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SP Number 32.009.01
Revision 2
Date Eff. 2/4/83
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INSULATION RESISTANCE TEST OF AUXILIARY ELECTRICAL EQUIPMENT

1.0 PURPOSE

To determine that the insulation resistance value of electrical equipment, as corrected to 20°C, is adequate for electrical equipment to be safely re-energized.

2.0 RESPONSIBILITY

The Maintenance Engineer shall be responsible for ensuring the proper implementation of this procedure.

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3.0 DISCUSSION

3.1 This test is performed to determine the integrity of station electrical equipment insulation and is made with a Megger. This instrument generates a constant internal D.C. voltage and has a high internal resistance. The meter on the Megger actually senses terminal voltage, thus any current flow (micro amperes) in the external circuit reduces the scale reading which is calibrated in megohms. The reading therefore indicates the presence or absence of conducting paths through or around the insulation.

3.2 The following topics are contained in this procedure:

4.0 PRECAUTIONS

4.1 ALL EQUIPMENT SHALL BE CONSIDERED ENERGIZED UNTIL VOLTAGE TESTED AND GROUNDED.

4.2 Portable leads shall be used to ground the phases not under test and to ground equipment at the conclusion of testing.

4.3 Megger tester shall be connected to the load side of the power source (eg. the load side of the starter or fuse.)

4.4 Be aware it is possible to have full megger D.C. potential (2500V) to ground.

4.5 Any equipment to be meggered shall be properly grounded first and then ground removed before connecting the megger for testing.

4.6 When using the megger, the connection from the megger to the ground shall

be connected first and disconnected last.

4.7 After application of megger D.C. voltage, grounding is important for safety as well as duplication accuracy of additional tests. The grounding time should be a minimum of 2 times the charge time.

5.0 PREREQUISITES

5.1 Equipment Clearance Permit. SP 12.Ø11.Ø1. <2

5.2 Maintenance Work Request where applicable, SP 12.Ø13.Ø1.

5.3 Equipment History Form SPF31.ØØ2.Ø1-53D Insulation Resistance Test Record Data Sheet.

5.4 Level megger and check for proper operation.

5.4.1 Leads shorted, meter reads zero.

5.4.2 Leads separated, meter reads infinity

5.5 Suitable voltage testing device shall be used to insure the equipment to be tested is not energized. Ground & Test Devices shall be used where applicable.

5.6 Prior to commencement of testing visually inspect the equipment to be tested to insure it is free of foreign materials (N/A for totally enclosed units).

5.7 Space heaters, when available, should be energized at least 12 hours prior to testing to minimize surface moisture accumulation.

5.8 Prior to conducting megger test, monitor for a minimum of 3 minutes, and record the temperature (°C) of the motor windings or of the equipment to be tested.

6.0 LIMITATIONS OR ACTIONS

N/A

7.0 MATERIALS OR TEST EQUIPMENT

7.1 Temperature measuring device (ie. Thermometer, pyrometer, RTD meter or potentiometer).

7.2 Megger Tester of appropriate voltage as required in Appendix 12.1.

7.3 Voltage tester (ie. Glowstick, voltmeter, etc.) applicable to the voltage range of the equipment.

7.4 Ground & Test Devices as required (416ØV).

7.5 Approved Grounding Device as required (460V).

8.0 PROCEDURE

8.1 4160 Volt Switchgear-Air Circuit Breaker (ACB)

8.1.1 Check to insure that the ACB has been properly tagged out and isolated.

8.1.2 Position ACB in test cabinet, connect test coupler, and close breaker.

8.1.3 Conduct a 1 minute D.C. insulation resistance test using the test parameters in Appendix 12.1. Test each breaker phase individually to ground with the other phases grounded.

8.1.4 The minimum acceptable insulation resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct readings to 20°C.

8.1.5 Ground all components at the conclusion of the test to remove any residual charges.

8.1.6 Trip breaker open.

8.1.7 Return ACB to compartment as found.

8.1.8 Complete Equipment History Form.

8.2 4160 Volt Switchgear-Bus

8.2.1 Check to insure that all supply and feeder breakers are racked out to the fully disconnected position, and tagging required for equipment clearance permit completed.

8.2.2 Rack out all potential transformers.

8.2.3 Remove ACB's and install Ground and Test Devices as required for electrical safety.

8.2.4 Remove bus grounds and conduct a 1 minute D.C. insulation test using the test parameters in Appendix 12.1. Test each phase individually to ground with the other phases grounded.

8.2.5 The minimum acceptable insulation resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct reading to 20°C.

8.2.6 Ground all bus components at the conclusion of the test to remove any residual charges.

NOTE: The grounding time should be at least twice the charge

time.

8.2.7 Remove all Ground & Test Devices and return ACB's to position as found.

8.2.8 Complete Equipment History Form.

8.3 125V & 460V Switchgear-Power Center Air Circuit Breaker

NOTE: On bus tie cubicles of NORMAL power centers, sections of the bus may remain energized with the switchgear de-energized.

8.3.1 Check to insure the ACB to be tested is properly tagged out and in the disconnected position.

8.3.2 Remove ACB from compartment.

8.3.3 Connect all sixteen terminals of the power shield logic box together and to ground. (N/A on 125V ACB).

8.3.4 Manually close breaker and conduct a 1 minute D.C. insulation resistance test using the test parameter in Appendix 12.1. Test each breaker phase to ground with the other phases grounded.

8.3.5 The minimum acceptable insulation resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct readings to 20°C.

8.3.6 Ground all components at the conclusion of the test to remove any residual charges.

NOTE: Grounding time should be at least twice the charge time.

8.3.7 Remove ground wiring from power shield logic box terminals. (N/A on 125V ACB).

8.3.8 Trip breaker open.

8.3.9 Return ACB to compartment as found.

8.3.10 Complete Equipment History Form.

8.4 125V & 460V Power Center Bus

NOTE: On bus tie cubicles of NORMAL power centers, sections of the bus may remain energized with the switchgear deenerg[illegible].

8.4.1 Check to insure that all power supply and feeder breakers are racked out to the fully disconnected position for the applicable switchgear, all fuses are removed from the potential transformer primaries, and tagging required for equipment clearance permit completed.

8.4.2 Voltage test and ground as required for electrical safety.

8.4.3 Conduct a 1 minute D.C. insulation resistance test on the power center bus utilizing the test parameters in Appendix 12.1. Test each phase individually to ground with the other phases grounded.

8.4.4 The minimum acceptable resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct readings to 20°C.

8.4.5 Ground all components at the conclusion of the test to remove any residual charges.

NOTE: Grounding time should be at least twice the charge time.

8.4.6 Complete Equipment History Form.

8.5 125V (GE) & 460V (Square D) Motor Control Center (MCC) Unit Compartment

8.5.1 Check to insure the MCC unit compartment is properly tagged out, and components deenergized as determined by voltage tests.

8.5.2 Conduct a 1 minute insulation resistance test. on all 460 volt components, using the test parameters in Appendix 12.1.

8.5.3 The minimum acceptable resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct readings to 20°C.

8.5.4 Ground all components at the conclusion of the test to remove any residual charges.

8.5.5 Complete Equipment History Form.

8.6 125V (GE) & 460V (Square D) Motor Control Center (MCC) Bus & Feeder Cables

8.6.1 Check to insure that the power supply and feeder breakers are racked out to the fully disconnected position for the applicable 480 V switchgear, and tagging required for equipment clearance permit completed.

8.6.2 Voltage test and ground as required for electrical safety.

8.6.3 Remove grounds and after using a multimeter to check continuity of motor windings conduct a 1 minute insulation resistance test using test parameters in Appendix 12.1. Test center (B) phase with the other phases grounded.

8.6.4 The minimum acceptable insulation resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct reading to 20°C.

8.6.5 Ground all components at the conclusion of the test to remove any residual charges.

NOTE: Grounding time should be at least twice the charge time.

8.6.6 Complete Equipment History Form.

8.7 4160/460 Volt Emergency Station Service Power Center Transformers

8.7.1 Check to insure that the 460V transformer secondary ACB has been disconnected from the bus, the incoming 4160V primary ACB has been disconnected, and tagging required for equipment clearance permit has been completed.

8.7.2 Install Grounding Devices.

8.7.3 Voltage Test & Ground Supply and Load Sides, as required for electrical safety.

8.7.4 Remove secondary (460V) neutral ground.

8.7.5 Remove & reinstall grounds as required to conduct the following 10 minute (or 3 successive same value readings) insulation resistance tests using the test parameters in Appendix 12.1.

a) High voltage windings to ground with the low voltage windings grounded.

b) Low voltage windings to ground with the high voltage windings grounded.

c) The low voltage to high voltage windings.

8.7.6 The minimum acceptable insulation resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct readings to 20°C.

8.7.7 At the conclusion of the tests ground all phases of the transformer for at least 4 minutes.

8.7.8 Replace secondary (460V) neutral ground.

8.7.9 Remove approved grounding devices and return ACB's to disconnect position.

8.7.10 Complete Equipment History Form.

8.8 4160/460 Volt Normal Station Service Power Center Transformers

8.8.1 Check to insure that the 460V transformer secondary has been disconnected from the bus. the incoming hand disconnect switch has been opened, and tagging required for equipment clearance permit has been completed.

8.8.2 Voltage test and ground supply and load sides, as required for electrical safety.

NOTE: In the following step utilize Appendix 12.2 to correct readings to 20 C.

8.9.7 At the conclusion of the test, the motor shall be grounded for at least 20 minutes to remove any residual charge.

8.9.8 Remove Ground & Test Device and replace ACB into compartment as found.

8.9.9 Complete Equipment History Form.

8.10 460 Volt Power Center Motors

NOTE: The procedure for 460 Volt Power Center Motors is primarily the same as for 4160 Volt Motors with the following exceptions :

a) The megger test voltage shall be 500 volts.

b) When 460 Volt ACB's are removed a voltage test shall be performed to establish energized connections. Insulate bus side connection stabs as required for electrical safety and ground motor leads prior to megger test.

8.10.1 Perform steps in Section 8.9 with the exception as noted above.

8.11 460 Volt Motor Control Center Motors

NOTE: The procedure for 460 Volt Motor Control Center Motors will be primarily the same as for the 4160 volt motors with the following exceptions:

a) The megger test voltage shall be 500 volts.
b) The ACB is not removed. Load side of the ACB is voltage tested to insure the circuit is de-energized.
c) An approved grounding device is applied to contactor (load side) terminals after voltage testing.

d) Approved grounding device is removed prior to and reinstalled following application of test voltage to remove any residual charges.

8.11.1 Perform steps in Section 8.9 with the exceptions as noted above.

8.12 4160 or 460 Volt Electrical Apparatus

NOTE: This section shall be used for any 4160 or 460 apparatus not covered in other sections.

8.12.1 Check to insure the supply breakers are racked out to the fully disconnected position, all fuses are removed from the potential transformer primaries, and tagging required for equipment clearance permit completed.

8.12.2 Voltage test and ground all phases.

8.12.3 Conduct a 10 minute, or 3 successive same value reading, D.C. insulation resistance test using the test parameters in Appendix 12.1.

8.12.4 The minimum acceptable insulation resistance is set forth in Appendix 12.1. Utilize Appendix 12.2 to correct readings to 20°C.

8.12.5 At the conclusion of the test ground all phases to remove any residual charges.

NOTE: Grounding time should be at least twice the charging time.

8.12.6 Complete Equipment History Form.

8.13 Miscellaneous Circuits & Apparatus

NOTE: This section is intended for equipment not covered by previous sections (i.e. 110/220 VAC and 125VDC motors and circuits) and shall be performed only on circuits not limited by voltage rating of the wiring or connected devices (i.e., electronic equipment, transducers, etc.) for a megger test voltage of 500 VDC.

8.13.1 Check to insure the circuit to be tested has been isolated and tagged out with the associated breaker open and the fuses removed.

8.13.2 Voltage test to insure the circuit has been de-energized and apply grounds.

8.13.3 Remove grounds and conduct a 1 minute D.C. insulation resistance test using the test parameters in Appendix 12.1.

8.13.4 The minimum acceptable insulation resistance is set forth in Appendix 12.1 Utilize Appendix 12.2 to correct readings to 20°C.

8.13.5 Complete Equipment History Form.

9.0 ACCEPTANCE CRITERIA

9.1 The minimum insulation values as set forth in Appendix 12.1.

9.2 A Polarization Index of 1.5 or greater when motors & cables are tested as a unit, and 2.0 or greater in all other cases.

9.3 An Absorption Ratio of 1.25 or greater. For all motors 100 HP or greater.

10.0 FINAL CONDITIONS

10.1 At the conclusion of testing remove all shorts and grounds, and replace any fuses removed during testing.

10.2 Equipment History Form submitted to Maintenance Engineer for review and filing in accordance with SP 31.002.01, Maintenance Record System.

10.3 Upon failure to meet the above Acceptance Criteria, the Watch Engineer shall be notified and a MWR shall be initiated to find and correct the cause of the problem.

11.0 REFERENCES

N/A

12.0 APPENDICES

12.1 D.C. Insulation Resistance Test Acceptance Criteria.

12.2 Temperature Correction Curve.

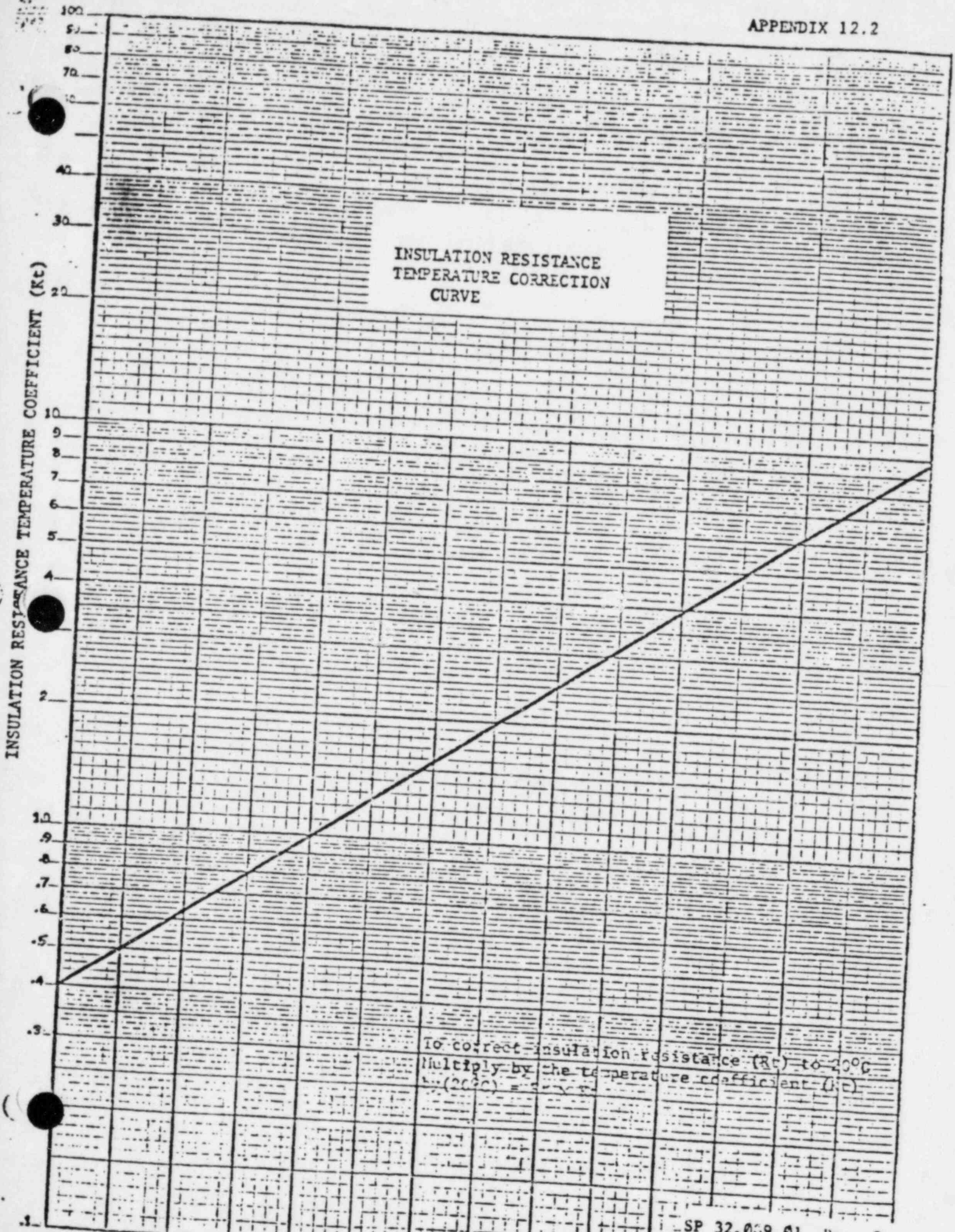
APPENDIX 12.1

DC INSULATION RESISTANCE TEST

ACCEPTANCE CRITERIA

EQUIPMENT	VOLTAGE RATINGS	MEGGER D C TEST VOLTAGE	TEST TIME (MIN)	MINIMUM ACCEPTANCE INSULATION RESISTANCE CORRECTED TO 20°C
SWITCH GEAR BUS & ACB	4160 VOLT	2500 VOLT	1	13 MEGOHM
SWITCH GEAR BUS & ACB	125V & 460 VOLT	500 VOLT	1	4 MEGOHM
CABLE BUS	4160 VOLT	2500 VOLT	1	13 MEGOHM
CABLE BUS	125V & 460 VOLT	500 VOLT	1	4 MEGOHM
MOTOR CONTROL CENTERS	125V & 460 VOLT	500 VOLT	1	4 MEGOHM
POWER CENTER TRANSFORMER	(PRIMARY) 4160 VOLT	2500 VOLT	10	13 MEGOHM
POWER CENTER TRANSFORMER	(SECONDARY) 460 VOLT	500 VOLT	10	4 MEGOHM
4.16 KV MOTORS	4160 VOLT	2500 VOLT	10	*13 MEGOHM
125V & 460 VOLT MOTORS	125V & 460 VOLT	500 VOLT	10	* 4 MEGOHM
ELECTRICAL APPARATUS	4160 VOLT	2500 VOLT	10	13 MEGOHM
ELECTRICAL APPARATUS	125V & 460 VOLT	500 VOLT	10	4 MEGOHM
MISC. CIRCUITS	AS APPLICABLE	500 VOLT	1	1 MEGOHM

* MOTOR & CABLE FINAL TIMED READING IS ACCEPTABLE.


