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MILITARY STANDARD

SHIPYARD INSPECTION AND CLEANING PROCEDURES FOR SUBMARINES

Part 11

NAVIGATION CENTER

SSBN 608 CLASS

FSC 1905

DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND

WASHINGTON, D.C. 20362

Shipyard Inspection and Cleaning
Procedures for Submarines, Navigation
Center SSBN 608 Class

MIL-STD-1682/11(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.

FOREWORD

This part provides inspection and cleaning procedures for the Navigation Center aboard SSBN 608 Class submarines.

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1. SCOPE

1.1 This part provides inspection and cleaning procedures for the Navigation Center (NC) aboard SSBN 608 Class submarines. In addition, it provides inspection and cleaning procedures for the Ventilation System cooling coil, ducts, 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.

4. REQUIREMENTS

4.1 General requirements.

4.1.1 The cleaning medium shall be a water-soluble (Type 1) liquid detergent, conforming to specification MIL-D-16791.

4.1.2 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 Accomplishing 5.4.1.1(k) requires entering the air conditioning room. Accomplish these steps when the high velocity fans can be secured. If fans cannot be secured, ensure that maintenance personnel wear adequate ear protection. Serious hearing loss may result from failure to follow this precaution.

4.2.5 Since some of the equipment being cleaned in 5.7 is located in the air conditioning room, this procedure should be conducted when high velocity fans may be secured. If the fans cannot be secured, ensure that maintenance personnel wear adequate ear protection. Serious hearing loss may result from failure to follow this precaution.

4.2.6 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.

Paragraph	Title	Inspection Frequency
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
5.4	Filter replacement	Determined by 5.2
5.5	Inspection and cleaning of navigation ventilation system ducts	Monthly and once during overhaul
5.6	Cooling coil inspection and cleaning	Monthly and once during overhaul
5.7	Air-intake, fan, and supply ductwork inspection and cleaning	Determined by 5.4 and once during overhaul

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 solution 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) Cleaning kit

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 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 heavy accumulations of dust, chips, etc., from work surfaces, exposed equipment, wire raceways, readily accessible areas of overhead, 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 5.1.2.4.

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

(a) In port passageway separating ship control center directly aft of ballast control panel at frame 49.

(b) Between overhead and deck from bulkhead 58 (at stiffener between NAVDAC cabinet D and watertight door) and forward end of NAVDAC computer group no. 2 (as much as practical).

CAUTION

In 5.1.2.1(c), air-intakes on ventilation plenum just forward of NAVDAC computer group No. 2 must not be covered. Provide cutouts in the coated cloth (fire retardant curtains) rigged in 5.1.2.1(c) to allow for unrestricted flow of air into the plenum and for filter cleaning and/or replacement. Tape coated cloth (fire retardant curtains) around air intakes to prevent it from fluttering.

(c) Rig coated cloth (fire retardant curtains) as much as practical between overhead and deck from forward end of NAVDAC computer group no. 2 forward past the various fan controllers, speed converter, and dummy log distance transmitter to nonstructural bulkhead between frames 50 and 51 that separates the ship control center from NC.

(d) Tape or rig coated cloth (fire retardant curtains) over any opening in Type XI periscope booth that opens into ship control center.

5.1.2.2 Clean NC as follows on an as required basis but at least as often as shown 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) Remove dust from following, using wiping cloths and/or vacuum cleaner, then dispose of cloths:

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

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

WARNING

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

(c) Damp wipe equipment and work surfaces as necessary using a sponge and cleaning solution to remove dirt not removed by dusting or vacuuming. 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).

5.1.2.3 Maintain NC within conditions stated in table II. Take psychrometer readings daily if the 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 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 the dewpoint to ensure against condensation on the navigation equipment or inside an equipment if a drawer or cabinet is opened.

Navigation control console

Receiving Set, Sonar AN/BQN-3 recorder

Radio Navigation Set AN/BRN-3 receiver

NAVDAC no. 1 or 2

NAVDAC C cabinet

SINS no. 1 or 2 console

MARDAN spare

LORAN C receivers

5.1.2.4 Inspect NC daily to ensure that equipment exposed to dust, dirt, moisture, or other foreign matter is protected as follows:

(a) Equipment exposed to possibility of damage is 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 penetrations, 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**	18.3 min**	63	17.2

*If dewpoint conditions stated are exceeded, have temporary dehumidifiers and/or heaters installed in NC to bring the dewpoint condition back within tolerance. Maintaining these conditions will ensure that ambient air coming in contact with the navigation equipment or mixing with 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 acceptable limits.

