode lever on blower assembly in the BLOWER AIR position and tape supplemental filter material over air-intake. For MTU, install blower assembly as follows:
  - (1) Shut ventilation damper on MTU foundation in NC.
  - (2) Take fan enclosure assembly and six hinge screws out of storage.
  - (3) Loosen the 16 captive screws at top and bottom of air conditioning duct.
  - (4) Remove and store air conditioning duct.
  - (5) Place cover (Part No. 2656717) over deck hole and secure by tightening eight captive screws.
  - (6) Place fan enclosure assembly in bottom of cabinet. Secure it by replacing six rear hinge mounting screws and by turning two captive front locking screws clockwise one-quarter turn.
  - (7) Connect blower power wires according to tagging or color coding at terminals 7, 8, and 9 of TB 5.
  - (8) Tape supplemental filter material over blower assembly intake from underneath cabinet.
- (d) Shut control air valve CAC-87 and open CAC-88.
- (e) Secure fan 66.
- (f) Shut Navigation Equipment Cooling System damper (D 202) in crews' activities space.
- (g) Adjust thermostat CAC-315-TX313 to lowest temperature setting.
- (h) Open backup system isolation damper in the middle level passageway and position fan 63\*, damper D 200\*\* to POSITION II.

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- (i) Repeat 5.4.1.2(c) through 5.4.1.2(g).
- (j) Position fan 63\*, damper D 200\*\* POSITION I and close the backup system isolation damper in the middle level passageway.
- (k) Readjust thermostat CAC-315-TX313 to original setting.
- (l) Open Navigation Equipment Cooling System damper (D 202).
- (m) Energize fan 66.
- (n) Shut control air valve CAC-88 and open CAC-87.
- (o) If the CNCs, MTU, or A/D and D/D converters are operating, restore navigation equipment cooling air to this equipment. For the CNCs and D/D converter, place lever on blower assembly in SHIP's AIR position. For the A/D converter, close air-intake vent at the bottom of the cabinet and set fan switch to OFF. Remove blower assembly from the MTU by reversing the instructions in 5.4.1.2 above. Open the ventilation duct damper on the side of the MTU foundation in NC.

\*Fan 63 is designated as fan 83 on SSBN 626.

\*\*Damper 200 is not installed on SSBN 626.

5.4.1.4 Verify that main air conditioning room filter no. 49 in fan room bulkhead and filters no. 75, 76, 77, 78, and 79 on the supply plenum are clean and properly installed.

5.4.1.5 Verify that main air conditioning room return filter no. 1 in NC is clean and properly installed.

5.4.1.6 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 no. 66.

- (a) Verify that supply fans 2, 60, 61, 62, and 63 are operating on FAST.
- (b) Verify that exhaust fans 5, 6, 7, 28, 33, and 41 are operating on FAST.

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- (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 the galley.

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

#### 5.5 Inspection and cleaning of NC ventilation system ducts.

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

- (a) From crews' mess, open overhead to gain access to one inspection plate in structural trunk. Remove fastening screws and plate, and inspect the trunk. (If testing status does not permit securing fan 66 for this inspection, inspect only at locations specified in (b), (c), and (d).
- (b) In NC - Radio Navigation Set AN/BRN-3 base plenum.
- (c) In NC - D/D base plenum.
- (d) In NC - CNC 2 supply at base of unit.

5.5.2 At least once during the conversion (after equipment turn-on), clean as follows. (See figure 2 for location of access covers.)

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

5.5.2.2 Deenergize fan 66 at the Navigation Cooling System control panel in the NC.

5.5.2.3 Perform the following steps to open the Ventilation System as much as possible.

- (a) Remove the 3 access covers in structural plenum located in overhead of crews' mess that supply the MTU and LORAN Receiving Set (or AN/BRN-5 receiver).