INSULATION RESISTANCE
TEMPERATURE CORRECTION
CURVE
INSULATION RESISTANCE TEMPERATURE COEFFICIENT (Kt)
100
50
60
70
40
30
20
10
9
8
7
6
5
4
2
1.0
.9
.8
.7
.6
.5
.4
.3
.1
To correct insulation resistance (Rt) to 20°C
Multiply by the temperature coefficient (Kt)

WESTINGHOUSE

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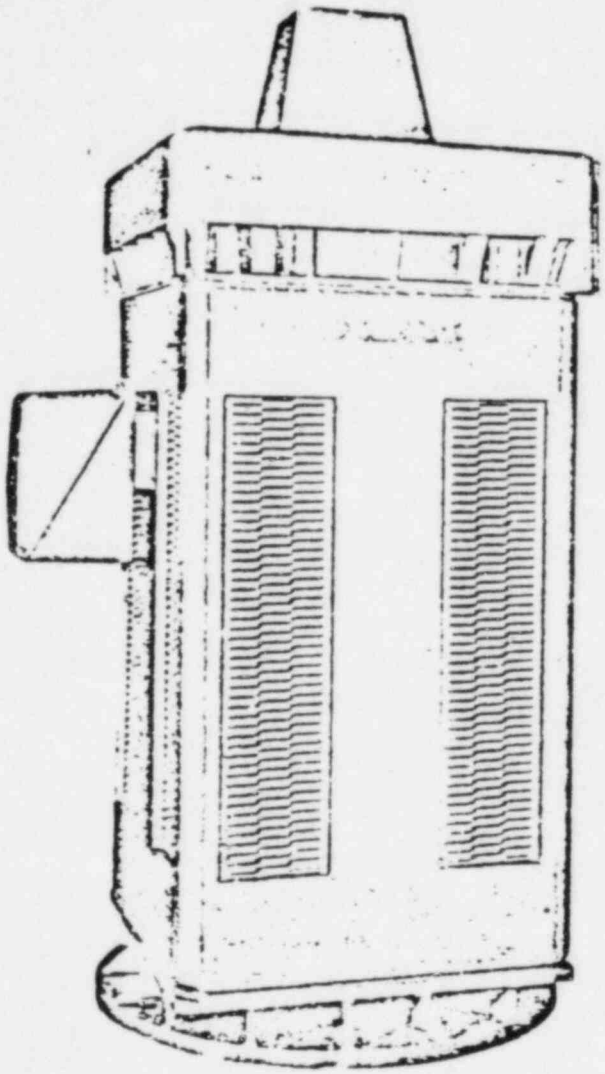
Large AC Motors — Life-Line® D

I.L. 3030-D1

Vertical Induction Motor; Frames 5000, 5800, 6800 Weather Protected Type I Weather Protected Type II



DESCRIPTION

Westinghouse Life-Line D vertical pump motors are designed for normal or high thrust applications. These squirrel cage motors are available with either a hollow or solid shaft to suit the application. The self-ventilating system for the WPI with air inlets at the top and bottom of the motor allows air to pass over the stator winding ends as well as through the rotor core and exhaust through louvered air outlets on all four sides. The WPI enclosure provides protection for indoor or outdoor use, where operating conditions are not extreme. The WPII enclosure provides additional protection at air inlets and outlets from severe climates with additional turns and low velocity inlet air passages. A light weight top cap provides access to the top coupling.

These instructions may not cover all details or variations in equipment that may be supplied or every possible question in regard to the installation, operation or maintenance. Should situations arise that are not covered by these instructions, further information may be obtained through Westinghouse Sales and Service engineers.

STANDARD WARRANTY

Westinghouse warrants that the equipment delivered by it will be of the kind and quality described in the order or contract, and will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within one year after date of initial operation, not to exceed eighteen months after date of shipment, Westinghouse shall, on prompt notification from the purchaser, and provided that (1) the equipment has been stored, installed, operated and maintained in accordance with the order or contract, generally acceptable industry practices and Westinghouse instructions, and (2) that the equipment has not been subject to alteration, misapplication or misuse, correct such non-conformity by repair or replacement F.O.B. point of shipment, of the non-conforming part or parts. Westinghouse shall not be responsible for providing working access to the defects. Correction of non-conformities, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of Westinghouse with respect to the quality of the equipment.

The foregoing warranty is exclusive and in lieu of all other warranties of quality, whether written, oral, or implied, including any warranty of merchantability or fitness for purpose.

Any defects that may develop should be referred to the nearest Westinghouse Sales Office for complete servicing information.

Effective, February 1971

It is strongly recommended that all Weather-Protected Type I 2300 volt motors have a sealed insulation system if mounted outdoors and otherwise unprotected. Motors for 4000 volt and high service must have a sealed insulation system to maintain the warranty, if they have WPI enclosures and are mounted outdoors and otherwise unprotected.

Unauthorized Repairs

In the event that the customer sends his motor to an unauthorized repair shop, the coverage of this warranty policy is automatically terminated.

RECEIVING

Motors should be carefully inspected upon arrival. Any damage should be reported promptly to the carrier and to the nearest office of the Westinghouse Electric Corporation.

HANDLING

The WPI motor should be lifted by means of the two hooks on frame corners diagonally opposite each other near the top of the motor.

STORAGE

If, at the time of purchase, it was specified the motor be packed for long-term storage, the package should be left intact during the period of storage.

If the motor is not packaged for long-term storage and is not to be put into service immediately, certain precautions should be taken to protect it. If at all possible, place the motor under cover in a clean, dry location.

During storage, the winding should be protected from excessive moisture absorption by some safe and reliable method of heating. Space heaters, if supplied, may be used for this purpose. The temperature of the winding should be always maintained a few degrees above the temperature of the surrounding air.

During manufacturing and preparation for shipment, certain precautions are taken to guard against corrosion of the bearings. Machines with oil lubricated bearings are operated with a rust-inhibiting oil in the lubrication system. However, it is recommended that the oil reservoir be filled immediately with a good grade of rust-inhibiting oil, and shaft should be rotated at one-month intervals. Grease lubricated rolling bearings have an inherent rust inhibitor in the grease, but the shaft should be rotated at three-month intervals.

Off-Season Storage

Drain and refill with new oil. Run the motor for a short time to put oil on parts. Allow sufficient ventilation to avoid condensation; plastic or canvas covers promote condensation. Weather protection is desirable. Be sure screens are in place. Drain water from cooling coils.

INSTALLATION

Unpacking

Remove the shipping braces which may be installed (used to limit movement of the rotor during shipment). Remove slushing compound on solid shaft extension with a petroleum solvent, observing safety precautions.

Location

Install the machine in a well ventilated area not subject to ambient temperatures above 40°C (104°F) or altitude over 3300 feet. If protecting shields or guards are used, they must not obstruct the free flow of air around the motor.

Avoid locations subject to excessive steam vapors, oil vapors, chemical fumes, moisture, dirt, dust, or lint.

WARNING

Do not install the motor where hazardous, inflammable or combustible vapors or dust are present, due to the possibility of explosions or fire and damage to property or injury to personnel. Install motors on a non-combustible surface.

Note the air inlet and outlet locations and take precautions to prevent hot exhaust air from recirculating into the intake openings or to prevent hot exhaust air from entering the inlet of an adjacent motor.

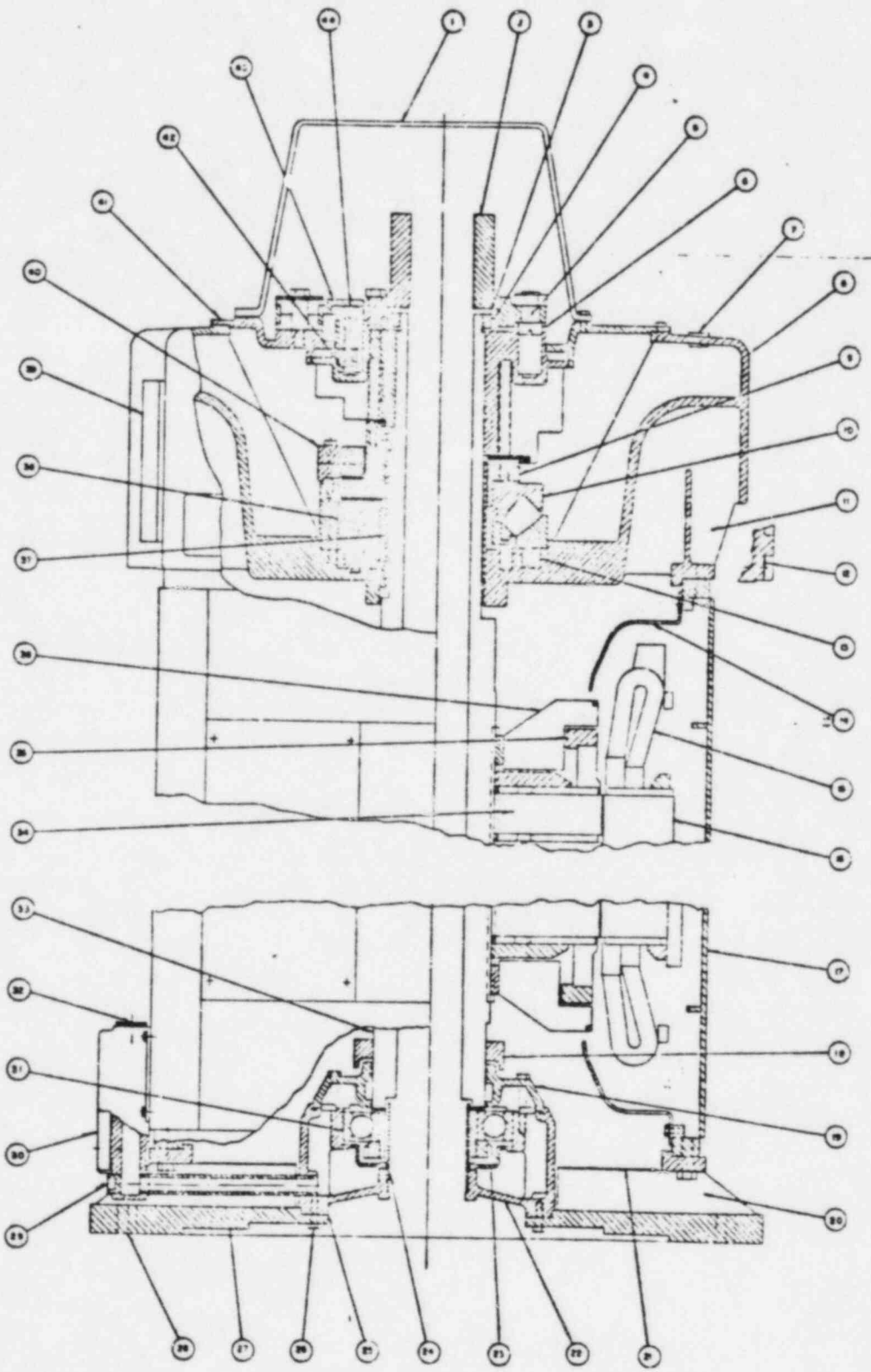


Fig. 1 *Typical high-thrust hollow shaft motor with spherical roller thrust bearing and clutch shown for illustration on right hand side and tilting pad thrust bearing and ratchet on left.*

Mounting

The mounting platform for the motor must be sufficiently rigid to minimize vibration and to maintain alignment between the motor and the pump. Motors are dynamically balanced at the factory to NEMA standard vibration limits. However, vibration of motor and pump in service are determined not only by balance but may be greatly affected by the base on which the motor is mounted. To minimize vibration, a base with proper rigidity must be provided for the motor. A frequent cause of vibration when motor and pump are first coupled up has been inadequate rigidity of the motor mounting base. Vertical motors are provided with a base having a machined lower face with a rabbet fit. If motor base and platform have been machined correctly, the parts can be used for line-up with no problems. If shafts do not line up, it is possible to bring them into line by shimming under the motor, however, remachining the part in error is more desirable.

Precautions

To assure satisfactory service, it is important that bearing thrusts do not exceed recommended values. Thrust in excess of recommended values will result in an extreme reduction in bearing life. Also, a minimum thrust is required at all times on spherical roller bearings, except for brief trial runs.

On hollow shaft verticals, a flinger should be installed on the pump shaft between the pump shaft gland and the base of the motor to keep water that might spray from the seal from entering the lower bearing of the motor.

Coupling Solid Shaft

The coupling should be mounted on the motor shaft before placing on pump platform. The coupling should be heated in oil before installation and slid into position onto shaft or installed with a pushing device. Do not hammer because of possible damage to bearings.

Mechanical vibration and roughness during the operation of the motor may be indications of poor alignment. In general, lineup by straight edges across, and a feeler gauge between coupling halves, is not sufficient. It is recommended that the lineup be checked with dial indicators and checking bars connected to the motor and pump shafts.

After checking lineup and fastening coupling, dowel pins may be inserted, if desired, through the base of the motor into the platform to maintain accurate positioning of the motor. The holes should be drilled and reamed simultaneously with the corresponding holes in the foundation and the dowel pins inserted.

Coupling Hollow Shaft

The motor may be equipped with either ratchet, clutch, or bolted type couplings (as specified by purchaser) as follows:

1. Ratchet Type

These motors are equipped with non-reverse ratchet that permits rotation in the CCW direction only (looking down). A ratchet is used when it is desirable to prevent reversal of shaft and pump rotation after shutdown. It prevents damage due to overspeeding or damage to pump bearings if falling water column tends to cause reverse rotation. The ratchet consists of a stationary member with teeth or steps cast into it and a rotating member with pins operating in vertical holes. When the motor starts in the forward or CCW direction, the inclined faces of the ratchet teeth throw the pins downward where they are held by centrifugal force and friction. When the motor stops, the pins lift and prevent CW or reverse rotation by striking the vertical faces of the teeth. The ratchet should not be lubricated. (Solid shaft ratchet assembly, Fig. 2)

2. Clutch Type

These motors are equipped with a disengaging clutch that consists of a coupling and a drive hub. A clutch is used to prevent driving the pump in reverse if the motor is run with reversed rotation, and thus unscrewing the pump line-shaft joints. The drive hub is keyed to the motor shaft, and the coupling is keyed to the pump shaft and attached through a screw to the adjusting nut. The coupling centers on the drive hub by means of a machined fit. The coupling is driven by two pins attached to the coupling and engaging corresponding holes in the drive hub. Disengagement of the clutch is caused by a lifting of the pump shaft which separates the pins in the coupling from the holes in the drive hub. Both types of couplings are bolted to the drive hub at the factory for shipping purposes.