5.2 Check of differential pressure gage indication.

5.2.1 In NC, daily check (more frequently under extremely dirty conditions) that differential pressure gage VH-337-GA-2, on the ventilation plenum, indicates between 0.4 and 2.0 inches water. If differential pressure gage indicates below 0.4 inch or above 2.0 inches water, replace Navigation Ventilation System 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.

Note: Gage indications below 0.4 inch water indicate tears or leaks in differential pressure filters or a gage malfunction. Readings 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.

5.2.2 Daily inspect the Navigation Equipment Cooling System as 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 vicinity of the air-intake to the Navigation Cooling System.

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 up to 2 feet in front of prefilters (no. 68) 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 filter material burns; therefore, its use is prohibited at all other times.

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

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

Radio Navigation Set AN/BRN-3 data processor (intake and exhaust)

Radio Navigation Set AN/BRN-3 computerwriter 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)

Radio Navigation Set AN/BRN-3 computer (intake and exhaust)

Multispeed repeaters (MSRs)

Radio Navigation Set AN/BRN-3 tape punch

NAVDAC computer test console

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.

WARNING

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

Notes: 1. Prefilter and differential filter cleaning can only be accomplished when fan 36 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. The filter casing/sound trap in NC contains prefilters and differential filters for the Navigation Equipment Ventilation System and air-intake filters for ship control center exhaust. Navigation System filters are the large filters in the upper half of the filter casing/sound trap.

3. See figures 1 and 2 for the Navigation Equipment Ventilation System equipment configurations.

4. Verify that the area to be used in changing filters is free of loose materials or dirt which could be carried into the filter casing or fan when inserting new filters.

WARNING

Accomplishing 5.4.1.1 (k) requires entering the air conditioning room. Accomplish these steps when the high velocity fans can be secured. If the fans cannot be secured, ensure that maintenance personnel wear adequate ear protection. Serious hearing loss may result from failure to follow this precaution.

5.4.1 When the ventilation system differential pressure gage VH-337-GA-2 observation in 5.2 indicates below 0.4 or above 2.0 inches water, replace system filter assemblies as described below.

5.4.1.1 If no system testing is in progress and equipment can be shut down, deenergize individual equipments and perform the following:

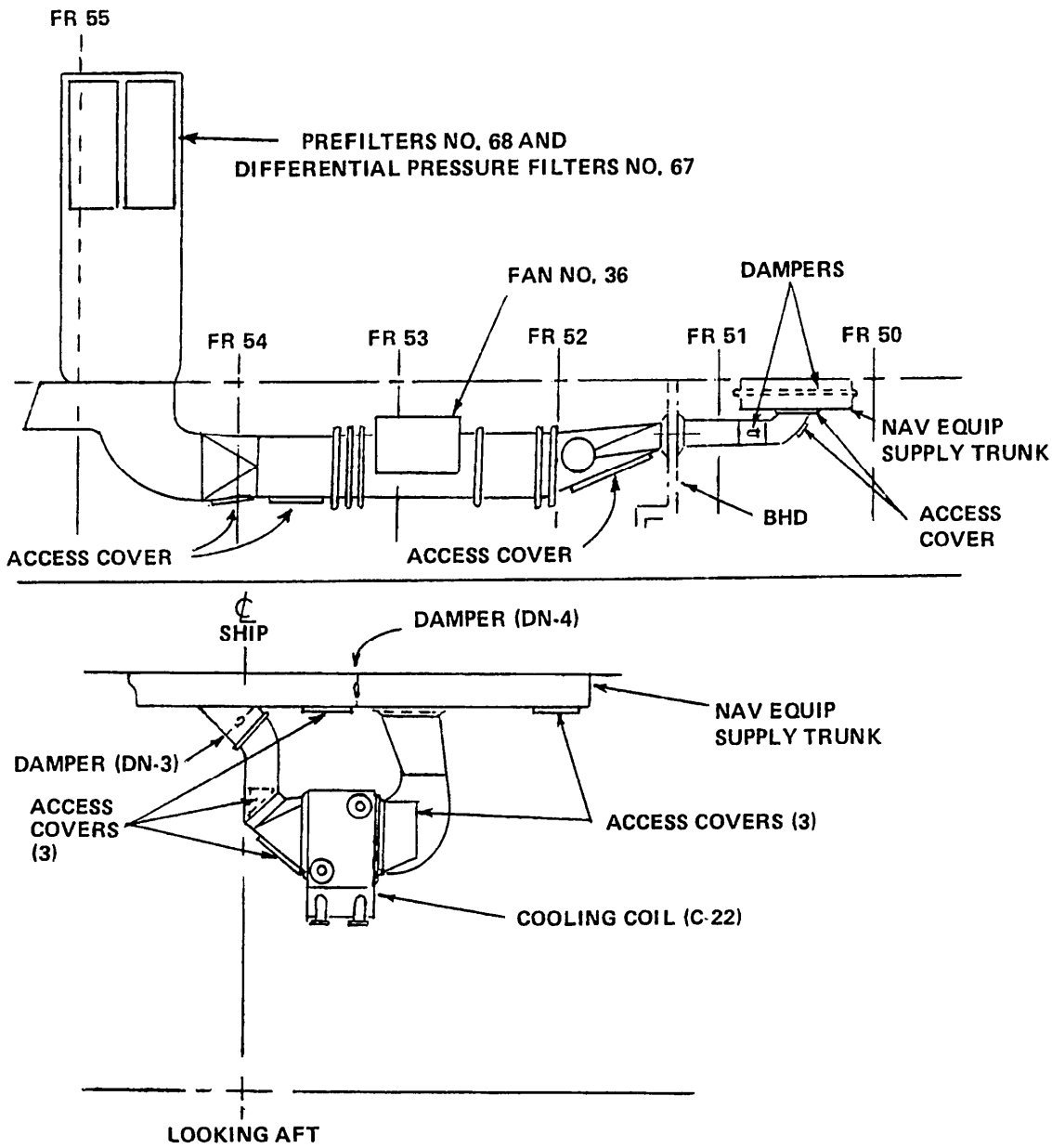


Figure 1. 608 Class navigation ventilation system equipment configuration

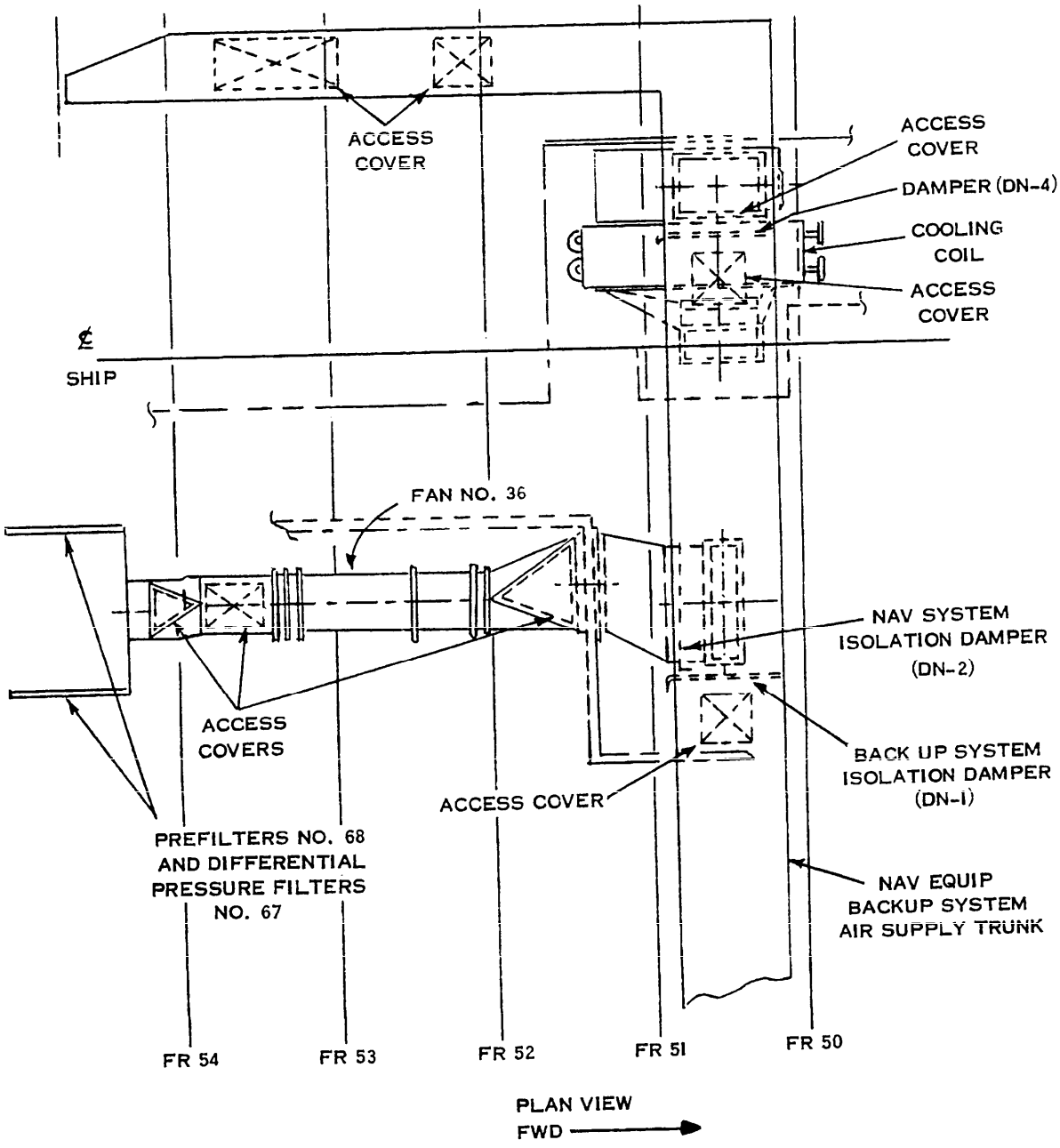


Figure 2. 608 Class navigation ventilation system equipment configuration

(a) Deenergize fan 36 at START/STOP pushbuttons in NC.

(b) Verify that differential pressure gage VH-337-GA-2 in the filter casing/sound trap indicates 0.

CAUTION

When absolute filters are removed in the following paragraphs, the filter casing should not be left unattended. Ensure that no foreign matter is allowed to enter the openings. Failure to observe this precaution could result in damage to the navigation equipment ventilation fan or restrict air flow through the system. Reinstall prefilters if area is to be left unattended.

(c) Remove prefilter retainer nuts, retainer brackets, and 2 prefilters on inboard side and 2 prefilters on outboard side.

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

(2) Remove small accumulations of dirt by vacuuming.

(3) If necessary, clean prefilters in an ultrasonic cleaner. Dry by applying low pressure air. If an ultrasonic cleaner is not available, prefilters can be cleaned in a mixture of mild detergent and water.

(d) Using a vacuum cleaner or a clean, lint-free cloth, remove any dirt or dust exposed after prefilters have been removed.

(e) Remove retaining nuts and differential pressure filter retainer brackets.

(f) Carefully and slowly remove each differential pressure filter to prevent dislodging any dust or dirt from the filter exterior. Discard the four differential pressure filters.

(g) Remove dirt or dust exposed in the filter seating area after filter removal using a vacuum cleaner or a clean, lint-free cloth. Inspect navigation air-intake plenum (filter case) 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 the filters or filter casing.

(h) Observe the air flow arrow on the case and install four new differential pressure filters. Reinstall retainer brackets and retainer nuts. Ensure nuts are tightened uniformly for proper seating of gasket.

