

**NAVSHIPS 900,719**

# **PREVENTIVE MAINTENANCE**

**SECTION 6**



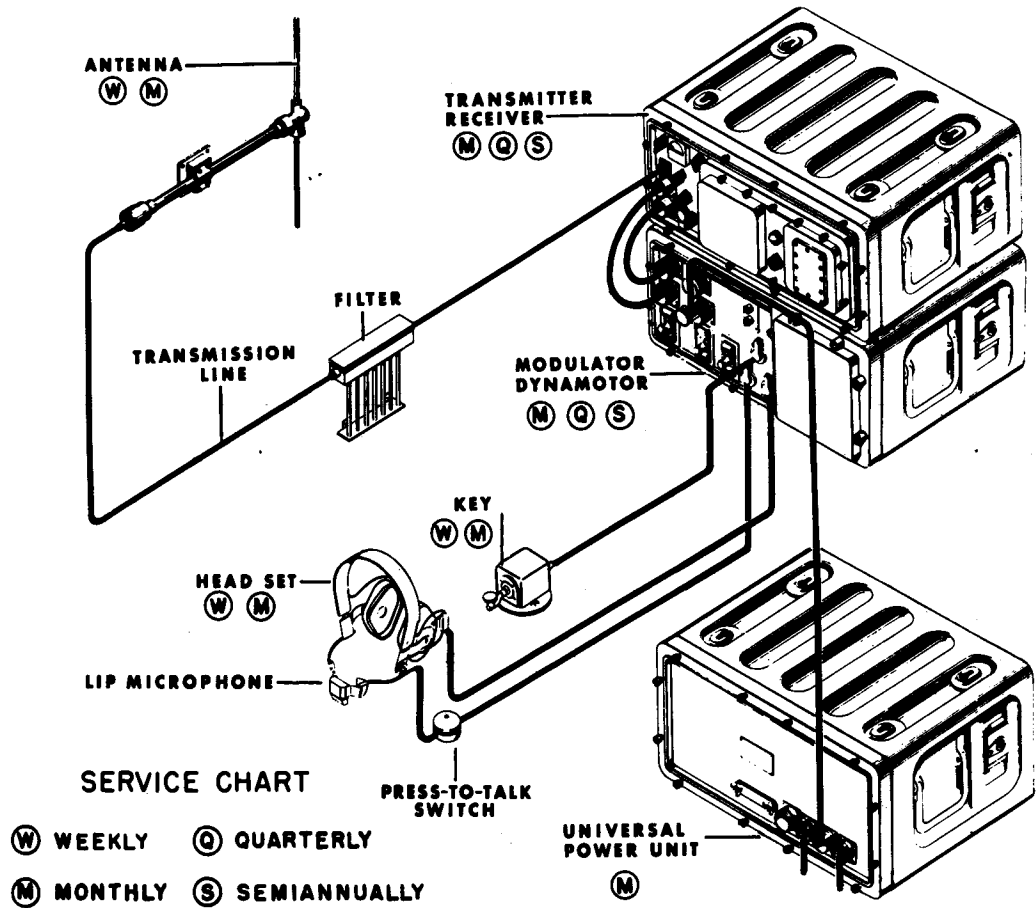
# **M-A-R**

**RADIO TRANSMITTING AND  
RECEIVING EQUIPMENT**

**RESTRICTED**



# SERVICING MAR EQUIPMENT



The purpose of preventive maintenance is to disclose or remedy minor irregularities in equipment appearance and operation as a means of minimizing equipment breakdown. Most maintenance of this type consists of periodic visual and auditory inspections wherein slight physical changes and unusual symptoms are evaluated and corrected to prevent major troubles. Systematic inspection and adjustment, as outlined on the following charts, will be reflected in greater efficiency and prolonged life of equipment.