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- (b) Remove the backup air trunk access cover located in overhead of passageway and the access cover in the structural plenum approximately below SINS consoles.
- (c) Open equipment doors to gain access to duct or supply plenums:  
Radio Navigation Set AN/BRN-3 receiver  
D/D converter  
CNC 1 and 2
- (d) Remove flexible duct from AN/BQN-3 recorder transmitter.
- (e) Remove access cover above navigation equipment cooling damper, D 202, in the plenum that supplies air to the structural trunk.
- (f) Remove the two access covers in the plenum supplying air to CNCs structural plenum.
- (g) Remove the four access covers in the plenum that supplies air to the D/D converter and the A/D converter.
- (h) Close Navigation Equipment Cooling System damper D 202.
- (i) Remove the three access covers in the plenum that supplies the NOCC, AN/BQN-3, NCC, and AN/BRN-3.
- (j) Remove the circular duct that contains the A/D converter damper by removing the bolts from the flange on the duct and sliding the duct out of the rubber sleeve that connects it to the next piece of duct work.
- (k) Remove the section of circular duct that feeds air from the structural plenum to the LORAN sensor by removing the bolts in the flange on the duct and sliding the duct out of the rubber sleeve that connects the duct to the structural plenum.

5.5.2.4 Clean all accessible system ducting using a clean, lint-free cloth dampened in a solution of detergent and warm water. Use flexible wire or other suitable extension to facilitate wipe-down of maximum duct area. Wipe from all access covers and openings. Wipe ducting dry with clean, lint-free cloth. Check to see if orifice plate is installed. If so, then mark it for exact replacement during reassembly.

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5.5.2.5 Verify that all equipment dampers are shut:

CNC (2 units) - (blower assembly in cabinet)

MTU input/output unit

A/D converter

D/D converter - (blower assembly in cabinet)

Navigation operation checkout console (NOCC)

Receiving Set, LORAN AN/BRN-5

Receiving Set, Sonar AN/BQN-3

NCC

Radio Navigation Set AN/BRN-3

SINS navigation console

Gyromonitor electronics

MARDAN spare

5.5.2.6 Energize fan 66.

5.5.2.7 Allow air to discharge for several minutes through access openings in plenums to CNCs and D/D converter and out the open end of the plenum to the A/D converter.

WARNING

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

5.5.2.8 Deenergize fan 66.

5.5.2.9 Replace access covers in plenum to CNCs and D/D converter. Also, replace circular duct to A/D converter removed in 5.5.2.3(j).

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5.5.2.10 Replace all covers except the cover located approximately below AN/BQN-3 and access cover closest to MTU in the structural plenum that supplies the MTU and AN/BRN-5. Do not replace the section of circular duct that supplies the LORAN sensor. Open the AN/BQN-3 damper (all other equipment dampers should be SHUT).

5.5.2.11 Energize fan 66 and discharge air through the opening for several minutes until ducts are dry and have been blown clear.

5.5.2.12 Deenergize fan 66.

5.5.2.13 Replace remaining two access covers, circular duct to the LORAN sensor, and flexible duct to the AN/BQN-3.

5.5.2.14 Restore Navigation Subsystem equipment and Cooling System to normal.

5.6 Cooling coil and air-intake duct inspection and cleaning.

Notes: 1. At least once during conversion, clean the cooling coil and air intake duct or perform a demonstration of cleaning.

2. See figure 2 for access cover locations.

5.6.1 Monthly open the access cover located downstream of the cooling coil and inspect the cooling coil. If cleaning is necessary, proceed as follows.

5.6.1.1 Ensure all equipments cooled by the Navigation Equipment Cooling System are secured or backup equipment cooling system is lined up to supply air to operating equipments. (Refer to 5.4.1.3 for instructions on operating the backup system.)

5.6.1.2 Deenergize fan 66 at Navigation Cooling System control panel in NC.

5.6.1.3 Shut Navigation Equipment Cooling System damper D202.

5.6.1.4 Shut chilled water isolation valves CW-334 and CW-337.

5.6.1.5 Remove the following:

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- (a) Four absolute filters.
- (b) Access cover downstream of navigation cooling coil.
- (c) Access covers located on ductwork upstream of absolute filters in the former Type XI periscope well area.
- (d) Filters on Navigation Cooling System air-intake in NC.

5.6.1.6 Inspect cooling coil fins and air-intake ductwork between NC and absolute filters for accumulation of dirt or other foreign matter.

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

CAUTION

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

5.6.1.7 Using a clean, lint-free cloth dampened in a detergent and warm water solution, clean accessible portions of the air-intake ductwork between NC and absolute filters. Use flexible wire or other suitable extension to facilitate wipe-down of maximum duct area. Working from access cover openings and the opening in NC, wipe ducting dry with clean, lint-free cloth.

5.6.1.8 Using a paint or scrub brush, carefully loosen any dirt or other foreign matter on intake side of cooling coil fins. Also clean cooling coil drip pan.