(i) Install 4 clean prefilters. Reinstall retainer brackets and nuts. Ensure nuts are tightened sufficiently for proper seating of filters on gasket.

(j) Tape supplemental filter material over the prefilters in accordance with 5.3.

(k) Refer to WARNING under Note 4 in 5.4. In the air conditioning room, remove one of the three access covers at the inlet and outlet of fan 36. Inspect the fan for cleanliness. If cleaning is required, proceed to 5.7.

(l) Energize fan 36 at the START/STOP pushbuttons in NC.

(m) Check that differential pressure gage VH-337-GA-2 indicates at least 0.4 inch water.

5.4.1.2 When system testing precludes shutdown of the Navigation Ventilation System fan and the backup system is available, perform the filter replacement as follows:

(a) Ensure that the following fans are operating in FAST mode:

Fan Number	Service
2	Ship's supply system aft
40	Supply zone no. 1
41	Supply zone no. 2
42	Supply zone no. 3
43	Supply zone no. 4
44	Supply booster crews' quarters (starboard)
45	Supply booster crews' quarters (port)

Fan Number	Service
38	MCC booster
5	Battery exhaust
6	Main ship's exhaust
7	High-pressure forward exhaust

(b) If operable, verify that the following electrostatic precipitators are clean and operating:

EP no. 1, galley exhaust in galley

EP no. 2, ship control center exhaust in air conditioning room

EP no. 4, battery supply in crews' quarters

(c) Verify that the following filters are clean and properly installed:

Filter No.	Service and Location
69	Natural return, in aft bulkhead
60	Fan 40/cooling coil 31, air conditioning room
61	Fan 41/cooling coil 32, air conditioning room
62	Fan 42/cooling coil 33, air conditioning room
63	Fan 43/cooling coil 34, air conditioning room
64	Fan 41/bypass cooling coil 32, air conditioning room
65	Fan 6/2nd level passageway, 2nd level passageway
66	Fan 6/ship control center, NC

(d) Ensure air conditioning room is maintained in the operating condition specified in 5.4.1.2(a) through 5.4.1.2(c) until the Navigation Ventilation System is returned to normal supply from fan 36.