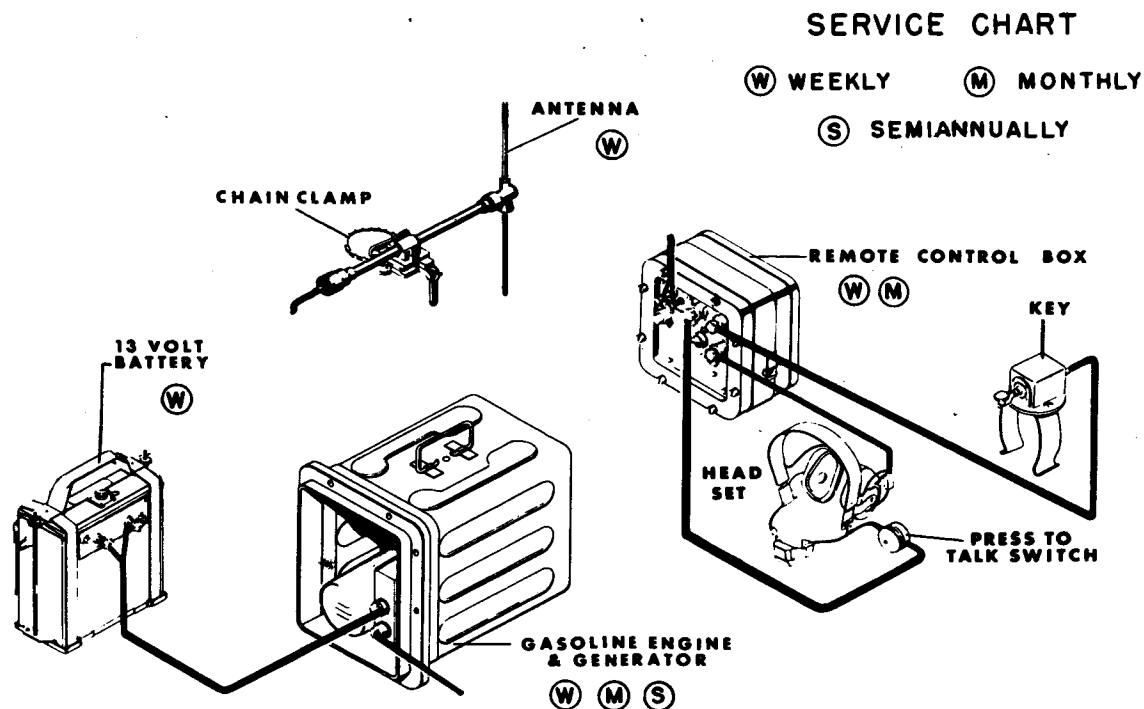
Tube maintenance requires mainly that clamps be kept tight and that tubes be checked regularly. Tube failure is generally signalled by a gradually decreased efficiency and tubes should be replaced at any evidence of deterioration rather than waiting for burnouts.

While all cables and connectors have been designed to withstand abuse of all kinds, age, accidents, or severe operating conditions may cause slight visible damage which might develop into actual breakdown of the wiring. The operations outlined in the chart are intended to aid the technician in locating potential sources of trouble.

Since design of a suitable wide-band antenna system at ultra-high frequencies is more critical than at the lower frequencies, the maintenance of the system at peak efficiency is, therefore, more important. The procedure on antenna maintenance should be followed carefully to insure satisfactory radiation.

The remote control unit, in a sense, may be considered as "emergency" equipment since it serves to extend control of the MAR units to some necessary remote operating point. Its performance then becomes doubly important but, because it is not in constant use, it is the piece of equipment most likely to be neglected or overlooked until required. Maintenance of this unit, should not be slighted.

Because of the type of construction employed in the MAR components, dust and dirt will constitute a minor problem. The sealed cases keep the equipment free of dust which, otherwise, at ultra-high frequencies, might be an important maintenance chore. The few items requiring such attention are enumerated separately under the relevant equipment headings.



# PREVENTIVE MAINTENANCE CHART

## WEEKLY CHECK

### ANTENNA

Check all mounting bolts, or clamps for rigidity.

Check radiating rods for damage and tightness.

Check coaxial connectors on transmission line for tightness.

Check coaxial transmission line cable to insure that its position has not been changed accidentally to where it is parallel to radiating rods within a distance of five feet.

### GAS ENGINE GENERATOR

Tighten all bolts, making certain grounding strap is tight.

Wipe off magneto lead to spark plug and tighten connections.