A clutch type coupling is not to be used if upthrust is present. Caution should be taken to be sure that the pump shaft extension above the coupling is short enough to allow clearance between the top of the shaft and the inside of the cap when the shaft lifts as the coupling

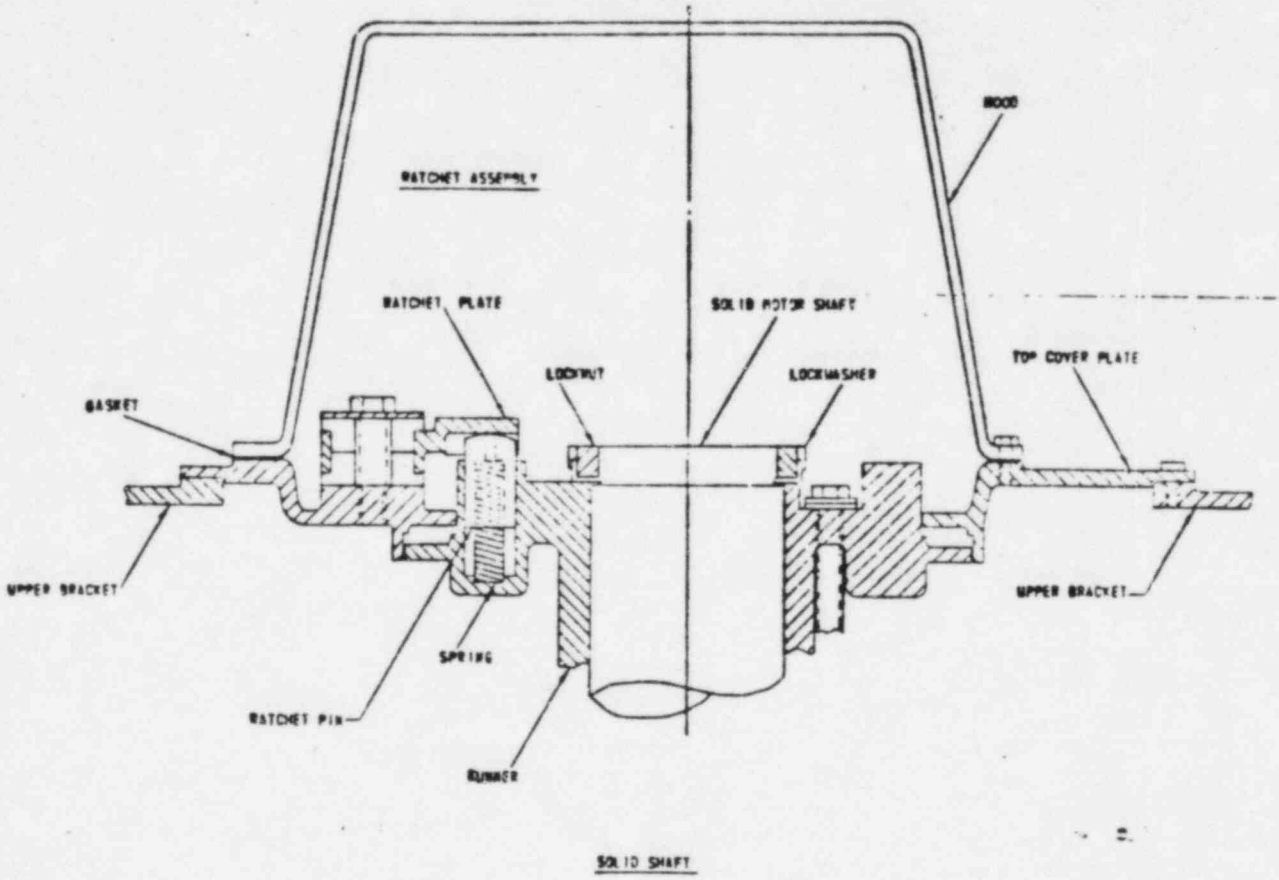


Fig. 2 *Upper end of typical high thrust solid shaft motor with ratchet.*

releases. The distance between inside surface of the cap and top of half coupling is the following:

Frame Size	Distance
5000	5.56 inches
5800	5.56 inches
6800	6.62 inches

3. Bolted Coupling

The bolted coupling does not have the non-reverse or disengaging feature. The coupling halves are bolted together securely to allow the upthrust from the pump to be taken by the motor bearings.

The motor shaft must be accurately aligned with the pump shaft so that shaft stresses, vibration and coupling wear will be reduced to a minimum. Once the shafts have been aligned, assemble the coupling.

ELECTRICAL CONNECTIONS

Motor and control wiring, overload protection and grounding should be in accordance with the National Electrical Code and local requirements.

The motor frame should be grounded by attaching a ground strap from a known ground point to one of the conduit box bolts.

Be sure the motor is connected as shown on the nameplate, and that the power supply (voltage, frequency, and number of phases) corresponds with the nameplate data. The motors will continue to operate (but with characteristics somewhat different from the nameplate values) if the voltage and frequency vary within the following ranges:

Voltage - within ± 10% of the value stamped on the nameplate

Frequency - within ± 5% of the value stamped on the nameplate

Voltage and Frequency together - within ± 10% providing the frequency is within ± 5% of the value stamped on the nameplate.

To change the direction of rotation on 3 phase motors, interchange any two line leads. Note: If the direction of rotation is indicated on the motor, and it is desired to operate in the opposite direction, it will be necessary to change the ratchet if used, and the blowers, as unidirectional blowers have been used. Refer to the nearest Westinghouse Sales Office for assistance.

INSULATION RESISTANCE

Before energizing motors, it is recommended that the insulation resistance be measured, particularly if the motor has been exposed to excessive moisture in shipment or in storage. The insulation resistance of the stator winding can be measured with a "Megger" type instrument. This value should be not less than KV + 1 in megohms. For example, a 2300 volt motor should have a minimum insulation resistance of 2.3 + 1 or 3.3 megohms.

If the insulation resistance is lower than this value, it is advisable to eliminate the moisture in one of the following ways:

1. If space heaters were supplied, energize these until motor dries out and until resistance becomes constant.

2. Enclose the motor with canvas or similar covering, leaving a hole at the top for moisture to escape. Insert heating units or lamps and leave them on until the insulation resistance becomes practically constant.

3. With the rotor locked, using approximately 10% of rated voltage, pass a current through the stator windings. This current may be gradually increased until the temperature of the stator winding reaches 90°C. Do not exceed this temperature. Maintain a temperature of 90°C until the insulation resistance becomes practically constant.

OPERATION

Steps Prior to Initial Start

Before starting a motor with oil lubricated bearings, remove the protective tape on the oil gauges. Fill the oil reservoirs through the plug in the top bracket and the top plug of the lower oil level gauge with the proper rust and oxidation inhibited turbine oil to the standstill level on the oil gauge. This level may change slightly when motor is in operation. See page 8 for oil viscosities.

If possible, turn the rotor to make sure that it rotates freely; spherical roller bearings will feel stiff due to spring load, but there should be no binding.

Examine the rotor for loose objects or debris which may have accumulated to interfere with operation. Check factory made connections for tightness to make sure none have become loosened during shipment or storage. Remove shipping braces from rotor. If the upper bearing requires water cooling coils, connect the fittings and circulate the water at the flow rate and pressure specified on the nameplate or instructions. Water pressure 75 psig maximum.

Initial Start

It is recommended that the motor be initially started uncoupled from the load. Check the direction of rotation.

After starting the motor, check the temperature of the bearing oil. If the oil is not water cooled, the normal oil operating temperature will be in the range of 75 to 90°C. Bearing temperatures may be higher than this, since oil is the cooling medium.

At initial start, the rate of rise of the bearing temperature is more indicative of trouble than the total temperature. When starting a motor for the first time, the bearing temperature should be observed for a minimum of two hours. If at any time the rate of temperature rise appears too great or if there is excessive vibration or unusual noises, shut down the motor immediately and inspect the machine for possible causes. Observe the standstill oil levels for several days to insure no oil leakage has occurred.

With the motor connected to the load, check for satisfactory operation.

Jogging and Repeated Starts

CAUTION

Repeated starts and/or jogs of induction motors greatly reduce the life of the winding insulation and the rotor. The heat produced by each acceleration or jog is much more than that produced and dissipated

by the motor under full load. These motors are designed to withstand being shut down and restarted once, providing the motor is allowed to coast to rest before being restarted. It is recommended that no restart be made until all conditions affecting operation have been thoroughly checked and the motor examined for evidence of excessive heating.

Long accelerating times, resulting from low voltage, high connected inertia, or other reasons, may seriously damage the rotor or shorten its life. If load inertia in excess of that recommended by NEMA, MG1-20.42 is expected, the nearest Westinghouse Office should be consulted to determine if motor is suitable.

Heating

Consult the nameplate for the correct temperature rating of the motor. The maximum continuous operating temperature of the motor is a rise stamped on the nameplate plus the temperature of the surrounding air. If the motor does not have temperature indicating devices, and abnormal heating conditions are suspected, shut the motor down until the cause of overheating can be determined and corrected. Temperature rise can be determined by the change in stator winding resistance. Do not exceed steady value of nameplate amperes times service factor.

MAINTENANCE

A carefully planned program of inspection and maintenance will result in maximum equipment availability and minimum maintenance cost. If it is necessary to repair, recondition, or rebuild these motors, it is recommended that the nearest Westinghouse Apparatus Repair shop be consulted.

In addition to the daily observation of the overall condition and operation of the motor, it is recommended that a general inspection routine be established to check periodically the following items:

1. Cleanliness
2. Insulation and winding
3. Lubrication and bearings
4. Vibration

Cleanliness

The interior and exterior of the machine should be kept free from dirt, oil, and grease. Oily vapor, paper, chemical, product, or textile dust may build up and block off ventilation, leading to overheating of windings. Conducting dusts shorten creepage distance and may penetrate windings, causing short circuits and grounds. Sharp dusts tend to abrade the insulation, and shorten its useful life as they are driven by motor fans. Magnetic dust is a particular hazard to insulation because of the magnetic properties and agitation by magnetic fields. Light and relatively harmless dust can be blown out with low pressure dry air. Grit, metallic, magnetic and carbon dust should be removed by suction with non-metallic suction tips.

Cleaning Insulation

The insulated windings should be kept reasonably clean of dirt, oil, metal particles, and other contaminants. A film of oily dirt tends to accumulate particles that may interfere with the satisfactory ventilation of the machine. Cleaning can be accomplished in several satisfactory methods, some of which are suggested below:

1. Vacuum Cleaning

For removal of loose dust, dirt, and particles, the use of suction is preferable to blowing out with compressed air since there is less possibility of damage to insulation and less chance of getting conducting or harmful particles into areas that may later result in damage during operation.

2. Compressed Air Cleaning

Compressed air is effective and convenient for removing loose dust and particles from inaccessible areas such as air ducts, and between coils at the end turns. Caution should be taken, however, to make sure that the air supply is dry, and free of oil. Excessive air pressure (in excess of 30 psi), should not be used.

3. Solvent Cleaning

Oil or grease are not harmful to the insulation, however, they do tend to accumulate dust which may impair the ventilation. Oil or grease may be removed with a cloth moistened, but not dripping, with a petroleum solvent of the safety type, such as Stoddard solvent or similar materials available under various trade names. In using such solvents, precaution should be taken because of their flammability and possible injurious health reaction. If there is evidence of winding movement or varnish deterioration, revarnishing the winding should be considered.

Moisture

Dripproof motors should always be guarded against the accidental intrusion of water from splatter or splashing.

Standby motors should be run at least once a week to guard against moisture condensation. Motors with long idle periods should normally be installed with space heaters in operation during the idle periods.

Bearing Oil Recommendations

For tilting pad thrust bearings or oil lubricated ball bearings at normal ambient temperatures, use a good grade of oxidation and corrosion inhibited mineral base turbine oil with a viscosity of 200 SUS at 100°F.

For spherical roller bearings at normal ambient temperatures, use a good grade of oxidation and corrosion inhibited mineral base turbine oil with a viscosity of 1000 SUS at 100°F.

Operation in ambient temperatures that are near or below freezing may require oil heaters or special oil.

Lower end bearings may be lubricated for convenience with same viscosity of oil as top bearings. Automotive or detergent oils are not recommended.

Cleaning

The reservoir should be drained approximately every six months by removing the drain plug. More frequent changes may be necessary if discoloration or other contamination of the oil is observed, oil temperature is near the top (90°C) of the operating range, or for 3600 RPM machines. Flush with kerosene, if necessary, to remove sediment. Check that metering hole or holes are clear. Refill with fresh, clean oil.

Maintenance of Grease Lubricated Rolling Bearings

When motor is installed, make certain that the motor turns easily, particularly when the motor is not installed until some months after being shipped. External inspection after the motor is put into operation will determine whether the bearings are operating quietly and without undue heating.

The grease used as a lubricant in grease lubricated rolling bearings does not lose its lubricating ability suddenly, but over a period of time. This time, in which regreasing would be necessary, depends upon the type of grease, the size of the bearings, the speed at which the bearing operates, and the severity of operating conditions. As a result, it is not possible to accurately predetermine when new grease must be added. Some of the conditions for which more frequent greasing is required would be severe dirt; exposure to weather, high humidity, splashing water; or high ambient temperature.

Regreasing

Too much grease will cause churning, overheating, and grease leakage. Only a small amount of lubricant is necessary for lubrication, however, this amount must always be present. Lubricant also performs other functions such a prevention of water and contaminants from entering the bearing and corrosion protection.

When regreasing, care must be taken against introduction of dirt. Clean the fittings as this has been found to be a primary cause of dirt introduction and failure of bearings.

If high pressure guns are used, great care must be taken to avoid over-lubrication.

When shipped from the factory, grease lubricated ball bearings have sufficient grease of a rust inhibited lithium soap type to last for a limited period. However, a charge of grease should be added soon after the motor is put into operation, and thereafter at suitable intervals as determined by experience.

NOTE

Some motors for special applications, such as high ambient temperature conditions, will require a special grade of grease. These motors will be identified by having a special nameplate giving greasing instructions. In such cases, do not use the standard grease.

When regreasing the motor, it is preferable to stop the motor. To regrease, proceed as follows:

1. Wipe the lubrication fitting clean, remove the relief plug, and free the hole of hardened grease.

2. Add grease slowly with a hand operated pressure gun.

3. Operate motor for at least ten minutes with the drain plug removed to allow excess grease to drain out.

4. On motors with long grease pipes, pipes should be thoroughly cleaned before regreasing.

5. If it is necessary to regrease with the machine in operation, grease added should be limited and careful attention paid to avoid over greasing. Allow to run with drain plug open for approximately ten minutes before restoring drain plug to its sealed condition.

As a guide to the amount of grease to be added and the frequency of greasing, see following charts.

Greasing Schedule

Method of Drive	Hours Operation	Greasing Intervals		
		8 Hr. Day	16 Hr. Day	24 Hr. Day
Coupled (1800 RPM or less	2000	8 Mo.	4 Mo.	2-2/3 Mo.
Coupled (3600 RPM)	1000	4 Mo.	2 Mo.	1-1/3 Mo.

Guide to Amount of Grease

Shaft Diameter at Bracket	Amount of Grease to Add
Up to 2-3/8	1-1/4 cu. in.
Above 2-3/8 to 3	2
Above 3 to 4	3
Above 4 to 5	4
Note: 1 oz. = 1-1/4 cu. in.	

Ordering Data Standard Westinghouse Grease #55272-BA	
1 lb. can	S#1781387
5 lb. can	S#1781388
35 lb. can	S#1781389

Under operating conditions of severe dirt or temperature, it may be desirable, for most satisfactory service, to open the bearing housing once a year, or after every 5,000 hours operation, to check the condition of the housing and grease. If difficult to inspect the drive end bearing, the condition of the bearing at the opposite end will usually be representative of both. If grease deterioration has occurred or if dirty, the bearing housing parts should be thoroughly cleaned out and new grease added. Clean with a suitable solvent, such as Trichlorethylene, taking necessary precautions.

Bearing Currents

Certain motors have a tendency to produce harmful circulating currents through the bearings. In such cases, the upper bearing is insulated. This insulation must not be short circuited when temperature detecting devices are inserted into the bearing.

Vibration

Any excessive noise or vibration should be traced to its source and eliminated. Increase in vibration may be indicative of change in balance (uncouple or disengage from pump to isolate motor), possible incipient bearing or rotor failure, electrical unbalance, or change in alignment.

RENEWAL PARTS

Renewal parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to name the part or parts required and give the complete nameplate reading on the motor for positive identification.

INSPECTION

The air outlet louver screens can be removed to check cleanliness of windings and necessity for further disassembly for cleaning.

DISASSEMBLY OF GREASE LUBRICATED ROLLING BEARING MOTORS

1. When necessary to disassemble the bearing housing, first thoroughly remove all dirt from the adjacent part, so no dirt will fall upon the bearing or into the bearing housing.

2. Remove top bracket by unscrewing all the bolts that hold the bracket to the frame and the bolts that hold the inner caps to the bearing housings. Upon removing the brackets and airshield, the rotor can be removed.

3. Bearings can be removed using a wheel puller or similar device. The inner cap should be slid along the shaft away from the bearings so that the puller can be used against the inner race of the bearing.

4. To replace a bearing on the shaft, be sure that the shaft fit and bracket fits are free from dirt, nicks, or burrs. The internal surfaces of the bearing housing, the shaft, and the shaft fit of the bearing and the bearing cap should be coated with a thin film of the recommended grease. Heat the bearing in an oven or clean oil bath for one half-hour at a temperature of approximately 190°F, but not to exceed 212°F at any time. Slip the hot bearing on the shaft

and hold it in place until bearing has cooled appreciably. Do not assemble in bracket until bearing has cooled. Fill bearing with grease; pack outboard grease cavity in bracket approximately one-half full. Do not fill inner bearing cap with grease. Orient the inner bearing cap so that grease relief passage is lined up with similar passage in the bracket.

DISASSEMBLY OF MOTOR (Oil Lubricated)

1. Drain upper and lower bearing reservoirs.

2. Remove lower drain pipe and gauge.

3. Remove hood, coupling (if hollow shaft), ratchet plate, if used, and top cover plate. Do not remove water coils in water cooled bearings unless coils need repair.

4. Remove nut and lock washer from upper end of shaft and pull runner and bearings from the shaft. (Nut may be removed more readily if bottom end of shaft is jacked up.)

5. If entire rotor is to be removed, remove upper bracket and airshield. If solid shaft, coupling may have to be removed also.

6. Remove bolts from lower bearing cartridge and pull shaft and rotor. (If upper bearing is preloaded, discard shims at lower bearing cartridge.)

ASSEMBLY OF MOTOR

A. Motors With Spherical Roller Thrust Bearings (Spring Loaded Bearings) (Fig. 3)

1. Assemble motor in reverse procedure as disassembly.

2. Fully compress upper bearing springs using assembly fixture. The jacking screws should be tightened evenly until the bearing is solidly seated (torques in table below should assure that bearing is seated).