(e) Shift Navigation Equipment Ventilation System to the backup system as follows:

(1) Open backup ventilation system isolation dampers DN-1 and DN-4 in structural trunk.

(2) Shut isolation damper DN-2 at outlet of fan 36 and damper DN-3 at inlet to Navigation Equipment Ventilation System cooling coil no. C-22.

(3) Open backup supply damper D-5 located in air conditioning room (operator for damper is located in passageway at frame 53) by placing damper in Position II.

(4) Deenergize fan 36 at START/STOP pushbuttons in NC.

(5) Shut chilled water valves CW-271 and CW-273.

(6) Adjust thermostat CAC-322-TX-81, air conditioning for crews' quarters port side, to its lowest setting (note present setting). Check that Navigation Equipment Cooling System heater no. 51 is ON.

(f) Perform 5.4.1.1(b) through 5.4.1.1(m).

(g) Open chilled water valves CW-271 and CW-273.

(h) Position backup supply damper D-5 to Position I.

(i) Open dampers DN-2 and DN-3 and shut dampers DN-1 and DN-4.

(j) Energize fan 36.

(k) Readjust thermostat CAC-322-TX-81 to its original setting.

5.5 Inspection and cleaning of navigation ventilation system ducts.

Note: See figures 1 and 2 for Ventilation System configuration.

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

(a) From port passageway in officers' and CPOs' living space area, open the overhead to gain access to the 12-inch square access plate in the Navigation Equipment Ventilation System structural trunk at frame 52. Remove fastening screws and plate, and inspect the trunk. If this system testing status does not permit securing fan 36 for this inspection, inspect only at the locations indicated below:

(b) In NC - Base plenum of AN/BRN-3 receiver cabinets

(c) In NC - Base of NAVDAC C cabinet

(d) In NC - NAVDAC supply at base of computers no. 1 and 2

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

(a) Ensure all equipment cooled by Navigation Ventilation System is secured.

(b) Deenergize fans 36 and 37 at START/STOP pushbuttons in NC.

(c) Deenergize Navigation Equipment Ventilation System heater no. 51.

(d) Shut chilled-water isolation valves CW-271 and CW-273.

(e) Perform the following to open Ventilation System as much as possible:

(1) Remove large access under SINS consoles in structural trunk between frames 53 and 54 from port passageway in the officers' and CPOs' living spaces. Also, remove 12x12-inch access plate at frame 52.

(2) Remove 12x12-inch access cover above cooling coil in air conditioning equipment space.

(3) Remove 12x12-inch access plate from athwartship section of structural plenum in passageway above stairs to MCC and lower level.

(4) Open equipment doors in NC to gain access to duct and/or supply plenum of the following equipment:

(f) Verify that differential pressure gage VA 525 GA 1 indicates

Radio Navigation Set AN/BRN-3 receiver

NAVDAC C cabinet

NAVDACs no. 1 and 2

(5) Remove flexible ducts in NC from Sonar AN/BQN-3, LORAN Cs, and spare MARDAN.

(6) Close fan 36 isolation damper DN-2 and coil 22 isolation damper DN-3. Also, open NC equipment backup duct isolation damper DN-1 and coil 22 bypass - damper DN-4.

(7) In air conditioning equipment space, remove large access covers on inlet and outlet sides of cooling coil 22.

(8) Working through openings made by removing cooling coil access covers in (7) above, tape sheet plastic inside ductwork on both sides of cooling coil. (This is to prevent dirt and water from getting into cooling coil.)

5.5.3 Clean ducts and structural plenums which were opened in 5.5.2(e) as follows:

CAUTION

Use detergent and water to clean perforated ductwork only if brushing and wiping with dry brushes and cloths will not remove all dirt and foreign matter. Do not use 20-psi air for drying perforated ductwork.

(a) Working through openings in the structural plenum, use a clean, lint-free cloth dampened in a detergent and warm water solution to clean accessible portions of plenum. Use flexible wire or other suitable extension to facilitate wipe-down of maximum duct area. Be careful not to damage heating elements of heater 51.

(b) For perforated structural plenum ducting in the cooling coil area, remove all loose dirt and foreign matter with a vacuum cleaner. Loosen dirt and foreign matter not removed by vacuuming with dry brushes and dry, lint-free cloths, and then remove it with a vacuum cleaner.

(c) If necessary, use cleaning solvent and warm water solution to clean perforated ducting as follows:

(1) To prevent water from being introduced into ductwork sound treatment, squeeze lint-free cloth as dry as possible prior to wiping.