Keep all wiring from contact with oil, water or grease.

Inspect starting cord. Replace if frayed or worn.

Inspect muffler to make sure exhaust holes are not clogged. Stoppage of these holes with mud or other foreign matter may cause overheating or render engine inoperative.

GAS ENGINE  
GENERATOR

If generator is used under dusty conditions, remove end cover and blow all dust and dirt from brushes and commutator.

Clean end cover ventilating louvers and fan blade of any foreign matter.

Inspect control box interior and wipe or blow dust from interior.

Inspect contacts of reverse current relay for burning or pitting. Clean with fine sandpaper if rough or smooth with fine file if badly pitted.

## STORAGE BATTERIES

Check specific gravity of electrolyte and charge batteries if below gravity specified for operating conditions. (Replace caps.)

Maintain electrolyte level in battery, by adding distilled water to cover plates at least one-quarter inch.

Inspect battery case for cracks. Clean terminals of any corrosion and coat lightly with grease or vaseline.

Wipe off top of battery, making sure vent holes in filler caps are open.

## CABINET CLAMPS

If used, tighten knobs. finger-tight.

HEADSETS, KEYS,  
AND MICROPHONES

Inspect cords and plugs for wear or cracks.

Test microphones and phones in operation. A unit that produces any clicks or crackling sounds when its cord is moved or shaken should have its cord replaced.

Press-to-talk switch should operate evenly and smoothly and should close relay circuit before "bottom" is reached. Replace, if otherwise.

REMOTE CONTROL  
UNIT

Wire to remote unit, if used, should be traced for signs of maltreatment or breakage.

## MONTHLY CHECK

**TRANSMITTER-  
RECEIVER****MODULATOR-  
DYNAMOTOR****UNIVERSAL  
POWER SUPPLY**

Remove chassis of each unit from case and visually inspect all resistors and capacitors for signs of any spots, discoloration, bulging, or leakage. This indicates deterioration or a possible, partial breakdown, and such components should be checked for deviation from their design values. Circuits involved should also be checked.

An area of discolored or oxidized metal near a component may also indicate overheating.

Brown or charred insulation is an obvious warning and all components in the circuit should be checked for causes.

With chassis accessible, see that fuses and clamp-type resistors are secure in clamps and that clamps are tight.

While chassis is out of case tighten all bolts and nuts.

Tighten all terminal strip mounting bolts and all connections to strips.

Rotate Silencer and Output Level knobs to insure that wiping arm is not loose and is making firm contact.

Rotate arm of filament rheostat to wipe off possible oxidization and to make certain wiping arm is making firm contact.

Inspect silica gel units clipped in bottom of cases and replace if drying material, viewed through mica window, shows pink color.

Tighten vibrator hold-down clamps.

Touch unit cases after extended period of operation to discover if any unit is overheating. Due to sealing of unit cases, no tell-tale odors or smoke will be given

**TRANSMITTER-  
RECEIVER**

off and touch test is advisable. If any case gives evidence of overheating (all cases will be to some extent), remove from service and consult Section 7.

**MODULATOR-  
DYNAMOTOR**

Insert proper plug in each jack for test of rubber seal around plug. Looseness indicates worn seal and replacement is necessary. See that hinge cover fits snugly with plug removed.

**UNIVERSAL  
POWER SUPPLY**

Inspect rubber gaskets under metal panel covers for breaks or excessively deep ridges.

Inspect rubber gaskets behind panels for possible leakage or excessively deep ridges.

Tighten setscrews on all knobs and pointers.

Tighten all panel cover bolts.

Rotate wafer switches to wipe off possible oxidation. If contacts remain discolored or oxidized, rotate switch with piece of heavy paper between contacts, cleaning afterward with carbon tetrachloride.

Tighten all selector bolts and bolts holding selectors to chassis.

Tighten all bolts holding motors in place.

Inspect rubber mounts on dynamotor for any appearance of cracking.

Tighten grounding straps.

Listen for any bearing trouble, usually indicated by grinding noises, knocking, or repeated thumps.

Inspect all flexible rubber sheaths around switches for cracks or breaks.