5.6.1.9 Vacuum intake side of cooling coil.

5.6.1.10 Blow 20-psi air through cooling coil from the discharge side and then vacuum the intake side of cooling coil again.

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

- (a) Use plastic sheeting to prevent water from entering the supply duct. Using a fine spray, saturate entire cooling coil fin surface area. Spray the solution into the coil from the air discharge side. Allow solution to remain on coil approximately 5 minutes.

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- (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 ventilation supply duct to fan, block off duct with a plastic sheet.
- (c) Wipe away any solution remaining in cooling coils, filter case, and ductwork between cooling coil and fan and clean cooling coil drains.
- (d) Remove plastic sheet.

5.6.1.12 Check that A/D converter damper is shut. Also check that CNCs and D/D converter levers on the blower assembly are in the BLOWER AIR position.

5.6.1.13 Remove access cover on diffuser just downstream of fan 66 and access cover closest to fan 66 in plenum that supplies CNCs.

5.6.1.14 Reinstall two access covers upstream of absolute filters and access cover downstream of cooling coils.

5.6.1.15 Energize fan 66 at the Navigation Cooling System control panel in NC.

5.6.1.16 Allow system air to discharge through open access covers until residual cleaning water is removed.

5.6.1.17 Deenergize fan 66.

5.6.1.18 Reinstall remaining system access covers and filters on air intake in NC.

5.6.1.19 Open chilled water isolation valves CW-334 and CW-337.

5.6.1.20 Restore Navigation Ventilation System and navigation equipment to pretest conditions.

#### 5.7 Fan inspection and cleaning.

5.7.1 The navigation equipment fan is to be inspected for cleanliness during differential filter replacement when the fan is deenergized. Also, clean the fan at least once during conversion. Fan cleaning is necessary to assure system flow will not fall below specified minimum flow. Fan cleaning may be accomplished either in-place or by removing the fan. Inspect fan by removing



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the access cover just upstream of the fan prewhirl and access cover on the diffuser just downstream of the fan.

5.7.1.1 In-place cleaning of fan.

- (a) Ensure all equipment cooled by the Navigation Equipment Cooling System is secured or the backup system is lined up to supply cooling air to operating equipment. (Refer to 5.4.1.3 for instructions on operation of backup system.)
- (b) Deenergize fan 66 at the Navigation Cooling System control panel in the NC.
- (c) Remove the two access covers between cooling coil and fan.
- (d) Unbolt and remove diffuser.
- (e) Clean prewhirl, fan blades, fan housing, and motor supports working from open end of fan and through openings gained by removing access covers mentioned in 5.7.1.1(c), using brushes (see figure 1), inspection mirror, and solvent.
- (f) Swab all surfaces with clean, fresh water to remove solvent residue. Wipe dry.
- (g) Inspect carefully to ensure all cleaning material or other objects are removed from fan and ducting.
- (h) Reinstall two access covers removed in 5.7.1.1(c).
- (i) Energize fan 66 for several minutes to remove residue moisture and blow fan clear.
- (j) Clean diffuser with solvent and water. Wipe dry.
- (k) Reinstall diffuser.
- (l) Restore system to normal and check for proper filter differential pressure gage reading.

5.7.1.2 Fan removal for cleaning.

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- (a) Ensure all equipment cooled by the Navigation Equipment Cooling System is secured or the backup system is lined up to supply cooling air to operating equipment.
- (b) Deenergize fan 66 at the Navigation Cooling System control panel in the NC.
- (c) Unbolt the rubber flex connections fore and aft of fan.
- (d) Disconnect electrical wiring from motor.
- (e) Rig chainfall to support fan.
- (f) Unbolt fan from foundation. Lower fan to clear foundation and move fan to a position convenient for cleaning.
- (g) Clean prewhirl, fan, diffuser, and ductwork between fan and cooling coil. Swab with fresh water to remove all residues.
- (h) Reinstall fan and reassemble the rubber flex connection pieces. Ensure all cleaning materials have been removed from the fan and ducting before doing so.
- (i) Remove access cover on diffuser.
- (j) Energize fan 66 and allow air to discharge through diffuser access opening for several minutes.
- (k) Reinstall access cover on diffuser.
- (l) Restore system to normal and check for proper differential pressure gage reading.

Preparing activity:

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