Table I

Bearing Size	Spring Pressure (#)	Minimum Torque (Ft. #) for Each Jacking Screw (2)	
		5/8" Screw	3/4" Screw
29326	3600	36	43
29426	3600	36	43
29430	5400	54	65
29334	3600	36	43
29438	5400	54	65
29452	7200	72	86

3. Tighten the lock nut until the lower bearing comes up against the housing shoulder. This is easier if the shaft is jacked up until the lower bearing bears against the housing shoulder and then the nut is tightened.

4. Loosen lock nut approximately 1/4 turn. This should give about .020" shaft end play. Check the end play by mounting a dial indicator on the upper bracket with gage indicating the shaft runner in an axial direction. Loosen fixture jacking bolts, and note end play. Readjust lock nut, if necessary, to obtain .015-.020" end play. Lock nut in position.

B. Assembly of Motors With Oil Lubricated "DT" Bearings

1. Bearings with "DT" thrust bearing take momentary upthrust with the lower bearing and required limited end play.

2. Tighten the lock nut until the lower bearing comes up against the housing shoulder. This is easier if the shaft is jacked up until the lower bearing bears against the housing shoulder. Tighten the lock nut to remove any end play and then loosen nut 1/4 turn. Check end play by mounting a dial indicator on the bracket with gage indicating the shaft runner in an axial direction. Release jack from under shaft and note end play. When jack is not used under shaft, lift shaft with pry bar to measure end play. Readjust nut, if necessary, to obtain .015-020" end play. Lock nut in position.

C. Assembly of Other Oil Lubricated Bearings

1. Motors with Kingsbury type thrust bearings, "DB" ball thrust bearings or 7000/9000 ball thrust bearings take up and down thrust in the upper bearings and do not require end play adjustment. Assemble motor in reverse procedure as disassembly of the motor. Keep grease out of the bearing oil sumps (a small quantity of grease in the oil may cause severe foaming). Seal joints that are vulnerable to oil leaks or water into oil leaks with Permatex #2.

BEARINGS

For normal thrust applications, grease-lubricated ball bearings are used for the upper and lower bearings. However, all verticals for high thrust applications have oil lubricated upper and lower bearings. The following upper bearings are used for high thrust application.

1. Spherical Roller Bearing

A spherical roller thrust bearing supports the weight of the motor rotor and has been selected to withstand the

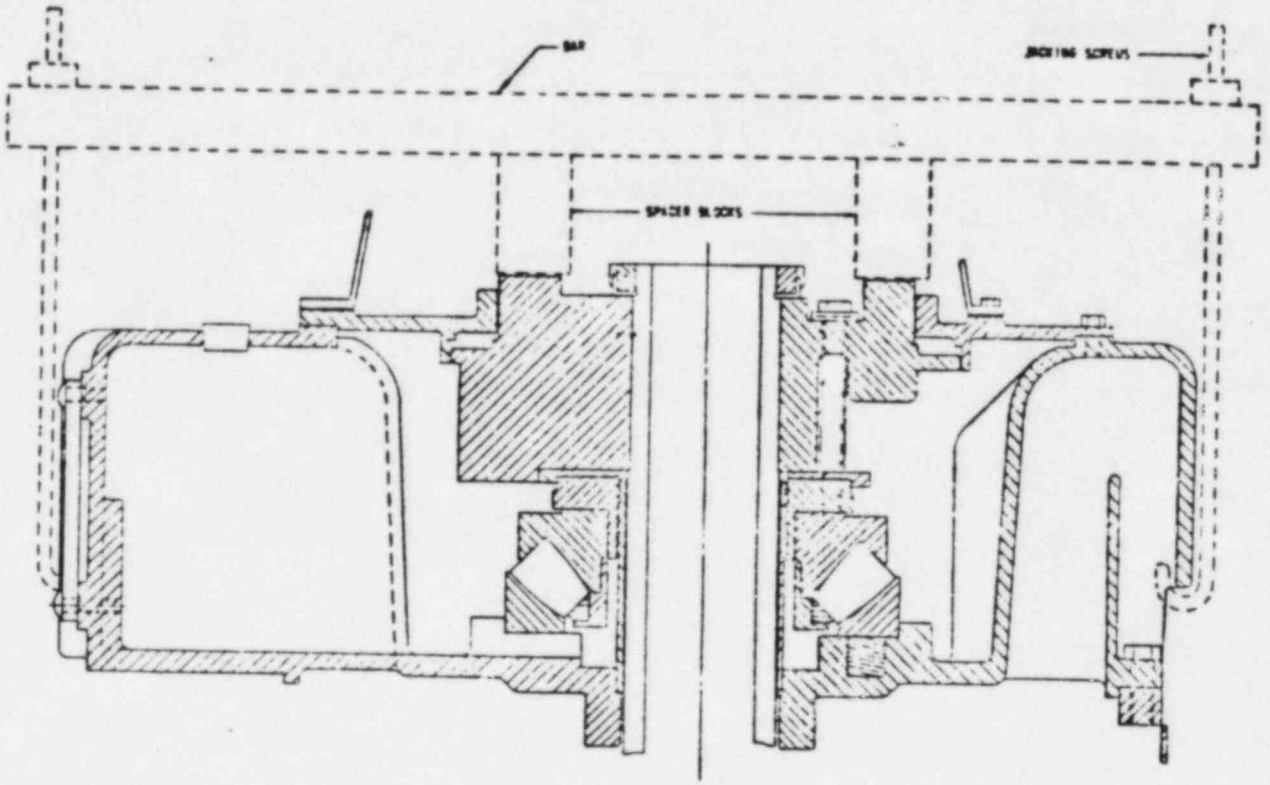


Fig. 3 *Upper end of typical high thrust hollow shaft with spherical roller bearings, showing assembly rig.*

pump thrust as determined by the pump manufacturer. Coil springs under the outer race of the roller thrust bearing compensate for rotor lifting effect. Similarly, these springs are used on slower speed applications where an upward thrust is imposed by the pump or when the thrust exceeds the weight of the motor rotor. The downthrust, with the exception of momentary upthrust, should always exceed maximum spring load. Note that if motor is run without downthrust, excessive vibration may occur. In normal operation with downthrust sufficient to compress the springs, vibration should be normal.

2. Tilting Pad Bearing

The tilting pad self leveling vertical thrust bearing is constructed basically of two parts; the upper portion or thrust collar which is positioned by the shaft runner and lower portion or leveling pads which is positioned by the fit in the upper bracket. The self-aligning leveling pads are constructed of tin base babbitt metallurgically bonded to a steel backing. Radial position is maintained by an (upper) sleeve guide bearing; momentary upthrust is taken by a thrust collar on the guide bearing.

3. Angular Contact Bearing (Fig. 4)

An angular contact bearing is a special ball bearing designed with a high contact angle between balls and race to carry a much greater thrust load than a normal ball bearing. Two bearings may be stacked to provide duplex tandem or duplex back to back.

The lower bearings used for high thrust applications are oil lubricated ball bearings. The type of oil used is the same as that required for the upper bearing in each individual case.

Water Cooling

When water cooling is required, it is accomplished with a continuous copper tube immersed in the oil with water connections brought out the side of the pot so that the coil will drain. For proper cooling, approximately three gallons per minute of 70°F clean water is required; either connection can be used as the inlet. Use only pure, clean water unless motor was specially ordered with a coil to withstand corrosive water.

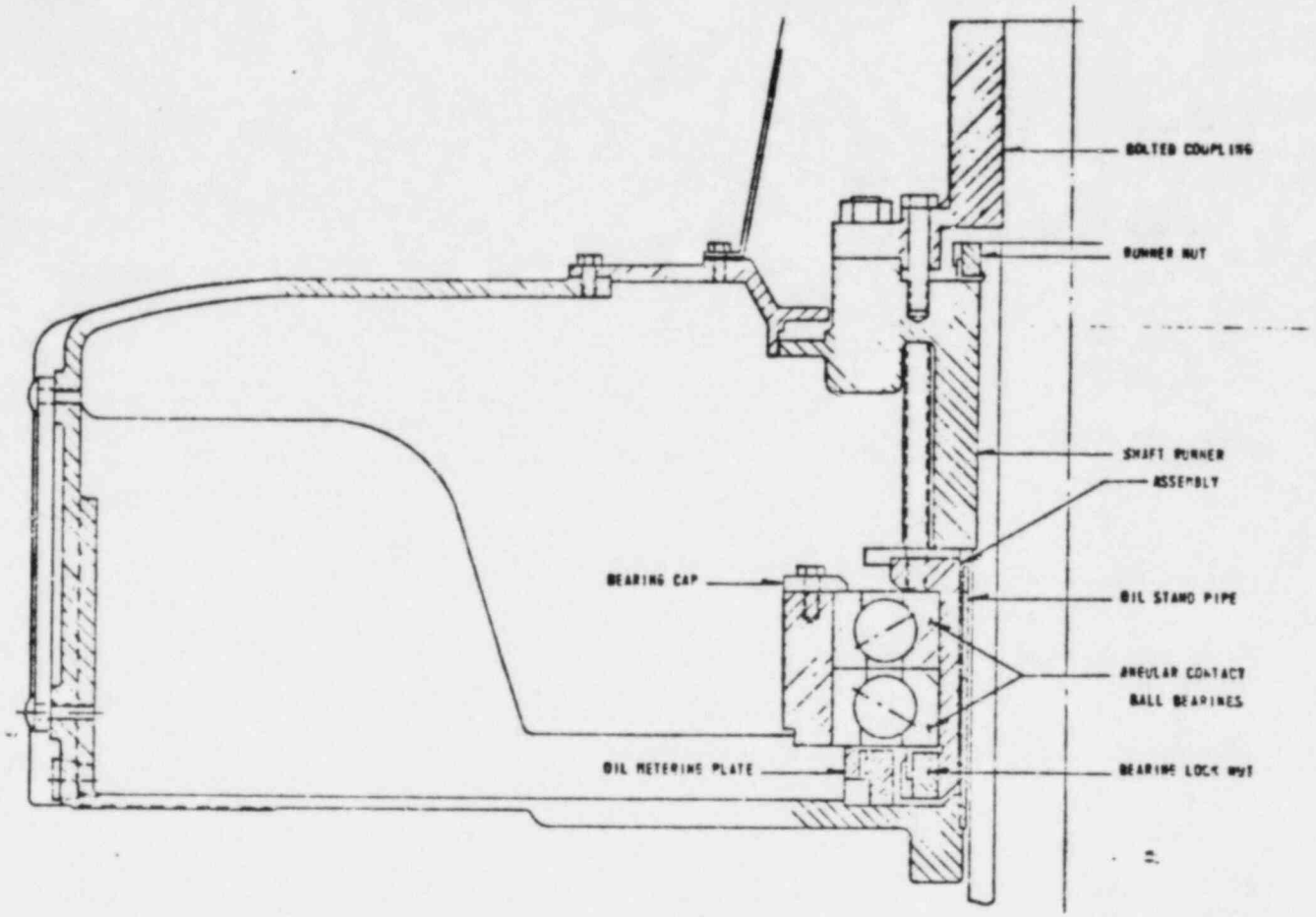


Fig. 4 *High thrust hollow shaft with angular contact ball bearings.*

Replacement Bearings

If for any reason it becomes necessary to replace motor bearings, it is important that the exact type be secured.

Antifriction type bearings are delivered by the bearing supplier with a clearance, usually greater than the bearing should have in service. When the inner ring of the bearing is mounted with a press fit, the ring expands elastically so that the bearing looseness is reduced. In service, the bearing clearance is also affected by the heat distribution. Accordingly, all antifriction bearings should be ordered through Westinghouse by Westinghouse style number and not by contacting the bearing supplier with his number directly. See Table II.

Antifrication bearing Westinghouse style numbers are specified on each applicable motor outline data drawing. By notifying the nearest Westinghouse Sales Office of the motor identity from the nameplate, the proper style replacement bearings can also be obtained.

Replacement of tilting pad type bearing segments or guide bearings is normally done by disassembly of the damaged bearing and rebabbitting of same in a local Westinghouse Apparatus Repair shop.

Table II

	Bearing Size	Type	(W) Style No.
Normal Thrust	219	Ball Bearing	385D260G20
	226	Ball Bearing	1603042
	230	Ball Bearing	385D260G27
	313	Ball Bearing	1449545
	315	Ball Bearing	1449546
	319R	Ball Bearing	1297175
	322	Ball Bearing	1297124
	322R	Ball Bearing	4109D50G14

Table II (Cont'd.)

	Bearing Size	Type	(W) Style No.
High Thrust	29326	Spherical Roller Bearing	388P535G01
	29334	Spherical Roller Bearing	858C134G05
	29426	Spherical Roller Bearing	1603038
	29430	Spherical Roller Bearing	1603039
	29438	Spherical Roller Bearing	1603040
	29452	Spherical Roller Bearing	858C134G14
	10.5"-6 pad	Tilting Pad Bearing	267C705 lt. 1
	13.5"-6 pad	Tilting Pad Bearing	268C841 lt. 1
	7222DB	Angular Contact Bearing	1603035
	7222DT	Angular Contact Bearing	374P622G01
	7230	Angular Contact Bearing	345P611G01
	7230DB	Angular Contact Bearing	1603036
	7230DT	Angular Contact Bearing	1603037
	7232DB	Angular Contact Bearing	385P537G01
	7232DT	Angular Contact Bearing	4109D42G39
	9222/7222	Angular Contact Bearing	374P675G01
	9230/7230	Angular Contact Bearing	386P464G01
	9232/7232	Angular Contact Bearing	857C027G12
Lower Guide Bearings	219	Ball Bearing	385D260G20
	226	Ball Bearing	1603042
	230	Ball Bearing	385D260G27

COMMON PROBLEMS AND REMEDIES

Oil Leakage

Check oil pot designated oil level, check gaskets and seals for excessive clearance. (See Maintenance, previously discussed.)

Hot Bearings

Check oil pot designated oil level. This level appears on oil gauge.

Make certain the correct oil viscosity also is being used. This appears also on the oil nameplate. Check oil temperature.

Misalignment of shaft, bearings, coupling or pump shaft. Check shaft runouts and possibility of bent shaft.

Make certain motor ventilation is not being restricted. If air filters have been provided, check that they are not clogged.

Vibration

Stator vibration, if prevalent, may be caused by loose foundation bolts, inadequately supported pump head or foundation, or possibly foundation resonance. A check should be made if these conditions exist.

Rotor vibration may be caused by misalignment of the shaft, bearings, coupling or pump shaft. Uneven air gap between the rotor and the stator may be the result of these factors of misalignment. Shaft runouts and bearing alignment should be checked. Open rotor bars may result in increased vibration (see below).

Noise

Unusual noise during operation. Certain motors built with ratchet plates experience sharp metallic sounds initially at starting until centrifugal force acting on the ratchet pins is great enough for the pins to clear the ratchet teeth. At normal motor operating speed, this noise is not present. Again when the motor is de-energized, the noise will reappear as the speed decreases.

Noises should be localized during operation of the motor, then at shutdown check that all mechanical clearances are maintained. Note whether noise is reduced when power is removed. If possible, turn the rotor over by hand to see that it turns freely. Carefully inspect the air gap and rotor for loose foreign objects. Ascertain that all electrical clearances are adequate.

Slowing Down Under Load and Reduced Starting Torque

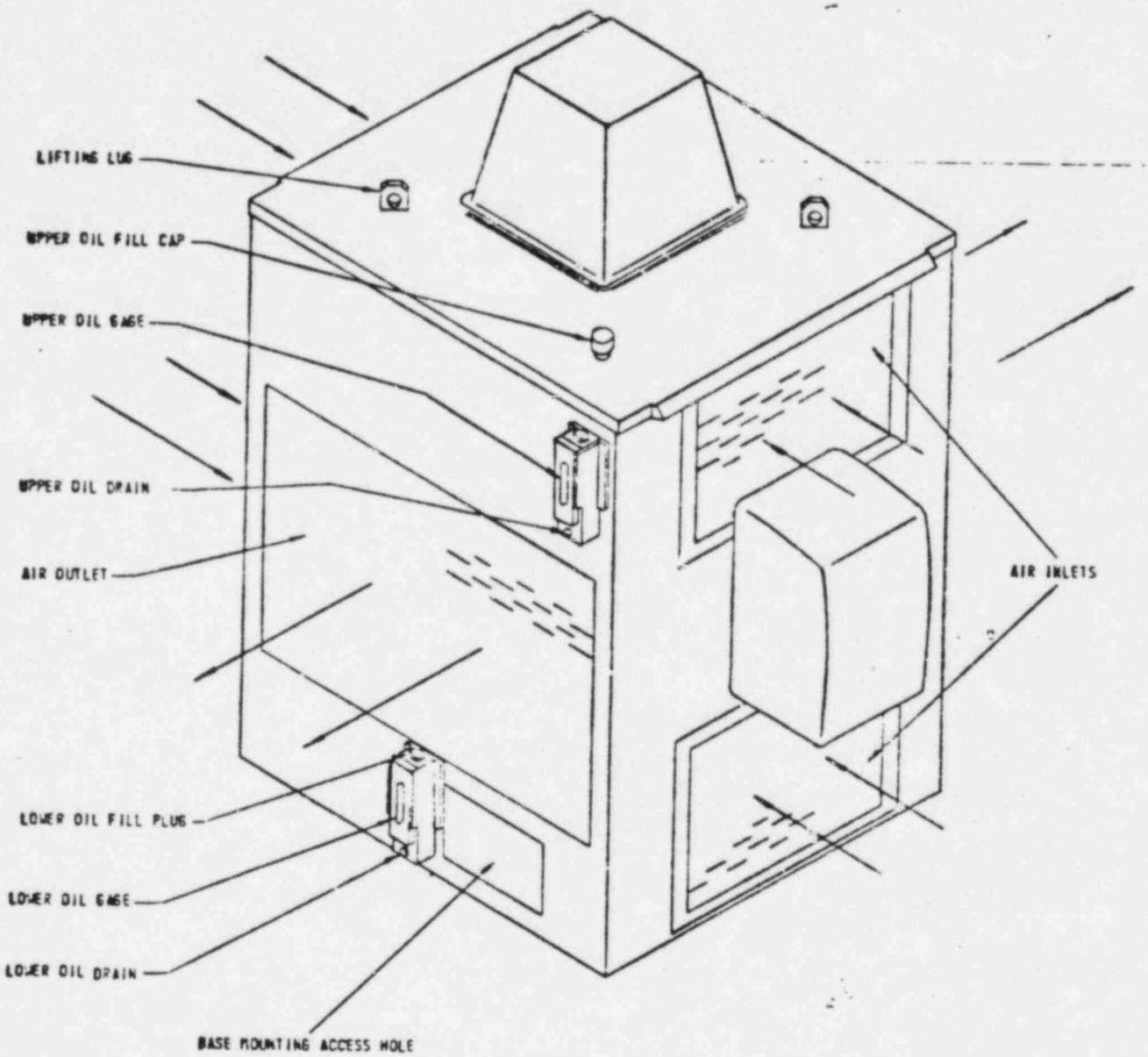
The symptoms are generally cause by open circuits or broken joints between the rotor end rings and the rotor bars. Cracks or breaks usually occur where the bars are connected to the end rings or at a point just outside the rotor laminations. If this condition is suspected, note any arcing during operation and evidence of heating at the end ring connections at shutdown after operation of the motor under load. Excessive heating is evident by discoloring of the rotor bars.