Check cables at points of attachment to connectors for evidence of cracks or breakage of rubber seal that may develop into damage to cable wiring. If cracks are present, repair by replacing rubber seal.



**TRANSMITTER-  
RECEIVER**

Inspect all connectors, male and female, for dust or dirt between pins or in holes. Remove with air blast, carbon tetrachloride, or with small brush.

**MODULATOR-  
DYNAMOTOR**

Inspect all male connectors and receptacles for broken or loose pins. Replace, since repair is impossible.

**UNIVERSAL  
POWER SUPPLY**

Inspect plug pins for corrosion, particularly clips on cables to batteries, if used. Clean with crocus cloth or fine sandpaper. (A rubber eraser, with a hole bored in it, twisted around a pin several times makes a good cleaner. Use carbon tetrachloride afterwards.)

**TUBES**

Check all tubes in a transconductance type tester, if possible. Tubes 829B, 9003, and 2C39 must be checked on this type tester but the other tubes may be checked on an emission tester, if necessary. Remove tubes one at a time when testing to be certain each tube is replaced in same socket from which removed. Interchanging of tubes with same number will probably unbalance one or more stages, requiring re-alignment. Replace any tube registering below normal in tests. If emission tester is used and a tube checks normal but will not function in set, replacement is necessary.

Tube clamps are of several types and each should be tightened carefully. Bayonet-type tube shields should be turned clockwise to tighten. This shield clamps tube in place by spring under shield.

The cord and spring over the top of the 829B tube should be inspected for looseness. If the spring is weak, replace it. The cord should be replaced if there is any evidence of wear or fraying.

**ANTENNA**

Inspect plugs and receptacles for dust or dirt. Clean with air blast, carbon tetrachloride, or small brush.

Wipe off insulator at base of "live" radiating rod.

**HEADSETS, KEYS,  
PRESS-TO-TALK  
SWITCH**

Inspect headset and key seals for cracks or breaks in rubber. Make sure clamp around key operating arm is tight.

REMOTE CONTROL  
UNIT

Remove batteries and if terminals are discolored sand lightly with fine sandpaper. Sand battery-holding contacts, also, if discolored.

Test voltage of batteries with hummer operating and then disconnected. If voltage shows a decided dip, replace batteries. In any event, replace batteries every two months.

If remote unit is not connected, see that key, microphone, headset, and press-to-talk switch are in carrying case. Test each in operation.

GAS ENGINE  
GENERATOR

Tighten all bolts and grounding strap.

Clean gasoline strainer by removing fuel line valve from tank and washing in clean gasoline. Use air blast if washing does not remove sediment.

Clean carburetor float bowl by removing drain plug in bottom of bowl.

After engine is thoroughly warmed up, and while operating radio equipment from engine generator, measure output of generator with voltmeter. If less than 13.3 volts adjust rheostat on control box of generator. The shaft of the rheostat is covered by the acorn cap on the side of control box toward the engine. Remove cap and adjust rheostat by inserting screwdriver in slot in shaft. Replace cap after adjustment is made.

Test magneto output by removing shield and cable from spark plug. Holding cable by insulation to avoid shock, turn engine over with starting rope. If end of cable is held one-eighth inch from metal body of plug, a spark should appear in the gap. No spark indicates need to check magneto output if cable is undamaged. Refer to Section 7 for magneto servicing details.

Remove spark plug after approximately 50-hours operation and examine porcelain. Discard plug if porcelain is cracked, and replace with new plug and gasket from spares. If plug points are fouled, clean and reset points to 0.020 inches.

GAS ENGINE  
GENERATOR

Remove head after approximately 50 hours operation and clean carbon from head, cylinder, piston, and valves. The presence of heavy carbon deposits is evidenced by difficulty in starting and by pounding or knocking under load.

Adjust valve clearance and grind valves after approximately 75 hours operation.

Remove air cleaner filter cartridge and inspect after every 50-hour period. If dirty, replace with new cartridge from spares. Replace oftener under unusually dusty or dirty operating conditions.

Inspect for wear or possible leaks in rubber gasket on door seal of carrying case. Repair or replace if seal is not perfect.

Inspect and clean voltage-regulating rheostat in control box.