(2) Rinse lint-free cloth frequently to prevent any collected dirt from being forced into perforations and crevices.

CAUTION

When cleaning ducting, care must be exercised to prevent damaging, loosening, or changing orifice plate settings. Failure to do so may result in serious equipment cooling problems.

(3) Rinse ductwork with a clean, lint-free cloth squeezed as dry as possible and dry with a clean, lint-free cloth. Do not use 20-psi air for drying perforated ductwork.

(d) Using a clean, lint-free cloth dampened in a cleaning solvent solution and warm water solution, clean accessible portions of system ducting. Disassemble ductwork sections that are readily accessible to facilitate cleaning. If orifice plates are installed at any disassembled sections, mark the plates for exact replacement during reassembly. Use flexible wire or other suitable extension to facilitate wipe-down of maximum dust area. Wipe from any accessible opening. Wipe ducting dry with clean, lint-free cloth.

5.5.4 Verify that the following equipment dampers are shut:

NAVDACs no. 1 and 2

NAVDAC C cabinet

LORAN C (2 units)

Receiving Set, Sonar AN/BQN-3

Navigation control console (NCC)

Radio Navigation Set AN/BRN-3 receiver

SINS navigation consoles (2)

MARDAN spare

SINS gyroelectronics monitor

5.5.5 Remove sheet plastic installed in the cooling coil ductwork in 5.5.2(e)(8).

5.5.6 Replace access plate above cooling coil and 12x12-inch access plate in fore/aft portion of structural plenum at frame 52.

5.5.7 Open fan 36 isolation damper DN-2. Ensure NC equipment backup duct damper DN-1 and coil 22 bypass damper DN-4 are open. Ensure coil 22 isolation damper DN-3 is closed.

5.5.8 Energize fan 36 at START/STOP pushbuttons in NC.

5.5.9 Allow air to discharge for several minutes through two open access openings.

5.5.10 Deenergize fan 36.

5.5.11 Replace two remaining access plates in structural plenum.

Note: Due to inaccessibility of most ductwork to individual navigation equipments, cleaning will be by blowing down the ductwork.

5.5.12 Shut backup duct damper DN-1.

5.5.13 Reassemble any sections of ductwork disassembled in 5.5.3(d). Do not replace flexible ducts to the LORANs, AN/BQN-3, or spare MARDAN.

5.5.14 Open AN/BRN-3 receiver doors and remove filters 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 36 is energized. Attach a cheesecloth windsock to deflector to preclude blowing dust into compartment.

5.5.15 Remove the NAVDAC drum from NAVDAC computers 1 and 2.

by replacing six rear hinge mounting screws and by drilling

5.5.16 Arrange a deflector and a cheesecloth windsock around the ventilation opening in NAVDAC A and B cabinets and in C cabinet similar to AN/BRN-3 in 5.5.14.

5.5.17 Remove the 3 drawers from SINS gyromonitor. To remove these cabinets, it is necessary to disconnect the ventilation hose to each cabinet.

5.5.18 Arrange a cheesecloth windsock on open end of flexible ducts of the LORAN Cs, AN/BQN-3, spare MARDAN and gyromonitor console.

5.5.19 Check that all equipment dampers are shut (refer to 5.5.4).

5.5.20 Open AN/BRN-3 ventilation damper.

5.5.21 Energize fan 36.

5.5.22 After operating fan 36 for several minutes, check cheesecloth for dirt accumulation. If dirt is accumulating, secure fan 36, replace cheesecloth with clean cheesecloth, and reenergize fan 36. Continue this process until there is no noticeable further accumulation of dirt on cheesecloth.

5.5.23 Secure fan 36.

5.5.24 Repeat 5.5.14 and 5.5.19 through 5.5.22 for NCC.

5.5.25 Repeat 5.5.18 through 5.5.22 for LORAN Cs, AN/BQN-3, gyromonitor console and spare MARDAN. Each time, assure that only the damper to equipment in question is open. For spare MARDAN, energize fan 37 and open SINS no. 2 console damper in addition to spare MARDAN damper to blow down spare MARDAN ductwork.

5.5.26 Deenergize fans 36 and 37 and restore equipment and ducting to normal. Open chilled water valves CW-271 and CW-273 if ventilation system is to be used.

5.6 Cooling coil inspection and cleaning.

Notes 1: At least once during overhaul, clean cooling coils or perform a demonstration of cleaning.

2: See figures 1 and 2 for the Navigation Equipment Ventilation System configuration.