At shutdown, the rotor should be carefully examined for cracked or broken bars. Repair or replacement of the rotor winding is required if cracks or breaks are evident. Such repairs are normally performed at your local Westinghouse Apparatus Repair shop.

Weather Protected Type II Enclosure (Fig. 5)

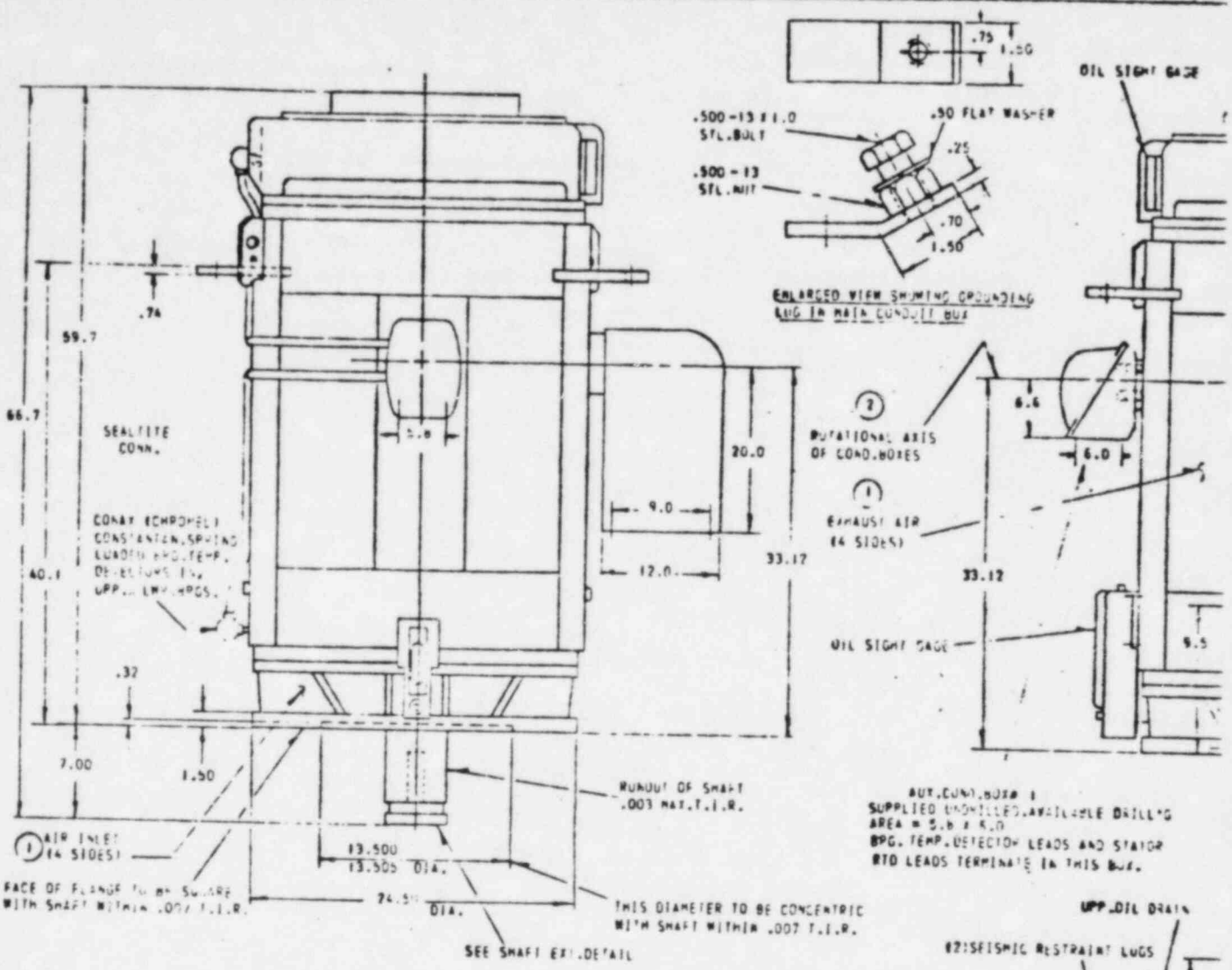
The WPII enclosure is an auxiliary enclosure around a WPI vertical motor with air inlets which are located on the side on which the conduit box is mounted and the opposite side, and air outlets on the other two sides.

Extending out of the top of the WPII enclosure are two lifting lugs which are to be used for lifting the motor.



NOTE: IF FILTERS ARE ORDERED, THEY WILL BE INSTALLED BEHIND AIR INLET SCREENS.

Fig. 5 *High thrust motor with Weather Protected Type II Enclosure.*



DRY. BRG.			OPP. BRG.		
+		-	+		-
D1	D2	D3			
D4	D5	D6			

VIEW SHOWING MARKING STRIPS IN AUX. CONDUIT BOX # 1

H1	H2

VIEW SHOWING MARKING STRIPS IN AUX. CONDUIT BOX # 2

ROTATION VOLTAGE SEQUENCE CONNECTIONS

VOLTAGE SEQUENCE T3 T2 T1
MECHANICAL ROTATION CLOCKWISE
FACING END OPPOSITE SHAFT EXTENSION

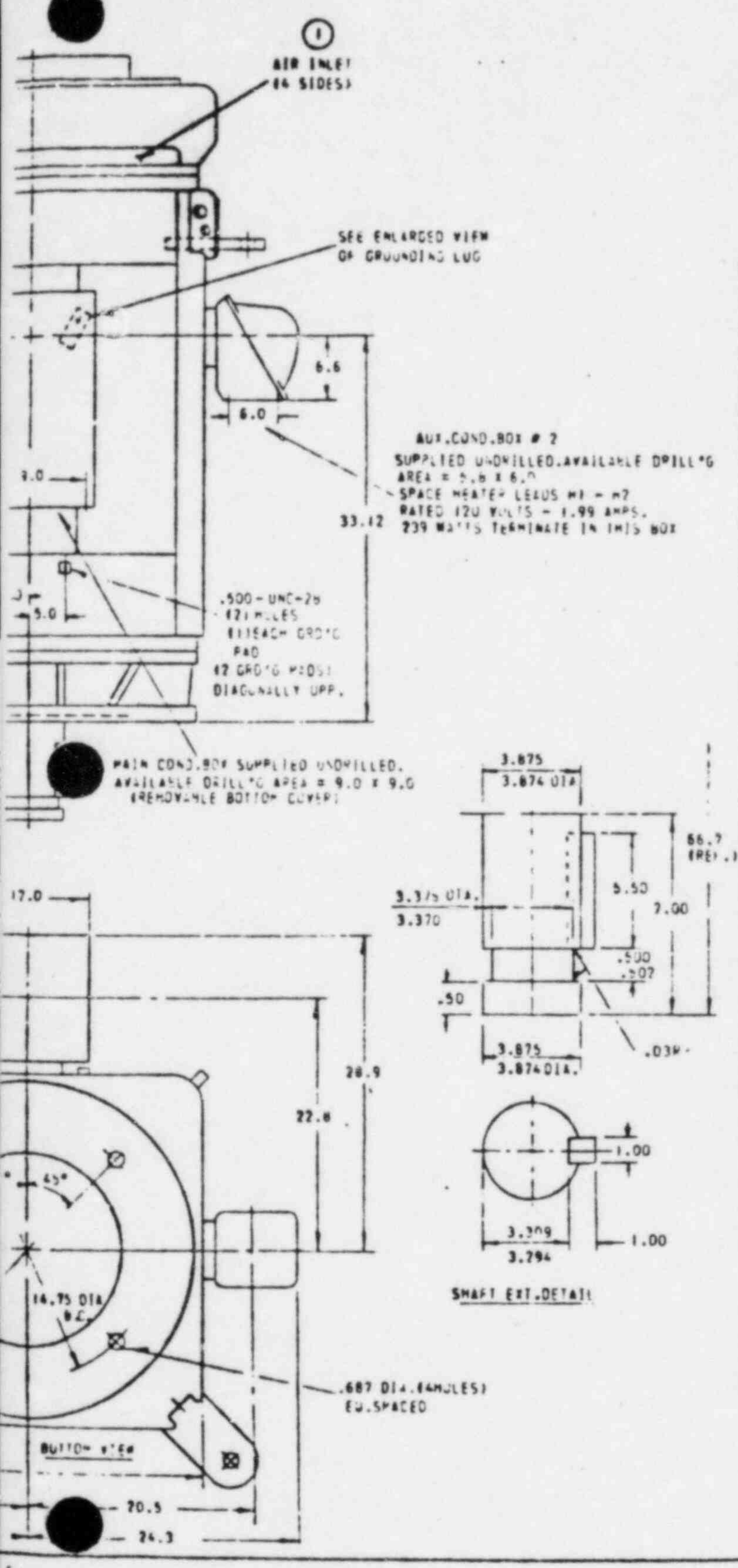
VOLTAGE SEQUENCE T1 T2 T3
MECHANICAL ROTATION COUNTER-CLOCKWISE
FACING END OPPOSITE SHAFT EXTENSION

CAUTION

WITH RATED VOLTAGE & FREQUENCY-WITHIN NEMA LIMITS AT MOTOR TERMINALS AND WITH CONNECTED LOAD INERTIA NOT EXCEEDING VALUE SHOWN BELOW THE FOLLOWING STARTING DUTY SHOULD NOT BE EXCEEDED.
LOAD INERTIA AT MOTOR SHAFT 75 LB.FT.²
MOTOR COLD 2 CONSECUTIVE STARTS
MOTOR AT OPERATING TEMP. 1 CONSECUTIVE STARTS
SUBSEQUENT STARTS WITH MOTOR RUNNING
BETWEEN STARTS 15 MINUTES APART
SUBSEQUENT STARTS WITH MOTOR STANDING
BETWEEN STARTS 45 MINUTES APART

BRG.TEMP.DETECTORS UPP.& LWR.

DWG 8926D83 SUB 13



NOTES:

1) AVOID LOCATING MOTOR SUCH THAT ADJACENT STRUCTURES IMPEDE FLOW OF VENTILATING AIR OR CAUSE RE-CIRCULATION OF EXHAUST AIR INTO INLET OPENINGS.

2) CONDUIT BOXES MAY BE ROTATED IN STEPS OF 90° ABOUT ROTATIONAL AXIS.

3) MOTOR ENDPLAY .010 MIN./ .015 MAX.

4) MOTOR DESIGNED FOR MOMENTARY UP-THRUST.

WESTINGHOUSE TYPE "LLD" MOTOR

MOTOR RATING & DESCRIPTION

1- FRAME NUMBER - 5808-P24
2) HORSEPOWER - 450
3) TIME RATING - CONTINUOUS
4) TEMPERATURE RISE - 80° BY RESISTANCE @ 1.0 SERVICE FACTOR.
5) SYNCHRONOUS SPEED - 1200 RPM
6) FULL LOAD SPEED - 1185 RPM
7) RATED VOLTAGE - 4000
8) FULL LOAD CURRENT - 58.1 AMPS.
9) RATED FREQUENCY - 60 HZ
10) NUMBER OF PHASES - 3
11) LOCKED KVA CODE - F
12) DESIGN LETTER - B
13) ROTOR TYPE - BRAZED SQUIRREL CAGE
14) ROTOR INERTIA - 271 LB.FT.^{2}
15) APPROXIMATE MOTOR WEIGHT - 4740 LBS.
16) INSULATION TYPE - THERMALASTIC EPOXY
17) INSULATION CLASS - B
18) ENCLOSURE TYPE - WPI
19) APPROXIMATE ROTOR WEIGHT - 1440 LBS.
20) APPROXIMATE STATOR WEIGHT - 2250 LBS.
21) APPROXIMATE WEIGHT OF BRACKETS - 1050 LBS.
22) ROTATION DIRECTION - CCW (MOTOR SUITABLE FOR EITHER DIRECTION)
23) AIR GAP (SINGLE) BETWEEN ROTOR & STATOR - .047 "
24) MOTOR LEAD SIZE - 49-.0231 CABLE - BUNDY TYPE YAXER - 95 HT LUGS SUPPLIED WITH MOTOR FOR INSTALLATION BY CUSTOMER.

CALCULATED MOTOR PERFORMANCE CHARACTERISTICS AT RATED VOLTAGE & FREQUENCY

1) % EFFICIENCY: 93.3 @ FULL LOAD, 93.5 @ .75 LOAD, 92.9 @ .50 LOAD
2 % POWER FACTOR: 85.3 @ FULL LOAD, 85.1 @ .75 LOAD, 83.1 @ .50 LOAD
3) LOCKED ROTOR CURRENT - 321 AMPS.
4) LOCKED ROTOR POWER FACTOR - 24.3 %
5) LOCKED ROTOR TORQUE - 87% OF FULL LOAD TORQUE
6) PULL UP TORQUE - 80% OF FULL LOAD TORQUE
7) BREAK DOWN TORQUE - 236% OF FULL LOAD TORQUE
8) MAXIMUM LOCKED ROTOR TIME: MOTOR HOT - 8.0 SECONDS
MOTOR @ 40°C - 17.0 SECONDS
9) LIMITING ROTOR TEMPERATURE - 200°C RISE
10) CRITICAL SPEED - 1800 RPM APPROX.
11) CALCULATED THRUST BRG.LOSSES - 2.1 KW WITH NO EXTERNAL THRUST

MOTOR BEARING & LUBRICATION DATA

1) UPPER BEARING - SPHERICAL ROLLER THRUST # 29334 - S# 658C134G06
2) LOWER BEARING - RADIAL BALL #226 - S# 1E02142
3) LUBRICANT TYPE - D & R INHIBITED TURBINE OIL, 1000 SSU VISCOSITY
4) B-10 BEARING LIFE - 80648 HOURS

ACCELERATION TIME FOR CUSTOMER - SPECIFIED MOTOR LOAD TORQUE

	SPECIFIED	CALCULATED
1) MINIMUM STARTING VOLTAGE	(80%) 3200 VOLTS	(80%) 3200 VOLTS
2) LOAD INERTIA REFERRED TO MOTOR SHAFT	75 LB.FT.^{2}	75 LB.FT.^{2}
3) LOAD TORQUE CURVE # REFERRED TO MOTOR SHAFT	32788 *	32789 *
4) ACCELERATION TIME	NOT SPECIFIED	1.6 SEC.
5) SPEED - TORQUE DATA		CURVE # 583463

* BINGHAM - WILLAMETTE

WESTINGHOUSE ELECTRIC CORPORATION

TITLE A.C.MOTOR FRAME # 5808-P24 - VSS - WPI
OUTLINE - BRG.TEMP.DETECTORS WITH SEAL-TITE CONNECTIONS
DIMENSIONS IN INCHES - SCALE (2) AUX.COND.BOXES
DR'N APPD
5447296
8926D83

LAC1-2 - Westinghouse Motor Identification

G.O. P0-57601-L7 I.B. S.O.

Customer Bingham-Willamette/Long Island Lighting

Motor S.O. 74F12087 74F12089

Application Service Water Pumps

A.C. Motor Squirrel Cage

Data:

Frame 5808P24 Type LLD NEMA Design B

Rating:

450	HP	4000	Volts	58.1	Amperes		
1200	RPM	3	Phase	60	Hertz		

Locked Code Letter E

Characteristics:

Enclosure WPI

Duty Continuous

Rotation CCW

Ambient Temperature 40°C

Temperature Rise 80°C by resistance

Service Factor 1.0

Class of Insulation B Thermalastic Epoxy

Drive coupled

Bearings Upper(thrust)-Spherical roller; Lower-ball

Lubrication O & R inhibited turbine oil 1000 SSU viscosity

Mounting vertical

Maintenance Instructions IL 3030-D1

Outline Drawing 8926085 Sub 3

In order to gain access to the flange mounting bolts, four covers must be removed from the enclosure. The two louver covers at the bottom of the enclosure on opposite sides of the motor must be removed as well as the two small solid covers at the bottom on the other two sides. Then the mounting bolts are accessible.