Remove end bell housing of generator and inspect commutator while in operation under load.

Remove brushes and inspect. If pitted, chipped, or worn, replace with new brushes of proper polarity.

Brushes should be at least  $3/8$ " long to make good contact. If short, replace. When removing brushes for inspection make certain each brush is returned to same holder and is in same position as when removed. Polarity marks must correspond.

Inspect commutator surface. A smooth, reddish-brown appearance is normal and commutator should not be touched. If surface is rough or dirty, sand lightly with fine sandpaper while unit is operating.

Using a fine brush or soft wood stick, clean commutator grooves of any dust or foreign matter.

A grooved or worn commutator calls for replacement of generator unit from spares, and overhaul of old unit.

**GAS ENGINE  
GENERATOR**

Excessive brush sparking at commutator or chattering of brushes will result in damage to commutator surface. Check for broken brush spring or brush stuck in holder. Replace with new generator unit from spares and overhaul old unit if brushes are not the cause of the trouble.

Brush-holding springs should be firm and of such length as to maintain sufficient pressure on brushes. If weak, replace. If stranded wire shunt inside brush holders is broken, or if most of fine wires are broken, replace brush.

If any oil is noted inside fields or on armature, this indicates oil seal has broken down. Remove generator and clean to prevent damage to unit. Then replace oil seal with one from spare stock. Refer to Section 7 for instructions on dismantling generator and engine.

**JUNCTION BOXES**

Inspect cables and plugs for wear or cracks in cables and plugs.

Clean plugs with fine sandpaper if oxidized.

Remove all plugs and see that hinge caps fit snugly.

Insert proper plug in each jack for test of rubber seal around plug. Looseness indicates worn seal, and replacement is necessary.

Make test of remote microphone and headset by operation from junction box remote from transmitter.

**SHOCKMOUNTS**

Put drop of oil on each pointed pin at rear of slides and clamping screw to insure ease of operation.

Check all bolts and nuts for tightness. No movement should take place at any point in shockmount base when cases are rocked back and forth.

**SPARES**

Check number of spare parts and order all components necessary to bring stock up to prescribed quantities.

Test all spare tubes for quality.

## QUARTERLY CHECK

SELECTOR  
MECHANISM

Test for gear backlash by turning various shafts by hand. If excessive, replace gears involved.

Inspect gears visually for signs of wear. Replace if wear is noticeable. Lubricate as indicated in chart, page 6-12.

DYNAMOTOR AND  
MOTORS

Brushes in all motor units (dynamotor, blower, and tuning motor) should be removed and inspected for scoring or pitting. It will be necessary to remove dynamotor from chassis to allow of removal of end covers of this unit. If brushes are pitted, excessive sparking at commutator is indicated. Replace entire unit with component from spares and repair as described in Section 7.

All brushes should be at least  $3/8$ " long to make good contact. If short, replace. When removing brushes for inspection make certain each brush is returned to its holder and is in same position as before removal. Polarity marks must correspond.

Brush holding springs should be firm and of length to maintain sufficient pressure on brushes. Replace, if weak.

## JUNCTION BOXES

Remove junction box covers. Inspect cover seals. Tighten terminal screws holding wiring. Use sandpaper to remove any corrosion.

GAS ENGINE  
GENERATOR

Check magneto point setting after approximately 200 hours of operation. Set to 0.020 inches. See Section 7 for servicing details.

Place drop of oil on felt oil wick under bearing pin of magneto breaker arm.

Test compression by turning engine over slowly and noting resistance of compression stroke on alternate revolutions. If resistance is not noticeable, compression is poor, denoting worn rings, leaky gaskets, or defective valves. Overhaul of engine is remedy. In any event, engine should be taken down and overhauled every 300 hours of operation. (Refer to Section 7.)

## SEMIANNUAL CHECK

TRANSMITTER-  
RECEIVER

Check sensitivity and selectivity of receiver. Realign as described in Section 7 if output is below standard.

MODULATOR-  
DYNAMOTOR

Remove dynamotor, blower, and tuning motor for overhaul and repair as described in Section 7. Replace with spare units.

GAS ENGINE  
GENERATOR

Remove generator for inspection and overhaul.