5.6.1 Monthly in the air conditioning equipment space in the officers' living space, remove one of the three access covers on cooling coil ductwork and inspect cooling coil and upstream and downstream ductwork for cleanliness. If cleaning is necessary, proceed as follows.

5.6.1.1 Ensure all equipments cooled by Navigation Equipment Ventilation System are secured.

5.6.1.2 Deenergize fans 36 and 37 at START/STOP pushbuttons in NC.

5.6.1.3 Shut chilled water isolation valves CW-271 and CW-273.

5.6.1.4 Remove two remaining access covers (one already removed for inspection) on cooling coil ductwork.

5.6.1.5 Working through access openings on each side of cooling coil, clean accessible portions of ductwork between structural plenum and cooling coil including damper DN-3. Be careful not to damage thermal bulb in the ductwork on outlet side of cooling coil. Remove all loose dirt and foreign matter from ductwork with a vacuum cleaner. Use a mild detergent and warm water to clean dirt not removed by vacuuming. Use flexible wire or other extension to facilitate cleaning. Wipe dry with lint-free cloth.

5.6.1.6 When upstream and downstream ducting from the cooling coil has been cleaned and is dry, tape a piece of plastic sheeting inside ducting to prevent dust, dirt, or foreign material from entering while cleaning cooling coil C-22.

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

5.6.1.7 Working through cooling coil inlet access openings, carefully loosen dirt and other foreign matter from face of cooling coil C-22 using a scrub brush or paint brush. Remove loosened dirt with a vacuum cleaner.

5.6.1.8 Working through access on outlet side of cooling coil, blow 20-psi air through coil fin area to loosen dirt and foreign matter. Vacuum inlet side of cooling coil to remove loosened dirt and foreign matter.

CAUTION

Before cleaning coils with warm water and detergent, ensure that plastic sheeting installed in 5.6.1.6 is secured in place to prevent water carry-over into the ducting.

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

(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 five minutes.

(b) Adjust bleed for high velocity spray and wash coil from air discharge side using clean water.

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

5.6.1.10 When cooling coils are dry, remove plastic sheeting installed in 5.6.1.6. Check that ductwork is dry.

5.6.1.11 Check all navigation equipment ventilation dampers are shut (refer to 5.5.4).

5.6.1.12 Reinstall two access covers on cooling coil inlet ductwork.

5.6.1.13 From port passageway in officers' and CPOs' living spaces, remove the 12x12-inch access plate at frame 52 in structural plenum.

5.6.1.14 Check that dampers DN-1 and DN-4 are shut and dampers DN-2 and DN-3 are open.

5.6.1.15 Energize fan 36.

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

5.6.1.17 Deenergize fan 36.

5.6.1.18 Reinstall access cover on outlet side of cooling coil and 12x12-inch access plate in the structural plenum removed in 5.6.1.13.

5.6.1.19 Restore Ventilation System to normal, including opening chilled water isolation valves CW-271 and CW-273 if ventilation system is to be used.

5.7 Air-intake, fan, and supply ductwork inspection and cleaning.

WARNING

Since some equipment being cleaned in this section is located in the air conditioning room, this procedure should be conducted when high velocity fans can be secured. If the fans cannot be secured, ensure that maintenance personnel wear adequate ear protection. Serious hearing loss may result from failure to follow this precaution.

Notes 1: See figures 1 and 2 of 5.4 for Navigation Equipment Ventilation System configuration.

2: The air-intake for ship control center exhaust, which is in the same filter casing/sound trap with the navigation ventilation air intake, is not to be cleaned as part of this procedure.

5.7.1 The navigation equipment ventilation fan and the air-intake are to be inspected for cleanliness during differential filter replacement when the fan can be deenergized. Also, clean the fan air-intake and supply or perform a demonstration of cleaning at least once during overhaul.

5.7.1.1 In-place cleaning of fan.

(a) Ensure that all equipment cooled by Navigation Equipment Ventilation System is secured. Because of the ventilation system configuration, the backup system cannot be used when performing the instructions in this section.

(b) Deenergize fans 36 and 37 at START/STOP pushbuttons in NC.

(c) Shut chilled water isolation valves on CW-271 and CW-273.

(d) Remove prefilters and differential filters from air-intake in NC.

(e) Remove two access plates on inlet side of fan 36 and triangular access plate on outlet side of fan 36 in air conditioning room.

(f) Remove pop-riveted access plate located on curved duct that connects to structural plenum. This access plate is just upstream of Navigation Ventilation System isolation damper DN-2.

(g) Open damper DN-2.

CAUTION

When filters are removed, the casing must not be left unattended. Ensure that no foreign material is allowed to enter opening. Failure to observe this precaution could result in damage to the navigation fan or restrict air flow. Reinstall prefilters if area is to be left unattended.