Access to the coupling (if hollow shaft) is obtained by removing the top cap from the top of the enclosure.

The top bearing oil reservoir is filled through the pipe extending from the top of the WPII enclosure. The oil gauge can be viewed through the window provided in the side of the enclosure. The bottom bearing reservoir is filled through top of the bottom oil gauge which extends from the side of the enclosure at the bottom.

If filters are ordered, they will be mounted inside of the air inlets. Filters should be cleaned periodically, as clogged filters restrict the amount of cooling air and cause the motor to overheat.

Enclosure 5

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1018357

PM INQUIRY

ECTION ME MAINTENANCE ENG ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

CTIVITY NO. 1R42>180BA-41 -0001 PROCEDURE NO. A/I A

QUIPMENT NAME 125 VOLT BATTERY LOCATION CR/025

CTIVITY DESCRIPTION WEEKLY BATTERY CHECK

ELATED ACTIVITIES

EF NCES GOULD TECH MANUAL R42:180

REQUENCY 001W LAST PERFORMED / / DUE 11/25/83 EXTENSION 11/25/83

ST. MAN HOURS 0000.0 SKILL CONDITION CODES 0, , , ,

WR REQD N RWP REQD N W.E. AUTH. REQD Y

PECIAL REQUIREMENTS

AST COMPLETION DATA ENTERED:

EADMAN TIME DATE / / TOTAL MANHOURS EXPENDED

OMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE

DVANCED TO/DEFERRED UNTIL / / COMMENTS

IT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1015091

PM INQUIRY

SECTION ME MAINTENANCE ENG ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. 1R42*180RA-A1 -0002 PROCEDURE NO. A/I N

EQUIPMENT NAME 125 VOLT BATTERY LOCATION CR/025

ACTIVITY DESCRIPTION QUARTERLY BATTERY CHECK

RELATED ACTIVITIES

REFERENCES GOULD TECH MANUAL R42 180

FREQUENCY 0003 LAST PERFORMED / / DUE 12/02/83 EXTENSION 12/23/83

EST. MAN HOURS 0000.0 SKILL CONDITION CODES 0, , , ,

NWR REQD Y RWP REQD Y W.E. AUTH. REQD Y

SPECIAL REQUIREMENTS

LAST COMPLETION DATA ENTERED:

LEADMAN TIME DATE / / TOTAL MANHOURS EXPENDED

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE

ADVANCED TO/DEFERRED UNTIL / / COMMENTS

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1019406

PM INQUIRY

SECTION ME MAINTENANCE ENG ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. 1R42*180PA-A1 -0003 PROCEDURE NO. A/I A

EQUIPMENT NAME 125 VOLT BATTERY LOCATION CR/025

ACTIVITY DESCRIPTION ANNUAL BATTERY CHECK

RELATED ACTIVITIES

REFERENCES GOULD TECH MANUAL R42:180

FREQUENCY 0012 LAST PERFORMED / / DUE 02/28/83 EXTENSION 05/27/83

EST. MAN HOURS 0000.0 SKILL CONDITION CODES 0, , , ,

MWR REQD N RWP REQD Y W.E. AUTH. REQD Y

SPECIAL REQUIREMENTS

LAST COMPLETION DATA ENTERED:

LEADMAN TIME DATE / / TOTAL MANHOURS EXPENDED .

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE

ADVANCED TO/DEFERRED UNTIL / / COMMENTS

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1020032

PM INQUIRY

ECTION ME MAINTENANCE ENG ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

CTIVITY NO. 1R42*180PA-A1 -0004 PROCEDURE NO. A/I A

QUIPMENT NAME 125 VOLT BATTERY LOCATION CR/025

CTIVITY DESCRIPTION RATED LOAD TEST

ELATED ACTIVITIES

EFE CES GOULD TECH MANUAL R42:180

REQUENCY 0018 LAST PERFORMED / / DUE 09/02/83 EXTENSION 01/06/84

ST. MAN HOURS 0000.0 SKILL CONDITION CODES 5,6, , ,

WR REQD N RWP REQD Y W.E. AUTH. REQD Y

PECIAL REQUIREMENTS

AST COMPLETION DATA ENTERED

EADMAN TIME 0000 DATE 09/13/82 TOTAL MANHOURS EXPENDED

OMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 4

DVANCED TO/DEFERRED UNTIL / / COMMENTS DUE DATE CHANGE

IT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1020259

PM INQUIRY

ECTION EM ELE MAINTENANCE ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

CTIVITY NO. 1R42*180BA-A1 -0005 PROCEDURE NO. A/I A

QUIPMENT NAME 125VDC BATTERY ROOM LOCATION TB-025-W

CTIVITY DESCRIPTION CHECK BATTERY ROOM CLEANLINESS AND CLEAN WHEN REQUIRED.

ELATED ACTIVITIES

EFE NCES

REQUENCY 0001 LAST PERFORMED 01/05/83 DUE 01/28/83 EXTENSION 02/04/83

ST. MAN HOURS 0000.8 SKILL "B" MECHANIC CONDITION CODES 0, , , ,

WR REQD N RWP REQD N W.E. AUTH. REQD N

PECIAL REQUIREMENTS

AST COMPLETION DATA ENTERED:

EADMAN TIME 0930 DATE 01/05/83 TOTAL MANHOURS EXPENDED 0000.5

OMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 0

DVANCED TO/DEFERRED UNTIL / / COMMENTS ROOM CLEANED

IT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1020528

PM INQUIRY

'ECTION EM ELE MAINTENANCE ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

CTIVITY NO. 1R42*180RA-A1 -9002 PROCEDURE NO. 34.315.01 A/I A

QUIPMENT NAME 125 VOLT BATTERY LOCATION CR-025

CTIVITY DESCRIPTION QUARTERLY STATION BATTERY CHECK

ELATED ACTIVITIES

EFE NCES SSP 34.315.01

REQUENCY 0003 LAST PERFORMED 12/08/82 DUE 03/01/83 EXTENSION 03/22/83

ST. MAN HOURS 0003.7 SKILL CONDITION CODES 0, , , ,

WR REQD Y RWF REQD Y W.E. AUTH. REQD N

PECIAL REQUIREMENTS PERFORM EQUALIZING CHARGE IF NECESSARY SP 23.315.02

AST COMPLETION DATA ENTERED:

EADMAN TIME 1600 DATE 12/08/82 TOTAL MANHOURS EXPENDED 0003.0

OMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 0

DVANCED TO/DEFERRED UNTIL / / COMMENTS

IT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH10 DATE 83026 TIME 1021170

PM INQUIRY

ECTION EM ELE MAINTENANCE ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

CTIVITY NO. 1R42*1R05A-A1 -9003 PROCEDURE NO. 34.315.03 A/I A

QUIPMENT NAME 125 VOLT BATTERY LOCATION CR-025

CTIVITY DESCRIPTION WEEKLY BATTERY CHECK

ELATED ACTIVITIES CHECK BATTERY ROOM CLEANLINESS AND CLEAN AS REQUIRED

EFE NCES

REQUENCY 001W LAST PERFORMED 01/13/83 DUE 01/18/83 EXTENSION 01/19/83

ST. MAN HOURS 0001.0 SKILL ELECTRICIAN CONDITION CODES 0, , , ,

WR REQD N RWP REQD N W.E. AUTH. REQD N

PECIAL REQUIREMENTS

AST COMPLETION DATA ENTERED:

EADMAN TIME 1430 DATE 01/13/83 TOTAL MANHOURS EXPENDED 0001.0

OMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 0

DVANCED TO/DEFERRED UNTIL / / COMMENTS

IT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

DRAFT

3/4.7 PLANT SYSTEMS

3/4.7.1 SERVICE WATER SYSTEMS

PLANT SERVICE WATER SYSTEM-OPERATING

LIMITING CONDITION FOR OPERATION

3.7.1.1 Two independent plant service water system loops shall be OPERABLE with each loop capable of taking suction from the ultimate heat sink and comprised of:

a. Two OPERABLE plant service water pumps, and

b. An OPERABLE Reactor Building service water (RBSW) flow path capable of transferring the water to the associated safety related equipment, and

c. An OPERABLE residual heat removal service water (RHRSW) flow path capable of transferring the water through the associated RHR heat exchanger.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

a. With one plant service water pump inoperable, restore the inoperable pump to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. With one plant service water pump in each loop inoperable, restore at least one inoperable pump to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

c. With one plant service water loop inoperable, restore the inoperable loop to OPERABLE status with at least one OPERABLE pump within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. With both plant service water loops inoperable, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN* within the following 24 hours.

e. In OPERATIONAL CONDITION 3 with the RHRSW loop, which is associated with an RHR loop required OPERABLE by Specification 3.4.9.1, inoperable, declare the associated RHR loop inoperable and take the ACTION required by Specification 3.4.9.1.

*Whenever both RHRSW flow paths are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

SURVEILLANCE REQUIREMENTS

4.7.1.1 The plant service water system shall be demonstrated OPERABLE:

a. By verifying the screenwell water level at the intake structure is greater than or equal to -5.9 feet MLW;

1. At least once per 14 days when the level is greater than -3.5 feet MLW.

2. At least once per 12 hours when the level is less than or equal to -3.5 feet MLW.

b. At least once per 31 days by verifying that each valve, manual, power operated or automatic, servicing safety related equipment that is not locked, sealed or otherwise secured in position, is in its correct position.

c. At least once per 18 months during shutdown, by verifying that:

1. Each automatic valve servicing non-safety related equipment actuates to its isolation position on an isolation test signal.

2. Each pump starts automatically on a simulated automatic initiation signal.

3. Each automatic valve servicing safety related equipment actuates to its correct position on a simulated automatic initiation test signal.

4. The hinged caps located on the service water standpipes from the equipment lift freely using a force no greater than required to overcome the weight of the caps:

a) Residual Heat Removal Heat Exchangers.
b) Reactor Building Closed Loop Cooling Water Heat Exchanger.
c) Diesel Engine Coolers.
d) Reactor Building Standby Ventilation System and Control Room Air Conditioning System.

DRAFT

PLANT SERVICE WATER SYSTEM - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.7.1.2 At least one of the following shall be OPERABLE:

a. Two independent plant service water system loops with each loop capable of taking suction from the ultimate heat sink and comprised of:

1. One OPERABLE plant service water pump, and

2. An OPERABLE Reactor Building service water (RBSW) flow path capable of transferring the water to the associated safety related equipment, and

3. An OPERABLE residual heat removal service water (RHRSW) flow path capable of transferring the water through the associated RHR heat exchanger.

b. At least one plant service water system loop capable of taking suction from the ultimate heat sink and comprised of:

1. Two OPERABLE plant service water pumps, and

2. An OPERABLE Reactor Building service water (RBSW) flow path capable of transferring the water to the associated safety related equipment, and

3. An OPERABLE residual heat removal service water (RHRSW) flow path capable of transferring the water through the associated RHR heat exchanger.

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5 and *.

ACTION:

a. With only one plant service water pump and its associated flowpaths OPERABLE, restore at least two pumps to OPERABLE status within 72 hours or:

1. In OPERATIONAL CONDITION 4 with the RHRSW loop(s), which is associated with an RHR loop required OPERABLE by Specification 3.4.9.2, inoperable, declare the associated RHR loop inoperable and take the ACTION required by Specification 3.4.9.2.

2. In OPERATIONAL CONDITION 4 or 5, declare the associated safety related equipment and the associated diesel generator(s) inoperable and take the ACTION required by Specifications 3.5.2 and 3.8.1.2.

*When handling irradiated fuel in the secondary containment.

PLANT SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

3. In OPERATIONAL CONDITION 5 with the RBSW loop(s), which is associated with an RHR loop required OPERABLE by Specification 3.9.11.1 or 3.9.11.2, inoperable, declare the associated RHR loop inoperable and take the ACTION required by Specification 3.9.11.1 or 3.9.11.2, as applicable.

4. In OPERATIONAL CONDITION*, declare the associated diesel generator(s) inoperable and take the ACTION required by Specification 3.8.1.2. The provisions of Specification 3.0.3 are not applicable.

b. With no plant service water pump or associated RBSW or RHRSW flow path OPERABLE, declare the associated safety related equipment inoperable and take the ACTION required by Specifications 3.4.9.2, 3.5.2, 3.8.1.2, 3.9.11.1 or 3.9.11.2, as applicable.

SURVEILLANCE REQUIREMENTS

4.7.1.2 At least the above required plant service water system shall be demonstrated OPERABLE for Surveillance Requirement 4.7.1.1.

Enclosure 7

L I L C O COPY FROM TERMINAL SH13 DATE 83032 TIME 1413225

PM INQUIRY

SECTION ME MAINTENANCE ENG ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. [illegible] -0001 PROCEDURE NO. 35.122.01 A/I A

EQUIPMENT NAME [illegible] LOCATION SW-021

ACTIVITY DESCRIPTION PUMP OVERHAUL

RELATED ACTIVITIES

REFERENCES BINGHAM MANUAL P41-110.01

FREQUENCY 0048 LAST PERFORMED / / DUE 04/01/86 EXTENSION 03/27/87

EST. MAN HOURS 0160.0 SKILL GENERAL, 3B MECH CONDITION CODES 6, , , ,

MU REQD Y RWP REQD N W.E. AUTH. REQD Y

SPECIAL REQUIREMENTS DISASSEMBLE PUMP, INSPECT INTERNALS, REPAIR OR REPLACE WOR
PARTS

LAST COMPLETION DATA ENTERED:

LEADMAN TIME DATE / / TOTAL MANHOURS EXPENDED

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE

ADVANCED TO/DEFERRED UNTIL / / COMMENTS

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH13 DATE 83032 TIME 1415583

PM INQUIRY

SECTION SO STARTUP OPS ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. 1P41*181MOT-003A -0002 PROCEDURE NO. A/I A

EQUIPMENT NAME SERVICE WATER PUMP MOTOR LOCATION SW-021

ACTIVITY DESCRIPTION FOLLOW LUBE CODE 4 CHECK LUBE LEVEL IF NEEDED ADD MOBIL DT

-BB TO PROPER LEVEL. BUMP MOTOR IF NOT OPERATING

RELATED ACTIVITIES PERFORM SAME ACTIVITY FOR 1P41*181MOT-271A

REFERENCES P41 101 DATED 10-14-81

FREQUENCY 0001 LAST PERFORMED 01/08/83 DUE 02/08/83 EXTENSION 02/15/83

EST. MAN HOURS 0000.2 SKILL CONDITION CODES 0, , , ,

MU REQD N RWP REQD N W.E. AUTH. REQD N

SPECIAL REQUIREMENTS

LAST COMPLETION DATA ENTERED:

LEADMAN TIME 1840 DATE 01/08/83 TOTAL MANHOURS EXPENDED 0000.2

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 0

ADVANCED TO/DEFERRED UNTIL / / COMMENTS

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH13 DATE 83032 TIME 1414472

PM INQUIRY

SECTION SM STARTUP MAINT ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. 1P41*101MOT-0003A -0003 PROCEDURE NO. A/I A

EQUIPMENT NAME SERVICE WATER PUMP MOTOR LOCATION SW-021

ACTIVITY DESCRIPTION FOLLOW LUBE CODE 9 CHANGE LUBE REFILL WITH MOBIL DTE-BB 6

TS 12 OZ IN UPPER 3 QTS 25 OZ IN LOWER BEARING.

RELATED ACTIVITIES PERFORM SAME ACTIVITY FOR 1P41*101MOT-271A

REFERENCES P41 IOI DATED 10/14/81

FREQUENCY 0006 LAST PERFORMED 04/15/82 DUE 01/12/83 EXTENSION 02/23/83

EST. MAN HOURS 0000.3 SKILL GENERAL CONDITION CODES 6, , , ,

MW EQD N RWP REQD N W.E. AUTH. REQD Y ACTIVITY ADVANCED/DEFERRED

SPECIAL REQUIREMENTS

LAST COMPLETION DATA ENTERED:

LEADMAN TIME 0000 DATE 11/16/82 TOTAL MANHOURS EXPENDED

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 1

ADVANCED TO/DEFERRED UNTIL 01/12/83 COMMENTS DEFERRED DUE TO PT

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH13 DATE 83032 TIME 1414000

PM INQUIRY

SECTION ME MAINTENANCE ENG ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. 1PA141P1MOT-0038 -0004 PROCEDURE NO. 35.054.01 A/I A

EQUIPMENT NAME SERVICE WATER PUMP MOTOR LOCATION SW-021

ACTIVITY DESCRIPTION MOTOR OVERHAUL

RELATED ACTIVITIES

REFERENCES PROCEDURE 35.054.01

FREQUENCY 0048 LAST PERFORMED / / DUE 04/01/83 EXTENSION 03/26/84

EST. MAN HOURS 0072.0 SKILL ELECTRICIAN,2B MECH CONDITION CODES 6, , , ,

MP REQD N RWP REQD N W.E. AUTH. REQD Y

SPECIAL REQUIREMENTS FOLLOW PROCEDURE 35.054.01

LAST COMPLETION DATA ENTERED:

LEADMAN TIME DATE / / TOTAL MANHOURS EXPENDED

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE

ADVANCED TO/DEFERRED UNTIL / / COMMENTS

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

L I L C O COPY FROM TERMINAL SH13 DATE 83032 TIME 1415166

PM INQUIRY

SECTION SM STARTUP MAINT ACTIVITY PREVENTIVE MAINTENANCE PRIORITY 1

ACTIVITY NO. 1P41*181MOT-003A -0005 PROCEDURE NO. 32.009.01 A/I A

EQUIPMENT NAME SERVICE WATER PUMP MOTOR LOCATION SW-021

ACTIVITY DESCRIPTION MEGGER MOTOR 450 HP/4000 VOLTS SWG 101-3

RELATED ACTIVITIES PERFORM SAME ACTIVITY FOR 1P41*181MOT-271A

REFERENCES P41 IOI DATED 10-14-81

FREQUENCY 0012 LAST PERFORMED / / DUE 10/14/83 EXTENSION 01/12/84

EST. MAN HOURS 0000.0 SKILL CONDITION CODES 6, , , ,

MWR REQD N RWP REQD N W.E. AUTH. REQD Y ACTIVITY ADVANCED/DEFERRED

SPECIAL REQUIREMENTS

LAST COMPLETION DATA ENTERED:

LEADMAN TIME 0000 DATE 11/12/82 TOTAL MANHOURS EXPENDED

COMPLETED NORMAL-0 DEFERRED-1 INCOMPLETE-2 ADVANCED-3 OTHER-4 CODE 1

ADVANCED TO/DEFERRED UNTIL 10/14/83 COMMENTS CANNOT BE DONE AT THIS TIME DU TO TESTING

HIT ENTER TO CONTINUE INQUIRY MODE OR TYPE END AND HIT ENTER TO CANCEL.