Overhaul gas engine as outlined in Section 7.

## LUBRICATION CHART

## SELECTOR MECHANISM

Lubricate every three months.

To lubricate parts accessible from the front:

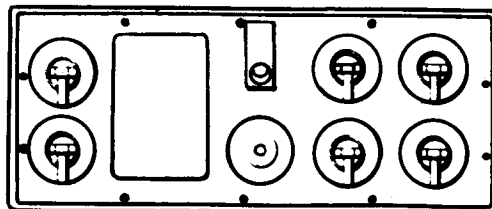
Remove cover of selector panel.

Withdraw crystal oven from jack plate.

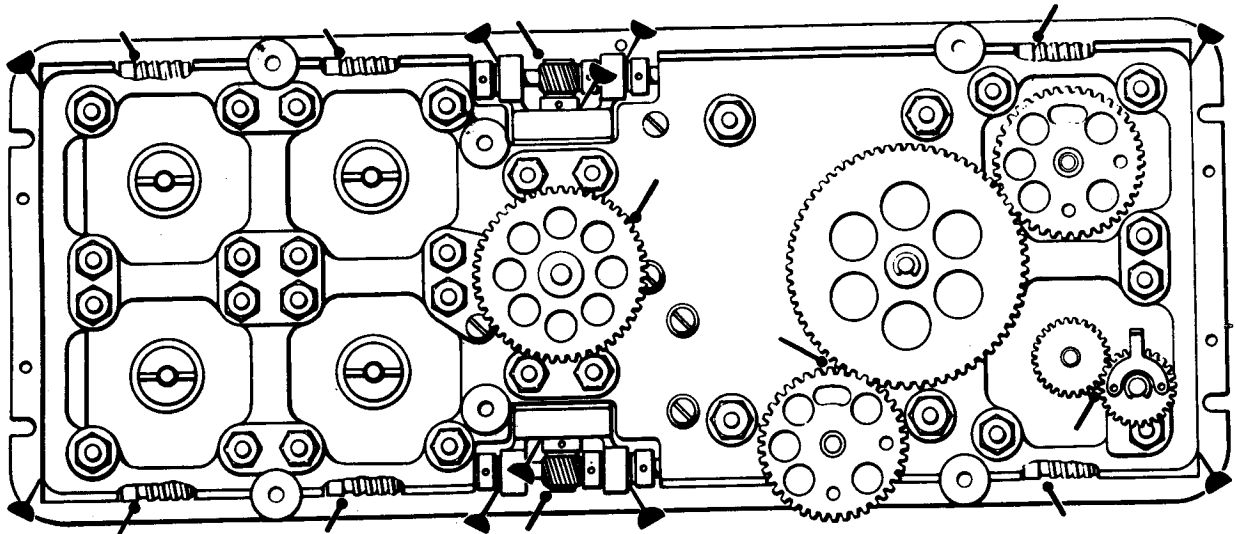
Remove pin from channel switch coupling and remove coupling. Care must be taken in driving out pin so as not to bend shaft.



Remove switch mounting nuts and lockwashers.

Remove screws holding panel and lift panel over selector dials.



Rear view of selector mechanism showing parts to be lubricated:



LUBRICANT	GREASE	OIL
NAVY TYPE NO.	PD-535-A	N.S. 2190-T
NAVY STOCK NO.	14-G715	14-O-2879
COMMERCIAL DESIGNATION	SOCONY VACUUM 08-1350	SAE-20 5 Gal.
LEGEND		
USE	WORMS AND GEARS	NEEDLE AND BALL BEARINGS

Apply grease (PD535A) to such gears and worms found accessible from the front. Balance of gears may be reached from top and bottom of chassis through holes in frame. Apply grease to miter gears on antenna compensator and antenna coupling mechanisms. Gears located in transmitter section should also be greased sparingly.

Using an oil can, apply oil to bearing surfaces and bearings indicated.

It is advisable to place the chassis so the axis of the bearing being lubricated is in a vertical position so oil will run into bearing. Avoid flowing oil over non-friction surfaces.

**NOTE:** Do not lubricate interior of selector switch drums.