(h) Using a vacuum cleaner or a clean, lint-free cloth, remove any dirt or dust exposed after removal of prefilters and differential filters.

(i) Working through openings in the filter casing where filters were, clean filter case and plenum as outlined below. Use flexible wire or other extension to facilitate cleaning.

(1) Remove loose dirt or foreign matter with a vacuum cleaner.

(2) Loosen dirt and foreign matter not removed by vacuuming with dry brushes and dry lint-free cloths, and then remove it with a vacuum cleaner.

(3) When using detergent and warm water solution to clean filter case and plenum sound treatment, proceed as follows:

a. Squeeze lint-free cloth as dry as possible prior to wiping to prevent water from being introduced into sound treatment.

b. Rinse lint-free cloth frequently to prevent any collected dirt from being forced into perforations and crevices.

c. Rinse with a clean, lint-free cloth squeezed as dry as possible and dry with a clean, dry, lint-free cloth. Do not use 20-psi air for drying perforated ductwork.

(j) Using brushes shown in figure 3 or other convenient bristle brushes, work through inlet and outlet access openings to loosen dirt and other foreign matter from slotted fan blades and fan housing.

(k) Remove loosened dirt with vacuum cleaner. If necessary a length of clear plastic tubing may be used to reach areas not accessible with normal vacuum cleaner attachments.

(l) If the previous paragraphs have not sufficiently cleaned fan, perform additional fan cleaning using safety solvent called for in figure 3 or mild detergent and warm water, lint-free cloths, and brushes as required. Use clean, fresh water to remove any detergent residue. Dry fan with clean, lint-free cloth.

(m) Working through access openings on inlet side of fan, clean accessible areas of air-intake between overhead and fan. Use a vacuum cleaner, any convenient bristle brushes, mild detergent and warm water, and clean, lint-free cloths to accomplish this cleaning. Dry with clean, lint-free cloths.

(n) Working through access opening at fan outlet and access opening on curved plenum that connects to structural plenum, clean connecting ductwork between fan and structural plenum including the damper. Clean as outlined in 5.7.1.1(m).

(o) Check that dampers DN-1, DN-3, and DN-4 are closed.

(p) Replace two access covers on inlet side of fan.

(q) Check that area around air-intake in NC is clear of anything that could be drawn into intake when fan is energized.

The following cleaning tools are recommended for use by shipyards when conducting inplace or off location cleaning of the Navigation Cooling System fan. 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

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

OVERHEAD PIPE SW[illegible] 3-4 PLY

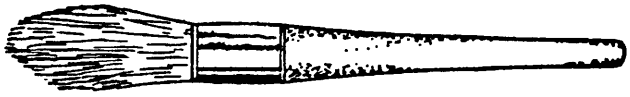
NOTE: To facilitate cleaning, suitable plastic tubing or wood extensions may be attached to these tools. Also, the wire handle brushes may be bent to a convenient angle to clean the fan blades.

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

GREY HAIR AND POLYPROPYLENE 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 3. Cleaning kit

(r) Energize fan 36 and allow air to discharge through two remaining open access openings for several minutes until residual cleaning water is removed.

(s) Reinstall two access covers on ductwork between fan and structural plenum.

(t) Install new differential filters, and clean prefilters and supplemental filter material at the air-intake in NC.

(u) Restore Navigation Equipment and Ventilation System to pre-cleaning conditions which includes opening chilled water valves CW-271 and CW-273.

(v) Check that differential pressure gage reads between 0.4 and 2.0 inches water when energizing fan 36.

5.7.2 Fan removal for cleaning.

(a) Proceed as specified in 5.7.1.1(a) through 5.7.1.1(i).

(b) In air conditioning room, remove all bolts that secure flexible rubber connections on inlet and outlet flanges of fan.

(c) Arrange appropriate rigging to hold and lower fan when foundation bolts are removed.

(d) Unbolt fan from its foundation.

(e) Lower fan an amount sufficient to facilitate cleaning. Disconnect motor wiring if necessary.

(f) Clean fan as outlined in 5.7.1.1(j) through 5.7.1.1(l).

(g) While fan is removed, some of the cleaning specified in 5.7.1.1(m) and (n) may be accomplished if more convenient.

(h) Reinstall fan to its normal operating position. Rebolt flexible connections to fan flanges. Reconnect motor wiring if disconnected.

(i) Proceed as specified in 5.7.1.1(o) through 5.7.1.1(v).

Preparing activity:
Navy - SH
(Project 1905-N006-11)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

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