		PERFORMANCE OF EITHER ACTIVITY 4.8.1.1.2.C-000A, 000B OR 000C							
4.8.1.2	-000E	ELECTRICAL POWER SYSTEMS/AC SOURCES-SHUTDOWN PERFORMANCE OF EITHER ACTIVITY 4.8.1.2.C-000A, 000B OR 000C (EMERG DIESEL GEN FUEL STORAGE TANK SAMPLE TEST)	RC	4,5, , ,	4,5, , ,	Q	74.017.01	.0	I
4.8.1.2	-000F	ELECTRICAL POWER SYSTEMS/AC SOURCES-SHUTDOWN VERIFY ALL 4.8.1.1.2 SERIES ACTIVITIES ARE CURRENT FOR ONE OF THE EMERGENCY DIESELS AND 4.8.1.1.1 SERIES ARE FOR THE SAME DIESEL	OP	4,5, , ,	4,5, , ,	R		.0	I
4.8.2.1.A.1	-000A	ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING WEEKLY 125 VOLT BATTERY CHECKS PER TABLE 4.8.2.1-1 (CAT A LIMITS) (BATTERY A1)	MT	1,2,3,4,5	1,2,3, ,	M	34.315.01	.0	

Batteries

ACTIVITY NUMBER	SURVEILLANCE REQUIRED	SECT	PERFORMED IN CONDITIONS	REQUIRED IN CONDITIONS	FREQ	PROCEDURE NUMBER	EST. MAN HOURS	
4.8.2.1.A.1	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING WEEKLY 125 VOLT BATTERY CHECKS PER TABLE 4. 8.2.1-1(CAT A LIMITS) (BATTERY B1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.01	.0	
4.8.2.1.A.1	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING WEEKLY 125 VOLT BATTERY CHECKS PER TABEL 4. 8.2.1-1 (CAT A LIMITS) (BATTERY C1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.01	.0	
4.8.2.1.A.2	-000A ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING WEEKLY 125 VOLT BATTERY CHECKS FOR TOTAL BA TTERY TERMINAL VOLTAGE ON FLOAT CHARGE (BAT TERY A1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.03	.0	
4.8.2.1.A.2	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING WEEKLY 125 VOLT BATTERY CHECKS FOR TATAL BA TTERY TERMINAL VOLTAGE ON FLOAT CHARGE (BAT TERY B1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.01	.0	
4.8.2.1.A.2	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING WEEKLY 125 VOLT BATTERY CHECKS FOR TATAL BA TTERY TERMINAL VOLTAGE ON FLOAT CHARGE (BAT TERY C1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.03	.0	
4.8.2.1.B	-000A ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING QUARTERLY 125 VOLT BATTERY CHECKS PER TABLE 4.8.2.1-1 (CAT B LIMITS) AND FOR CORROSION AND FOR ELECTROLYTE TEMP (BATTERY A1)	MT	1,2,3,4,5	1,2,3, ,	Q	34.315.01	.0	I
4.8.2.1.B	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING QUARTERLY 125 VOLT BATTERY CHECKS PER TABLE 4.8.2.1-1 (CAT B LIMITS) AND FOR CORROSION AND FOR ELECTROLYTE TEMP (BATTERY B1)	MT	1,2,3,4,5	1,2,3, ,	Q	34.315.01	.0	I
4.8.2.1.B	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING QUARTERLY 125 VOLT BATTERY CHECKS PER TABLE 4.8.2.1-1 (CAT B LIMITS) AND FOR CORROSION AND FOR ELECTROLYTE TEMP (BATTERY C1)	MT	1,2,3,4,5	1,2,3, ,	Q	34.315.01	.0	I
4.8.2.1.C	-000A ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING VISUAL INSPECTION OF 125 VOLT BATTERY AND B ATTERY CHARGER OPERABILITY TEST (BATTERY A1)	MT	1,2,3,4,5	1,2,3, ,	R	34.315.01	.0	I
4.8.2.1.C	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING VISUAL INSPECTION OF 125 VOLT BATTERY AND B ATTERY CHARGER OPERABILITY TEST (BATTERY B1)	MT	1,2,3,4,5	1,2,3, ,	R	34.315.02	.0	I
4.8.2.1.C	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING	MT	1,2,3,4,5	1,2,3, ,	R	34.315.02	.0	I

		VISUAL INSPECTION OF 125 VOLT BATTE B ATTERY CHARGER OPERABILITY TEST (BATTERY C1)							
4.8.2.1.D	-000A	ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING 125 VOLT BATTERY SERVICE VERIFICATION TEST (BATTERY A1)	MT	4,5, , ,	1,2,3, ,	R	34.315.02	.0	I
4.8.2.1.D	-000B	ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING 125 VOLT BATTERY SERVICE VERIFICATION TEST (BATTERY B1)	MT	4,5, , ,	1,2,3, ,	R	34.315.02	.0	I
4.8.2.1.D	-000C	ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING 125 VOLT BATTERY SERVICE VERIFICATION TEST (BATTERY C1)	MT	4,5, , ,	1,2,3, ,	R	34.315.02	.0	I

ACTIVITY NUMBER	SURVEILLANCE REQUIRED	SECT	PERFORMED IN CONDITIONS	REQUIRED IN CONDITIONS	FREQ	PROCEDURE NUMBER	EST. MAN HOURS	
4.8.2.1.E	-000A ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING 125 VOLT BATTERY CAPACITY VERIFICATION TEST (BATTERY A1)	MT	4,5, , ,	1,2,3, ,	5Y	34.315.02	.0	I
4.8.2.1.E	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING 125 VOLT BATTERY CAPACITY VERIFICATION TEST (BATTERY B1)	MT	4,5, , ,	1,2,3, ,	5Y	34.315.02	.0	I
4.8.2.1.E	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING 125 VOLT BATTERY CAPACITY VERIFICATION TEST (BATTERY C1)	MT	4,5, , ,	1,2,3, ,	5Y	34.315.02	.0	I
4.8.2.1.F	-000A ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING ANNUAL PERFORMANCE DISCHARGE TEST OF BATTER Y CAPACITY (BATTERY A1)	MT	4,5, , ,	1,2,3, ,	W	34.315.02	.0	I
4.8.2.1.F	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING ANNUAL PERFORMANCE DISCHARGE TEST OF BATTER Y CAPACITY (BATTERY B1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.02	.0	I
4.8.2.1.F	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-OPERATING ANNUAL PERFORMANCE DISCHARGE TEST OF BATTER Y CAPACITY (BATTERY C1)	MT	1,2,3,4,5	1,2,3, ,	W	34.315.02	.0	I
4.8.2.2	-000A ELECTRICAL POWER SYSTEMS/DC SOURCES-SHUTDOWN PERFORMANCE OF AT ELAST TWO OF ACTIVITIES 4 .8.2.1.A.1-000A 000B AND/OR 000C (WEEKLY 12 5 VOLT BATTERY CHECKS-CAT A LIMITS)	ME	4,5, , ,	4,5, , ,	W	34.315.03	.0	
4.8.2.2	-000B ELECTRICAL POWER SYSTEMS/DC SOURCES-SHUTDOWN PERFORMANCE OF AT LEAST TWO OF ACTIVITIES 4 .8.2.1.A.2-000A 000B AND/OR 000C(WEEKLY 125 VOLT BATTERY CHECK-TOTAL TERMINAL VOLTAGE)	ME	4,5, , ,	4,5, , ,	W	34.315.03	.0	
4.8.2.2	-000C ELECTRICAL POWER SYSTEMS/DC SOURCES-SHUTDOWN PERFORMANCE OF AT LEAST TOW OF ACTIVITIES 4 .8.2.1.B-000A, 000B, AND/OR 000C (QUARTERLY 125 VOLT BATTERY CHECKS-CAT B LIMITS)	ME	4,5, , ,	4,5, , ,	Q	34.315.01	.0	I
4.8.2.2	-000D ELECTRICAL POWER SYSTEMS/DC SOURCES-SHUTDOWN PERFORMANCE OF AT LEAST TWO OF ACTIVITIES 4 .8.2.1.C/D/E-000A, 000B, AND/OR 000C (125 V OLT BATTERY INSPECTN/SEVICE-CAPACITY TESTS)	ME	4,5, , ,	4,5, , ,	R	34.315.02	.0	I
4.8.2.2	-000E ELECTRICAL POWER SYSTEMS/DC SOURCES-SHUTDOWN	ME	4,5, , ,	4,5, , ,	SA	34.315.02	.0	I

PERFORMANCE OF AT LEAST TWO OF ACTIVITI
.0.2.1.F-000A, 000B, AND/OR 000C (125 VOLT
BATTERY ANNUAL DISCHARGE TEST)

4.8.3.1	-000A	ELEC PWR SYSTEMS/ONSITE DISTRIB-OPERATING DIVISION 1 AC DISTRIBUTION BREAKER ALIGNMEN T CHECK AND VOLTAGE ON BUSES/MCC'S/PANNELS VERIFICATION	OP	1,2,3,4,5	1,2,3, ,	W	22.008.01	.0
4.8.3.1	-000B	ELEC PWR SYSTEMS/ONSITE DISTRIB-OPERATING DIVISION 2 AC DISTRIBUTION BREAKER ALIGNMEN T CHECK AND VOLTAGE ON BUSES/MCC'S/PANNELS VERIFICATION	OP	1,2,3,4,5	1,2,3, ,	W	22.008.01	.0
4.8.3.1	-000C	ELEC PWR SYSTEMS/ONSITE DISTRIB-OPERATING DIVISION 3 AC DISTRIBUTION BREAKER ALIGNMEN T CHECK AND VOLTAGE ON BUSES/MCC'S/PANNELS VERIFICATION	OP	1,2,3,4,5	1,2,3, ,	W	22.008.01	.0

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ACTIVITY NUMBER		SURVEILLANCE REQUIRED	SECT	PERFORMED IN CONDITIONS	REQUIRED IN CONDITIONS	FREQ	PROCEDURE NUMBER	EST. MAN HOURS	
4.6.6.1.A	-000A	HYDROGEN RECOMBINER SYSTEM (LOOP A) VERIFY MINIMUM OUTLET GAS TEMPERATURE INCRE ASE WITHIN LIMITS DURING A RECOMBINER F UNCTIONAL TEST	OP	1,2,3,4,5	1,2, , ,	SA		.0	I
4.6.6.1.A	-000B	HYDROGEN RECOMBINER SYSTEM (LOOP B) VERIFY MINIMUM OUTLET GAS TEMPERATURE INCR EASE WITHIN LIMITS DURING A RECOMBINER F UNCTIONAL TEST	OP	1,2,3,4,5	1,2, , ,	SA		.0	I
4.6.6.1.B.1	-	HYDROGEN RECOMBINER SYSTEMS CHANNEL CALIBRATION OF ALL CONTROL ROOM REC OMBINER INSTRUMENTATION AND CONTROL CIRCUITS	IC	1,2,3,4,5	1,2, , ,	R		.0	I
4.6.6.1.B.2	-000A	HYDROGEN RECOMBINER SYSTEM (LOOP A) VERIFY INTEGRITY OF ALL HEATER ELECTRICAL C IRCUITS BY PERFORMING A RESISTANCE TO G ROUND CHECK WITHIN 30 MINS OF FUN'L TEST	OP	1,2,3,4,5	1,2, , ,	R		.0	I
4.6.6.1.B.2	-000B	HYDROGEN RECOMBINER SYSTEM (LOOP B) VERIFY INTEGRITY OF ALL HEATER ELECTRICAL C IRCUITS BY PERFORMING A RESISTANCE TO G ROUND CHECK WITHIN 30 MINS OF FUN'L TEST	OP	1,2,3,4,5	1,2, , ,	R		.0	I
4.6.6.1.B.3	-000A	HYDROGEN RECOMBINER SYSTEM (LOOP A) VISUAL EXAMINATION OF RECOMBINER ENCLOSURE FOR ABNORMAL CONDITIONS	OP	1,2,3,4,5	1,2, , ,	R		.0	I
4.6.6.1.B.3	-000B	HYDROGEN RECOMBINER SYSTEM (LOOP B) VISUAL EXAMINATION OF RECOMBINER ENCLOSURE FOR ABNORMAL CONDITIONS	OP	1,2,3,4,5	1,2, , ,	R		.0	I
4.6.6.1.C	-	HYDROGEN RECOMBINER SYSTEMS LEAK RATE TEST OF PORTIONS OF SYSTEM OUTSID E PRIMARY CONTAINMENT IF NOT PART OF T YPE A TEST BOUNDRY	TS	1,2,3,4,5	1,2, , ,	FM		.0	I
4.6.6.2	-	DRYWELL AND SUPP CHAMBER OXYGEN CONCENTRATION VERIFY OXYGEN CONCENTRATION WITHIN LIMITS W ITHIN 24 HOURS OF THERMAL POWER GREATER THA N 15 PER CENT AND WEEKLY THEREAFTER	OP	1, , , ,	1, , , ,	W	22.008.01	.0	
4.7.1.1.A.1	-	PLANT SYSTEMS/RBSW VERIFY SCREENWELL WATER LEVEL AT INTAKE STR UCTURE GREATER THAN MINIMUM REQUIRED	OP	1,2,3,4,5	1,2,3,4,5	S	22.008.01	.0	
4.7.1.1.A.2	-	PLANT SYSTEMS/RBSW	OP	1,2,3,4,5	1,2,3,4,5	S		.0	

		VERIFY SCREENWELL WATER LEVEL AT INTAKE UCTURE GREATER THAN MINIMUM REQUIRED							
4.7.1.1.B	-000A	PLANT SYSTEMS/RBSW (LOOP A) VALVE LINEUP VERIFICATION (LOOP A)	OP	1,2,3,4,5	1,2,3,4,5	M	24.122.03	.0	I
4.7.1.1.B	-000B	PLANT SYSTEMS/RBSW (LOOPB) VALVE LINEUP VERIFICATION (LOOP B)	OP	1,2,3,4,5	1,2,3,4,5	M	24.122.03	.0	I
4.7.1.1.C.1	-000A	PLANTSYSTEMS/RBSW (LOOP A) AUTOMATIC VALVE ISOLATION OPERABILITY TEST (LOOP A)	OR	3,4,5, ,	1,2,3,4,5	R	24.122.04	.0	I

ACTIVITY NUMBER	SURVEILLANCE REQUIRED	SECT	PERFORMED IN CONDITIONS	REQUIRED IN CONDITIONS	FREQ	PROCEDURE NUMBER	EST. MAN HOURS	
4.7.1.1.C.1	-000B PLANT SYSTEMS/RBSW (LOOP B) AUTOMATIC VALVE ISOLATION OPERABILITY TEST (LOOP B)	OR	3,4,5, ,	1,2,3,4,5	R	24.122.04	.0	I
4.7.1.1.C.2	-000A PLANT SYSTEMS/RBSW (PUMP A) AUTOMATIC PUMP START OPERABILITY TEST (PUMP A)	OR	3,4,5, ,	1,2,3,4,5	R	24.307.02	.0	I
4.7.1.1.C.2	-000B PLANT SYSTEMS/RBSW (PUMP B) AUTOMATIC PUMP START OPERABILITY TEST (PUMP B)	OR	3,4,5, ,	1,2,3,4,5	R	24.307.02	.0	I
4.7.1.1.C.2	-000C PLANT SYSTEMS/RBSW (PUMP C) AUTOMATIC PUMP START OPERABILITY TEST (PUMP C)	OR	3,4,5, ,	1,2,3,4,5	R	24.307.02	.0	I
4.7.1.1.C.2	-000D PLANT SYSTEMS/RBSW (PUMP D) AUTOMATIC PUMP START OPERABILITY TEST (PUMP D)	OR	3,4,5, ,	1,2,3,4,5	R	24.307.02	.0	I
4.7.1.1.C.3	-000A PLANT SYSTEMS/RBSW (LOOP A) AUTOMATIC VALVE ACCIDENT SIGNAL ACTUATION O PERABILITY TEST (LOOP A)	OR	3,4,5, ,	1,2,3,4,5	R	24.122.04	.0	I
4.7.1.1.C.3	-000B PLANT SYSTEMS/RBSW (LOOP B) AUTOMATIC VALVE ACCIDENT SIGNAL ACTUATION O PERABILITY TEST (LOOP B)	OR	3,4,5, ,	1,2,3,4,5	R	24.122.04	.0	I
4.7.1.1.C.4	- PLANT SYSTEMS/RBSW STANDPIPE HINGED CAP OPERABILITY TEST	OP	3,4,5, ,	1,2,3, ,	R		.0	I
4.7.1.2	- PLANT SYSTEMS/RBSW VERIFY REQUIRED SURVEILLANCE ACTIVITIES OF SPEC 4.7.1.1 ARE PERFORMED TO MEET LCO 3. 7.1.2	TS	4,5, , ,	4,5, , ,	M		.0	I
4.7.1.3.A	-0A/B PLANT SYSTEMS/RBCLCW (LOOPS A AND B) VALVE LINE-UP VERIFICATION (LOOPS A AND B)	OP	1,2,3,4,5	1,2,3, ,	M	24.118.03	.0	
4.7.1.3.A.1	- PLANT SYSTEMS/ULTIMATE HEAT SINK	TS	1,2,3,4,5	1,2,3,4,	A		.0	I

8.8.1.2 In cases where a failed component prevents completion of a portion of a surveillance test, the results shall be considered unacceptable. In these cases, applicable portions of the surveillance test, as determined by the cognizant Section Head, shall be performed following repair of the equipment to comply with the surveillance requirement.

8.8.2 The cognizant Section Head shall document on the Scheduled Activity Work Sheet (SAWS) whether or not the test results are acceptable by checking the appropriate box and/or signing and dating his review prior to forwarding the Copy 2 of the SAWS to the Lead Technical Engineer-Compliance.

8.8.3 The cognizant Section Head shall attach Copy 1 of the SAWS to the completed test procedure and forward these to the Plant Administrative Coordinator for filing in accordance with Section 10.1.

8.9 Surveillance Test Procedure Changes

8.9.1 Surveillance test procedures shall be revised as necessary in accordance with Reference 11.7.

8.10 Changing Information on Existing Surveillance SAWS

8.10.1 Any of the fields on a SAWS (except the Activity Number) may be changed for all future issues of that SAWS.

8.10.1.1 Obtain a duplicate copy of the SAWS to be revised. Change and cirle the information to be revised.

8.10.1.2 Forward revised SAWS to the appropriate Section Head, who will review, sign and Forward the revised SAWS to the Lead Technical Engineer-Compliance.

8.10.1.3 A SAWS may be similiarly revised, during its completion cycle by changing and circuling the information to be revised.

8.11 Initiating a New Surveillance SAWS

NOTE: The following steps follow the sequence of entries on the SAWS, Appendix 12.2.

8.11.1 A new surveillance requirement shall be initiated by filling in a blank SAWS in the following manner and submitting it to the Lead Technical Engineer for inclusion in the surveillance program:

8.11.1.1 Section:

Blank invalid, must be a two character section code. The following codes are valid:

CL - Clerical
EM - Electrical Maintenance
FP - Fire Protection
HP - Health Physics
IC - Instrument and Controls
ME - Maintenance Engineering
MR - Meter and Test
MT - Maintenance
OP - Operations
OR - Operations Engineering
QA - Quality Assurance
RC - Radio Chemistry
RE - Reactor Engineering
RY - Relay
SG - Security
SI - Startup Instrumentation
SM - Startup Maintenance
SO - Startup Operations
SR - Stores
TS - Technical Support

8.11.1.2 Activity Number:

Blank invalid. Activity number is entered in the following format:

(Tech Spec Surveillance Requirement #) - (Sequence #)

The Environmental Surveillance requirements (i.e., those contained within Appendix B to the Shoreham Operating License) activity numbers shall be prefaced by an E (i.e., E2.3.A).

The sequence number shall be used to distinguish between different activities associated with the same Surveillance Requirement.

8.11.1.3 Procedure Number:

SNPS Procedure number. Blank is valid or any 9 character format is valid.

NOTE: Each Surveillance Requirement/Activity should have a SNPS Procedure associated with it. Blank for this field should only be used when a SNPS Procedure number has not

as yet been identified and initial data input into the Surveillance Program is desired. Also note that the Surveillance Program uses the middle three numbers in the SNPS number to identify systems for sorts, for special reports, and/or listings.

8.11.1.4 A/I (Active - Inactive):

Blank defaults to A. A or I valid.

A - Active (normally scheduled surveillance activity)

I - Inactive (all information remains on Master File, but schedule reports are not produced)

8.11.1.5 Equipment Name:

Blank is valid. Component identification up to 45 characters is valid.

NOTE: For initial data entry into the Surveillance Program the format used for this field is as follows:

(Tech Spec Section Name)/
(Tech Spec LCO Name)

EXAMPLE:

Instrumentation/Reactor Protection System

8.11.1.6 Location:

Blank valid. Suggested format xx-xxx-xx
(Area - Elevation - Direction)
Valid abbreviations are as follows:

AB - Auxiliary Boiler Building
CH - Chlorine House
CR - Control Room Building
CW - Circulating Water Auxiliary Building
DG - Diesel Generator Building
FP - Fire Pump House
FO - Diesel Fuel Oil Transfer Building
HB - Heater Bay
MG - Motor Generator Building
MT - Meteorological Tower
OA - Office Building Annex
OS - Office and Service Building
PS - Post Accident Sample Facility
RB - Reactor Building

RW - Radwaste Building
SB - Security Building
SW - Screenwell Building
TB - Turbine Building
WH - Warehouse Building
YD - Yard

8.11.1.7 Activity Description:

Blank is valid. This field is used to describe the activity to be performed. Any 130 character field is valid.

8.11.1.8 Related Activities:

Blank is valid. This field is used to identify any surveillance activities which should be performed in conjunction with the subject activity. Any 130 character field is valid.

8.11.1.9 References

Blank is valid. This field is used to identify related Tech Spec LCO's and/or instruction manuals, drawings, catalogs, etc., that may be used or referred to in the performance of the subject activity. The first reference listed is always the LCO associated with the subject Tech Spec Surveillance Requirement. Any 68 character field is valid.

8.11.1.10 Frequency:

Blank is valid. Only frequency code from the table contained in Appendix 12.3 is valid. The frequencies are subdivided into two catagories. The first of these is for scheduled activities for which SAWS will be generated and the activitiy will be reported in the Section and Lead Technical Engineer-Compliance Surveillance Schedule Reports. The second of these is for non-scheduled activities for which neither will a SAWS be generated nor will the activity be reported on the Schedule Reports.

NOTE: SAWS may be obtained for any non-scheduled activity via the SAWS Print Program and if completion information is provided the surveillance history master files will be updated and maintained for that activity.

8.11.1.11 Last Performed:

No entry valid on a surveillance activity initial entry into the surveillance program. This date will normally be automatically be entered by the computer when completion information is entered. (With completion Codes Ø or 2, the Leadman Date will become the last performed date. Also, it is the last performed dates which are used to calculate extension dates).

8.11.1.12 Due:

Blank is valid with A/I=I or for a non-scheduled activity. Blank is invalid with A/I=A and for a scheduled activity. This date is required for initial scheduling of the activity. After normal completion of the activity this date will automatically be calculated and updated as follows:

1. For monthly and quarterly frequencies, an integral number of seven day periods will be added to the previous due date such that the due date calculated will fall on the same day of the week in the next month for monthly frequencies, and on the same day of the week and on the same week of the month for the next quarter.

2. For all other scheduled frequencies, one frequency interval will be added to the previous due date.

3. If the above calculated due date turns out to be later than or equal to the calculated extension date then the due date will be set equal to the extension date and this fact will be flagged on the scheduled reports.

8.11.1.13 Extention:

No entry only valid. After normal completion of scheduled activities this date will automatically be calculated and updated using last performed dates to ensure the following rules are adhered to:

1. A maximum allowed extention shall not exceed 25% of the surveillance interval, but

2. The combined time interval for any 3 consecutive surveillance intervals shall not exceed 3.25 times the specified surveillance interval.

8.11.1.14 Estimated Man Hours:

Computer based estimate (calculated using Total Manhours Expended Completion information) on average time required for activity performance. Blank is valid. If known enter in 5 digit (9999.9) format.

8.11.1.15 Skill:

Blank or any 20 character field is valid.

8.11.1.16 Required in conditions:

Used to identify those operational conditions for which the subject activity is required (i.e. the equipment tested by the subject surveillance requirement is required to be operable which is in part demonstrated operable by satisfactory completion of the surveillance activity). Up to 5 codes may be entered. (Format x,x,x,x,x,). Following codes are valid:

Ø - At all times
1 - Power Operation
2 - Startup
3 - Hot Shutdown
4 - Cold Shutdown
5 - Refueling

8.11.1.17 MWR (Maintenance Work Request) Required

Blank defaults to Y.
N or Y valid (N - NO, Y - YES).

8.11.1.18 RWP (Radiation Work Permit) Required

Blank defaults to Y.
N or Y valid (N-NO, Y-YES)

NOTE: N requires Health Physics Engineer approval.

8.11.1.19 Performed in Conditions:

Used to identify those conditions for which the subject activity can be performed. Codes Ø-8 are valid. Following codes are valid:

Ø - No special conditions required
1 - Power operations
2 - Startup
3 - Hot Shutdown

4 - Cold Shutdown
5 - Refueling
6 - Component Shutdown Required
7 - System Shutdown, Plant Unrestricted
8 - System Shutdown, Plant Restricted

NOTE: Codes 6-8 above are used to further amplify codes 0-5 above. If codes 6-8 are used this should signify that performance of the subject surveillance activity requires inoping the system/component.

8.11.1.20 Special Requirements:

Blank valid. Any special requirements amplifing inoperable system requirements or the required in condition codes. Any 130 character field is valid.

8.11.1.21 Remarks:

Blank valid. Any amplifing remarks may be entered in this field as is in 8.11.1.20 above. Any 130 character field is valid.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

10.1 Completed Surveillance Check Sheets, or log, or surveillance test procedures with attached Scheduled Activity Work Sheet shall be filed by the Plant Administrative Coordinator in accordance with Reference 11.8.

11.0 REFERENCES

11.1 ANSI N18.7-1976, Administrative Controls for Nuclear Power Plants. Section 6.4.

11.2 SP12.ØØ6.Ø2, Station Procedures - Control and Distribution

11.3 SP12.Ø13.Ø1, Maintenance Work Request

11.4 SP12.Ø12.Ø1, Radiation Work Permit

11.5 SP12.ØØ9.Ø1, Station Reporting Requirements - NRC

11.6 QAP-S-15.1, Site OOA Nonconformance Control

11.7 SP12.ØØ6.Ø1, Station Procedures - Preparation, Review, Approval, Change Revision and Cancellation

Enclosure 10 - 2. Maint. Proc. excerpt.

8.6 Initiating a New Preventive Maintenance SAWS

NOTE: The following steps follow the sequence of entries on the SAWS, Appendix 12.1.

8.6.1 A new PM requirement shall be initiated by filling in a blank SAWS in the following manner and submitting it to the Maintenance Engineer for inclusion in the PM program:

8.6.1.1 SECTION:

Blank invalid, must be a two character section code. The following codes are valid:

CL - Clerical	RC - Radio Chemistry
EM - Electrical Maintenance	RE - Reactor Engineering
IC - Instrument and Controls	RY - Relay
FP - Fire Protection	SG - Security
HP - Health Physics	SI - Startup Instrumentation
ME - Mechanical Engineering	SM - Startup Maintenance
MR - Meter and Test	SO - Startup Operations
MT - Maintenance	SR - Storeroom
OP - Operations	TS - Technical Support
OR - Operations Engineering	
QA - Quality Assurance	

8.6.1.2 PRIORITY:

Blank invalid. Numeric characters 1, 2 or 3 are valid.

1 - PM affects category 1 Equipment
2 - PM affects noncategory 1 Equipment but affects ... Station Generation Capability
3 - PM affects other Equipment

8.6.1.3 ACTIVITY NUMBER:

Blank invalid. Activity number is entered in the following format:

(System #) (QA Indicator) (File Code) (Component ID #) - (Sequence #)

8.6.1.4 PROCEDURE NUMBER:

SNPS Procedure number. Blank is valid or any 9 character format is valid.

8.6.1.5 A/I (ACTIVE - INACTIVE):

Blanks defaults to A. A or I valid.
A - Active (normally scheduled PM activity)
I - Inactive (All information remains on Master File, but schedule reports are not produced).

8.6.1.6 EQUIPMENT NAME:
Name assigned on component listing.
Blank is valid.
Component Identification up to 45 characters is valid.

8.6.1.7 LOCATION:
Suggested format XX-XXX-XX (Area-Elevation-Direction)
Blank is valid.
Valid area abbreviations:

AB - Aux. Boiler
CH - Chlorine House
CR - Control Room Building
CW - Circ. Water Aux. Building
DG - Diesel Generator Building
FO - Diesel Fuel Oil Xfer Bldg
FP - Fire Pump House
HB - Heater Bay
MG - MG Set Building
MT - Meteorological Tower
OA - Office Building Annex
OS - Office and Service Building
PS - Post Accident Sample Facility
RB - Reactor Building
RW - Radwaste Building
SB - Security Building
SW - Screenwell Building
TB - Turbine Building
WH - Warehouse Building
YD - Yard

8.6.1.8 ACTIVITY DESCRIPTION:
This field used to describe activity to be performed.
13Ø character field is valid.

Blank defaults to preventive maintenance.

8.6.1.9 RELATED ACTIVITIES:
This field lists any additional SAWS, Surveillance Activities, etc. required of scheduled.
Blank valid.
13Ø character field is valid.

8.6.1.10 REFERENCES:
This field lists instruction manuals, drawings, catalogs, etc. used in performance of activity.
Blank is valid.
68 character field is valid.

8.6.1.11 FREQUENCY:
Blank invalid. 9999, 999H, 999W valid.

9999 - 4 digit indicates months
999H - indicates number of hours
999W - indicates number of weeks

8.6.1.12 LAST PERFORMED:
No entry valid. This date will automaticlly be entered by the computer when completion information is entered.

8.6.1.13 DUE:
Blank invalid. Must be a MM DD YY format (YY greater then 74). If the due date entered falls on a weekend, the program will back it up to the preceding Friday.

8.6.1.14 EXTENSION DATE:
No entry valid. This date will automaticlly be calculated and entered by the computer based on due date entered and frequency of activity.

8.6.1.15 ESTIMATED MAN HOURS:
Computer based estimate on average time required for previous completions. Blank is valid. If known enter in 5 digit (9999.9) format.

8.6.1.16 SKILL:
Blank or any 20 character field is valid.

8.6.1.17 CONDITION CODES:
Blank invalid. Codes Ø-8 are valid. Up to 5 codes may be entered. (Format X, X, X, X, X)
Following codes are valid:

Ø - No special condition required
1 - Power Operation
2 - Startup
3 - Hot Shutdown
4 - Cold Shutdown
5 - Refueling
6 - Component Shutdown required
7 - System Shutdown, Plant Unrestricted
8 - System Shutdown, Plant Restricted

8.6.1.18 MWR REQUIRED (MAINTENANCE WORK REQUEST):
Blank defaults to Y
N or Y valid N-NO Y-YES

8.6.1.19 RWP REQUIRED (RADIATION WORK PERMIT):
Blank defaults to Y
N or Y valid N-NO Y-YES

8.6.1.20 W.E. AUTH. REQUIRED (WATCH ENGINEERS AUTHORIZATION):
Blank defaults to Y
N or Y valid N-NO Y-YES

8.6.1.21 SPECIAL REQUIREMENTS:
This field is used to identify spare parts, materials, special tools or actions required to perform this activity.
Blank or any 150 character field is valid.

8.6.1.22 TERMINATION TIME, DATE:
No input valid - termination time and/or date can be specified by the Watch Engineer or his designee when the equipment is released for work to establish limitations on amount of time equipment can be out of service.

8.6.1.23 WATCH ENGINEER AUTHORIZATION/DATE:
No input valid - Watch Engineer or his designee completes this entry when the equipment is released for work.

8.6.2 New PM Activities shall be reviewed and signed by the appropriate Section Head or his Designee.

8.6.3 Following approval of the appropriate Section Head, the completed SAWS should be to the PAC for incorporation into the Preventive Maintenance Program and filing in accordance with Reference 11.1.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

10.1 Maintenance History Form or Instrument Record History Card completed by the Leadman (when applicable).

10.2 Copy 1 of the SAWS, Maintenance History Form, and Procedure Checklists (as applicable) filed by PAC in accordance with Reference 11.1.

10.3 PM performance data entered into the Preventive Maintenance Program records.

10.4 Data Process completed by PAC.

11.0 REFERENCES

11.1 ANSI 45.2.9. - 1974, Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants

11.2 Reg. Guide 1.33, 11/72, Quality Assurance Program Requirements

11.3 ANSI N18.7-1972, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants

12.0 APPENDICES

12.1 SPF 12.Ø15.Ø1-1, Scheduled Activity Work Sheet

12.2 SPF 12.Ø15.Ø1-2, Manually Reported Preventive Maintenance Schedule